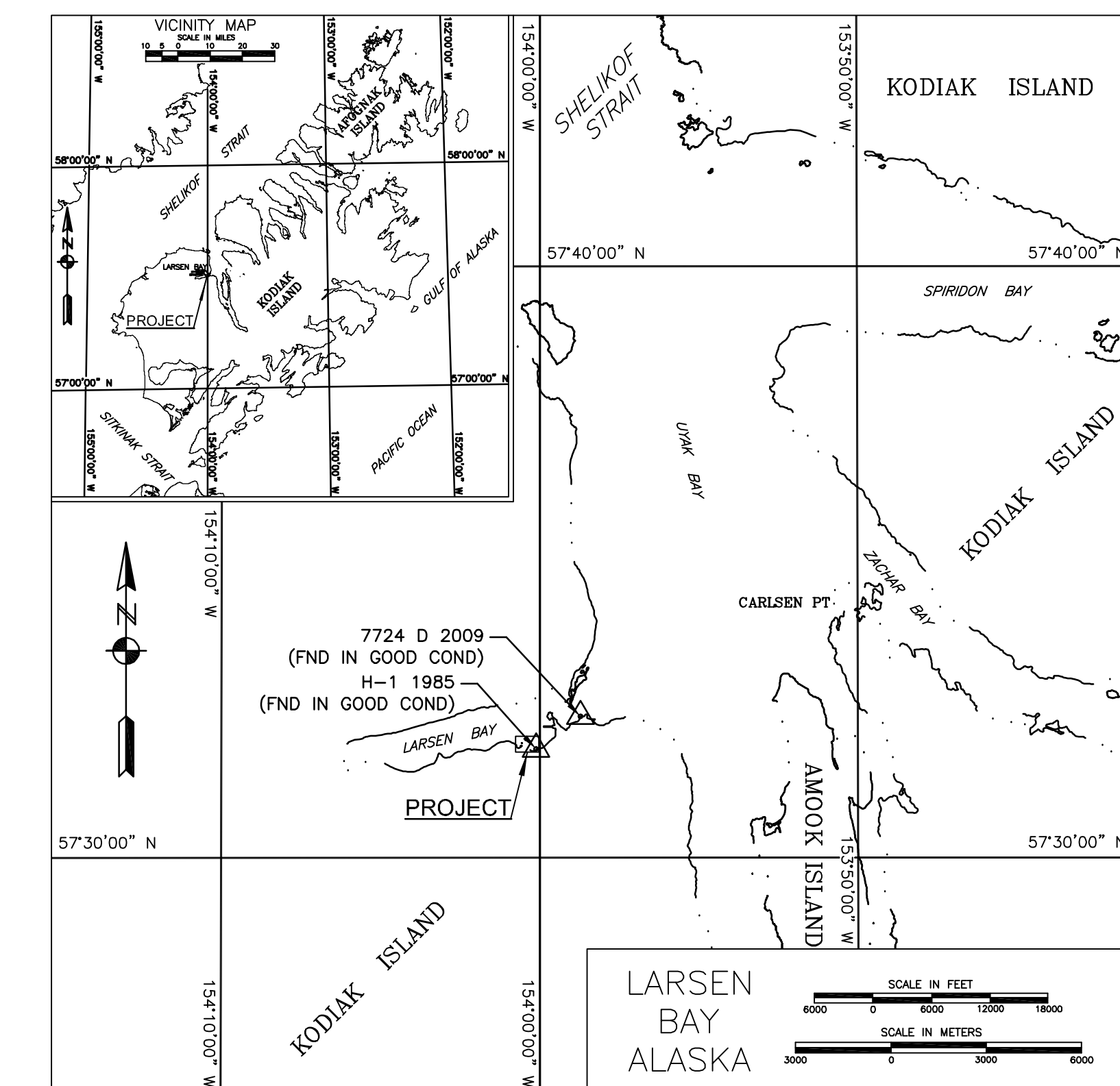


## SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT I AM PROPERLY REGISTERED AND LICENSED TO PRACTICE LAND SURVEYING IN THE STATE OF ALASKA AND I AM AN ACSM, CERTIFIED INSHORE HYDROGRAPHER. THIS PLAT REPRESENTS A HYDROGRAPHIC SURVEY MADE BY ME OR UNDER MY DIRECT SUPERVISION. THE ELEVATIONS SHOWN HEREON ACCURATELY DEPICT THE DEPTHS AS SURVEYED JULY 8-22, 2010.

