



1. HORIZONTAL CONTROL IN ALASKA STATE PLANE, ZONE 1 (5001), NAD83, IN US SURVEY FEET, BASED ON A FULLY CONSTRAINED STATIC GPS NETWORK HOLDING THE PUBLISHED NAD83 (CORP66) 2003 EPOCH VALUES OF NGS CORS STATIONS: DLR6995+ "ANNETTE ISLAND" CORS ARP (PD DK6482).
2. VERTICAL CONTROL IN US SURVEY FEET AND REFERS TO MEAN-LOW-WATER (MLLW+0.0'), BASED ON THE NOAA/NOS TIDAL STATION 9451600, SITKA ALASKA, HOLDING THE NOAA TIDAL BENCH MARK BRASS CAP, "NOS NOAA 1600 P" (VM 01007) TIDAL STATION 1983 - 2001, PUBLISHED 6 NOV 2007 FOR THIS STATION.
3. VERTICAL CONTROL WAS ALSO TIED INTO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVDS88) HOLDING THE OPUS DB PUBLISHED VALUES OF BRASS CAP, "NOS NOAA 0460 BM M 1983" ELEVATION 5.96 METERS, APPLYING THE AVERAGE DELTA TIDE CORRECTION OF 0.0000 METERS.
4. HORIZONTAL AND HORIZONTAL CONTROL SURVEY WAS CONDUCTED 21/22 AUGUST 2010 USING RTK AND DIFFERENTIAL LEVELING TECHNIQUES ALONG WITH LONG PERIOD STATIC GPS OBSERVATIONS USING A TRIMBLE 5700 AND/OR A JAVAD L1/L2 WHICH WAS ALSO PNEUMATICALLY TIED TO THE NATIONAL DIFFERENTIAL ONLINE POSITIONING USER SERVICE (OPUS DB) DIFFERENTIAL LEVELING EQUIPMENT USING A LECIA N11 SELF LEVELING LEVEL AND LEVEL ROD. ALL PUBLISHED CONTROL POINTS WERE CHECKED AGAINST THE SURVEY STRIP METHODS AND INDEPENDENT BASELINES. MONUMENTS WERE CHECKED AGAINST THEIR PUBLISHED VALUES AS A QUALITY CONTROL PROCEDURE USING A JAVAD ROVER UNIT AND BASE STATION.
5. HYDROGRAPHIC SOUNDING DATA ACQUISITION WAS CONDUCTED 21/22 AUGUST 2010 USING A OCEANIC ECHOSOUNDER (200 KHZ, 30 DEGREES SWATH) WITH 1.5" BEAMS. POSITIONING AND VESSEL ALTITUDE WERE MEASURED USING A JAVASIGMA AND A CODA FIBS+ INTERNAL NAVIGATION SYSTEM OPERATING ON RTK DATA FROM CORS BARS BAY AND BARS BAY. VESSEL ALTITUDE WAS MEASURED BY THE BENCHMARK "LR-2, 1978". GEOID 09 MODEL WITH A SEPARATION VALUE OF -0.1 FEET WAS USED. SOUND VELOCITY WAS MEASURED AT NUMEROUS LOCATIONS USING A PHASED ARRAY ECHOSOUNDER PRO-LOGIC 1000. DATA COLLECTION, MULTIBEAM SURVEY DATA COLLECTION, NAVIGATION AND POST-PROCESSING WERE PERFORMED USING HYPACK HYSWEEP (2010) SOFTWARE.
6. SOUNDINGS ARE IN US SURVEY FEET AND ARE MINUS UNLESS OTHERWISE NOTED.
7. THIS SURVEY IS INDICATIVE OF CONDITIONS ON THE DATES OF SURVEY.
8. THIS SURVEY WAS PERFORMED BY: US ARMY CORPS OF ENGINEERS, SEATTLE DISTRICT, PUGET SOUND SURVEY CREW.

CONTROL DATA						
STATION	NORTHING	EASTING	MLW ELEV	NAV808 ELEV	DESCRIPTION	
CBH-1 1974	1908843.75	2354747.78	15.99	20.69	USACE SBC (CENTER OF NAV. AID)	
LB-2 1978	1908778.38	2354474.26	15.09	19.79	USACE SBC IN BEDROCK	
CH-3 1982	1909317.68	2355892.99	14.87	19.57	USACE SBC IN CONCRETE SIDEWALK	
CH-4 1982	1908775.84	2355893.61	16.72	21.42	USACE SBC IN BOULDER	
CH-5 1989	1909438.03	2354492.88	19.93	24.57	USACE SBC IN CONCRETE SIDEWALK	
CH-7 2001	1909515.78	2354294.31	14.11	18.81	SET DOME BC IN CONC SIDEWALK	
CH-8 2001	1909477.45	2356270.73	14.51	19.21	SET DOME BC IN CONC SIDEWALK	

