City and Borough of Juneau Docks and Harbors Department

AURORA HARBOR REBUILD

GEOTECHNICAL REPORT

PREPARED FOR

PREPARED BY:

P N D

ENGINEERS, INC.
9360 Glacier Hwy, Ste. 100
Juneau, Alaska 99801

October 2013

PND 122055.01

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Charles R. Somerville
10/18/13
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1.0 Introduction

1.1 Purpose and Scope

The City and Borough of Juneau, Docks and Harbors Department (CBJ) is planning improvements to Aurora Harbor in Juneau, Alaska to enhance moorage and accessibility. This report presents the findings of a secondary geotechnical investigation performed in support of a design for reconstruction of Aurora Harbor.

Reconstruction of Aurora Harbor will take place in several phases as project funding becomes available. Construction of Phase 1 is scheduled to begin in the fall of 2014 and will consist of:

- Demolition and disposal of all timber floats, timber piles, and utilities from the south approach dock up to and including D float, with the exception of the gangway landing float at C float approach dock and the private float and gangway at the south approach dock
- Demolition and disposal of the south and C float approach docks
- Installation of new timber headwalk, mainwalk, and finger floats with new steel float anchor piles
- Construction of new C float and south approach docks
- Installation of new utilities including potable water, sewer pump-out stations, and electricity

Further reconstruction of Aurora Harbor will likely consist of similar improvements. See Appendix A for the master plan with all scheduled and future anticipated improvements.

The purpose of this report is to present and summarize characteristics of the marine sediments in the vicinity of Aurora Harbor based on the records of past projects. No additional field investigations were performed as part of this study. Knowledge derived from this research provides information for the anchor pile design of the float infrastructure and support pile design of the approach docks. The sediment conditions established from this research provides the contractor with information to determine the appropriate methods and means for installing the piles and harbor improvements.

1.2 Authorization

PND Engineers, Inc. (PND) received formal Notice to Proceed with this investigation under CBJ Contract DH12-160 on August 22, 2012.

2.0 Physical Setting

2.1 Site Geography and Background

Aurora Harbor is located in Juneau, Alaska, 58°18'N/134°26'W and within the greater surrounding region of the southeast Alaskan Panhandle, a region of deeply incised waterways and numerous steep, mountainous, and densely forested slopes with topographic elevations reaching from tide water rapidly upwards to over 4,000 feet. A popular cruise ship and tourist destination, Juneau is accessible only by air or sea – no highway provides access to the rest of Alaska or to the bordering Canadian provinces. Juneau is approximately 900 air miles from Seattle, Washington and approximately 570 air miles from Anchorage, Alaska. See Appendix A, sheet 1 for the vicinity location map.

Figure 1: View of the Downtown Juneau waterfront.

Aurora Harbor, Juneau's largest downtown district harbor, was built in the 1960's and is located approximately one mile northwest of downtown Juneau adjacent to both Egan Drive and Gastineau Channel. The harbor is protected on its northwest and southeast sides by jetties. A detached rubble-mound breakwater and wave barrier extends along the southwest face of the harbor, parallel to Gastineau Channel.

The original Aurora Harbor project, then referred to as Juneau Small Boat Basin No. 2, was adopted in 1958. The initial design called for a 530-foot (ft) rubble-mound jetty and 1,150-ft detached rubble-mound breakwater. These were lengthened in the design stage to 670 ft and 1,500 ft, respectively. The detached breakwater was also altered from a rubble-mound to a composite rubble-mound and piling/plank design due to unstable soil conditions (Ward 1988).

Figure 2: Aurora Harbor viewed from the south

Construction of Aurora Harbor began in 1962 with the rubble-mound north jetty. The 19-acre basin was dredged in 1962-'63 to bottom elevations of between -12 ft mean lower low water (MLLW) and -14 ft MLLW. Dredge spoils were used as blanket material for the detached breakwater and wave barrier, constructed in 1963-'64. The parking area and site of the Juneau Yacht Club immediately north of Aurora Harbor is also partially constructed of dredge spoils.

The first float infrastructure was installed in 1964 and included the south approach dock, headwalk float (up to the northern-most mainwalk float installed during this project) and the six southern-most mainwalk floats. In 1968 the headwalk float was extended north and a seaplane float was added. The seaplane float was relocated to the north side of the fill on which the existing Juneau Yacht Club sits in 1974. The headwalk float was again extended, this time to the north end of the harbor where an additional approach dock was constructed. Two additional mainwalk floats were installed in place of the relocated seaplane float. An additional mainwalk float was added to the extreme north end of the harbor in 1975.

Figure 3: Detached breakwater protecting west side of Aurora Harbor along Gastineau Channel

In the 1980's the City and Borough of Juneau began developing plans for expanding Aurora Harbor further into Gastineau Channel. The plan called for removal of the existing detached breakwater, extension of the north and south jetties using salvaged material from the detached breakwater, installation of a floating breakwater further offshore, and extension of the existing mainwalk float infrastructure. A geotechnical investigation was performed for this project, however construction never occurred.

Figure 4: Aurora Harbor south approach dock

2.2 Site Conditions

Aurora Harbor is currently comprised of 12 mainwalk floats extending from a long headwalk float and has a capacity of nearly 500 vessels of various lengths up to 100 ft. There are also 21 covered float houses that provide moorage for about 40 vessels.

The harbor is accessed through two main uplands areas. The first is on the southeast end of the harbor near the Harbormaster's office. The second is a narrow road and parking area stretching along most of the northwest side of the harbor before ending at the Juneau Yacht Club on the north end. All uplands areas are at an approximate elevation of 22 ft MLLW and relatively flat before sloping down at roughly 3H:1V (horizontal:vertical) to the bottom of the dredge basin where elevations range from -14 ft to -16 ft MLLW.

Figure 5: Failed timber retaining wall under north approach dock

Fresh water is supplied to the harbor from the uplands near the south approach dock and harbormaster's office. Electric and communication utilities are supplied to floats via conduit-encased and overhead wire.

The majority of the Aurora Harbor float infrastructure is 40 to 50 years old and is generally in poor condition. The south timber approach dock and retaining wall has deteriorated significantly to the point of being unsafe for vehicular traffic. The timber retaining wall beneath the north approach dock has failed. Timber and concrete floats show substantial rot and deterioration and are sinking. All gangways except for the one connecting the south approach dock to the headwalk float are less than ten years old and are in good condition. The north approach dock and H float gangway approach dock are in fair condition, as are the surrounding uplands areas.

2.3 Regional Climate

The coastal communities of the Juneau–Douglas region experience typical southeast Alaska temperate rainforest/maritime climate conditions consisting of small temperature variations, high humidity, and heavy precipitation.

Figure 6: Taku Winds gusting down Gastineau Channel.

Subregions within Gastineau Channel including downtown Juneau can be subjected to wind channeling due to the channel's characteristic physiography. Significant seasonal variation in wind direction and velocity occur with strong southeast or northwest wind conditions possible at any time of the year. In addition, the downtown Juneau-Douglas area can be subjected to gusty, easterly winter winds, a phenomenon known locally as Taku Winds. The wind gusts often originate when strong high pressure systems in the northern interior regions of both Alaska and Canada stall with coincident low pressure systems simultaneously developing to the southern off-shore regions. Strong pressure gradients subsequently develop that generate extreme gusty winds that funnel down east-west trending, narrow coastal mountain valleys and inland waterway passages occasionally causing destructive impacts to local structures. Wind gusts in excess of 100 miles per hour have been experienced in downtown Juneau.

The tidewaters surrounding the Juneau Borough are susceptible to storm surges when strong southeast winds occur concurrently with extreme high tides. An example of this situation is the 1984 Thanksgiving Day storm where an extreme high tide coincided with unusually strong winds that generated waves large enough to impact structures and the surrounding harbor facilities.

Tidal information for the Juneau area obtained from the National Oceanic and Atmospheric Administration (NOAA), National Ocean Service Bench Mark Data sheets, Station No. 9452210 is as follows:

Table 1: Tidal Information for Juneau

Highest Observed Water Level	+24.6 ft
Extreme High Water (EHW)	+23.2 ft
High Tide Line (HTL)	+20.8 ft
Mean High Water (MHW)	+15.4 ft
Mean Low Water (MLW)	+1.6 ft
Mean Lower Low Water (MLLW)	0 ft
Lowest Observed Water Level	-5.5 ft

Climate summaries for temperature and precipitation variation recorded from the downtown Juneau weather station are provided in Appendix J.

2.4 Regional Geology

Southeast Alaska is situated on the outer margin of the North American Cordillera, an extensive coastal mountain range extending along the western edge of North America from Southern California to the Alaskan Peninsula. The Corderillian Range is composed of numerous rugged interconnected mountain ranges which are the product of the tectonic interaction between the North American and Pacific plates. The existing geology of southeast Alaska bears evidence of volcanic activity, igneous intrusion, uplift, sedimentation, and glacial scouring.

Glacial isostatic rebound of the regional land surface is typical in the area. It manifests in recent land emergence in the form of raised marine terraces, raised beach and intertidal delta deposits and wave-cut benches common throughout the entire region. Much of the region within southeast Alaska has experienced varying rates of isostatic rebound. The published current regional uplift rate for Juneau is approximately 0.5 inches per year (Freymueller et al, 2008). Figure 7 shows contoured current uplift rates for southeast Alaska.

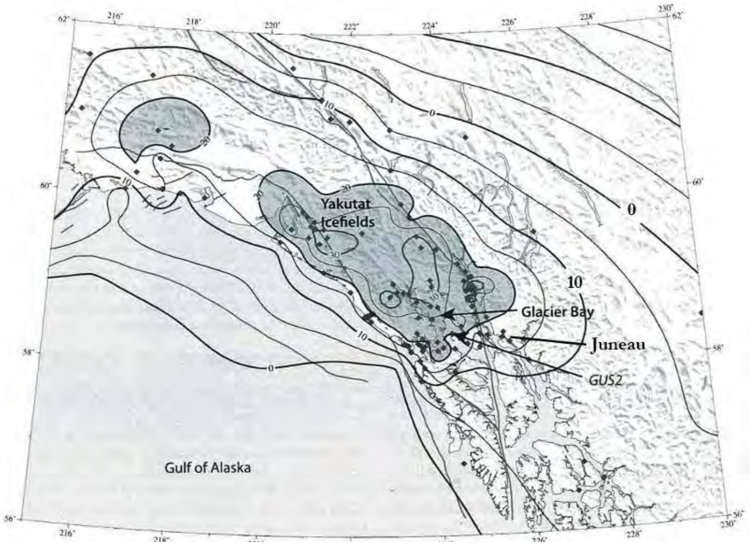

Figure 7: Contours showing current uplift rates in millimeters per year in the vicinity of Juneau. Modified from Freymueller and others, 2008.

The region is noted for its steep mountains, islands and extensive fjords which were carved during the ice ages of the Pleistocene epoch (10,000 to 1 million years ago). Major fjords in the region run southeast to northwest with numerous lesser fjords and valleys cutting obliquely to the northeast. This orientation is the result of tectonic movement noted above and the later glacial scouring of the broken rock along the fault zones which created the existing channels. Local examples of this alignment include Gastineau Channel and Lynn Canal.

Field mapping of the surficial deposits surrounding the Juneau/Douglas areas with emphasis on earthquake and other geologic hazards was performed with the results published in the report *Surficial geology of the Juneau urban area and vicinity, Alaska, with emphasis on earthquake and other geologic hazards* (Miller 1972). This report provides an invaluable reference to primary physical characteristics of the deposits specific to engineering applications and is the most complete and comprehensive within the area. Limited references to the bedrock characteristics in the vicinity of the harbor area are also discussed. Much of the following site conditions are summarized in this report.

Aurora Harbor sits at the lower western slope of Mount Juneau which rises from the tidewaters of Gastineau Channel to a peak elevation of approximately 3,500 ft. The steep upper slopes of Mount Juneau are considered inherently unstable and prone to gravity-induced mass wasting processes. The steepness of the mountain slopes, rock type and the inner structural discontinuities develop weak zones within the rock resulting in loss of shear strength and loosening of the rock along the discontinuities. Slope instability may be exacerbated by the response to stress release continuing today from the last retreat of the enormous volumes of glacial ice that once covered the region (Miller 1972).

The most evident example of slope instability on Mount Juneau is an enormous prehistoric rock slide avalanche on its southern slope. The rock slide crossed the Gold Creek valley, a major drainage emptying into Gastineau channel near downtown Juneau, and rose more than 180 ft on the opposite side of the drainage, settling back on a bedrock ridge that connects a prominent bedrock knob, Mount Maria, directly to the ridge of Mount Roberts. The debris load from the rock slide was so large that it dammed the Gold Creek valley causing a lake to form. Debris from the rock slide along the Gold Creek valley is considered to be at least 38 ft thick and so massive that the rock fragments can look like bedrock knobs with surrounding surficial overburden. On the upper slopes near Mount Maria, the scattered rock fragments form a deposit 300 ft wide (Miller 1972).

Overburden found within the immediate Aurora Harbor vicinity is a composite of man-made fill, mass wasting slope deposits, alluvial/deltaic deposits, native marine intertidal deposits and glaciomarine deposits. Gold Creek, which drains Silver Bowl Basin, is the location of a large alluvial fan and intertidal delta contributing sediment to the vicinity just south of the project site. Glaciomarine deposits commonly consist of extensive horizons of very hard/dense sediment classified as diamicton. This material is typically comprised of course-grained sands and gravels, up to cobble and boulder sized, along with abundant marine fossils all hosted within a fine-grained cemented matrix of silt and sand (Miller 1972).

Bedrock in the immediate vicinity of the investigation site includes various volcanic and sedimentary units that have undergone varying degrees of metamorphism. The site borders a region where the bedrock increases in metamorphic grade from little to no metamorphism on Douglas Island to increasingly higher metamorphic grades to the northeast of Juneau. The primary rock types mapped on the slopes of the immediate vicinity include metavolcanic and metasedimentary rocks that range in metamorphic grade from slate to phyllite to greenschist. In addition, igneous mafic dikes are commonly found intruding the metamorphic rocks. Both ductile and brittle forms of structural deformation have been locally imposed on the bedrock (Miller 1972).

2.5 Regional Seismicity and Seismic Hazards

Juneau is in an area of moderate seismicity because of the close proximity to four known faults: Queen Charlotte-Fairweather Fault, Chatham Strait Fault, Denali Fault, and the Transition Fault. These four faults present the known seismic hazards to Juneau and the surrounding communities. Wesson et al (1999) found that these four faults would yield maximum moment magnitude (M_w) earthquakes of 7.8 to 8.2 for their maximum recurrence intervals. These ranges are consistent with the larger historic earthquakes that have previously been documented or recorded in the Juneau area (Brockman et al, 1988). Many earthquakes of M_w of 5.0 or less are fairly common to southeastern Alaska though present low hazard to the project site. See Table 2 below for estimates of slip rates for the aforementioned faults.

Table 2: Estimated Slip Rates of Known Faults in the Juneau Area

Fault	Slip Rate, in./yr (mm/yr)
Queen Charolette-Fairweather	2.3 (58)
Chatham Strait	2 (52)
Denali	0.08 (2)
Transition	0.4 (10)

A plot of the seismicity of southeast Alaska (between 1898 and 2005) is found in Figure 8.

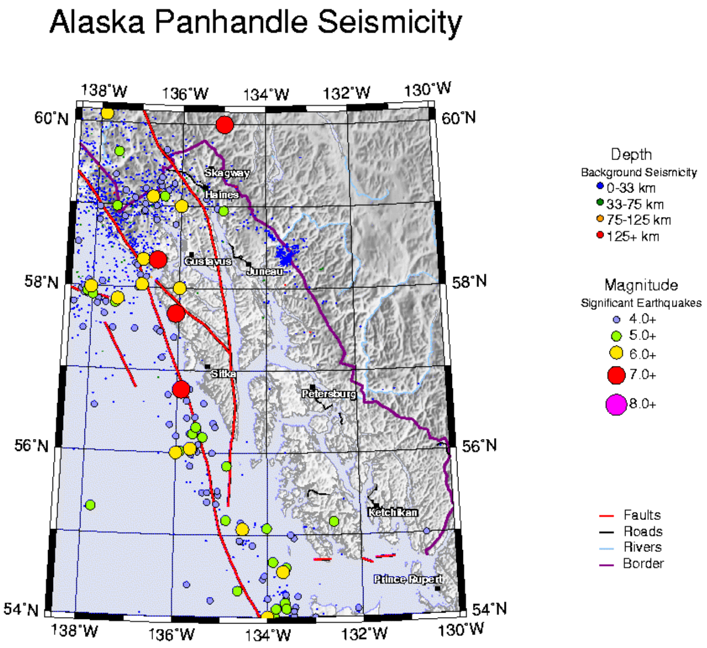

Figure 8: Map showing the main faults within southeast Alaska and seismic activity between 1898 and 2005 (Alaska Earthquake Information Center).

Aurora Harbor is also subject to damage from avalanches. The CBJ Urban Avalanche Response Plan designates the southern half of Aurora Harbor as Avalanche Zone B, and states that a 100 to 300 year event could cause damage within Aurora Harbor. While not a direct seismic hazard, a small seismic event could potentially induce a large, destructive avalanche.

3.0 Records Research

3.1 Geotechnical Investigations

3.1.1 Juneau Small Boat Basin No. 2, 1961-'62

The Unites States Army Corps of Engineers (USACE) performed a geotechnical investigation at the Aurora Harbor site, referred to in the project documents as Juneau Small Boat Basin No. 2. The investigation consisted of two boreholes, four test pits, and 49 probe holes and was performed prior to dredging, therefore much of the material encountered above an approximate elevation of -15 ft MLLW was likely removed during construction of the basin. Coordinates for the boreholes and test pits are provided on the logs. No coordinates are provided for the probe holes, and no site plan showing locations could be found.

Probe holes generally show a surface layer of silt/silty sand over sand/gravelly sand and finally sandy gravel/gravel. The deepest hole terminated at a depth of 71 ft (elevation -69 ft MLLW) on a "solid object" and the shallowest terminated at a depth of 7 ft (elevation +1 ft MLLW) on a possible boulder. The probe met refusal conditions on 22 occasions, with 11 noting a solid object or boulder and 11 noting gravel or no specific condition. Probing difficulty, as described in the probe logs, ranged from very easy to difficult. The surface layer of silt and silty sand was generally noted as very soft or soft and probing difficulty increased in the underlying sands and gravels. Details of probing equipment and procedures are not provided.

The two boreholes, DH-6 and DH-7, were drilled using a jet probe and sampler near the southern end of the existing detached breakwater, one on the harbor side and one on the channel side. DH-6 was drilled to a depth of 15 ft (-12.2 ft MLLW) and encountered only soft or loose silt and sand deposits. DH-7 was drilled to a depth of 33 ft (-46.5 ft MLLW) and encountered only loose silty sand. Occasional gravel and a hard, possibly metallic object were noted between 22 ft and 27.5 ft.

The four test pits were excavated along the east side of the basin near the toe of the existing slope. Depths ranged between 5 ft and 16 ft with surface elevations near +7 ft and +8 ft MLLW. The only soils encountered were silts and sands with occasional gravel. Densities were described as loose to compact.

Logs from this investigation are available in Appendix D.

3.1.2 Aurora Harbor Expansion, 1985

The USACE performed a geotechnical exploration in Aurora Harbor in 1985 for the Aurora Harbor Expansion project. This project, had it been constructed, would have extended the existing north and south jetties and moved the breakwater further west into Gastineau Channel, which would have allowed the existing mainwalk floats to be lengthened.

A total of four boreholes and eight probe holes were drilled for this investigation, most of which were just beyond the existing jetties and breakwater. Samples were obtained using standard 2-in. outside diameter (O.D.) split spoons driven with a 140-lb hammer, Shelby tubes, and core samplers. The four boreholes were drilled beyond the ends of the existing jetties (two per jetty). Boreholes DH-66 and DH-65, near the north jetty, encountered a surface layer of sands and gravels approximately 4 ft to 6 ft thick over a layer of gravel, referred to as cemented till, which continued to the end of the holes at depths of 14 ft and 20 ft respectively. DH-60 and DH-67, near the south jetty, generally encountered only loose silty sands with occasional gravel up to a maximum depth of 38.5 ft.

Probe holes were performed approximately 450 ft west of the existing breakwater and between the jetties using a 2-in. split spoon sampler and 140-lb hammer. Probes penetrated a maximum of 8.4 ft into the ocean floor and generally encountered loose and soft combinations of silts, sands, and gravels. Records from this investigation are included in Appendix C.

3.1.3 Juneau Fisheries Terminal, 1988

A geotechnical investigation was performed by PND in May 1988 for the Juneau Fisheries Terminal, immediately southeast of Aurora Harbor and north of Harris Harbor. This project included enclosing the south Aurora Harbor jetty with sheetpile bulkheads, dredging the existing basin, and general uplands improvements. A total of 11 test holes were drilled in the south Aurora Harbor jetty and the basin between Aurora and Harris Harbors. R&M Engineering also conducted two test probes on the south end of this basin as part of this investigation.

Test hole PND-2 is the closest in proximity to Aurora Harbor and was drilled on the west end of the mud bench on the north side of the south Aurora Harbor jetty, near the existing private mooring float. The report from this investigation states that strata in this location are comprised of the following:

- 0 ft to 3 ft – cobbles and boulders locally known as "A. J." shot rock, possibly core rock placed when the jetty was constructed
- 3 ft to 14 ft – soft sandy silt with trace organics
- 14 ft to 20 ft – loose to medium dense silty sand with gravel lenses
- 20 ft to 37.5 ft – loose sandy gravel grading to medium dense gravelly sand with some silt

Logs from this investigation are attached in Appendix B.

3.2 Pile Driving Records

3.2.1 Juneau Boat Harbor Facilities – Boat Basin No. 2, Phase No. 1, 1964

Construction of the original Aurora Harbor consisted of the installation of mainwalk floats A through F, the headwalk float, and the southern approach dock. Criteria specified for satisfactory pile installation were a minimum 15 ft penetration or refusal. Records indicate that timber float anchor piles were typically driven 14 ft to 16 ft below mudline. Refusal conditions were encountered on several occasions between 9 ft and 14 ft, however no criteria for refusal are provided. Hammer information and blow counts are also unknown. These pile logs and a site plan are available in Appendix E.

3.2.2 Juneau Boat Harbor Facilities – Boat Basin No. 2, Phase No. 3, 1968

Phase 3 of the original Aurora Harbor construction project involved the installation of a seaplane tiedown float on the north side of the existing facilities. Pile logs from this project show that timber piles were driven to between 10 ft and 12 ft below mudline. Refusal conditions were met on three occasions however no criteria for refusal are provided. Hammer information, blow counts, and a site plan corresponding to the pile numbers could not be located. Pile logs and a general site plan are available in Appendix F.

3.2.3 Juneau Aurora Harbor Facilities and Taku Harbor Repairs, 1973

In 1973, a new mainwalk float was installed immediately south of the transition from concrete to timber headwalk floats. Pile installation criteria included a minimum 15 ft embedment or refusal, though no refusal requirements are stated. A total of 17 timber piles were driven, with penetrations ranging from 14 ft to 18 ft. Driving conditions were described as very easy and piles were noted to sink up to 8 ft from the weight of the hammer alone. Blow counts were not recorded, and hammer type could not be determined. Pile driving logs and a general site plan are available in Appendix G.

3.2.4 Juneau Aurora Harbor Facilities, 1974

In 1974 and 1975, Aurora Harbor was expanded north with two additional mainwalk floats, additional headwalk float, and three new timber approach docks. The existing seaplane float was relocated outside Aurora Harbor, to the north side of the existing Yacht Club fill pad. One of the approach docks was constructed for the relocated seaplane float, and the other two are the existing north approach dock and H Gangway approach dock.

Pile driving records were located for the approach docks and seaplane float but not for the new mainwalk floats. A Vulcan No.1 hammer with a rated energy of 15,000 ft-lbs was used for pile driving throughout this project. A total of 12 piles for the north approach dock were driven between 1.5 ft and 17.5 ft below mudline. Refusal was noted on five occasions and only one pile was driven beyond 9 ft.

A total of eight piles were driven for the H float gangway approach dock. Penetrations ranged from 16 ft to 25 ft. Soft bottom conditions were noted and none were driven to refusal.

Four piling were driven for the headwalk float extension, but only 4 ft to 5 ft below mudline. Refusal was not noted. Pile driving logs from this investigation can be found in Appendix H.

3.2.5 Aurora Harbor Repairs and Renovations, 2004

The Aurora Harbor Repairs and Renovations project took place in 2003-2004 and involved the replacement of the three northern-most gangways and gangway landing floats. The H-Float gangway approach dock was also extended, and two additional 12-in. diameter steel piles were driven to support this extension. Piles were driven using an MKT #7B air hammer with a rated energy of 4,150 ft-lbs. The piles were driven approximately 25 ft and 27 ft below mudline (tip elevations of -17 ft and -19 ft MLLW respectively). Blow counts within the first 15 ft to 20 ft of penetration range between 8 blows/ft and 62 blows/ft but are generally 15-30 blows/ft. Blow counts at the end of driving exceeded 120 blows/ft. Pile logs from this project are available in Appendix I.

4.0 Geotechnical Design Recommendations

The Aurora Harbor Rebuild project relies on pile-supported structures for the majority of the new infrastructure. Soil properties are critical in developing pile designs. Float anchor piles will depend on soil strength to resist lateral loading. In addition to lateral loads, the approach docks will require frictional resistance against piles, which develop at the soil/pile interface as piles are driven, to support the structure against vertical loads. This section will describe recommendations to facilitate pile design based on available information.

There is not sufficient data available for this site to perform a thorough stability analysis and assess the risk of slope failures or soil liquefaction. Additional soil sampling and laboratory testing is required to perform such an analysis.

4.1 Seismic Design Criteria

Seismic structural design for all structures in the Juneau area shall comply with the appropriate design codes, and designs for this site should also consider the seismic design parameters provided in Table 3 below. These parameters were obtained from the USGS Seismic Hazard Curves and Uniform Response Spectra utility, and are provided for an Operating Level Earthquake (OLE), Contingency Level Earthquake (CLE), and Maximum Considered Earthquake (MCE).

Table 3: Aurora Harbor Seismic Design Parameters

Seismic Event (Return Period, Probability of Exceedence):	OLE (72 years, 50% in 50 years)	CLE (475 years, 10% in 50 years)	MCE (2,475 years, 2% in 50 years)
Site Class:	D	D	D
Peak Ground Acceleration (PGA):	0.05g	0.13g	0.25g
S_S (0.2 sec period acceleration):	0.11g	0.27g	0.58g
S_1 (1.0 sec period acceleration):	0.06g	0.14g	0.28g

Note: PGA, S_S, and S_1 are for Site Class B and require site classification correction pursuant to the appropriate design code

4.2 Pile Foundation Considerations and Recommendations

Piles may be subject to axial loads (both compressive and tensile) resulting from pedestrian and vehicular traffic, snow, seismic activity, uplift, weight from the supported structure, etc. The axial compressive capacity of a pile is a result of the forces developed through skin friction and end bearing capacity. The tensile capacity of a pile is determined from skin friction only. In addition, the weight of the pile can be considered as this also resists uplift loads.