THOMAS S. NEWMAN, P.L.S.  
REGISTRATION NO. LS 8034  
ACSM CERTIFICATION NO. 173

AUGUST 27, 2010  
DATE



## NOTES

- HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 5, NAD83 (CORS96) IN U.S. SURVEY FEET BASED ON A FULLY CONSTRAINED STATIC GPS NETWORK HOLDING THE 2003 EPOCH VALUES OF OPUS DB DERIVED STATIONS: "H-1 1985" (FND BBBL01) AS NORTHING 1,289,708.22, EASTING 1,639,996.34; "7724 D 2009" (PID BBBL07) AS NORTHING 1,293,105.33, EASTING 1,644,578.89.
- VERTICAL CONTROL IS IN U.S. SURVEY FEET AND REFERS TO MEAN-LOWER-LOW-WATER DATUM (MLLW=0.0'). THE MLLW VALUES SHOWN ON THIS PLAT ARE BASED ON NOAA/NOS TIDAL STATION 945 7724, LARSEN BAY, KODIAK ISLAND, ALASKA HOLDING USCGS BENCH MARK SBC 7724 C 1995 AS 19.69 FEET. THIS VALUE IS FROM TIDAL EPOCH 1983-2001, PUBLISHED 5/19/2010 FOR THIS STATION.
- VERTICAL CONTROL WAS ALSO TIED INTO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) HOLDING THE OPUS DB PUBLISHED VALUE OF "BC MON 1963" (PID BBBL06) AS 17.31 FEET AND APPLYING A CONSTANT DELTA OF NEGATIVE 1.95' TO THE REMAINING PRIMARY CONTROL.
- THE HORIZONTAL CONTROL SURVEY WAS CONDUCTED AUGUST 13 THROUGH AUGUST 17, 2009 BY TERRASOFT LTD USING THREE (3) TRIMBLE R8 GPS RECEIVERS AND A COMBINATION OF STATIC GPS AND RTK SURVEY TECHNIQUES. GPS DATA POST-PROCESSING WAS ACCOMPLISHED USING TRIMBLE GEOMATICS OFFICE V1.6. ALL PRIMARY CONTROL WAS DOUBLE-TIED USING REAL-TIME-KINEMATIC CONTROL METHODS AND INDEPENDENT BASELINE SOLUTIONS.
- THE TOPOGRAPHIC AND PLANIMETRIC SURVEYS WERE CONDUCTED AUGUST 13 THROUGH AUGUST 17, 2009 BY TERRASOFT LTD USING TRIMBLE R8 GPS RECEIVERS, REAL-TIME-KINEMATIC PROCEDURES, AND CONVENTIONAL METHODS. FIXED AIS-TO-NAVIGATION WERE SURVEYED AT THE LIGHT GLOBE. BUOY POSITIONS WERE DETERMINED BY AVERAGING THE FLOOD AND EBB SURVEYED LOCATIONS TO ESTABLISH AN APPROXIMATE BUOY ANCHOR POSITION.
- HYDROGRAPHIC DATA ACQUISITION WAS CONDUCTED AUGUST 15, 2009 BY TERRASOFT LTD USING A RESON SEABAT 7125 MULTIBEAM ECHOSOUNDER (200KHZ WITH 511 BEAMS AT 128 DEGREES SWATH WIDTH). VESSEL POSITIONING, HEADING AND ATTITUDE WERE MEASURED USING A CODA-OCOTOPUS F185 INERTIAL MOTION UNIT OPERATING WITH RTK CORRECTIONS FROM THE BASE STATION SET AT "TDB 125 SOUND VELOCITY CASTS" WERE MEASURED AND COLLECTED USING AN ODOM DIGIBAR PRO SOUND VELOCITY PROFILER. SURFACE SOUND VELOCITY WAS MEASURED USING AN APPLIED MICRO-SYSTEMS SMART PROBE. VESSEL NAVIGATION AND DATA COLLECTION WAS PERFORMED USING QPS DINSY INTEGRATED SOFTWARE (DINSY v8). DATA PROCESSING AND FINAL DATA ANALYSIS WERE PERFORMED USING CARIS HIPS SOFTWARE (V6.1).
- SOUNDINGS ARE SHOWN IN U.S. SURVEY FEET AND ARE MINUS UNLESS NOTED OTHERWISE.
- THIS SURVEY IS INDICATIVE OF CONDITIONS ON THE DATES OF SURVEY.
- TWO MONUMENTS WERE SET THIS SURVEY (SEE CONTROL DATA TABLE).
- THE LARSEN BAY CENTERLINE COORDINATES AND DIMENSIONS DEFINE AND CONTROL THE CENTERLINE OF THE 75' WIDE CHANNEL. THE COORDINATES FOR THE PROJECT LIMITS ARE LISTED FOR COMPUTATIONAL PURPOSES ONLY.