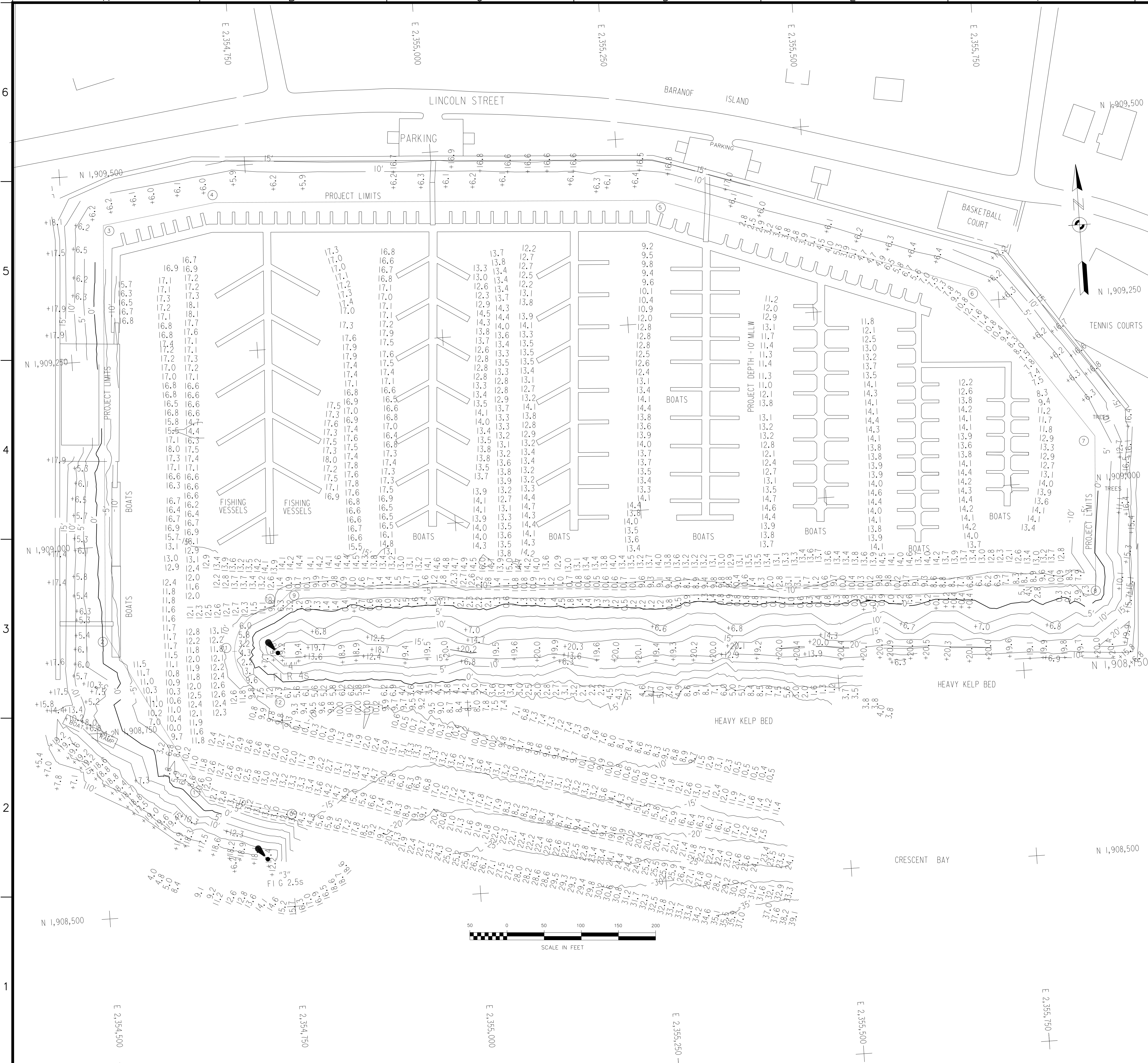
PROJECT LIMITS					
CORNER	NORTHING	EASTING	CORNER	NORTHING	EASTING
0	1908626.17	2354745.04	7	1909058.26	2355866.65
1	1908655.80	2354639.41	8	1908858.66	2355854.07
2	1908882.60	2354519.94	9	1908926.54	2354776.72
3	1909431.52	2354554.53	10	1908904.57	2354751.78
4	1909452.03	2354706.12	11	1908847.73	2354691.83
5	1909414.61	2355299.94	12	1908783.81	2354744.17
6	1909267.81	2355721.54			

