Izembek
National Wildlife Refuge
Land Exchange/Road Corridor

Final Environmental Impact Statement

Appendix E  Water Sources and
35 Percent Road Design
U.S. Fish and Wildlife Service Mission Statement

The Mission of the U.S. Fish & Wildlife Service is working with others to conserve, protect and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people.

Refuge System Mission Statement

The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

—National Wildlife Refuge System Improvement Act of 1997

On the Cover: Izembek National Wildlife Refuge, 2007
Photo from the NCTC Image Library
APPENDIX E
Water Sources and 35 Percent Road Design
**Figure X-00**

**U.S. Fish and Wildlife Service**

**Izembek Land Exchange EIS**

**MATERIAL SOURCES & WATER SOURCES MAP**

**Cold Bay, Alaska**

---

### WATER SOURCES

<table>
<thead>
<tr>
<th>Water Source</th>
<th>STA</th>
<th>Volume (Gal)</th>
<th>Expected Daily Intake (Gal)</th>
<th>Expected Total Intake (Gal)</th>
<th>Expected Percent Taken</th>
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</thead>
<tbody>
<tr>
<td>14S+100 (Creek)</td>
<td>400 gal/sec</td>
<td>-30,000</td>
<td>500,000</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>513+00 Southern Alt</td>
<td>18,647,191</td>
<td>30,000</td>
<td>1,000,000</td>
<td>0.36%</td>
<td></td>
</tr>
<tr>
<td>815+00 (Lake)</td>
<td>109,392,532</td>
<td>30,000</td>
<td>1,000,000</td>
<td>0.91%</td>
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</tr>
<tr>
<td>Blinn Lake</td>
<td>492,338,836</td>
<td>30,000</td>
<td>1,000,000</td>
<td>0.20%</td>
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</tr>
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</table>

*Max intake rate = 600 gal/minute*

---

### DESIGN CRITERIA

- **Design Speed**: 20 mph
- **Maximum Grade**: 12%
- **Minimum Curve Radius**: 135 ft
- **Stopping Sight Distance**: 180 ft
- **Minimum K Value (Crest)**: 15
- **Minimum K Value (Sag)**: 17
- **Maximum Superelevation**: 3%

---

### STATION EQUATION:

- **CENTRAL 754+22.70 BK = 755+00 AH**
- **SOUTHERN 664+63.33 BK = 755+00 AH**

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**LEGEND**

- **CENTRAL ISTHMUS ALIGNMENT**
- **SOUTHERN ISTHMUS ALIGNMENT**
- **EXISTING ROADWAY**
- **REFUGE BOUNDARY**
- **DESIGNATED WILDERNESS BOUNDARY**
- **CATALOGED ANADROMOUS STREAM**
- **PROPOSED WATER SOURCE**

---

**BEGIN CENTRAL**

**BEGIN SOUTH**

**STA 10+00**

**EXISTING ACCESS RD STA 2911+43.10**

**NE CORNER MATERIAL SITE (6.2 ac)**
LEGEND

- CENTRAL ISTHMUS ALIGNMENT
- CENTRAL ISTHMUS 100' RIGHT-OF-WAY
- SOUTHERN ISTHMUS ALIGNMENT
- SOUTHERN ISTHMUS 100' RIGHT-OF-WAY
- NWR BOUNDARY
- DESIGNATED WILDERNESS BOUNDARY

PLAN AND PROFILE

STA 85+00 to 160+00 (CENTRAL)
STA 85+00 to 160+00 (SOUTHERN)
LEGEND

- CENTRAL ISTMUS ALIGNMENT
- CENTRAL ISTMUS 100' RIGHT-OF-WAY
- SOUTHERN ISTMUS ALIGNMENT
- SOUTHERN ISTMUS 100' RIGHT-OF-WAY
- NWR BOUNDARY
- DESIGNATED WILDERNESS BOUNDARY
- DITCH LINE
- DAYLIGHT LINE - CUT
- DAYLIGHT LINE - FILL
- APPROX TURNOUT STATION

