

- NOTES**
1. THIS LOCALITY IS SHOWN ON USC & GS CHARTS NO. 16664, 16660, 16603 AND 500.
  2. DEPTHS ARE IN FEET REFERENCED TO MEAN LOWER LOW WATER (MLLW=0.0').
  3. SOUNDINGS ARE IN FEET AND ARE MINUS UNLESS OTHERWISE INDICATED.
  4. THIS DRAWING INDICATES GENERAL CONDITIONS AT THE TIME OF SURVEY.
  5. SURVEY WAS CONDUCTED ON APRIL 21, 2014 BY ETRAC INC. SOUNDINGS WERE COLLECTED USING AN R2SONIC 2024 MULTIBEAM DEPTH SOUNDER (200KHZ, 120-DEGREE SWATH-WIDTH WITH 256, 0.5 DEGREE BEAMS). SOUND VELOCITY PROFILES WERE MEASURED USING AN ODOM DIGI-BAR PRO. SOUND VELOCITY WAS MEASURED IN REAL TIME AT THE SOUNDER HEAD USING A VALEPORT MINIVIS.
  6. VESSEL POSITIONING, HEADING, ATTITUDE, AND RTK TIDES WERE PROVIDED IN REAL TIME USING AN APPLANIX POSMV WAVEMASTER GPS/INERTIAL POSITIONING SYSTEM RECEIVING RTK CORRECTIONS FROM A TRIMBLE SPS855 RECEIVER SET AT CONTROL STATION "TERRA 11" LOCATED ATOP THE PORT OFFICE BUILDING. POST-PROCESS KINEMATIC CORRECTIONS USING POSPAC MMS 5.4 SOFTWARE WERE APPLIED TO DATA FOLLOWING ACQUISITION. VESSEL NAVIGATION, DATA ACQUISITION AND PROCESSING WERE PERFORMED USING GPS INTEGRATED SOFTWARE.

**2014 SURVEY LIMITS**

NAME	NORTHING	EASTING
S-1	2,628,109.78	1,616,398.10
S-2	2,628,629.58	1,619,207.16
S-3	2,634,149.17	1,629,627.37
S-4	2,632,899.70	1,630,288.59
S-5	2,627,539.90	1,620,173.66
S-6	2,626,939.60	1,616,614.64
S-7	2,626,423.49	1,613,948.61
S-8	2,626,423.49	1,616,773.28
S-9	2,624,254.99	1,613,948.61
S-10	2,624,254.99	1,616,773.28

**2014 DREDGE LIMITS**

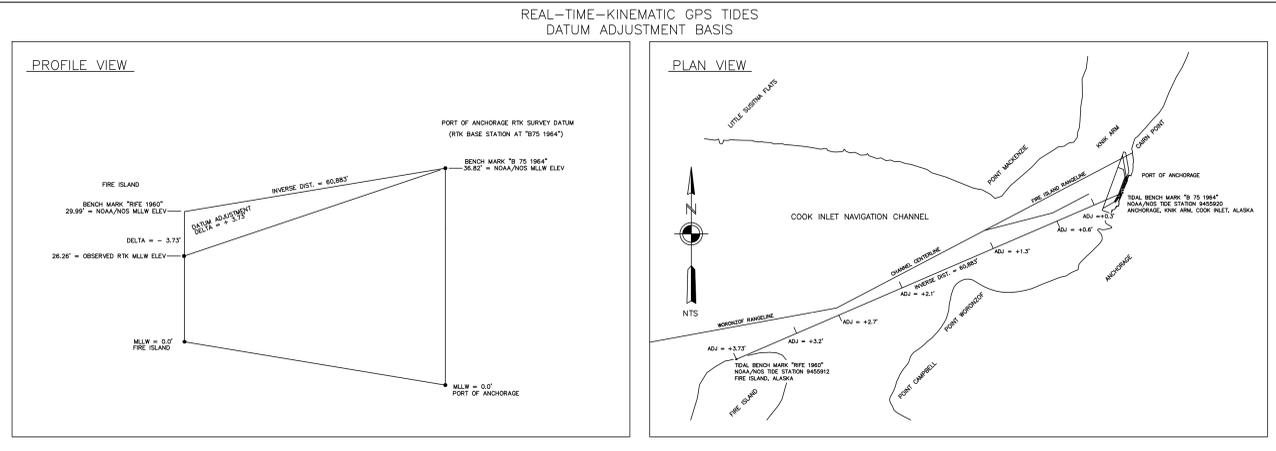
NAME	NORTHING	EASTING
C-1	2,628,320.37	1,618,085.73
C-2	2,628,534.04	1,619,240.43
C-3	2,633,360.88	1,628,352.82
C-4	2,632,288.21	1,628,921.02
C-5	2,627,635.82	1,620,141.11
C-6	2,627,320.35	1,618,270.78

**CONTROL DATA**

POINT ID	NORTHING	EASTING	ELEV. (MLLW)	DESCRIPTION
BM 12 1984	2,620,563.82	1,604,566.35	27.63	Brass Cap
BM 5934 F	2,655,203.73	1,655,049.51	36.48	Brass Cap
CRAIG	2,642,635.95	1,661,029.47	44.95	Brass Cap
ETRAC-1	2,646,395.57	1,660,814.72	38.34	Brass Cap
ETRAC-2	2,644,443.04	1,660,120.66	36.38	Brass Cap
MIKE	2,645,987.73	1,661,875.48	48.67	Brass Cap
NORTH END	2,646,649.84	1,660,584.80	41.56	USACE SBC 1978
PORT 1968	2,639,934.29	1,656,925.43	39.55	Almon
PORT MAC	2,655,563.46	1,654,968.22	41.51	Brass Cap
RIFE 1960	2,630,502.19	1,604,162.70	29.99	Brass Cap
SOUTH END	2,644,296.27	1,659,728.03	40.58	USACE SBC 1978
TERRA 11 ARP	2,644,969.84	1,660,159.24	80.48	Antennae Reference Point
TERRA 12 ARP	2,644,990.65	1,660,166.56	81.21	Antennae Reference Point
5920 THERMO 1 1988	2,642,784.70	1,660,183.87	37.32	Almon

**VOLUME COMPUTATIONS**

NAVIGATION CHANNEL PROJECT DEPTH -38' MLLW	CUBIC YARDS
VOLUME AVAILABLE ABOVE -38' MLLW	51,561
VOLUME AVAILABLE ABOVE -42.5' MLLW	1,315,223
DISPOSAL AREA PROJECT FILL DEPTH -45' MLLW	
FILL VOLUME AVAILABLE BELOW -45' MLLW	2,293,537



CONTRACT NO. W911KB-14-D-0013  
 CONTRACTOR: ETRAC, INC.  
 CITY: SAN RAFAEL, STATE: CA  
 Recommended: Approved: Date:  
 PRIME CONTRACTOR: RESUBMIT ENGINEER

Serial	Action	Description	Date	App'd

Date: 06/20/14  
 Draw Scale: 1" = 1000'  
 Plot Scale: 1:1  
 File: FILE\_20140421\_PNL.dwg  
 Designer: S. OLSON  
 Drawn: S. OLSON  
 Reviewed: J. ANDERSON  
 Checked: A. CHURCHILL  
 Submitted: A. CHURCHILL  
 USACE Survey No: 3190-14

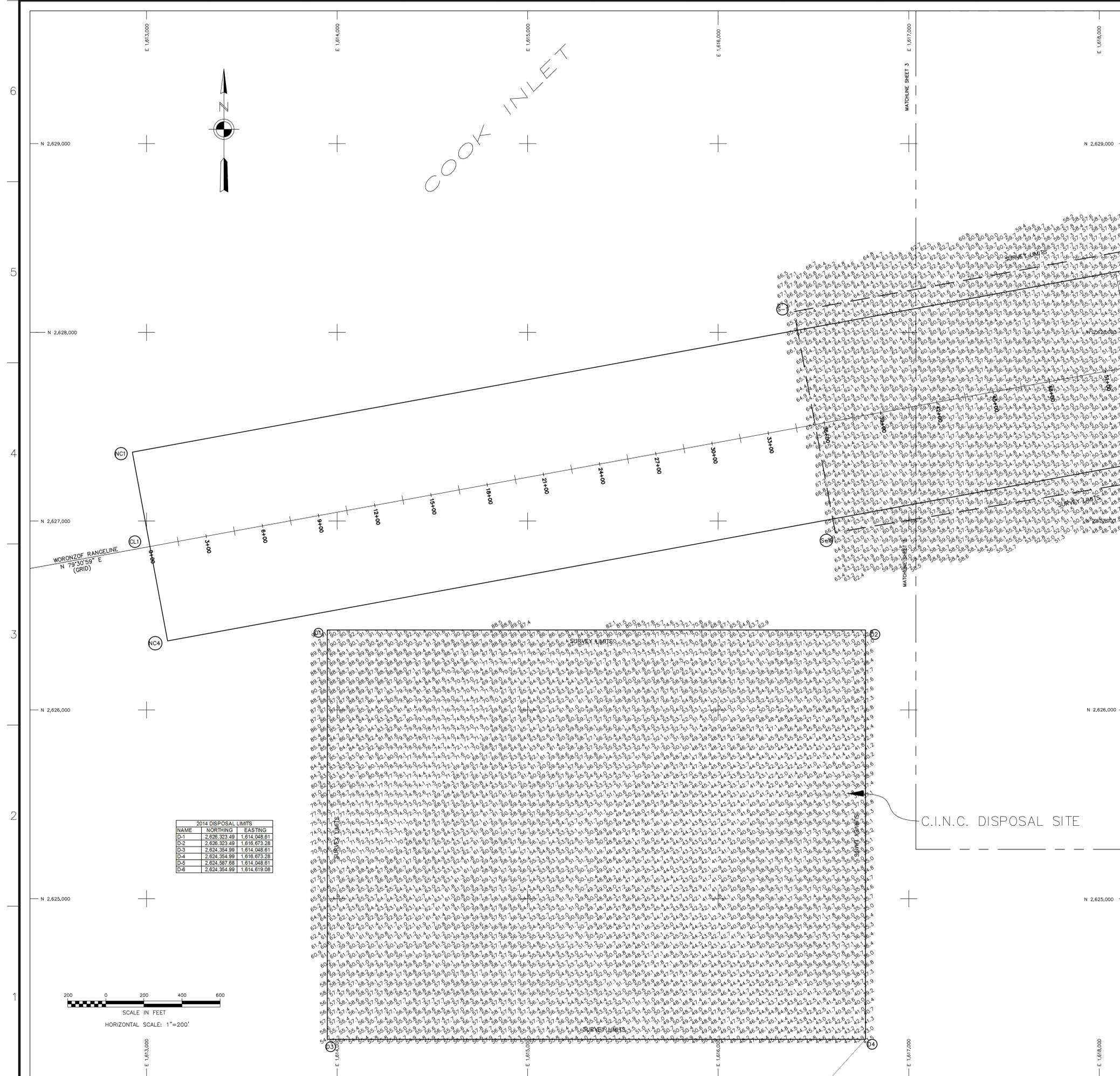
COOK INLET, ALASKA  
 COOK INLET NAVIGATION CHANNEL  
 PREDEGREE SURVEY  
 APRIL 21, 2014



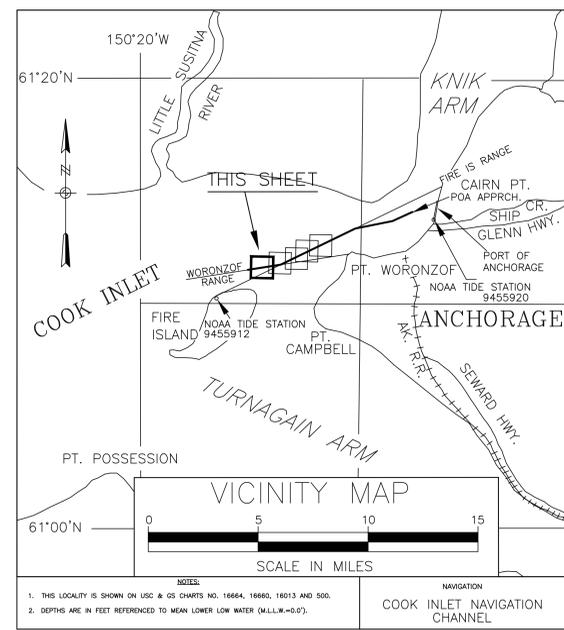
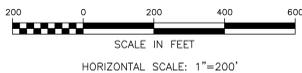
THIS HYDROGRAPHIC SURVEY WAS COMPLETED UNDER THE OVERSIGHT OF AN ACSM/THSOA CERTIFIED HYDROGRAPHER  
 David R. Neff CH(275)

**BATHYMETRY**

Reference number:  
**V-101**  
 Sheet 1 of 11



NAME	NORTHING	EASTING
D-1	2,626,323.49	1,614,048.61
D-2	2,626,323.49	1,616,673.28
D-3	2,624,354.99	1,614,048.61
D-4	2,624,354.99	1,616,673.28
D-5	2,624,387.88	1,614,048.61
D-6	2,624,354.99	1,614,619.08



