

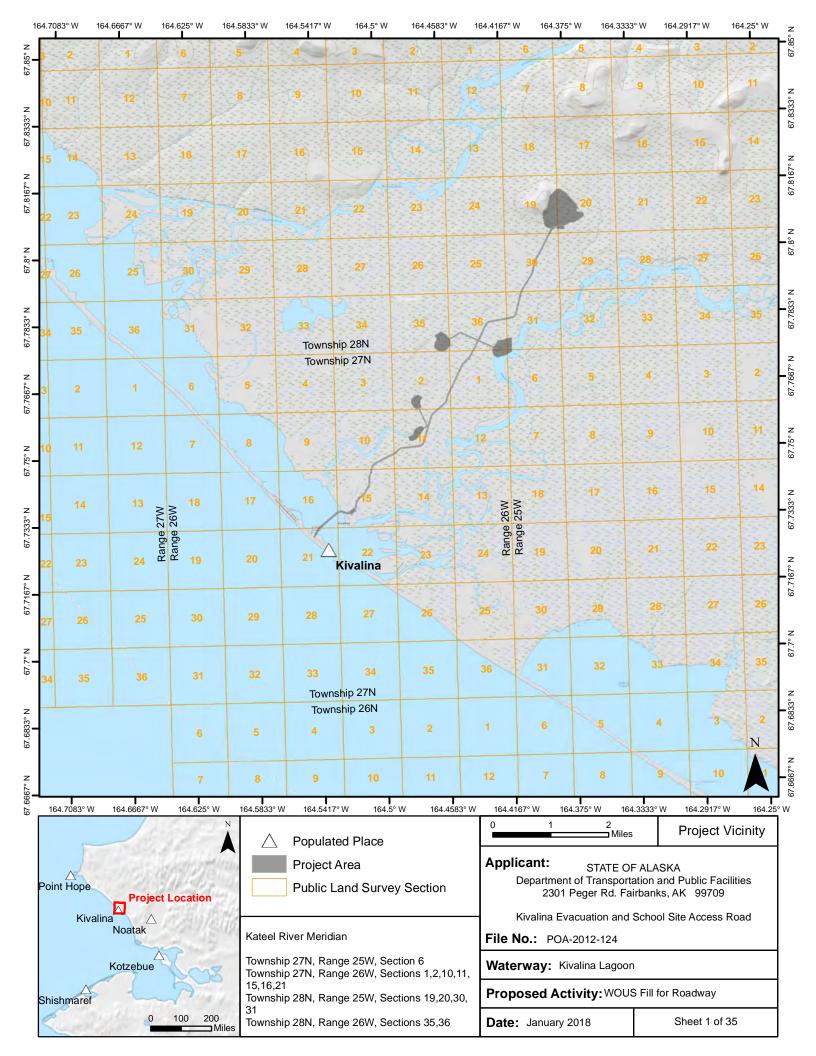
Kivalina Evacuation and School Site Access Road POA-2012-124

Section 10/404 Permit Application

Detail and Plan View Figures

List of Sheets

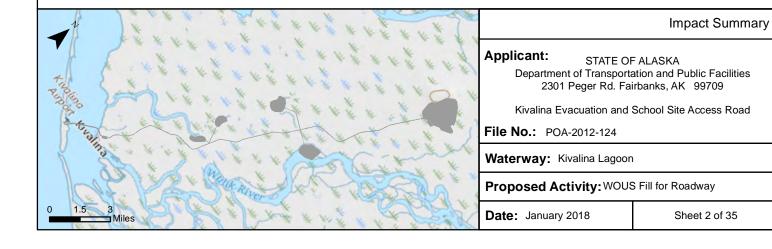
Project Vicinity	1
Impact Summary	2
Bridge and Bridge Approach 3D Render	3
Bridge Approach Detail	4
Bridge Specifications	5
Bridge and Bridge Approach Profile	6
Bridge Plan Detail	7
Roadway Detail	8
Terminus Detail	9
Ice Road Plan View	10
Ice Road Detail	11
Turnout Detail	12
Non-Fish Passage Culvert Detail	13
Fish Passage Culvert Detail	14
Spur Road Detail	15
K-Hill Material Site Detail	16
Wulik River Material Site Detail	17
Wulik Relic Channel Material Site Detail	18
Plan View Index	19
Plan View Sheets	20-35



SUMMARY OF PROPOSED IMPACTS TO WETLANDS AND WATERS OF THE U.S.

