

### VOLUME COMPUTATIONS

AREA A: ENTRANCE CHANNEL	MLLW=0	CU. YD.
AVAILABLE TO PROJECT DEPTH (PD)	-4.0	5
AVAILABLE TO MAX PAY DEPTH (MP)	-5.0	191
AVAILABLE SIDE SLOPES (SS) AT 3:1 (H:V) & 25' WIDE	VARIES	1
AREA B: TURNING CHANNEL		
AVAILABLE TO PD	-4.0	11
AVAILABLE TO MP	-5.0	131
AVAILABLE SS AT 3:1 (H:V) & 25' WIDE	VARIES	1
AREA C: WEST MANEUVERING CHANNEL		
AVAILABLE TO PD	-4.0	12
AVAILABLE TO MP	-5.0	191
AVAILABLE SS AT 3:1 (H:V) & 25' WIDE	VARIES	6
AREA D: EAST MANEUVERING CHANNEL		
AVAILABLE TO PD	-4.0	0
AVAILABLE TO MP	-5.0	23
AVAILABLE SS AT 3:1 (H:V) & 25' WIDE	VARIES	0
<b>TOTAL MAXIMUM VOLUME AVAILABLE (MP + SS)</b>		<b>544</b>

### PROJECT LIMITS CURVE DATA (FT)

CURVE	RADIUS	ARC LENGTH	DELTA ANGLE	CHORD BEARING	CHORD LENGTH
C1	144.42	146.80	58°14'32"	S53°30'18"W	140.56
C2	175.99	172.71	56°13'49"	N54°07'30"E	165.87
C3	50.12	60.17	68°46'40"	S49°43'41"E	56.62
C4	40.01	63.39	90°46'39"	N60°21'09"W	56.97
C5	20.02	41.71	119°23'25"	S14°55'15"W	34.57
C6	94.61	182.05	110°15'02"	N28°58'33"W	155.23
C7	144.43	142.17	56°24'01"	N54°07'15"E	136.50
C8	174.69	176.59	57°55'02"	S63°30'34"W	169.16



- ### NOTES
- PRIMARY PROJECT HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 7, NAD83 2011 (2010.00), IN US SURVEY FEET BASED ON A FULLY CONSTRAINED STATIC GPS NETWORK HOLDING THE PUBLISHED NAD83 2011 (2010.00) EPOCH VALUES OF NGS CORS STATIONS "MEKORYUPK\_AK2008 CORS ARP" (PID D16420); "BETHEL WNAS CORS ARP" (PID DK4091); "DILLINGHAMAK2007 CORS ARP" (PID D16426).
  - LOCAL PROJECT HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 7, NAD83 2011 (2010.00), IN US SURVEY FEET HOLDING 3.75" FLAT ALUMINUM SC "BH-D 1998" AS N 2,481,244.46, E 1,687,288.26 AND 0.25" STAINLESS STEEL ROD "946 6477 B" AS N 2,481,197.72, E 1,684,072.362.
  - VERTICAL CONTROL IS MEAN LOWER LOW WATER (MLLW=0.0'), BASED ON THE NOAA'S TIDAL BENCH MARK LIST "9466477 BETHEL, KUSKOKWIM RIVER, ALASKA", PUBLISHED 1/14/11. THIS TIDAL DATUM IS BASED ON THE 1983-2001 TIDAL EPOCH AND IS REFERENCED BY HOLDING NOAA'S TIDAL BENCH MARK "NO 7 1970" (VMM19681) AS 26.98'.
  - VERTICAL TIES TO THE NATIONAL SPATIAL REFERENCE SYSTEM ARE BASED ON PUBLISHED NAVD83 (GEOID 12B) ELEVATIONS HOLDING NOAA/USACE TIDAL BENCHMARK "946 6477 B" (PID BCC05/VMM19681) AS 17.50'.
  - SOUNDINGS ARE IN US SURVEY FEET AND ARE MINUS UNLESS OTHERWISE INDICATED.
  - BATHYMETRY WAS COLLECTED JUNE 20-25, 2016. SOUNDINGS WERE COLLECTED USING AN RZSONIC 2022 MULTIBeam ECHOSOUNDER OPERATING AT 200 KHZ. SOUND VELOCITY THROUGH THE WATER COLUMN WAS DETERMINED WITH AN AIR BASE X SOUND VELOCITY PROBE. POSITION AND VESSEL ORIENTATION WERE MEASURED USING AN APPLANIX POSMV OCEANMASTER V6 SYSTEM. DATA WAS COLLECTED AND PROCESSED USING QINSY 8.1 SOFTWARE. HORIZONTAL CONTROL WAS SURVEYED USING STATIC GNSS EQUIPMENT AND TECHNIQUES. VERTICAL CONTROL WAS SURVEYED USING DIFFERENTIAL LEVELING TECHNIQUES.
  - THIS DRAWING INDICATES GENERAL CONDITIONS AT THE TIME OF THE SURVEY.
  - MAP SOUNDINGS ARE BINNED AT 24 FEET AND ARE SHOAL BIASED. COUNTOURS ARE BASED ON 12 FEET BINNED SHOAL-BIASED SOUNDINGS. VOLUME SOUNDINGS ARE BINNED AT 3 FEET AND ARE MEAN VALUE.