- NOTES**
- HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 4, NAD83 IN U.S. SURVEY FEET HOLDING USACE "TERRA 11" AS N 2,644,969.84, E 1,660,159.24.
  - VERTICAL CONTROL: ELEVATIONS ARE MEAN LOWER LOW WATER (MLLW) TIDAL DATUM EPOCH 1983-2001, EXPRESSED IN U.S. SURVEY FEET. PRELIMINARY ELEVATIONS WERE ACQUIRED IN REFERENCE TO A SINGLE BENCHMARK HOLDING USACE "TERRA 11" AS 80.48 FEET MLLW. FINAL DATA WERE ADJUSTED BASED ON THE C.I.N.C. CUSTOM MLLW PLANE DETERMINED FROM THE DOWL C.I.N.C. CONTROL SURVEY CONDUCTED IN FEBRUARY, 2013.
  - SOUNDINGS ARE IN FEET AND ARE MINUS UNLESS OTHERWISE INDICATED.
  - THIS DRAWING INDICATES GENERAL CONDITIONS AT THE TIME OF SURVEY.
  - SURVEY WAS CONDUCTED ON APRIL 21, 2014 BY ETRAC INC. SOUNDINGS WERE COLLECTED USING AN R230NC 2024 MULTIBeam DEPTH SOUNDER (200kHz, 120-DEGREE SWATH-WIDTH WITH 246, 0.5 DEGREE BEAMS). SOUND VELOCITY PROFILES WERE MEASURED USING AN ODOM DIGI-BAR PRO. SOUND VELOCITY WAS MEASURED IN REAL TIME AT THE SOUNDER HEAD USING A VALEPORT MINISV.
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NAME	NORTHING	EASTING
C-1	2,628,320.37	1,618,085.73
C-2	2,628,534.04	1,619,240.43
C-3	2,633,360.88	1,628,352.82
C-4	2,632,288.21	1,628,921.02
C-5	2,627,635.82	1,620,141.11
C-6	2,627,320.35	1,618,270.78

NAME	NORTHING	EASTING
S-1	2,628,109.78	1,616,398.10
S-2	2,628,629.58	1,619,207.16
S-3	2,634,149.17	1,629,627.37
S-4	2,632,899.70	1,630,288.59
S-5	2,627,539.90	1,620,173.66
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S-7	2,626,423.49	1,613,948.61
S-8	2,626,423.49	1,616,773.28
S-9	2,624,254.99	1,613,948.61
S-10	2,624,254.99	1,616,773.28

POINT ID	NORTHING	EASTING	ELEV. (MLLW)	DESCRIPTION
BM 12 1984	2,620,563.82	1,604,566.35	27.63	Brass Cap
BM 5934 F	2,655,203.73	1,655,049.51	36.48	Brass Cap
CRAIG	2,642,635.95	1,661,029.47	44.95	Brass Cap
ETRAC-1	2,646,395.57	1,660,814.72	38.34	Brass Cap
ETRAC-2	2,644,443.04	1,660,120.66	36.38	Brass Cap
MIKE	2,645,987.73	1,661,875.48	48.67	Brass Cap
NORTH END	2,646,649.84	1,660,584.80	41.56	USACE SBC 1978
PORT 1968	2,639,934.29	1,656,925.43	39.55	Almon
PORT MAC	2,655,563.46	1,654,988.22	41.51	Brass Cap
RIFE 1960	2,630,502.19	1,604,162.70	29.99	Brass Cap
SOUTH END	2,644,296.27	1,659,728.03	40.58	USACE SBC 1978
TERRA 11 ARP	2,644,969.84	1,660,159.24	80.48	Antennae Reference Point
TERRA 12 ARP	2,644,990.65	1,660,166.56	81.21	Antennae Reference Point
5920 THERMO 1 1988	2,642,784.70	1,660,183.87	37.32	Almon

NAVIGATION CHANNEL PROJECT DEPTH -38' MLLW	CUBIC YARDS
VOLUME AVAILABLE ABOVE -38' MLLW	51,561
VOLUME AVAILABLE ABOVE -42.5' MLLW	1,315,223
DISPOSAL AREA PROJECT FILL DEPTH -45' MLLW	CUBIC YARDS
FILL VOLUME AVAILABLE BELOW -45' MLLW	2,293,537



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

David R. Neff CH(275)

**BATHYMETRY**



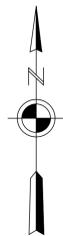
CONTRACT NO. W911KB-14-D-0013  
 CONTRACTOR: ETRAC, INC.  
 CITY: SAN RAFAEL, STATE: CA  
 Recommended: Approved: Date:  
 PRIME CONTRACTOR RESIDENT ENGINEER

Serial	Action	Description	Date	App'd

Date: 06/20/14  
 Dwg. Scale: 1" = 200'  
 Plot Scale: 1:1  
 File: ME\_20140421\_PML.dwg  
 Designer: S. OLSON  
 Drafter: S. OLSON  
 Reviewer: J. ANDERSON  
 Checker: A. CHURCHILL  
 Submitter: A. CHURCHILL  
 Branch: ANCHORAGE, ALASKA  
 USACE Survey No: 3190-14

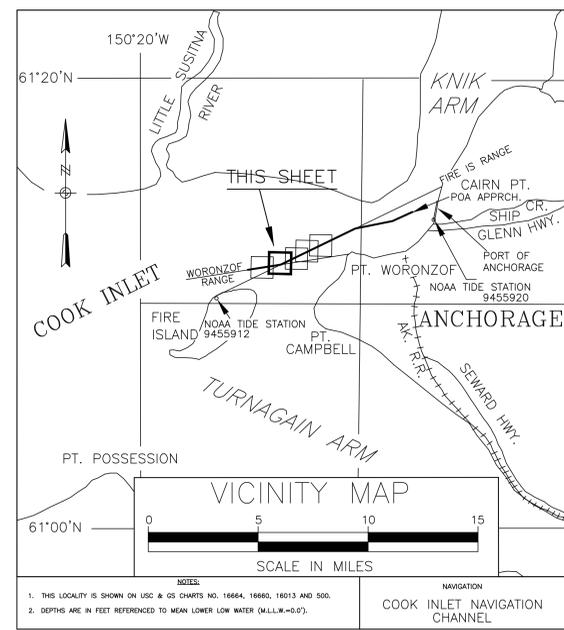
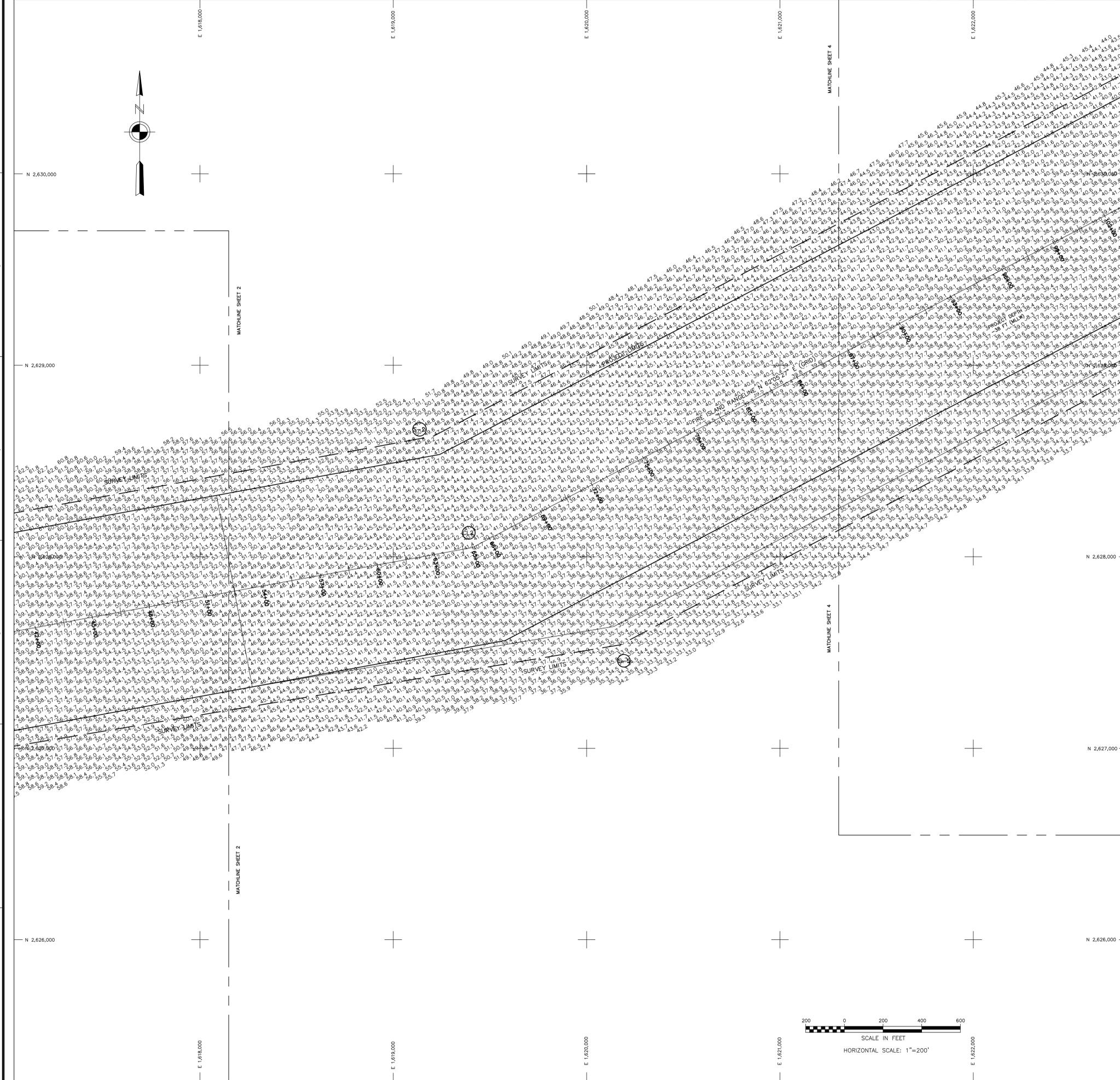
COOK INLET, ALASKA  
 COOK INLET NAVIGATION CHANNEL  
 PREDREDGE SURVEY  
 APRIL 21, 2014

Reference number:  
**V-102**  
 Sheet 2 of 11



E 1,618,000 E 1,619,000 E 1,620,000 E 1,621,000 E 1,622,000

6 5 4 3 2 1



- NOTES**
- HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 4, NAD83 IN U.S. SURVEY FEET HOLDING USACE "TERRA 11" AS N 2,644,969.84, E 1,660,159.24.
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**2014 DREDGE LIMITS**

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C-5	2,627,635.82	1,620,141.11
C-6	2,627,320.35	1,618,270.78

**2014 SURVEY LIMITS**

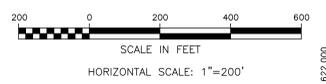
NAME	NORTHING	EASTING
S-1	2,628,109.78	1,616,398.10
S-2	2,628,629.58	1,619,207.16
S-3	2,634,149.17	1,629,627.37
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**CONTROL DATA**

POINT ID	NORTHING	EASTING	ELEV. (MLLW)	DESCRIPTION
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MIKE	2,645,987.73	1,661,875.48	48.67	Brass Cap
NORTH END	2,646,649.84	1,660,584.80	41.56	USACE SBC 1978
PORT 1968	2,639,934.29	1,656,925.43	39.55	Almon
PORT MAC	2,655,563.46	1,654,988.22	41.51	Brass Cap
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**VOLUME COMPUTATIONS**

NAVIGATION CHANNEL PROJECT DEPTH -38' MLLW	CUBIC YARDS
VOLUME AVAILABLE ABOVE -38' MLLW	51,561
VOLUME AVAILABLE ABOVE -42.5' MLLW	1,315,223
DISPOSAL AREA PROJECT FILL DEPTH -45' MLLW	CUBIC YARDS
FILL VOLUME AVAILABLE BELOW -45' MLLW	2,293,537



THIS HYDROGRAPHIC SURVEY WAS COMPLETED UNDER THE OVERSIGHT OF AN ACSM/THOSOA CERTIFIED HYDROGRAPHER  
David R. Neff CH(275)

**BATHYMETRY**



CONTRACT NO. W911KB-14-D-0013  
CONTRACTOR: ETRAC, INC.  
CITY: SAN RAFAEL, STATE: CA  
Recommended by: [Signature]  
Approved: [Signature]  
Date: [Blank]  
PRIME CONTRACTOR: [Blank]  
RESIDENT ENGINEER: [Blank]

Serial	Action	Description	Date	App'd

Date: 06/20/14  
Dwg. Scale: 1" = 200'  
Plot Scale: 1:1  
File: P10204021\_P104.dwg

