

## NEW RUBBLEROCK BREAKWATER AND HARBOR

### NEW BREAKWATER :

SUPPORTED BY APPROXIMATELY  
A TEN FOOT LAYER OF SAND AND  
GRAVEL AND A THINNER SINGLE  
LAYER OF LEAN CLAY AND BELOW  
THAT A VERY THICK LAYER OF  
SAND, GRAVEL AND BOULDERS .  
DRAIN WICKS ARE NOT REQUIRED.

### IMPROVED BEACH ROAD ACCESS :

NEW ROAD RAMP TO BOAT SLIPS  
TWO LANE SPORTBOAT RAMP

### APPEARANCE :

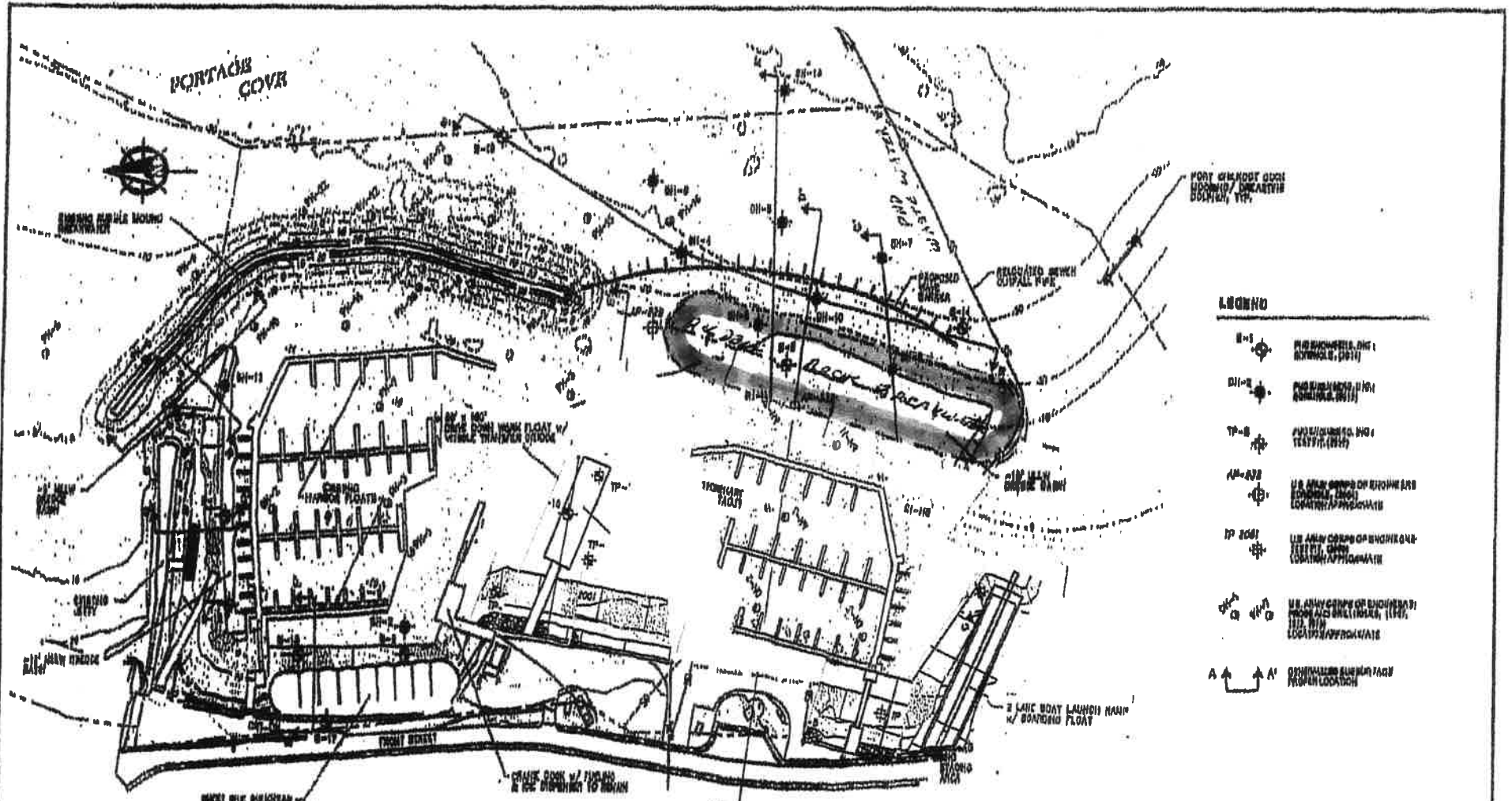
PICTURESQUE  
CONSISTENTLY ATTRACTIVE  
NATURAL LAND TRAIL

### FUTURE :

ROOM FOR EXPANSION WITHIN  
THE HARBOR AND EXTERNAL  
VEHICLE PARKING

7/15/16

MY NEW DESIGN

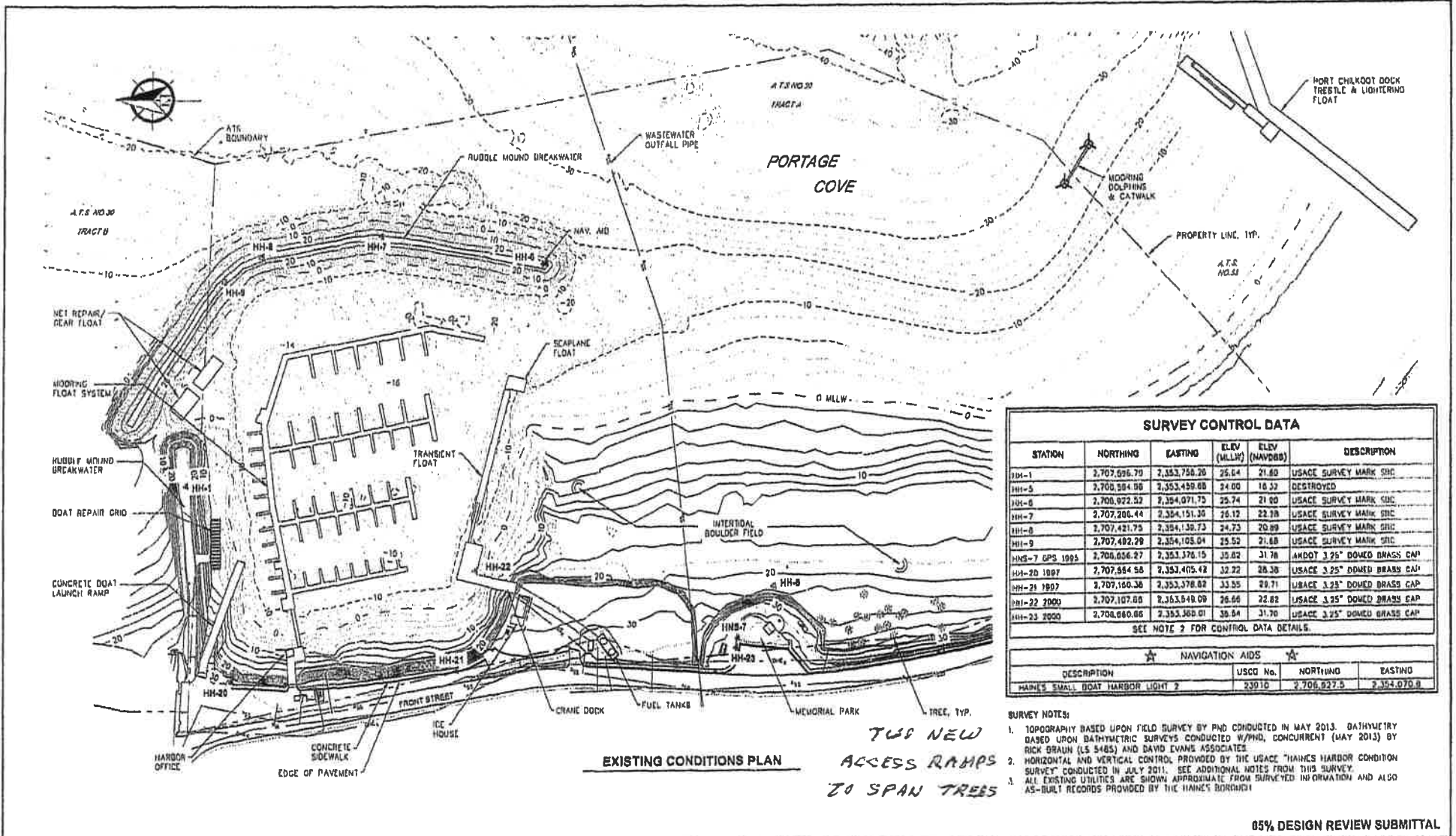


- LEGEND**
- ⊕ E-1 PIER STRUCTURE, DIRT, CONCRETE, (DIT)
  - ⊕ D1-E PIER STRUCTURE, DIRT, CONCRETE, (DIT)
  - ⊕ TP-E PIER STRUCTURE, DIRT, CONCRETE, (DIT)
  - ⊕ AP-E PIER STRUCTURE, DIRT, CONCRETE, (DIT)
  - ⊕ TP 2001 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2002 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2003 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2004 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2005 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2006 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2007 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2008 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2009 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2010 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2011 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2012 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2013 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2014 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2015 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2016 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2017 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2018 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2019 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2020 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2021 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2022 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2023 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2024 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2025 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2026 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2027 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2028 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2029 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2030 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2031 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2032 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2033 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2034 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2035 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2036 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2037 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2038 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2039 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2040 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2041 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2042 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2043 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2044 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2045 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2046 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2047 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2048 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2049 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH
  - ⊕ TP 2050 U.S. ARMY CORPS OF ENGINEERS, TUG BOAT, CRANE, LOADING APPROACH

**SITE PLAN**  
SCALE IN FEET  
0 30 100

1. VERIFYING DATA TO EXISTING LOWER LOW WATER (LLWL) IN 4 FEET.  
2. SANITARIAN CONTAINERS FROM BAYBERRY AND ASSOCIATES, INC. APRIL 2014.  
3. UPLAND TOPOGRAPHIC CONTAINS FROM THE ENGINEERS, INC. APRIL 2014.

