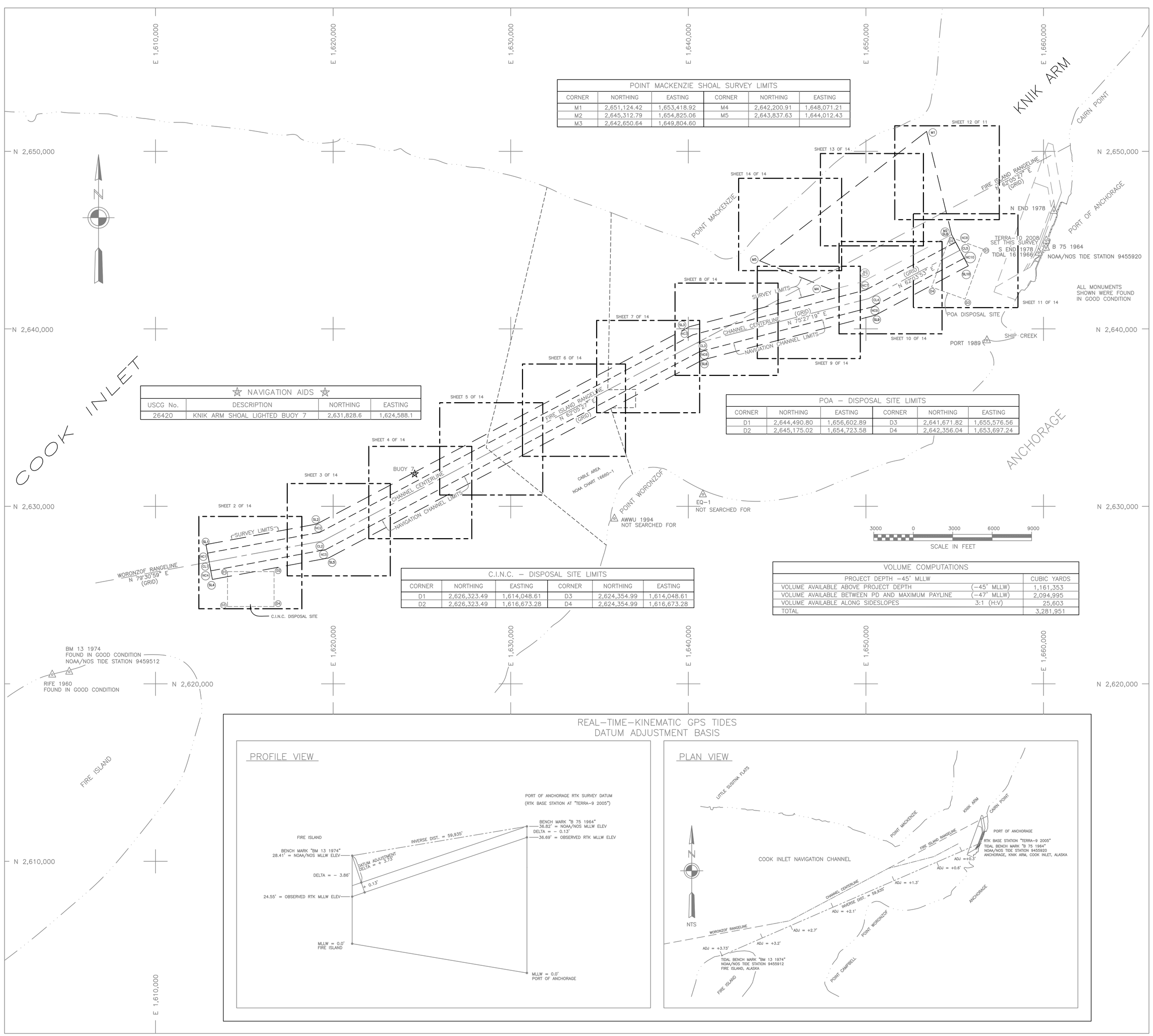
U. S. ARMY



POINT MACKENZIE SHOAL SURVEY LIMITS					
CORNER	NORTHING	EASTING	CORNER	NORTHING	EASTING
M1	2,651,124.42	1,653,418.92	M4	2,642,200.91	1,648,071.21
M2	2,645,312.79	1,654,825.06	M5	2,643,837.63	1,644,012.43
M3	2,642,650.64	1,649,804.60			

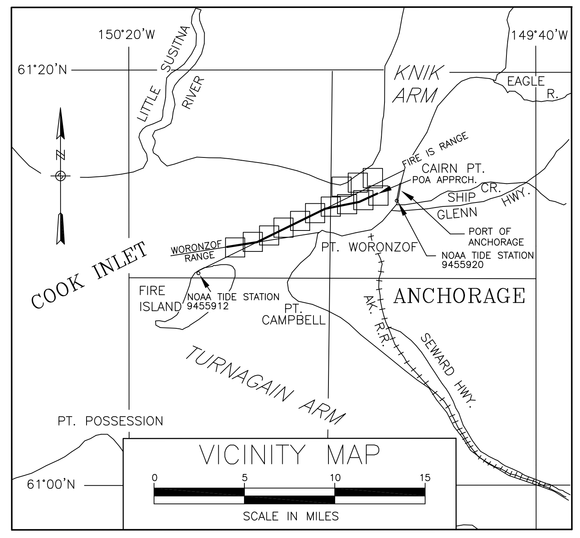
☆ NAVIGATION AIDS ☆			
USCG No.	DESCRIPTION	NORTHING	EASTING
26420	KNIK ARM SHOAL LIGHTED BUOY 7	2,631,828.6	1,624,588.1

POA – DISPOSAL SITE LIMITS					
CORNER	NORTHING	EASTING	CORNER	NORTHING	EASTING
D1	2,644,490.80	1,656,602.89	D3	2,641,671.82	1,655,576.56
D2	2,645,175.02	1,654,723.58	D4	2,642,356.04	1,653,697.24

C.I.N.C. – DISPOSAL SITE LIMITS					
CORNER	NORTHING	EASTING	CORNER	NORTHING	EASTING
D1	2,626,323.49	1,614,048.61	D3	2,624,354.99	1,614,048.61
D2	2,626,323.49	1,616,673.28	D4	2,624,354.99	1,616,673.28

VOLUME COMPUTATIONS		
PROJECT DEPTH –45' MLLW		CUBIC YARDS
VOLUME AVAILABLE ABOVE PROJECT DEPTH	(–45' MLLW)	1,161,353
VOLUME AVAILABLE BETWEEN PD AND MAXIMUM PAYLINE	(–47' MLLW)	2,094,995
VOLUME AVAILABLE ALONG SIDESLOPES	3:1 (H:V)	25,603
TOTAL		3,281,951

REAL–TIME–KINEMATIC GPS TIDES
DATUM ADJUSTMENT BASIS



NOTES

1. HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 4, NAD83 IN U.S. SURVEY FEET HOLDING USACE SBC "N END 1978" AS N 2,646,652.19, E 1,660,582.43 AND USACE SBC "S END 1978" AS N 2,644,298.25, E 1,659,725.47.
2. VERTICAL CONTROL IS MEAN–LOWER–LOW–WATER (MLLW = 0.0') IN U.S. SURVEY FEET BASED ON NOAA/NOS TIDAL DATUM "9455920 ANCHORAGE, KNIK ARM, COOK INLET, ALASKA", PUBLISHED 04/21/2003, HOLDING USCGS SBC "B 75 1964" AS 36.82' AND NOAA/NOS TIDAL DATUM "9455912 FIRE ISLAND, ALASKA", PUBLISHED 05/21/2004, HOLDING NOS SBC "BM 13 1974" AS 28.41'. (SEE NOTE 4)
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6. THIS DRAWING IS INDICATIVE OF CONDITIONS AT THE TIME OF SURVEY.

COOK INLET NAVIGATION CHANNEL COORDINATES				
CHANNEL CENTERLINE				
COR.	NORTHING	EASTING	STATION	DESCRIPTION
CL1	2,626,865.50	1,613,018.09	0+00	CENTERLINE WORONZOF RANGELINE
CL2	2,628,048.21	1,619,409.58	65+00	WORONZOF/FIRE ISLAND RANGELINE INTERSECTION
CL3	2,639,188.27	1,640,441.44	303+00	FIRE ISLAND/TRANSITION TO POA APPROACH
CL4	2,641,712.17	1,650,169.36	403+50	POA APPROACH
CL5	2,644,429.31	1,655,293.53	459+50	CENTERLINE POA APPROACH

CHANNEL LIMITS

COR.	NORTHING	EASTING	STATION	COR.	NORTHING	EASTING	STATION
NC1	2,627,365.51	1,612,925.56	0+00	NC6	2,638,711.03	1,640,626.80	303+00
NC2	2,628,534.04	1,619,240.43	65+00	NC7	2,642,189.38	1,649,983.88	403+50
NC3	2,639,665.52	1,640,256.07	303+00	NC8	2,644,878.56	1,655,055.31	459+50
NC4	2,626,365.49	1,613,110.61	0+00	NC9	2,641,234.95	1,650,354.84	403+50
NC5	2,627,562.38	1,619,578.73	65+00	NC10	2,643,980.06	1,655,531.75	459+50

SURVEY LIMITS

CORNER	NORTHING	EASTING	CORNER	NORTHING	EASTING
SL1	2,627,848.80	1,612,836.13	SL6	2,638,249.74	1,640,805.97
SL2	2,629,003.63	1,619,076.93	SL7	2,642,650.64	1,649,804.60
SL3	2,640,126.80	1,640,076.90	SL8	2,645,312.79	1,654,825.06
SL4	2,625,882.19	1,613,200.04	SL9	2,640,773.69	1,650,534.12
SL5	2,627,092.79	1,619,742.23	SL10	2,643,545.83	1,655,762.00

△ CONTROL COORDINATES △

STATION	NORTHING	EASTING	ELEVATION	DESCRIPTION
N END 1978	2,646,652.19	1,660,582.43	41.39	USACE SBC
S END 1978	2,644,295.69	1,659,728.19	40.37	USACE SBC
TERRA–10 2008	2,644,971.59	1,660,156.45	80.40	PORT OFFICE ANT. MOUNT
PORT 1989	2,639,936.64	1,656,922.51	39.93	USACE SAC
EQ–1	2,629,995.41	1,643,787.75	–	–
VAN DUSEN GPS 1988	2,621,198.82	1,648,753.69	–	NGS SBC
AWWU 1994	2,629,310.76	1,635,837.68	–	3" ALCAP
NOAA/NOS TIDAL BENCH MARKS AT THE PORT OF ANCHORAGE 9455920				
TIDAL 16 1966	2,644,293	1,659,727	40.53	USCGS BENCH MARK SBC
B 75 1964	2,644,598	1,660,095	36.82	USCGS BENCH MARK SBC
NOAA/NOS TIDAL BENCH MARKS AT FIRE ISLAND 9455912				
BM 13 1974	2,620,685	1,605,138	28.41	NOS TIDAL BENCH MARK SBC
RIFE 1960	2,620,520	1,604,180	29.99	USCGS TRI–STA SBC