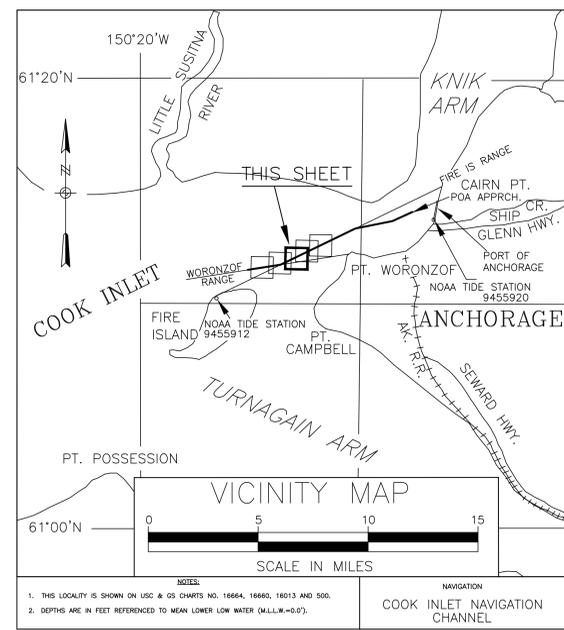
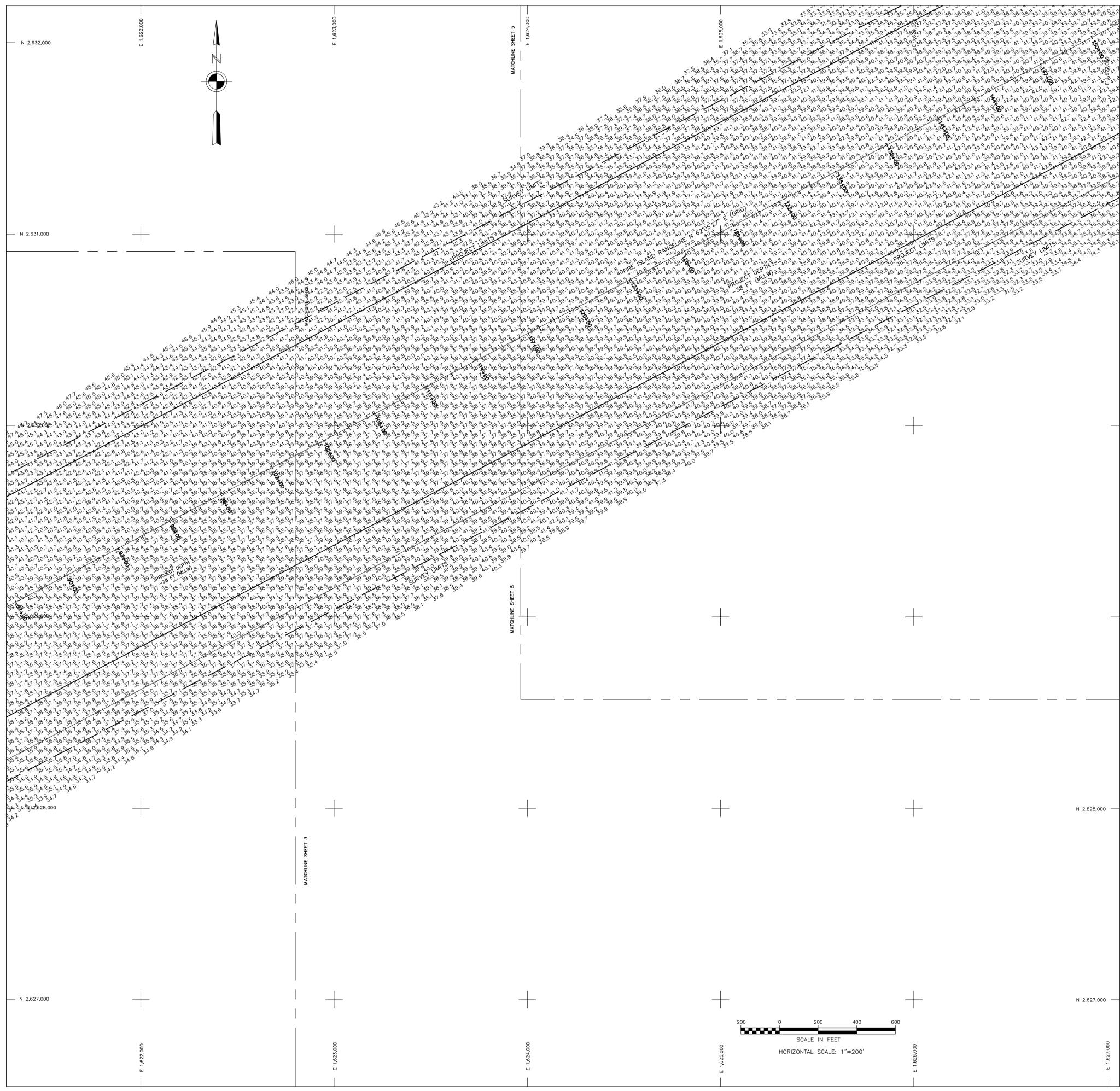
Designed: S. OLSON  
Drawn: S. OLSON  
Reviewed: J. ANDERSON  
Submitted: A. CHURCHILL  
Checked: [Blank]

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

USACE Survey No: **3190-14**

**COOK INLET, ALASKA**  
**COOK INLET NAVIGATION CHANNEL**  
**PRE-DREDGE SURVEY**  
**APRIL 21, 2014**

Reference number:  
**V-103**  
Sheet 3 of 11



- NOTES**
- HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 4, NAD83 IN U.S. SURVEY FEET HOLDING USACE "TERRA 11" AS N 2,644,969.84, E 1,660,159.24.
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THIS HYDROGRAPHIC SURVEY WAS COMPLETED UNDER THE OVERSIGHT OF AN ACSM/THSOA CERTIFIED HYDROGRAPHER

David R. Neff CH(275)

**BATHYMETRY**



CONTRACT NO. W911KB-14-D-0013  
 CONTRACTOR: ETRAC, INC.  
 CITY: SAN RAFAEL STATE: CA  
 Recommended: Approved: Date:  
 PRIME CONTRACTOR RESIDENT ENGINEER

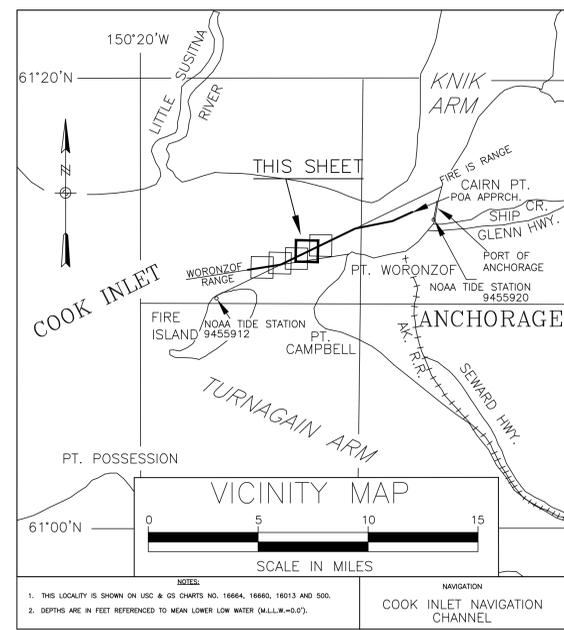
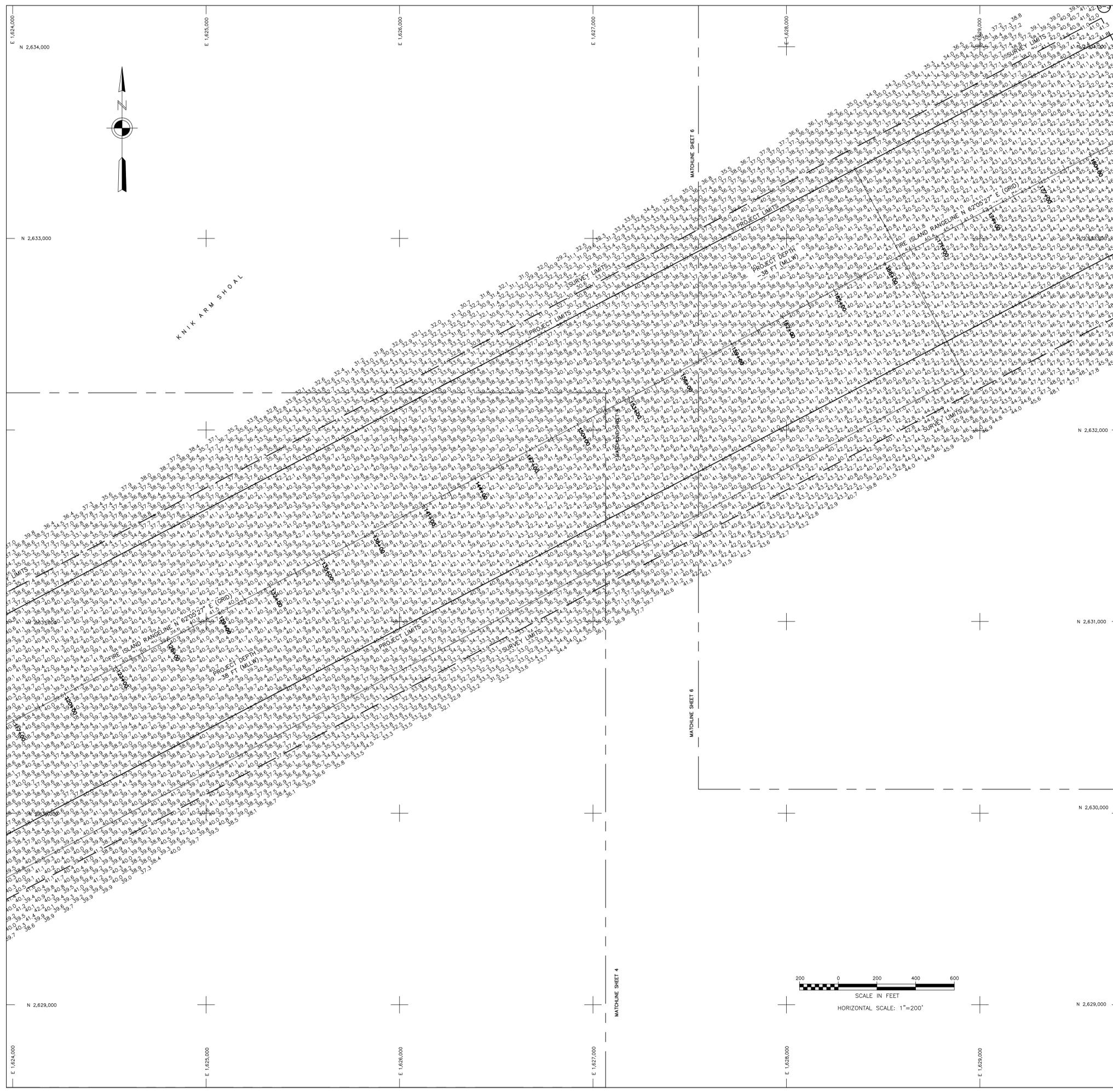
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 Branch:  

Design: S. OLSON  
 Drawn: S. OLSON  
 Reviewed: J. ANDERSON  
 Checked: A. CHURCHILL  
 Submitted: A. CHURCHILL  
 USACE Survey No: 3190-14

COOK INLET, ALASKA  
 COOK INLET NAVIGATION CHANNEL  
 PREDREDGE SURVEY  
 APRIL 21, 2014

Reference number:  
**V-104**  
 Sheet 4 of 11



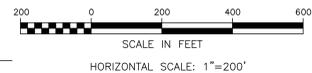
- NOTES**
- HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 4, NAD83 IN U.S. SURVEY FEET HOLDING USACE "TERRA 11" AS N 2,644,969.84, E 1,660,159.24.
  - VERTICAL CONTROL: ELEVATIONS ARE MEAN LOWER LOW WATER (MLLW) TIDAL DATUM EPOCH 1983-2001, EXPRESSED IN U.S. SURVEY FEET. PRELIMINARY ELEVATIONS WERE ACQUIRED IN REFERENCE TO A SINGLE BENCHMARK HOLDING USACE "TERRA 11" AS 80.48 FEET MLLW. FINAL DATA WERE ADJUSTED BASED ON THE C.I.N.C. CUSTOM MLLW PLANE DETERMINED FROM THE DOWL C.I.N.C. CONTROL SURVEY CONDUCTED IN FEBRUARY, 2013.
  - SOUNDINGS ARE IN FEET AND ARE MINUS UNLESS OTHERWISE INDICATED.
  - THIS DRAWING INDICATES GENERAL CONDITIONS AT THE TIME OF SURVEY.
  - SURVEY WAS CONDUCTED ON APRIL 21, 2014 BY ETRAC INC. SOUNDINGS WERE COLLECTED USING AN R250NC 2024 MULTIBEAM DEPTH SOUNDER (200KHZ, 120-DEGREE SWATH-WIDTH WITH 246, 0.5 DEGREE BEAMS). SOUND VELOCITY PROFILES WERE MEASURED USING AN ODOM DIGI-BAR PRO. SOUND VELOCITY WAS MEASURED IN REAL TIME AT THE SOUNDER HEAD USING A VALEPORT MINIVUS.
  - VESSEL POSITIONING, HEADING, ATTITUDE, AND RTK TIDES WERE PROVIDED IN REAL TIME USING AN APPLANIX POSMV WAVEMASTER GPS/INERTIAL POSITIONING SYSTEM RECEIVING RTK CORRECTIONS FROM A TRIMBLE SP5855 RECEIVER SET AT CONTROL STATION "TERRA 11" LOCATED ATOP THE PORT OFFICE BUILDING. POST-PROCESS KINEMATIC CORRECTIONS USING POSPAC MMS 5.4 SOFTWARE WERE APPLIED TO DATA FOLLOWING ACQUISITION. VESSEL NAVIGATION, DATA ACQUISITION AND PROCESSING WERE PERFORMED USING OPS INTEGRATED SOFTWARE.