Although driven piles may potentially be founded on firm strata that will provide significant bearing capacity, only skin friction should be considered for estimating axial capacities for this project. Once construction commences, pile axial capacity can be revaluated based on pile driving observations.

Piles may also be subject to lateral loads developed from wind, seismic activity, currents, wave action, vessel berthing, as well as soil pressures where piles are installed in areas of sloped soil. The capacity of a pile to withstand lateral loads depends on the rigidity of the pile, as well as the load-deformation characteristics and formation thickness of the rock and soil in which the pile is founded.

Although historical information from past geotechnical explorations and construction projects is available, accurately estimating soil stratification and strength parameters in the majority of the immediate Aurora Harbor area is difficult. The only explorations inside of the existing harbor basin were either performed before the harbor was dredged and did not go beyond the dredge limits or only penetrated a few feet into the surface after the harbor had been dredged. However, conservative recommendations can be made using general characteristics of the soil types and empirical methods obtained from the Naval Facilities Engineering Command Foundations and Earth Structures Design Manual 7.02 (NAVFAC DM7.02).

4.2.1 Pile Design Recommendations

In the vicinity of the south approach dock, recommendations can be based on the results from the geotechnical investigation performed by PND in 1988. Two boreholes and two probe holes were drilled on the mud bench immediately southwest of the approach dock. In this area, up to 14 ft of soft organic silt and clay can be expected on the surface and will provide minimal axial or lateral support. This layer should thin out as the approach dock extends into the dredge basin because the material likely was removed during dredging. The underlying medium dense sands and gravels should provide the majority of support for piles, and the following unfactored strength parameters (estimated from NAVFAC DM7.02) are recommended for this area.

Table 4: Recommended Values for Coefficients of Lateral Subgrade Reaction

	Cohesive Soils	Granular Soils
Coefficient of Lateral Subgrade Reaction, k_h (tons/ft^3)	$k_h=(7*z)/d$	$k_h=(17*z)/d$

Where z=depth (ft) and d=pile diameter or width (ft)

Table 5: Recommended Values for Ultimate Skin Friction

	Cohesive Soils	Granular Soils
Ultimate Skin Friction, f_s (lb/ft^2)	f_s=185	f_s=640
Recommended Factor of Safety	3	3

Estimating strength parameters for the remainder of the harbor is more difficult due to the lack of applicable geotechnical information, highly variable pile driving conditions, and generally vague pile driving records. Records for floats A through F show that the majority of the piles were driven to an average depth of approximately 15 ft below mudline, occasionally noting refusal and firm driving conditions. No indication was given to suggest any soft soils or piles sinking during driving. Towards the north end of the harbor, float piles were noted to sink as much as 8 ft under the weight of the hammer, while the north approach dock piles met refusal as shallow as 1.5 ft.

Based on previous float anchor pile installations and no known failures, float anchor piles should be installed to a minimum embedment depth equivalent to 20 pile diameters (e.g. install a 12-in. diameter pile a minimum of 20 ft below mudline) as a preliminary recommendation. As design proceeds an appropriate lateral pile design program should be used to determine the pile-soil response and the required pile size and embedment. Further guidance to soil strength properties and other design loads can be provided during design.

4.2.2 Pile Installation Recommendations

Piles should be installed using an appropriately sized pile-driving impact or vibratory hammer. Pile hammers should be of sufficient size to drive the piles to design embedment without damaging the pile. Pile logs noting shallow refusal suggest that obstructions or very hard soils exist sporadically throughout the site. Contractors should be prepared to either drill a pilot hole prior to pile installation or use an appropriate alternate method in order to achieve adequate embedment for the anchor piles as required. External driving shoes are recommended to prevent damage to the pile, as previous pile driving logs noted possible cobbles and boulders.

4.3 Additional Geotechnical Recommendations

Further investigation within Aurora Harbor is recommended either consisting of a geotechnical investigation or driving of probe piles in order to provide additional information and further recommendations.

5.0 Closure

This report was prepared in accordance with generally accepted professional principles and practices in the field of geotechnical engineering at the time this report was prepared. This report describes the background information and geotechnical data gathered from previous reports that may be of interest to the Contractor, though no geotechnical field investigation was performed by PND for this report.

The nature and extent of subsurface variations across the site may not become evident until construction. If during construction, fill, soil, rock, or bedrock appear to be different from those described herein, PND's geotechnical engineer should be advised at once so the information contained in this report can be re-evaluated by the designers of this facility.

PND is not responsible for safety programs, methods or procedures of operation, or the construction of the design recommendations provided in this report. Where recommendations are general or not called out, the recommendations shall conform to standards of the industry. This geotechnical report is for use on this project only and is not intended for reuse without written approval from PND. This geotechnical report is not to be used in a manner that would constitute a detriment directly or indirectly to PND.

PND is a member of the American Society of Foundation Engineers (ASFE). Included in Appendix L is a copy of the ASFE publication "Important Information about your Geotechnical Engineering Report". The publication is included in this report to help the Owner, Contractor, and others who read this document understand the limitations described above and the additional limitations contained in the publication and made a part of this report. This document should be read carefully. If in the opinion of Contractors bidding on this project sufficient information has not been made available to satisfactorily bid the project then the Contractor should perform additional geotechnical investigations as necessary to satisfy themselves as to site conditions.

6.0 References

Alaska Earthquake Information Center, as viewed in June 2013 at: http://www.aeic.alaska.edu/

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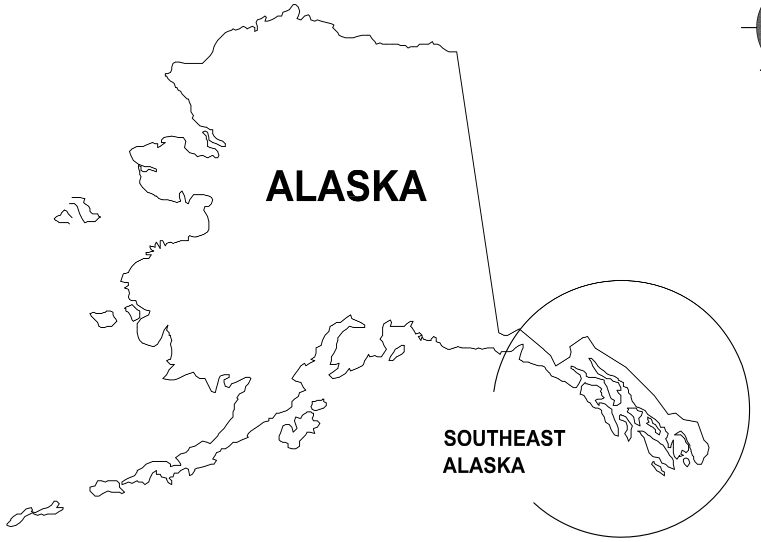
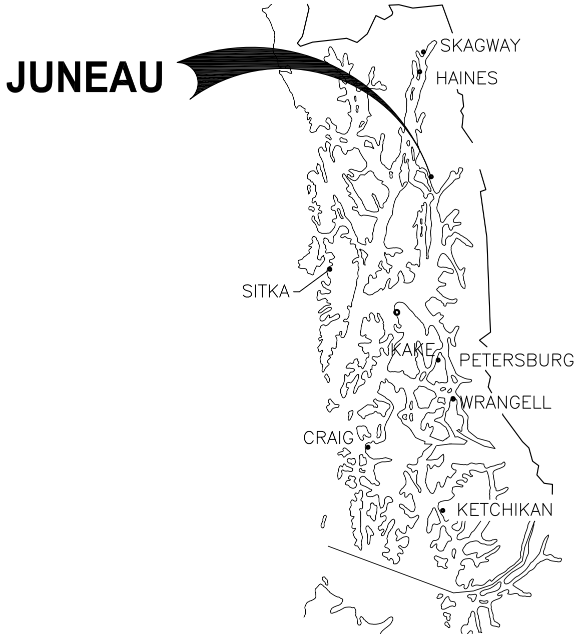
APPENDIX A

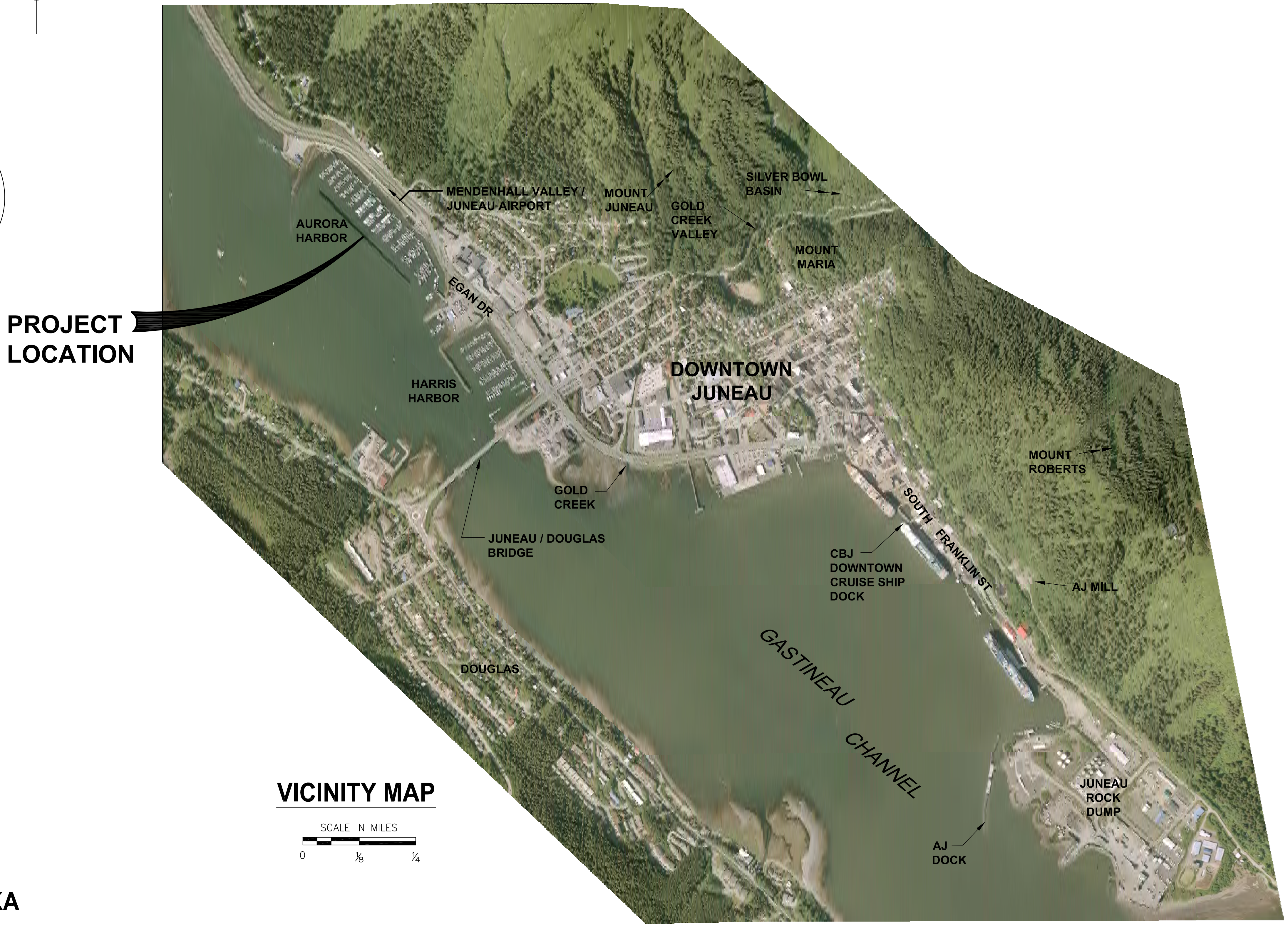
Vicinity Map, Master Site Plan and Existing Conditions with Borehole, Probe Hole, and Test Pit Locations



LOCATION MAP



SOUTHEAST ALASKA



VICINITY MAP

SCALE IN MILES
0 ⅛ ¼

P | N | D
ENGINEERS, INC.

9360 Glacier Highway Ste 100
Juneau, Alaska 99801

Phone: 907-586-2093
Fax: 907-586-2099
www.pnd-anc.com

DESIGN: PND
CHECKED: CRS
DRAWN: SCS
APPROVED: CRS

SCALE:
SCALE IN FEET
0 50 100 FT.

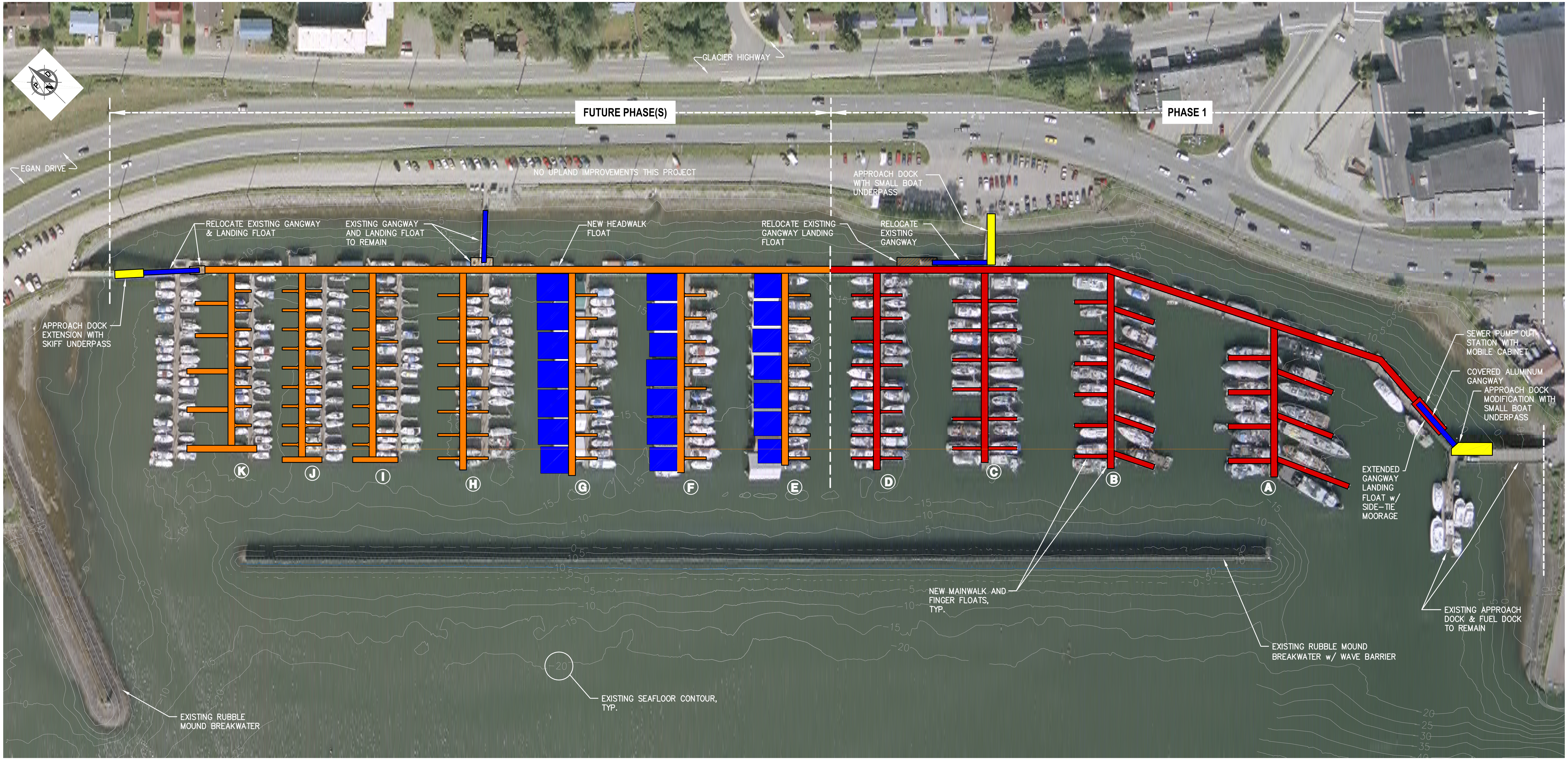
DATE: AUGUST 2013

CITY & BOROUGH OF JUNEAU, ALASKA
AURORA HARBOR REBUILD

SHEET TITLE:
VICINITY MAP

PN&D PROJECT NO.: 122055.01
DWG. FILE:

A
SHEET
1 OF 3



AURORA HARBOR REBUILD

MASTER SITE PLAN

CITY & BOROUGH OF JUNEAU, ALASKA DOCKS & HARBORS

REVISIONS

REV.	DATE	DESCRIPTION	DWN.	CKD.	APP.

P N D ENGINEERS, INC.

9360 Glacier Highway, Ste. 100
Juneau, Alaska 99801

Phone: 907-586-2093
Fax: 907-586-2099
www.pndengineers.com

DESIGN: PND **CHECKED:** CRS
DRAWN: PND **APPROVED:** CRS

SCALE: SCALE IN FEET
0 40 80 160 FT.

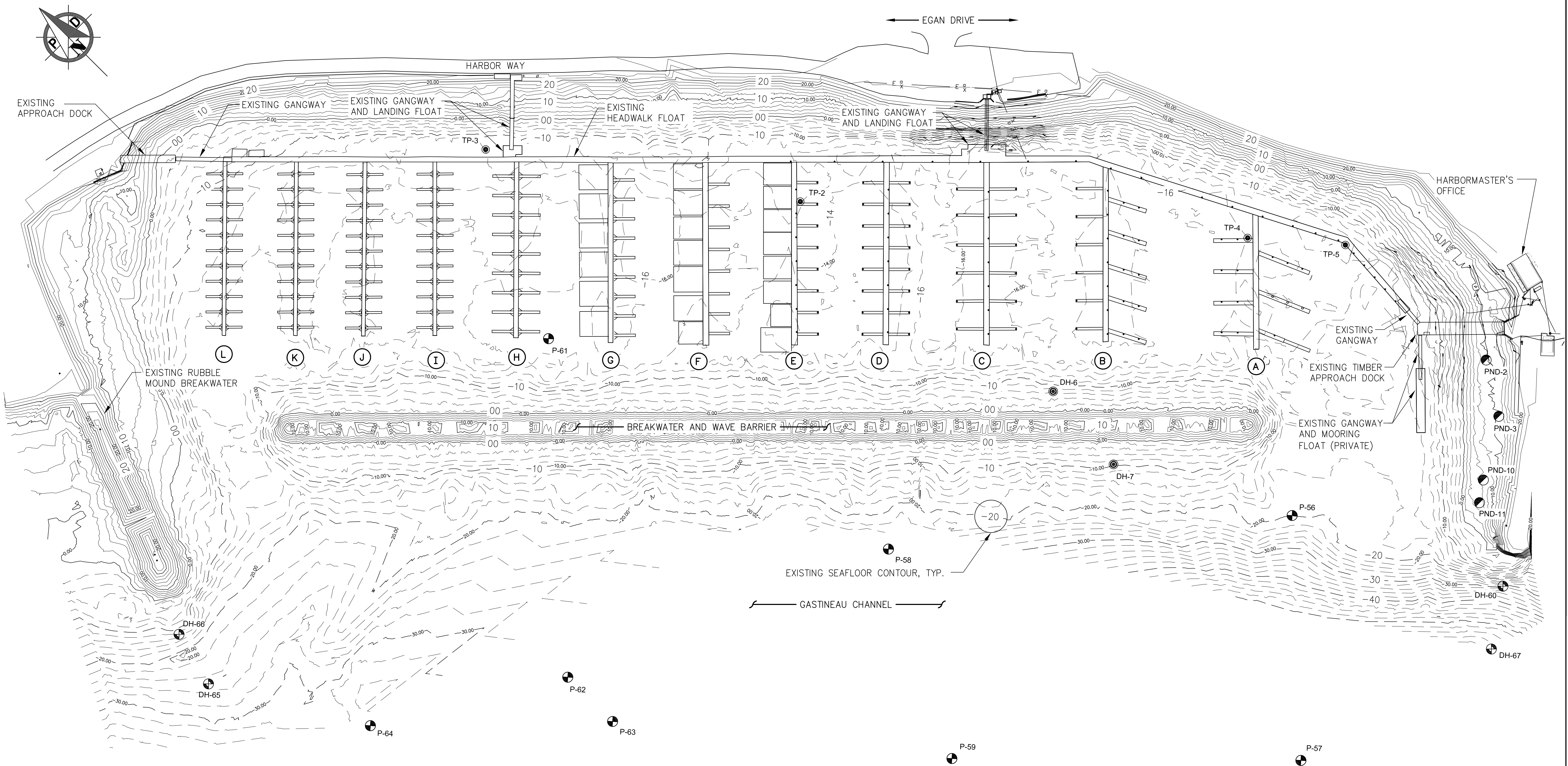
DATE: AUGUST 2013

CITY & BOROUGH OF JUNEAU, ALASKA
AURORA HARBOR REBUILD

SHEET TITLE:
MASTER SITE PLAN

PN&D PROJECT NO.: 122055.01 **DWG. FILE:** -----.DWG

A
SHEET
2 OF 3



LEGEND

◉	TP-#	US ARMY CORPS OF ENGINEERS (USACE) TEST PIT, 1961
◎	DH-#	USACE BOREHOLE, 1962
◐	P-#	USACE PROBE HOLE, 1985
◐	DH-#	USACE BOREHOLE, 1985
◐	PND-#	PND BOREHOLE, 1988 (SHOWN APPROXIMATE)

NOTE: USACE BOREHOLE, PROBE HOLE AND TEST PIT LOCATIONS DETERMINED FROM NORTHINGS AND EASTINGS PROVIDED ON BORING LOGS, ASSUMING NAD27 DATUM. PND BOREHOLE LOCATIONS ESTABLISHED USING SCALED DISTANCES TO KNOWN HARDSCAPES.

SURVEY NOTES:

1. EXISTING CONDITIONS ARE BASED UPON FIELD SURVEYS BY PND, UTILITY LOCATES, AND AS-BUILTS PROVIDED BY THE UNITED STATES ARMY CORPS OF ENGINEERS (USACE). FIELD VERIFY ALL EXISTING CONDITIONS.
2. THE BASIS OF VERTICAL DATUM FOR THIS SURVEY WAS DERVIED FROM A FOUND MONUMENT, AH-B WITH AN ELEVATION OF 23.12 MLLW AS PER CORPS OF ENGINEERING DRAWING AURORA HARBOR, PROJECT CONDITION SURVEY, DATED APRIL 12, 2003. SHEET 2 OF 2. SURVEY NO. 1952-02.
3. ALL EXISTING UTILITIES ARE SHOWN FROM SURVEYED INFORMATION, SURVEYED UTILITY LOCATES, AS-BUILT RECORDS PROVIDED BY USACE. FIELD VERIFY ALL UTILITIES.

CITY & BOROUGH OF JUNEAU
DOCKS & HARBORS

REVISIONS

REV.	DATE	DESCRIPTION	DWN.	CKD.	APP.

P N D
ENGINEERS, INC.

9360 Glacier Highway, Ste. 100
Juneau, Alaska 99801
Phone: 907-586-2093
Fax: 907-586-2099
www.pndengineers.com

DESIGN: SCS
DRAWN: SCS
CHECKED: CRS
APPROVED: CRS
SCALE: SCALE IN FEET 0 40 80 FT.
DATE: AUGUST 2013

CITY & BOROUGH OF JUNEAU, ALASKA
AURORA HARBOR REBUILD

SHEET TITLE:
EXISTING CONDITIONS WITH BOREHOLE, PROBE HOLE AND TEST PIT LOCATIONS

PN&D PROJECT NO.: 122055.01
DWG. FILE: -----.DWG

A
SHEET 3 OF 3

APPENDIX B

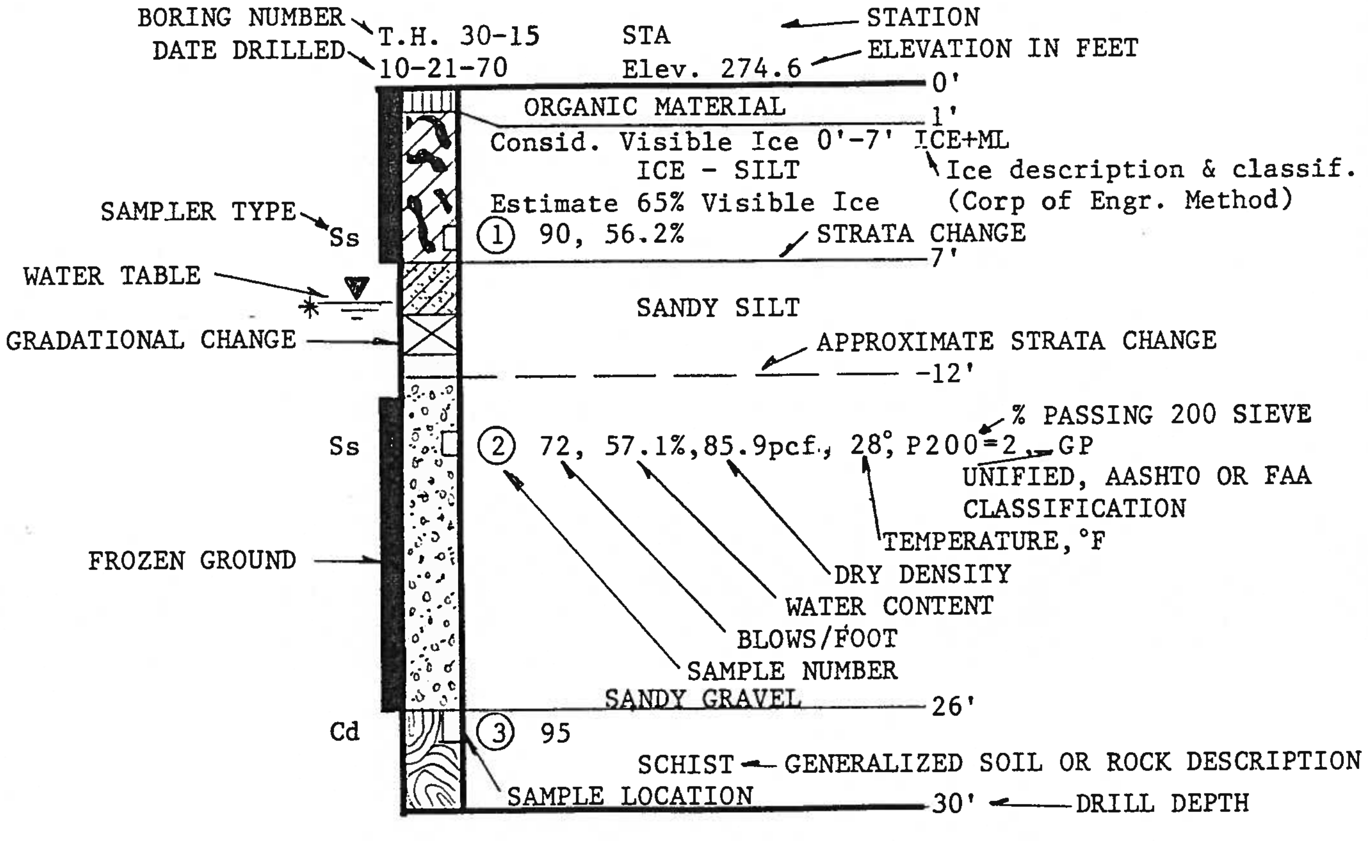
JUNEAU FISHERIES TERMINAL
GEOTECHNICAL INVESTIGATION (PND, 1988)

SAMPLER TYPE SYMBOLS

P......1.4" PENETROMETER WITH 140# HAMMER
Ss.....1.4" SPLIT SPOON WITH 140# HAMMER
Sl.....2.5" SPLIT SPOON WITH 140# HAMMER
Sh.....2.5" SPLIT SPOON WITH 340# HAMMER
Sx.....2.0" SPLIT SPOON WITH 140# HAMMER
Sz.....1.4" SPLIT SPOON WITH 340# HAMMER
Sp.....2.5" SPLIT SPOON, PUSHED
Hs.....1.4" SPLIT SPOON DRIVEN WITH AIR HAMMER
Hl.....2.5" SPLIT SPOON DRIVEN WITH AIR HAMMER

Ts....SHELBY TUBE
Tm....MODIFIED SHELBY TUBE
Pb....PITCHER BARREL
Cs....CORE BARREL WITH SINGLE TUBE
Cd....CORE BARREL WITH DOUBLE TUBE
Bs....BULK SAMPLE
A.....AUGER SAMPLE
G.....GRAB SAMPLE

NOTE: SAMPLER TYPES ARE EITHER NOTED ABOVE THE BORING LOG OR ADJACENT TO IT AT THE RESPECTIVE SAMPLE DEPTH.