	<b>PROJECTIONS</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> <th>BY</th> <th>CHECKED</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	NO.	DATE	DESCRIPTION	BY	CHECKED	DATE																																																								PROJECT NUMBER: 8700 PROJECT TITLE: SOUTH PORTAGE COVE HARBOR EXPANSION PROJECT LOCATION: SOUTH PORTAGE COVE HARBOR EXPANSION	DATE: 8/17/16 DRAWN BY: JWB CHECKED BY: JWB	<b>SOUTH PORTAGE COVE HARBOR EXPANSION</b> <b>PROVISIONAL SITE PLAN WITH SAMPLING LOCATIONS</b> SHEET 2 OF 10
	NO.	DATE	DESCRIPTION	BY	CHECKED	DATE																																																											
U.S. ARMY CORPS OF ENGINEERS WASHINGTON, D.C.					A																																																												



SURVEY CONTROL DATA					
STATION	NORTHING	EASTING	ELEV (MLLW)	ELEV (NAVD83)	DESCRIPTION
HH-1	2,707,026.70	2,353,758.20	25.64	21.60	USACE SURVEY MARK GNC
HH-5	2,700,984.90	2,353,439.80	24.00	18.32	DESTROYED
HH-6	2,700,922.52	2,354,071.75	25.74	21.60	USACE SURVEY MARK GNC
HH-7	2,707,206.44	2,354,151.30	26.12	22.78	USACE SURVEY MARK GNC
HH-8	2,707,421.73	2,354,30.73	24.73	20.89	USACE SURVEY MARK GNC
HH-9	2,707,482.29	2,354,103.04	25.52	21.68	USACE SURVEY MARK GNC
HNS-7 GPS 1995	2,700,036.27	2,353,376.15	35.82	31.78	AKDOT 3.25" DOMED BRASS CAP
HH-20 1997	2,707,664.58	2,353,405.42	32.22	28.38	USACE 3.25" DOMED BRASS CAP
HH-21 1997	2,707,160.36	2,353,378.82	33.55	29.71	USACE 3.25" DOMED BRASS CAP
HH-22 2000	2,707,107.03	2,353,549.09	26.66	22.82	USACE 3.25" DOMED BRASS CAP
HH-23 2000	2,708,060.06	2,353,360.01	38.84	31.70	USACE 3.25" DOMED BRASS CAP
SEE NOTE 2 FOR CONTROL DATA DETAILS.					
NAVIGATION AIDS					
DESCRIPTION	USCG No.	NORTHING	EASTING		
HAINES SMALL BOAT HARBOR LIGHT 2	23010	2,706,827.5	2,354,070.0		

- SURVEY NOTES:**
1. TOPOGRAPHY BASED UPON FIELD SURVEY BY PHD CONDUCTED IN MAY 2013. BATHYMETRY BASED UPON BATHYMETRIC SURVEYS CONDUCTED W/PHD, CONCURRENT (MAY 2013) BY RICK BRAUN (LS 5485) AND DAVID EVANS ASSOCIATES.
  2. HORIZONTAL AND VERTICAL CONTROL PROVIDED BY THE USACE "HAINES HARBOR CONDITION SURVEY" CONDUCTED IN JULY 2011. SEE ADDITIONAL NOTES FROM THIS SURVEY.
  3. ALL EXISTING UTILITIES ARE SHOWN APPROXIMATE FROM SURVEYED INFORMATION AND ALSO AS-BUILT RECORDS PROVIDED BY THE HAINES BOROUGH.

65% DESIGN REVIEW SUBMITTAL



REVISIONS				
REV.	DATE	DESCRIPTION	BY	APP.

**PND ENGINEERS, INC.**  
 9160 Glacier Highway, Ste. 105  
 Juneau, Alaska 99801  
 Phone: 907 586 2993  
 Fax: 907 586 2992  
 www.pndengineers.com