NAME	NORTHING	EASTING
C-1	2,628,320.37	1,618,085.73
C-2	2,628,534.04	1,619,240.43
C-3	2,633,360.88	1,628,352.82
C-4	2,632,288.21	1,628,921.02
C-5	2,627,635.82	1,620,141.11
C-6	2,627,320.35	1,618,270.78

NAME	NORTHING	EASTING
S-1	2,628,109.78	1,616,398.10
S-2	2,628,629.58	1,619,207.16
S-3	2,634,149.17	1,629,627.37
S-4	2,632,899.70	1,630,288.59
S-5	2,627,539.90	1,620,173.66
S-6	2,626,939.60	1,616,614.64
S-7	2,626,423.49	1,613,948.61
S-8	2,626,423.49	1,616,773.28
S-9	2,624,254.99	1,613,948.61
S-10	2,624,254.99	1,616,773.28

POINT ID	NORTHING	EASTING	ELEV. (MLLW)	DESCRIPTION
BM 12 1984	2,620,563.82	1,604,566.35	27.63	Brass Cap
BM 5934 F	2,655,203.73	1,655,049.51	36.48	Brass Cap
CRAIG	2,642,635.95	1,661,029.47	44.95	Brass Cap
ETRAC-1	2,646,395.57	1,660,814.72	38.34	Brass Cap
ETRAC-2	2,644,443.04	1,660,120.66	36.38	Brass Cap
MIKE	2,645,987.73	1,661,875.48	48.67	Brass Cap
NORTH END	2,646,649.84	1,660,584.80	41.56	USACE SBC 1978
PORT MAC	2,659,934.29	1,656,925.43	39.55	Almon
PORT MAC	2,655,563.46	1,654,988.22	41.51	Brass Cap
RIFE 1960	2,630,502.19	1,604,162.70	29.99	Brass Cap
SOUTH END	2,644,296.27	1,659,728.03	40.58	USACE SBC 1978
TERRA 11 ARP	2,644,969.84	1,660,159.24	80.48	Antennae Reference Point
TERRA 12 ARP	2,644,990.65	1,660,166.56	81.21	Antennae Reference Point
5920 THERMO 1 1988	2,642,784.70	1,660,183.87	37.32	Almon

NAVIGATION CHANNEL PROJECT DEPTH -38' MLLW	CUBIC YARDS
VOLUME AVAILABLE ABOVE -38' MLLW	51,561
VOLUME AVAILABLE ABOVE -42.5' MLLW	1,315,223
DISPOSAL AREA PROJECT FILL DEPTH -45' MLLW	CUBIC YARDS
FILL VOLUME AVAILABLE BELOW -45' MLLW	2,293,537



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

David R. Neff CH(275)

**BATHYMETRY**



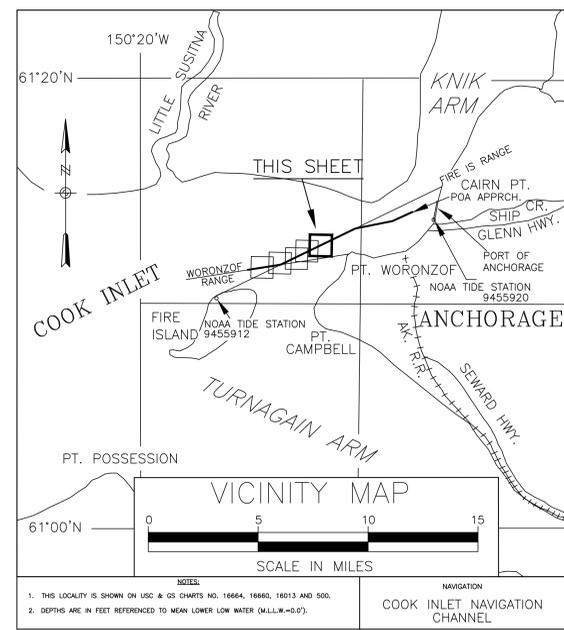
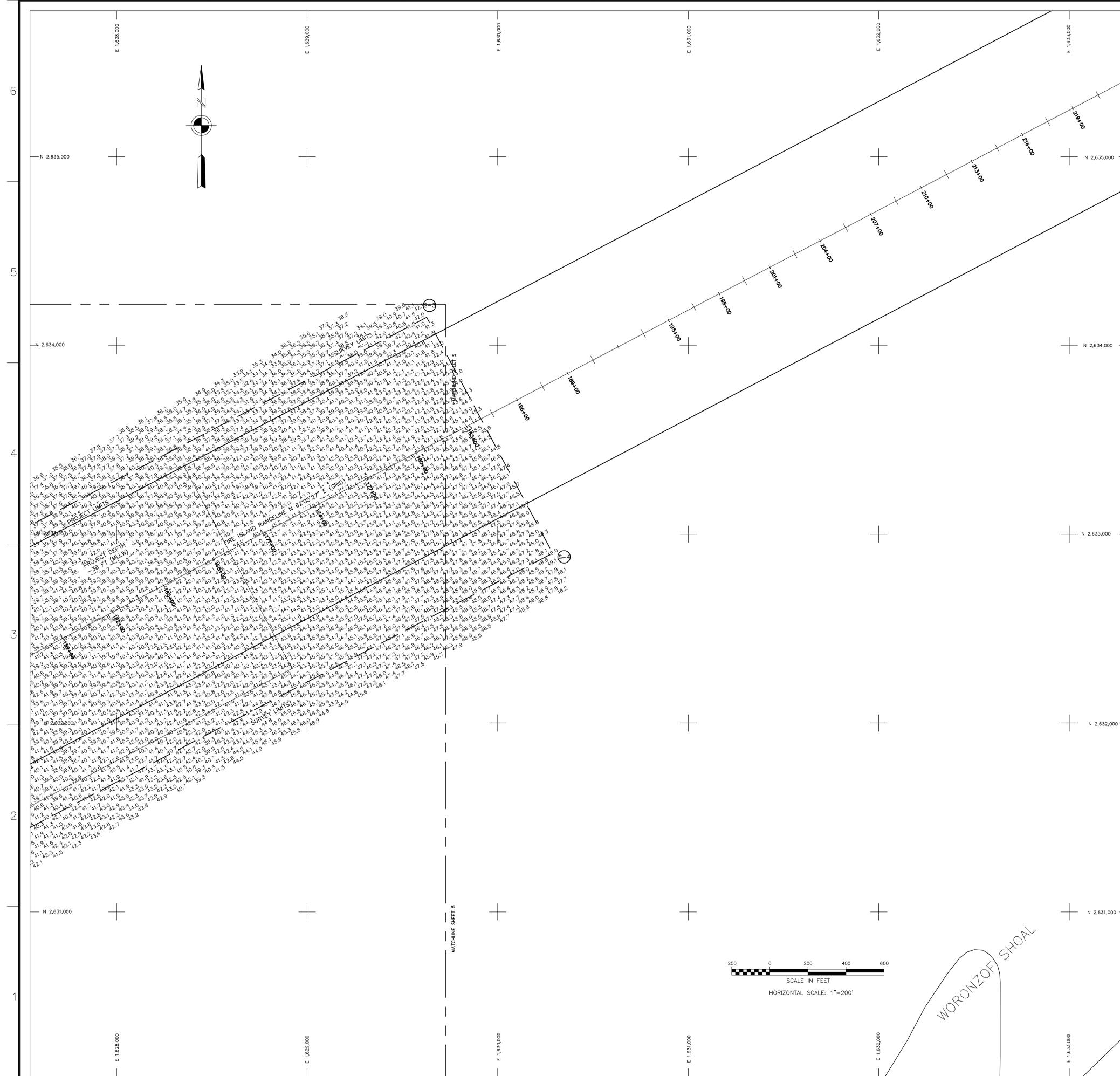
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 CONTRACTOR: ETRAC, INC.  
 CITY: SAN RAFAEL, STATE: CA  
 Recommended by: [Signature]  
 Approved: [Signature]  
 Date: [Blank]  
 RESUBMIT ENGINEER: [Blank]

Serial	Action	Description	Date	App'd

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 Plot Scale: 1:1  
 File: PRELIMINARY.dwg  
 Designer: S. OLSON  
 Drawn: S. OLSON  
 Reviewed: J. ANDERSON  
 Chief: [Blank]  
 Submitted: A. CHURCHILL  
 Chief: [Blank]  
 USACE Survey No: 3190-14

COOK INLET, ALASKA  
 COOK INLET NAVIGATION CHANNEL  
 PRE-DREDGE SURVEY  
 APRIL 21, 2014

Reference number:  
**V-105**  
 Sheet 5 of 11



- NOTES**
- HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 4, NAD83 IN U.S. SURVEY FEET HOLDING USACE "TERRA 11" AS N 2,644,969.84, E 1,660,159.24.
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  - SOUNDINGS ARE IN FEET AND ARE MINUS UNLESS OTHERWISE INDICATED.
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  - VESSEL POSITIONING, HEADING, ATTITUDE, AND RTK TIDES WERE PROVIDED IN REAL TIME USING AN APPLANIX POSMV WAVEMASTER GPS/INERTIAL POSITIONING SYSTEM RECEIVING RTK CORRECTIONS FROM A TRIMBLE SP5855 RECEIVER SET AT CONTROL STATION "TERRA 11" LOCATED ATOP THE PORT OFFICE BUILDING. POST-PROCESS KINEMATIC CORRECTIONS USING POSPCAP MMS 5.4 SOFTWARE WERE APPLIED TO DATA FOLLOWING ACQUISITION. VESSEL NAVIGATION, DATA ACQUISITION AND PROCESSING WERE PERFORMED USING OPS INTEGRATED SOFTWARE.

**2014 DREDGE LIMITS**

NAME	NORTHING	EASTING
C-1	2,628,320.37	1,618,085.73
C-2	2,628,534.04	1,619,240.43
C-3	2,633,360.88	1,628,352.82
C-4	2,632,288.21	1,628,921.02
C-5	2,627,635.82	1,620,141.11
C-6	2,627,320.35	1,618,270.78

**2014 SURVEY LIMITS**

NAME	NORTHING	EASTING
S-1	2,628,109.78	1,616,398.10
S-2	2,628,629.58	1,619,207.16
S-3	2,634,149.17	1,629,627.37
S-4	2,632,899.70	1,630,288.59
S-5	2,627,539.60	1,620,173.66
S-6	2,626,939.60	1,616,614.64
S-7	2,626,423.49	1,613,948.61
S-8	2,626,423.49	1,616,773.28
S-9	2,624,254.99	1,613,948.61
S-10	2,624,254.99	1,616,773.28

**CONTROL DATA**

POINT ID	NORTHING	EASTING	ELEV. (MLLW)	DESCRIPTION
BM 12 1984	2,620,563.82	1,604,566.35	27.63	Brass Cap
BM 5934 F	2,655,203.73	1,655,049.51	36.48	Brass Cap
CRAIG	2,642,635.95	1,661,029.47	44.95	Brass Cap
ETRAC-1	2,646,395.57	1,660,814.72	38.34	Brass Cap
ETRAC-2	2,644,443.04	1,660,120.66	36.38	Brass Cap
MIKE	2,645,987.73	1,661,875.48	48.67	Brass Cap
NORTH END	2,646,649.84	1,660,584.80	41.56	USACE SBC 1978
PORT MAC	2,659,934.29	1,656,925.43	39.55	Almon
PORT MAC	2,655,563.46	1,654,988.22	41.51	Brass Cap
RIFE 1960	2,630,502.19	1,604,162.70	29.99	Brass Cap
SOUTH END	2,644,296.27	1,659,728.03	40.58	USACE SBC 1978
TERRA 11 ARP	2,644,969.84	1,660,159.24	80.48	Antennae Reference Point
TERRA 12 ARP	2,644,990.65	1,660,166.56	81.21	Antennae Reference Point
5920 THERMO 1 1988	2,642,784.70	1,660,183.87	37.32	Almon

**VOLUME COMPUTATIONS**

NAVIGATION CHANNEL PROJECT DEPTH -38' MLLW	CUBIC YARDS
VOLUME AVAILABLE ABOVE -38' MLLW	51,561
VOLUME AVAILABLE ABOVE -42.5' MLLW	1,315,223
DISPOSAL AREA PROJECT FILL DEPTH -45' MLLW	
FILL VOLUME AVAILABLE BELOW -45' MLLW	2,293,537



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

David R. Neff CH(275)

**BATHYMETRY**



CONTRACT NO. W911KB-14-D-0013  
 CONTRACTOR ETRAC, INC.  
 CITY SAN RAFAEL STATE CA  
 Recommended: Approved: Date:  
 PRIME CONTRACTOR RESUBMIT ENGINEER