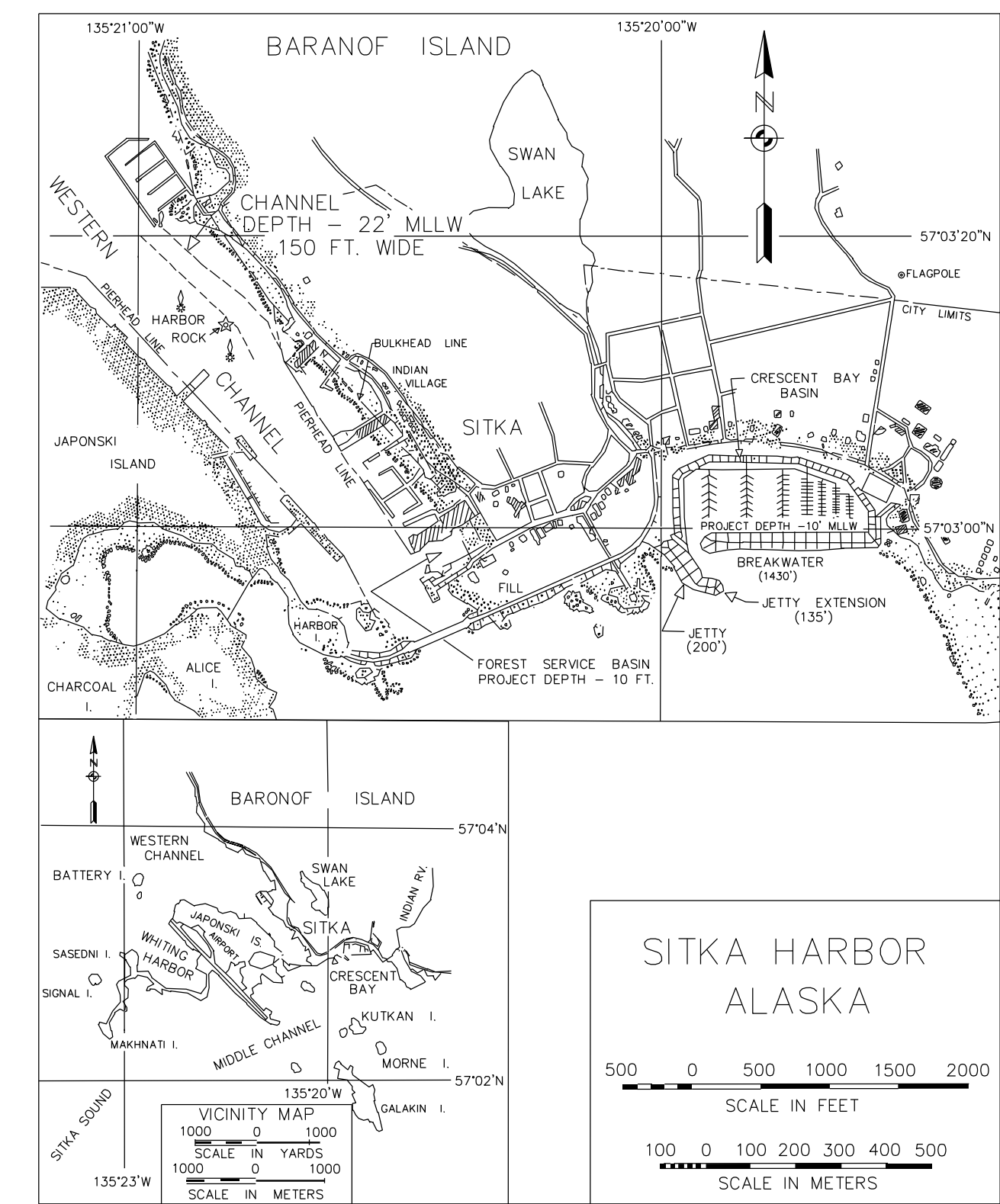
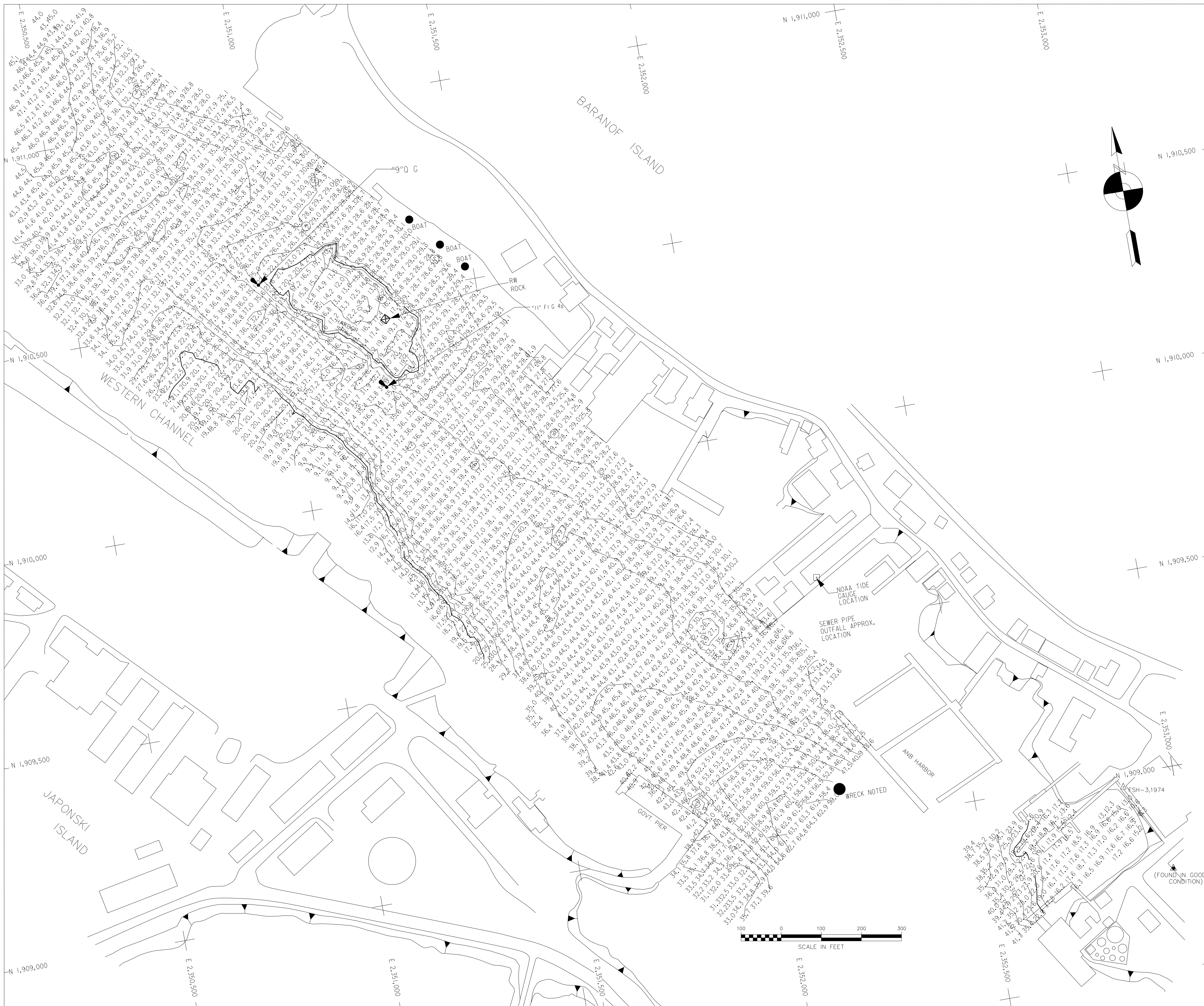
☆ NAVIGATION AIDS ☆			
USCG No.	DESCRIPTION	NORTHING	EASTING
24975	CRESCENT HARBOR WEST BREAKWATER LIGHT 3, FL. G.	1908565.6	2354717.5
24970	CRESCENT HARBOR EAST BREAKWATER LIGHT 4, FL. R.	1908841.5	2354750.0