PLAN AND PROFILE

STA 235+00 to 310+00 (CENTRAL)
STA 235+00 to 310+00 (SOUTHERN)
FIGURE X-06

U.S. Fish and Wildlife Service
Izembek Land Exchange EIS

PLAN AND PROFILE
STA 385+00 to 460+00 (SOUTHERN)

Cold Bay, Alaska
LEGEND
- CENTRAL ISTHMUS ALIGNMENT
- CENTRAL ISTHMUS 100' RIGHT-OF-WAY
- SOUTHERN ISTHMUS ALIGNMENT
- SOUTHERN ISTHMUS 100' RIGHT-OF-WAY
- NWR BOUNDARY
- DESIGNATED WILDERNESS BOUNDARY
- DITCH LINE
- DAYLIGHT LINE - CUT
- DAYLIGHT LINE - FILL
- APPROX TURNOUT STATION

PLAN AND PROFILE
STA 460+00 to 535+00 (SOUTHERN)

Cold Bay, Alaska

U.S. Fish and Wildlife Service
Izembek Land Exchange EIS

FIGURE X-07
FIGURE X-08

LEGEND

- CENTRAL ISTHMUS ALIGNMENT
- CENTRAL ISTHMUS 100' RIGHT-OF-WAY
- SOUTHERN ISTHMUS ALIGNMENT
- SOUTHERN ISTHMUS 100' RIGHT-OF-WAY
- DITCH LINE
- DAYLIGHT LINE - CUT
- DAYLIGHT LINE - FILL
- APPROX TURNOUT STATION
- NWR BOUNDARY
- DESIGNATED WILDERNESS BOUNDARY

EXISTING GRADE
PROPOSED FINISH GRADE

TO
50
75
100

SCALE IN FEET
CENTRAL ISTMUS ALIGNMENT
CENTRAL ISTMUS 100' RIGHT-OF-WAY
SOUTHERN ISTMUS ALIGNMENT
SOUTHERN ISTMUS 100' RIGHT-OF-WAY
NWR BOUNDARY
DESIGNATED WILDERNESS BOUNDARY
EXISTING GRADE
PROPOSED FINISH GRADE
APPROX TURNOUT STATION
LEGEND
DAYLIGHT LINE - CUT
DAYLIGHT LINE - FILL
SCALE IN FEET
PLAN AND PROFILE
STA 910+00 to 985+00 (CENTRAL)
STA 910+00 to 985+00 (SOUTHERN)
Cold Bay, Alaska
U.S. Fish and Wildlife Service
Izembek Land Exchange EIS
FIGURE X-18
| FIGURE X-21 |

<table>
<thead>
<tr>
<th>TURNOUT LOCATIONS - CENTRAL ALTERNATIVE</th>
<th>TURNOUT LOCATIONS - SOUTHERN ALTERNATIVE</th>
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<tbody>
<tr>
<td>STATION OFFSET</td>
<td>STATION OFFSET</td>
</tr>
<tr>
<td>16+30 L</td>
<td>41+400 L</td>
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<td>21+30 L</td>
<td>419+60 L</td>
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<tr>
<td>30+90 L</td>
<td>427+80 L</td>
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<td>37+50 L</td>
<td>437+90 L</td>
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<td>67+60 L</td>
<td>469+60 R</td>
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<td>74+00 R</td>
<td>469+70 L</td>
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<td>496+40 R</td>
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<tr>
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<td>382+00 L</td>
<td>1034+50 R</td>
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<tr>
<td>391+00 R</td>
<td>1044+50 R</td>
</tr>
<tr>
<td>400+40 R</td>
<td>1054+50 R</td>
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U.S. Fish and Wildlife Service
Izembek Land Exchange EIS
Cold Bay, Alaska

TURNOUT LOCATION TABLES

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<table>
<thead>
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<td>FIGURE X-21</td>
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D:\PROJECTS\IZEKM\IZEMBEK EIS\IZEMBEK EIS\401 WORKING DRAWINGS\ROAD DESIGN\PNP SHEETS.DWG
Revised 10/6/2011 10:22:35 AM

FILE: PNP SHEETS.DWG
DRAWN: JOB NO:
DATE: October 2011

Cold Bay, Alaska
Izembek Land Exchange EIS
U.S. Fish and Wildlife Service
EXISTING GROUND
ROADWAY FILL PER
TYPICAL SECTIONS