Project Component	Fill Type	WOUS Acres Impacted	Total Acres Impacted	Cubic Yards Fill in WOUS
		•	ппрассец	W003
Section 404				
Road and Staging Pads	Gravels and Silts	66.0	66.7	518,000
Material Sites	Excavation	297.3	326.8 ¹	(765,800)
Material Site Spur Roads	Gravels and Silts	7.2	7.2	52,800
Section 10				
Bridge and Bridge Approaches	Gravel, Rock, Rip Rap 8 Piles up to 4 ft. diameter = (100.6 sq. ft.)	8.2	8.2	195,000
Total Impacts		378.7	408.8 ²	
Total Fill		765,800		
Total Excavation		765,800		

Disturbance within the defined Material Site boundaries is expected to be smaller than the boundaries being permitted. Additional geotechnical drilling and determination of material quality and quantity within pit boundaries has not yet been determined. This additional material site data will be used to define the final material boundaries.



² Apparent inconsistencies in sums are the result of rounding.

^{*} Culvert footprints are included within the roadway footprint.





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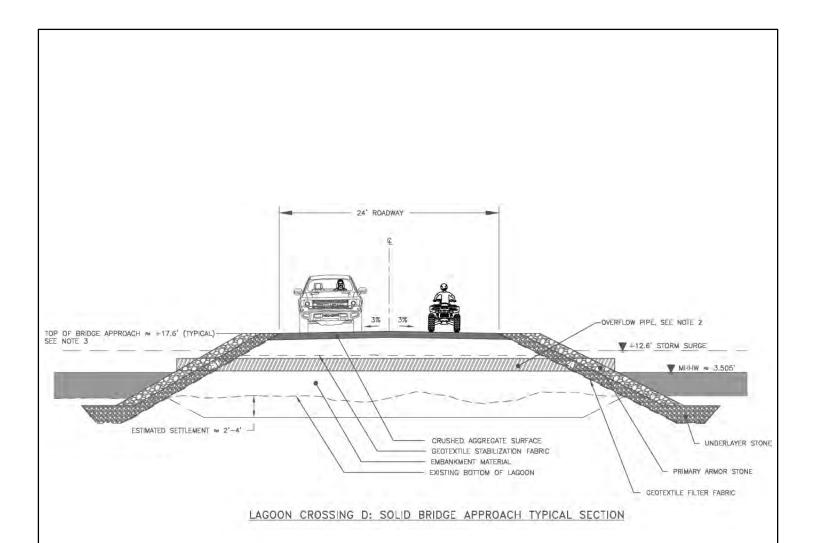
Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

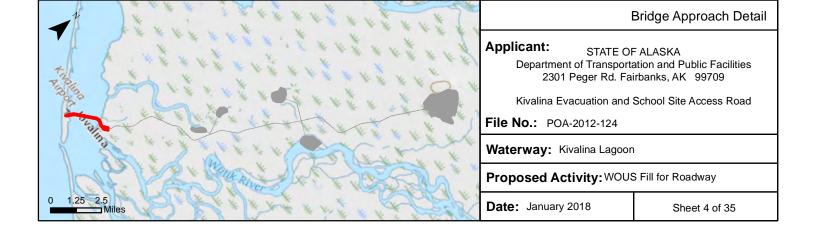
Proposed Activity: WOUS Fill for Roadway

Date: January 2018 Sheet 3 of 35



NOTES:

- LAGOON CROSSING D CONSISTS OF SOLID BRIDGE APPROACHES WITH TWO PRIMARY OPENINGS CONSISTING OF A BRIDGE, AND LARGE STRUCTURAL PLATE PIPES. THIS FIGURE DETAILS THE SOLID PORTION OF THE LAGOON CROSSING.
- OVERFLOW PIPES TO BE PLACED ABOVE MHHW INCREMENTALLY WITHIN THE EMBANKMENT OVER THE LENGTH OF THE BRIDGE APPROACHES.
- TOP OF BRIDGE APPROACH ELEVATION VARIES FROM APPROX. 17.6-25' TO ACCOMMODATE DRAINAGE STRUCTURES/FEATURES. ELEVATIONS ARE APPROXIMATE AND BASED ON THE NAVD88 VERTICAL DATUM

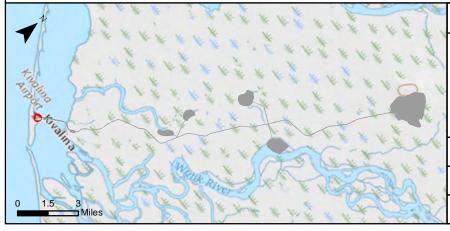


Single-span steel girder bridge

Approximately 180ft single span bridge over 110ft lagoon channel. 12ft clearance at high water for recreational boats. 8 piles, up to 4ft diameter, placed within bridge approach footprint. No piles in channel.