✳ W.D.-WHILE DRILLING, A.B.-AFTER BORING

Peratrovich, Nottingham & Drage, Inc.
Engineering Consultants

STANDARD SYMBOLS

GUIDE TO FIELD DESCRIPTION OF SOILS

ICE DESCRIPTION

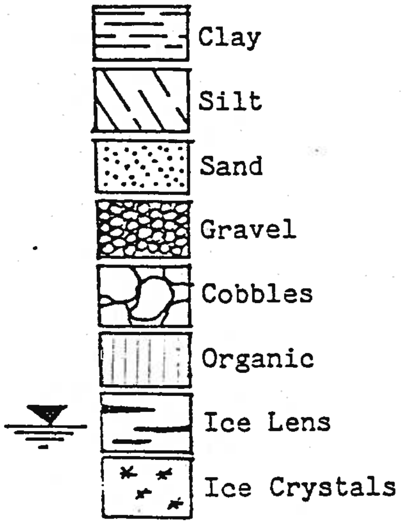
FROZEN WITH NO VISIBLE ICE
Well Bonded (Nbn)
Not Well Bonded (Nbf)

FROZEN WITH VISIBLE ICE
Crystals-(Vx)
Ice Coatings on Particles-(Vc)
Random or Irregularly Oriented Ice Formations-(Vr)
Stratified or Distinctly Oriented Ice Formations-(Vs)

ANGULARITY

Angular
Subangular
Subrounded
Rounded

GRAPHIC SYMBOLS



SOIL CALL OUTS	PROPORTION
Major Soil Callout	Greater than 30%
With Some	12-30%
With Trace	3-12%
No Call Out	Less than 3%

ORGANIC MATERIAL	
Peat	>50%
Organic (Modifier)	10-50%
With Some	4-10%
With Trace	<4%
No Call Out	0%

DENSITY-NON FROZEN

COHESIVE SOILS

Very soft 2 bpf	Easily penetrated several inches by fist
Soft 2-4 bpf	Easily penetrated several inches by thumb
Medium 4-8 bpf	Can be penetrated several inches by thumb with moderate effort
Stiff 8-15 bpf	Readily indented by thumb but penetrated only with great effort
Very Stiff 15-30 bpf	Readily indented by thumbnail
Hard 30 bpf	Indented with difficulty by thumbnail

COHESIONLESS SOILS

Number of Blows per ft., N	Relative Density
0-4	Very Loose
4-10	Loose
10-30	Medium
30-50	Dense
Over 50	Very Dense

MOISTURE CONTENT

(VW) Very Wet
(W) Wet
(VM) VeryMoist
(M) Moist
(SM) Slighly Moist
(D) Dry

BOULDER & COBBLE DESCRIPTIONS

Since boulders and cobbles are seldom sampled, their occurrence can only be inferred from drilling action. The terms used to describe their occurrence in order of frequency are:

Subject Noun: Greater than 50% of total soil
Many: 30% to 50% of total soil
Some: 10% to 30% of total soil
Few: Less than 10% of total soil

Example: Boulders and cobbles and sandy gravel with trace silt.

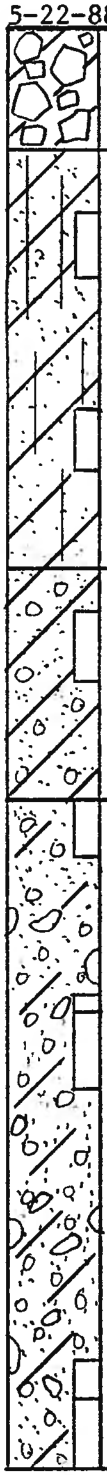
Peratrovich, Nottingham & Drage, Inc.
Engineering Consultants

STANDARD SYMBOLS

PND 2
5-22-88

ELEV. 10.0' ±

0'



COBBLES & BOULDERS - "A.J." SHOT ROCK
w/silty matrix - rock angular, avg. 6"-8" dia.

3.0'

5.0' W.D.

S1 ① 9, P_{200} = 49%

SANDY SILT WITH TRACE ORGANICS - INTERBEDDED
Gray, saturated, soft

Ss ② 3, P_{200} = 57%, $P_{.002}$ = 2, LL = 29, NP

14.0'

S1 ③ 17, 49%*, 67 pcf, P_{200} = 52%

SILTY SAND WITH SOME GRAVEL (AS HZNTL LENSES)
Gray, loose to medium dense, saturated

20.0'

Ss ④ 5

Ss ⑤ **

P ⑥ 16

SANDY GRAVEL AND GRAVELLY SAND WITH TRACE TO SOME SILT
Brown, loose, saturated

P ⑦ 14

S1 ⑧ 22, P_{200} = 19%

37.5'

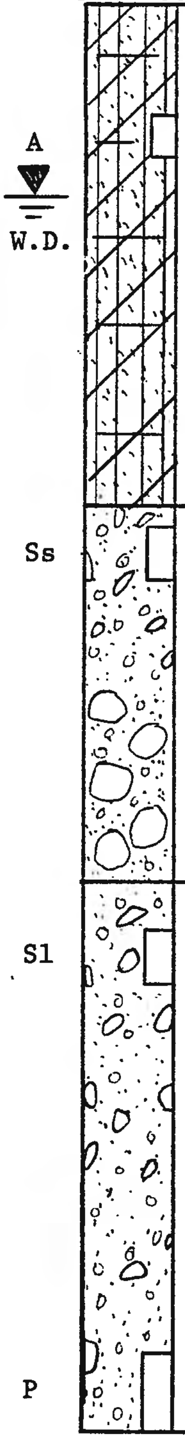
*Anamalously high moisture due to high content of shell fragments.
**Blow counts not representative due to heaving sands in auger.

Peratrovich, Nottingham & Drage, Inc.
Engineering Consultants

TEST HOLE LOG

PND 3
5-22-88

ELEV. 9.0" ± 0'



① P_{200} = 66%, $P_{.002}$ = 2%

ORGANIC SANDY SILT WITH TRACE CLAY
Black, wet, cohesive, soft to very soft

Clay content decreasing with depth

13.0'

② 10

SANDY GRAVEL
Brown, wet, loose to medium dense

Many cobbles - 18'-23'

23.0'

③ 17, P_{200} = 22%

SAND WITH TRACE TO SOME SILT AND GRAVEL
Gray, wet, medium dense

④ 14

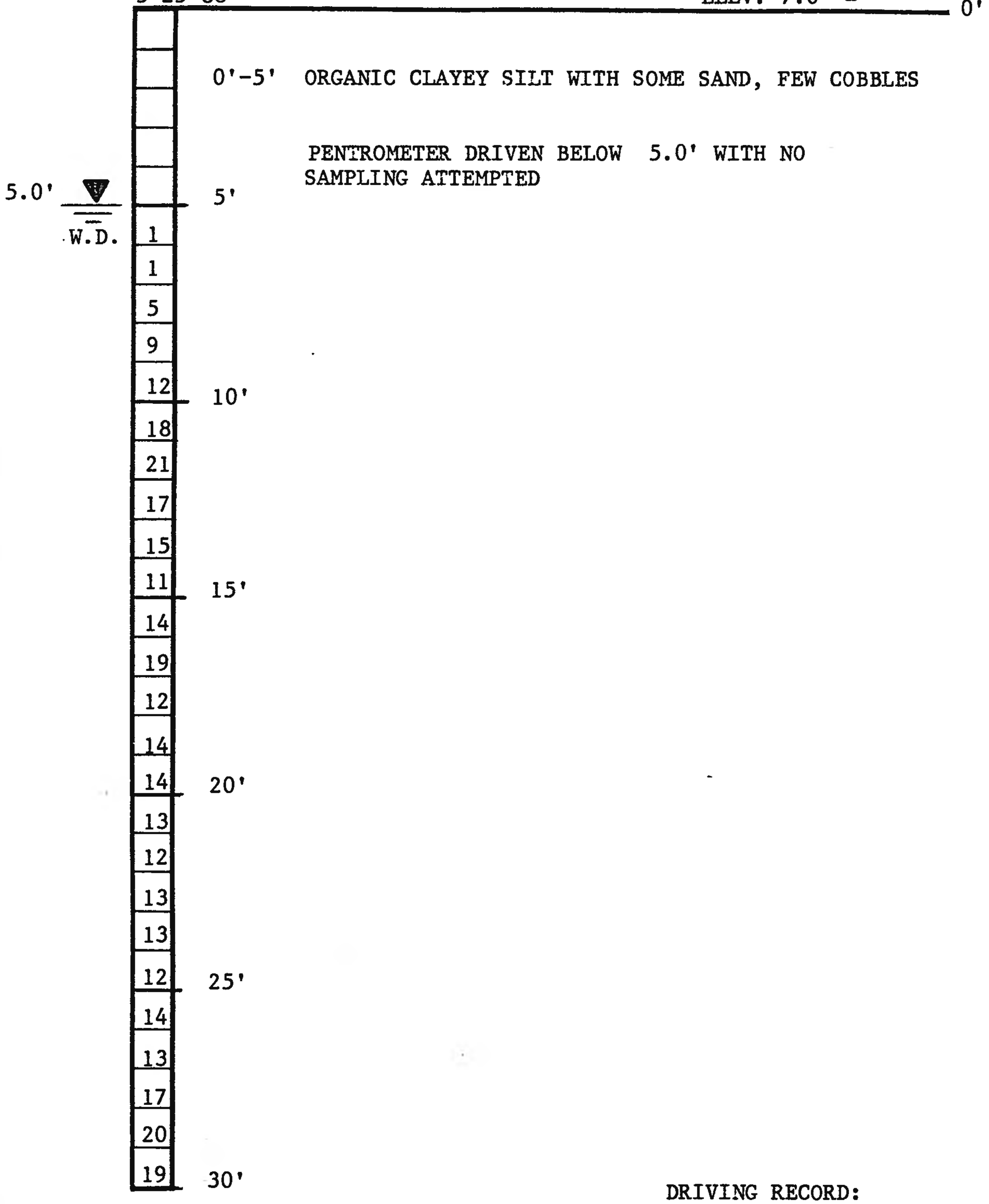
37.0'

Peratrovich, Nottingham & Drage, Inc.
Engineering Consultants

TEST HOLE LOG

PND 10
5-25-88

ELEV. 7.0' ±



0'-5' ORGANIC CLAYEY SILT WITH SOME SAND, FEW COBBLES

PENTROMETER DRIVEN BELOW 5.0' WITH NO SAMPLING ATTEMPTED

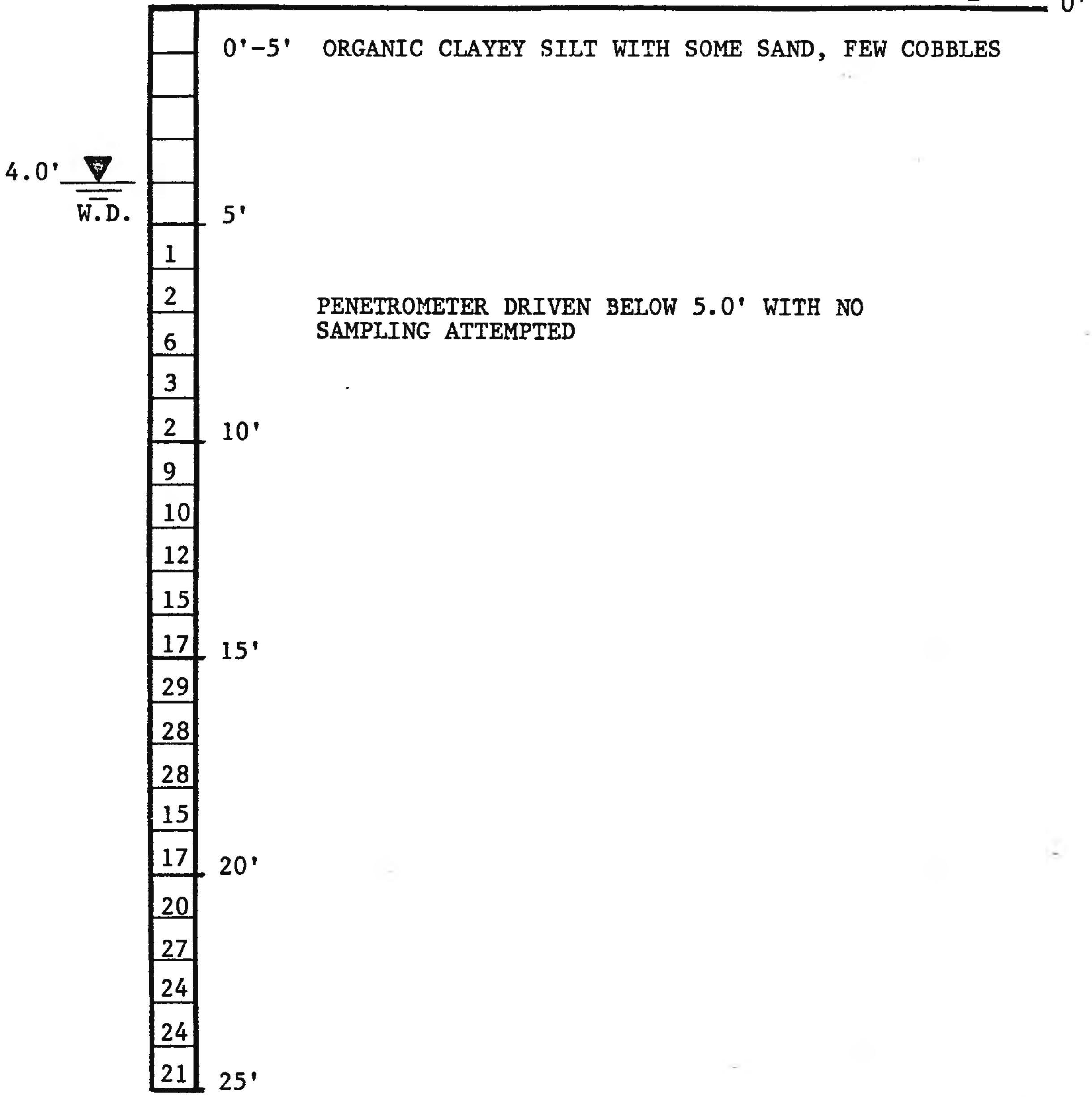
DRIVING RECORD:
1.4" Drill rod advanced with
30" drop of 140 lb. drop hammer.

Peratrovich, Nottingham & Drage, Inc.
Engineering Consultants

TEST HOLE LOG

PND 11
5-25-88

ELEV. 4.2' ±



0'-5' ORGANIC CLAYEY SILT WITH SOME SAND, FEW COBBLES

PENETROMETER DRIVEN BELOW 5.0' WITH NO SAMPLING ATTEMPTED

DRIVING RECORD:
1.4" Drill rod advanced with
30" drop of 140 lb. drop hammer

Peratrovich, Nottingham & Drage, Inc.
Engineering Consultants

TEST HOLE LOG

APPENDIX C

AURORA HARBOR EXPANSION
GEOTECHNICAL INVESTIGATION (USACE, 1985)

))

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT Juneau, Alaska Aurora Harbor Expansion
SHEET 1 OF 3
LOCATION (Coordinates or Station) N. 2,364,300± E. 2,538,518±
DRILLING AGENCY ☒ CORPS OF ENGINEERS ☐ OTHER Alaska District
HOLE NO. FIELD 5 PERMANENT DH-60
NAME OF DRILLER D. VanLandingham
WEATHER rain
TYPE OF HOLE TEST PIT ☐ drill HOLE ☒ CHURN DRILL ☐
DEPTH TO 38.5'
DEPTH DRILLED INTO 38.5'
TOTAL DEPTH OF HOLE 38.5'
SIZE AND TYPE OF BIT NQ
DATUM FOR ELEVATION SHOWN ☐ TBM. ☒ MLLW
TYPE OF EQUIPMENT Longyear Rotary
TOTAL NO. OF SAMPLES 9
TYPE OF SAMPLES Split spoon&core grab
DEPTH TO GROUND-WATER *
DATE HOLE STARTED COMPLETED 23 Jul85
EL. TOP OF HOLE -21.5'±
INSPECTOR S. Slagle
Chief, Soils Section J. Raychel
Chief, Foundations & Materials Branch D. Thomas
Date

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE	FORMATION DESCRIPTION & REMARKS
1						
2		1	SM	Silty sand		6% gr,76% sa,18% fines 3.1% organics N=10
3						Black w/sea urchin & shrimp
4		2	SM	Silty sand		Core sample, 87% sa, 13% fines 3.3% organics
5						
6						
7		3			3/4"	Core sample, six ½" to 3/4" rocks sand/silt lost from smp
8						
9		6	SP-SM	Poorly graded sand w/silt		Grab sample out of casing, heaved up from below 93% sa, 7% fines 2.2% organics
10						
11		4		Gravel	1½"	Misc. rocks 1½" to sand Core sample
12						
13		5	SP-SM	Poorly graded sand w/silt		16% gr, 78% sa, 6% fines N=9 1.6% orgaics

NPA FORM 19 (REV)
DEC. 1959

PROJECT Juneau, Alaska Aurora Harbor Expansion
PERMANENT HOLE NO. DH-60

* Drilling in Gastineau Channel

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT Juneau, Aska
Aurora Harbor Expansion

SHEET 2 OF 3

LOCATION (Coordinates or Station) N. 2,364,300+ E. 2,538,518+

DRILLING AGENCY ☒ CORPS OF ENGINEERS ☐ OTHER Alaska District

HOLE NO. FIELD 5 PERMANENT DH-60

NAME OF DRILLER D. VanLandingham

WEATHER rain

TYPE OF HOLE: TEST PIT ☐ drill HOLE ☒ CHURN DRILL ☐

DEPTH TO 38.5'

DEPTH DRILLED INTO 38.5'

TOTAL DEPTH OF HOLE 38.5'

SIZE AND TYPE OF BIT NO

DATUM FOR ELEVATION SHOWN ☐ TBM. ☒ MLLW

TYPE OF EQUIPMENT Longyear Rotary

TOTAL NO. OF SAMPLES 9

TYPE OF SAMPLES Split spoon & Grab core

DEPTH TO GROUND-WATER *

DATE HOLE STARTED

COMPLETED 22 Jul 85

EL. TOP OF HOLE -21.5'+

INSPECTOR S. Slagle

Chief, Soils Section J. Raychel

Chief, Foundations & Materials Branch D. Thomas

Date

DEPTH FEET	WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25		7	SP-SM	Poorly graded sand w/silt		Grab sample from cooling wtr return. 88% sa, 12% fines 2.1% organics
26						
27						

NPA FORM DEC 1959 (REV)

Juneau, Alaska
PROJECT Aurora Harbor Expansion

PERMANENT HOLE NO. DH- 60

* Drilling in Gastineau Channel

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT Juneau, ska
Aurora Harbor Expansion

SHEET 3 OF 3

LOCATION (Coordinates or Station) N. 2,364,300 + E. 2,538,518+

DRILLING AGENCY ☒ CORPS OF ENGINEERS ☐ OTHER Alaska District

HOLE NO. FIELD 5 PERMANENT DH-60

NAME OF DRILLER D. VanLandingham

WEATHER rain

TYPE OF HOLE: TEST PIT ☐ drill HOLE ☒ CHURN DRILL ☐

DEPTH TO 38.5'

DEPTH DRILLED INTO 39.5'

TOTAL DEPTH OF HOLE 38.5'

SIZE AND TYPE OF BIT NO

DATUM FOR ELEVATION SHOWN ☐ TBM ☒ MLLW

TYPE OF EQUIPMENT Longyear Rotary

TOTAL NO. OF SAMPLES 9

TYPE OF SAMPLES split spoon & grab core

DEPTH TO GROUND-WATER *

DATE HOLE STARTED COMPLETED 22 Jul 85

EL. TOP OF HOLE -21.5'+

INSPECTOR S. Slagle

Chief, Soils Section J. Raychel

Chief, Foundations & Materials Branch D. Thomas

Date

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX. SIZE	FORMATION DESCRIPTION & REMARKS
29						
30						
31						
32						
33						
34						
35		8	SP-SM	Poorly graded sand		Grab sample from cooling wtr return. 92% sa, 8% fines 1.7% organics
36						
37		9				Core sample, miscellaneous 1½" to sand.
38						
				End of hole 38.5' elevation: -60.0±		
39						
40						
41						

NPA FORM DEC 1959 19 (REV)

PROJECT Juneau, Alaska
Aurora Harbor Expansion

PERMANENT HOLE NO. DH-60

* Drilling in Gastineau Channel

)　　　　)

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT Juneau, Alaska Aurora Harbor Expansion
SHEET 1 OF 2
LOCATION (Coordinates or Station) N 2,365,639± E 2,537,080±
DRILLING AGENCY ☒ CORPS OF ENGINEERS ☐ OTHER Alaska District
HOLE NO. FIELD 10 PERMANENT DH-65
NAME OF DRILLER D. VanLandingham
WEATHER
TYPE OF HOLE TEST PIT ☐ Drill HOLE ☒ CHURN DRILL ☐
DEPTH TO 20'
DEPTH DRILLED INTO 20'
TOTAL DEPTH OF HOLE 20'
SIZE AND TYPE OF BIT NQ
DATUM FOR ELEVATION SHOWN ☐ TBM. ☒ MLLW
TYPE OF EQUIPMENT Longyear Rotary
TOTAL NO. OF SAMPLES 6
TYPE OF SAMPLES grab & core
DEPTH TO GROUND-WATER *
DATE HOLE STARTED COMPLETED 24 Jul 85
EL. TOP OF HOLE -25.5'±
INSPECTOR S. Slagle
Chief, Soils Section J. Raychel
Chief, Foundations & Materials Branch D. Thomas
Date

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE	FORMATION DESCRIPTION & REMARKS
1						
2		1	SP	Gravelly Sand w/cobbles (visual)	1½"	Core sample, contained only rock fragments
3						
4		3	SP	Gravelly sand w/cobbles (visual)		Core sample, contained only rock fragments.
5		2	SP	Poorly graded sand		97% sa, 3% fines 24% organics Grab sample from cooling water return.
6						
7						Highly cemented till
8						
9						
10		4	GP	Poorly graded gravel		Core sample 96% gr, 3% sa, 1% fines
11						
12						Core sample #5 lost when retrieving core
13						

NPA FORM 19 (REV) DEC. 1959

PROJECT Juneau, Alaska Aurora Harbor Expansion
PERMANENT HOLE NO. DH-65

* Drilling in Gastineau Channel

1839-60

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT: Juneau, ska
Aurora Harbor Expansion

SHEET 2 OF 2

LOCATION (Coordinates or Station): N. 2,365,638+ E. 2,537,080+

DRILLING AGENCY: ☒ CORPS OF ENGINEERS ☐ OTHER Alaska District

HOLE NO. FIELD 10 PERMANENT DH-65

NAME OF DRILLER: D. VanLandingham

WEATHER: rain

TYPE OF HOLE: TEST PIT ☐ drill HOLE ☒ CHURN DRILL ☐

DEPTH TO 20

DEPTH DRILLED INTO 20'

TOTAL DEPTH OF HOLE 20'

SIZE AND TYPE OF BIT: NQ

DATUM FOR ELEVATION SHOWN: ☐ TBM. ☒ MLLW

TYPE OF EQUIPMENT: Longyear Rotary

TOTAL NO. OF SAMPLES: 6

TYPE OF SAMPLES: Grab & core

DEPTH TO GROUND-WATER: *

DATE HOLE STARTED:

DATE HOLE COMPLETED: 24 Jul 85

EL. TOP OF HOLE: -25.5+

INSPECTOR: S. Slagle

Chief, Soils Section: J. Raychel

Chief, Foundations & Materials Branch: D. Thomas

Date:

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
15						
16		6		Cemented till (visual)	1½"	Hard drilling. core sample sand/silt lost when retrieving. Sample contained only 1½" to #4.
17						
18						
19		7		Cemented till (visual)		Core sample, sand/silt lost when retrieving. Sample contained only 1½" to 3/8"
20						
21				End of hole @ 20' Elev.		
22						
23						
24						
25						
26						
27						

NPA FORM 19 (REV)
DEC 1950

PROJECT: Juneau, Alaska
Aurora Harbor Expansion

PERMANENT HOLE NO. DH-65

* Drilling in Gastineau Channel

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT Juneau, AK Aurora Harbor Expansion
SHEET 1 OF 1
LOCATION (Coordinates or Station) N. 2,365,727+ E. 2,537,103+
DRILLING AGENCY ☐ OTHER ☒ CORPS OF ENGINEERS Alaska District
HOLE NO. FIELD 11 PERMANENT DH66
NAME OF DRILLER VanLandingham
WEATHER Rain
TYPE OF HOLE TEST PIT ☐ drill HOLE ☒ CHURN DRILL ☐
DEPTH TO 14.2'
DEPTH DRILLED INTO 14.2'
TOTAL DEPTH OF HOLE 14.2'
SIZE AND TYPE OF BIT NQ
DATUM FOR ELEVATION SHOWN ☐ TBM. ☒ MLLW
TYPE OF EQUIPMENT Longyear Rotary
TOTAL NO. OF SAMPLES 8
TYPE OF SAMPLES Split-spoon & Core
DEPTH TO GROUND-WATER Gast. channel
DATE HOLE STARTED
DATE HOLE COMPLETED
EL. TOP OF HOLE -9.4' MLLW
Geologist S. Slagle
Chief, Geology Section J. Raychel
Chief, Foundations & Materials Branch D. Thomas
Date

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
4		1 A	SW	Well graded sand w/gravel Sample "A" includes cobbles		16% gr, 80% sa, 4% fines N=2 organic 1.8%(sample 1) Drill cuttings, 1½"-#4 rocks (sample A)
8 12		B C 4 2 6 7		Till		Drill cuttings, misc. sand & gravel (sample B) One 1½" rock (sample C) Misc. rock particles (smpl 2) One 1½" rock (Sample 4) Misc. 1½" -#4 rock particles (sample 6) 11 ea 1" - 1½" rock particles (sample 7)
16				End of hole 14.2' (-) 23.6' ± MLLW		Drive sample #1; sand ½' by hammer weight (140 lbs). From 4.70' material is a highly cemented till. In some cases short core remained intack for inspection. Bit blocked off every 2" to 6".