## ENTRANCE CHANNEL AND MOORING BASIN PROJECT LIMITS

CORNER	NORTHING	EASTING	DESCRIPTION	CORNER	NORTHING	EASTING	DESCRIPTION
1	1,290,497.94	1,638,513.57	BOP	15	1,289,813.36	1,639,200.55	ANGLE POINT
2	1,290,264.76	1,638,710.49	Angle Point	16	1,289,921.51	1,639,012.69	PC CURVE E
3	1,290,188.57	1,639,002.33	Angle Point	17	1,289,977.17	1,638,967.51	PT CURVE E
4	1,290,166.64	1,639,150.97	PC CURVE A	18	1,290,142.69	1,638,913.54	Angle Point
5	1,290,164.79	1,639,272.49	PT CURVE A	19	1,290,197.05	1,638,669.50	Angle Point
6	1,290,177.17	1,639,337.31	PC CURVE B	20	1,290,449.59	1,638,659.27	BOP
7	1,290,181.89	1,639,412.71	Point On Curve				
8	1,290,181.39	1,639,419.35	Point On Curve				
9	1,290,182.49	1,639,543.28	PT CURVE B				
10	1,290,084.09	1,639,644.70	PC CURVE C	A	23,201.0*	300.45*	62.05' 122.37'
11	1,289,947.53	1,639,647.53	PT CURVE C	B	40,444.37*	300	111.40' 213.33'
12	1,289,725.47	1,639,653.64	PC CURVE D	C	89,593.66*	100	100' 157.08'
13	1,289,688.70	1,639,417.08	PT CURVE D	D	89,582.26*	100	99.98' 157.08'
14	1,289,610.36	1,639,205.75	Angle Point	E	41,975.9*	100	38.39' 73.32'

## CONTROL DATA

STATION	NORTHING	EASTING	ELV. (MLW)	ELV. (NAVD88)	DESCRIPTION
7724 C 2009	1,292,017.52	1,641,797.49	19.89	17.94	FND NOS 3 1/2" SBC
7724 D 2009	1,293,105.33	1,644,578.89	20.02	18.07	FND NOS 3 1/2" SBC
H-1 1985	1,289,708.22	1,639,996.34	26.17	24.22	FND 2" ALCAP
H-2 1985	1,290,360.25	1,639,253.91	21.89	19.94	FND 2" ALCAP
H-4 1985	1,290,410.97	1,638,909.55	20.76	18.81	FND 2" ALCAP
LB-01 2009	1,289,502.57	1,639,378.38	40.28	38.33	SET 3 1/4" DOMED BC
LB-02 2009	1,290,340.82	1,639,365.06	17.34	15.39	SET 3 1/4" DOMED BC
531 MC AMC 1963	1,290,438.03	1,638,844.23	19.26	17.31	FND BLM 3 1/4" SBC