Example Bridge:





Bridge Specifications

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Kivalina Evacuation and School Site Access Road

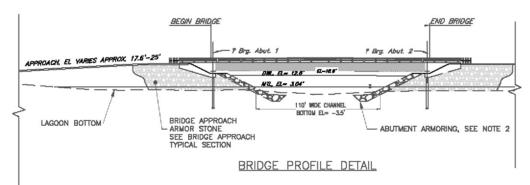
File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

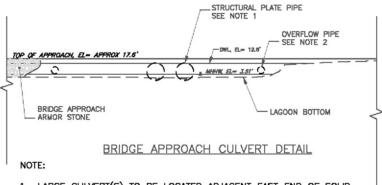
Date: January 2018 Sheet 5 of 35

BRIDGE APPROACH AND BRIDGE PROFILE VIEW

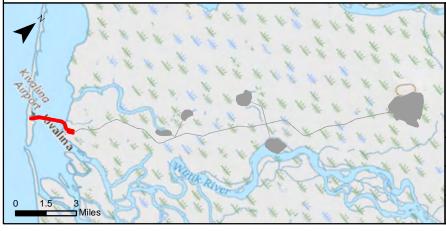


NOTE:

- BRIDGE TO BE CONSTRUCTED OVER EXISTING 110' WIDE LAGOON CHANNEL, CENTERED APPROXIMATELY 225' EAST OF THE BARRIER ISLAND.
- 2. BRIDGE ABUTMENTS & FOUNDATION TO CONSIST OF SLOPED EARTHEN EMBANKMENT ARMORED WITH ROCK, OR VERTICAL SHEET PILE WALL, AND BE DESIGNED TO SPAN ENTIRE 110' LAGOON CHANNEL.
- LOCATION AND DIMENSIONS OF ROCK ARMORING ALONG ABUTMENTS ARE APPROXIMATE, AND WILL BE DESIGNED TO CLOSELY MAINTAIN NATURAL CHANNEL DIMENSIONS TO THE FURTHEST EXTENT PRACTICABLE.
- 4. ELEVATIONS ARE APPROXIMATE AND BASED ON NAVD88 VERTICAL DATUM



- LARGE CULVERT(S) TO BE LOCATED ADJACENT EAST END OF SOLID BRIDGE APPROACH. PIPE INVERTS TO BE RECESSED BELOW BOTTOM OF LAGOON AND FILLED WITH 2'-4' THICK ROCK SUBSTRATE.
- OVERFLOW PIPE(S) INVERTS TO BE PLACED ABOVE MHHW AND SPACED INCREMENTALLY OVER LENGTH OF SOLID BRIDGE APPROACH TO PROVIDE CONVEYANCE DURING HIGH WATER EVENTS.



Bridge and Bridge Approach Profile

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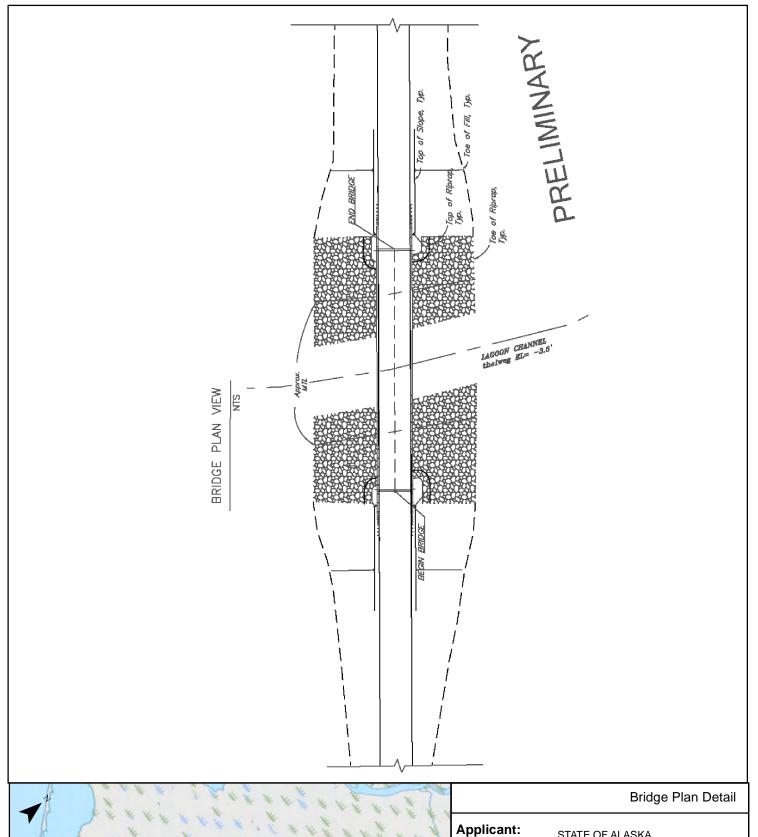
Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: January 2018 Sheet 6 of 35