NPA FORM 19 (REV)
DEC. 1959

PROJECT Aurora Harbor Expansion
Juneau, Alaska

PERMANENT HOLE NO. DH- 66

1892-60

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT Juneau, AK Aurora Harbor Expansion
SHEET 1 OF 1
LOCATION (Coordinates or Station) N. 2,364,244+ E. 2,538,535+
DRILLING AGENCY ☒ CORPS OF ENGINEERS ☐ OTHER Alaska District
HOLE NO. FIELD 12 PERMANENT DH 67
NAME OF DRILLER VanLandingham
WEATHER Rain
TYPE OF HOLE: TEST PIT ☐ drill HOLE ☒ CHURN DRILL ☐
DEPTH TO 25'
DEPTH DRILLED INTO 25'
TOTAL DEPTH OF HOLE 25'
SIZE AND TYPE OF BIT NQ
DATUM FOR ELEVATION SHOWN ☐ TBM. ☒ MLLW
TYPE OF EQUIPMENT Longyear Rotary
TOTAL NO. OF SAMPLES
TYPE OF SAMPLES Split-spoon & Core
DEPTH TO GROUND-WATER Gast. channel
DATE HOLE STARTED
COMPLETED 26 Jul 85
EL. TOP OF HOLE (-) 61'+MLLW
Geologist S. Slagle
Chief, Geology Section J. Raychel
Chief, Foundations & Materials Branch D. Thomas
Date

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
		A 2 1	SP-SM	Poorly graded sand w/silt		9% gr, 81% sa, 10% fines N=3 Organic 2.3% (smpl 1) 11% gr, 74% sa, 15% fines Organic 2.8% (smpl 2)
5						
10		3	SM	Silty sand w/gravel		13% gr, 72% sa, 15% fines N=12 Organic 2.7% (smpl 3)
15						A=Shelby tube sample fr: 0' to 2'
20						No samples from 11' to 25' Drilled down to determine if a change of strata might be encountered, none was.
25				End of hol2 25' (-) 86' ± MLLW		Split spoon sank first 6" by hammer weight (140 lbs) (sample 1)
30						

NPA FORM 19 (REV)
DEC. 1959

PROJECT Aurora Harbor Expansion
Juneau, Alaska
PERMANENT HOLE NO. DH-67

1892-60

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT Juneau, Alaska Aurora Harbor Expansion
SHEET 1 OF 1
LOCATION (Coordinates or Station) N. 2,364,614 E. 2,538,465+
DRILLING AGENCY ☒ CORPS OF ENGINEERS ☐ OTHER Alaska District
HOLE NO. FIELD 1 PERMANENT P-56
NAME OF DRILLER D. VanLandingham
WEATHER rain
TYPE OF HOLE: TEST PIT ☐ probe HOLE ☒ CHURN DRILL ☐
DEPTH TO 1.5'
DEPTH DRILLED INTO 0.0'
TOTAL DEPTH OF HOLE 1.5'
SIZE AND TYPE OF BIT 2" split spoon
DATUM FOR ELEVATION SHOWN ☐ TBM. ☒ MLLW
TYPE OF EQUIPMENT Longyear Rotary
TOTAL NO. OF SAMPLES 1
TYPE OF SAMPLES split spoon
DEPTH TO GROUND-WATER *
DATE HOLE STARTED COMPLETED 21 Jul 85
EL. TOP OF HOLE -22.0'
INSPECTOR S. Slagle
Chief, Soils Section J. Raychel
Chief, Foundations & Materials Branch D. Thomas
Date

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX. SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1		1	SP-SM	Poorly graded sand w/silt and gravel		Gray with marine shell fragments N=4
2				end of hole @ 1.5' elevation; -23.5'±		Sample #1, 32% gr, 63% sa, 5% fines, 1.88% organics
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						

NPA FORM 19 (REV)
DEC. 1969

PROJECT Juneau, Alaska Aurora Harbor Expansion
PERMANENT HOLE NO. P-56

* Drilling in Gastineau Channel

1809-60

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT Juneau, Alaska Aurora Harbor Expansion
SHEET 1 OF 1

LOCATION (Coordinates or Station) N. 2,364,335± E. 2,538,200±

DRILLING AGENCY ☒ CORPS OF ENGINEERS ☐ OTHER Alaska District

HOLE NO. FIELD 2 PERMANENT P-57

NAME OF DRILLER D. VanLandingham

WEATHER rain

TYPE OF HOLE: TEST PIT ☐ probe HOLE ☒ CHURN DRILL ☐

DEPTH TO 7.5'

DEPTH DRILLED INTO 0.0'

TOTAL DEPTH OF HOLE 7.5'

SIZE AND TYPE OF BIT 2" split spoon

DATUM FOR ELEVATION SHOWN ☐ TBM. ☒ MLLW

TYPE OF EQUIPMENT Longyear Rotary

TOTAL NO. OF SAMPLES 2

TYPE OF SAMPLES split spoon

DEPTH TO GROUND-WATER *

DATE HOLE STARTED

COMPLETED 21 JUL 85

EL. TOP OF HOLE -77.7'

INSPECTOR S. Slagle

Chief, Soils Section J. Raychel

Chief, Foundations & Materials Branch D. Thomas

Date

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX. SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1		1	SP-SM	Silty sand w/marine shells		very loose sample lost N=1
2						
3						
4						Split spoon sank to 4.5' by weight of hammer (140 lbs)
5		2	SW-SM	Well graded sand w/silt		11% gr, 79% sa, 10% fines N=8 1.77% organics
6						
7						
8				End of hole @ 7.5' elev. -85.2±		
9						
10						
11						
12						
13						

NPA FORM 1D (REV)
DEC. 1959

PROJECT Juneau, Alaska Aurora Harbor Expansion

PERMANENT HOLE NO. P-57

* Drilling in Gastineau Channel

1892-4c

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT	Juneau, Alaska Aurora Harbor Expansion
SHEET	1 OF 1
LOCATION (Coordinates or Station)	N. 2,365,028+ E. 2,537,981+
DRILLING AGENCY	☐ OTHER ☒ CORPS OF ENGINEERS Alaska District
HOLE NO. FIELD	3
HOLE NO. PERMANENT	P-58
NAME OF DRILLER	D. VanLandingham
WEATHER	rain
TYPE OF HOLE	TEST PIT ☐ probe HOLE ☒ CHURN DRILL ☐
DEPTH TO	4.5'
DEPTH DRILLED INTO	0.0'
TOTAL DEPTH OF HOLE	4.5'
SIZE AND TYPE OF BIT	2" split spoon
DATUM FOR ELEVATION SHOWN	☐ TBM ☒ MLLW
TYPE OF EQUIPMENT	Longyear Rotary
TOTAL NO. OF SAMPLES	1
TYPE OF SAMPLES	split spoon
DEPTH TO GROUND-WATER	*
DATE HOLE STARTED	
DATE HOLE COMPLETED	21 Jul 85
EL. TOP OF HOLE	-27.0'+
INSPECTOR	S. Slagle
Chief, Soils Section	J. Raychel
Chief, Foundations & Materials Branch	D. Thomas
Date	

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1		1	SP-SM	Poorly graded sand w/silt and gravel		29% gr,66% sa, 5% fines N=1 1.88% organics
2						
3						
4						
5				End of hole @ 4.5' elevation: -31.5'±		
6						
7						
8						
9						
10						
11						
12						
13						

NPA FORM 19 (REV)
DEC. 1959

PROJECT Juneau, Alaska Aurora Harbor Expansion PERMANENT HOLE NO. P-58

* Drilling in Gastineau Channel

1859-60

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DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA
EXPLORATION LOG

PROJECT Juneau, Alaska Aurora Harbor Expansion
SHEET 1 OF 1
LOCATION (Coordinates or Station) N. 2,364,726± E. 2,537,827+
DRILLING AGENCY ☒ CORPS OF ENGINEERS ☐ OTHER Alaska District
HOLE NO. FIELD 4 PERMANENT P-59
NAME OF DRILLER D. VanLandingham
WEATHER rain
TYPE OF HOLE: TEST PIT ☐ probe HOLE ☒ CHURN DRILL ☐
DEPTH TO 7.7'
DEPTH DRILLED INTO 0.0'
TOTAL DEPTH OF HOLE 7.7'
SIZE AND TYPE OF BIT 2" split spoon
DATUM FOR ELEVATION SHOWN ☐ TBM. ☒ MLLW
TYPE OF EQUIPMENT Longyear Rotary
TOTAL NO. OF SAMPLES 1
TYPE OF SAMPLES split spoon
DEPTH TO GROUND-WATER *
STARTED
DATE HOLE COMPLETED 23 Jul 85
EL. TOP OF HOLE -58.0'±
INSPECTOR S. Slagle
Chief, Soils Section J. Raychel
Chief, Foundations & Materials Branch D. Thomas
Date

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
						Split spoon sank 3.2' by weight of hammer (140 lbs)
1						
2						
3						
4		1	SW-SM	Well graded sand w/silt		15% gr,75% sa, 10% fines N=12 2.1% organics
5						
6						N=11
7						N=8
8				End of hole @7.7' elev. -65.7'±		
9						
10						
11						
12						
13						

NPA FORM 19 (REV) DEC 1959

PROJECT Juneau, Alaska Aurora Harbor Expansion
PERMANENT HOLE NO. P-59

* Drilling in Gastineau Channel

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DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA
EXPLORATION LOG

PROJECT Juneau, Alaska Aurora Harbor Expansion

SHEET 1 OF 1

LOCATION (Coordinates or Station) N. 2,365,640+ E. 2,537,841+

DRILLING AGENCY ☒ CORPS OF ENGINEERS ☐ OTHER Alaska District

HOLE NO. FIELD 6 PERMANENT P-61

NAME OF DRILLER D. VanLandingham

WEATHER rain

TYPE OF HOLE: TEST PIT ☐ probe HOLE ☒ CHURN DRILL ☐

DEPTH TO 3.5'

DEPTH DRILLED INTO 0.0'

TOTAL DEPTH OF HOLE 3.5'

SIZE AND TYPE OF BIT 2" split spoon

DATUM FOR ELEVATION SHOWN ☐ TBM. ☒ MLLW

TYPE OF EQUIPMENT Longyear Rotary

TOTAL NO. OF SAMPLES 1

TYPE OF SAMPLES split spoon

DEPTH TO GROUND-WATER *

DATE HOLE STARTED

COMPLETED 23 Jul 85

EL. TOP OF HOLE -21.4'+

INSPECTOR S. Slagle

Chief, Soils Section J. Raychel

Chief, Foundations & Materials Branch D. Thomas

DATE

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE	FORMATION DESCRIPTION & REMARKS
1						Sampler sand 1.4' by weight of hammer (140 lbs)
2		1	SP-SM	Poorly graded sand w/silt		6% gr, 85% sa, 9% fines N=4 3.3% organics N=4.
3						
4				End of hole 3.5' elevation: -24.9'±		
5						
6						
7						
8						
9						
10						
11						
12						
13						

NPA FORM 19 (REV)
DEC. 1959

PROJECT Juneau, Alaska Aurora Harbor Expansion

PERMANENT HOLE NO. P-61

* Drilling in Gastineau Channel

18x-4c

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DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT Juneau, Alaska Aurora Harbor Expansion

SHEET 1 OF 1

LOCATION (Coordinates or Station) N. 2,365,245+ E. 2,537,484+

DRILLING AGENCY ☒ CORPS OF ENGINEERS ☐ OTHER Alaska District

HOLE NO. FIELD 7 PERMANENT P-62

NAME OF DRILLER D. VanLandingham

WEATHER Rain

TYPE OF HOLE: TEST PIT ☐ probe HOLE ☒ CHURN DRILL ☐

DEPTH TO 6.0'

DEPTH DRILLED INTO 0.0'

TOTAL DEPTH OF HOLE 6.0'

SIZE AND TYPE OF BIT 2" split spoon

DATUM FOR ELEVATION SHOWN ☐ TBM. ☒ MLLW

TYPE OF EQUIPMENT Longyear Rotary

TOTAL NO. OF SAMPLES 1

TYPE OF SAMPLES split spoon

DEPTH TO GROUND-WATER *

DATE HOLE STARTED

COMPLETED 23 Jul 85

EL. TOP OF HOLE -22.1'+

INSPECTOR S. Slagle

Dist. Soils Section J. Raychel

Chief, Foundations & Materials Branch D. Thomas

Date

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX. SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1						Sampler sank 2.0' by hammer weight (140 lbs)
2						
3						
4		1	SP-SM	Poorly graded sand w/silt	3/4"	11% gr, 81% sa, 8% fines N=3 2.0% organics
5						
6						
7				End of hole @ 6.0' elevation: -28.1'±		
8						
9						
10						
11						
12						
13						

NPA FORM 19 (REV)
DEC. 1959

Juneau, Alaska
PROJECT Aurora Harbor Expansion

PERMANENT HOLE NO. P-62

* Drilling in Gastineau Channel

1859-60

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT Juneau, Alaska Aurora Harbor Expansion

SHEET 1 OF 1

LOCATION (Coordinates or Station) N. 2,365,146+ E. 2,537,484+

DRILLING AGENCY ☒ CORPS OF ENGINEERS ☐ OTHER Alaska District

HOLE NO. FIELD 8 PERMANENT P-63

NAME OF DRILLER D. VanLandingham

WEATHER rain

TYPE OF HOLE TEST PIT ☐ probe HOLE ☒ CHURN DRILL ☐

DEPTH TO 6.6'

DEPTH DRILLED INTO 0.0'

TOTAL DEPTH OF HOLE 6.6'

SIZE AND TYPE OF BIT 2" split sppon

DATUM FOR ELEVATION SHOWN ☐ TEM. ☒ MLLW

TYPE OF EQUIPMENT Longyear Rotary

TOTAL NO. OF SAMPLES 1

TYPE OF SAMPLES split spoon

DEPTH TO GROUND-WATER *

DATE HOLE STARTED

COMPLETED 23 Jul 85

EL. TOP OF HOLE 36.5'±

INSPECTOR S. Slagle

Chief, Soils Section J. Raychel

Chief, Foundations & Materials Branch D. Thomas

Date

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX. SIZE MATERIAL	FORMATION DESCRIPTION & REMARKS
1						Sampler sank 2.6' by hammer weight (140 lbs)
2						
3						
4						
		1	SM	Silty sand	½"	5% gr, 73% sa, N=3 22% fines, 2.2% organics
5						
6						
7				End of hole @ 6.6 Elevation: -43.1'±		
8						
9						
10						
11						
12						
13						

NPA FORM 19 (REV)
DEC 1959

Juneau, Alaska
PROJECT Aurora Harbor Expansion

PERMANENT HOLE NO. P-63

* Drilling in Gastineau Channel

10sp-60

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT Juneau, Alaska
Aurora Harbor Expansion
SHEET 1 OF 1

LOCATION (Coordinates or Station)
N. 2,365,412+ E. 2,537,212+

DRILLING AGENCY ☒ CORPS OF ENGINEERS ☐ OTHER Alaska District

HOLE NO. FIELD 9 PERMANENT P 64

NAME OF DRILLER D. VanLandingham

WEATHER rain

TYPE OF HOLE: TEST PIT ☐ probe HOLE ☒ CHURN DRILL ☐

DEPTH TO 8.4'

DEPTH DRILLED INTO 0'

TOTAL DEPTH OF HOLE 8.4'

SIZE AND TYPE OF BIT 2" split spoon

DATUM FOR ELEVATION SHOWN ☐ TBM. ☒ MLLW

TYPE OF EQUIPMENT Longyear Rotary

TOTAL NO. OF SAMPLES 1

TYPE OF SAMPLES split spoon

DEPTH TO GROUND-WATER *

DATE HOLE STARTED / COMPLETED 23 Jul 85

EL. TOP OF HOLE -34.8'+

INSPECTOR S. Slagle

Chief, Soils Section J. Raychel

Chief, Foundations & Materials Branch D. Thomas

Date

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1						Sampler sank to 4.4' by weight of hammer (140 lbs)
2						
3						
4						
5						
6		1	SP-SM	Poorly graded sand w/silt	½"	9% gr, 80% sa, 11% fines N=7 2.9% organics
7						
8						
9				End of hole @ 8.4' Elev. -43.2'±		
10						
11						
12						
13						

NPA FORM 19 (REV)
DEC. 1959

PROJECT Juneau, Alaska Aurora Harbor Expansion PERMANENT HOLE NO. P-64

* Drilling in Gastineau Channel

1092-4c

APPENDIX D

JUNEAU SMALL BOAT BASIN NO. 2
GEOTECHNICAL INVESTIGATION (USACE, 1961-62)

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT: JUNEAU SMALL BOAT BASIN NO.2
SHEET 1 OF 2
LOCATION (Coordinates or Station): N. 201,808 2365018 E. 198,545 2538339
DRILLING AGENCY: ☒ CORPS OF ENGINEERS ☐ OTHER
HOLE NO. FIELD: DH-1 PERMANENT: DH-6
NAME OF DRILLER: Breckon
WEATHER: Cool
TYPE OF HOLE: TEST PIT ☐ AUGER HOLE ☐ DRILL ☒
DEPTH TO: --
DEPTH DRILLED INTO: --
TOTAL DEPTH OF HOLE: 15'
SIZE AND TYPE OF BIT: Custom sampler
DATUM FOR ELEVATION SHOWN: ☐ TBM. MLLW ☒ MSL.
TYPE OF EQUIPMENT: Jet Probe and Sampler
TOTAL NO. OF SAMPLES: Three
TYPE OF SAMPLES: Disturbed
DEPTH TO GROUND-WATER: *.
DATE HOLE STARTED: 7 Feb 62
DATE HOLE COMPLETED: 7 Feb 62
EL. TOP OF HOLE: 2.8
Geologist: R. S. Velikanje
Chief, Geology Section:
Chief, Foundations & Materials Branch: John C.
Date: 8 Mar 62

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1						
2		1	ML	Sandy SILT F-4		Black, very soft.
3						
4						
5						Vane shear test - bottom of casing at 4 ft.
6		2	SM	Silty gravelly SAND F-3		Occasional thin gravelly layers, dark gray, soft.
7						
8						
9						
10		3				
11			ML	Sandy SILT F-4		Soft.
12						
13						
14						

NPA FORM 19 (REV)
DEC. 1959

PROJECT JUNEAU SMALL BOAT BASIN NO.2 PERMANENT HOLE NO. DH-6

1892-60

Exhibit #7

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT JUNEAU SMALL BOAT BASIN NO. 2
SHEET 2 OF 2
LOCATION (Coordinates or Station) N. 201,808 E. 198,545
DRILLING AGENCY ☒ CORPS OF ENGINEERS ☐ OTHER
HOLE NO. FIELD DH-1 PERMANENT DH-5
NAME OF DRILLER Breckon
WEATHER Cool
TYPE OF HOLE: TEST PIT ☐ AUGER HOLE ☐ CHURN DRILL ☒
DEPTH TO --
DEPTH DRILLED INTO --
TOTAL DEPTH OF HOLE 15'
SIZE AND TYPE OF BIT Custom sampler
DATUM FOR ELEVATION SHOWN ☐ TBM. MLLW ☒ MSL.
TYPE OF EQUIPMENT Jet Probe and Sampler
TOTAL NO. OF SAMPLES Three
TYPE OF SAMPLES Disturbed
DEPTH TO GROUND-WATER *
DATE HOLE STARTED 7 Feb 62 COMPLETED 7 Feb 62
EL. TOP OF HOLE 2.8
Geologist R. S. Velikanje
Chief, Geology Section
Chief, Foundations & Materials Branch John C. Sutton
Date 8 Mar 62

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
15			ML	Sandy SILT F-4		10 ft of 4 inch diameter casing abandoned in hole.
						Vane shear test - bottom of casing at 14 ft. *Water level fluctuates with tide.

NPA FORM 19 (REV)
DEC. 1959

PROJECT JUNEAU SMALL BOAT BASIN NO. 2
PERMANENT HOLE NO. DH-6

1892-60

Exhibit #7

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT JUNEAU SMALL BOAT BASIN NO.2

SHEET 1 OF 3

LOCATION (Coordinates or Station) N. 201,660 2364870 E. 198,532 2538521

DRILLING AGENCY ☒ CORPS OF ENGINEERS ☐ OTHER

HOLE NO. FIELD DH-2 PERMANENT DH-7

NAME OF DRILLER Breckon

WEATHER Cool

TYPE OF HOLE: TEST PIT ☐ AUGER HOLE ☐ [illegible] DRILL ☒

DEPTH TO --

DEPTH DRILLED INTO --

TOTAL DEPTH OF HOLE 33'

SIZE AND TYPE OF BIT Custom sampler

DATUM FOR ELEVATION SHOWN ☐ TBM. MLLW ☒ [illegible].

TYPE OF EQUIPMENT Jet Probe and Sampler

TOTAL NO. OF SAMPLES Three

TYPE OF SAMPLES Disturbed

DEPTH TO GROUND-WATER *

DATE HOLE STARTED 10 Feb 62 COMPLETED 10 Feb 62

EL. TOP OF HOLE -13.5

Geologist R. S. Velikanje

Chief Geology Section Alvin W [illegible]

Chief Foundations & Materials Branch John C. [illegible] Date 8 Mar 62

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1						
2						
3						
4						
5						
6						
7			SM	Silty SAND F-2		Dark gray, soft; sand is very fine.
8						
9						
10						
11						
12						
13						
14						

NPA FORM 19 (REV)
DEC. 1959

PROJECT JUNEAU SMALL BOAT BASIN NO.2 PERMANENT HOLE NO. DH-7

1892-60

Exhibit #7

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT JUNEAU SMALL BOAT BASIN NO.2
SHEET 2 OF 3
LOCATION (Coordinates or Station) N. 201,660 E. 198,532
DRILLING AGENCY ☒ CORPS OF ENGINEERS ☐ OTHER
HOLE NO. FIELD DH-2 PERMANENT DH-7
NAME OF DRILLER Breckon
WEATHER Cool
TYPE OF HOLE TEST PIT ☐ AUGER HOLE ☐ DRILL ☒
DEPTH TO --
DEPTH DRILLED INTO --
TOTAL DEPTH OF HOLE 33'
SIZE AND TYPE OF BIT Custom Sampler
DATUM FOR ELEVATION SHOWN ☐ TBM. MLLW ☒
TYPE OF EQUIPMENT Jet Probe and Sampler
TOTAL NO. OF SAMPLES Three
TYPE OF SAMPLES Disturbed
DEPTH TO GROUND-WATER *
DATE HOLE STARTED 10 Feb 62 COMPLETED 10 Feb 62
EL. TOP OF HOLE -13.5
Geologist R. S. Velikanje
Chief, Geology Section Alvin W [illegible]
Chief, Foundations & Materials Branch John C. [illegible]
Date 8 Mar 62

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
15						Vane shear test - bottom of casing at 14 ft.
16		1				Vane shear test - bottom of casing at 14 ft.
17						
18						
19						
20			SM	Silty SAND F-2		Dark gray, soft; sand is very fine.
21						
22						Vane shear test - bottom of casing at 21 ft.
23						Vane shear test - bottom of casing at 21 ft.
24		2				Occasional pebbles between 22 ft and 26 ft depths.
25						
26						
27						Casing encountered hard, probably metallic obstacle at 27.5 ft of depth.
28						

NPA FORM 19 (REV)
DEC. 1959

PROJECT JUNEAU SMALL BOAT HARBOR NO.2 PERMANENT HOLE NO. DH-7

Exhibit #7 1892-60

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT JUNEAU SMALL [illegible] AT BASIN NO. 2

SHEET 3 OF 3

LOCATION (Coordinates or Station) N 201,660 E. 198,532

DRILLING AGENCY ☒ CORPS OF ENGINEERS ☐ OTHER

HOLE NO. FIELD DH-2 PERMANENT DH-7

NAME OF DRILLER Breckon

WEATHER Cool

TYPE OF HOLE TEST PIT ☐ AUGER HOLE ☐ DRILL ☒

DEPTH TO --

DEPTH DRILLED INTO --

TOTAL DEPTH OF HOLE 33'

SIZE AND TYPE OF BIT Custom Sampler

DATUM FOR ELEVATION SHOWN ☐ TBM. MLLW ☒ [illegible]

TYPE OF EQUIPMENT Jet Probe and Sampler

TOTAL NO. OF SAMPLES Three

TYPE OF SAMPLES Disturbed

DEPTH TO GROUND-WATER *

DATE HOLE STARTED 10 Feb 62 COMPLETED 10 Feb 62

EL. TOP OF HOLE -13.5

Geologist R. S. Velikanie

Chief Geology Section Alvin W. [illegible]

Chief, Foundations & Materials Branch John C. [illegible]

Date 8 Mar 62

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
29						
30						
31			SM	Silty SAND F-2		Dark gray, soft, sand is very fine.
32		3				
33						

Vane shear test - bottom of casing at 27.5 ft.

Vane shear test - bottom of casing at 27.5 ft.

*Water level fluctuates with tide.

NPA FORM 19 (REV.)
DEC. 1959

PROJECT JUNEAU SMALL BOAT BASIN NO. 2 PERMANENT HOLE NO. DH-7

Exhibit #7

1892-60

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT JUNEAU BOAT HARBOR NO. 2

SHEET 1 OF 1

LOCATION (Coordinates or Station) N 202,300 2365510 E. 198,473 2538272

DRILLING AGENCY ☐ CORPS OF ENGINEERS ☒ OTHER S.E. Thorpe Constr Co.

HOLE NO. FIELD TP-2 PERMANENT TP-2

NAME OF DRILLER Hendricks

WEATHER Clear, cold & windy

TYPE OF HOLE TEST PIT ☒ AUGER HOLE ☐ CHURN DRILL ☐

DEPTH TO

DEPTH DRILLED INTO

TOTAL DEPTH OF HOLE 12'

SIZE AND TYPE OF BIT ¼ yd Bucket

DATUM FOR ELEVATION SHOWN ☐ TBM. MLLW ☒ MSL.