CONTRACT NO. W9111KB–08–D–0002–0005
CONTRACTOR TERRASOND, LTD
CITY PALMER STATE ALASKA

ALASKA DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKA

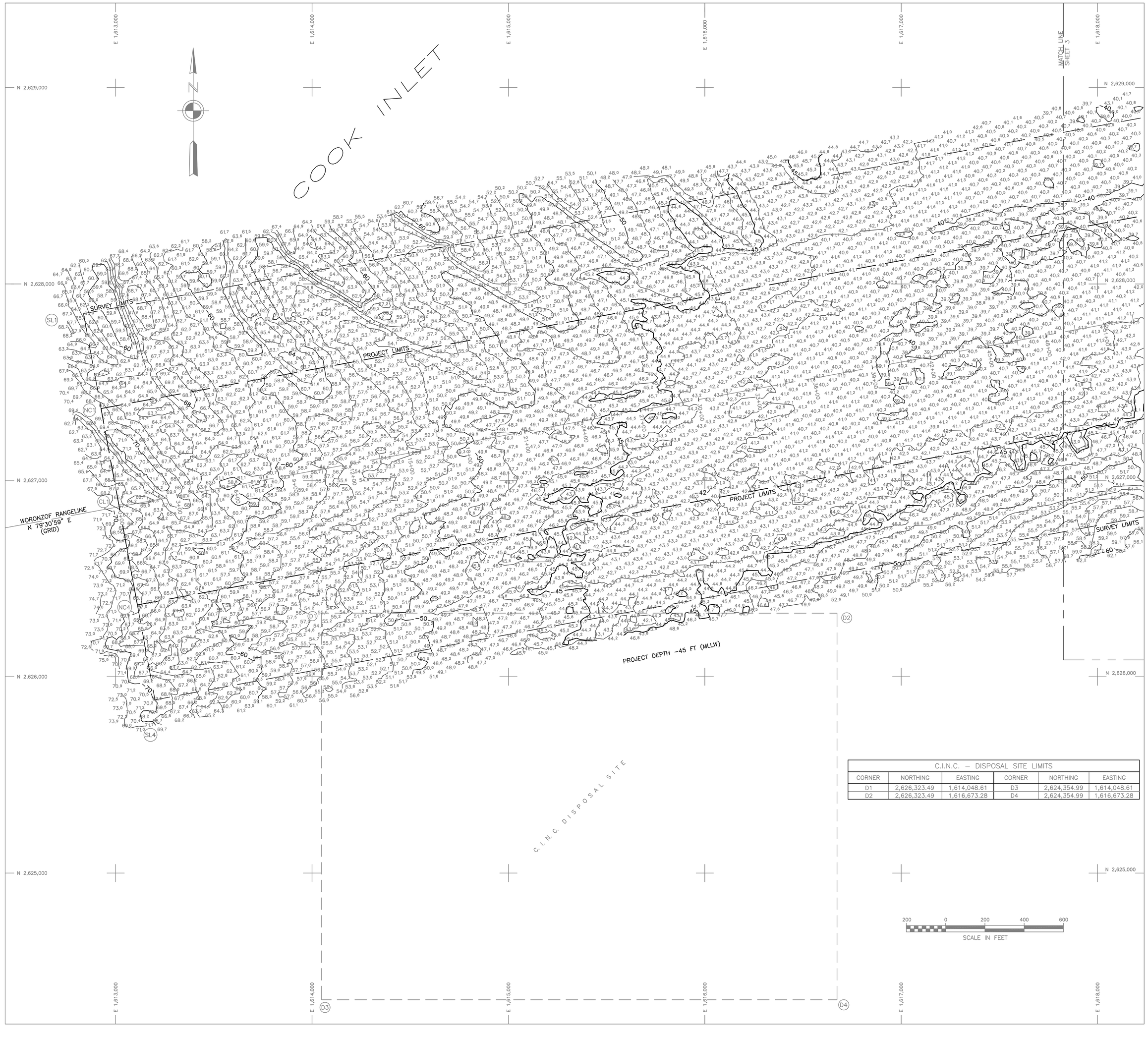
SURVEYED: CJP/SJM/DSM
DRAWN: S. LEATHAM
CHECKED: KDW
SUBMITTED:

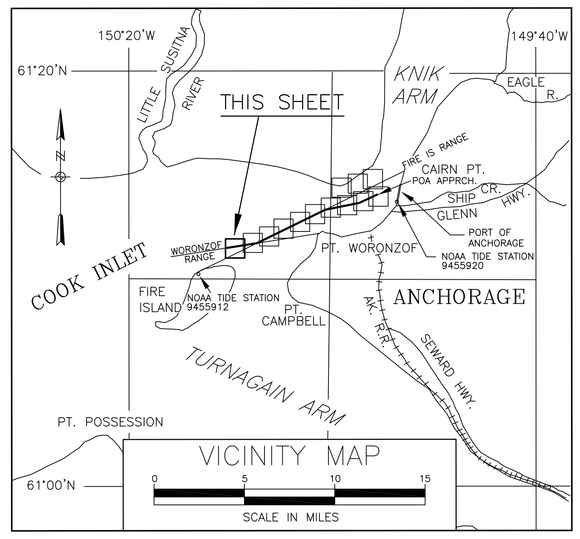
ANCHORAGE, ALASKA
COOK INLET NAVIGATION CHANNEL
PROJECT CONDITION SURVEY
AUGUST 21–25, 2008

RECOMMENDED: PROJECT MANAGER
APPROVED: CHIEF OPERATIONS–READINESS BRANCH
DATE:

SURVEY NO. 2556–08
SCALE: 1" = 3000'
SHEET 1 OF 14

U. S. ARMY





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C.I.N.C. – DISPOSAL SITE LIMITS

CORNER	NORTHING	EASTING	CORNER	NORTHING	EASTING
D1	2,626,323.49	1,614,048.61	D3	2,624,354.99	1,614,048.61
D2	2,626,323.49	1,616,673.28	D4	2,624,354.99	1,616,673.28

COOK INLET NAVIGATION CHANNEL COORDINATES

CHANNEL CENTERLINE

COR.	NORTHING	EASTING	STATION	DESCRIPTION
CL1	2,626,865.50	1,613,018.09	0+00	CENTERLINE WORONZOF RANGELINE
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CL3	2,639,188.27	1,640,441.44	303+00	FIRE ISLAND/TRANSITION TO POA APPROACH
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CL5	2,644,429.31	1,655,293.53	459+50	CENTERLINE POA APPROACH

CHANNEL LIMITS

COR.	NORTHING	EASTING	STATION	COR.	NORTHING	EASTING	STATION
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CONTRACTOR TERRASOND, LTD

CITY PALMER STATE ALASKA

ALASKA DISTRICT
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ANCHORAGE, ALASKA

SURVEYED: CJP/SJM/DSM
DRAWN: S. LEATHAM
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SUBMITTED:

ANCHORAGE, ALASKA
COOK INLET NAVIGATION CHANNEL
PROJECT CONDITION SURVEY
AUGUST 21–25, 2008

RECOMMENDED: PROJECT MANAGER

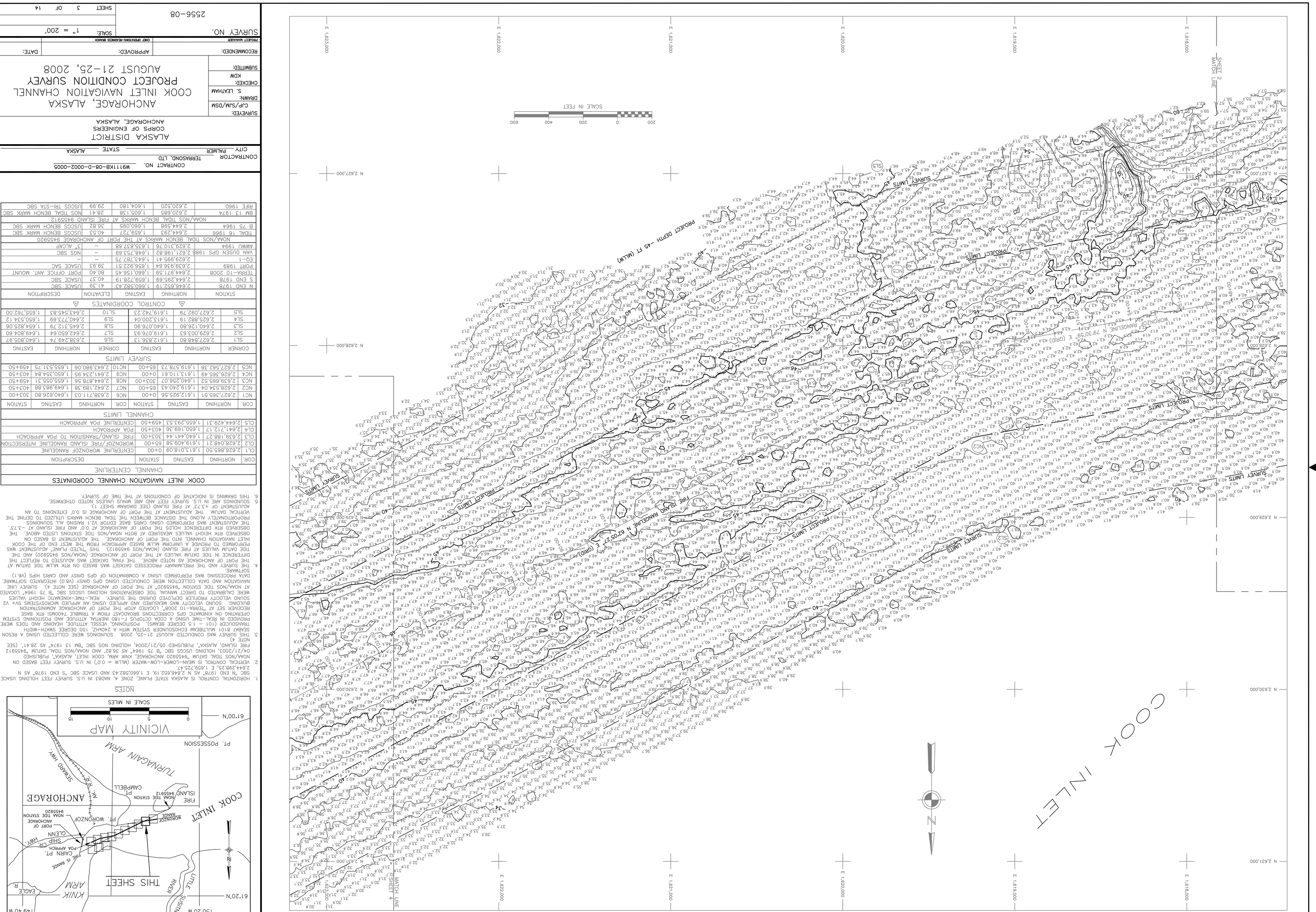
APPROVED: CHIEF OPERATIONS–READINESS BRANCH

DATE:

SURVEY NO. 2556–08

SCALE: 1" = 200'

SHEET 2 OF 14



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AWWU 1994	1,629,310.76	1,635,837.88	–	"J" ACAP

NOAA/NOS TIDAL BENCH MARKS AT THE PORT OF ANCHORAGE 9455920

TIDAL 16 1966	2,644,293	1,659,727	40.53	USCGS BENCH MARK SBC
B 75 1964	2,644,598	1,660,095	36.82	USCGS BENCH MARK SBC

NOAA/NOS TIDAL BENCH MARKS AT FIRE ISLAND 9455912

BM 13 1974	2,620,685	1,605,138	28.41	NOS TIDAL BENCH MARK SBC
RIFE 1960	2,620,520	1,604,180	29.99	USCGS TRI–STA SBC

CONTRACTOR TERRASOND, LTD
CONTRACT NO. W9113KB-08-D-0002-0005
CITY PALMER STATE ALASKA

ALASKA DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKA

SURVEYED: CJP/SJM/DSM
DRAWN: S. LEATHAM
CHECKED: KDW
SUBMITTED:

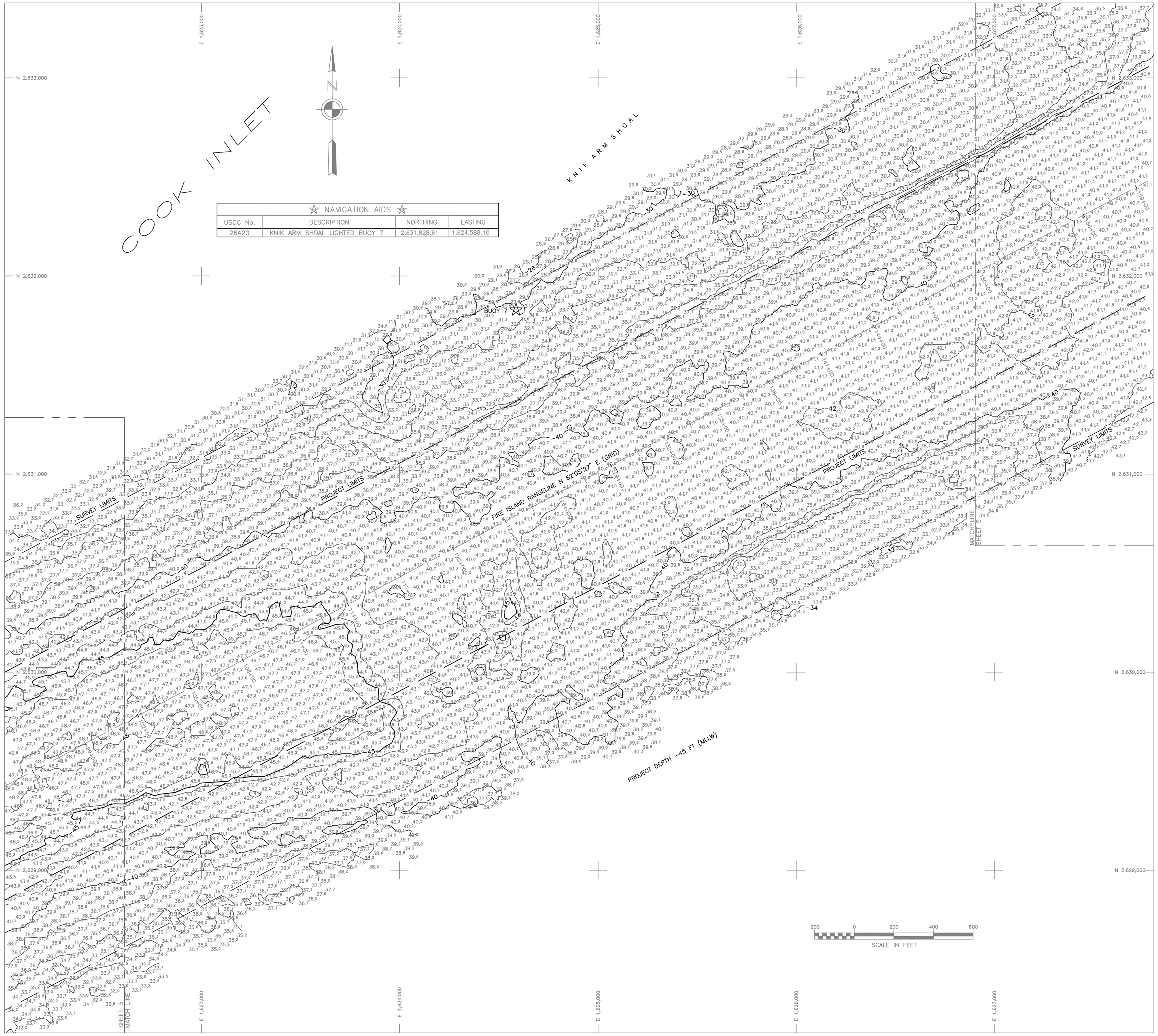
ANCHORAGE, ALASKA
COOK INLET NAVIGATION CHANNEL
PROJECT CONDITION SURVEY
AUGUST 21–25, 2008