Serial	Action	Description	Date	App'd

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 Plot Scale: 1:1  
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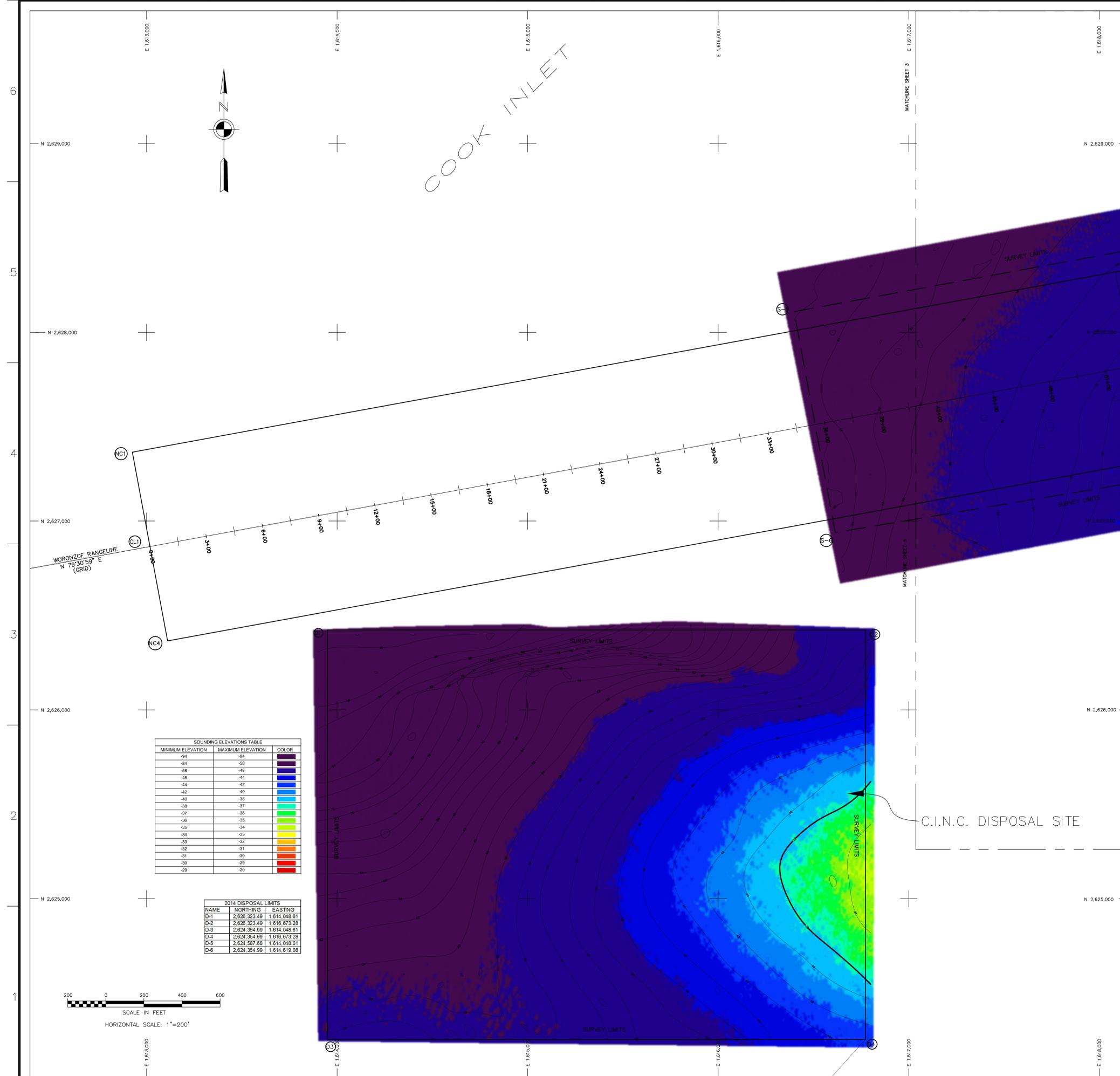
Designed: S. OLSON  
 Drawn: S. OLSON  
 Reviewed: J. ANDERSON  
 Checked: J. ANDERSON  
 Submitted: A. CHURCHILL  
 Checked: A. CHURCHILL

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

USACE Survey No: **3190-14**

**COOK INLET, ALASKA  
 COOK INLET NAVIGATION CHANNEL  
 PRE-DREDGE SURVEY  
 APRIL 21, 2014**

Reference number:  
**V-106**  
 Sheet 6 of 11

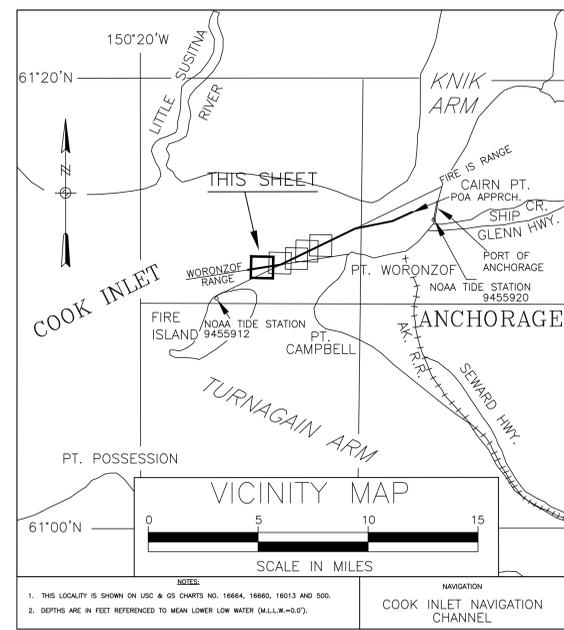


**SOUNDING ELEVATIONS TABLE**

MINIMUM ELEVATION	MAXIMUM ELEVATION	COLOR
-94	-84	Dark Purple
-84	-74	Purple
-74	-64	Dark Blue
-64	-54	Blue
-54	-44	Light Blue
-44	-34	Cyan
-34	-24	Teal
-24	-14	Green
-14	-4	Light Green
-4	6	Yellow-Green
6	16	Yellow
16	26	Orange
26	36	Red-Orange
36	46	Red
46	56	Dark Red
56	66	Brown
66	76	Dark Brown
76	86	Black

**2014 DISPOSAL LIMITS**

NAME	NORTHING	EASTING
D-1	2,626,323.49	1,614,048.61
D-2	2,626,323.49	1,616,673.28
D-3	2,624,354.99	1,614,048.61
D-4	2,624,354.99	1,616,673.28
D-5	2,624,587.68	1,614,048.61
D-6	2,624,354.99	1,614,619.08



- NOTES**
- HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 4, NAD83 IN U.S. SURVEY FEET HOLDING USACE "TERRA 11" AS N 2,644,969.84, E 1,660,159.24.
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**2014 DREDGE LIMITS**

NAME	NORTHING	EASTING
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C-2	2,628,534.04	1,619,240.43
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C-5	2,627,635.82	1,620,141.11
C-6	2,627,320.35	1,618,270.78

**2014 SURVEY LIMITS**

NAME	NORTHING	EASTING
S-1	2,628,109.78	1,616,398.10
S-2	2,628,629.58	1,619,207.16
S-3	2,634,149.17	1,629,627.37
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S-7	2,626,423.49	1,613,948.61
S-8	2,626,423.49	1,616,773.28
S-9	2,624,254.99	1,613,948.61
S-10	2,624,254.99	1,616,773.28

**CONTROL DATA**

POINT ID	NORTHING	EASTING	ELEV. (MLLW)	DESCRIPTION
BM 12 1984	2,620,563.82	1,604,566.35	27.63	Brass Cap
BM 5934 F	2,655,203.73	1,655,049.51	36.48	Brass Cap
CRAIG	2,642,635.95	1,661,029.47	44.95	Brass Cap
ETRAC-1	2,646,395.57	1,660,814.72	38.34	Brass Cap
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NORTH END	2,646,649.84	1,660,584.80	41.56	USACE SBC 1978
PORT 1968	2,639,934.29	1,656,925.43	39.55	Almon
PORT MAC	2,655,563.46	1,654,968.22	41.51	Brass Cap
RIFE 1960	2,630,502.19	1,604,162.70	29.99	Brass Cap
SOUTH END	2,644,296.27	1,659,728.03	40.58	USACE SBC 1978
TERRA 11 ARP	2,644,969.84	1,660,159.24	80.48	Antennae Reference Point
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5920 THERMO 1 1988	2,642,784.70	1,660,183.87	37.32	Almon

**VOLUME COMPUTATIONS**

NAVIGATION CHANNEL PROJECT DEPTH -38' MLLW	CUBIC YARDS
VOLUME AVAILABLE ABOVE -38' MLLW	51,561
VOLUME AVAILABLE ABOVE -42.5' MLLW	1,315,223
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David R. Neff CH(275)

**BATHYMETRY**



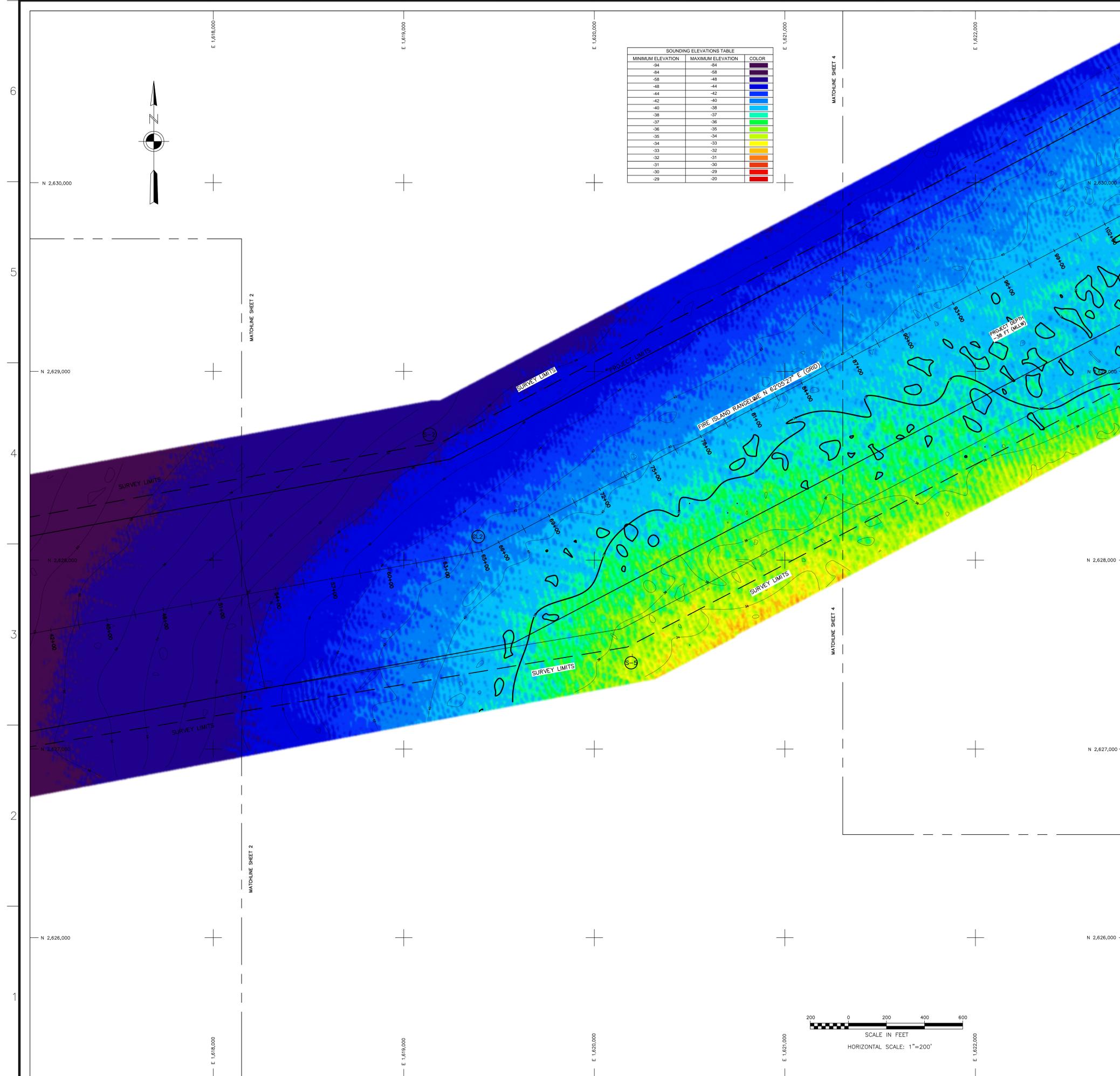
CONTRACT NO. W911KB-14-D-0013  
 CONTRACTOR: ETRAC, INC.  
 CITY: SAN RAFAEL, STATE: CA  
 Recommended: [Signature] Approved: [Signature]  
 Date: [Blank] Date: [Blank]

Serial	Action	Description	Date	App'd

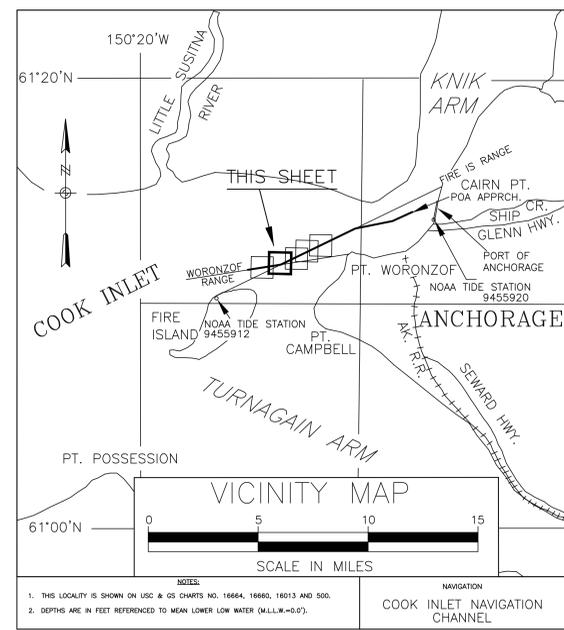
Date: 06/20/14  
 Drawn: S. OLSON  
 Reviewed: J. ANDERSON  
 Submitted: A. CHURCHILL  
 USACE Survey No: 3190-14