**HAINES BOROUGH SOUTH PORTAGE COVE HARBOR EXPANSION**

EXISTING CONDITIONS AND SURVEY CONTROL

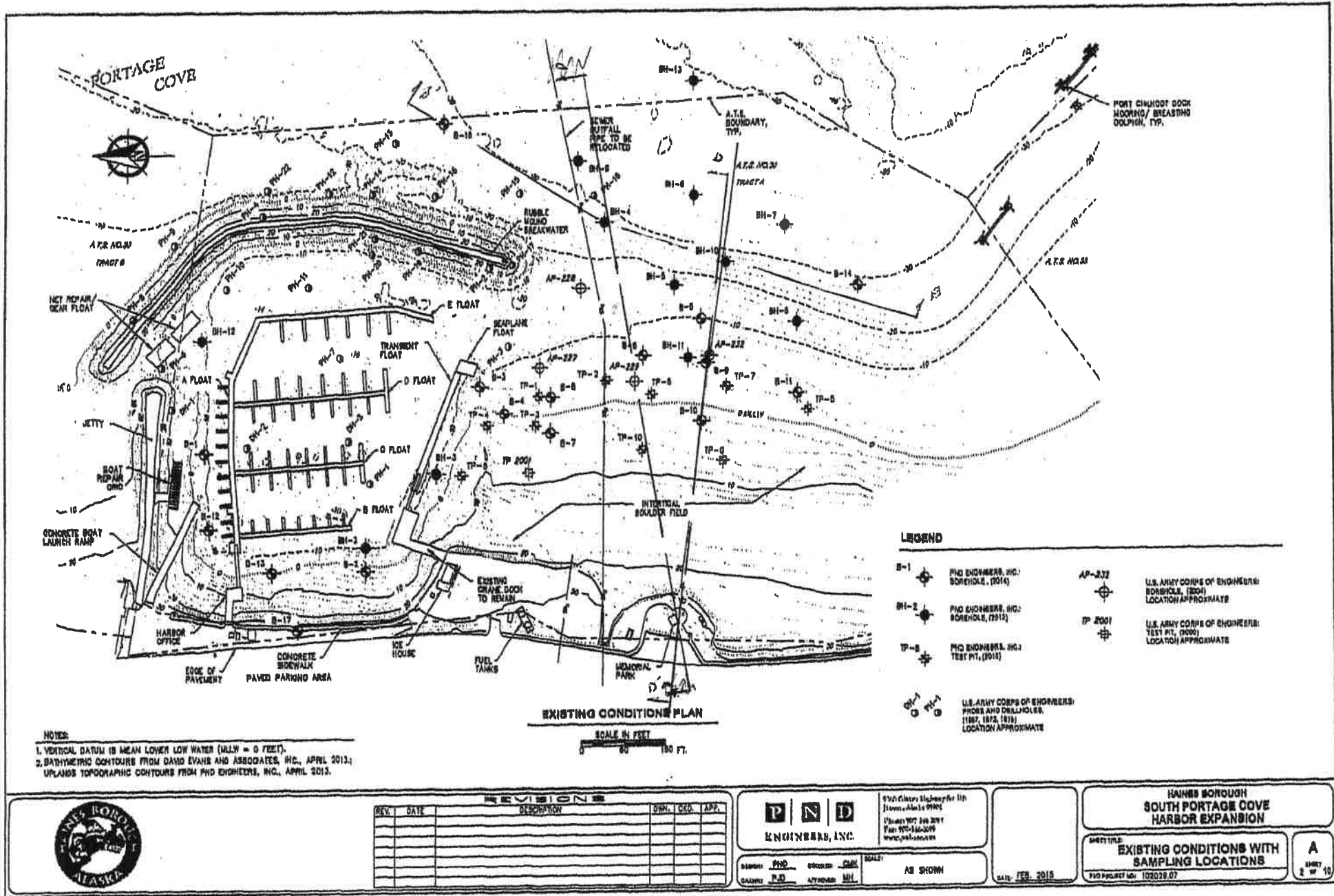
SCALE: 1" = 100'