RECOMMENDED: DATE:
PROJECT MANAGER
APPROVED:
CHIEF, OPERATIONS–READINESS BRANCH

SURVEY NO. 2556–08
SCALE: 1" = 200'
SHEET 3 OF 14

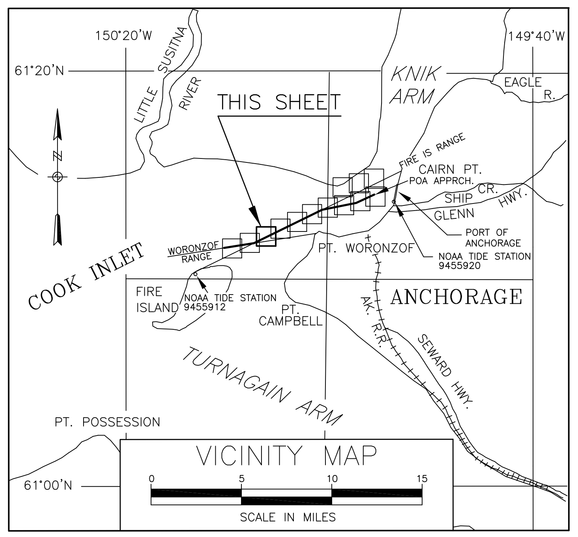
U. S. ARMY

U. S. ARMY



☆ NAVIGATION AIDS ☆

USCG No.	DESCRIPTION	NORTHING	EASTING
26420	KNIK ARM SHOAL LIGHTED BUOY 7	2,631,828.61	1,624,588.10



NOTES

1. HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 4, NAD83 IN U.S. SURVEY FEET HOLDING USACE SBC "N END 1978" AS N 2,646,652.19, E 1,660,582.43 AND USACE SBC "S END 1978" AS N 2,644,298.25, E 1,659,725.47.
2. VERTICAL CONTROL IS MEAN–LOWER–LOW–WATER (MLLW = 0.0') IN U.S. SURVEY FEET BASED ON NOAA/NOS TIDAL DATUM "9455920 ANCHORAGE, KNIK ARM, COOK INLET, ALASKA", PUBLISHED 04/21/2003, HOLDING USCGS SBC "B 75 1964" AS 36.82' AND NOAA/NOS TIDAL DATUM "9455912 FIRE ISLAND, ALASKA", PUBLISHED 05/21/2004, HOLDING NOS SBC "BM 13 1974" AS 28.41'. (SEE NOTE 4)
3. THIS SURVEY WAS CONDUCTED AUGUST 21–25, 2008. SOUNDINGS WERE COLLECTED USING A RESON SEABAT 8101 MULTIBEAM ECHOSOUNDER SYSTEM WITH A 240kHZ, 150 DEGREE SWATH–WIDTH TRANSDUCER (101 – 1.5 DEGREE BEAMS). POSITIONING, VESSEL ATTITUDE, HEADING AND TIDES WERE PROVIDED IN REAL–TIME USING A CODA OCTOPUS F–180 INERTIAL ATTITUDE AND POSITIONING SYSTEM OPERATING ON KINEMATIC GPS CORRECTIONS BROADCAST FROM A TRIMBLE 7400MSI RTK BASE RECEIVER SET AT "TERRA–10 2008", LOCATED ATOP THE PORT OF ANCHORAGE ADMINISTRATION BUILDING. SOUND VELOCITY WAS MEASURED AND APPLIED USING AN APPLIED MICROSYSTEMS SV+ V2 SOUND VELOCITY PROFILER DEPLOYED DURING THE SURVEY. REAL–TIME–KINEMATIC HEIGHT VALUES WERE CALIBRATED TO DIRECT MANUAL TIDE OBSERVATIONS HOLDING USCGS SBC "B 75 1964" LOCATED AT NOAA/NOS TIDE STATION "9455920" AT THE PORT OF ANCHORAGE (SEE NOTE 4). SURVEY LINE NAVIGATION AND DATA COLLECTION WERE CONDUCTED USING QPS QINSY (V8.0) INTEGRATED SOFTWARE. DATA PROCESSING WAS PERFORMED USING A COMBINATION OF QPS QINSY AND CARIS HIPS (V6.1) SOFTWARE.
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COOK INLET NAVIGATION CHANNEL COORDINATES

CHANNEL CENTERLINE

COR.	NORTHING	EASTING	STATION	DESCRIPTION
CL1	2,626,865.50	1,613,018.09	0+00	CENTERLINE WORONZOF RANGELINE
CL2	2,628,048.21	1,619,409.58	65+00	WORONZOF/FIRE ISLAND RANGELINE INTERSECTION
CL3	2,639,188.27	1,640,441.44	303+00	FIRE ISLAND/TRANSITION TO POA APPROACH
CL4	2,641,712.17	1,650,169.36	403+50	POA APPROACH
CL5	2,644,429.31	1,655,293.53	459+50	CENTERLINE POA APPROACH

CHANNEL LIMITS

COR.	NORTHING	EASTING	STATION	COR.	NORTHING	EASTING	STATION
NC1	2,627,365.51	1,612,925.56	0+00	NC6	2,638,711.03	1,640,626.80	303+00
NC2	2,628,534.04	1,619,240.43	65+00	NC7	2,642,189.38	1,649,983.88	403+50
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NC4	2,626,365.49	1,613,110.61	0+00	NC9	2,641,234.95	1,650,354.84	403+50
NC5	2,627,562.38	1,619,578.73	65+00	NC10	2,643,980.06	1,655,531.75	459+50

SURVEY LIMITS

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S END 1978	2,644,295.69	1,659,728.19	40.37	USACE SBC
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PORT 1989	2,639,936.64	1,656,922.51	39.93	USACE SAC
EQ–1	2,629,995.41	1,643,787.75	–	–
VAN DUSEN GPS 1985	2,621,198.82	1,648,753.69	–	NGS SBC
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PROJECT CONDITION SURVEY
AUGUST 21–25, 2008

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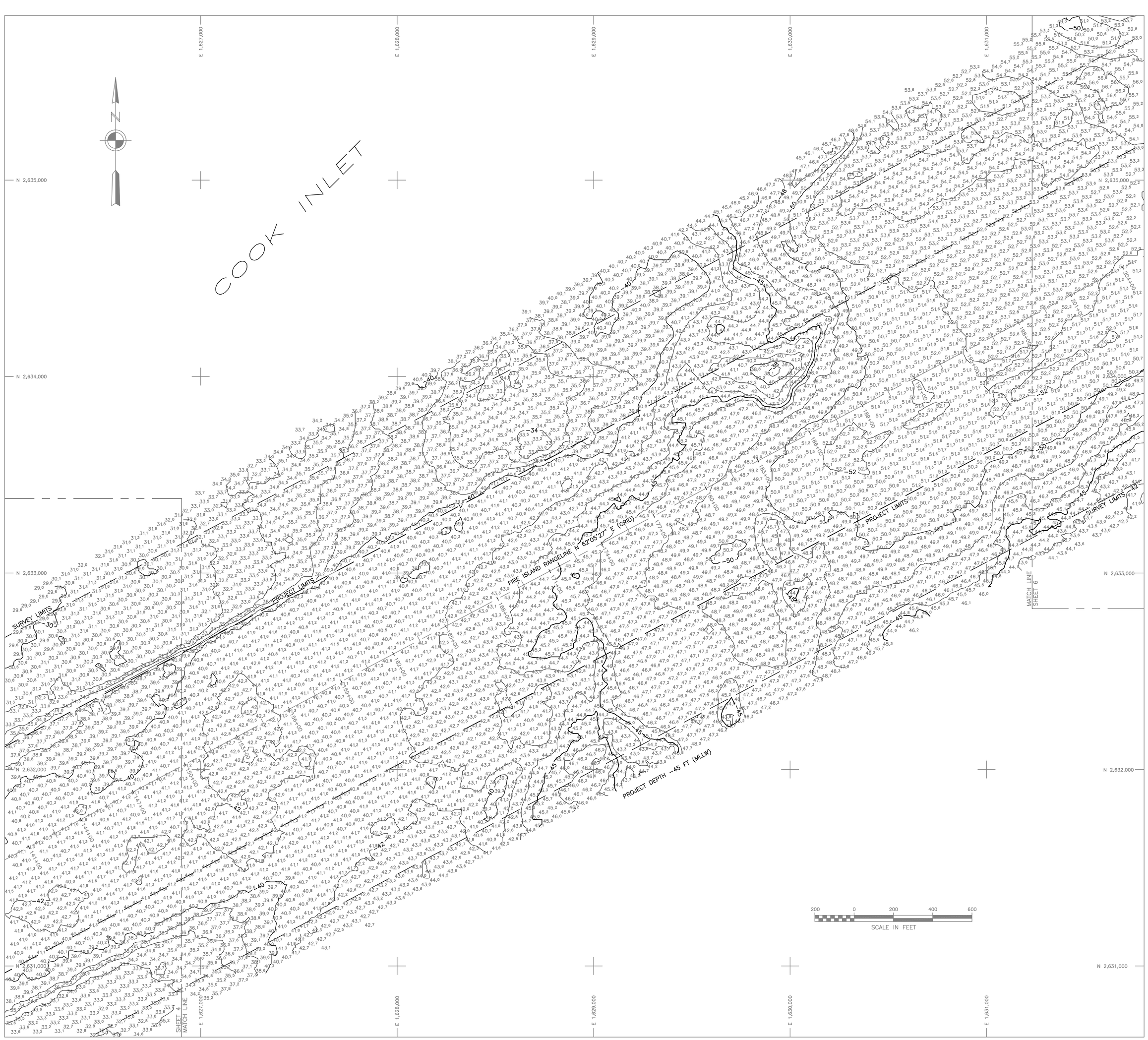
DATE:

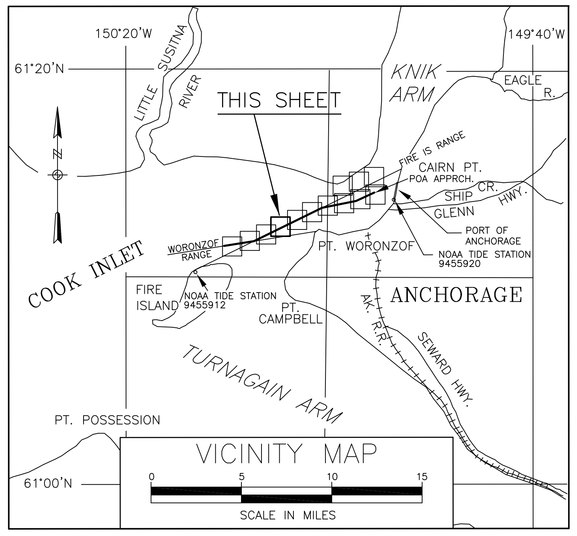
SURVEY NO. 2556–08

SCALE: 1" = 200'