**COOK INLET, ALASKA  
 COOK INLET NAVIGATION CHANNEL  
 PRE-DREDGE SURVEY  
 APRIL 21, 2014**

Reference number:  
**V-107**  
 Sheet 7 of 11



MINIMUM ELEVATION	MAXIMUM ELEVATION	COLOR
-94	-84	Dark Purple
-84	-78	Purple
-78	-72	Dark Blue
-72	-66	Blue
-66	-60	Light Blue
-60	-54	Cyan
-54	-48	Teal
-48	-42	Green
-42	-36	Light Green
-36	-30	Yellow-Green
-30	-24	Yellow
-24	-18	Orange
-18	-12	Light Orange
-12	-6	Orange-Red
-6	0	Red
0	6	Dark Red
6	12	Red-Orange
12	18	Orange
18	24	Light Orange
24	30	Yellow
30	36	Light Yellow
36	42	Yellow-Green
42	48	Green
48	54	Light Green
54	60	Light Blue
60	66	Blue
66	72	Dark Blue
72	78	Purple
78	84	Dark Purple
84	90	Dark Purple
90	94	Dark Purple



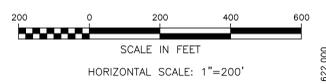
- NOTES**
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NAME	NORTHING	EASTING
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NAME	NORTHING	EASTING
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S-2	2,628,629.58	1,619,207.16
S-3	2,634,149.17	1,629,627.37
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S-9	2,624,254.99	1,613,948.61
S-10	2,624,254.99	1,616,773.28

POINT ID	NORTHING	EASTING	ELEV. (MLLW)	DESCRIPTION
BM 12 1984	2,620,563.82	1,604,566.35	27.63	Brass Cap
BM 5934 F	2,655,203.73	1,655,049.51	36.48	Brass Cap
CRAIG	2,642,635.95	1,661,029.47	44.95	Brass Cap
ETRAC-1	2,646,395.57	1,660,814.72	38.34	Brass Cap
ETRAC-2	2,644,443.04	1,660,120.66	36.38	Brass Cap
MIKE	2,645,987.73	1,661,875.48	48.67	Brass Cap
NORTH END	2,646,649.84	1,660,584.80	41.56	USACE SBC 1978
PORT 1968	2,639,934.29	1,656,925.43	39.55	Almon
PORT MAC	2,655,563.46	1,654,988.22	41.51	Brass Cap
RIFE 1960	2,630,502.19	1,604,162.70	29.99	Brass Cap
SOUTH END	2,644,296.27	1,659,728.03	40.58	USACE SBC 1978
TERRA 11 ARP	2,644,969.84	1,660,159.24	80.48	Antennae Reference Point
TERRA 12 ARP	2,644,990.65	1,660,166.56	81.21	Antennae Reference Point
5920 THERMO 1 1988	2,642,784.70	1,660,183.87	37.32	Almon

NAVIGATION CHANNEL PROJECT DEPTH -38' MLLW	CUBIC YARDS
VOLUME AVAILABLE ABOVE -38' MLLW	51,561
VOLUME AVAILABLE ABOVE -42.5' MLLW	1,315,223
DISPOSAL AREA PROJECT FILL DEPTH -45' MLLW	
FILL VOLUME AVAILABLE BELOW -45' MLLW	2,293,537



CONTRACT NO. W911KB-14-D-0013  
 CONTRACTOR ETRAC, INC.  
 CITY SAN RAFAEL STATE CA  
 Recommended: Approved: Date:  
 PRIME CONTRACTOR RESIDENT ENGINEER

Serial	Action	Description	Date	App'd

Date: 06/20/14  
 Drawn: S. OLSON  
 Reviewed: J. ANDERSON  
 Submitted: A. CHURCHILL  
 USACE Survey No: 3190-14

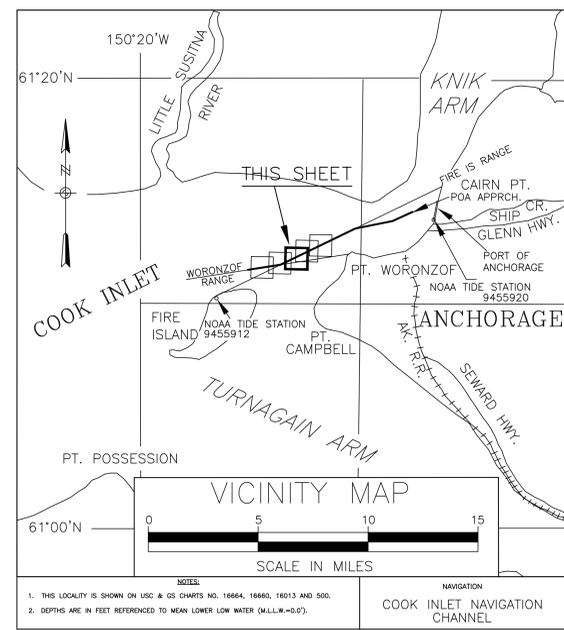
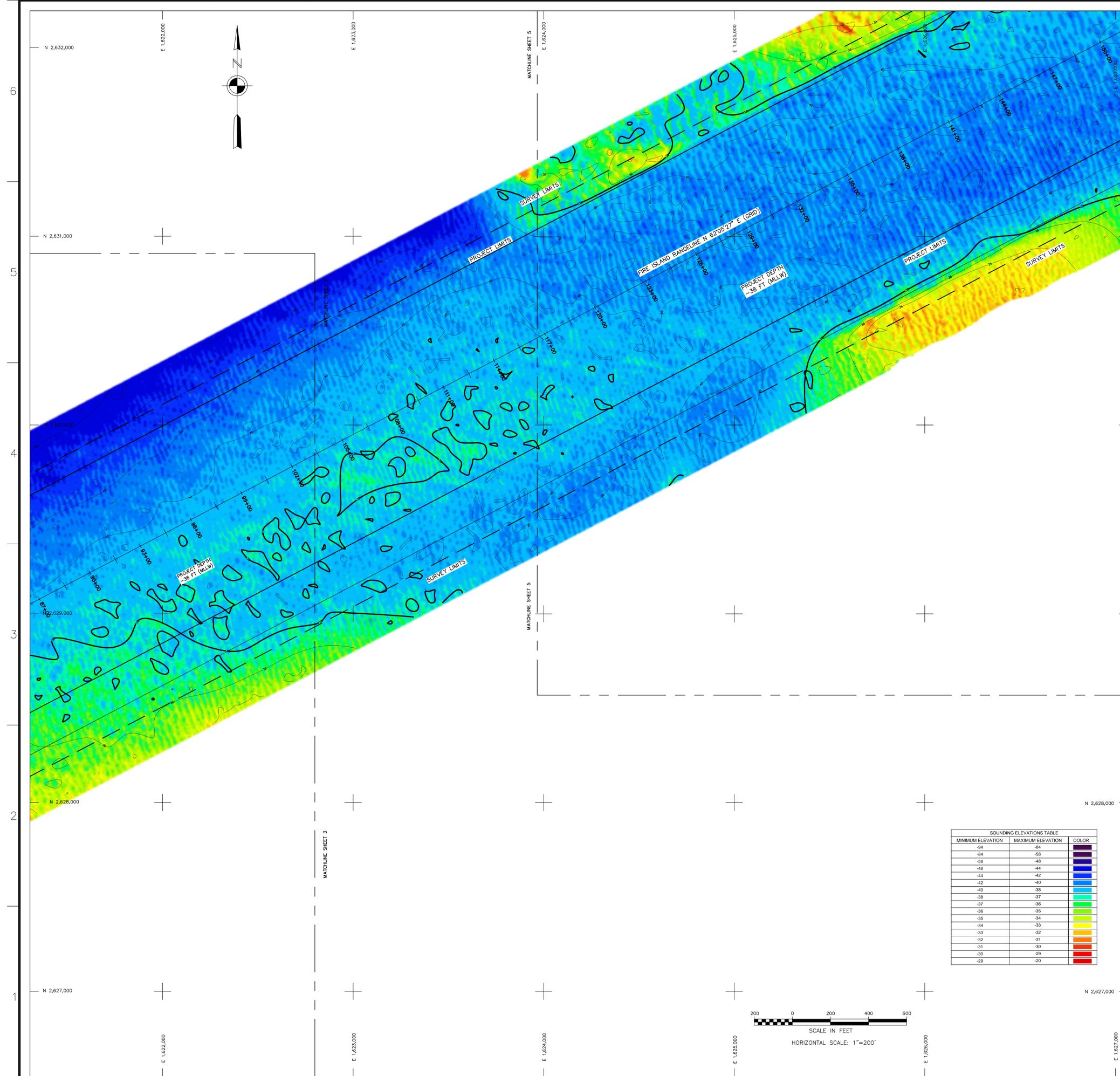
COOK INLET, ALASKA  
 COOK INLET NAVIGATION CHANNEL  
 PREDDREDGE SURVEY  
 APRIL 21, 2014



THIS HYDROGRAPHIC SURVEY WAS COMPLETED UNDER THE OVERSIGHT OF AN ACSM/THSOA CERTIFIED HYDROGRAPHER  
 David R. Neff CH(275)

**BATHYMETRY**

Reference number:  
**V-108**  
 Sheet 8 of 11



- NOTES**
- HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 4, NAD83 IN U.S. SURVEY FEET HOLDING USACE "TERRA 11" AS N 2,644,969.84, E 1,660,159.24.
  - VERTICAL CONTROL: ELEVATIONS ARE MEAN LOWER LOW WATER (MLLW) TIDAL DATUM EPOCH 1983-2001, EXPRESSED IN U.S. SURVEY FEET. PRELIMINARY ELEVATIONS WERE ACQUIRED IN REFERENCE TO A SINGLE BENCHMARK HOLDING USACE "TERRA 11" AS 80.48 FEET MLLW. FINAL DATA WERE ADJUSTED BASED ON THE C.I.N.C. CUSTOM MLLW PLANE DETERMINED FROM THE DOWL C.I.N.C. CONTROL SURVEY CONDUCTED IN FEBRUARY, 2013.
  - SOUNDINGS ARE IN FEET AND ARE MINUS UNLESS OTHERWISE INDICATED.
  - THIS DRAWING INDICATES GENERAL CONDITIONS AT THE TIME OF SURVEY.
  - SURVEY WAS CONDUCTED ON APRIL 21, 2014 BY ETRAC INC. SOUNDINGS WERE COLLECTED USING AN R2SONIC 2024 MULTIBEAM DEPTH SOUNDING (200KHZ, 120-DEGREE SWATH-WIDTH WITH 295, 0.5 DEGREE BEAMS). SOUND VELOCITY PROFILES WERE MEASURED USING AN ODOM DIGI-BAR PRO. SOUND VELOCITY WAS MEASURED IN REAL TIME AT THE SOUNDER HEAD USING A VALEPORT MINIVS.
  - VESSEL POSITIONING, HEADING, ATTITUDE, AND RTK TIDES WERE PROVIDED IN REAL TIME USING AN APPLANIX POSMV WAVEMASTER GPS/INERTIAL POSITIONING SYSTEM RECEIVING RTK CORRECTIONS FROM A TRIMBLE SP5855 RECEIVER SET AT CONTROL STATION "TERRA 11" LOCATED ATOP THE PORT OFFICE BUILDING. POST-PROCESS KINEMATIC CORRECTIONS USING POSPAC MMS 5.4 SOFTWARE WERE APPLIED TO DATA FOLLOWING ACQUISITION. VESSEL NAVIGATION, DATA ACQUISITION AND PROCESSING WERE PERFORMED USING OPS INTEGRATED SOFTWARE.

**2014 DREDGE LIMITS**

NAME	NORTHING	EASTING
C-1	2,628,320.37	1,618,085.73
C-2	2,628,534.04	1,619,240.43
C-3	2,633,360.88	1,628,352.82
C-4	2,632,288.21	1,628,921.02
C-5	2,627,635.82	1,620,141.11
C-6	2,627,320.35	1,618,270.78

**2014 SURVEY LIMITS**

NAME	NORTHING	EASTING
S-1	2,628,109.78	1,616,398.10
S-2	2,628,629.58	1,619,207.16
S-3	2,634,149.17	1,629,627.37
S-4	2,632,899.70	1,630,288.59
S-5	2,627,539.90	1,620,173.66
S-6	2,626,939.60	1,616,614.64
S-7	2,626,423.49	1,613,948.61
S-8	2,626,423.49	1,616,773.28
S-9	2,624,254.99	1,613,948.61
S-10	2,624,254.99	1,616,773.28

**CONTROL DATA**

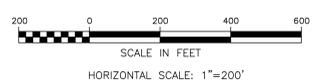
POINT ID	NORTHING	EASTING	ELEV. (MLLW)	DESCRIPTION
BM 12 1984	2,620,563.82	1,604,566.35	27.63	Brass Cap
BM 5934 F	2,655,203.73	1,655,049.51	36.48	Brass Cap
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PORT 1968	2,639,934.29	1,656,925.43	39.55	Almon
PORT MAC	2,655,563.46	1,654,988.22	41.51	Brass Cap
RIFE 1960	2,620,502.19	1,604,162.70	29.99	Brass Cap
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TERRA 12 ARP	2,644,990.65	1,660,166.56	81.21	Antennae Reference Point
5920 THERMO 1 1988	2,642,784.70	1,660,183.87	37.32	Almon

**VOLUME COMPUTATIONS**

NAVIGATION CHANNEL PROJECT DEPTH -38' MLLW	CUBIC YARDS
VOLUME AVAILABLE ABOVE -38' MLLW	51,561
VOLUME AVAILABLE ABOVE -42.5' MLLW	1,315,223
DISPOSAL AREA PROJECT FILL DEPTH -45' MLLW	CUBIC YARDS
FILL VOLUME AVAILABLE BELOW -45' MLLW	2,293,537