STATE OF ALASKA

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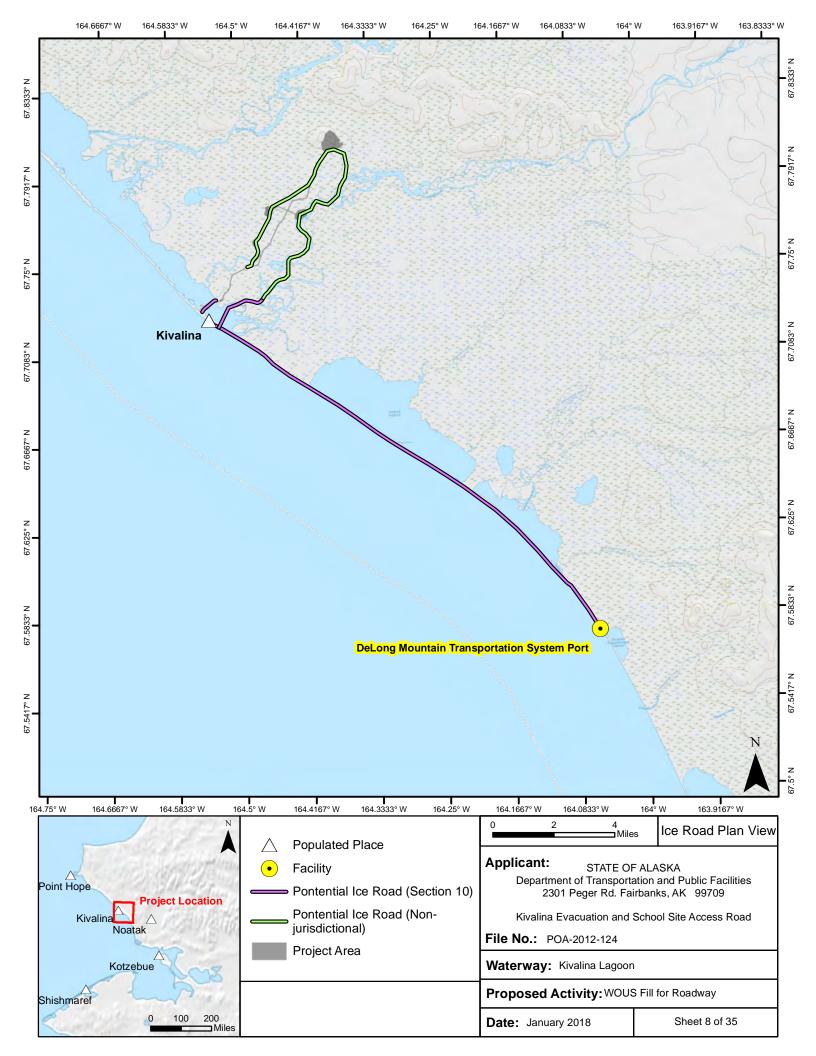
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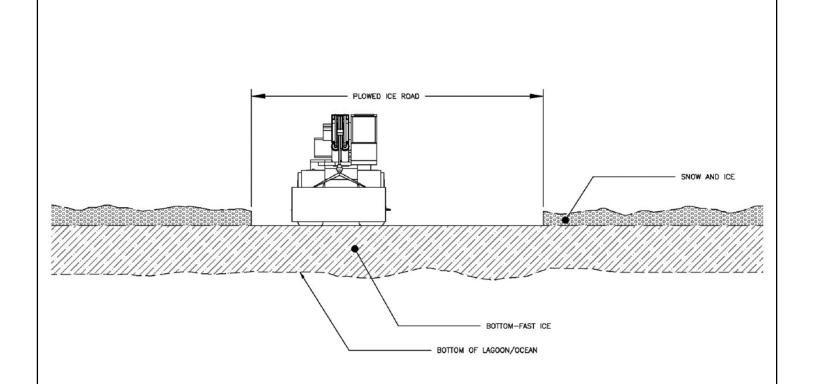
File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: January 2018 Sheet 7 of 35



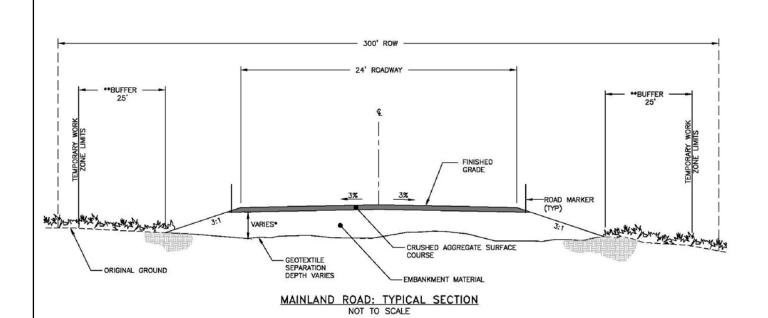


NOTES:

ICE ROAD CONSISTS OF PLOWED SURFACE OF BOTTOM-FAST ICE (ICE FROZEN TO LAGOON/OCEAN BOTTOM)
 BERMS WILL BE IN PLACE IF PLOWING OF ICE SURFACE IS NECESSARY
 NO FILL PLACED