TYPE OF EQUIPMENT Bucyrus-Erie 22B Backhoe

TOTAL NO. OF SAMPLES None

TYPE OF SAMPLES --

DEPTH TO GROUND-WATER *

DATE HOLE STARTED 29 Nov 61 COMPLETED 29 Nov 61

EL. TOP OF HOLE 8.3

Geologist R. S. Velikanje

Chief Geology Section Alvin W. [illegible]

Chief Foundations & Materials Branch John C. [illegible]

Date 6 Mar 62

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
0–1			SM	Silty Gravelly SAND		Gray, Moderately compact.
1–5			ML	Sandy SILT F-4		Gray, Compact.
5–6			SM	Silty Gravelly SAND F-2		Yellowish, red, loose, water bearing.
6–9			ML	Sandy SILT F-4		Gray, compact.
9–12			SM	Silty SAND F-2		Brownish gray. Sand is coarse and moderately compact.

Refusal at 12' due to excessive caving.

*Saturated below 5 ft depth. Water level varies with tidal conditions.

NPA FORM 19 (REV.)
DEC. 1959

PROJECT JUNEAU BOAT BARBOR NO. 2 PERMANENT HOLE NO. TP-2

1892-60

Exhibit #7

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT: JUNEAU BOAT HARBOR NO. 2

SHEET 1 OF 1

LOCATION (Coordinates or Station): N. 202,705 2265919 E. 198,179 2537983

DRILLING AGENCY: ☐ CORPS OF ENGINEERS ☒ OTHER S. E. Thorpe Constr Co

HOLE NO.: FIELD TP-3 PERMANENT TP-3

NAME OF DRILLER: Hendricks

WEATHER: Clear, cold & windy

TYPE OF HOLE: TEST PIT ☒ AUGER HOLE ☐ CHURN DRILL ☐

DEPTH TO: --

DEPTH DRILLED INTO: --

TOTAL DEPTH OF HOLE: 11'

SIZE AND TYPE OF BIT: ½ yd Bucket

DATUM FOR ELEVATION SHOWN: ☐ TBM MLLW ☒ MSL.

TYPE OF EQUIPMENT: Bucyrus-Erie 22B Backhoe

TOTAL NO. OF SAMPLES: Two

TYPE OF SAMPLES: Disturbed

DEPTH TO GROUND-WATER: *

DATE HOLE: STARTED 29 Nov 61 COMPLETED 29 Nov 61

EL. TOP OF HOLE: 7.6

Geologist: R. S. Velikanje

Chief, Geology Section: Alvin W Petchek

Chief, Foundations & Materials Branch: John C. Sexton

Date: 6 Mar 62

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1						
2			ML	Sandy SILT F-4		Gray, compact, numerous sea shells, occasional pebbles.
3		3				
4		4				
5						
6						
7						
8			SP/SM	Silty Gravelly SAND F-2		Tannish Gray, moderately compact, water in gravel channels. Reddish colored water at 9 ft depth. Indications of gravel content increase at depth.
9						
10						
11						

Refusal at 11' due to excessive caving.

*Saturated below 9 ft depth. Water level varies with tidal conditions.

NPA FORM 19 (REV)
DEC. 1959

PROJECT JUNEAU BOAT HARBOR NO. 2 PERMANENT HOLE NO. TP-3

1092-60

Exhibit #7

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT: JUNEAU BOAT HARBOR NO. 2
SHEET 1 OF 1

LOCATION (Coordinates or Station): N. 201,764 2344970 E. 198,932 2638725

DRILLING AGENCY: ☒ CORPS OF ENGINEERS ☐ OTHER

HOLE NO.: FIELD TP-4 PERMANENT TP-4

NAME OF DRILLER: Crabtree/ Veilkanje

WEATHER: Heavy snow

TYPE OF HOLE: TEST PIT ☒ AUGER HOLE ☐ CHURN DRILL ☐

DEPTH TO:

DEPTH DRILLED INTO:

TOTAL DEPTH OF HOLE: 5.5'

SIZE AND TYPE OF BIT: #2 Shovel

DATUM FOR ELEVATION SHOWN: ☐ TBM. MLLW ☒ MSL.

TYPE OF EQUIPMENT: Hand tools

TOTAL NO. OF SAMPLES: One

TYPE OF SAMPLES: Disturbed

DEPTH TO GROUND-WATER: *

DATE HOLE STARTED:

DATE HOLE COMPLETED: 2 Dec 61

EL. TOP OF HOLE: 7.9

Geologist: R. S. Velikanje

Chief, Geology Section: Alvin W. Petchek

Chief, Foundations & Materials Branch: John C. Sutton

Date: 6 Mar 62

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1						
2			ML	Sandy SILT F-4		Mottled Gray to Black, compact. 5" cobble at 2 ft. depth.
3		5				
4						Gray green color - sand increases with depth. Water at 4 - 4.5 ft depth. Compact
5			GM	Silty sandy GRAVEL		Yellow brown, loose, wet.

Abandoned at 5.5' due to influx of water at 5 ft depth.

*Saturated below 5 ft depth. Water level varies with tidal conditions.

NPA FORM 19 (REV.)
DEC. 1959

PROJECT JUNEAU BOAT HARBOR NO. 2 PERMANENT HOLE NO. TP-4

1852-60

Exhibit #7

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT: JUNEAU HARBOR BASIN #2
SHEET 1 OF 2

LOCATION (Coordinates or Station): N. 201,648 2364853 E. 199,033 2538825

DRILLING AGENCY: ☐ CORPS OF ENGINEERS ☒ OTHER S.E. Thorpe Constr. Co.

HOLE NO.: FIELD TP-1 PERMANENT TP-5

NAME OF DRILLER: Miller

WEATHER: Snow & Wind

TYPE OF HOLE: TEST PIT ☒ AUGER HOLE ☐ CHURN DRILL ☐

DEPTH TO: --

DEPTH DRILLED INTO: --

TOTAL DEPTH OF HOLE: 16'

SIZE AND TYPE OF BIT: ½ yd Bucket

DATUM FOR ELEVATION SHOWN: ☐ TBM. MLLW ☒ MSL

TYPE OF EQUIPMENT: Bucyrus-Erie 22B Backhoe

TOTAL NO. OF SAMPLES: Two

TYPE OF SAMPLES: Disturbed

DEPTH TO GROUND-WATER: *

DATE HOLE STARTED: 25 Nov 61 COMPLETED: 25 Nov 61

EL. TOP OF HOLE: 7.4

Geologist: R.S. Velikanje

Chief, Geology Section: Alvin W Pateshuk

Chief, Foundations & Materials Branch: John C. Sexton

Date: 6 Mar 62

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1						
2						
3						
4						Dark Gray, Compact, Some stratification, Scattered Sea Shells, Scattered pieces of wood, Occasional cobbles and pebbles.
5			SM	Silty SAND F-3	5"	
6		1				
7						
8						
9						
10						
11						Brown, Loose - Flat platy pebbles and cobbles. *saturated below 10' which is 2.6 feet below MLLW. Test pit is covered with water at high tide.
12			SP/ SM	Silty GRAVELLY SAND F-2	12"	
13						
14		2				

NPA FORM 19 (REV)
DEC. 1959

PROJECT JUNEAU HARBOR BASIN #2 PERMANENT HOLE NO. TP-5

1892-60

Exhibit #7

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT JUNEAU HARBOR BASIN NO. 2
SHEET 2 OF 2
LOCATION (Coordinates or Station) N. 201,648 E. 199,033
DRILLING AGENCY ☐ CORPS OF ENGINEERS ☒ OTHER S. E. Thorpe Constr Co.
HOLE NO. FIELD TP-1 PERMANENT TP-5
NAME OF DRILLER Miller
WEATHER Snow & Wind
TYPE OF HOLE TEST PIT ☒ AUGER HOLE ☐ CHURN DRILL ☐
DEPTH TO
DEPTH DRILLED INTO
TOTAL DEPTH OF HOLE 16'
SIZE AND TYPE OF BIT ¼ Yd Bucket
DATUM FOR ELEVATION SHOWN ☐ TBM. MLLW ☒ MSL.
TYPE OF EQUIPMENT Bucyrus-Erie 22B Backhoe
TOTAL NO. OF SAMPLES Two
TYPE OF SAMPLES Disturbed
DEPTH TO GROUND-WATER *
DATE HOLE STARTED 25 Nov 61 COMPLETED 25 Nov 61
EL. TOP OF HOLE 7.4
Geologist R. S. Velikanje
Chief, Geology Section Alvin W Patschek
Chief, Foundations & Materials Branch John C. Seeton
Date 6 Mar 62

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
15			SP/SM	Silty Gravelly SAND F-2	12"	
16						

Refusal at 16' due to extreme caving.

*Saturated below 10 ft depth, which is 2.6 ft below MLLW. Water level varies with tidal conditions.

NPA FORM 19 (REV)
DEC. 1959

PROJECT JUNEAU HARBOR BASIN NO. 2 PERMANENT HOLE NO. TP-5

1892-60

Exhibit #7

TABLE 1

JUNEAU SMALL BOAT BASIN NO. 2

PROBE HOLE DATA

P - 7			Elev 4.0	12 December 1961
0	-	15.5'	Silty sand	Easy probing.
15.5		23	Gravel	Slow probing.
23		28	Sand	Moderate to easy probing.
P - 8			Elev 1.0	12 December 1961
0	-	26'	Silty sand	Minor gravel lenses - moderate to easy probing.
P - 9			Elev 8.0	12 December 1961
0	-	8'	Silty sand	Easy probing.
8		15.7	Gravel	Coarse material 13-15.7'. Refusal at 15.7' (Boulder?).
P - 10			Elev 8.0	1 February 1962
0	-	8.5'	Silty sand	
8.5		17.5	Gravel	Refusal in gravel at 17.5'.
P - 11			Elev 8.0	13 December 1961
0	-	6'	Silty sand	
6		7	Gravel	Difficult probing - refusal at 7'- (Boulder?).
P - 12			Elev 7.8	13 December 1961
0	-	8'	Silty sand	
8		12.5	Gravel	Refusal at 12.5'.
P - 13			Elev 2.1	15 December 1961
0	-	15'	Silty sand	
15		17	Gravel	Refusal in gravel at 17'.
P - 14			Elev -9.0	15 December 1961
0	-	14'	Silty sand	Easy probing.
14		17	Gravel	
17		21	Sand	Moderately hard probing.
P - 15			Elev -1.0	15 December 1961
0	-	18.5'	Silty sand	Easy probing.
18.5		19.5	Gravel	
19.5		28	Sand	
P - 16			Elev -2.0	15 December 1961
0	-	16'	Silty sand	Easy probing.
16		30	Sand	

P - 17			Elev -3.0	15 December 1961
0	-	27'	Silty sand	Easy probing - gravel at 27'.
P - 18			Elev -6.0	15 December 1961
0	-	26'	Silty sand	Minor gravel lenses.
P - 19			Elev 8.0	15 December 1961
0	-	29'	Silty sand	4" to 6" gravel lenses.
P - 20			Elev 7.3	16 December 1961
0	-	11'	Silty sand	Easy probing.
11		11.5	Gravel	Refusal in gravel at 11.5'.
P - 21			Elev -12.0	5 January 1962
0	-	16'	Silt	Soft.
16		18	Gravel	
18		20	Sand	
P - 22			Elev 3.3	5 January 1962
0	-	0.5'	Silt	Soft.
0.5		18	Gravel	Refusal in gravel at 18'.
P - 23			Elev 6.5	5 January 1962
0.	-	4'	Silt	Soft.
4		13	Gravel	Refusal in gravel at 13'.
P - 24			Elev 8.0	11 January 1962
0	-	4'	Silt	Soft.
4		30	Gravelly sand	Boulder at 30'
P - 25			Elev 7.1	11 January 1962
0	-	10'	Silt	Very easy probe.
10		17	Gravelly sand	Very easy probe penetration throughou
17		24	Gravel	
24		28	Gravelly sand	
P - 26			Elev 6.0	11 January 1962
0	-	6'	Silt	Soft.
6		30	Gravelly sand	Gravel finer below 14', with easier probe penetration.
P - 27			Elev 6.0	11 January 1962
0	-	10'	Silt	Very easy probing throughout.
10		32	Gravelly sand	
P - 28			Elev -0.7	13 January 1962
0	-	8'	Silt	Soft.
8		18	Gravelly sand	
18		28	Gravelly sand with 4"-6" thick gravel lenses	

P - 29			Elev 4.9	13 January 1962
0	-	8'	Silt	Soft.
8		12	Sandy gravel	
12		30	Gravelly sand	
P - 30			Elev -4.5	13 January 1962
0	-	6'	Silt	Soft.
6		8	Sandy gravel	
8		28	Gravelly sand	
P - 31			Elev 8.0	19 January 1962
0	-	1'	Sandy silt	Easy probing.
1		20	Sandy gravel	Moderately hard probing.
20		28	Gravel	
P - 32			Elev 9.0	19 January 1962
0	-	18'	Silty sand	Thin gravel layer at 12'.
18		22	Gravel	Cobble at 18'.
P - 33			Elev 5.6	19 January 1962
0	-	26'	Silty sand	Thin gravel layer at 15'.
P - 34			Elev 5.7	19 January 1962
0	-	9.5'	Silty sand	Easy probing.
9.5		10.5	Gravel	
10.5		25.5	Sand	Moderately hard probing.
P - 35			Elev 6.0	19 January 1962
0	-	12'	Silty sand	Soft.
12		12.5	Gravel	
12.5		26	Sand	
26		27	Gravel	
P - 36			Elev 10.5	20 January 1962
0	-	11'	Silty sand	Minor gravel lenses.
11		12.5	Gravel	
12.5		30.5	Sand	
P - 37			Elev 9.4	20 January 1962
0	-	10'	Silty sand	Abundant junk on surface.
10		23.7	Gravel	Slow probing. Refusal on a solid object at 23.7'.
P - 38			Elev 7.1	20 January 1962
0	-	8'	Silty sand	Cobble at 1'.
8		13	Gravel	Refusal in gravel at 13'.
P - 39			Elev 8.0	23 January 1962
0	-	3'	Silty sand	
3		9	Gravel	Difficult probing 7' to 9'. Refusa at 9'.

P - 40			Elev 8.0	23 January 1962
0	-	3'	Silty sand	
3		18	Gravel	Difficult probing.
18		21	Sand	
P - 41			Elev 11.0	31 January 1962
0	-	9'	Silty sand	Minor gravel lenses.
9		12	Gravel	
12		26	Sand	Minor gravel lenses.
P - 42			Elev 10.1	31 January 1962
0	-	12'	Silty sand	Soft.
12		16	Gravel	
16		26	Sand	
P - 43			Elev -22.2	31 January 1962
0	-	51'	Sandy silt	Soft - easy probing.
51		52	Gravel or boulders	Refusal at 52'.
P - 44			Elev -10.3	31 January 1962
0	-	43'	Sandy silt	Very soft. Occasional 2' thick sand lenses.
43		44.5	Gravel	Refusal on solid at 44.5'.
P - 45			Elev -19.4	31 January 1962
0	-	7'	Silty sand	Soft.
7		10.5	Gravel	Refusal on solid object at 10.5'.
P - 46			Elev -19.0	31 January 1962
0	-	8'	Silty sand	Soft.
8		13	Gravel	Refusal on solid object at 13'.
P - 47			Elev -20.4	1 February 1962
0	-	44'	Sandy silt	Soft. Minor sand lenses - Refusal on solid object at 44'.
P - 48			Elev -37.5	1 February 1962
0	-	20'	Sandy silt	Soft. Minor sand lenses.
20		21	Gravel	
21		30	Fine sand	
30		31	Gravel	Refusal in gravel at 31'.
P - 49			Elev -34.5	1 February 1962
0	-	25'	Sandy silt	Soft.
25		26	Gravel	Refusal in gravel at 26'.
P - 50			Elev 2.0	2 February 1962
0	-	63'	Silt	Very soft.
63		71	Gravel	Refusal on solid object at 71'.

P - 51			Elev -20.5	2 February 1962
0	-	38'	Silt	Very soft.
38		45	Gravel	Refusal at 45' (Boulders?).
P - 52			Elev -43.0	2 February 1962
0	-	18.5'	Silt	Very soft.
18.5		23.5	Sandy silt	Soft.
23.5		25.5	Gravel	Abandoned hole due to slipping anchor
P - 53			Elev -55.8	2 February 1962
0	-	26'	Silt	Very soft. Refusal on solid object at 26'.
P - 54			Elev -30.0	6 February 1962
0	-	32'	Silt	Very soft. Minor sand lenses.
32		51	Silty sand	Soft. Thin gravel layer at 41'.
P - 55			Elev -16.2	6 February 1962
0	-	2'	Silty sand	Soft.
2		4	Gravel	
4		43	Sand	Soft, becoming firmer with depth. Soft zone at 31' to 43'.

NOTE: Locations of probes are shown on the map included in the report. (Dwg No. Q-4-5-75, marked). Elevation datum for probes is MLLW.

APPENDIX E

JUNEAU SMALL BOAT BASIN NO. 2 PHASE 1 PILE DRIVING LOGS (1964)

STATE OF ALASKA

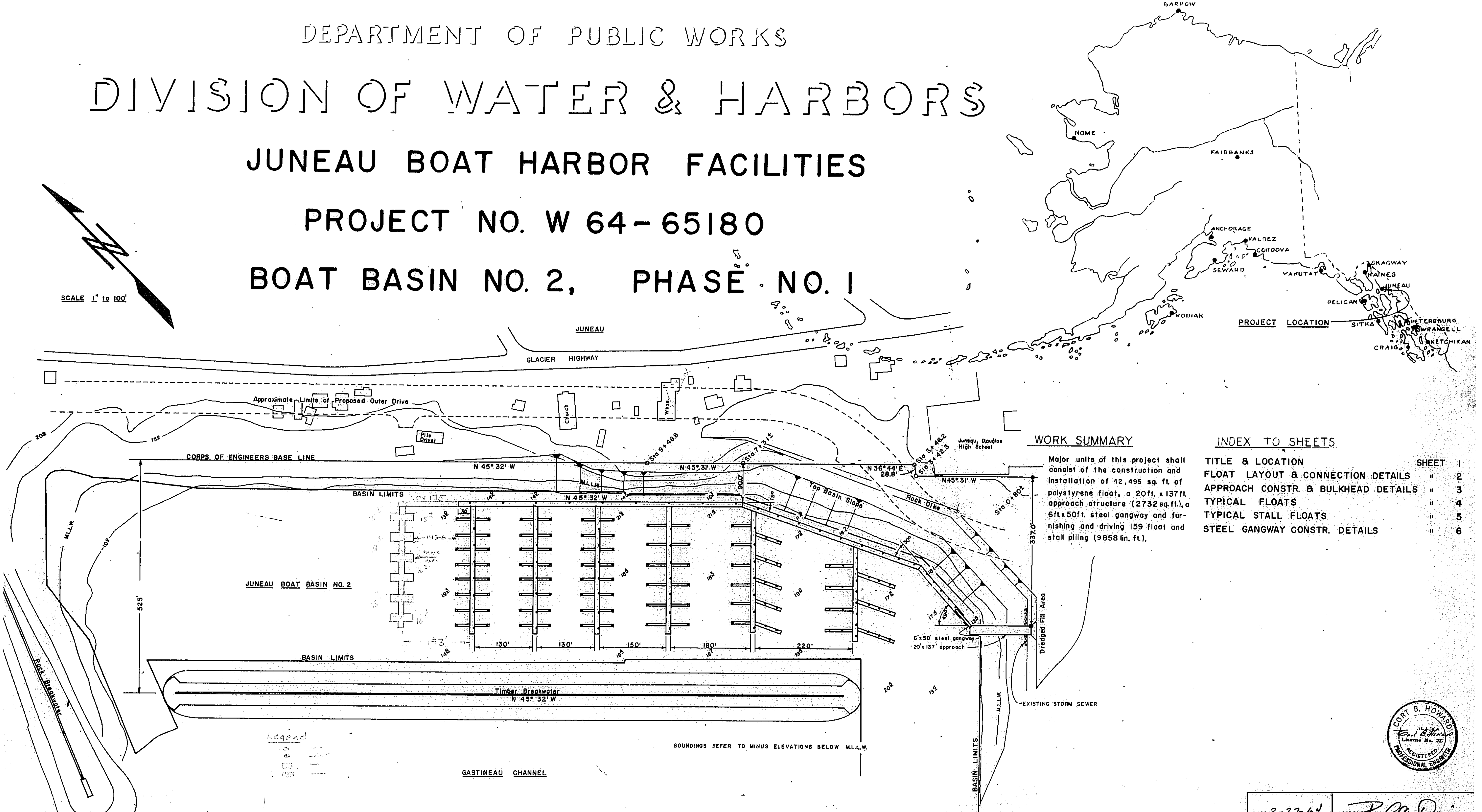
DEPARTMENT OF PUBLIC WORKS

DIVISION OF WATER & HARBORS

JUNEAU BOAT HARBOR FACILITIES

PROJECT NO. W 64-65180

BOAT BASIN NO. 2, PHASE NO. 1



WORK SUMMARY

Major units of this project shall consist of the construction and installation of 42,495 sq. ft. of polystyrene float, a 20ft. x 137ft. approach structure (2732 sq. ft.), a 6ft. x 50ft. steel gangway and furnishing and driving 159 float and stall piling (9858 lin. ft.).

INDEX TO SHEETS

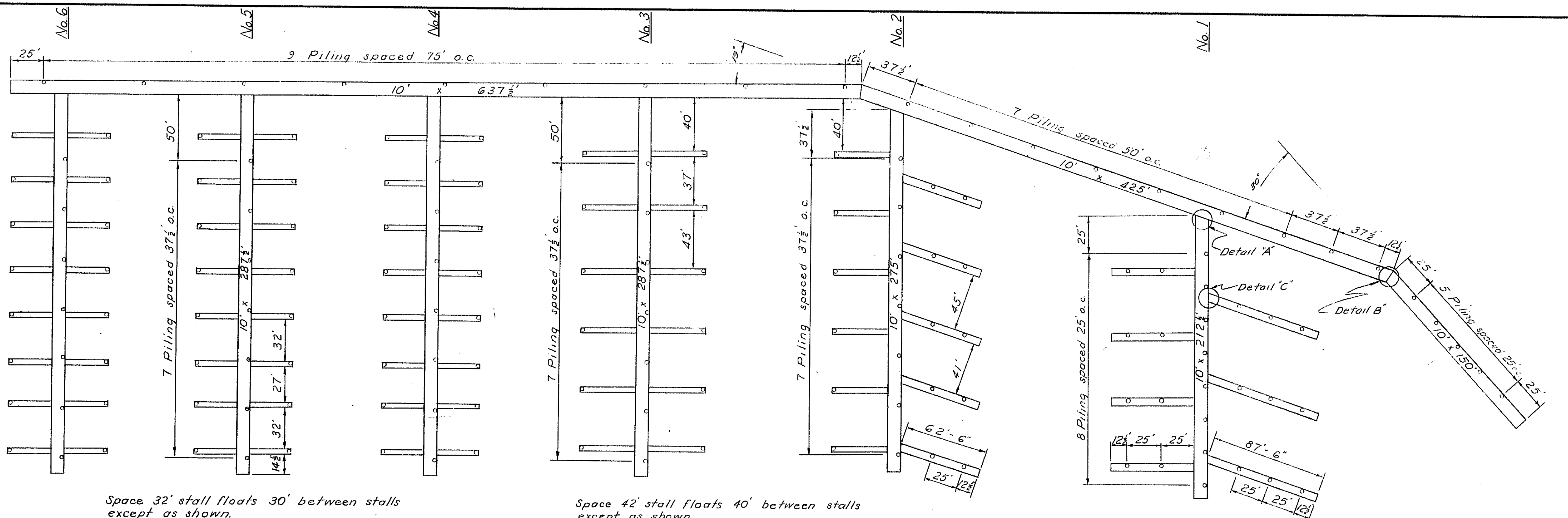
TITLE & LOCATION	SHEET	1
FLOAT LAYOUT & CONNECTION DETAILS	"	2
APPROACH CONSTR. & BULKHEAD DETAILS	"	3
TYPICAL FLOATS	"	4
TYPICAL STALL FLOATS	"	5
STEEL GANGWAY CONSTR. DETAILS	"	6

CORT B. HOWARD
License No. 3E

DATE 2-27-64

APPROVED
COMMISSIONER

SHEET NO. 1 of 6 SHEETS



Space 32' stall floats 30' between stalls except as shown.

Finger floats #4 & 6 shall conform to dimensions given for finger float #5.

Space 42' stall floats 40' between stalls except as shown.

Space 62½' stall floats 43' between stalls except as shown.

Space 87½' stall floats 52' between stalls

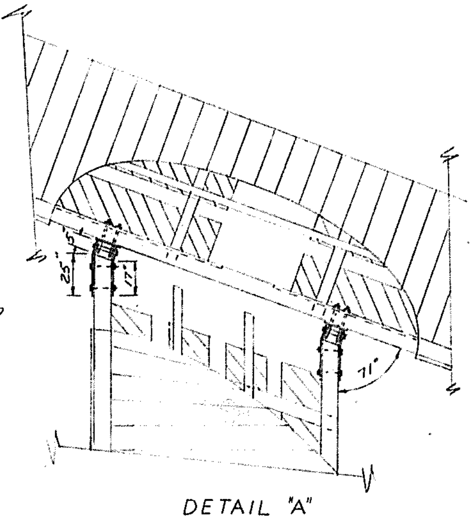
FLOAT LAYOUT

1" = 40'

NOTES

1. Piling to be driven butt down to 15' penetration or refusal
2. Pile cut-off Elev +30Ft.
3. Omit Tie Down Rail where stall floats join finger floats & finger floats join main float.
4. All Tie Down Rails between stalls to be made with one splice only with exception of Rails between 32' stalls which shall be one piece.
5. All splice plates & connection plates shall be bent to the angles indicated & holes drilled prior to galvanizing.

Connection U-bolts & Plates shall conform to the connection detail as shown on sheet 4 except as noted

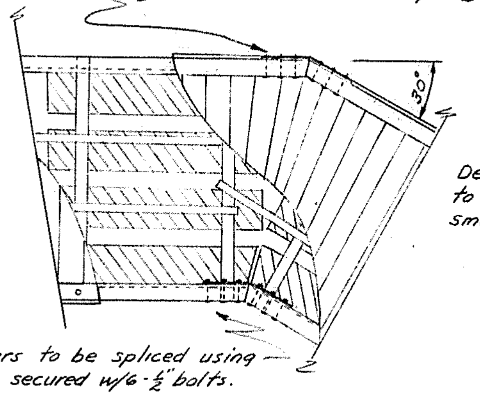


DETAIL "A"
FINGER FLOAT CONNECTION
$\frac{1}{4}$" = 1'-0"

8x8 Tie down rails to be spliced using ⅜"x 7½"x 4'-0" ℙ secured w/6-½" bolts

Decking at float angles to be wedge cut to provide smooth transition about angle.