**SOUNDING ELEVATIONS TABLE**

MINIMUM ELEVATION	MAXIMUM ELEVATION	COLOR
-94	-84	Dark Purple
-84	-78	Purple
-78	-72	Dark Blue
-72	-66	Blue
-66	-60	Light Blue
-60	-54	Teal
-54	-48	Green
-48	-42	Light Green
-42	-36	Yellow-Green
-36	-30	Yellow
-30	-24	Orange
-24	-18	Red-Orange
-18	-12	Red
-12	-6	Dark Red
-6	0	Black



CONTRACT NO. W911KB-14-D-0013  
 CONTRACTOR: ETRAC, INC.  
 CITY: SAN RAFAEL, STATE: CA  
 Recommended: Approved: Date:  
 Prime Contractor: Resident Engineer:

Serial	Action	Description	Date	App'd

Date: 06/20/14  
 Dwg. Scale: 1" = 200'  
 Plot Scale: 1:1  
 File: ME\_20140421\_MLW.dwg  
 Branch: 3190-14  
 USACE Survey No.:  
 Designer: S. OLSON  
 Drawn: S. OLSON  
 Reviewed: J. ANDERSON  
 Checked: A. CHURCHILL  
 Submitted: A. CHURCHILL  
 U.S. ARMY ENGINEER DISTRICT OF ENGINEERS ANCHORAGE, ALASKA

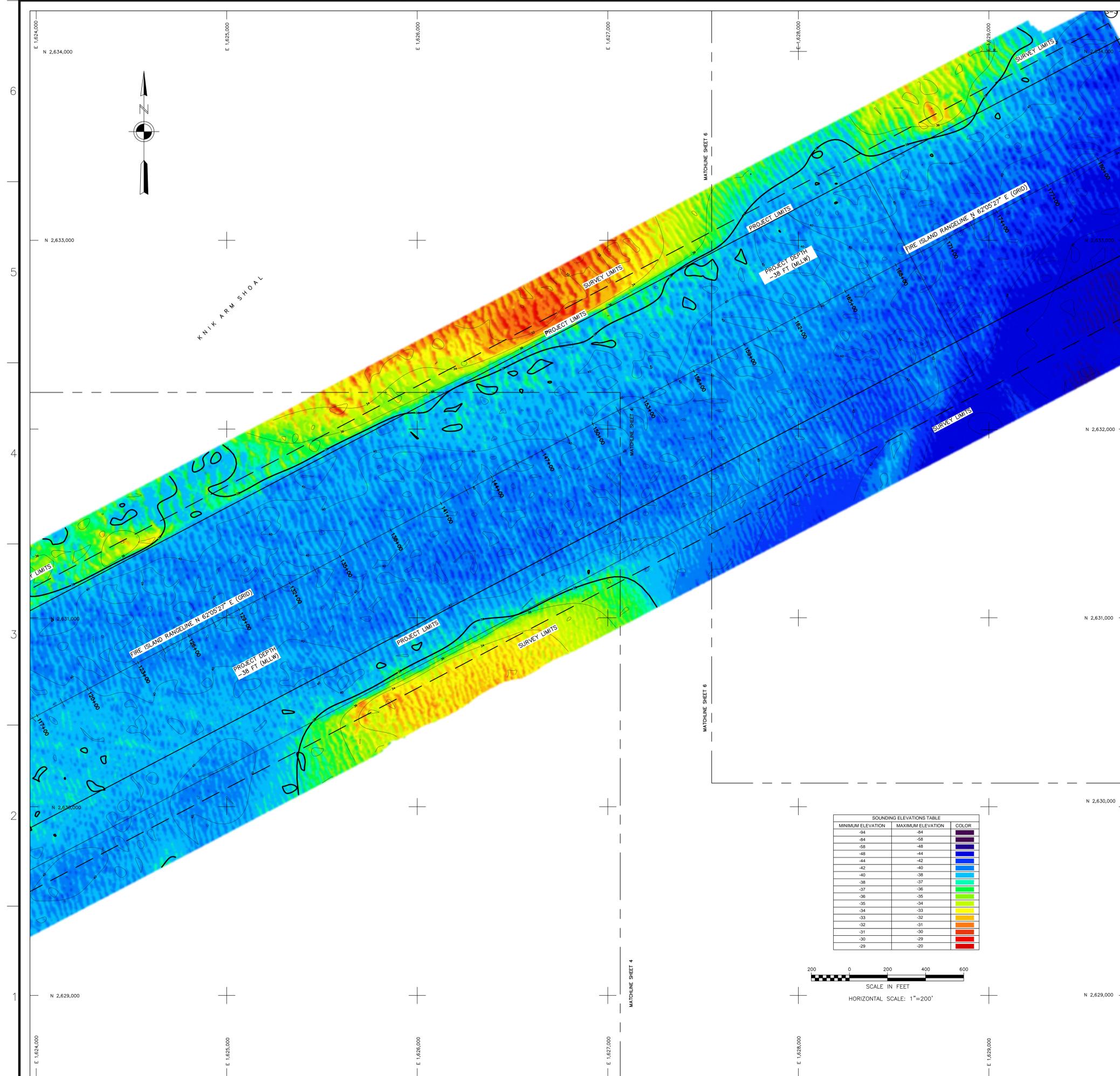
**COOK INLET, ALASKA  
 INLET NAVIGATION CHANNEL  
 DREDGE SURVEY  
 APRIL 21, 2014**



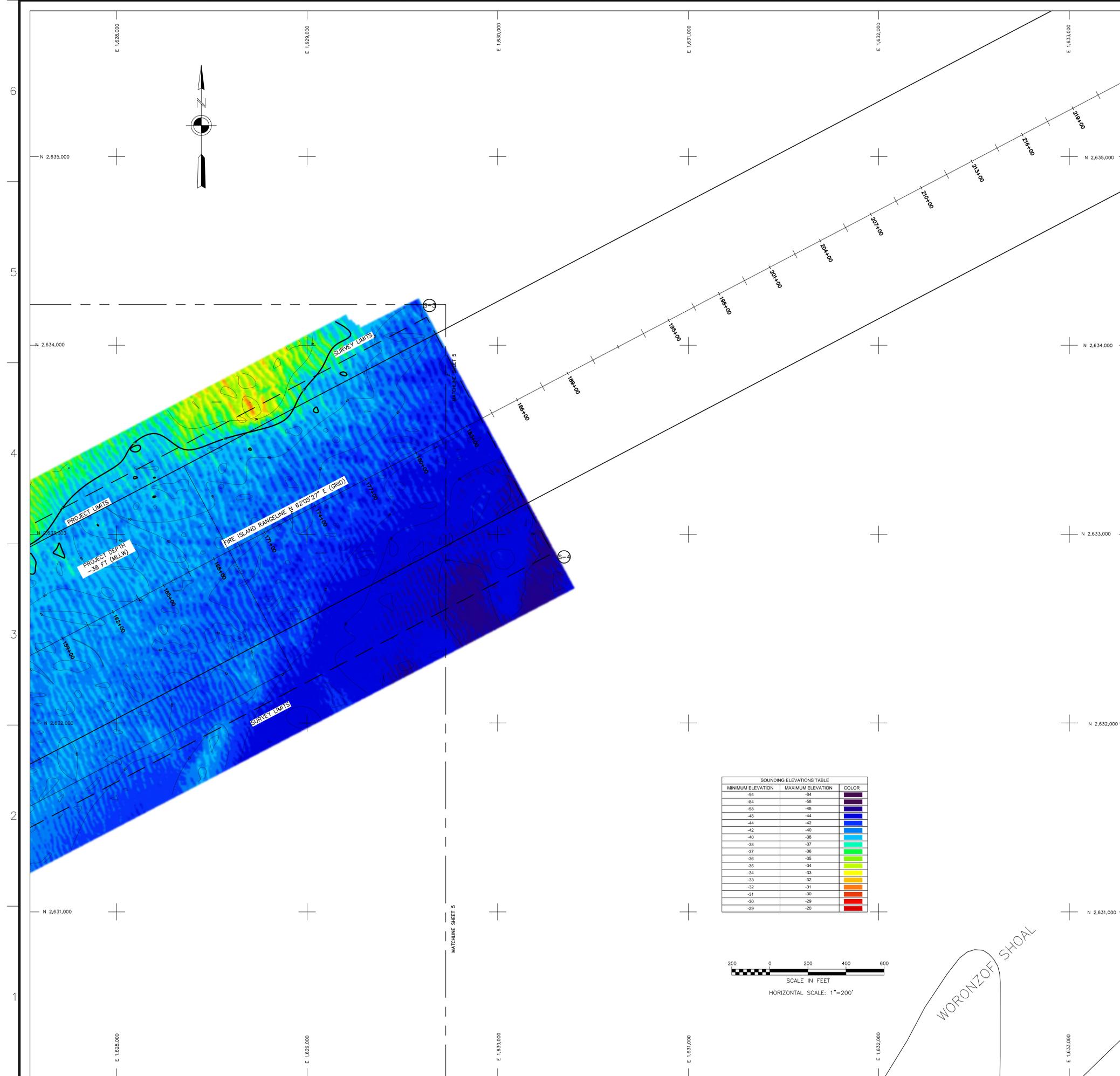
THIS HYDROGRAPHIC SURVEY WAS COMPLETED UNDER THE OVERSIGHT OF AN ACSM/THSOA CERTIFIED HYDROGRAPHER  
 David R. Neff CH(275)

**BATHYMETRY**

Reference number:  
**V-109**  
 Sheet 9 of 11

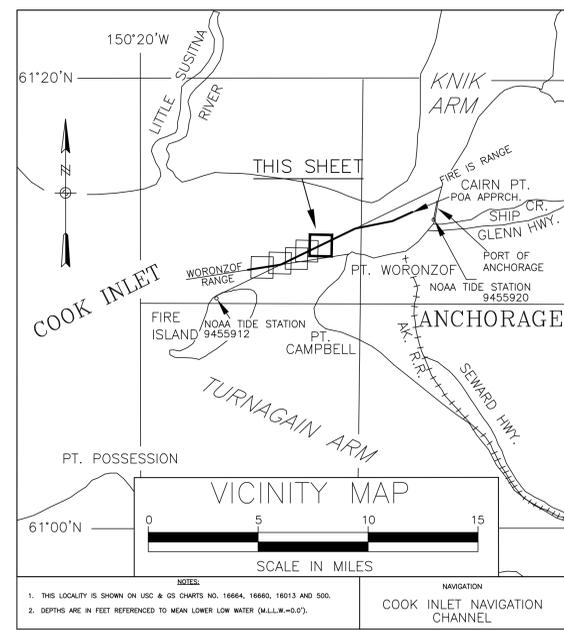
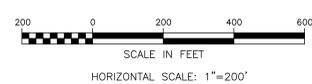