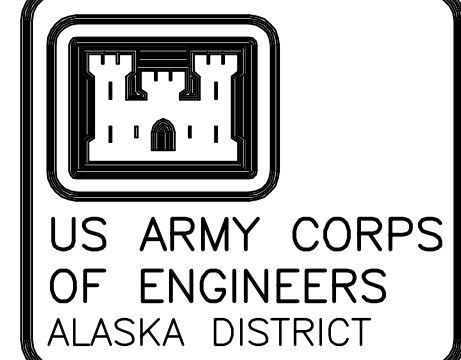
## NAVIGATION AIDS

USCG No.	DESCRIPTION	NORTHING	EASTING
26986	LARSEN BAY REEF BUOY 5	1,290,565	1,638,458
26988	LARSEN BAY HARBOR LIGHT 4	1,290,072	1,638,838

## VOLUME COMPUTATIONS

Project Depth -14' MLLW	CUBIC YARDS
MINIMUM PAY LINE (-14' MLLW)*	109
BETWEEN MINIMUM PAY LINE AND MAXIMUM PAY LINE (-15' MLLW)*	460
Project Depth -12' MLLW	
MINIMUM PAY LINE (-12' MLLW)*	30
BETWEEN MINIMUM PAY LINE AND MAXIMUM PAY LINE (-13' MLLW)*	216
VOLUME AVAILABLE ALONG SIDESLOPES (3:1, HV)	1,088
TOTAL	1,903

\* Volumes are within Project Limits and do not include SIDE SLOPES.



CONTRACT NO. W911KB-08-D-0002-0009  
CONTRACTOR TERRASOFT LIMITED  
CITY PALMER STATE ALASKA  
Recommended: Approved: Date: \_\_\_\_\_  
Prime Contractor Resident Engineer

Rev.	Date	Description
1	08/11/2010	Initial Issue
2	08/11/2010	Revised: KOW
3	08/11/2010	Revised: KOW
4	08/11/2010	Revised: KOW
5	08/11/2010	Revised: KOW
6	08/11/2010	Revised: KOW
7	08/11/2010	Revised: KOW
8	08/11/2010	Revised: KOW
9	08/11/2010	Revised: KOW
10	08/11/2010	Revised: KOW

U.S. ARMY ENGINEER DISTRICT  
CORPS OF ENGINEERS  
ANCHORAGE, ALASKA  
2772-10  
08/11/2010  
Date: 08/11/2010  
Drawn: JEA  
Checked: JEA  
Reviewed: KOW  
Submitted: KOW  
Approved: KOW  
Date: 08/11/2010