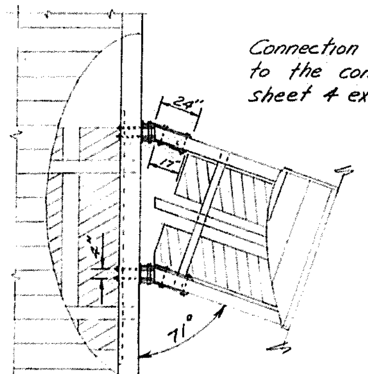
6x8 Stringers to be spliced using ⅜"x 5½"x 4'-0" ℙ secured w/6-½" bolts.



DETAIL "B"
MAIN FLOAT CONNECTION
$\frac{1}{4}$" = 1'-0"

Note 19° Float connection to be similarly constructed

Connection U-bolts & plates shall conform to the connection detail as shown on sheet 4 except as noted



DETAIL "C"
STALL FLOAT CONNECTION
$\frac{1}{4}$" = 1'-0"

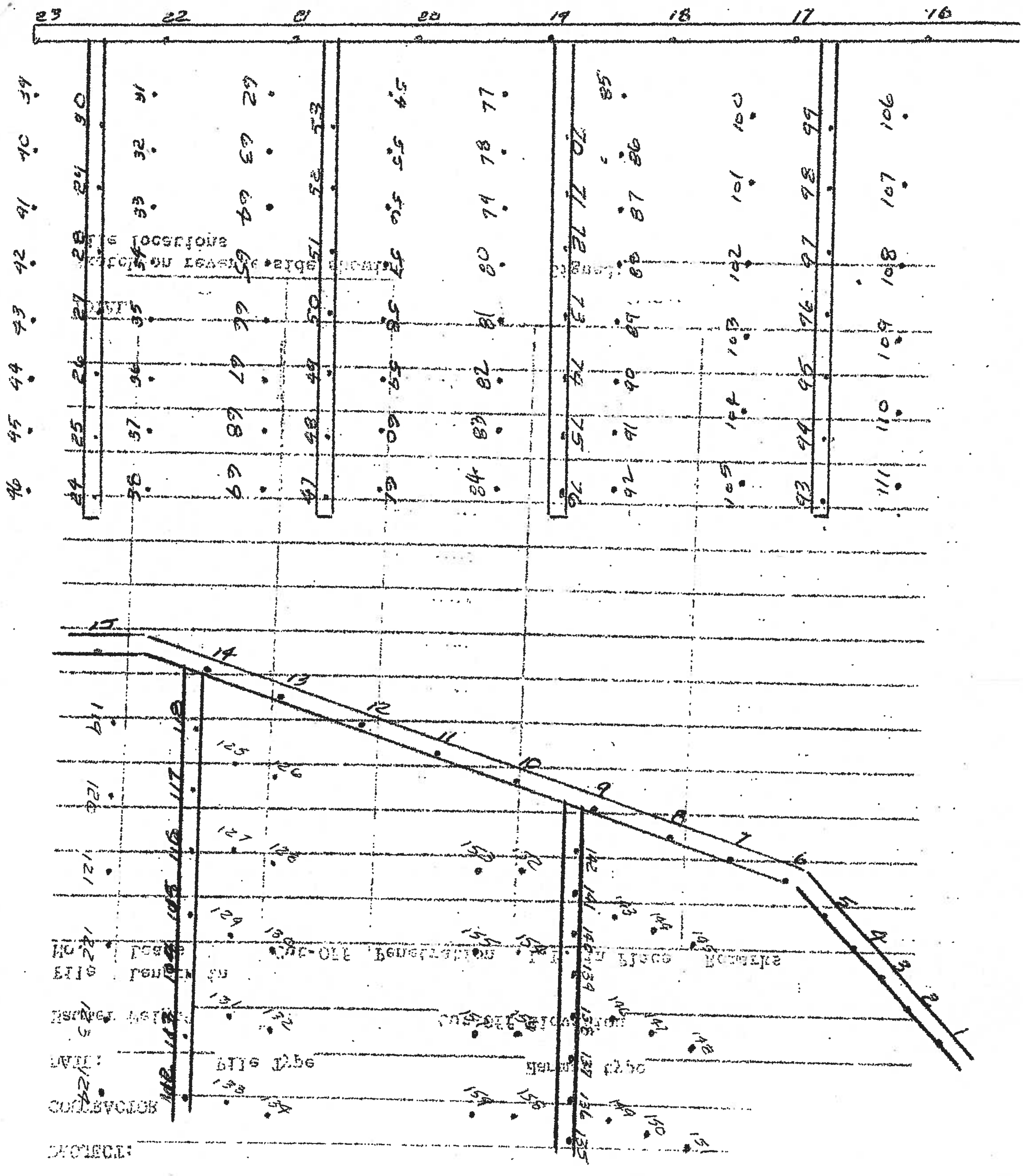
NO.	DATE	REVISION	BY

STATE OF ALASKA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER AND HARBORS

JUNEAU BOAT HARBOR Nº2
Float Layout

SCALE As Shown
DATE March 1964
PROJ. NO. W-64-65180
APPROVED
COMMISSIONER
SURVEYED BY DS
DRAWN BY OK
CHECKED BY DS

SHEET 2 OF 6 SHEETS



Too out

5	62	Too
33	63	1 out
31	64	
37	65	
33	66	
17	67	
3	68	

Replaced 2-63
1-64

Aurora

P. 1 of 12

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau Boat Harbor Facilities W-64-65180

CONTRACTOR Cole & Paddock

DATE: Aug. 1964 Pile Type ______ Hammer type ______

Hammer Weight ______ Cut-Off Elevation 30

Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
1	64	1	14	63	
2	64	1	14	63	
3	64	2	13	62	
4	64	2	13	62	
5	64	1	14	63	
6	64	1	14	63	
7	64	2	13	62	
8	64	2	14	62	
9	64	2	14	62	
10	64	2	13	62	
11	64	9	9	55	Refusel Rock
12	64	2	14	62	
13	64	2	14	62	
14	64	1	15	63	
TOTAL	896	30		866 ok	

Sketch on reverse side showing pile locations

Signed: ______

P 2 OF 12

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau B.H.F. W-64-65180

CONTRACTOR

DATE: Aug. 1964 Pile Type Hammer type

Hammer Weight Cut-Off Elevation

Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
15	63	2	16	61	
16	63	3	16	60	
17	63	1	17	62	
18	63	3	14	60	Refusel
19	63	2	15	61	
20	63	4	12 1/2	59	Refusel
21	63	1	14	62	
22	63	3	12	60	
23	63	2	13	61	
24	66	4	15	62	
25	66	3	16	63	
26	66	2	15	64	
27	64	1	14	63	
28	64	2	14	62	
TOTAL	893.	33		860 ok	

Sketch on reverse side showing pile locations

Signed:

63

1726

P. 3 of 12

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau B.A.F. W-64-65180

CONTRACTOR

DATE: Aug. 1964 Pile Type Hammer type

Hammer Weight Cut-Off Elevation

Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
29	65	2	15	63	
30	66	3	15	63	
31	63	1	14	62	s.
32	63	2	13	61	split
33	62	1	14	61	
34	63	2	13	61	split
35	63	1	14	62	
36	63	1	14	62	
37	63	1	15	62	
38	62	2	15	60	
39	64	1	15	63	
40	64	1	14	63	
41	64	1	13	63	
42	64	1	13	63	
TOTAL	889	20		869 ok	

Sketch on reverse side showing pile locations

Signed:

83

2595

P. A of 12

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau B.H.F. W-64-65180

CONTRACTOR:

DATE: Aug. 1964 Pile Type Hammer Type

Hammer Weight Cut-Off Elevation

Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
43	64	1	13	63	
44	64	1	13	63	
45	64	1	13	63	
46	64	1	14	63	
47	64	1	16	63	Pulled & redrove
48	64	1	15	63	
49	64	1	14	63	
50	63	1	13	62	
51	64	1	14	63	
52	64	1	14	63	
53	64	1	14	63	
54	64	2	16	62	
55	63	2	14	61	
TOTAL	830	15	815	→	

Sketch on reverse side showing pile locations

Signed:

98

~~3174~~

3410

P. 5 OF 12

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau B.H.F. W-64-65 180

CONTRACTOR:

DATE: Aug. 1964 Pile Type Hammer Type

Hammer Weight Cut-Off Elevation

Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
56	63	15	1	62	
57	63	14	2	61	
58	63	14	1	62	
59	63	14	1	62	
60	63	14	1	62	
61	63	15	1	62	Pulled & redrove
62	62	14	1	61	
63	63	15	1	62	
64	65	16	3	62	
65	65	16	2	63	
66	65	16	2	63	
67	65	16	2	63	
68	65	16	1	64	
TOTAL	828		19	809	

Sketch on reverse side showing
pile locations

Signed:

117

~~[illegible]~~

4219

P.6 OF 12

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau B.H.F. W-64-65180

CONTRACTOR:

DATE: Aug. 1964 Pile Type Hammer Type

Hammer Weight Cut-Off Elevation

Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
69	63	1	15	62	Pulled Redrove
70	63	1	15	62	
71	63	2	15	61	
72	63	2	15	61	
73	63	2	15	61	
74	63	1	15	62	
75	63	1	15	62	
76	63	1	15	62	
77	65	2	16	63	
78	65	6	12	59	Busted Top
79	65	2	15	63	
80	65	2	15	63	
81	65	1	16	65	
TOTAL	829	24		805	

Sketch on reverse side showing pile locations

Signed:

141

~~[illegible]~~
5024

P. 7 OF 12

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau B.H.F. W-64-65180

CONTRACTOR:

DATE: Aug. 1964 Pile Type ______ Hammer Type ______

Hammer Weight ______ Cut-Off Elevation ______

Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
82	65	1	16	64	
83	65	2	15	63	
84	65	1	16	64	
85	65	1	16	64	
86	65	2	15	63	
87	65	3	15	62	
88	65	1	16	64	
89	65	1	16	64	
90	65	1	16	64	
91	65	1	16	64	
92	65	1	16	64	
93	65'	1	16	64	
94	65'	3	15	62	

TOTAL

845 19 ~~841~~

Sketch on reverse side showing pile locations

Signed: 826

160

~~[illegible]~~

5850

P.8 of 12

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau B.H.F. W-64-65180

CONTRACTOR:

DATE: Aug. 1964 Pile Type ______ Hammer Type ______

Hammer Weight ______ Cut-Off Elevation ______

Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
95	65	1	16	64	All firm
96	65	1	16	64	driving
97	65	2	15	63	
98	65	6	10	59	Refusel
99	65	1	16	64	
100	66	1	16	65	
101	65	1	15	64	
102	66	2	15	64	
103	65	1	15	64	
104	65	1	15	64	
105	65	1	15	64	
106	65	3	15	62	
107	65	2	16	63	
TOTAL	847	23		824	

Sketch on reverse side showing pile locations

Signed:

183

6674

P. 9 OF 12

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau B.H.F. W-64-65180

CONTRACTOR:

DATE: Aug. 1964 Pile Type Hammer Type

Hammer Weight Cut-Off Elevation

Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
108	65	1	16	64	
109	66	1	16	65	
110	66	1	16	65	
111	66	1	16	65	
112	66	1	16	64	
113	65	2	15	63	Redrove
114	66	2	15	63	Redrove
115	66	3	14	63	
116	66	1	16	65	
117	66	2	15	64	
118	65	2	15	63	Redrove
119	66	1	16	65	
120	66	1	16	65	
TOTAL	853	19		834	

Sketch on reverse side showing pile locations

Signed:

7508

202

P. 10 of 12

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau B.H.F. W-64-65180

CONTRACTOR:

DATE: Aug. 1964 Pile Type Hammer Type

Hammer Weight Cut-Off Elevation

Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
121	66°	2	15	64	
122	67✓	3	15	64	
123	66°	1	16	65	
124	66°	1	16	65	
125	66°	1	16	65	
126	66°	1	16	65	
127	67✓	1	16	66	
128	67✓	2	15	65	
129	66°	1	16	65	
130	67✓	3	15	64	
131	63	1	14	62	Replacements
132	63	1	14	62	"
133	67✓	2	16	65	
TOTAL		20		837	

Sketch on reverse side showing pile locations

Signed:

222

8345

P. 11 of 12

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau B.H.F. W-64-65180

CONTRACTOR:

DATE: Aug. 1964 Pile Type Hammer Type

Hammer Weight Cut-Off Elevation

Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
134	67'	1	16	66	good
135	68	3	15	65	Firm
136	67'	1	16	66	driving
137	67'	2	16	65	No Mud
138	66'	2	15	64	
139	67'	4	14	63	split
140	67'	2	16	65	
141	67'	2	16	65	
142	67'	2	16	65	
143	68	1	16	67	
144	66	1	16	65	
145	66	1	16	65	
146	66	1	16	65	
TOTAL		23		846	

Sketch on reverse side showing pile locations

Signed:

245

9191

P. 12 OF 12

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau B.H.F. W-64-65180

CONTRACTOR:

DATE: Aug. 1964 Pile Type Hammer Type

Hammer Weight Cut-Off Elevation

Pile No.	Length in Leads	Cut-Off	Penetration	L.Ft. in Place	Remarks
147	66	1	16	65	
148	66	2	15	64	
149	66	2	15	64	
150	66	2	15	64	
151	68	2	16	66	
152	67✓	2	16	65	
153	67✓	2	16	65	
154	67✓	2	16	65	
155	67✓	2	16	65	
156	63	2	12	62	Replacement
157	67✓	2	16	65	
158	62	1	11	61	Replacement
159	66✓	2	16	64	
TOTAL		23		835	

Sketch on reverse side showing pile locations

268

Signed:

10,026

APPENDIX F

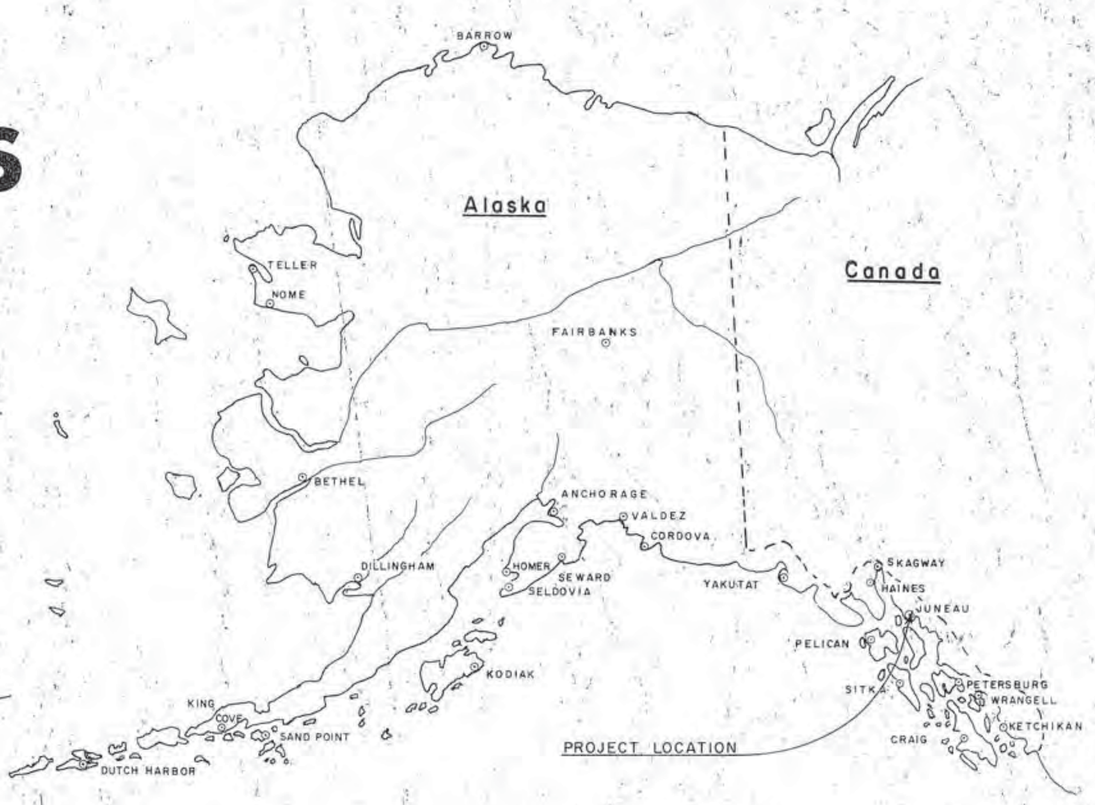
JUNEAU SMALL BOAT BASIN NO. 2 PHASE 3
PILE DRIVING LOGS (1968)

STATE OF ALASKA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS
JUNEAU AURORA HARBOR FACILITIES PHASE NO. 3
PROJECT NO. 3-68180

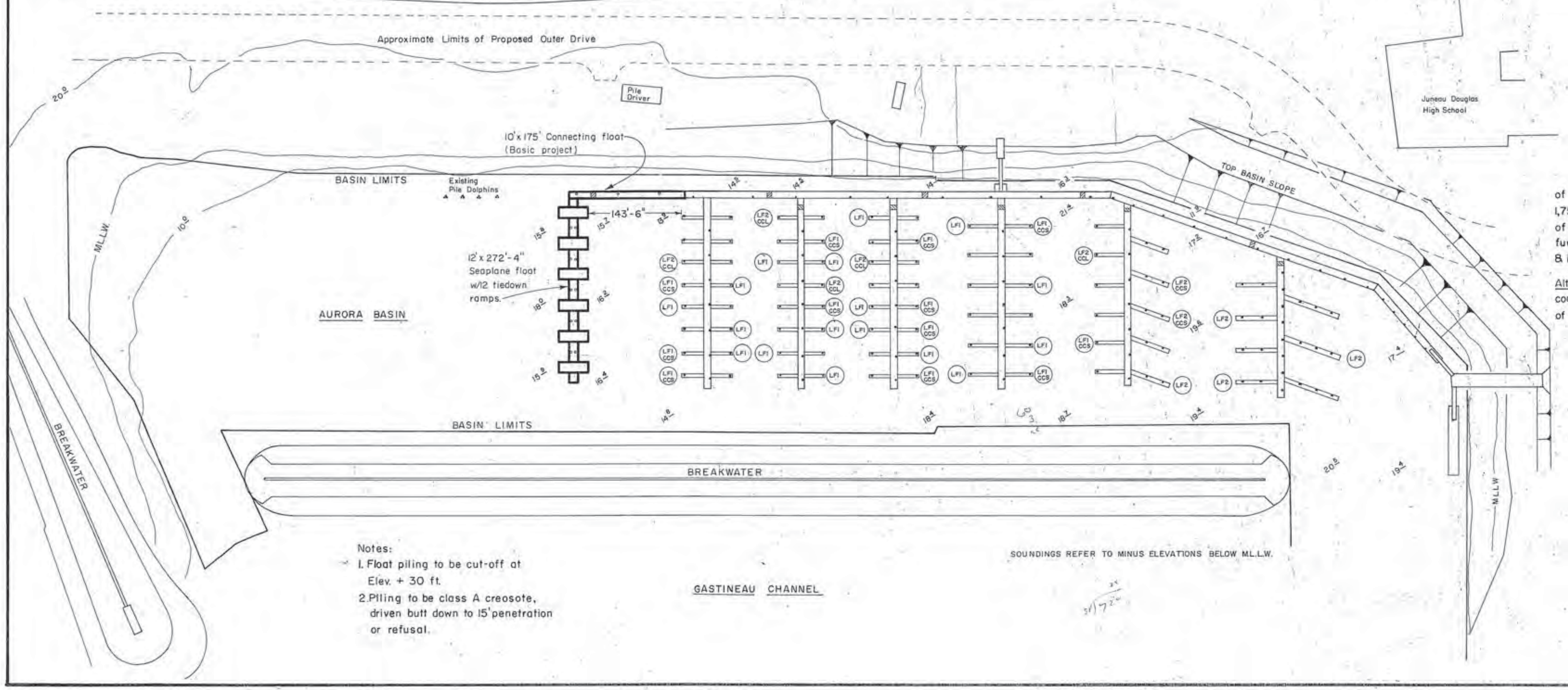
SCALE
1" to 100'

GENERAL LEGEND
- ▭ Existing Facilities
- ▬ Facilities This Contract
- ● Existing Piling
- ○ Piling This Contract
- ▨ Fire Stops This Contract

FLOAT LEVELING LEGEND (Sh. No.2 for details)
LF1 - Leveling flotation 1-5"x 20"x 4'-6" piece polystyrene
LF2 - " " 2 " " pieces "
CCS - Concrete counterbalance (small)
CCL - " " (large)



PROJECT LOCATION



Notes:
1. Float piling to be cut-off at Elev. + 30 ft.
2. Piling to be class A creosote, driven butt down to 15' penetration or refusal.

GASTINEAU CHANNEL

SOUNDINGS REFER TO MINUS ELEVATIONS BELOW ML.L.W.

WORK SUMMARY

The basic project shall consist of the construction & installation of 1,750 S.F. of polystyrene float, 7,048 S.F. of polystyrene seaplane tiedown float, furnishing & driving 13 float piling (793 L.F.) & installing 10 Fire stops.

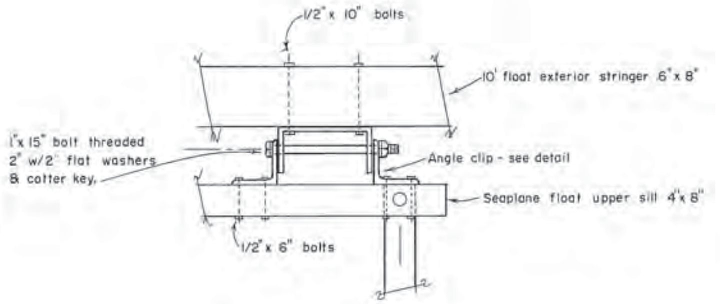
Alternate No: I shall consist of the construction & installation of an additional 500 S.F. of polystyrene connecting float.

INDEX TO SHEETS

NO AS BUILT AVAILABLE

DATE 1/3/68 APPROVED George R. MacPanahan
COMMISSIONER

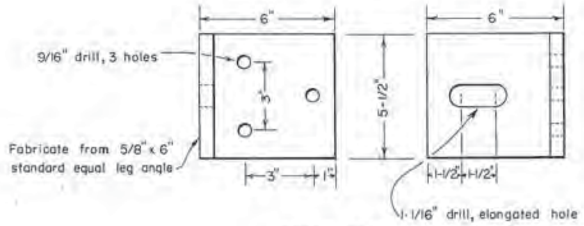
SHEET 1 OF 4 SHEETS



10' FLOAT TO SEAPLANE FLOAT CONNECTION DETAIL

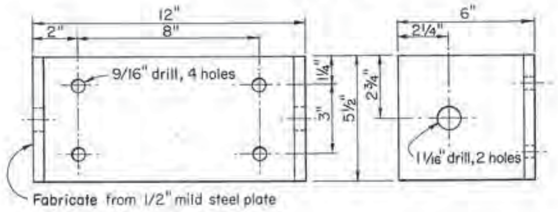
2 (Required)

Scale 1" to 1'-0"



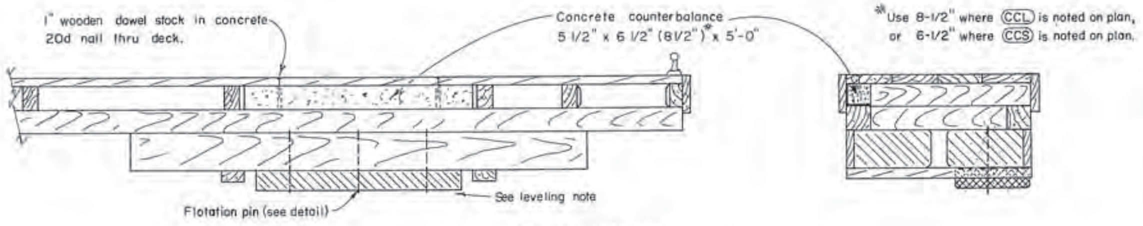
ANGLE CLIP DETAIL

Scale: 3" = 1'-0"



BASE PLATE DETAIL

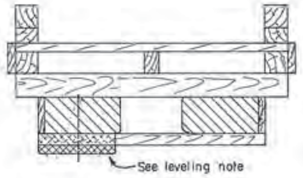
Scale: 3" = 1'-0"



4' FLOAT SECTION

(Showing leveling flotation & concrete ballast)

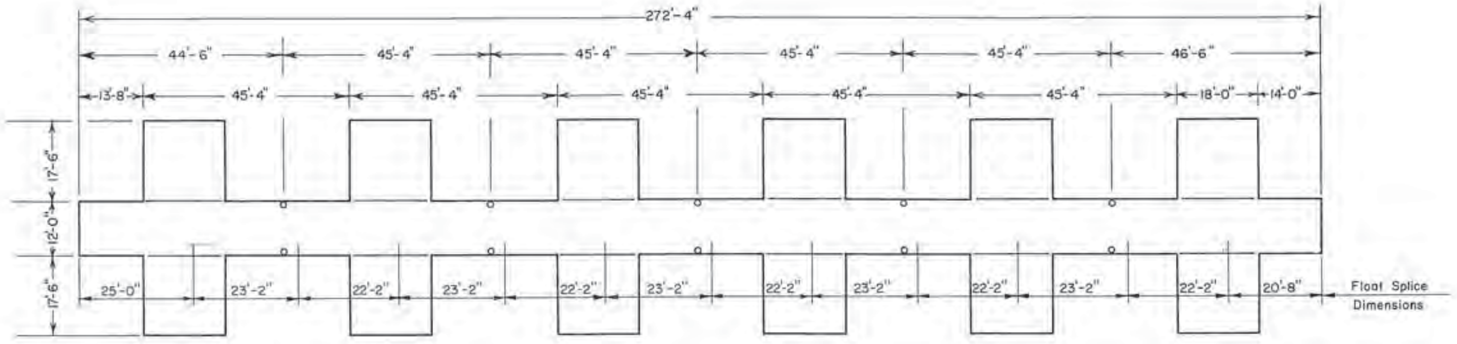
Scale 1/2" to 1'-0"



Leveling Note:
5" x 20" x 4'-6" leveling flotation shall be installed at the locations indicated on float plan layout sheet no 1. Place flotation between lower sill members with the outer edge bearing on siding members (cut side up). Pin flotation together with 1/2" x 20" "ell" pin (see detail, this sheet), 3 places, approx. equally spaced.