EXISTING STREAM BED
GABION WALL OR
APPROVED EQUAL
RIPRAP CLASS II TYP

COMPOSITE TIMBER DECK

APPROX. 50' BRIDGE LENGTH

GABION WALL OR
APPROVED EQUAL

Q10

FINISHED ROAD PROFILE

ROADWAY FILL PER
TYPICAL SECTIONS

EXISTING GROUND

TYPICAL ROADWAY PLAN

3:1 TAPER

3' 29'

3' 29'

3' 29'

3' 29'

A

A

PLAN VIEW

SECTION VIEW A-A

TYPICAL ROADWAY TURNOUT DETAIL

NOT TO SCALE

(MIRROR ABOUT CENTERLINE FOR LEFT OR RIGHT TURNOUT)

FILL CONDITION

MEET EXISTING GROUND
BOLLARD, TYP

GEOTEXTILE SEPARATION FABRIC

6" E-1 BASE COURSE

12" MIN UNCLASSIFIED FILL

18" BORROW TYPE B

GRADE TO MEET EXISTING GROUND
PER CUT/FILL CONDITIONS AS SHOWN
IN TYPICAL ROADWAY SECTION

CUT CONDITION

NOTE: LINE ALL CUT DITCHES WITH LONGITUDINAL
SLOPES OF 5% OR STEEPER - SEE TYPICAL DITCH
LINING DETAIL.

PLACE THE 3% CROSS GRADE TO DRAIN TOWARD
THE DOWNHILL SIDE OF EXISTING TOPOGRAPHY AND
TOWARDS THE INNER RADIUS OF HORIZONTAL CURVES.

TYPICAL ROADWAY SECTION

NOT TO SCALE

3' 29'

BOLLARD, TYP

PLACE GEOTEXTILE, EROSION CONTROL
FABRIC ON BOTTOM

1' THICK LAYER OF
CLASS I RIPRAP

EXISTING GROUND

TYPICAL DITCH LINING DETAIL

NOT TO SCALE

GEOTEXTILE
SEPARATION FABRIC

6" E-1 BASE COURSE

12" MIN UNCLASSIFIED FILL

18" BORROW TYPE B

TYPICAL BOX CULVERT

NOT TO SCALE

SCOUR PROTECTION TYP

TYPICAL FOOTING

ROADWAY FILL PER
TYPICAL SECTIONS

EXISTING GROUND

TYPICAL BRIDGE PLAN

NOT TO SCALE

APPROX. 50' BRIDGE LENGTH

COMPOSITE TIMBER DECK

FINISHED ROAD PROFILE

EXISTING GROUND

RIPRAP CLASS II TYP

Q10

GABION WALL OR
APPROVED EQUAL

ORDINARY HIGH WATER

1.5:1

3% *

6:1

1' THICK LAYER OF
CLASS I RIPRAP

PLACE GEOTEXTILE, EROSION CONTROL
FABRIC ON BOTTOM

EXISTING GROUND

TYPICAL DITCH LINING DETAIL

NOT TO SCALE

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Izembek Land Exchange EIS

Cold Bay, Alaska

TYPICAL DETAILS

FIGURE X-22

U.S. Fish and Wildlife Service
Izembek Land Exchange EIS

Cold Bay, Alaska

TYPICAL DETAILS

FIGURE X-22
TYPICAL DETAILS

TYPICAL BOLLARD WITH CHAIN DETAIL

NOT TO SCALE

NOTES:
1. GALVANIZED CHAIN MUST BE ATTACHED TO EACH POST.
2. ADDITIONAL CHAINS BETWEEN POSTS MAY BE REQUIRED TO PREVENT VEHICLE PASSAGE THROUGH LOW POINTS ALONG THE RUN.
3. USE ONLY GALVANIZED OR STAINLESS STEEL HARDWARE OR MELD CHAIN TO POSTS.
4. TACK MELD EACH POST CAP.

TYPICAL DETAIL - BOLLARD-ONLY OPTION

NOT TO SCALE