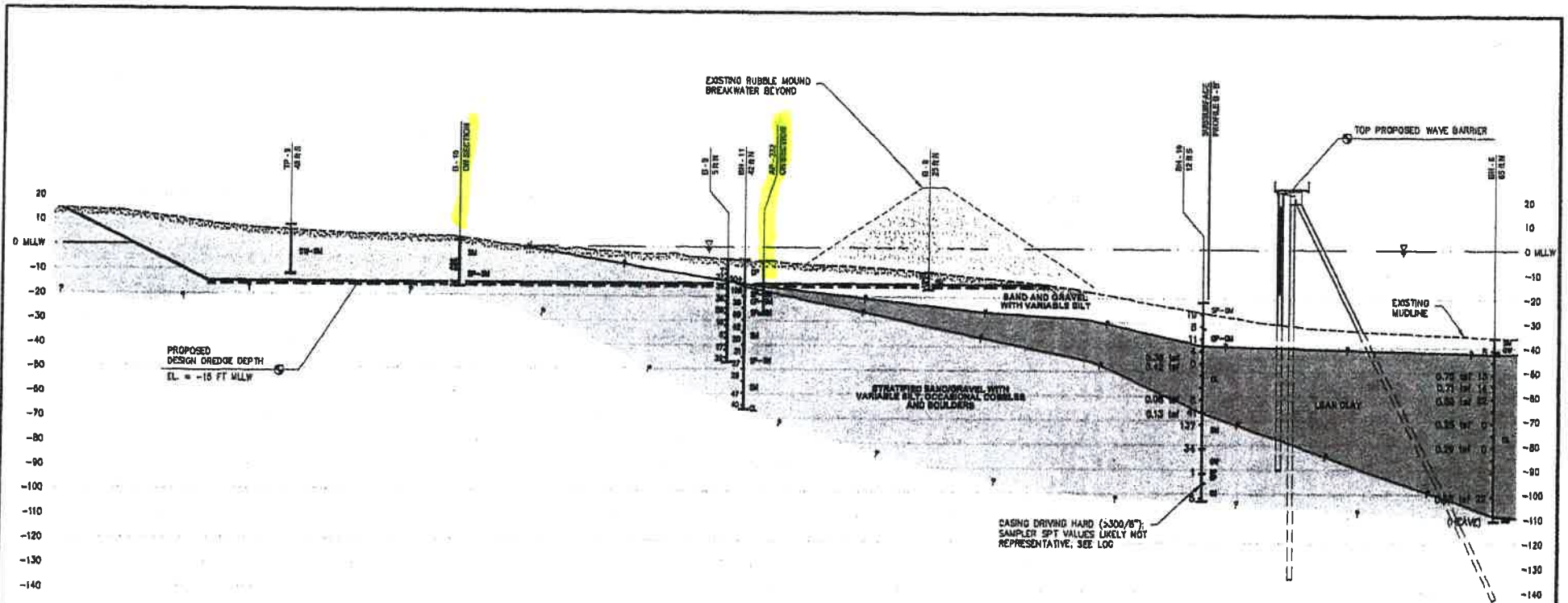
DATE: 9/13/16

PROJECT NO.: 16-0174

1.03

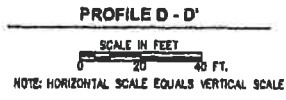
3 OF 23



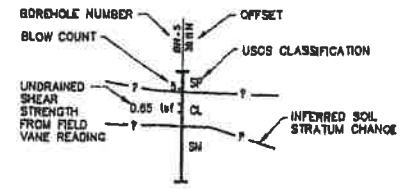


**NOTES**

- SECTION IS A DIAGRAMMATIC REFERENCE FOR INFORMATIONAL PURPOSES ONLY. CONDITIONS ARE SUBJECT TO CHANGE THROUGHOUT INVESTIGATION AREA.
- ENCOUNTERING COBBLE AND BOULDER-SIZE MATERIAL SHOULD BE ANTICIPATED WITHIN ANY OF THE REPRESENTED SOIL HORIZONS.
- VARIATION IN MUDLINE ELEVATIONS WERE OBSERVED BETWEEN BATHYMETRIC SURVEY DATA AND LEADLINE MEASUREMENTS TAKEN AT BOREHOLE COLLARS.
- SEE BOREHOLE LOGS FOR DETAILED SOIL DESCRIPTIONS AND BOREHOLE SAMPLE PHOTOGRAPHS FOR VISUAL REFERENCE.



**LEGEND**



REVISIONS					
REV.	DATE	DESCRIPTION	DWN.	CRD.	APP.