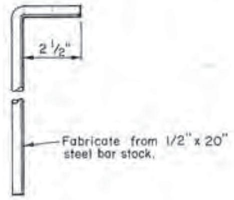
6' FLOAT SECTION

(Showing leveling flotation)



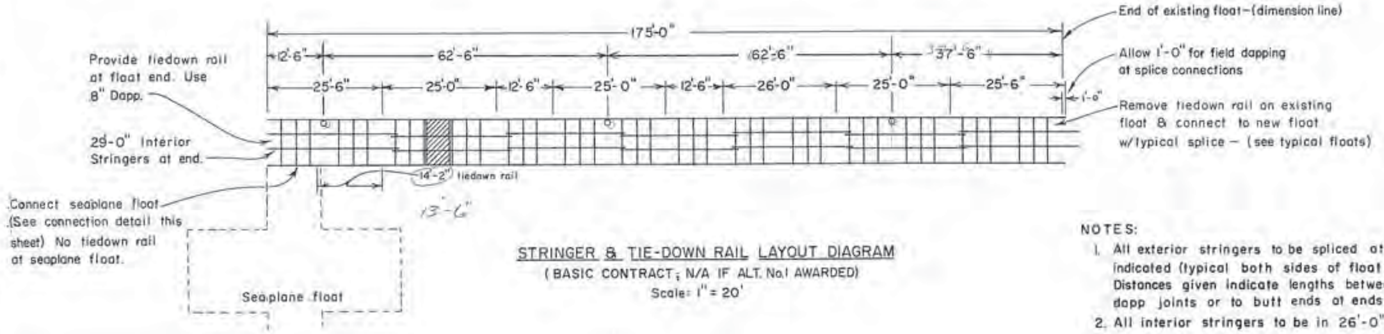
SEAPLANE FLOAT DIMENSIONS—PILE SPACING & SPLICE LAYOUT

Scale 1" to 20'-0"



FLOTATION PIN DETAIL

Scale: 1½" = 1'-0"



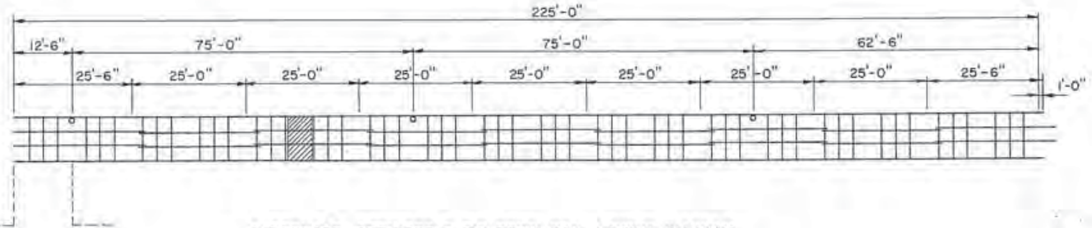
STRINGER & TIE-DOWN RAIL LAYOUT DIAGRAM

(BASIC CONTRACT; N/A IF ALT. No.1 AWARDED)

Scale: 1" = 20'

NOTES:

1. All exterior stringers to be spliced at the locations indicated (typical both sides of float except as indicated) Distances given indicate lengths between centers of dapp joints or to butt ends at ends of float.
2. All interior stringers to be in 26'-0" lengths except as noted.



ALTERNATE STRINGER & TIE-DOWN RAIL LAYOUT DIAGRAM

(APPLICABLE ONLY IF ALT. No.1 IS AWARDED)

Scale: 1" = 20'

For dimensions & notes, refer to basic layout except as noted.

NO	DATE	REVISION	BY

STATE OF ALASKA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER AND HARBORS

FLOAT AND PILING LAYOUT
MISC. CONSTRUCTION DETAILS

SCALE As Noted
DATE 1/3/68
PROJ. NO. 3-68180
DESIGNED BY
APPROVED
DIRECTOR
DRAWN BY
CHECKED BY DS

SHEET 2 OF 4 SHEETS

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau Aurora Harbor Facilities Phase # 3   3-68180

CONTRACTOR: Cole & Paddock

DATE: 6/22/68   Pile Type class A creo   Hammer Type Air

Hammer Weight ______   Cut-Off Elevation 32'+

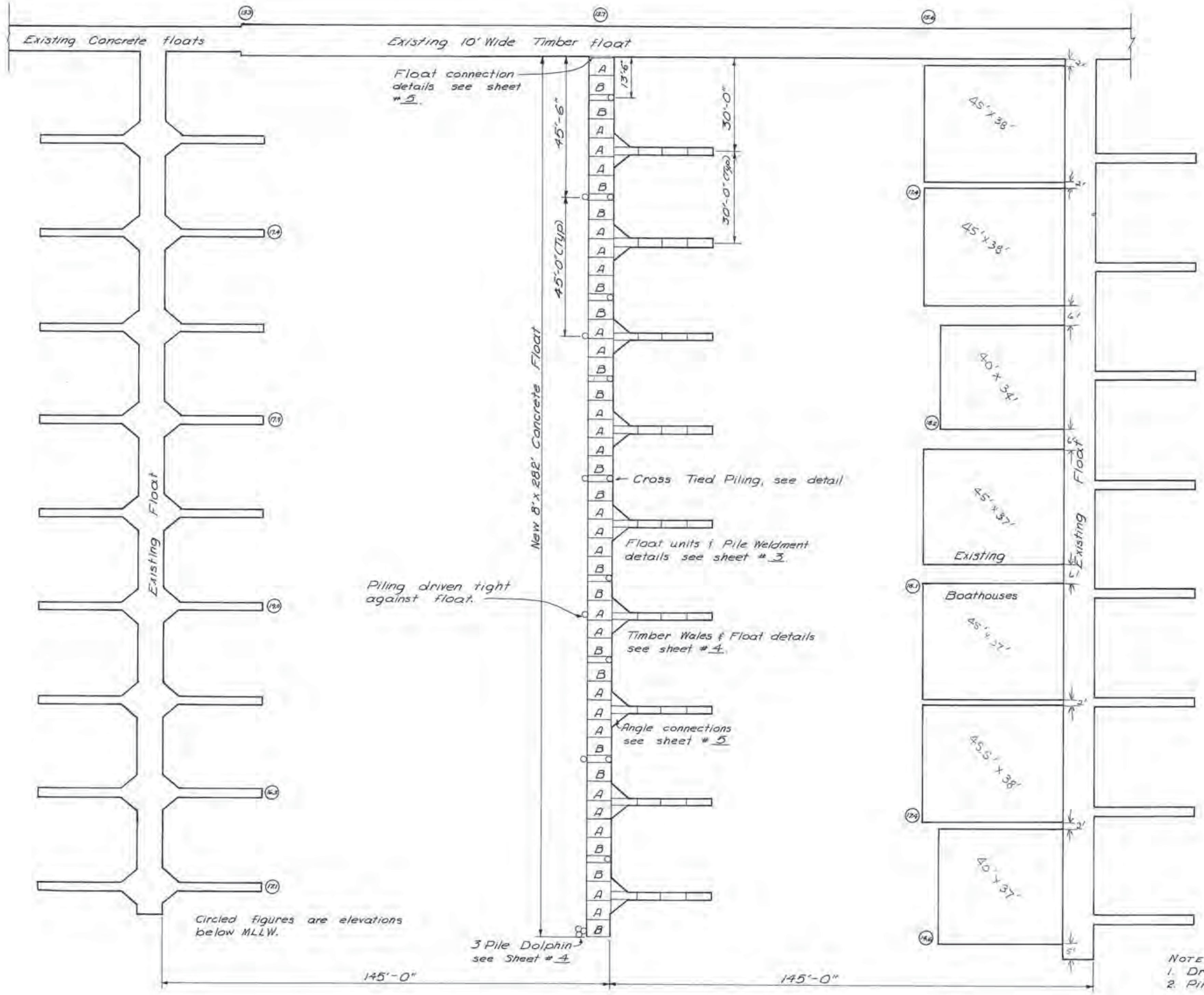
Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
1	62	5	11	57	Refusal
2	62	6	10	56	Refusal
3	62	3	12	59	Refusal
4	63	1	11	62	
5	63	1	11	62	
6	63	1	11	62	
7	63	1	11	62	
8	65	1	12	64	
9	65	1	12	64	
10	67	1	12	66	
11	68	1	12	67	
12	64	1	11	63	
13	64	1	11	63	
TOTAL	831	24		807	

Sketch on reverse side showing pile locations

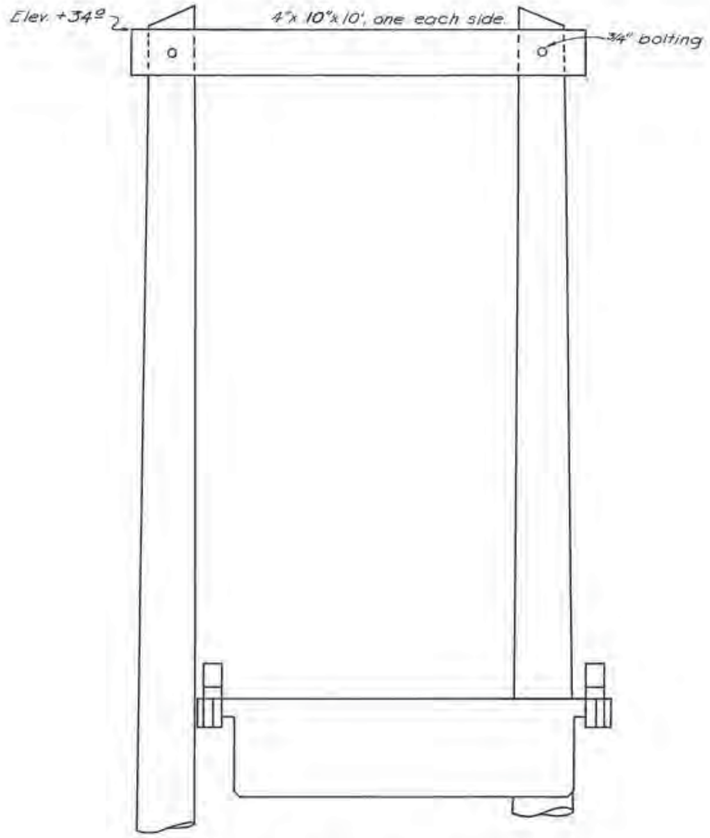
Signed: Wesley Owens

APPENDIX G

JUNEAU - AURORA HARBOR FACILITIES
& TAKU HARBOR REPAIRS
PILE DRIVING LOGS (1973)



PLAN
Scale 1" = 20'-0"



Cross Tied Piling Detail
Scale 1/2" = 1'-0"

NOTES:
1. Drive float piles butt down to 15º penetration, or refusal.
2. Pile Cut-off Elevation +34º.

DO NOT SCALE THIS DRAWING – USE DIMENSIONS

STATE OF ALASKA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER AND HARBORS

JUNEAU – AURORA HARBOR

PLAN VIEW

SCALE As Shown
DESIGNED JDB
CHECKED
SURVEYED
DRAWN JDB
DATE JAN 1973
APPROVED
DON STATTER
DIRECTOR
PROJECT NUMBER 3-73108
SHEET 2 OF 6

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau Aurora Harbor - 373180

CONTRACTOR: Climco Construtors

DATE: 8/24 to 8/27/73 **Pile Type** Class A creo **Hammer Type** Air

Hammer Weight 9B-2 **Cut-Off Elevation** 34'

Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
I	69	0	I7	69	
2	69	0	I5	69	
3	69	0	I5	69	
4	69	I	I5	68	
5	69	I	I5	68	
6	72	I	I5	7I	
7	72	2	I5	70	
8	69	I	I4	68	
9	70	3	I2	67	
I0	72	I	I8	7I	
II	68	2	I5	66	
I2	68	2	I5.	66	
I3	68	I	I3	67	
I4	68	I	I4	67	
I5	70	I	I5	69	
TOTAL					

Sketch on reverse side showing pile locations

Signed: Wesley Owens

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau Aurora Harbor

CONTRACTOR: Climco Constructors

DATE: ________ Pile Type Class A Hammer Type Air

Hammer Weight ________ Cut-Off Elevation 34'

Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
I6	7I	I	I6	70	
I7	70	I	I6	69	
	1183	19		1164 l.f.for pay	

Extremely easy driving,wieght of the hammer settled the pileing approx.eight feet

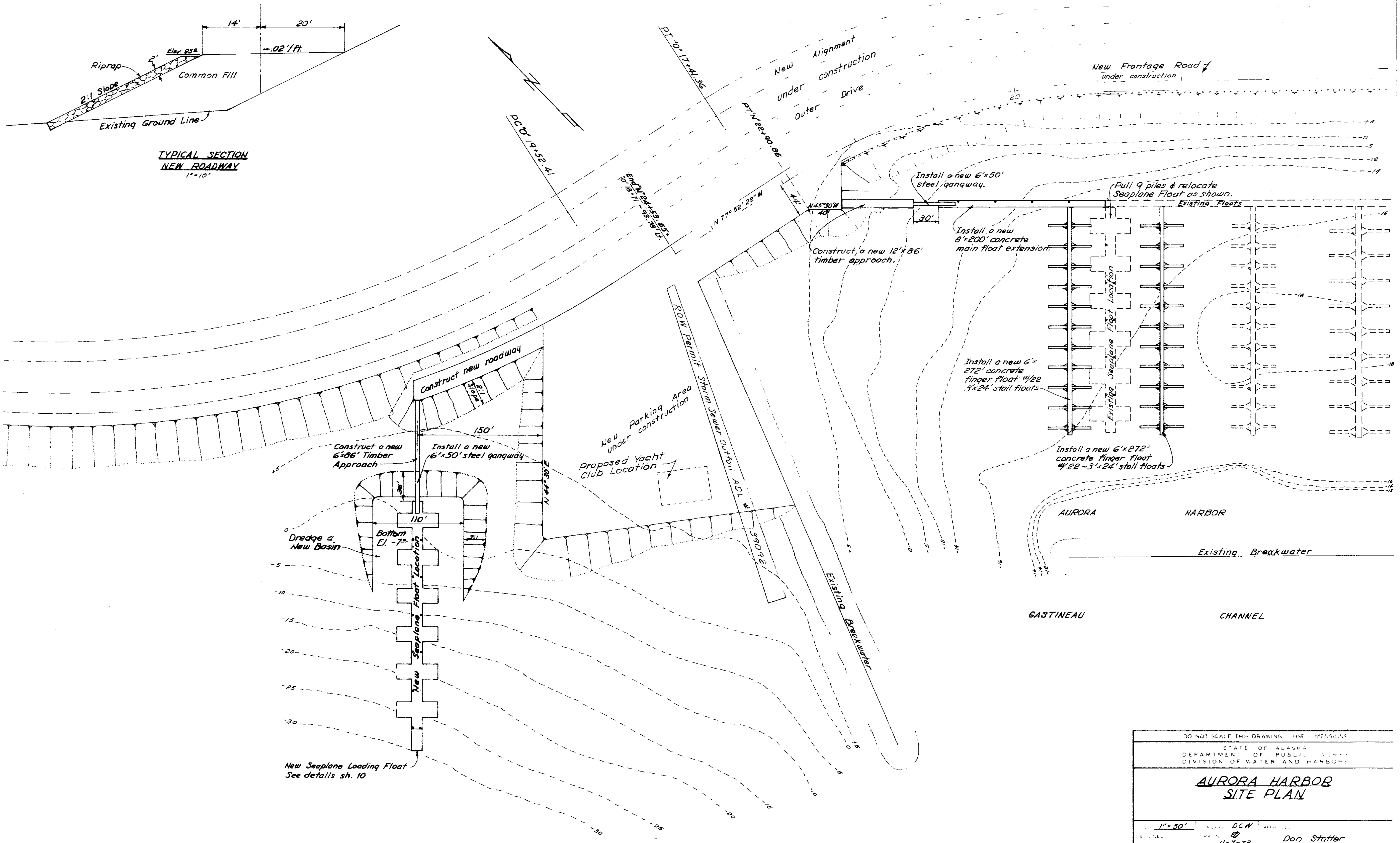
TOTAL

Sketch on reverse side showing pile locations

Signed: ________

APPENDIX H

JUNEAU AURORA HARBOR FACILITIES
PILE DRIVING LOGS (1974)

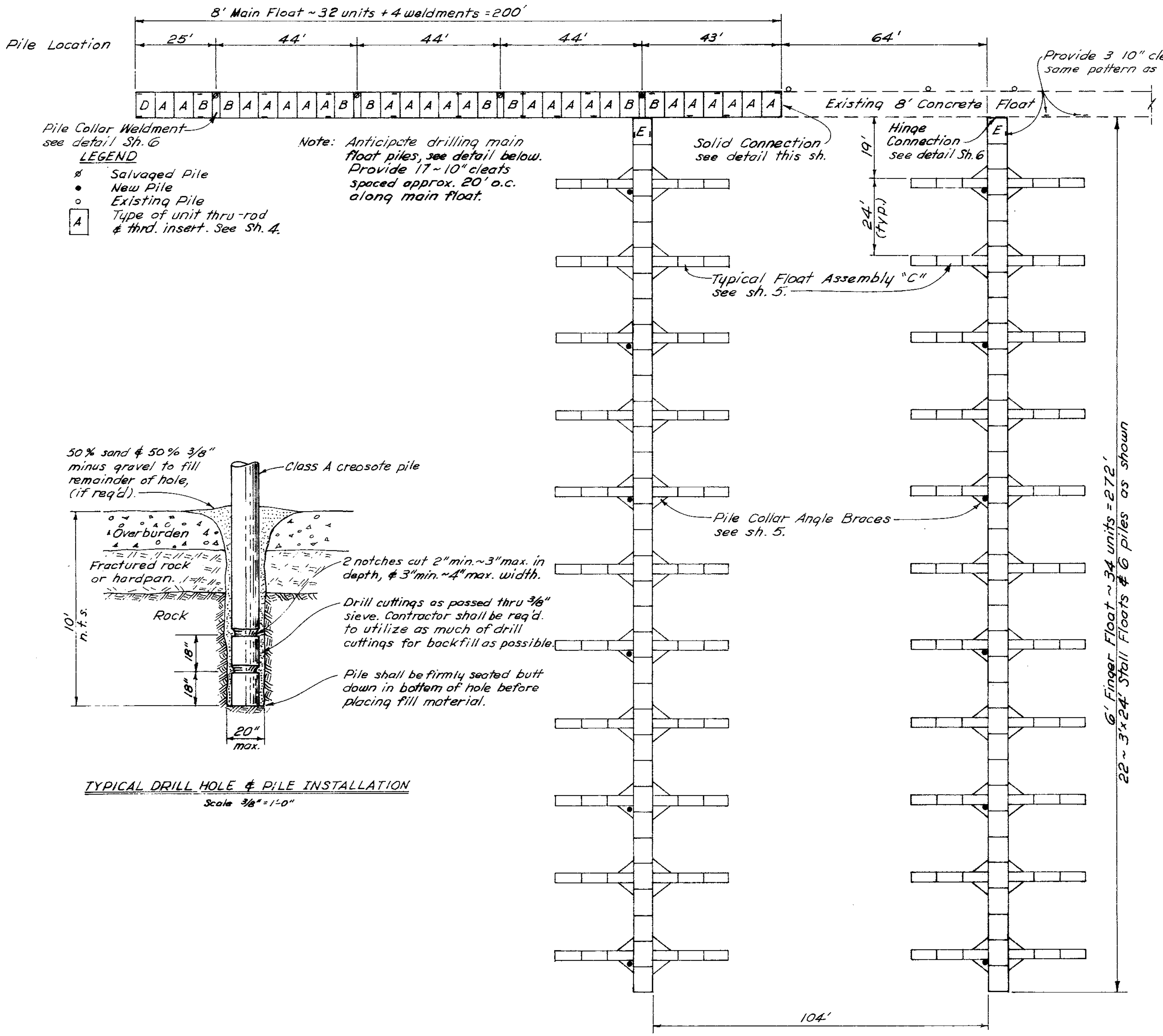


DO NOT SCALE THIS DRAWING USE DIMENSIONS

STATE OF ALASKA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER AND HARBORS

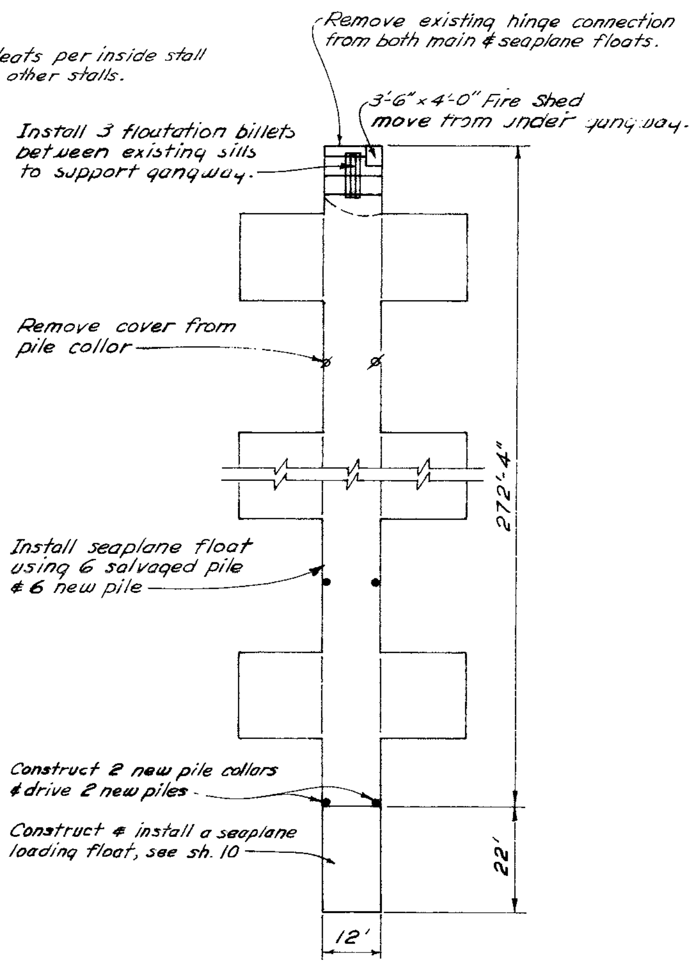
AURORA HARBOR
SITE PLAN

SCALE 1"=50'	DESIGNED DCW	APPROVED
	DRAWN EB	Don Statter
	DATE 11-7-73	
PROJECT NUMBER 3-74180		SHEET 2 OF 11

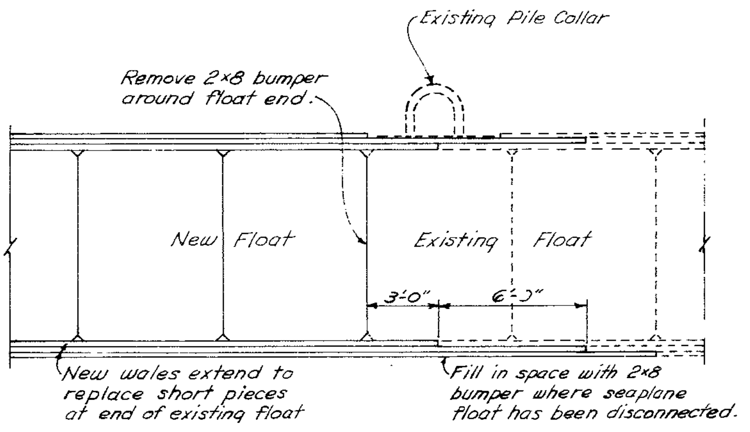


TYPICAL DRILL HOLE & PILE INSTALLATION
Scale 3/8" = 1'-0"

NEW FLOAT LAYOUT
1" = 20'



SEAPLANE FLOAT
1" = 20'



SOLID CONNECTION DETAIL
1/4" = 1'-0"

NOTES:

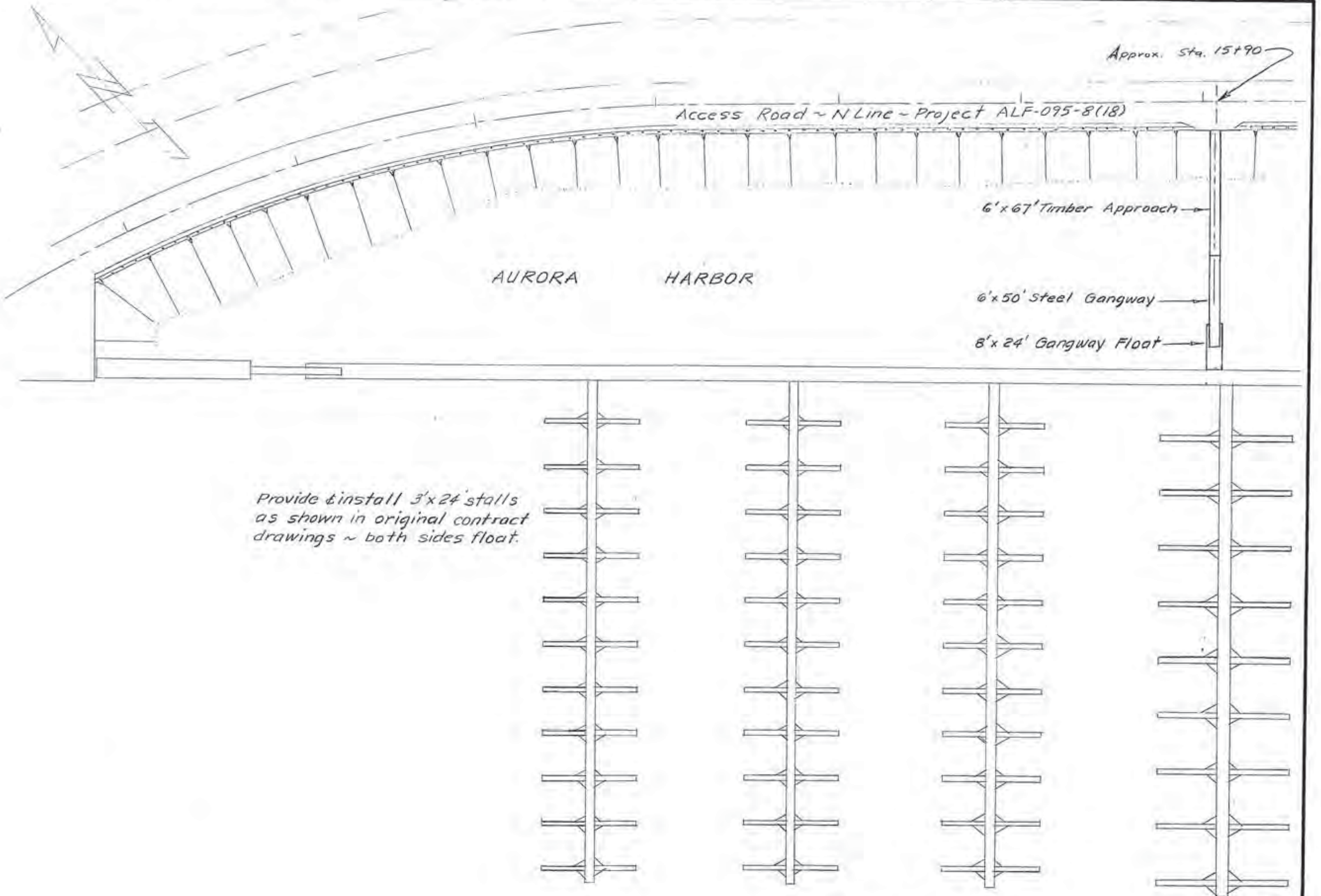
1. Float piles to be driven butt down to 15' penetration or refusal (See Specs.).
2. Pile cutoff Elev. = +34.0
3. All nominal dimensions on float layout are from face to face of concrete, or face of concrete to centerlines.