VOLUME COMPUTATIONS		
Project Depth -10' MLLW		
VOLUME AVAILABLE TO PROJECT DEPTH (-10' MLLW)	589.2	(cubic yards)
VOLUME AVAILABLE BETWEEN PROJECT DEPTH AND MAXIMUM PAY LINE (-11' MLLW)	1484.4	(cubic yards)
VOLUME AVAILABLE ALONG SIDE SLOPE (3:1, H:V)	1040.9	(cubic yards)
TOTAL	3114.5	(cubic yards)

SURVEY

Sheet 1 of





NOTES

- HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 1, (5001), NAD83, IN U.S. SURVEY FEET, BASED ON A FULLY CONSTRAINED STATIC GPS NETWORK HOLDING THE PUBLISHED NAD83 (COR96) 2003 EPOCH VALUES OF NGS CORS STATIONS: WHITEHORSE CORS ARP (PID D66815); "PORT ALEXAN, AK CORS ARP" (PID D6695); "ANNETTE ISLAND CORS ARP" (PID D66482).
- VERTICAL CONTROL IS IN U.S. SURVEY FEET AND REFERS TO MEAN-LOWER-LOW-WATER (MLLW+0.0') THE MLLW VALUES SHOWN ON THIS PLAT ARE BASED ON THE NOAA/NOS TIDAL BENCH MARK LIST FOR STATION 9451600, SITKA, ALASKA. HOLDING THE NOAA TIDAL BENCH MARK BRASS CAP, "NOS NOAA 1600 P 1998 VM#14007" 6.952 METERS AS ELEVATION. THIS VALUES IS FROM TIDAL EPOCH 1983 - 2001, PUBLISHED 6 NOV 2007 FOR THIS STATION.
- VERTICAL CONTROL WAS ALSO TIED INTO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAV88) HOLDING THE OPUS DB PUBLISHED VERTICAL VALUES FOR NOAA BENCH MARK BRASS CAP, "NOS NOAA 0406BM M 1983 VM#1187" AS ELEVATION 5.982 METERS. APPLYING THE AVERAGE DELTA TO THE REMAINING PRIMARY CONTROL.
- VERTICAL AND HORIZONTAL CONTROL SURVEY WAS CONDUCTED 18/19/20 AUGUST 2010 USING RTK AND DIFFERENTIAL LEVELING TECHNIQUES ALONG WITH LONG PERIOD STATIC GPS OBSERVATIONS USING A TRIMBLE 5700 AND/OR A JAVAD SIGMA WHICH WAS THEN PROCESSED THROUGH THE NATIONAL GEODETIC SURVEY ONLINE POSITIONING USER SERVICE (OPUS) THE DIFFERENTIAL LEVELING EQUIPMENT USING A LEICA NI-2 SELF LEVELING LEVEL AND LEVEL ROD. ALL PRIMARY CONTROL WAS DOUBLE-TIED USING REAL-TIME-KINEMATIC CONTROL METHODS AND INDEPENDENT BASELINES. SOLUTIONS, MONUMENTS WERE CHECKED AGAINST THEIR PUBLISHED VALUES AS A QUALITY CONTROL. PROCEDURE USING A JAVAD ROVER AND BASE STATION.
- HYDROGRAPHIC SOUNDING DATA WAS COLLECTED 18/19/20 AUGUST 2010 USING AN ODOM ES-3 MULTIBEAM ECHOSONAR, (240 KHZ, 90 DEGREE SWATH-WIDTH WITH 1.5' BEAMS). POSITIONING AND VESSEL ALTITUDE WERE MEASURED USING A NS TRIMBLE 750 AND A CODA F185+ INTERNAL NAVIGATIONS SYSTEM OPERATING ON RTK CORRECTORS BROADCAST FROM A JAVAD SIGMA BASE STATION, SET AT THE NOS BENCHMARK "FSH-3" GEOD 09 MODEL WITH A SEPARATION VELOCITY OF -017 FEET WAS USED. SOUND VELOCITY WAS MEASURED AT NUMEROUS LOCATIONS AND TIDE PHASES USING AN ODOM DIGI-BAR PRO SOUND VELOCITY PROFILER. DATA COLLECTION, NAVIGATION AND POST-PROCESSING WERE PERFORMED USING HYPACK HYSWEEP (2010) SOFTWARE.
- SOUNDINGS ARE IN US SURVEY FEET AND ARE MINUS UNLESS OTHERWISE NOTED.
- THIS SURVEY IS INDICATIVE OF CONDITIONS ON THE DATES OF THE SURVEY.
- THIS SURVEY WAS PERFORMED BY: SEATTLE DISTRICT, US ARMY CORPS OF ENGINEERS, PUGET SOUND SURVEY CREW.

CONTROL DATA

STATION	NORTHING	EASTING	MLLW ELEV	MLLW ELEV	DESCRIPTION
FSH-3, 1974	1,908,969.43	2,352,870.93	19.60	24.30	USACE SBC
1900-P, 1998	1,908,748.46	2,352,958.90	23.21	27.91	NGS SBC

PROJECT LIMITS

LIMIT	NORTHING	EASTING	LIMIT	NORTHING	EASTING
1	1,911,072.9	2,350,754.8	5	1,910,572.2	2,351,419.6
2	1,910,943.9	2,350,678.3	6	1,910,491.1	2,351,289.0
3	1,910,828.0	2,351,167.9	7	1,910,087.3	2,351,589.1
4	1,910,708.9	2,351,074.6	8	1,910,037.8	2,351,447.5

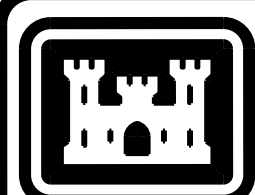
NAVIGATION AIDS

USCC No.	DESCRIPTION	NORTHING	EASTING
25035	HARBOR ROCK DAYBEACON	1,910,438.43	2,351,262.41
25030	SITKA HARBOR CHANNEL LIGHT 9	1,910,576.71	2,350,965.48
25040	SITKA HARBOR LIGHT 11	1,910,270.37	2,351,236.09