**PND**  
ENGINEERS, INC.

9840 Chena Highway, Ste. 131  
Juneau, Alaska 99801  
Phone: 907-586-2000  
Fax: 907-586-2465  
www.pnd-inc.com

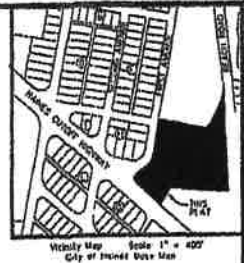
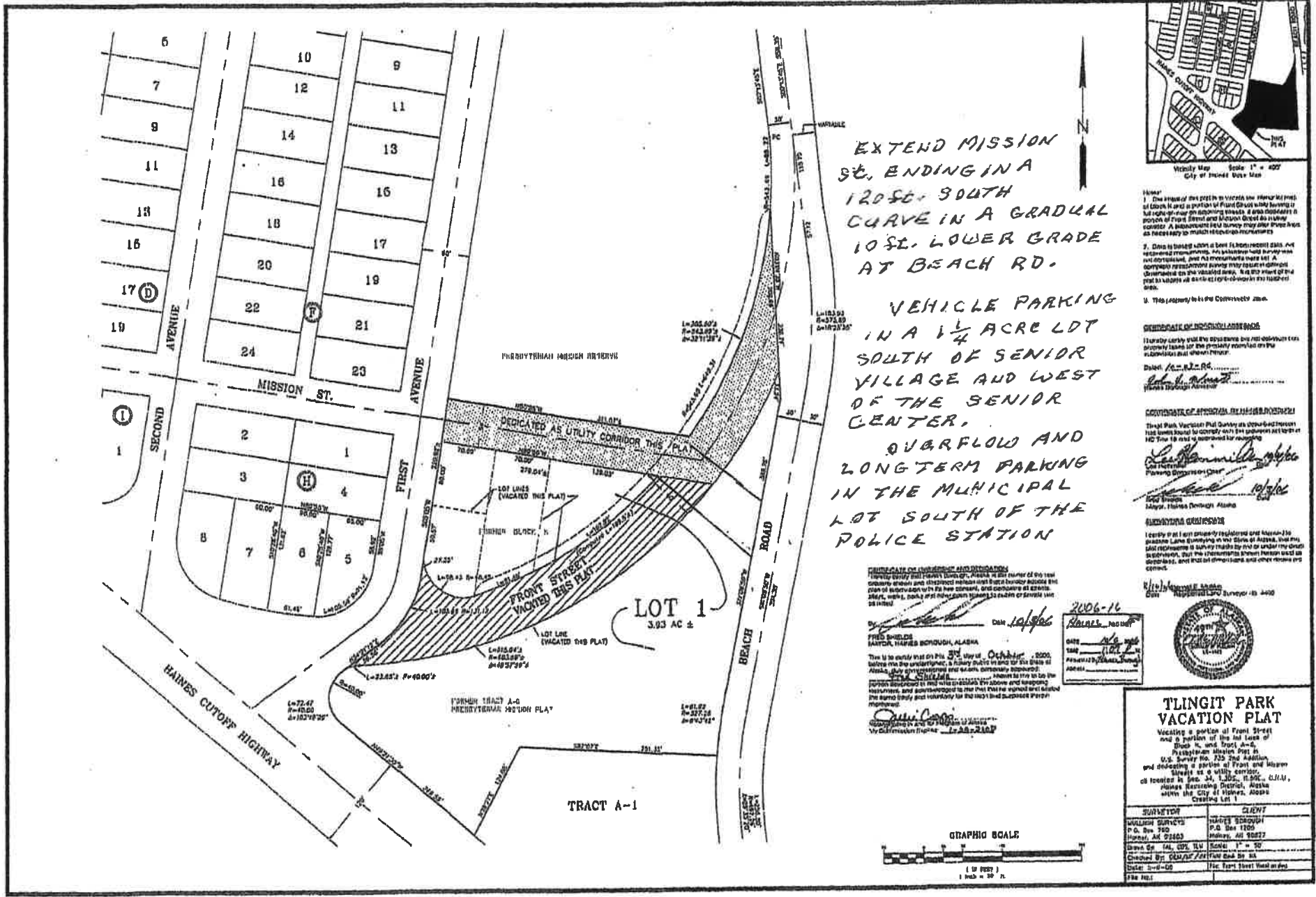
DRAWN: PND CHECKED: CJK SCALE: AS SHOWN  
DESIGN: PND APPROVED: MN

DATE: FEB. 2015

HAINES BOROUGH  
SOUTH PORTAGE COVE  
HARBOR EXPANSION

SHEET TITLE:  
**GENERALIZED SUBSURFACE  
PROFILE D - D'**

A  
7 OF 10



Notes:  
1. The purpose of this plat is to vacate the lower 10% of lot 1 of Block 1 and a portion of Front Street which bearing to the north-south line of the adjacent streets. It also contains a portion of Front Street and Mission Street as a utility corridor. A subsequent plat survey may alter these lines as necessary to match the improvements.  
2. Data is based upon a level of non-precise data and requires assumptions. An independent land survey may be required to verify the accuracy of the data. A subsequent plat survey may alter these lines as necessary to match the improvements.  
3. The survey is to be conducted in accordance with the provisions of the Alaska Statutes.

DATE OF SURVEY: 10/1/00  
SURVEYOR: FRED SWISHER  
ALASKA SURVEYOR NO. 1000

DATE OF PREPARATION: 10/1/00  
PREPARED BY: J. W. SWISHER  
ALASKA SURVEYOR NO. 1000

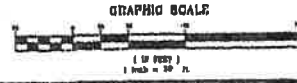
DATE OF RECORDING: 10/1/00  
RECORDED BY: J. W. SWISHER  
ALASKA SURVEYOR NO. 1000



STATE OF ALASKA  
COUNTY OF DENALI  
CITY OF HAINES  
I, FRED SWISHER, Surveyor, do hereby certify that the above and foregoing plat is a true and correct copy of the original plat as the same appears on file in my office, and that the same is a true and correct copy of the original plat as the same appears on file in my office, and that the same is a true and correct copy of the original plat as the same appears on file in my office.

**TLINGIT PARK VACATION PLAT**  
Vacating a portion of Front Street and a portion of the lot south of Block A, and Tract A-0, Precinct 10, Haines, Alaska, and dedicating a portion of Front Street and a portion of the lot south of Block A, and Tract A-0, Precinct 10, Haines, Alaska, as a utility corridor, and dedicating a portion of Front Street and a portion of the lot south of Block A, and Tract A-0, Precinct 10, Haines, Alaska, as a utility corridor, and dedicating a portion of Front Street and a portion of the lot south of Block A, and Tract A-0, Precinct 10, Haines, Alaska, as a utility corridor.