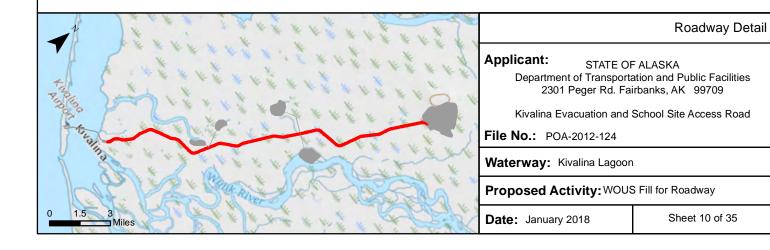
ICE ROAD TYPICAL SECTION

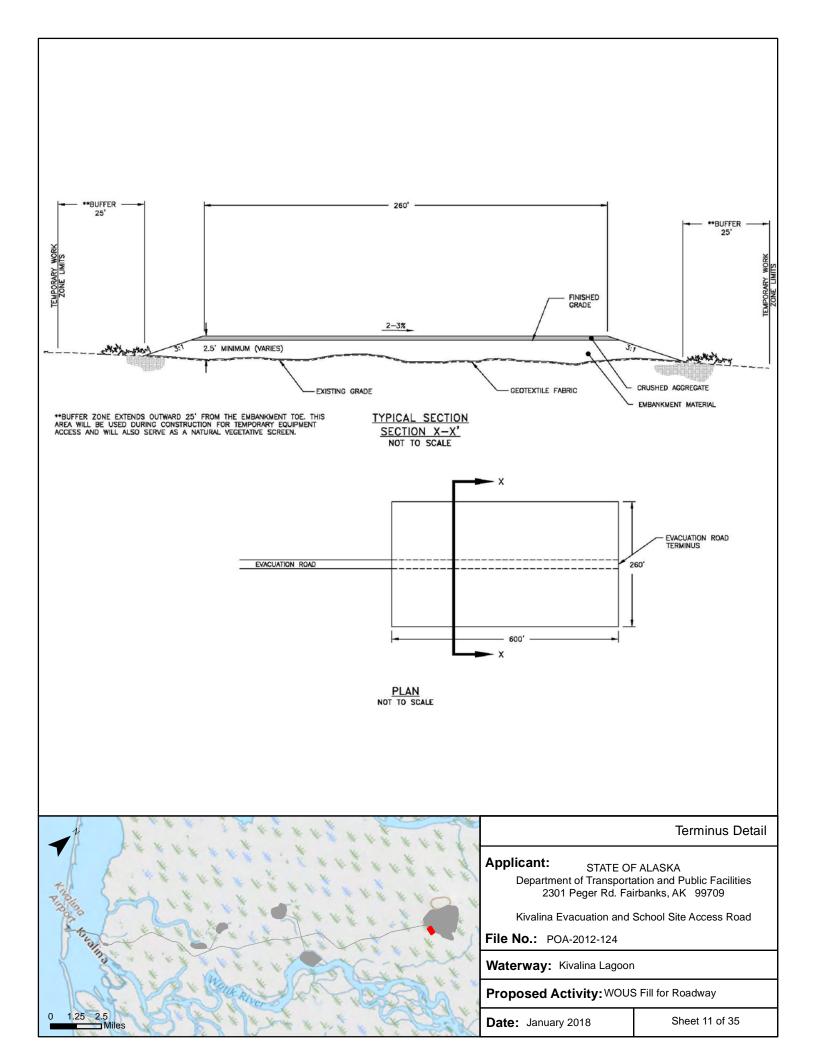


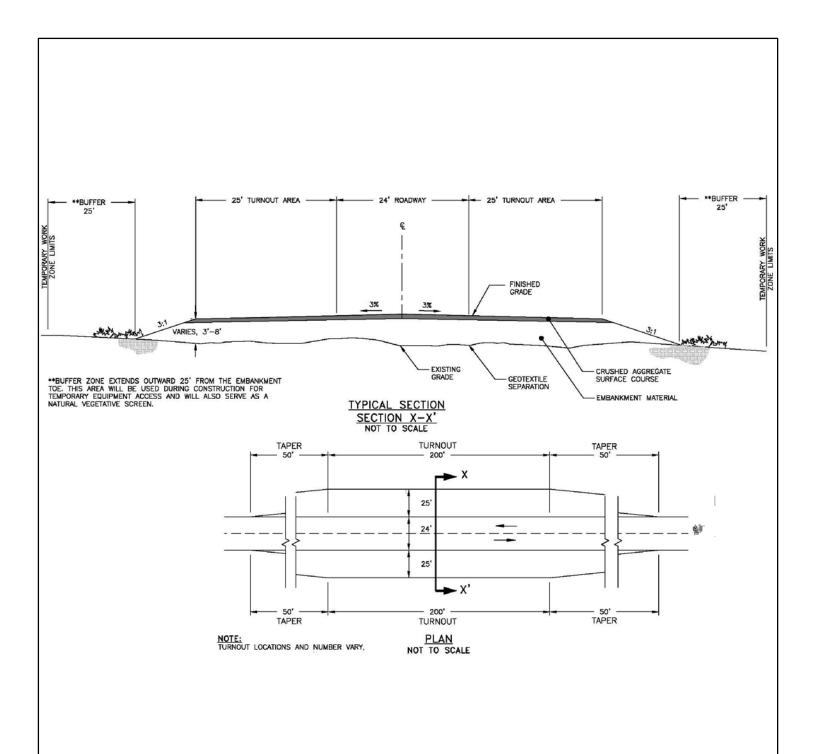


* EMBANKMENT HEIGHT WILL AVERAGE BETWEEN 5 TO 8 FEET, MINIMUM EMBANKMENT HEIGHT OF 6' MAY BE USED IN AREAS OF POTENTIAL SNOW DRIFTING AND IN AREAS WHERE THERE IS CONCERN OF THAWING UNDERLYING PERMAFROST.

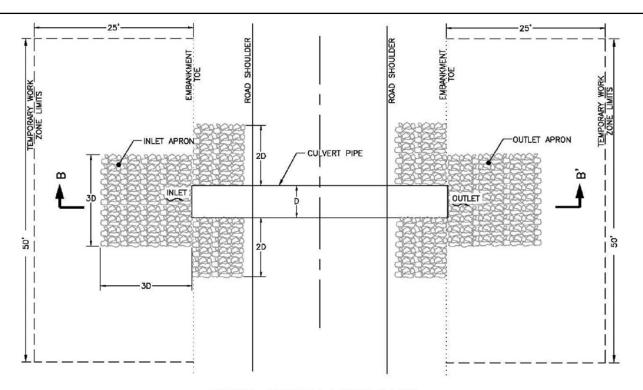
**BUFFER ZONE EXTENDS OUTWARD 25' FROM THE EMBANKMENT TOE. THIS AREA WILL BE USED DURING CONSTRUCTION FOR TEMPORARY EQUIPMENT ACCESS AND WILL ALSO SERVE AS A NATURAL VEGETATIVE SCREEN.



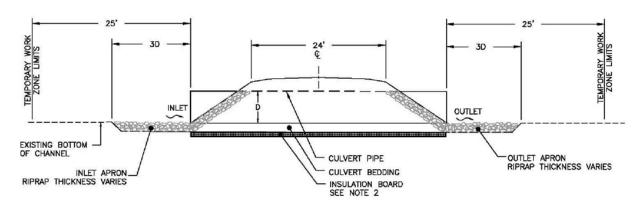








TYPICAL CULVERT APRON DETAIL



SECTION B-B'

NOTES:

- THIS TYPICAL SECTION IS FOR CONVEYANCE STRUCTURES NOT INTENDED FOR FISH PASSAGE. LOCATIONS AND SIZE VARY.
- 2. INSULATION BOARD TO BE USED IN AREAS OF PERMAFROST
- INLET, OUTLET, AND FORESLOPE RIPRAP TO BE INSTALLED IN AREAS WHERE EROSION AT CULVERT INVERTS IS A CONCERN. DIMENSIONS ARE APPROXIMATE.
- FOR ENHANCED HYDRAULIC DESIGN CULVERTS, INVERTS TO BE RECESSED BELOW EXISTING BOTTOM OF CHANNEL TO PROMOTE FISH PASSAGE.

0 1.25 2.5 Miles

Non-Fish Passage Culvert Detail

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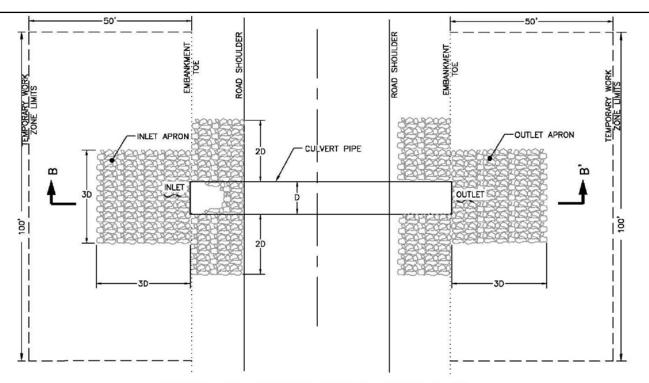
Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

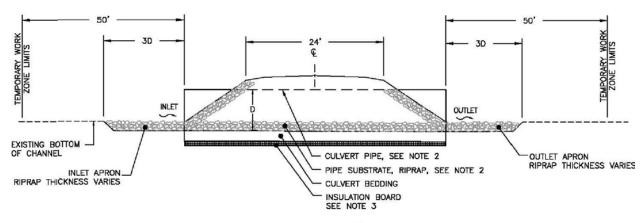
Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: January 2018 Sheet 13 of 35