### SURVEY CONTROL DATA

STATION	NORTHING	EASTING	MLLW	DESCRIPTION
946 6477 B	2,481,197.72	1,684,072.36	10.58	0.25" STEEL ROD
946 6477 C	2,481,229.28	1,684,303.68	10.01	0.25" STEEL ROD
BH-2 2013	2,482,278.29	1,687,609.16	9.39	3.5" USACE ALUM. CAP
BH-3 2016	2,481,501.91	1,687,629.37	8.71	3.5" USACE BRASS CAP
BH-4 2016	2,482,259.25	1,687,484.76	8.81	3.5" USACE BRASS CAP
BH-D 1998	2,481,244.46	1,687,288.26	8.50	3.75" ALUM. STAMPED CAP
LCMF C1 1992	2,481,417.70	1,687,819.45	9.11	3" ALUM. STAMPED CAP

### PROJECT LIMITS

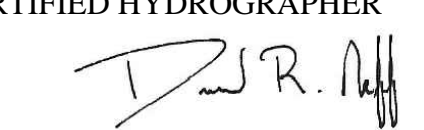
CORNER#	NORTHING	EASTING
1	2,481,713.90	1,688,093.60
2	2,481,663.80	1,688,107.40
3	2,481,175.90	1,687,862.30
4	2,481,078.70	1,687,727.90
5	2,481,023.30	1,687,318.90
6	2,480,939.70	1,687,205.90
7	2,480,706.30	1,687,098.70
8	2,480,719.20	1,687,070.50
9	2,480,953.30	1,687,178.00
10	2,481,053.90	1,687,314.00
11	2,481,109.40	1,687,723.80
12	2,481,189.40	1,687,834.40
13	2,481,451.20	1,687,961.60
14	2,481,587.00	1,687,886.40

### PROJECT LIMITS

CORNER#	NORTHING	EASTING
15	2,481,616.30	1,687,602.90
16	2,481,608.30	1,687,574.00
17	2,481,560.90	1,687,400.40
18	2,481,984.50	1,686,980.20
19	2,482,017.90	1,686,989.10
20	2,482,138.80	1,687,428.50
21	2,482,170.53	1,687,543.96
22	2,482,142.35	1,687,593.47
23	2,481,732.29	1,687,705.90
24	2,481,695.69	1,687,749.10
25	2,481,674.80	1,687,951.60
26	2,481,611.96	1,688,081.36
27	2,481,435.97	1,687,992.95
28	2,481,712.99	1,687,716.13



THIS HYDROGRAPHIC SURVEY WAS COMPLETED UNDER THE OVERSIGHT OF AN ACSM/THISOA CERTIFIED HYDROGRAPHER

  
 David R. Neff C.H. (275)

**US Army Corps of Engineers - ALASKA DISTRICT**

CONTRACT NO. W11M014E0011.0009  
 CONTRACTOR: ETAC INC.  
 CITY: WASHLEA, ALASKA  
 PROJECT: BETHEL HARBOR PROJECT CONDITION SURVEY  
 DRAWN BY: J. NEFF  
 CHECKED BY: J. NEFF  
 DATE: 06/25/2016

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**BETHEL, ALASKA**  
**BETHEL HARBOR**  
**PROJECT CONDITION SURVEY**  
**JUNE 20-25, 2016**