SUBMITTER	CLIENT
MALDEN SURVEYS P.O. Box 700 Haines, AK 99803	MALDEN SURVEYS P.O. Box 700 Haines, AK 99803
Drawn by: JAL, GDL, HLM	Scale: 1" = 50'
Checked by: GDL/HLM/JAL	Drawn and by: JAL
Date: 10-1-00	File: Front Street Vac Plat





HAINES BOROUGH  
 SOUTH PORTAGE COVE HARBOR EXPANSION  
 WAVE BARRIER, DREDGING, GRAVEL PARKING AREA &  
 SEWER LINE RELOCATION

P N D

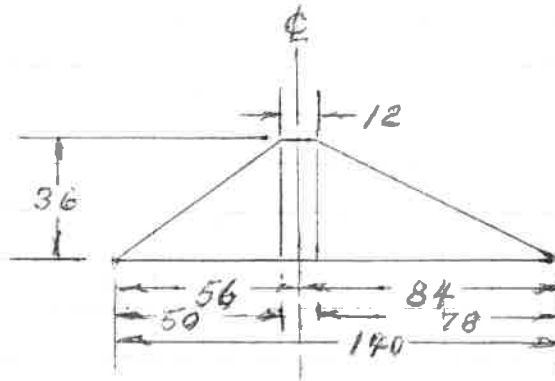
65% DESIGN COMPLETION - COST ESTIMATE  
 MARCH 13, 2015

Item	Item Description	Units	Quantity	Unit Cost	Amount
1505.1	Mobilization	LS	All Req'd	10%	\$1,282,888
1570.1	Erosion and Sediment Control - Upland Measures and Monitoring	LS	All Req'd	\$25,000	\$25,000
1570.2	Silt Containment Boom with Navigation Lights	LF	1,500	\$30	\$45,000
2060.1	Demolition, Salvage and Disposal	LS	All Req'd	\$150,000	\$150,000
2201.1	Clearing & Grubbing	AC	1.5	\$10,000	\$15,000
2202.1	Usable Excavation	CY	2,500	\$12	\$30,000
2202.2	Class A Shot Rock Borrow	CY	8,000	\$30	\$240,000
2202.3	Class B Shot Rock Borrow	CY	9,000	\$22	\$198,000
2202.4	Re-Grade Existing Parking Area	LS	All Req'd	\$3,000	\$3,000
2205.1	Class II Armor Rock	CY	6,000	\$60	\$360,000
2205.2	Class III Armor Rock	CY	3,000	\$70	\$210,000
2401.1	Furnish 16" Dia. HDPE Wastewater Outfall Pipe	LF	2,500	\$40	\$100,000
2401.2	Install 16" Dia. HDPE Wastewater Outfall Pipe Sta. 1+50 - 6+50	LF	505	\$80	\$40,400
2401.3	Install 16" Dia. HDPE Wastewater Outfall Pipe Sta. 6+50 - 7+75	LF	130	\$110	\$14,300
2401.4	Install 16" Dia. HDPE Wastewater Outfall Pipe Sta. 7+75 - 26+10	LF	1850	\$320	\$592,000
2401.5	Furnish and Install Wastewater Outfall Diffuser	LS	All Req'd	\$15,000	\$15,000
2401.6	Connect to Existing 16" Dia. HDPE Outfall Pipe	LS	All Req'd	\$8,000	\$8,000
2402.1	Furnish and Install Wastewater Outfall Concrete Anchor, Type I	EA	175	\$75	\$13,125
2402.2	Furnish and Install Wastewater Outfall Concrete Anchor, Type II	EA	20	\$100	\$2,000
2501.1	8" CPEP Storm Drain Pipe	LF	165	\$50	\$8,250
2501.2	24" CPEP Storm Drain Pipe	LF	200	\$100	\$20,000
2501.3	36" CPEP Storm Drain Pipe	LF	540	\$130	\$70,200
2501.4	Connect to Existing Storm Drain Pipe	EA	4	\$500	\$2,000
2502.1	Storm Drain Manhole Type I	EA	3	\$10,000	\$30,000
2502.2	Storm Drain Manhole Type II	EA	1	\$5,000	\$5,000
2502.3	Storm Drain Oil-Water Separator	EA	1	\$40,000	\$40,000
2502.4	Storm Drain Outfall Structure	LS	All Req'd	\$40,000	\$40,000
2702.1	Construction Surveying	LS	All Req'd	\$150,000	\$150,000
2714.1	Geotextile Fabric	SY	15,000	\$5	\$75,000
2881.1	Dredging and Offshore Disposal	CY	110,000	\$25	\$2,750,000
2881.2	Dredging and Onshore Placement at Parking Area	CY	25,000	\$35	\$875,000
2896.1	Furnish & Install Wave Barrier Pile, 24 Inch Dia. X 0.500 Inch Thick w/Sheepile Wing	EA	131	\$30,000	\$3,930,000
2896.2	Furnish Bearing Pile, 30 Inch Dia. X 0.750 Inch Thick	LF	7,920	\$250	\$1,980,000
2896.3	Install Bearing Pile, 30 Inch Dia. X 0.750 Inch Thick	EA	44	\$30,000	\$1,320,000
2896.4	Spin Fin®, 30 Inch Dia. Pile	EA	42	\$5,000	\$210,000
2896.5	Install Salvaged 12 Inch Dia. Steel Pile	EA	4	\$4,000	\$16,000
2901.1	Furnish & Install Barrier Waller	LF	700	\$600	\$420,000
2901.2	Furnish & Install Bearing Caps & Connections	EA	22	\$23,000	\$506,000
2901.3	Wave Barrier Amenities - Fenders, Light, Armor Excavation, Misc.	LS	All Req'd	\$160,000	\$160,000
<b>ESTIMATED CONSTRUCTION BID PRICE</b>					<b>\$15,938,863</b>
<b>CONTINGENCY &amp; COMPENSATORY MITIGATION (8%)</b>					<b>\$1,275,109</b>
<b>PLANNING, ALTERNATIVES ANALYSIS &amp; PUBLIC INVOLVEMENT</b>					<b>\$260,777</b>
<b>ENVIRONMENTAL INVESTIGATIONS, HABITAT STUDIES &amp; PERMITTING</b>					<b>\$417,740</b>
<b>GEOTECHNICAL INVESTIGATIONS</b>					<b>\$878,946</b>
<b>SITE TOPOGRAPHIC &amp; BATHYMETRIC SURVEYS</b>					<b>\$96,593</b>
<b>FINAL ENGINEERING DESIGN &amp; BID READY CONTRACT DOCUMENTS</b>					<b>\$1,139,841</b>
<b>CONTRACT ADMIN &amp; CONSTRUCTION INSPECTION</b>					<b>\$1,115,720</b>
<b>TOTAL RECOMMENDED PROJECT BUDGET</b>					<b>\$21,123,859</b>