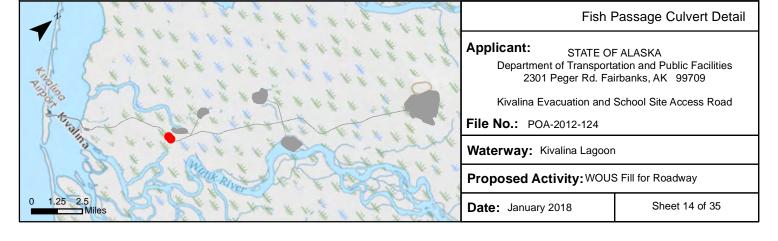
TYPICAL FISH PASSAGE CULVERT APRON DETAIL NOT TO SCALE

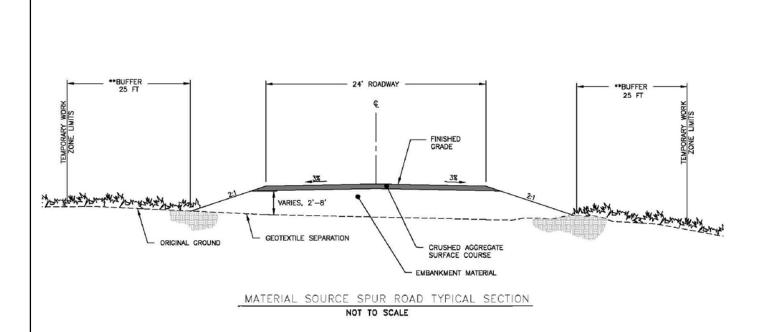


SECTION B-B'

NOTES:

- THIS TYPICAL SECTION IS FOR CONVEYANCE STRUCTURES INTENDED FOR FISH PASSAGE. LOCATIONS AND SIZE VARY.
- CULVERT INVERTS ARE DEPRESSED BELOW THE BOTTOM OF THE EXISTING CHANNEL, AND FILLED WITH RIPRAP SUBSTRATE THROUGH THE LENGTH OF CULVERT TO PROVIDE FISH PASSAGE. THICKNESS VARIES.
- 3. INSULATION BOARD TO BE USED IN AREAS OF PERMAFROST.
- INLET, OUTLET, AND FORESLOPE RIPRAP DIMENSIONS SHOWN ARE APPROXIMATE.





**BUFFER ZONE EXTENDS OUTWARD 25' FROM THE EMBANKMENT TOE. THIS AREA WILL BE USED DURING CONSTRUCTION FOR TEMPORARY EQUIPMENT ACCESS AND WILL ALSO SERVE AS A NATURAL VEGETATIVE SCREEN.



Spur Road Detail

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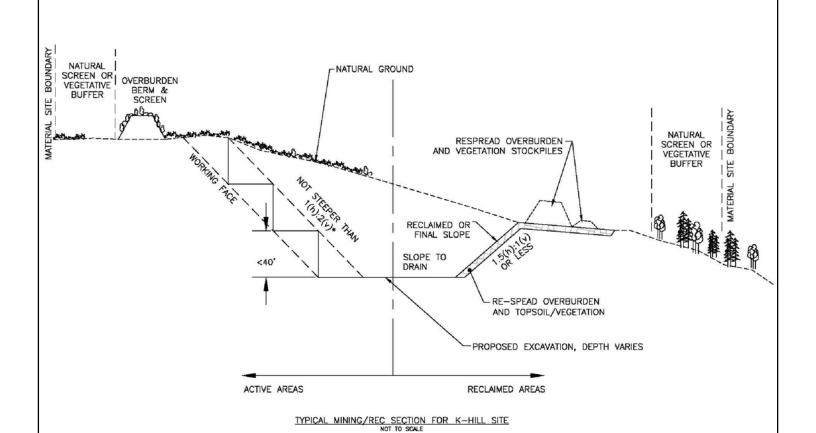
Kivalina Evacuation and School Site Access Road

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Waterway: Kivalina Lagoon

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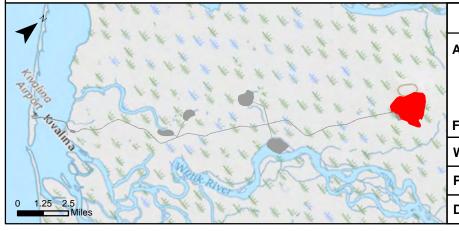
Date: January 2018 Sheet 15 of 35



 $\mbox{*}$ MAXIMUM SLOPE ANGLE DEPENDS ON SITE—SPECIFIC PARAMETERS AND WILL BE DETERMINED BY THE CONTRACTOR.