MINIMUM ELEVATION	MAXIMUM ELEVATION	COLOR
-94	-84	Dark Purple
-84	-78	Purple
-78	-72	Dark Blue
-72	-66	Blue
-66	-60	Light Blue
-60	-54	Cyan
-54	-48	Teal
-48	-42	Green
-42	-36	Light Green
-36	-30	Yellow-Green
-30	-24	Yellow
-24	-18	Orange
-18	-12	Red-Orange
-12	-6	Red
-6	0	Dark Red
0	6	Red
6	12	Orange
12	18	Yellow
18	24	Light Green
24	30	Green
30	36	Light Green
36	42	Yellow-Green
42	48	Yellow
48	54	Orange
54	60	Red-Orange
60	66	Red
66	72	Dark Red
72	78	Red
78	84	Orange
84	90	Yellow
90	96	Light Green
96	102	Green
102	108	Light Green
108	114	Yellow-Green
114	120	Yellow
120	126	Orange
126	132	Red-Orange
132	138	Red
138	144	Dark Red
144	150	Red
150	156	Orange
156	162	Yellow
162	168	Light Green
168	174	Green
174	180	Light Green
180	186	Yellow-Green
186	192	Yellow
192	198	Orange
198	204	Red-Orange
204	210	Red
210	216	Dark Red
216	222	Red
222	228	Orange
228	234	Yellow
234	240	Light Green
240	246	Green
246	252	Light Green
252	258	Yellow-Green
258	264	Yellow
264	270	Orange
270	276	Red-Orange
276	282	Red
282	288	Dark Red
288	294	Red
294	300	Orange
300	306	Yellow
306	312	Light Green
312	318	Green
318	324	Light Green
324	330	Yellow-Green
330	336	Yellow
336	342	Orange
342	348	Red-Orange
348	354	Red
354	360	Dark Red
360	366	Red
366	372	Orange
372	378	Yellow
378	384	Light Green
384	390	Green
390	396	Light Green
396	402	Yellow-Green
402	408	Yellow
408	414	Orange
414	420	Red-Orange
420	426	Red
426	432	Dark Red
432	438	Red
438	444	Orange
444	450	Yellow
450	456	Light Green
456	462	Green
462	468	Light Green
468	474	Yellow-Green
474	480	Yellow
480	486	Orange
486	492	Red-Orange
492	498	Red
498	504	Dark Red
504	510	Red
510	516	Orange
516	522	Yellow
522	528	Light Green
528	534	Green
534	540	Light Green
540	546	Yellow-Green
546	552	Yellow
552	558	Orange
558	564	Red-Orange
564	570	Red
570	576	Dark Red
576	582	Red
582	588	Orange
588	594	Yellow
594	600	Light Green
600	606	Green
606	612	Light Green
612	618	Yellow-Green
618	624	Yellow
624	630	Orange
630	636	Red-Orange
636	642	Red
642	648	Dark Red
648	654	Red
654	660	Orange
660	666	Yellow
666	672	Light Green
672	678	Green
678	684	Light Green
684	690	Yellow-Green
690	696	Yellow
696	702	Orange
702	708	Red-Orange
708	714	Red
714	720	Dark Red
720	726	Red
726	732	Orange
732	738	Yellow
738	744	Light Green
744	750	Green
750	756	Light Green
756	762	Yellow-Green
762	768	Yellow
768	774	Orange
774	780	Red-Orange
780	786	Red
786	792	Dark Red
792	798	Red
798	804	Orange
804	810	Yellow
810	816	Light Green
816	822	Green
822	828	Light Green
828	834	Yellow-Green
834	840	Yellow
840	846	Orange
846	852	Red-Orange
852	858	Red
858	864	Dark Red
864	870	Red
870	876	Orange
876	882	Yellow
882	888	Light Green
888	894	Green
894	900	Light Green
900	906	Yellow-Green
906	912	Yellow
912	918	Orange
918	924	Red-Orange
924	930	Red
930	936	Dark Red
936	942	Red
942	948	Orange
948	954	Yellow
954	960	Light Green
960	966	Green
966	972	Light Green
972	978	Yellow-Green
978	984	Yellow
984	990	Orange
990	996	Red-Orange
996	1002	Red
1002	1008	Dark Red
1008	1014	Red
1014	1020	Orange
1020	1026	Yellow
1026	1032	Light Green
1032	1038	Green
1038	1044	Light Green
1044	1050	Yellow-Green
1050	1056	Yellow
1056	1062	Orange
1062	1068	Red-Orange
1068	1074	Red
1074	1080	Dark Red
1080	1086	Red
1086	1092	Orange
1092	1098	Yellow
1098	1104	Light Green
1104	1110	Green
1110	1116	Light Green
1116	1122	Yellow-Green
1122	1128	Yellow
1128	1134	Orange
1134	1140	Red-Orange
1140	1146	Red
1146	1152	Dark Red
1152	1158	Red
1158	1164	Orange
1164	1170	Yellow
1170	1176	Light Green
1176	1182	Green
1182	1188	Light Green
1188	1194	Yellow-Green
1194	1200	Yellow
1200	1206	Orange
1206	1212	Red-Orange
1212	1218	Red
1218	1224	Dark Red
1224	1230	Red
1230	1236	Orange
1236	1242	Yellow
1242	1248	Light Green
1248	1254	Green
1254	1260	Light Green
1260	1266	Yellow-Green
1266	1272	Yellow
1272	1278	Orange
1278	1284	Red-Orange
1284	1290	Red
1290	1296	Dark Red
1296	1302	Red
1302	1308	Orange
1308	1314	Yellow
1314	1320	Light Green
1320	1326	Green
1326	1332	Light Green
1332	1338	Yellow-Green
1338	1344	Yellow
1344	1350	Orange
1350	1356	Red-Orange
1356	1362	Red
1362	1368	Dark Red
1368	1374	Red
1374	1380	Orange
1380	1386	Yellow
1386	1392	Light Green
1392	1398	Green
1398	1404	Light Green
1404	1410	Yellow-Green
1410	1416	Yellow
1416	1422	Orange
1422	1428	Red-Orange
1428	1434	Red
1434	1440	Dark Red
1440	1446	Red
1446	1452	Orange
1452	1458	Yellow
1458	1464	Light Green
1464	1470	Green
1470	1476	Light Green
1476	1482	Yellow-Green
1482	1488	Yellow
1488	1494	Orange
1494	1500	Red-Orange
1500	1506	Red
1506	1512	Dark Red
1512	1518	Red
1518	1524	Orange
1524	1530	Yellow
1530	1536	Light Green
1536	1542	Green
1542	1548	Light Green
1548	1554	Yellow-Green
1554	1560	Yellow
1560	1566	Orange
1566	1572	Red-Orange
1572	1578	Red
1578	1584	Dark Red
1584	1590	Red
1590	1596	Orange
1596	1602	Yellow
1602	1608	Light Green
1608	1614	Green
1614	1620	Light Green
1620	1626	Yellow-Green
1626	1632	Yellow
1632	1638	Orange
1638	1644	Red-Orange
1644	1650	Red
1650	1656	Dark Red
1656	1662	Red
1662	1668	Orange
1668	1674	Yellow
1674	1680	Light Green
1680	1686	Green
1686	1692	Light Green
1692	1698	Yellow-Green
1698	1704	Yellow
1704	1710	Orange
1710	1716	Red-Orange
1716	1722	Red
1722	1728	Dark Red
1728	1734	Red
1734	1740	Orange
1740	1746	Yellow
1746	1752	Light Green
1752	1758	Green
1758	1764	Light Green
1764	1770	Yellow-Green
1770	1776	Yellow
1776	1782	Orange
1782	1788	Red-Orange
1788	1794	Red
1794	1800	Dark Red
1800	1806	Red
1806	1812	Orange
1812	1818	Yellow
1818	1824	Light Green
1824	1830	Green
1830	1836	Light Green
1836	1842	Yellow-Green
1842	1848	Yellow
1848	1854	Orange
1854	1860	Red-Orange
1860	1866	Red
1866	1872	Dark Red
1872	1878	Red
1878	1884	Orange
1884	1890	Yellow
1890	1896	Light Green
1896	1902	Green
1902	1908	Light Green
1908	1914	Yellow-Green
1914	1920	Yellow
1920	1926	Orange
1926	1932	Red-Orange
1932	1938	Red
1938	1944	Dark Red
1944	1950	Red
1950	1956	Orange
1956	1962	Yellow
1962	1968	Light Green
1968	1974	Green
1974	1980	Light Green
1980	1986	Yellow-Green
1986	1992	Yellow
1992	1998	Orange
1998	2004	Red-Orange
2004	2010	Red
2010	2016	Dark Red
2016	2022	Red
2022	2028	Orange
2028	2034	Yellow
2034	2040	Light Green
2040	2046	Green
2046	2052	Light Green
2052	2058	Yellow-Green
2058	2064	Yellow
2064	2070	Orange
2070	2076	Red-Orange
2076	2082	Red
2082	2088	Dark Red
2088	2094	Red
2094	2100	Orange
2100	2106	Yellow
2106	2112	Light Green
2112	2118	Green
2118	2124	Light Green
2124	2130	Yellow-Green
2130	2136	Yellow
2136	2142	Orange
2142	2148	Red-Orange
2148	2154	Red
2154	2160	Dark Red
2160	2166	Red
2166	2172	Orange
2172	2178	Yellow
2178	2184	Light Green
2184	2190	Green
2190	2196	Light Green
2196	2202	Yellow-Green
2202	2208	Yellow
2208	2214	Orange
2214	2220	Red-Orange
2220	2226	Red
2226	2232	Dark Red
2232	2238	Red
2238	2244	Orange
2244	2250	Yellow
2250	2256	Light Green
2256	2262	Green
2262	2268	Light Green
2268	2274	Yellow-Green
2274	2280	Yellow
2280	2286	Orange
2286	2292	Red-Orange
2292	2298	Red
2298	2304	Dark Red
2304	2310	Red
2310	2316	Orange
2316	2322	Yellow
2322	2328	Light Green
2328	2334	Green
2334	2340	Light Green
2340	2346	Yellow-Green
2346	2352	Yellow
2352	2358	Orange
2358	2364	Red-Orange
2364	2370	Red
2370	2376	Dark Red
2376	2382	Red
2382	2388	Orange
2388	2394	Yellow
2394	2400	Light Green
2400	2406	Green
2406	2412	Light Green
2412	2418	Yellow-Green
2418	2424	Yellow
2424	2430	Orange
2430	2436	Red-Orange
2436	2442	



**SOUNDING ELEVATIONS TABLE**

MINIMUM ELEVATION	MAXIMUM ELEVATION	COLOR
-94	-84	Dark Purple
-84	-74	Purple
-74	-64	Dark Blue
-64	-54	Blue
-54	-44	Light Blue
-44	-34	Cyan
-34	-24	Teal
-24	-14	Green
-14	-4	Light Green
-4	6	Yellow-Green
6	16	Yellow
16	26	Orange
26	36	Red-Orange
36	46	Red
46	56	Dark Red
56	66	Brown
66	76	Dark Brown
76	86	Black
86	94	Black



- NOTES**
- HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 4, NAD83 IN U.S. SURVEY FEET HOLDING USACE "TERRA 11" AS N 2,644,969.84, E 1,660,159.24.
  - VERTICAL CONTROL: ELEVATIONS ARE MEAN LOWER LOW WATER (MLLW) TIDAL DATUM EPOCH 1983-2001, EXPRESSED IN U.S. SURVEY FEET. PRELIMINARY ELEVATIONS WERE ACQUIRED IN REFERENCE TO A SINGLE BENCHMARK HOLDING USACE "TERRA 11" AS 80.48 FEET MLLW. FINAL DATA WERE ADJUSTED BASED ON THE C.I.N.C. CUSTOM MLLW PLANE DETERMINED FROM THE DOWL C.I.N.C. CONTROL SURVEY CONDUCTED IN FEBRUARY, 2013.
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  - VESSEL POSITIONING, HEADING, ATTITUDE, AND RTK TIDES WERE PROVIDED IN REAL TIME USING AN APPLANIX POSMV WAVEMASTER GPS/INERTIAL POSITIONING SYSTEM RECEIVING RTK CORRECTIONS FROM A TRIMBLE SPS855 RECEIVER SET AT CONTROL STATION "TERRA 11" LOCATED ATOP THE PORT OFFICE BUILDING. POST-PROCESS KINEMATIC CORRECTIONS USING POSPAC MMS 5.4 SOFTWARE WERE APPLIED TO DATA FOLLOWING ACQUISITION. VESSEL NAVIGATION, DATA ACQUISITION AND PROCESSING WERE PERFORMED USING OPS INTEGRATED SOFTWARE.

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C-1	2,628,320.37	1,618,085.73
C-2	2,628,534.04	1,619,240.43
C-3	2,633,360.88	1,628,352.82
C-4	2,632,288.21	1,628,921.02
C-5	2,627,635.82	1,620,141.11
C-6	2,627,320.35	1,618,270.78

**2014 SURVEY LIMITS**

NAME	NORTHING	EASTING
S-1	2,628,109.78	1,616,398.10
S-2	2,628,629.58	1,619,207.16
S-3	2,634,149.17	1,629,627.37
S-4	2,632,899.70	1,630,288.59
S-5	2,627,539.90	1,620,173.66
S-6	2,626,939.60	1,616,614.64
S-7	2,626,423.49	1,613,948.61
S-8	2,626,423.49	1,616,773.28
S-9	2,624,254.99	1,613,948.61
S-10	2,624,254.99	1,616,773.28

**CONTROL DATA**

POINT ID	NORTHING	EASTING	ELEV. (MLLW)	DESCRIPTION
BM 12 1984	2,620,563.82	1,604,566.35	27.63	Brass Cap
BM 5934 F	2,655,203.73	1,655,049.51	36.48	Brass Cap
CRAIG	2,642,635.95	1,661,029.47	44.95	Brass Cap
ETRAC-1	2,646,395.57	1,660,814.72	38.34	Brass Cap
ETRAC-2	2,644,443.04	1,660,120.66	36.38	Brass Cap
MIKE	2,645,987.73	1,661,875.48	48.67	Brass Cap
NORTH END	2,646,649.84	1,660,584.80	41.56	USACE SBC 1978
PORT 1968	2,639,934.29	1,656,925.43	39.55	Almon
PORT MAC	2,655,563.46	1,654,988.22	41.51	Brass Cap
RIFE 1960	2,630,502.19	1,604,162.70	29.99	Brass Cap
SOUTH END	2,644,296.27	1,659,728.03	40.58	USACE SBC 1978
TERRA 11 ARP	2,644,969.84	1,660,159.24	80.48	Antennae Reference Point
TERRA 12 ARP	2,644,990.65	1,660,166.56	81.21	Antennae Reference Point
5920 THERMO 1 1988	2,642,784.70	1,660,183.87	37.32	Almon

**VOLUME COMPUTATIONS**

NAVIGATION CHANNEL PROJECT DEPTH -38' MLLW	CUBIC YARDS
VOLUME AVAILABLE ABOVE -38' MLLW	51,561
VOLUME AVAILABLE ABOVE -42.5' MLLW	1,315,223
DISPOSAL AREA PROJECT FILL DEPTH -45' MLLW	
FILL VOLUME AVAILABLE BELOW -45' MLLW	2,293,537



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

David R. Neff CH(275)

**BATHYMETRY**



CONTRACT NO. W911KB-14-D-0013  
 CONTRACTOR ETRAC, INC.  
 CITY SAN RAFAEL STATE CA  
 Recommended: Approved: Date:  
 PRIME CONTRACTOR RESIDENT ENGINEER

Serial	Action	Description	Date	App'd

Date: 06/20/14  
 Drawn: S. OLSON  
 Reviewed: J. ANDERSON  
 Submitted: A. CHURCHILL  
 U.S. ARMY ENGINEER DISTRICT OF ENGINEERS ANCHORAGE, ALASKA  
 USACE Survey No: 3190-14

COOK INLET, ALASKA  
 COOK INLET NAVIGATION CHANNEL  
 PRE-DREDGE SURVEY  
 APRIL 21, 2014

Reference number:  
**V-111**  
 Sheet 11 of 11