SHEET IDENTIFICATION  
 1-BET-92-07-52  
 Sheet 1 of 2



### VOLUME COMPUTATIONS

AREA	AVAILABLE TO PROJECT DEPTH (PD)	AVAILABLE TO MAX PAY DEPTH (MP)	AVAILABLE SIDE SLOPES (SS) AT 3:1 (H:V) & 25' WIDE	MLLW=0	CU. YD.
AREA A: ENTRANCE CHANNEL	-4.0	-5.0	VARIABLES	-4.0	5
AREA B: TURNING CHANNEL	-4.0	-5.0	VARIABLES	-4.0	11
AREA C: WEST MANEUVERING CHANNEL	-4.0	-5.0	VARIABLES	-4.0	12
AREA D: EAST MANEUVERING CHANNEL	-4.0	-5.0	VARIABLES	-4.0	0
<b>TOTAL MAXIMUM VOLUME AVAILABLE (MP + SS)</b>					<b>544</b>

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  - VERTICAL CONTROL IS MEAN LOWER LOW WATER (MLLW=0.0), BASED ON THE NOAA'S TIDAL BENCH MARK LIST "9466477 BETHEL, KUSKOKWIM RIVER, ALASKA", PUBLISHED 1/14/11, THIS TIDAL DATUM IS BASED ON THE 1983-2001 TIDAL EPOCH AND IS REFERENCED BY HOLDING NOAA'S TIDAL BENCH MARK "NO 7 1970" (VMF19681) AS 26.98'.
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### ELEVATION COLOR LEGEND

#	MIN. ELEV.	MAX. ELEV.	COLOR
1	-50.0	-20.0	Blue
2	-20.0	-15.0	Dark Blue
3	-15.0	-10.0	Light Blue
4	-10.0	-7.0	Very Light Blue
5	-7.0	-6.0	Light Cyan
6	-6.0	-5.0	Light Green
7	-5.0	-4.0	Yellow-Green
8	-4.0	-3.0	Yellow
9	-3.0	-2.0	Light Orange
10	-2.0	-1.0	Orange
11	-1.0	0.0	Light Red
12	0.0	1.0	Red
13	1.0	2.0	Dark Red
14	2.0	3.0	Dark Orange
15	3.0	4.0	Orange
16	4.0	5.0	Light Orange

### SURVEY CONTROL DATA

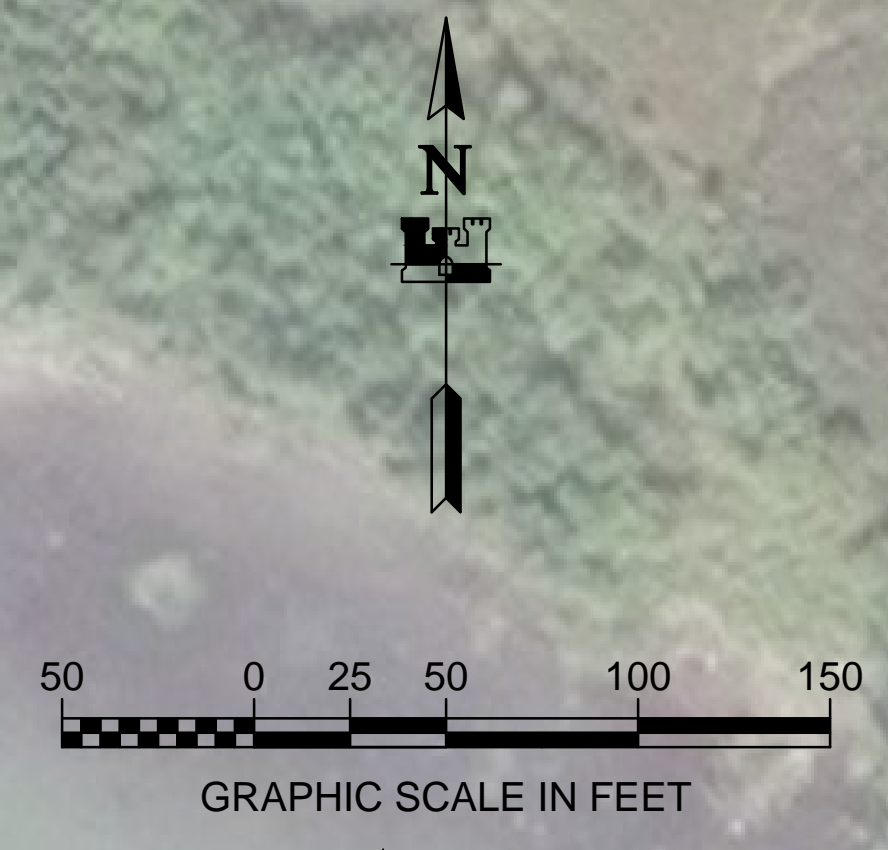
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