DO NOT SCALE THIS DRAWING – USE DIMENSIONS

STATE OF ALASKA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER AND HARBORS

AURORA HARBOR
FLOAT LAYOUT

SCALE As Shown	SURVEYED	APPROVED
DESIGNED	DRAWN AB	Don Statter
CHECKED	DATE Nov. 1973	DIRECTOR
PROJECT NUMBER	3-74180	SHEET 3 OF 11

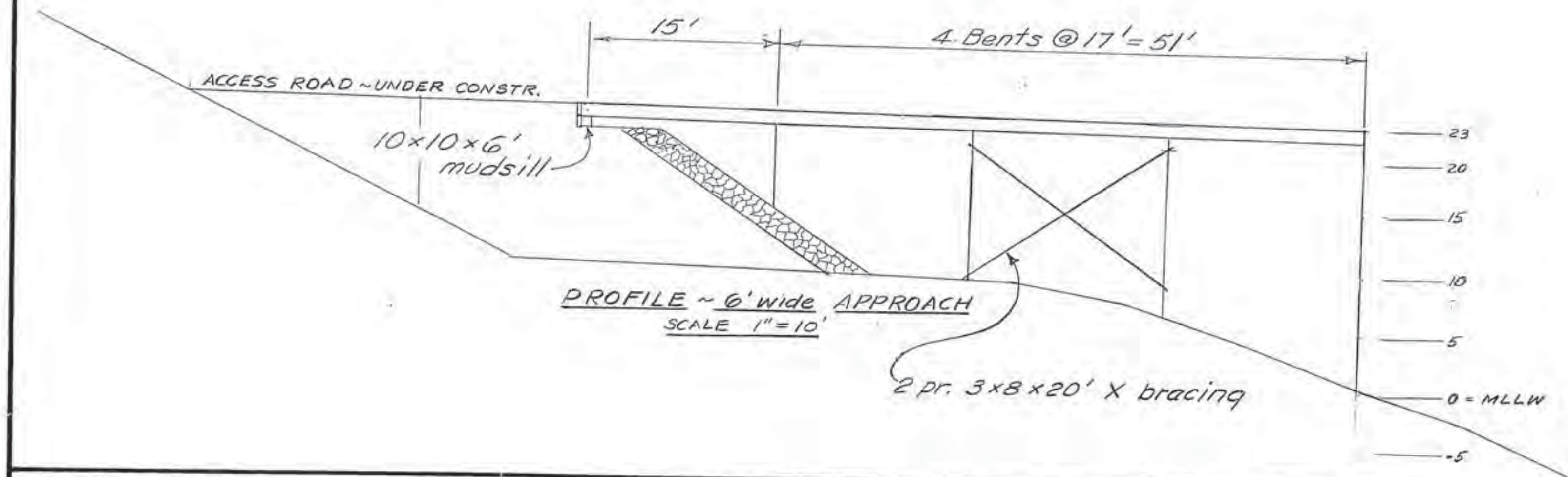


Provide & install 3'x24' stalls as shown in original contract drawings ~ both sides float.

PROJECT LAYOUT
SCALE 1" = 50'

NOTES

All mat'ls, fastenings, dimensions, etc. shall conform to details shown on the contract drawings, except as noted this Sheet.



PROFILE ~ 6' wide APPROACH
SCALE 1" = 10'

As Constructed 10-15-74 EB

STATE OF ALASKA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

JUNEAU AURORA HARBOR
CHANGE ORDER No. 1

SCALE AS SHOWN
DESIGNED DW
CHECKED DW
SURVEYED MH
DRAWN MH-DW
DATE 6-13-74
APPROVED
DON STATTER
DIRECTOR
PROJECT NUMBER 374180
SHEET 1 OF 1

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau Aurora Harbor Facilities No. 3-74180

CONTRACTOR: T.O. Peddock Co.

DATE: Aug. 23-24-26/1974 Pile Type Creosote Hammer Type Vulcan #1

Hammer Weight E=15,000 ft lbs Cut-Off Elevation 21.29

Aurora Harbor 6'x69' Approach

Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
1	38	4	22	34	Soft Bottom
2	38	1	25	37	
3	40	5	22	35	
4	40	4	23	36	
5	40	3	22	37	
6	40	4	21	36	
7	45	8	16	37	
8	45	6	18	39	
sept 9, 1974		Seaplane Float 6'x35' Approach			
1.	38	2	25	36	
2	50	7	32	43	
3	60	4	26	56	11/pent. w/one blow.
4	60	10	20	50	
TOTAL					

Sketch on reverse side showing pile locations

Signed: Ed Stewart

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau Aurora Harbor Facilities No. 3-74180

CONTRACTOR: J.O. Peddock

DATE: Aug 30-31 Sept 3-4 Pile Type Creosote Hammer Type Vulcan #1

Hammer Weight E=15000 ft.lb. Cut-Off Elevation 20.21

Aurora Harbor 12'x86' Approach

	Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
	1	25	7.5	17.5'	17.5	
	2	21	16.5	3.5'	4.5	on Boulder
	3	30	9	9'	21	
	4	35	14	9'	21	
3	5	35	5	8'	30	
	6	35	5	8'	30	
4	7	40	10	7'	30	
	8	40	10	7'	30	
5	9	40	13.3	1.7'	26.7	big used piles w/steel shoes Refusal
	10	40	12	3.0'	28	
6	11	40	10	3.0'	30	
	12	40	11.5	1.5'	28.5	
	TOTAL					

Sketch on reverse side showing pile locations

Signed: Ed Stewart

ALASKA DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER & HARBORS

PILE DRIVING LOG

PROJECT: Juneau - Aurora Harbor

CONTRACTOR: T. O. Paddock Co.

DATE: 9-13-74 Pile Type 12" steel × 3/8" Hammer Type Vulcan No. 1

Hammer Weight 5000# Cut-Off Elevation 34. -32?

Pile No.	Length in Leads	Cut-Off	Penetration	L.F. in Place	Remarks
1	57-10"	7.8	5.0	50	
2	57-10"	8.6	4.2	49.2	
3	57-10"	8.3	4.5	49.5	
4	50-0	0	5.0	50	
				199'	

TOTAL 198.7 199 L.F.

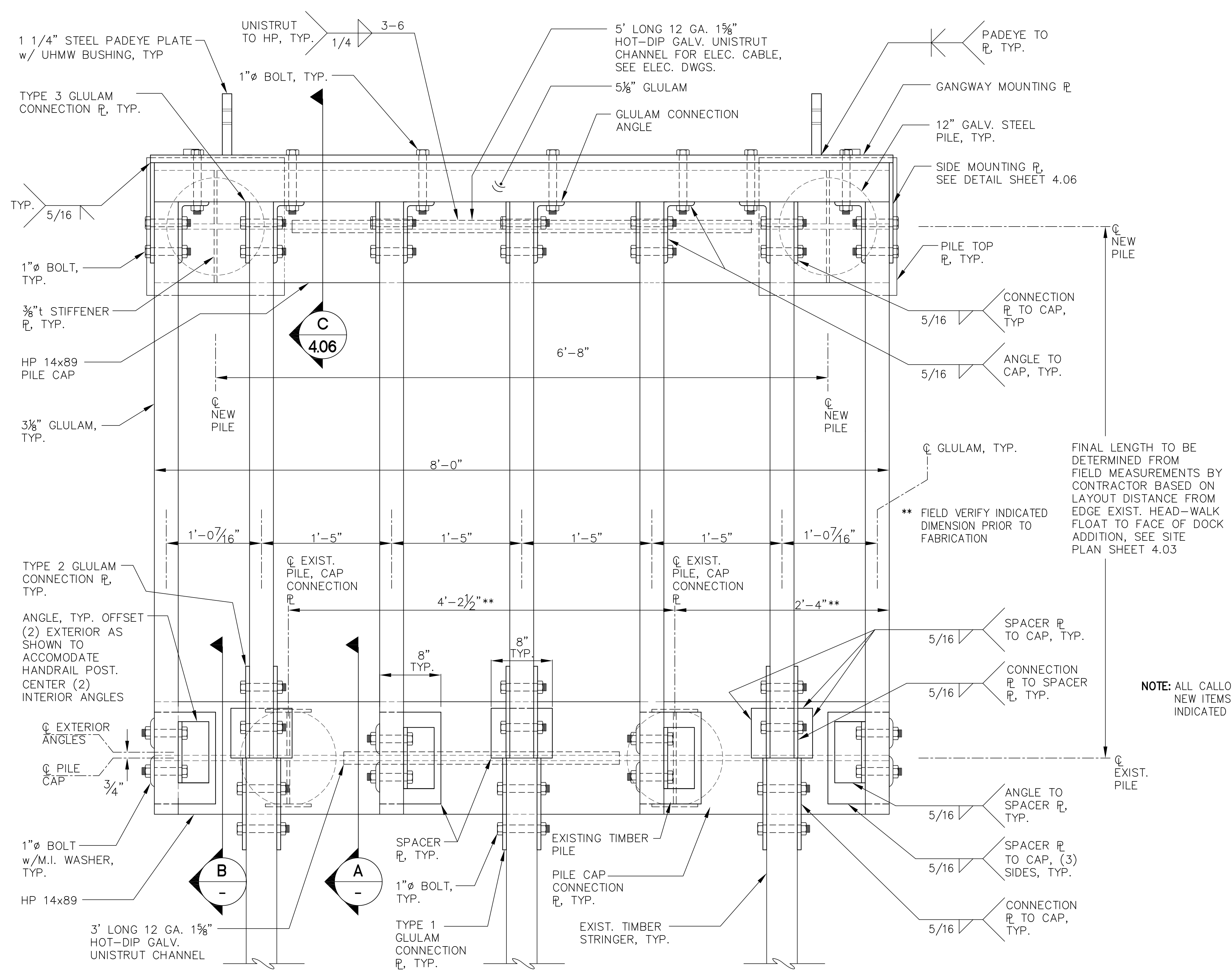
Sketch on reverse side showing pile locations

Signed: Dave

34
16
50
70

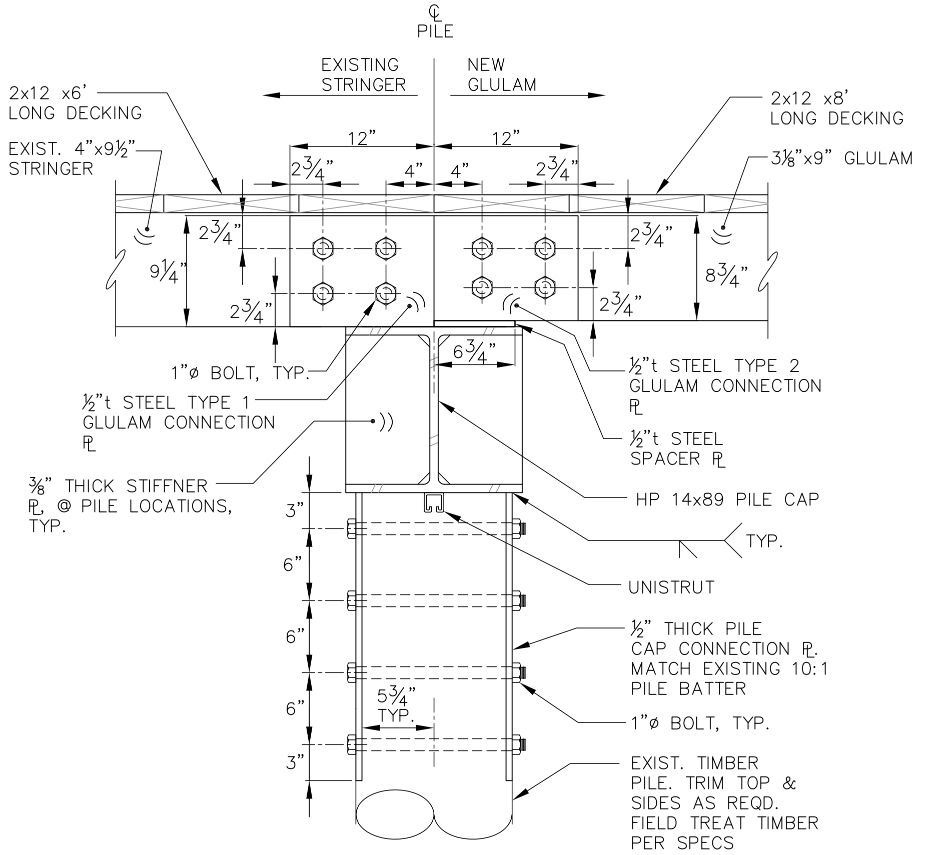
APPENDIX I

AURORA HARBOR REPAIRS AND RENOVATIONS
PILE DRIVING LOGS (2004)

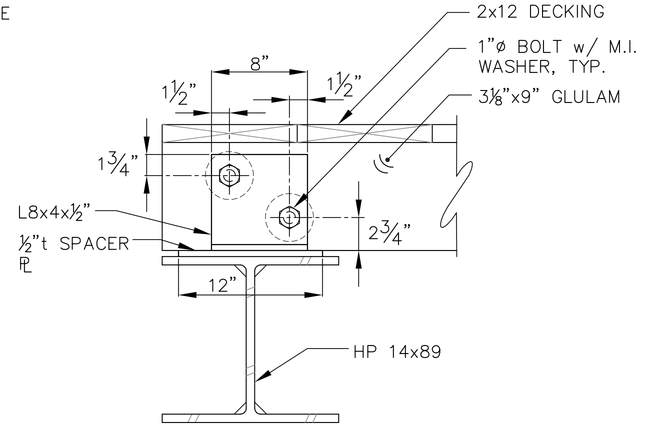


H-GANGWAY ADDITION - STRUCTURAL PLAN

NOTE: ALL CALLOUTS REFER TO NEW ITEMS UNLESS OTHERWISE INDICATED



A - TYPICAL SECTION



B - TYPICAL SECTION

CITY/BOROUGH OF JUNEAU
☆ ALASKA'S CAPITAL CITY
DOCKS & HARBORS DEPARTMENT

REVISIONS

REV.	DATE	DESCRIPTION	DWN.	CKD.	APP.

P | N | D
Incorporated
CONSULTING ENGINEERS

3220 Hospital Drive Ste 200
Juneau, Alaska 99801
Phone: 907-586-2093
Fax: 907-586-2099
www.pnd-anc.com

DESIGN: AWS CHECKED: CRS
DRAWN: AWS APPROVED: CRS
SCALE: AS SHOWN

Charles R. Somerville
CE-8845
DATE: 03/05/04

AURORA HARBOR
REPAIRS & RENOVATION
CONTRACT NO. DH04-269

SHEET TITLE:
H-GANGWAY APPROACH DOCK ADDITION DETAILS

PN&D PROJECT NO.: 032029.02 DWG. FILE:

4.05
SHEET 27 OF 42

Aurora Harbor Repairs & Renovation

Peratrovich, Nottingham & Drage, Inc.
Engineering Consultants
3220 Hospital Drive, Ste 200 • Juneau, AK 99801

Phone: (907) 586-2093
Fax: (907) 586-2099

PILE DRIVING RECORD

PN&D PROJECT #: 032029.05

TIP ELEV.	PENETR. (FT.)	BLOWS/ FT.	NOTES	TIP ELEV.	PENETR. (FT.)	BLOWS/ FT.	NOTES
+8	0					UNKNOWN	
7				15			
6							
5					25		
-					26		
-	5				26-6"		
-					26-7"	24 B/IN	
-					26-8"	33 B/IN	
0					26-9"	20 B/IN	
					26-10"	42 B/IN	
	10						
-5							
-							
	15						
-10							
	20						

PILE LOCATION: H-7
DATE DRIVEN: 9/8/04
PILE TYPE: 12.75Ø X0.500t
TIP TYPE: OPEN SHOE
HAMMER TYPE: MKT 7B
RATED ENERGY: 4150'#@.85
FOREMAN: BILL SMART
EST. BEARING CAP.: 56,982#
INITIAL LENGTH(S): 60.5'
CUTOFF LENGTH(S): 19 26'
FINAL LENGTH: 41 13'
CUTOFF ELEV.: 22 3'
GROUND ELEV.: +8 MLLW
TIP ELEV.: -19 MLLW
COMMENTS:
CONTRACTOR DRIVING @ ARRIVAL OF PND ON-SITE

INSPECTOR:

DATE: 9/8/04

Peratrovich, Nottingham & Drage, Inc.
Engineering Consultants
3220 Hospital Drive, Ste 200 • Juneau, AK 99801

Phone: (907) 586-2093
Fax: (907) 586-2099

PILE DRIVING RECORD

PN&D PROJECT #: 032029.05

TIP ELEV.	PENETR. (FT.)	BLOWS/ FT.	NOTES	TIP ELEV.	PENETR. (FT.)	BLOWS/ FT.	NOTES
+8	0	—				15	
	1	17	2:23 PM	-15		42	
		60				59	
5		62		-17	25	123	
		35			25'-1"	40	
	5	20					
		15		-20			
		18.					
0		20					
		22					
	10	24					
		23		-25			
		22					
-5		20					
		11					
	15	2					
		7					
		26					
-10		8					
	20	11					

PILE LOCATION: H-2
DATE DRIVEN: 9/8/04
PILE TYPE: 12.75Ø x0.500t
TIP TYPE: OPEN SHOE
HAMMER TYPE: MKT 7B
RATED ENERGY: 4150'#@.85
FOREMAN: BILL SMART
EST. BEARING CAP.: 56,440#
INITIAL LENGTH(S): 60.5'
CUTOFF LENGTH(S): 13"'
FINAL LENGTH: 47 38'
CUTOFF ELEV.: 22 3'
GROUND ELEV.: +8 MLLW
TIP ELEV.: -17 MLLW
COMMENTS:

INSPECTOR:

DATE: 9/8/04

APPENDIX J

LOCAL CLIMATE SUMMARIES FOR TEMPERATURE AND PRECIPITATION VARIATION

JUNEAU 2, ALASKA

Period of Record General Climate Summary - Temperature

Station:(504094) JUNEAU 2

From Year=1965 To Year=2012

	Monthly Averages			Daily Extremes				Monthly Extremes				Max. Temp.		Min. Temp.	
	Max.	Min.	Mean	High	Date	Low	Date	Highest Mean	Year	Lowest Mean	Year	>= 90 F	<= 32 F	<= 32 F	<= 0 F
	F	F	F	F	dd/yyyy or yyyymmdd	F	dd/yyyy or yyyymmdd	F	-	F	-	# Days	# Days	# Days	# Days
January	33.2	24.4	28.8	56	19/2009	-20	19/1972	39.2	1981	13.4	1969	0.0	11.3	22.7	0.6
February	36.9	27.3	32.1	57	27/1992	-9	01/1968	40.6	1977	13.9	1979	0.0	5.9	18.9	0.4
March	40.4	30.0	35.2	56	21/1981	-4	01/1972	40.6	1984	29.0	1967	0.0	2.9	18.0	0.0
April	48.8	35.0	41.9	69	26/1983	20	04/1968	46.0	1993	37.7	1982	0.0	0.0	7.6	0.0
May	55.8	41.5	48.7	79	28/1998	28	11/1971	53.8	1998	44.7	1982	0.0	0.0	0.3	0.0
June	62.1	47.9	55.0	87	21/1991	32	07/2010	61.4	1998	51.2	1972	0.0	0.0	0.0	0.0
July	63.6	51.0	57.3	85	29/1976	42	21/1965	61.6	1998	54.5	1969	0.0	0.0	0.0	0.0
August	63.0	49.9	56.5	88	20/1998	34	31/1968	61.6	2004	53.4	2006	0.0	0.0	0.0	0.0
September	56.5	45.3	50.9	76	04/1996	28	27/1983	53.2	1989	47.1	1992	0.0	0.0	0.3	0.0
October	48.6	39.0	43.8	63	02/1987	16	30/1984	46.9	1993	40.8	1996	0.0	0.1	3.6	0.0
November	39.9	30.8	35.3	58	11/1997	-7	24/1965	41.2	1976	25.6	1985	0.0	3.7	14.9	0.1
December	36.1	27.4	31.8	68	09/1965	-22	07/1970	38.6	1969	23.2	1980	0.0	8.0	20.0	0.2
Annual	48.7	37.5	43.1	88	19980820	-22	19701207	45.6	1993	40.6	1982	0.0	31.9	106.1	1.3
Winter	35.4	26.4	30.9	68	19651209	-22	19701207	37.2	1977	22.7	1969	0.0	25.2	61.6	1.1
Spring	48.3	35.5	41.9	79	19980528	-4	19720301	45.3	1993	38.8	1982	0.0	2.9	25.8	0.0
Summer	62.9	49.6	56.3	88	19980820	32	20100607	58.7	1993	53.9	1985	0.0	0.0	0.0	0.0
Fall	48.3	38.4	43.3	76	19960904	-7	19651124	45.7	1979	39.2	1985	0.0	3.8	18.7	0.1

Table updated on Oct 31, 2012
For monthly and annual means, thresholds, and sums:
Months with 5 or more missing days are not considered
Years with 1 or more missing months are not considered
Seasons are climatological not calendar seasons

Winter = Dec., Jan., and Feb.   Spring = Mar., Apr., and May
Summer = Jun., Jul., and Aug. Fall = Sep., Oct., and Nov.

JUNEAU 2, ALASKA

Period of Record General Climate Summary - Precipitation

Station:(504094) JUNEAU 2

From Year=1965 To Year=2012

	Precipitation											Total Snowfall		
	Mean	High	Year	Low	Year	1 Day Max.		>= 0.01 in.	>= 0.10 in.	>= 0.50 in.	>= 1.00 in.	Mean	High	Year
	in.	in.	-	in.	-	in.	dd/yyyy or yyyymmdd	# Days	# Days	# Days	# Days	in.	in.	-
January	7.06	15.35	1985	0.69	1998	2.17	17/1987	18	14	5	1	24.2	72.1	1989
February	6.10	11.66	1988	0.06	1989	3.14	20/1988	16	12	4	1	12.7	44.8	1990
March	5.92	10.04	2004	1.42	2011	3.60	13/1972	18	13	4	1	10.1	53.7	2007
April	4.98	9.38	1980	1.18	1989	1.83	22/1970	17	12	3	1	0.8	3.1	1982
May	5.62	11.26	1966	1.86	1968	2.50	19/1972	19	13	4	1	0.0	0.5	1971
June	4.28	7.57	2012	1.00	1966	2.57	03/1977	16	10	3	1	0.0	0.0	1966
July	5.69	13.43	1969	2.51	1993	2.24	16/1971	17	12	4	1	0.0	0.0	1965
August	7.61	15.39	1983	2.09	1979	4.16	17/2009	19	14	6	2	0.0	0.0	1965
September	12.00	19.09	1968	4.10	1986	4.55	28/1970	21	17	9	4	0.0	0.0	1966
October	13.21	26.68	1978	6.64	1969	3.60	18/1978	24	20	10	4	0.3	7.0	1991
November	9.39	21.01	2005	2.26	1965	4.14	30/1988	20	16	7	2	8.0	45.8	1990
December	8.67	19.59	2006	1.17	1983	5.00	17/2006	20	15	6	2	15.8	42.2	1968
Annual	90.52	108.05	1987	72.17	1982	5.00	20061217	226	169	65	21	71.9	124.8	1989
Winter	21.82	34.91	2007	7.97	1969	5.00	20061217	55	41	16	5	52.7	90.3	1982
Spring	16.52	22.78	1966	10.19	1989	3.60	19720313	54	38	11	2	10.9	53.7	2007
Summer	17.57	26.75	1969	9.13	1989	4.16	20090817	52	36	13	4	0.0	0.0	1966
Fall	34.60	51.28	2005	20.62	1984	4.55	19700928	65	53	26	10	8.3	45.8	1990

Table updated on Oct 31, 2012
For monthly and annual means, thresholds, and sums:
Months with 5 or more missing days are not considered
Years with 1 or more missing months are not considered
Seasons are climatological not calendar seasons
Winter = Dec., Jan., and Feb.   Spring = Mar., Apr., and May
Summer = Jun., Jul., and Aug. Fall = Sep., Oct., and Nov.

APPENDIX K

LIST OF DEFINITIONS

List of Geologic Definitions

The following definitions are used from Neuendorf and others, 2005.

bathymetric Pertaining to the measurement of ocean depths and the charting of the topography of the ocean floor.

borehole A circular hole made by drilling.

cohesionless Said of a soil that has relatively low shear strength when air-dried and low cohesion when wet, e.g. a sandy soil.

cohesive Said of a soil that has relatively high shear strength when air-dried, and high cohesion when wet, e.g., a clay-bearing soil.

foliation Parallel orientation of platy minerals, or mineral banding in metamorphic rocks.

fjord A long, narrow, winding, glacially-eroded inlet or arm of the sea, U-shaped and steep-walled, generally several hundred meters deep, between high rocky cliffs or slopes along a mountainous coast.

glacio-marine Pertaining to the combined interaction of a glacial and marine environment.

graywacke A field designation for dense, gray to greenish-gray colored impure sandstone that consists of 25 percent or more angular to subrounded feldspar grains and dark colored minerals and/or rock fragments.

isostatic rebound A situation where prior crustal loading, as by ice, water or sediments, or volcanic flows, leads to isostatic depression or downwarping; removal of the load leads to isostatic rebound or upwarping.

mean lower low water A chart datum, the average of the lower low-water heights of each tidal day, averaged over a specific 19-year period.

metamorphic rock Any rock derived from preexisting rocks by mineralogical, chemical, or structural changes, essentially in the solid state, in response to marked changes in temperature, pressure, shearing stress, and chemical environment, generally at a depth in the Earth's crust.

mudstone A blocky or massive, fine-grained sedimentary rock in which the proportions of clay and silt are approximately equal.

overburden The loose soil, silt, sand, gravel, or other unconsolidated material overlying bedrock, either transported or formed in place.

physiography Pertaining to the description of the surface features of the Earth, as bodies of air, water and land, with an emphasis on mode of origin.

Pleistocene epoch The time period spanning from approximately 1.75 million years ago to approximately 11,500 years ago, characterized by repeated glaciations.

sandstone A medium-grained sedimentary rock composed of abundant rounded or angular fragments of sand size with or without a fine-grained matrix and more or less firmly united by a cementing material.

sedimentary rock A rock resulting from the consolidation of loose sediment that has accumulated in layers.

APPENDIX L

ASFE PUBLICATION

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORTS

Important Information About Your
Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one—not even you*—should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions *only* at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an *opinion* about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce such risks, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations", many of these provisions indicate where geotechnical engineers responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Rely on Your Geotechnical Engineer for Additional Assistance

Membership in ASFE exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE

8811 Colesville Road Suite G106 Silver Spring, MD 20910
Telephone: 301-565-2733 Facsimile: 301-589-2017
email: info@asfe.org www.asfe.org

IIGER1000.10M