**PRIMARY MINING METHOD WITHIN UPLANDS QUARRY SITE WOULD INVOLVE BLASTING AND RIPPING OF ROCK AND CONSOLIDATED MATERIAL.

PRELIMINARY



K-Hill Material Site Detail

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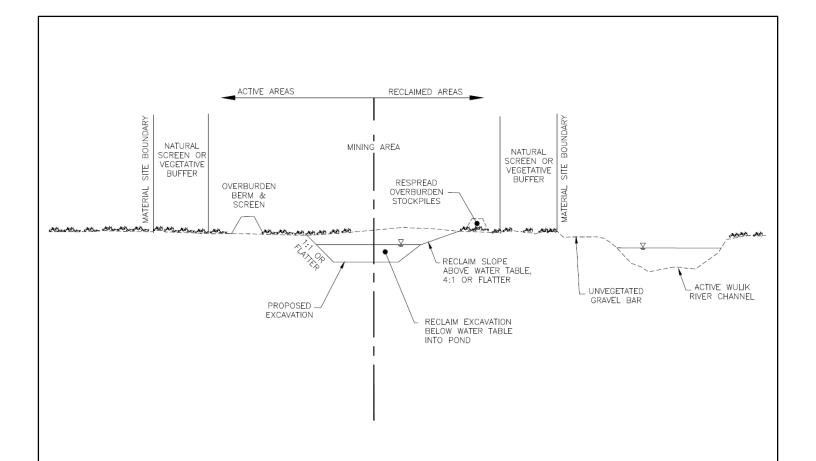
Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: January 2018 Sheet 16 of 35

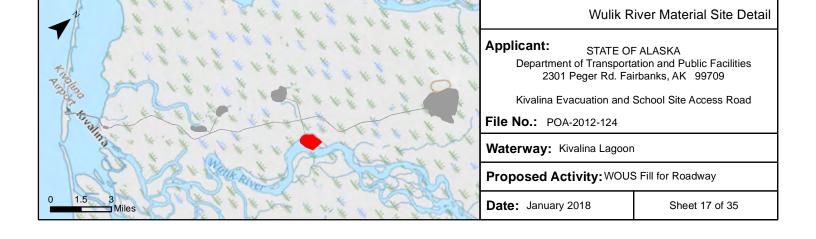


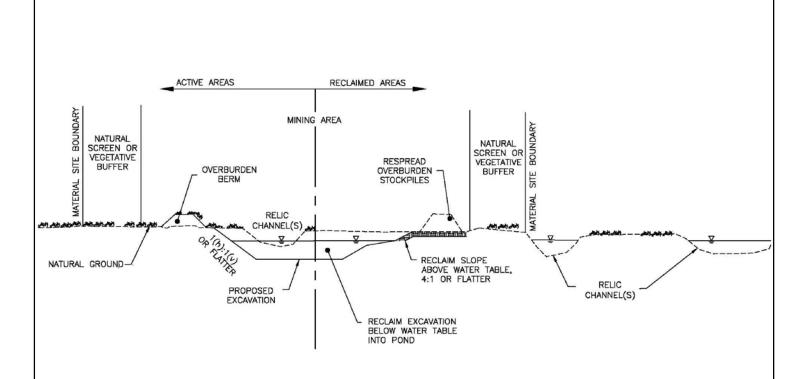
NOTES:

. EXCAVATION MAY OCCUR BELOW THE WATER TABLE, HOWEVER A 100' BUFFER WOULD BE MAINTAINED BETWEEN THE ACTIVE RIVER CHANNEL AND THE EXCAVATION AREA.

TYPICAL MINING/REC SECTION: WULIK RIVER SOURCE 1
NOT TO SCALE

2. RECLAMATION WOULD INCLUDE CONVERTING THE SOURCE INTO A POND. RECLAIMED POND(S) MAY BE CONNECTED TO THE WULIK RIVER VIA A CONSTRUCTED CHANNEL.

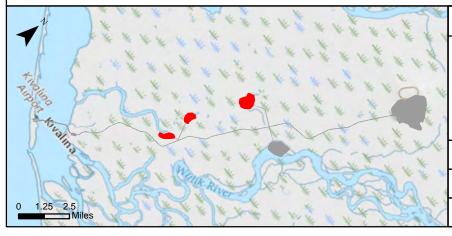




TYPICAL MINING/REC SECTION: WULIK RELIC CHANNEL SOURCES 1 & 2

NOTES:

- . MINING ACTIVITIES TO OCCUR WITHIN AND ADJACENT TO RELIC CHANNEL(S) ABOVE AND BELOW THE WATER TABLE.
- MINED AREAS TO BE RECLAIMED INTO DEEP WETLAND PONDS TO IMPROVE FISH OVERWINTERING HABITAT. RECLAIMED PONDS MAY BE CONNECTED TO EXISTING RELIC CHANNELS TO PROVIDE POTENTIAL OVERWINTERING HABITAT FOR JUVENILE FISH.



Wulik Relic Channel Material Site Detail

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Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: January 2018 Sheet 18 of 35