VOLUME COMPUTATIONS

Project Depth -22' MLLW

VOLUME AVAILABLE TO PROJECT DEPTH (-22' MLLW)	312.0	(cubic yards)
VOLUME AVAILABLE FROM PROJECT DEPTH AND MINIMUM PAY LINE	322.7	(cubic yards)
VOLUME AVAILABLE ALONG SIDE SLOPE (3:1, H:V)	792.7	(cubic yards)
TOTAL	1427.4	(cubic yards)

US ARMY CORPS
OF ENGINEERS
ALASKA DISTRICTCONTRACT NO. US ARMY CORPS OF ENGINEERS
SEATTLE DISTRICT

CONTRACTOR

CITY

STATE

Date

RECOMMENDED

APPROVED

DATE

DESCRIPTION

DATE

DATE: 23 SEP 2010

DRAWN BY: AS NOTED

PILOT SCALE

FILE

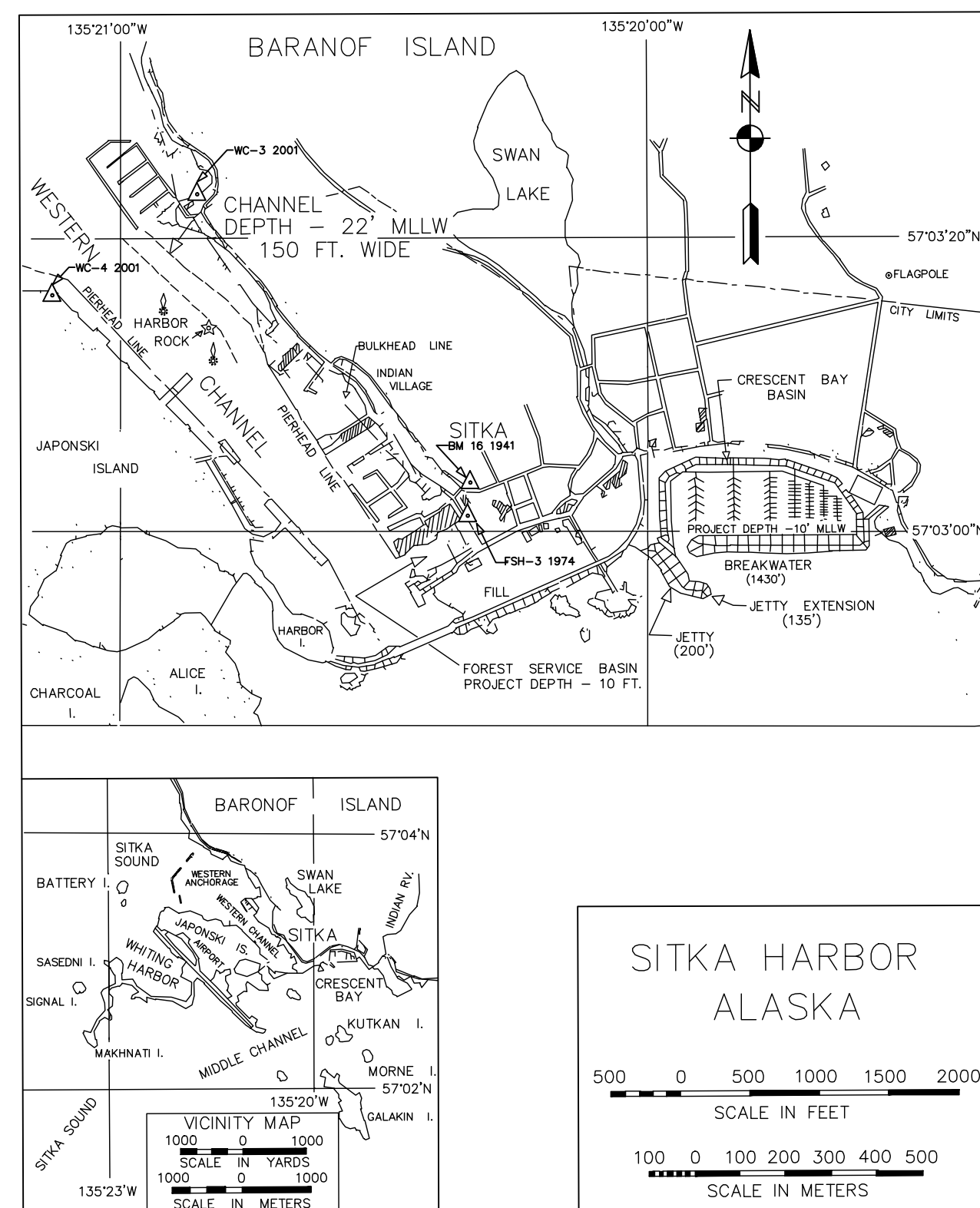
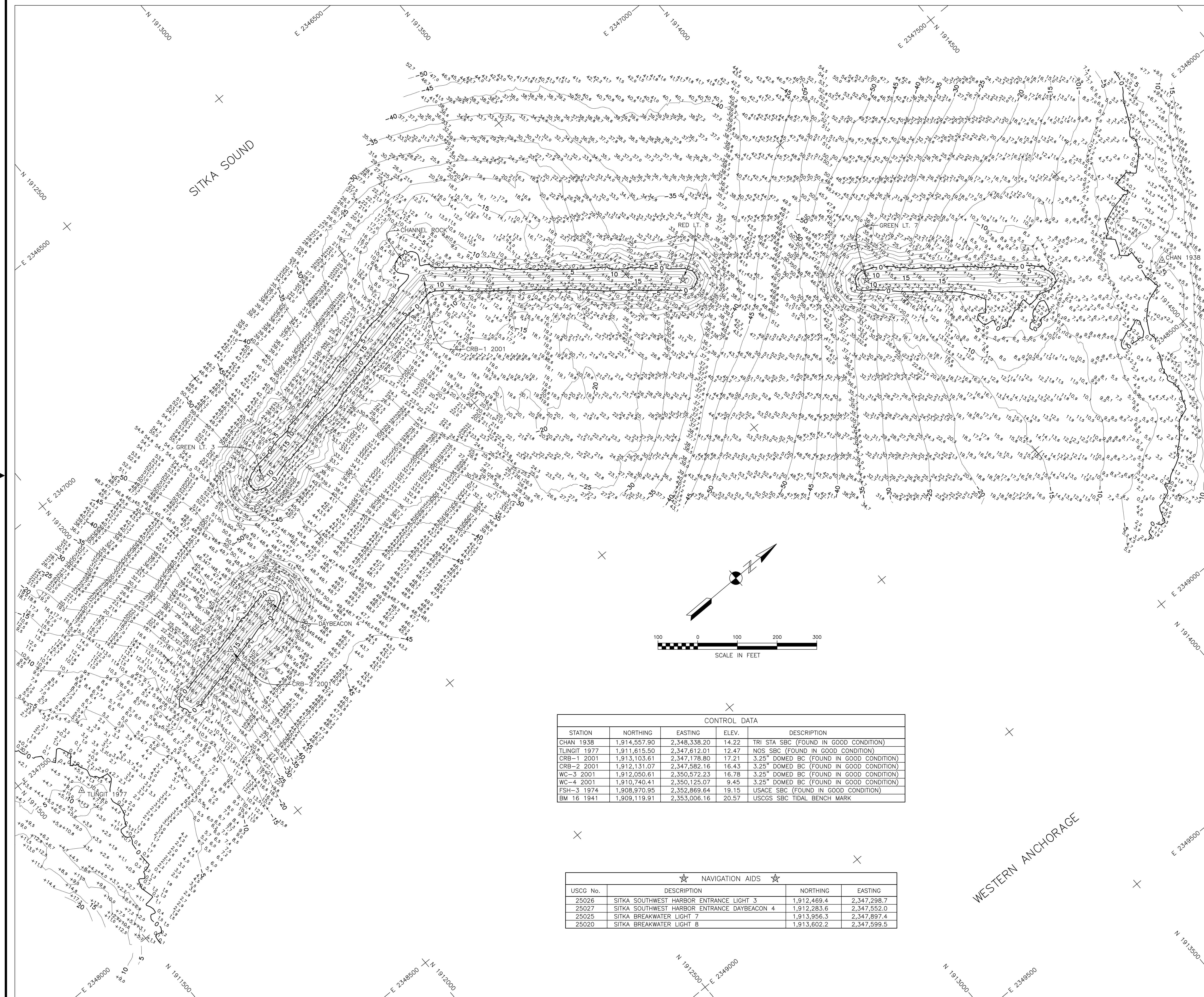
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U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKASITKA, ALASKA
SITKA WESTERN CHANNEL
PROJECT CONDITION SURVEY