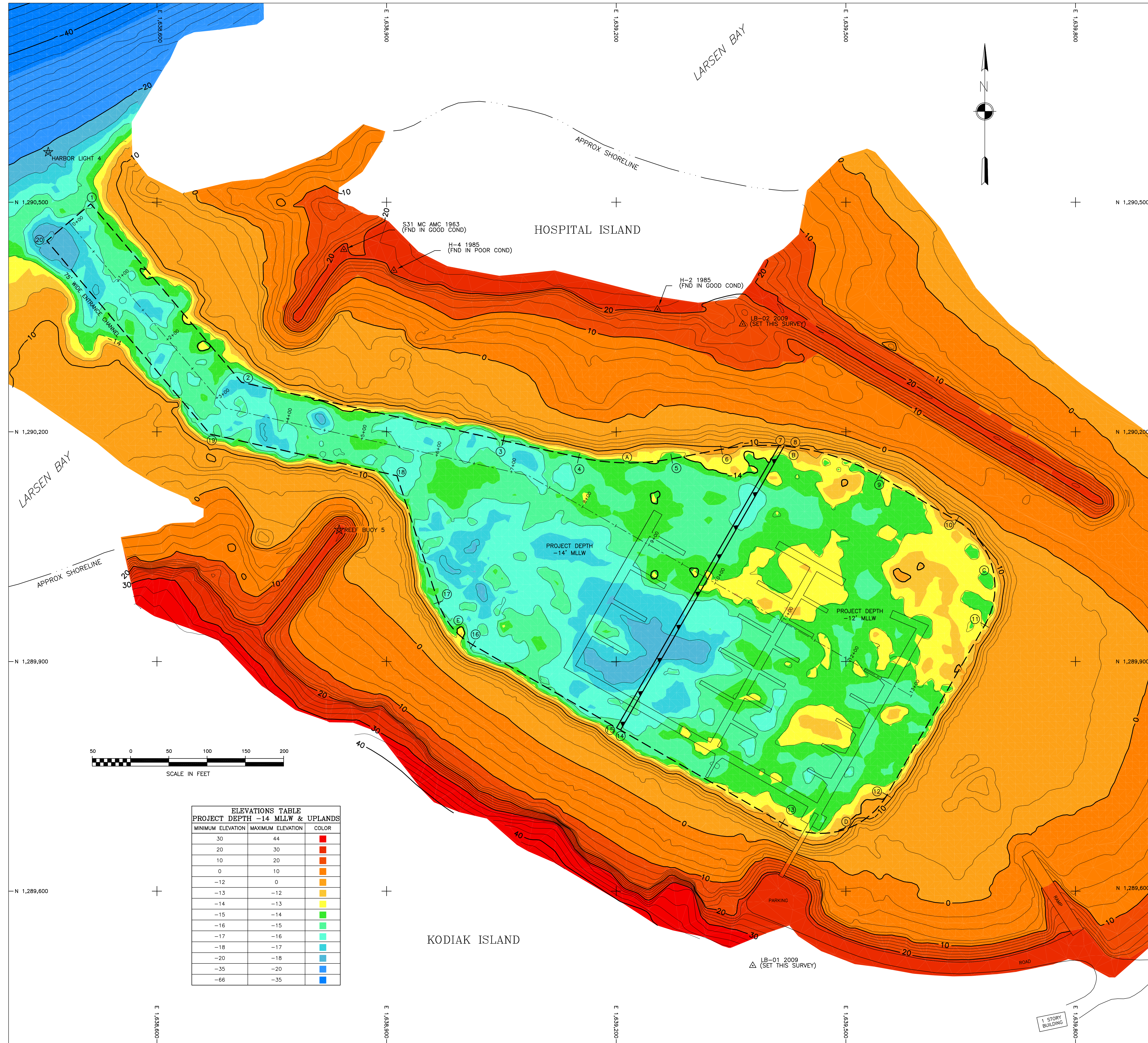
LARSEN BAY, ALASKA  
LARSEN BAY SMALL BOAT HARBOR  
PROJECT CONDITION SURVEY  
AUGUST 13-17, 2009

Reference number:

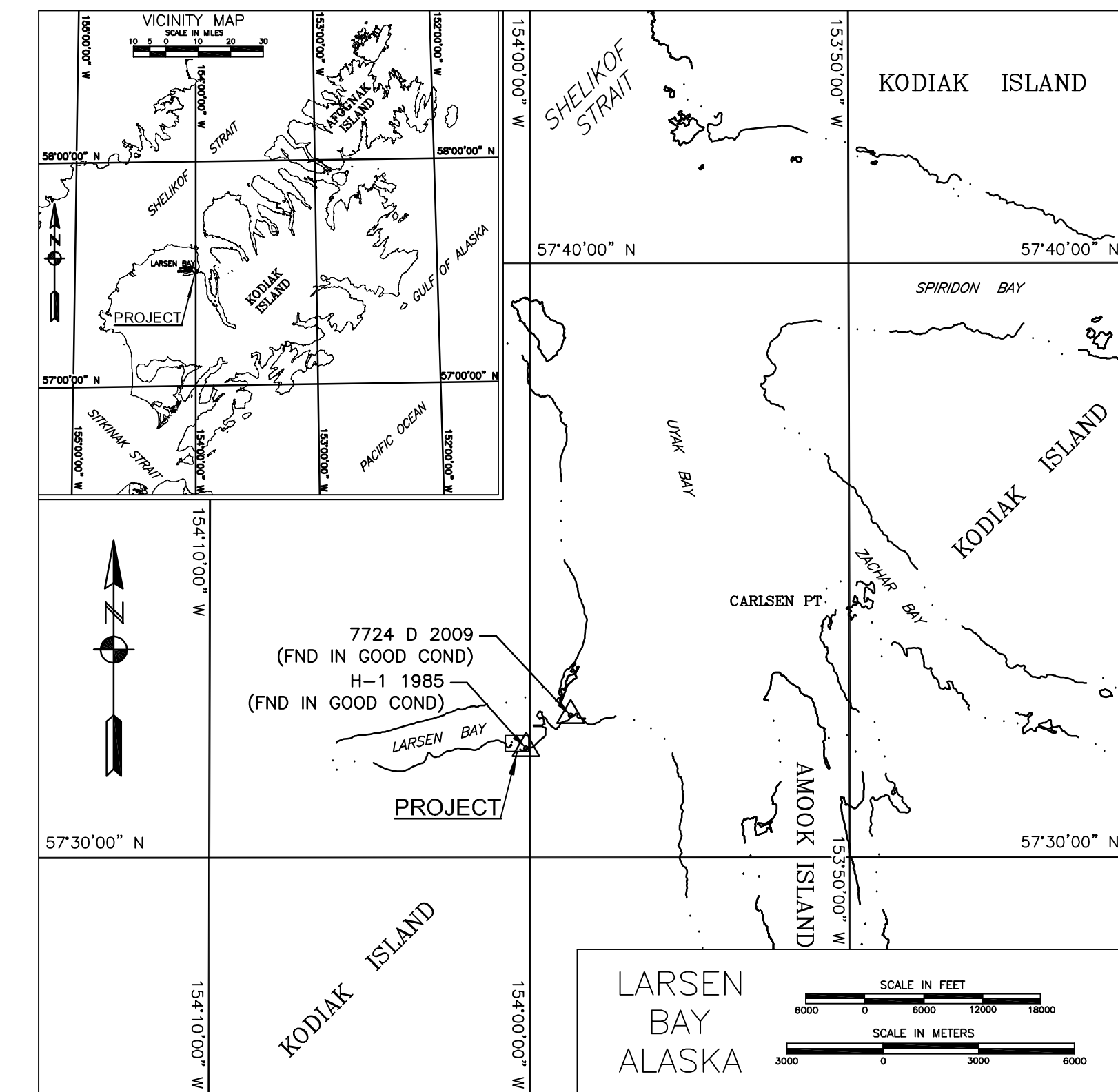
V-101  
Sheet 1 of 2

SURVEY





ELEVATIONS TABLE		
PROJECT DEPTH -14' MLLW & UPLANDS		
MINIMUM ELEVATION	MAXIMUM ELEVATION	COLOR
30	44	Red
20	30	Orange
10	20	Yellow
0	10	Light Green
-12	0	Green
-13	-12	Dark Green
-14	-13	Light Blue
-15	-14	Blue
-16	-15	Dark Blue
-17	-16	Very Dark Blue
-18	-17	Black
-20	-18	Black
-35	-20	Black
-66	-35	Black



## NOTES

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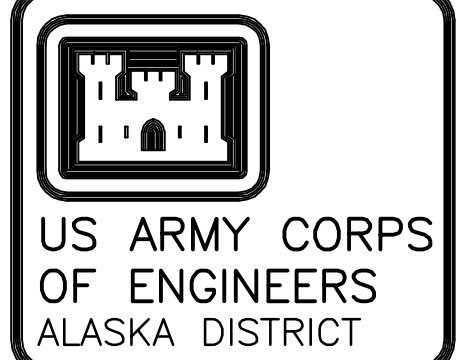
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CONTRACT NO. W911KB-08-D-0002-0009  
CONTRACTOR TERRASOOND LIMITED  
CITY PALMER STATE ALASKA  
Recommended: Approved: Date: \_\_\_\_\_  
PRIME CONTRACTOR RESIDENT ENGINEER

Rev.	Action	Description	Date	Appr.

Date: 08/11/2010  
Design: JEA LEP/KNE/JGM  
Drawn: JEA  
Reviewed: KOW  
Submitted: JEA  
Checked: JEA  
Section: 2772-10  
Drawing #: 2772-10

U.S. ARMY ENGINEER DISTRICT  
CORPS OF ENGINEERS  
ANCHORAGE, ALASKA

LARSEN BAY, ALASKA  
LARSEN BAY SMALL BOAT HARBOR  
PROJECT CONDITION SURVEY  
AUGUST 13-17, 2009

Reference number:  
V-102  
Sheet 2 of 2

SURVEY