NOTE: Costs for the parking area assume a gravel surface. Future paving, sidewalks, curbs, utilities, landscaping, restrooms and lighting improvements are not included in this estimate. Pile anodes are not included in this estimate.

RUBBLE ROCK  
BREAKWATER  
DAM VOLUME

7/10/16 JWW



$$\text{AREA} = \frac{50(36)}{2} = 900$$

$$\text{AREA} = \frac{78(36)}{2} = 1404$$

$$\text{AREA} = 6(36) = 216$$

$$\text{AREA} = 6(36) = 216$$

1116 SQ FT.

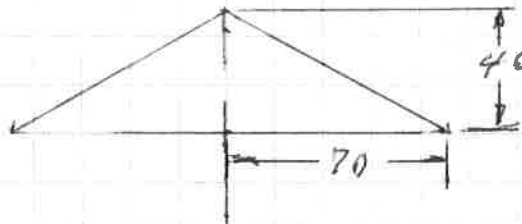
1620

$$\text{TOTAL AREA} = 1116 + 1620 = 2736 \text{ SQ FT.}$$

$$\text{TOTAL VOLUME} = 500(2736) = 1368000 \text{ CU FT.}$$

$$\text{TOTAL VOLUME} = \frac{1368000}{27} = 50666 \text{ CU YD.}$$

END CONE VOLUME



VOLUME

$$\text{VOL} = \frac{3.14(r^2)h}{3}$$

$$\text{VOL} = \frac{3.14(70)^2 40}{3}$$

$$\text{VOL} = 205146 \text{ CU FT.}$$

$$\text{VOL} = 7598 \text{ CU YD.}$$

$$\text{TOTAL VOLUME} = 50666 + 7598 = 58264 \text{ CU YD.}$$



RUBBLE ROCK BREAKWATER

TOTAL VOLUME = 58264 CU.YD.

CONTENT :

15% OF TOTAL CLASS III AMOR ROCK @ 70 DOLLARS / CU.YD.

5% OF TOTAL CLASS II AMOR ROCK @ 60 DOLLARS / CU.YD.

80% OF TOTAL CLASS A SHOT ROCK BORROW @ 30 DOLLARS / CU.YD.

THEREFORE :

15% OF 58264 = 8739 CU.YD. @ 70 DOLLARS = \$611730

5% OF 58264 = 2913 CU.YD. @ 60 DOLLARS = \$174780

80% OF 58264 = 46611 CU.YD. @ 30 DOLLARS = \$1398330  
\$ 2,184,840

MATERIAL RUBBLE ROCK = \$ 2,184,840

PARTIAL PND ESTIMATE \$ 8,223,600

IN ADDITION:

PND: WASTE WATER LINE DOES NOT  
REQUIRE RELOCATION SAVING OF \$ 784,825

TOTAL SAVING 6823585

THIS PLAN REQUIRES THE  
CURRENT PARKING LOT IS IN PLACE

JACNNANAK@YAHOO.COM 8/22/16  
JW