AUGUST 18, 19 & 20, 2010

Reference
number:V-003
Sheet 1 of 1

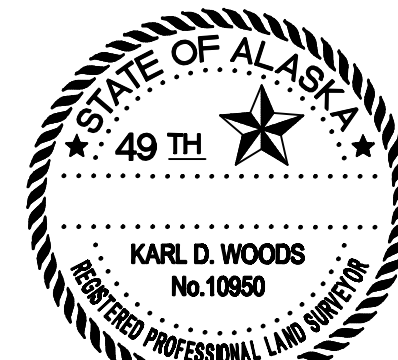
SURVEY



NOTES

- HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 1, NAD83(1986) IN US SURVEY FEET. HOLDING THE PUBLISHED NGS VALUES OF USCGS BRASS CAP, "CHAN 1938" (PID U0582) AS N 1,914,557.90, E 2,348,338.20 AND NOS BRASS CAP, "TLINGIT 1977" (PID U0631) AS N 1,911,615.49, E 2,347,612.01. HORIZONTAL CONTROL WAS SURVEYED APRIL 9-11, 2008, USING TRIMBLE R8 DUAL FREQUENCY GPS RECEIVERS OPERATING IN STATIC MODE AND USING LONG PERIOD (4+ HRS) OBSERVATION TECHNIQUES. FINAL COORDINATE VALUES FOR PROJECT CONTROL MONUMENTS WERE DETERMINED USING A FULLY CONSTRAINED GPS STATIC NETWORK HOLDING THE ABOVE VALUES FIXED.
- VERTICAL CONTROL IS IN US SURVEY FEET AND REFERS TO MEAN-LOWER-LOW-WATER TIDAL DATUM (MLLW=0.0'). MLLW DATUM IS BASED ON NOAA/NOS TIDAL BENCH MARK LIST 9451600, SITKA, BARANOF ISLAND, ALASKA, PUBLICATION DATE: 04/21/2003, HOLDING USCGS BRASS CAP "16 1941" AS 20.57 AND NOS BRASS CAP "1600 L 1982" AS 40.32'. VERTICAL CONTROL WAS SURVEYED APRIL 9-12, 2008 USING DIFFERENTIAL LEVELING EQUIPMENT AND TECHNIQUES. ALL PROJECT CONTROL MONUMENT ELEVATIONS SHOWN ON THIS PLAT WERE LEVEL-LOOPED TO PRIMARY VERTICAL CONTROL.
- HYDROGRAPHIC DATA ACQUISITION WAS CONDUCTED APRIL 14-17, 2008 USING AN ODOM HYDROTAC PRECISION DEPTH SOUNDER WITH A 200KHZ 4 DEGREE BEAM-WIDTH SINGLE-BEAM TRANSDUCER. VESSEL POSITIONING WAS PROVIDED IN REAL-TIME USING A TRIMBLE R8 GPS BASE RECEIVER SET AT USACE BRASS CAP, "CRB-01 2001", BROADCASTING RTK CORRECTORS TO A TRIMBLE R8 GPS ROVING RECEIVER, CO-LOCATED ABOVE THE SINGLE-BEAM TRANSDUCER ABOARD THE VESSEL. SOUND VELOCITY WAS DETERMINED USING STANDARD "BAR CHECK" METHODS TO REFLECT SITE CONDITIONS. NAVIGATION, DATA COLLECTION AND DATA PROCESSING WERE PERFORMED USING HYPACK V6.2A INTEGRATED SOFTWARE.
- TOPOGRAPHIC AND PLANIMETRIC DATA COLLECTION WAS CONDUCTED APRIL 12-16, 2008 AND WAS ACCOMPLISHED USING A COMBINATION OF CONVENTIONAL AND RTK GPS EQUIPMENT AND TECHNIQUES. ALL FIXED AIDS-TO-NAVIGATION WERE TIED AT THE LIGHT GLOBE OR CENTER OF DAY MARK SIGN BOARD.
- SOUNDINGS ARE IN US SURVEY FEET AND ARE MINUS UNLESS OTHERWISE INDICATED.
- THIS DRAWING INDICATES GENERAL CONDITIONS ON THE DATES OF SURVEY.

SURVEYOR'S CERTIFICATE



KARL D. WOODS, P.L.S. DATE
REGISTRATION NO. LS 10950

REV.	DATE	DESCRIPTION	BY	APP'D.
CONTRACT NO. W911KB-08-D-0002-0002				
CONTRACTOR TERRASO, LTD				
CITY PALMER STATE ALASKA				
ALASKA DISTRICT CORPS OF ENGINEERS ANCHORAGE, ALASKA				
SURVEYED: MRE/CJR				
DRAWN: S. LEATHAM				
CHECKED: KDW				
SUBMITTED: KDW				
RECOMMENDED: APPROVED: DATE:				
PROJECT MANAGER: CHIEF OPERATIONS-ENGINEER BRANCH				
SURVEY NO. 2484-08				
SCALE: 1" = 100'				
SHEET 1 OF 1				