SHEET 4 OF 14

U. S. ARMY





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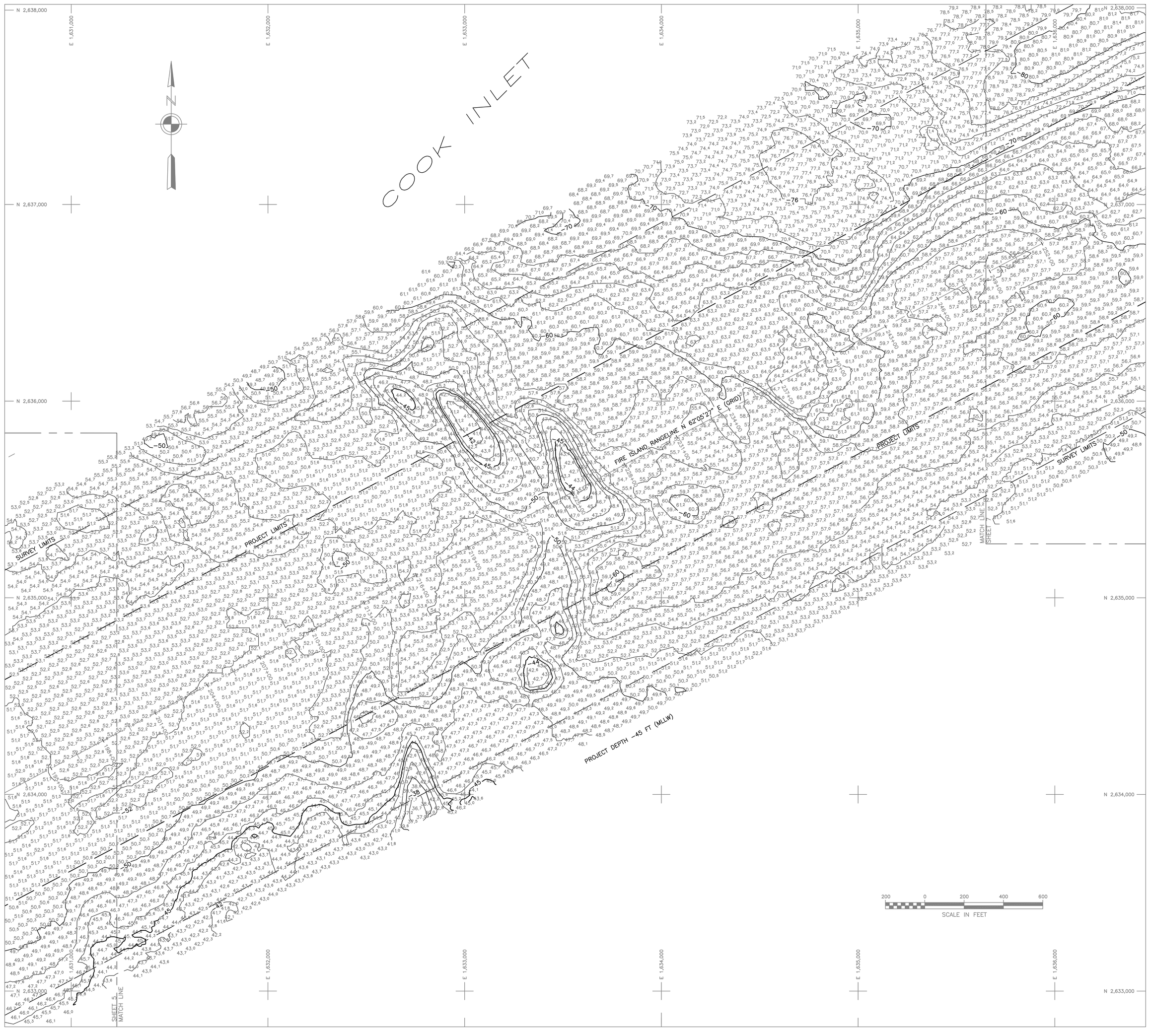
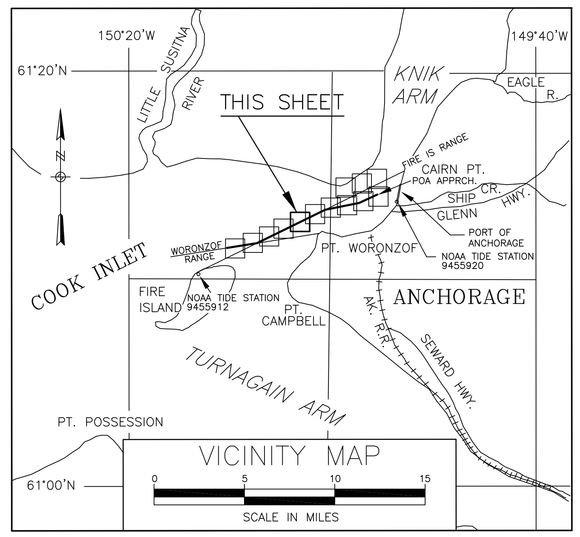
SHEET 5 OF 14

U. S. ARMY





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BM 13 1974	2,620,685	1,605,138	28.41	NOS TIDAL BENCH MARK SBC
RIFE 1960	2,620,520	1,604,180	29.99	USCGS TRI–STA SBC

CONTRACT NO. W9111KB–08–D–0002–0005

CONTRACTOR TERRASOND, LTD

CITY PALMER STATE ALASKA

ALASKA DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKA

SURVEYED: CJP/SJM/DSM
DRAWN: S. LEATHAM
CHECKED: KDW
SUBMITTED:

ANCHORAGE, ALASKA
COOK INLET NAVIGATION CHANNEL
PROJECT CONDITION SURVEY
AUGUST 21–25, 2008

RECOMMENDED: PROJECT MANAGER

APPROVED: CHIEF OPERATIONS–READINESS BRANCH

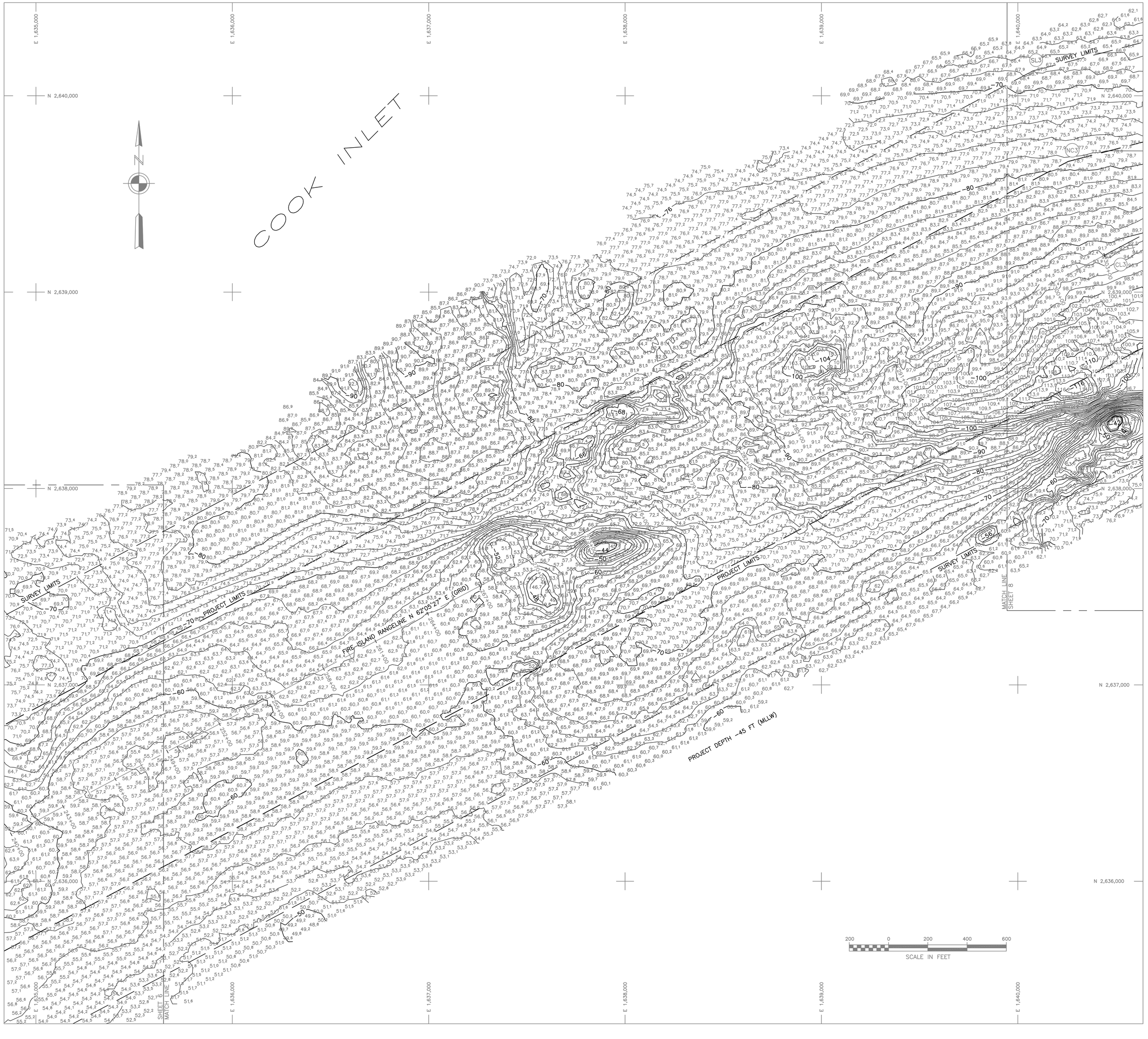
DATE:

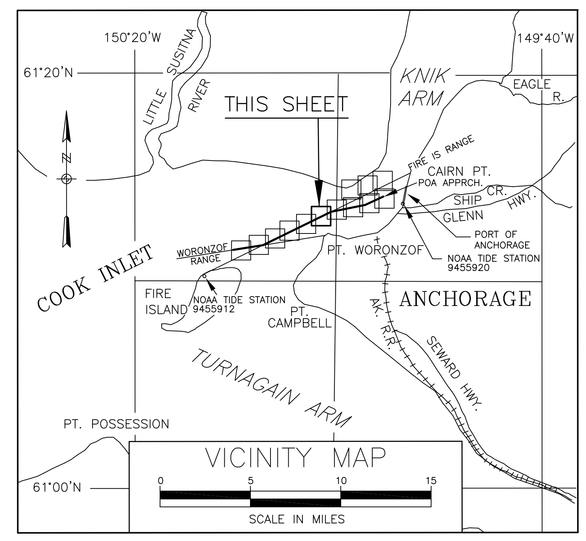
SURVEY NO. 2556–08

SCALE: 1" = 200'

SHEET 6 OF 14

U. S. ARMY





NOTES

1. HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 4, NAD83 IN U.S. SURVEY FEET HOLDING USACE SBC "N END 1978" AS N 2,646,652.19, E 1,660,582.43 AND USACE SBC "S END 1978" AS N 2,644,298.25, E 1,659,725.47.
2. VERTICAL CONTROL IS MEAN–LOWER–LOW–WATER (MLLW = 0.0') IN U.S. SURVEY FEET BASED ON NOAA/NOS TIDAL DATUM "9455920 ANCHORAGE, KNIK ARM, COOK INLET, ALASKA", PUBLISHED 04/21/2003, HOLDING USCGS SBC "B 75 1964" AS 36.82' AND NOAA/NOS TIDAL DATUM "9455912 FIRE ISLAND, ALASKA", PUBLISHED 05/21/2004, HOLDING NOS SBC "BM 13 1974" AS 28.41'. (SEE NOTE 4)
3. THIS SURVEY WAS CONDUCTED AUGUST 21–25, 2008. SOUNDINGS WERE COLLECTED USING A RESON SEABAT 8101 MULTIBEAM ECHOSOUNDER SYSTEM WITH A 240kHZ, 150 DEGREE SWATH–WIDTH TRANSDUCER (101 – 1.5 DEGREE BEAMS). POSITIONING, VESSEL ATTITUDE, HEADING AND TIDES WERE PROVIDED IN REAL–TIME USING A CODA OCTOPUS F–180 INERTIAL ATTITUDE AND POSITIONING SYSTEM OPERATING ON KINEMATIC GPS CORRECTIONS BROADCAST FROM A TRIMBLE 7400MSI RTK BASE RECEIVER SET AT "TERRA–10 2008", LOCATED ATOP THE PORT OF ANCHORAGE ADMINISTRATION BUILDING. SOUND VELOCITY WAS MEASURED AND APPLIED USING AN APPLIED MICROSYSTEMS SV+ V2 SOUND VELOCITY PROFILER DEPLOYED DURING THE SURVEY. REAL–TIME–KINEMATIC HEIGHT VALUES WERE CALIBRATED TO DIRECT MANUAL TIDE OBSERVATIONS HOLDING USCGS SBC "B 75 1964" LOCATED AT NOAA/NOS TIDE STATION "9455920" AT THE PORT OF ANCHORAGE (SEE NOTE 4). SURVEY LINE NAVIGATION AND DATA COLLECTION WERE CONDUCTED USING QPS QINSY (V8.0) INTEGRATED SOFTWARE. DATA PROCESSING WAS PERFORMED USING A COMBINATION OF QPS QINSY AND CARIS HIPS (V6.1) SOFTWARE.
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5. SOUNDINGS ARE IN U.S. SURVEY FEET AND ARE MINUS UNLESS NOTED OTHERWISE.
6. THIS DRAWING IS INDICATIVE OF CONDITIONS AT THE TIME OF SURVEY.

COOK INLET NAVIGATION CHANNEL COORDINATES

CHANNEL CENTERLINE

COR.	NORTHING	EASTING	STATION	DESCRIPTION
CL1	2,626,865.50	1,613,018.09	0+00	CENTERLINE WORONZOF RANGELINE
CL2	2,628,048.21	1,619,409.58	65+00	WORONZOF/FIRE ISLAND RANGELINE INTERSECTION
CL3	2,639,188.27	1,640,441.44	303+00	FIRE ISLAND/TRANSITION TO POA APPROACH
CL4	2,641,712.17	1,650,169.36	403+50	POA APPROACH
CL5	2,644,429.31	1,655,293.53	459+50	CENTERLINE POA APPROACH

CHANNEL LIMITS

COR.	NORTHING	EASTING	STATION	COR.	NORTHING	EASTING	STATION
NC1	2,627,365.51	1,612,925.56	0+00	NC6	2,638,711.03	1,640,626.80	303+00
NC2	2,628,534.04	1,619,240.43	65+00	NC7	2,642,189.38	1,649,983.88	403+50
NC3	2,639,665.52	1,640,256.07	303+00	NC8	2,644,878.56	1,655,055.31	459+50
NC4	2,626,365.49	1,613,110.61	0+00	NC9	2,641,234.95	1,650,354.84	403+50
NC5	2,627,562.38	1,619,578.73	65+00	NC10	2,643,980.06	1,655,531.75	459+50

SURVEY LIMITS

CORNER	NORTHING	EASTING	CORNER	NORTHING	EASTING
SL1	2,627,848.80	1,612,836.13	SL6	2,638,249.74	1,640,805.97
SL2	2,629,003.63	1,619,076.93	SL7	2,642,650.64	1,649,804.60
SL3	2,640,126.80	1,640,076.90	SL8	2,645,312.79	1,654,825.06
SL4	2,625,882.19	1,613,200.04	SL9	2,640,773.69	1,650,534.12
SL5	2,627,092.79	1,619,742.23	SL10	2,643,545.83	1,655,762.00

⚠ CONTROL COORDINATES ⚠

STATION	NORTHING	EASTING	ELEVATION	DESCRIPTION
N END 1978	2,646,652.19	1,660,582.43	41.39	USACE SBC
S END 1978	2,644,295.69	1,659,728.19	40.37	USACE SBC
TERRA–10 2008	2,644,971.59	1,660,156.45	80.40	PORT OFFICE ANT. MOUNT
PORT 1989	2,639,936.64	1,656,922.51	39.93	USACE SAC
EQ–1	2,629,995.41	1,643,787.75	–	–
VAN DUSEN GPS 1986	2,621,198.82	1,648,753.69	–	NGS SBC
AWWU 1994	2,629,310.76	1,635,837.68	–	3" ALCAP
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TIDAL 16 1966	2,644,293	1,659,727	40.53	USCGS BENCH MARK SBC
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ANCHORAGE, ALASKA
COOK INLET NAVIGATION CHANNEL
PROJECT CONDITION SURVEY
AUGUST 21–25, 2008

RECOMMENDED: PROJECT MANAGER

APPROVED: CHIEF OPERATIONS–READINESS BRANCH

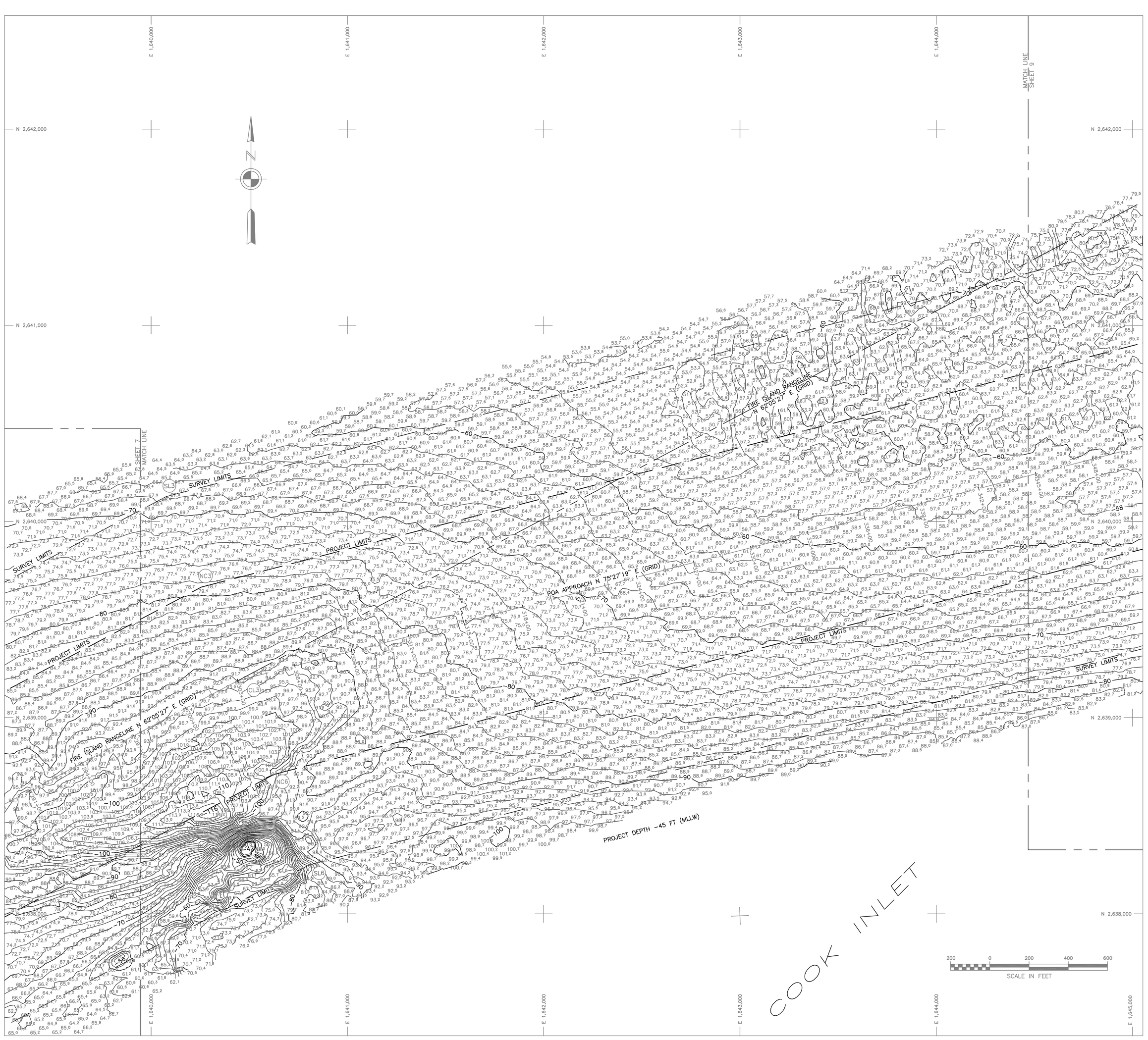
DATE:

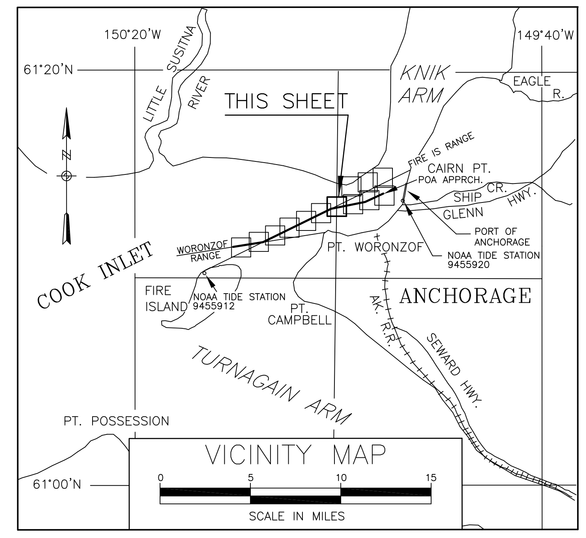
SURVEY NO. 2556–08

SCALE: 1" = 200'

SHEET 7 OF 14

U. S. ARMY





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COOK INLET NAVIGATION CHANNEL COORDINATES

CHANNEL CENTERLINE

COR.	NORTHING	EASTING	STATION	DESCRIPTION
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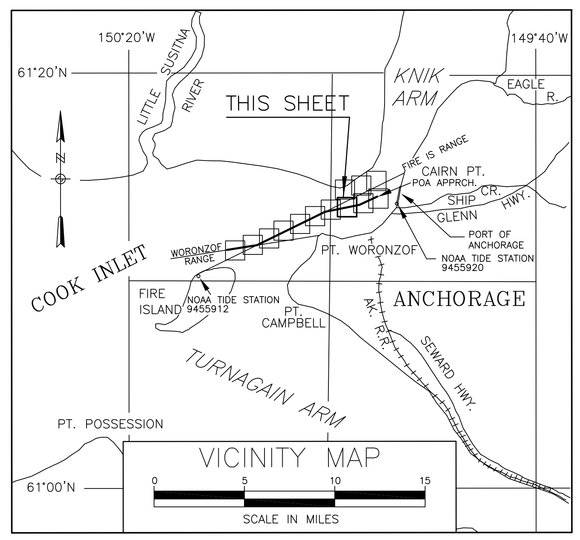
SHEET 8 OF 14

U. S. ARMY



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COOK INLET NAVIGATION CHANNEL COORDINATES

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POINT MACKENZIE SHOAL SURVEY LIMITS

CORNER	NORTHING	EASTING	CORNER	NORTHING	EASTING
M1	2,651,124.42	1,653,418.92	M4	2,642,200.91	1,648,071.21
M2	2,645,312.79	1,654,825.06	M5	2,643,837.63	1,644,012.43
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CORPS OF ENGINEERS
ANCHORAGE, ALASKA

SURVEYED: CJP/SJM/DSM
DRAWN: S. LEATHAM
CHECKED: KDW
SUBMITTED:

ANCHORAGE, ALASKA
COOK INLET NAVIGATION CHANNEL
PROJECT CONDITION SURVEY
AUGUST 21–25, 2008

RECOMMENDED: PROJECT MANAGER

APPROVED: CHIEF OPERATIONS–READINESS BRANCH

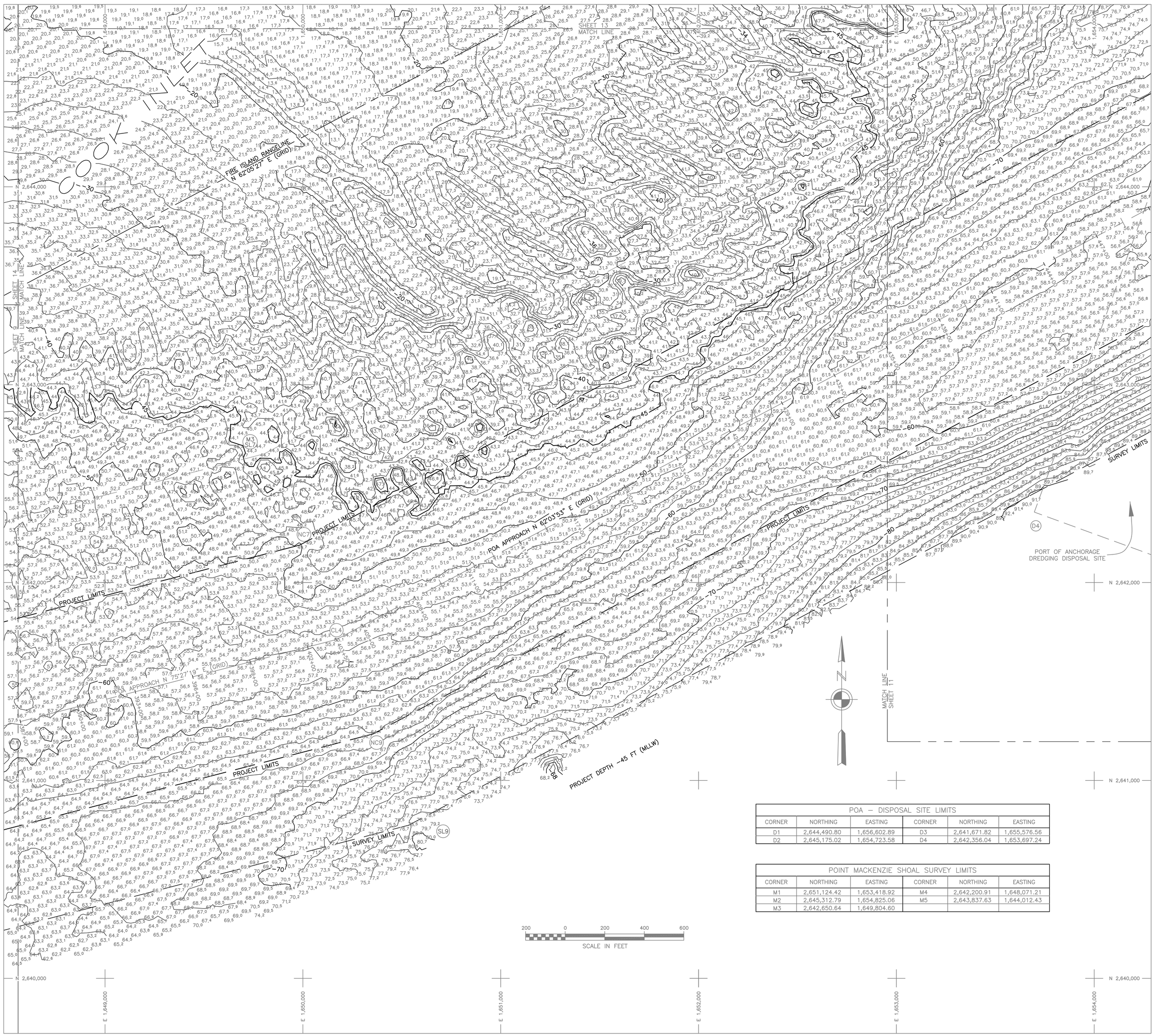
DATE:

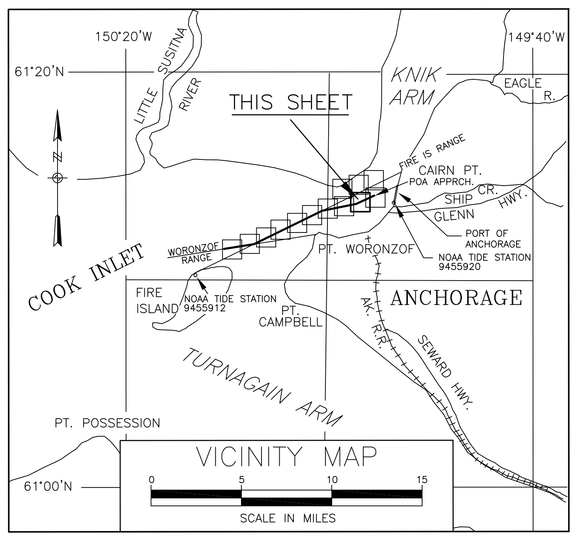
SURVEY NO. 2556–08

SCALE: 1" = 200'

SHEET 9 OF 14

U. S. ARMY





NOTES

1. HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 4, NAD83 IN U.S. SURVEY FEET HOLDING USACE SBC "N END 1978" AS N 2,646,652.19, E 1,660,582.43 AND USACE SBC "S END 1978" AS N 2,644,298.25, E 1,659,725.47.
2. VERTICAL CONTROL IS MEAN–LOWER–LOW–WATER (MLLW = 0.0') IN U.S. SURVEY FEET BASED ON NOAA/NOS TIDAL DATUM "9455920 ANCHORAGE, KNIK ARM, COOK INLET, ALASKA", PUBLISHED 04/21/2003, HOLDING USCGS SBC "B 75 1964" AS 36.82' AND NOAA/NOS TIDAL DATUM "9455912 FIRE ISLAND, ALASKA", PUBLISHED 05/21/2004, HOLDING NOS SBC "BM 13 1974" AS 28.41'. (SEE NOTE 4)
3. THIS SURVEY WAS CONDUCTED AUGUST 21–25, 2008. SOUNDINGS WERE COLLECTED USING A RESON SEABAT 8101 MULTIBEAM ECHOSOUNDER SYSTEM WITH A 240kHZ, 150 DEGREE SWATH–WIDTH TRANSDUCER (101 – 1.5 DEGREE BEAMS). POSITIONING, VESSEL ATTITUDE, HEADING AND TIDES WERE PROVIDED IN REAL–TIME USING A CODA OCTOPUS F–180 INERTIAL ATTITUDE AND POSITIONING SYSTEM OPERATING ON KINEMATIC GPS CORRECTIONS BROADCAST FROM A TRIMBLE 7400MSI RTK BASE RECEIVER SET AT "TERRA–10 2008", LOCATED ATOP THE PORT OF ANCHORAGE ADMINISTRATION BUILDING. SOUND VELOCITY WAS MEASURED AND APPLIED USING AN APPLIED MICROSYSTEMS SV+ V2 SOUND VELOCITY PROFILER DEPLOYED DURING THE SURVEY. REAL–TIME–KINEMATIC HEIGHT VALUES WERE CALIBRATED TO DIRECT MANUAL TIDE OBSERVATIONS HOLDING USCGS SBC "B 75 1964" LOCATED AT NOAA/NOS TIDE STATION "9455920" AT THE PORT OF ANCHORAGE (SEE NOTE 4). SURVEY LINE NAVIGATION AND DATA COLLECTION WERE CONDUCTED USING QPS QINSY (V8.0) INTEGRATED SOFTWARE. DATA PROCESSING WAS PERFORMED USING A COMBINATION OF QPS QINSY AND CARIS HIPS (V6.1) SOFTWARE.
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5. SOUNDINGS ARE IN U.S. SURVEY FEET AND ARE MINUS UNLESS NOTED OTHERWISE.
6. THIS DRAWING IS INDICATIVE OF CONDITIONS AT THE TIME OF SURVEY.

COOK INLET NAVIGATION CHANNEL COORDINATES

CHANNEL CENTERLINE

COR.	NORTHING	EASTING	STATION	DESCRIPTION
CL1	2,626,865.50	1,613,018.09	0+00	CENTERLINE WORONZOF RANGELINE
CL2	2,628,048.21	1,619,409.58	65+00	WORONZOF/FIRE ISLAND RANGELINE INTERSECTION
CL3	2,639,188.27	1,640,441.44	303+00	FIRE ISLAND/TRANSITION TO POA APPROACH
CL4	2,641,712.17	1,650,169.36	403+50	POA APPROACH
CL5	2,644,429.31	1,655,293.53	459+50	CENTERLINE POA APPROACH

CHANNEL LIMITS

COR.	NORTHING	EASTING	STATION	COR.	NORTHING	EASTING	STATION
NC1	2,627,365.51	1,612,925.56	0+00	NC6	2,638,711.03	1,640,626.80	303+00
NC2	2,628,534.04	1,619,240.43	65+00	NC7	2,642,189.38	1,649,983.88	403+50
NC3	2,639,665.52	1,640,256.07	303+00	NC8	2,644,878.56	1,655,055.31	459+50
NC4	2,626,365.49	1,613,110.61	0+00	NC9	2,641,234.95	1,650,354.84	403+50
NC5	2,627,562.38	1,619,578.73	65+00	NC10	2,643,980.06	1,655,531.75	459+50

SURVEY LIMITS

CORNER	NORTHING	EASTING	CORNER	NORTHING	EASTING
SL1	2,627,848.80	1,612,836.13	SL6	2,638,249.74	1,640,805.97
SL2	2,629,003.63	1,619,076.93	SL7	2,642,650.64	1,649,804.60
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⚠ CONTROL COORDINATES ⚠

STATION	NORTHING	EASTING	ELEVATION	DESCRIPTION
N END 1978	2,646,652.19	1,660,582.43	41.39	USACE SBC
S END 1978	2,644,295.69	1,659,728.19	40.37	USACE SBC
TERRA–10 2008	2,644,971.59	1,660,156.45	80.40	PORT OFFICE ANT. MOUNT
PORT 1989	2,639,936.64	1,656,922.51	39.93	USACE SAC
EQ–1	2,629,995.41	1,643,787.75	–	–
VAN DUSEN GPS 1988	2,621,198.82	1,648,753.69	–	NGS SBC
AWWU 1994	2,629,310.76	1,635,837.68	–	3" ALCAP

NOAA/NOS TIDAL BENCH MARKS AT THE PORT OF ANCHORAGE 9455920

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NOAA/NOS TIDAL BENCH MARKS AT FIRE ISLAND 9455912

BM 13 1974	2,620,685	1,605,138	28.41	NOS TIDAL BENCH MARK SBC
RIFE 1960	2,620,520	1,604,180	29.99	USCGS TRI–STA SBC

POA – DISPOSAL SITE LIMITS

CORNER	NORTHING	EASTING	CORNER	NORTHING	EASTING
D1	2,644,490.80	1,656,602.89	D3	2,641,671.82	1,655,576.56
D2	2,645,175.02	1,654,723.58	D4	2,642,356.04	1,653,697.24

POINT MACKENZIE SHOAL SURVEY LIMITS

CORNER	NORTHING	EASTING	CORNER	NORTHING	EASTING
M1	2,651,124.42	1,653,418.92	M4	2,642,200.91	1,648,071.21
M2	2,645,312.79	1,654,825.06	M5	2,643,837.63	1,644,012.43
M3	2,642,650.64	1,649,804.60			

CONTRACT NO. W9111KB–08–D–0002–0005

CONTRACTOR TERRASOND, LTD

CITY PALMER STATE ALASKA

ALASKA DISTRICT
CORPS OF ENGINEERS
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SURVEYED: CJP/SJM/DSM
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PROJECT CONDITION SURVEY
AUGUST 21–25, 2008

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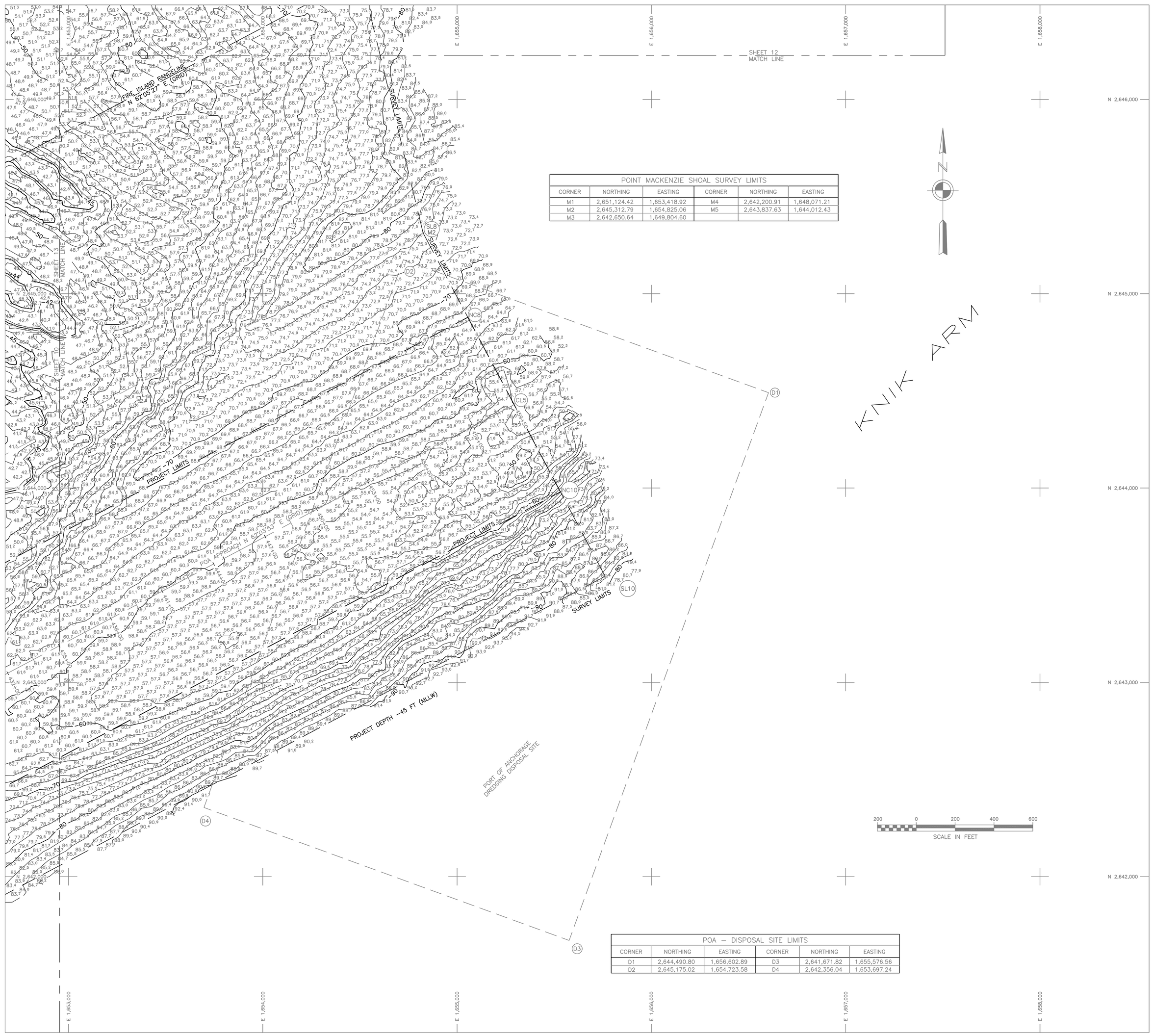
DATE:

SURVEY NO. 2556–08

SCALE: 1" = 200'

SHEET 10 OF 14

U. S. ARMY



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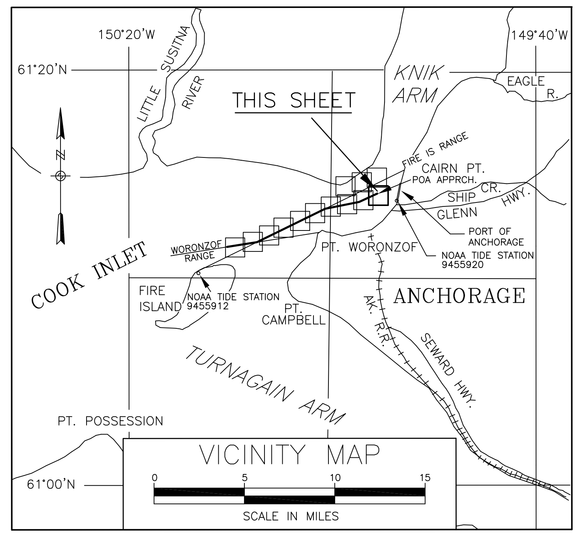

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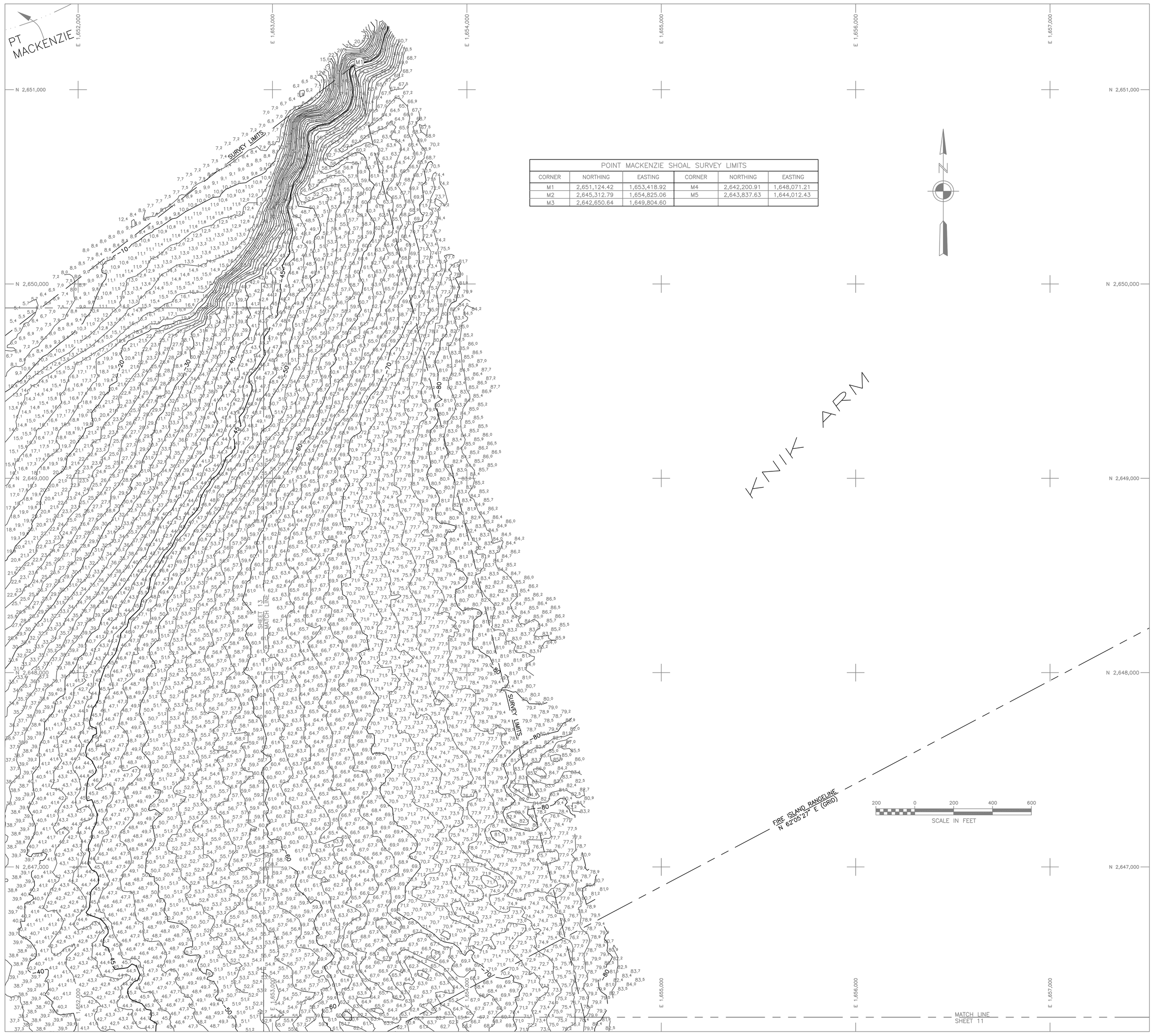

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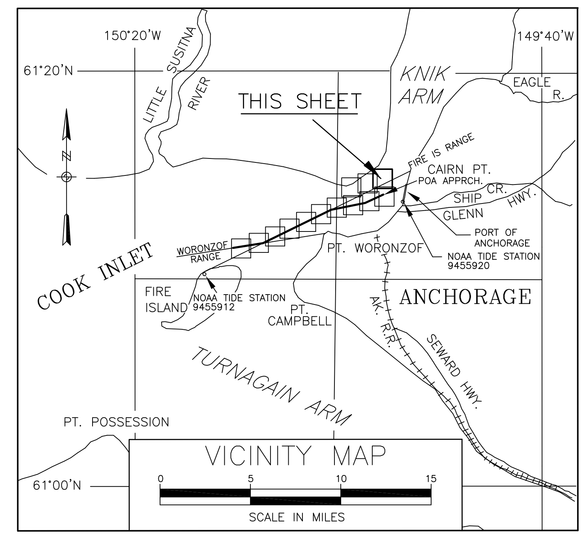

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STATION	NORTHING	EASTING	ELEVATION	DESCRIPTION
N END 1978	2,646,652.19	1,660,582.43	41.39	USACE SBC
S END 1978	2,644,295.69	1,659,728.19	40.37	USACE SBC
TERRA–10 2008	2,644,971.59	1,660,156.45	80.40	PORT OFFICE ANT. MOUNT
PORT 1989	2,639,936.64	1,656,922.51	39.93	USACE SAC
EQ–1	2,629,995.41	1,643,787.75	–	–
VAN DUSEN GPS 1985	2,621,198.82	1,648,753.69	–	NGS SBC
AWWU 1994	2,629,310.76	1,635,837.68	–	3" ALCAP
NOAA/NOS TIDAL BENCH MARKS AT THE PORT OF ANCHORAGE 9455920				
TIDAL 16 1966	2,644,293	1,659,727	40.53	USCGS BENCH MARK SBC
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NOAA/NOS TIDAL BENCH MARKS AT FIRE ISLAND 9455912				
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RIFE 1960	2,620,520	1,604,180	29.99	USCGS TRI–STA SBC

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CONTRACTOR TERRASOND, LTD

CITY PALMER STATE ALASKA

ALASKA DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKA

SURVEYED: CJP/SJM/DSM
DRAWN: S. LEATHAM
CHECKED: KDW
SUBMITTED:

ANCHORAGE, ALASKA
COOK INLET NAVIGATION CHANNEL
PROJECT CONDITION SURVEY
AUGUST 21–25, 2008

RECOMMENDED: PROJECT MANAGER

APPROVED: CHIEF OPERATIONS–READINESS BRANCH

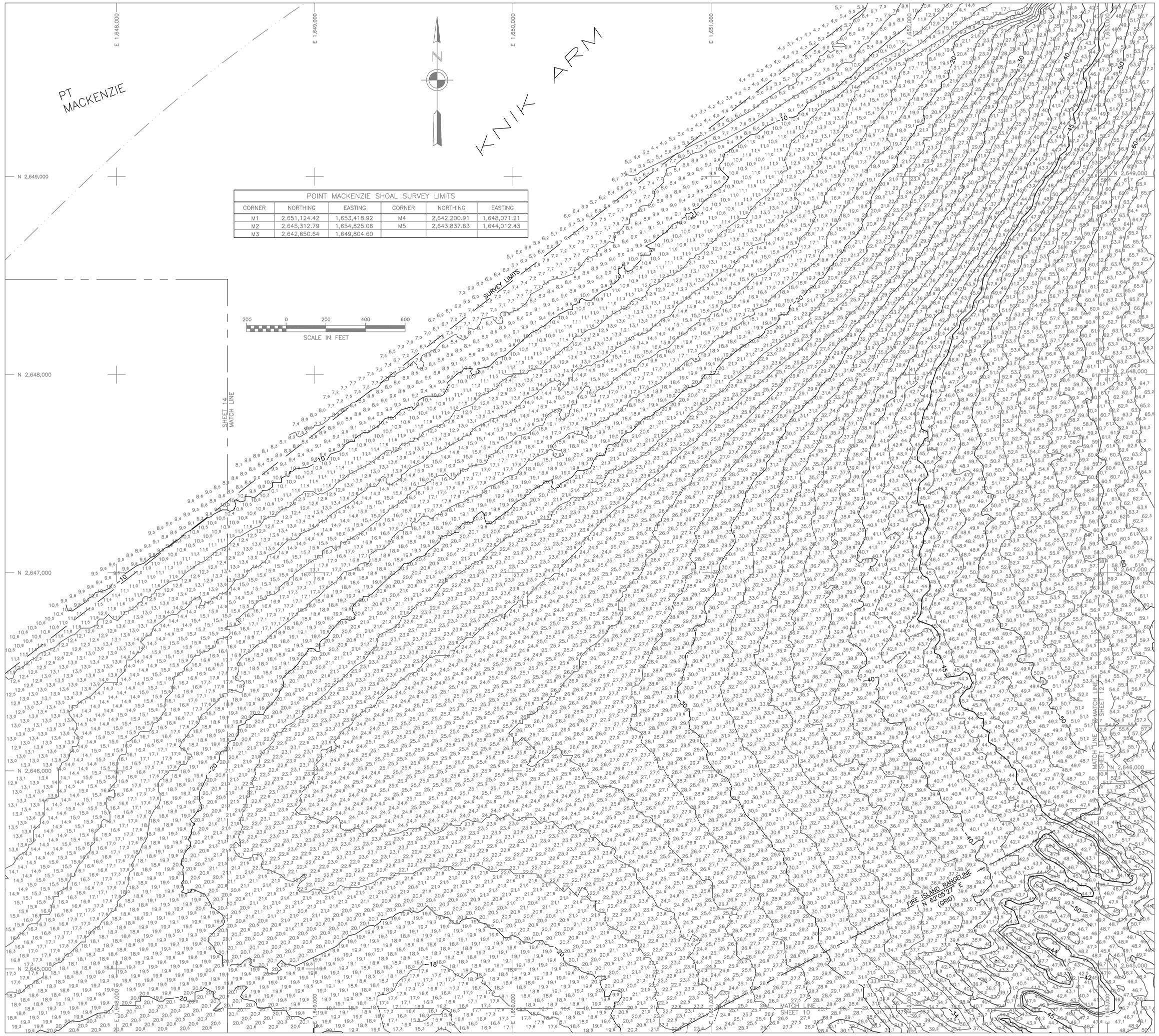
DATE:

SURVEY NO. 2556–08

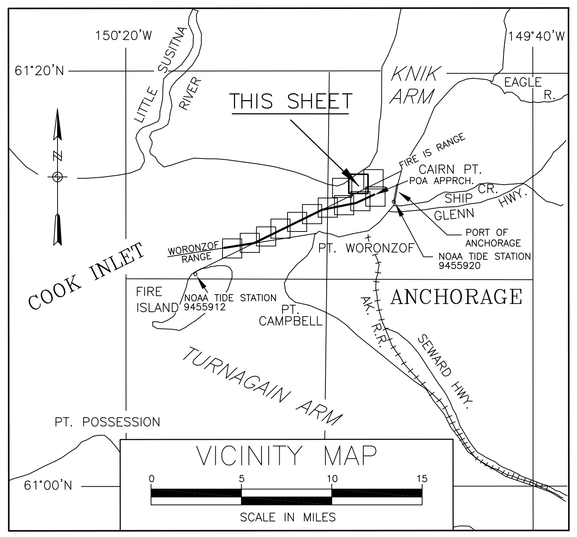
SCALE: 1" = 200'

SHEET 12 OF 14

U. S. ARMY



POINT MACKENZIE SHOAL SURVEY LIMITS					
CORNER	NORTHING	EASTING	CORNER	NORTHING	EASTING
M1	2,651,124.42	1,653,418.92	M4	2,642,200.91	1,648,071.21
M2	2,645,312.79	1,654,825.06	M5	2,643,837.63	1,644,012.43
M3	2,642,650.64	1,649,804.60			



NOTES

1. HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 4, NAD83 IN U.S. SURVEY FEET HOLDING USACE SBC "N END 1978" AS N 2,646,652.19, E 1,660,582.43 AND USACE SBC "S END 1978" AS N 2,644,298.25, E 1,659,725.47.
2. VERTICAL CONTROL IS MEAN–LOWER–LOW–WATER (MLLW = 0.0') IN U.S. SURVEY FEET BASED ON NOAA/NOS TIDAL DATUM "9455920 ANCHORAGE, KNIK ARM, COOK INLET, ALASKA", PUBLISHED 04/21/2003, HOLDING USCGS SBC "B 75 1964" AS 36.82' AND NOAA/NOS TIDAL DATUM "9455912 FIRE ISLAND, ALASKA", PUBLISHED 05/21/2004, HOLDING NOS SBC "BM 13 1974" AS 28.41'. (SEE NOTE 4)
3. THIS SURVEY WAS CONDUCTED AUGUST 21–25, 2008. SOUNDINGS WERE COLLECTED USING A RESON SEABAT 8101 MULTIBEAM ECHOSOUNDER SYSTEM WITH A 240kHZ, 150 DEGREE SWATH–WIDTH TRANSDUCER (101 – 1.5 DEGREE BEAMS). POSITIONING, VESSEL ATTITUDE, HEADING AND TIDES WERE PROVIDED IN REAL–TIME USING A CODA OCTOPUS F–180 INERTIAL ATTITUDE AND POSITIONING SYSTEM OPERATING ON KINEMATIC GPS CORRECTIONS BROADCAST FROM A TRIMBLE 7400MSI RTK BASE RECEIVER SET AT "TERRA–10 2008", LOCATED ATOP THE PORT OF ANCHORAGE ADMINISTRATION BUILDING. SOUND VELOCITY WAS MEASURED AND APPLIED USING AN APPLIED MICROSYSTEMS SV+ V2 SOUND VELOCITY PROFILER DEPLOYED DURING THE SURVEY. REAL–TIME–KINEMATIC HEIGHT VALUES WERE CALIBRATED TO DIRECT MANUAL TIDE OBSERVATIONS HOLDING USCGS SBC "B 75 1964" LOCATED AT NOAA/NOS TIDE STATION "9455920" AT THE PORT OF ANCHORAGE (SEE NOTE 4). SURVEY LINE NAVIGATION AND DATA COLLECTION WERE CONDUCTED USING QPS QINSY (V8.0) INTEGRATED SOFTWARE. DATA PROCESSING WAS PERFORMED USING A COMBINATION OF QPS QINSY AND CARIS HIPS (V6.1) SOFTWARE.
4. THE SURVEY AND THE PRELIMINARY PROCESSED DATASET WAS BASED ON RTK MLLW TIDE DATUM AT THE PORT OF ANCHORAGE AS NOTED ABOVE. THE FINAL DATASET WAS ADJUSTED TO REFLECT THE DIFFERENCE IN TIDE DATUM VALUES AT THE PORT OF ANCHORAGE (NOAA/NOS 9455920) AND THE TIDE DATUM VALUES AT FIRE ISLAND (NOAA/NOS 9455912). THIS "TILTED PLANE" ADJUSTMENT WAS PERFORMED TO PROVIDE A UNIFORM MLLW BASED APPROACH FROM THE WEST END OF THE COOK INLET NAVIGATION CHANNEL INTO THE PORT OF ANCHORAGE. THE ADJUSTMENT IS BASED ON OBSERVED RTK HEIGHT VALUES MEASURED AT BOTH NOAA/NOS TIDE STATIONS LISTED ABOVE. THE OBSERVED RTK DIFFERENCE HOLDS THE PORT OF ANCHORAGE AT 0.0' AND FIRE ISLAND AT –3.73'. THE ADJUSTMENT WAS PERFORMED USING CARIS BASE EDITOR V2.1 RAISING ALL SOUNDINGS PROPORTIONATELY ALONG THE DISTANCE BETWEEN THE TIDAL BENCH MARKS UTILIZED TO DEFINE THE VERTICAL DATUM. THE ADJUSTMENT AT THE PORT OF ANCHORAGE IS 0.0' EXTENDING TO AN ADJUSTMENT OF +3.73' AT FIRE ISLAND (SEE DIAGRAM SHEET 1).
5. SOUNDINGS ARE IN U.S. SURVEY FEET AND ARE MINUS UNLESS NOTED OTHERWISE.
6. THIS DRAWING IS INDICATIVE OF CONDITIONS AT THE TIME OF SURVEY.

COOK INLET NAVIGATION CHANNEL COORDINATES				
CHANNEL CENTERLINE				
COR.	NORTHING	EASTING	STATION	DESCRIPTION
CL1	2,626,865.50	1,613,018.09	0+00	CENTERLINE WORONZOF RANGELINE
CL2	2,628,048.21	1,619,409.58	65+00	WORONZOF/FIRE ISLAND RANGELINE INTERSECTION
CL3	2,639,188.27	1,640,441.44	303+00	FIRE ISLAND/TRANSITION TO POA APPROACH
CL4	2,641,712.17	1,650,169.36	403+50	POA APPROACH
CL5	2,644,429.31	1,655,293.53	459+50	CENTERLINE POA APPROACH

CHANNEL LIMITS							
COR.	NORTHING	EASTING	STATION	COR.	NORTHING	EASTING	STATION
NC1	2,627,365.51	1,612,925.56	0+00	NC6	2,638,711.03	1,640,626.80	303+00
NC2	2,628,534.04	1,619,240.43	65+00	NC7	2,642,189.38	1,649,983.88	403+50
NC3	2,639,665.52	1,640,256.07	303+00	NC8	2,644,878.56	1,655,055.31	459+50
NC4	2,626,365.49	1,613,110.61	0+00	NC9	2,641,234.95	1,650,354.84	403+50
NC5	2,627,562.38	1,619,578.73	65+00	NC10	2,643,980.06	1,655,531.75	459+50

SURVEY LIMITS					
CORNER	NORTHING	EASTING	CORNER	NORTHING	EASTING
SL1	2,627,848.80	1,612,836.13	SL6	2,638,249.74	1,640,805.97
SL2	2,629,003.63	1,619,076.93	SL7	2,642,650.64	1,649,804.60
SL3	2,640,126.80	1,640,076.90	SL8	2,645,312.79	1,654,825.06
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COOK INLET NAVIGATION CHANNEL
PROJECT CONDITION SURVEY
AUGUST 21–25, 2008

RECOMMENDED: PROJECT MANAGER

APPROVED: CHIEF OPERATIONS–READINESS BRANCH

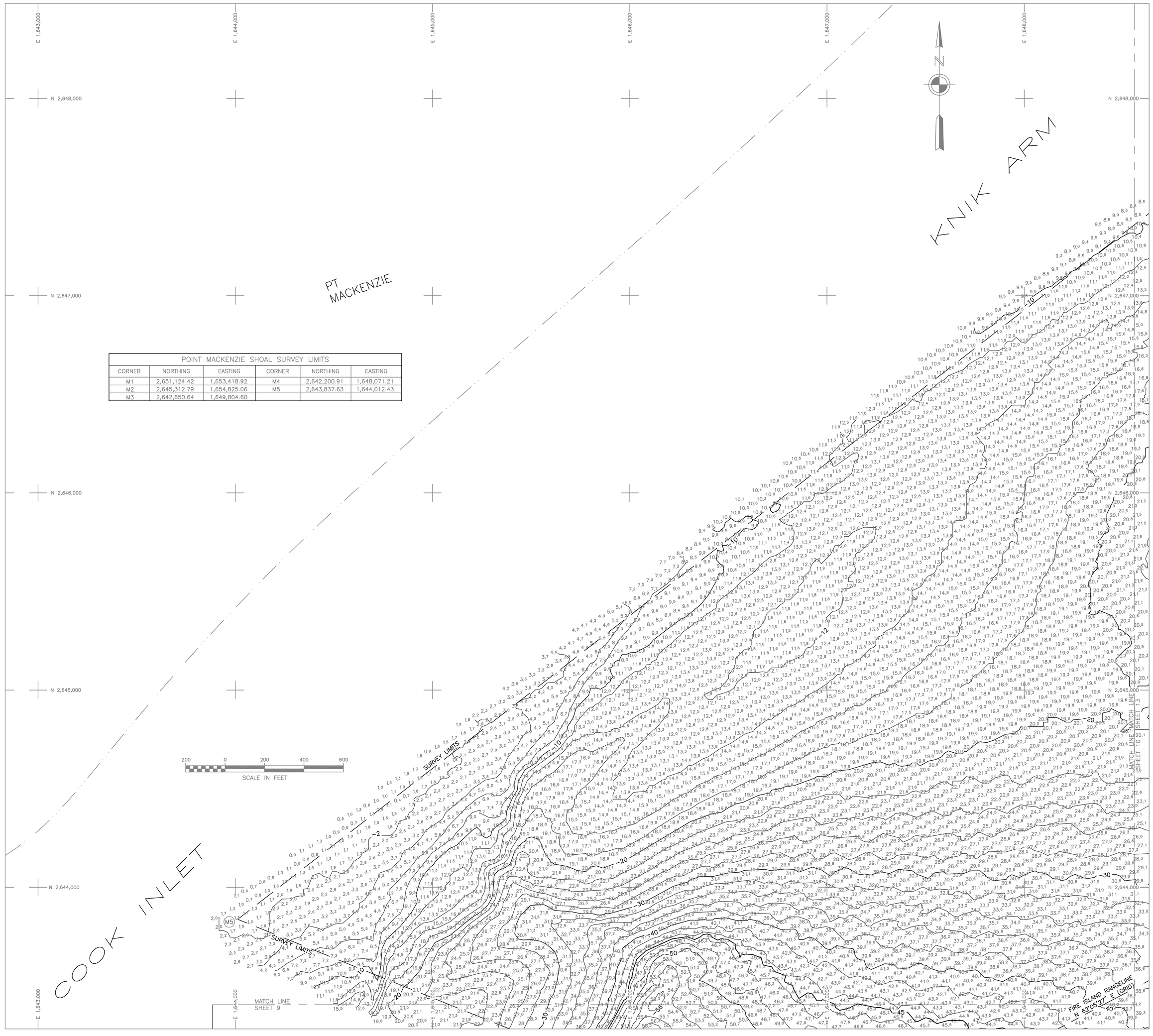
DATE:

SURVEY NO. 2556–08

SCALE: 1" = 200'

SHEET 13 OF 14

U. S. ARMY



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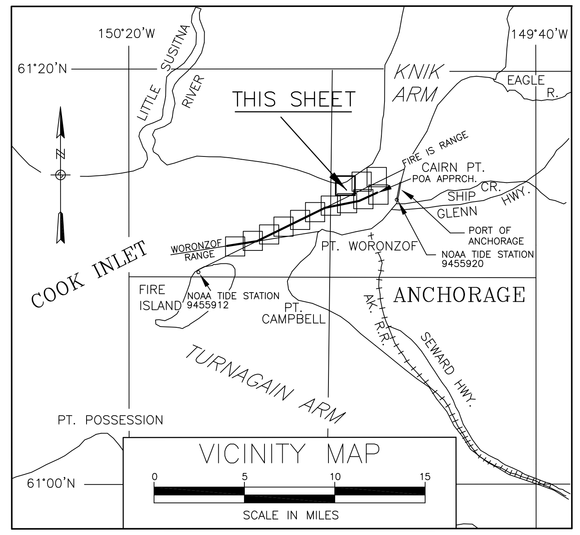

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SCALE: 1" = 200'

SHEET 14 OF 14