

# Infrastructure and Erosion Control

*An Overview of the Alaska Department of  
Transportation and Public Facilities Projects  
in the Northern Region*

Alaska Department of Transportation and Public Facilities  
Northern Region  
January – 2009

# Presentation Overview

- Erosion Control funding
- Current DOT&PF projects at the Communities of Shishmaref, Kivalina, Shaktoolik, Unalakleet and Koyukuk
- Other Communities with erosion related DOT&PF projects.
- Summary

# Infrastructure and Erosion Control Project

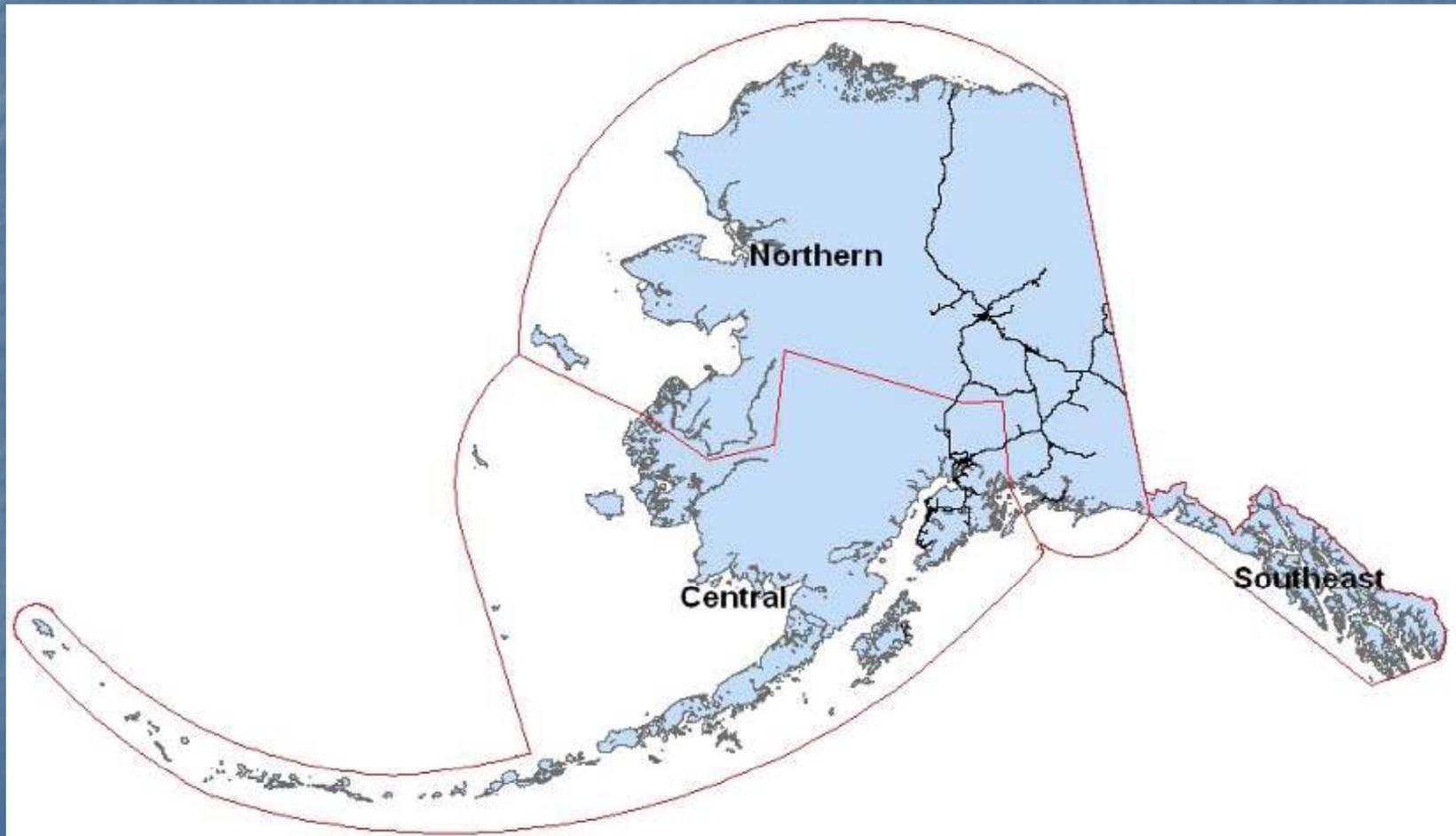
- Funding Authorized in 2008
- Funding allows DOT&PF to begin early coordination with the effected communities, as well as State and Federal Agencies.
- Allows DOT&PF to collect available engineering data that may be useful for future investigations.
- Also allows for preliminary engineering investigations to help accelerate project development

# Infrastructure and Erosion Control Project

- Contacts for information
  - Mike Coffey, Statewide Maintenance & Operations
  - Michael Lukshin, Statewide Ports and Harbors
  - Cindie Little, Design Group Chief, Northern Region
  - Ryan Anderson, Engineering Manager, Northern Region

# Northern Region DOT&PF

## What are the Boundaries?



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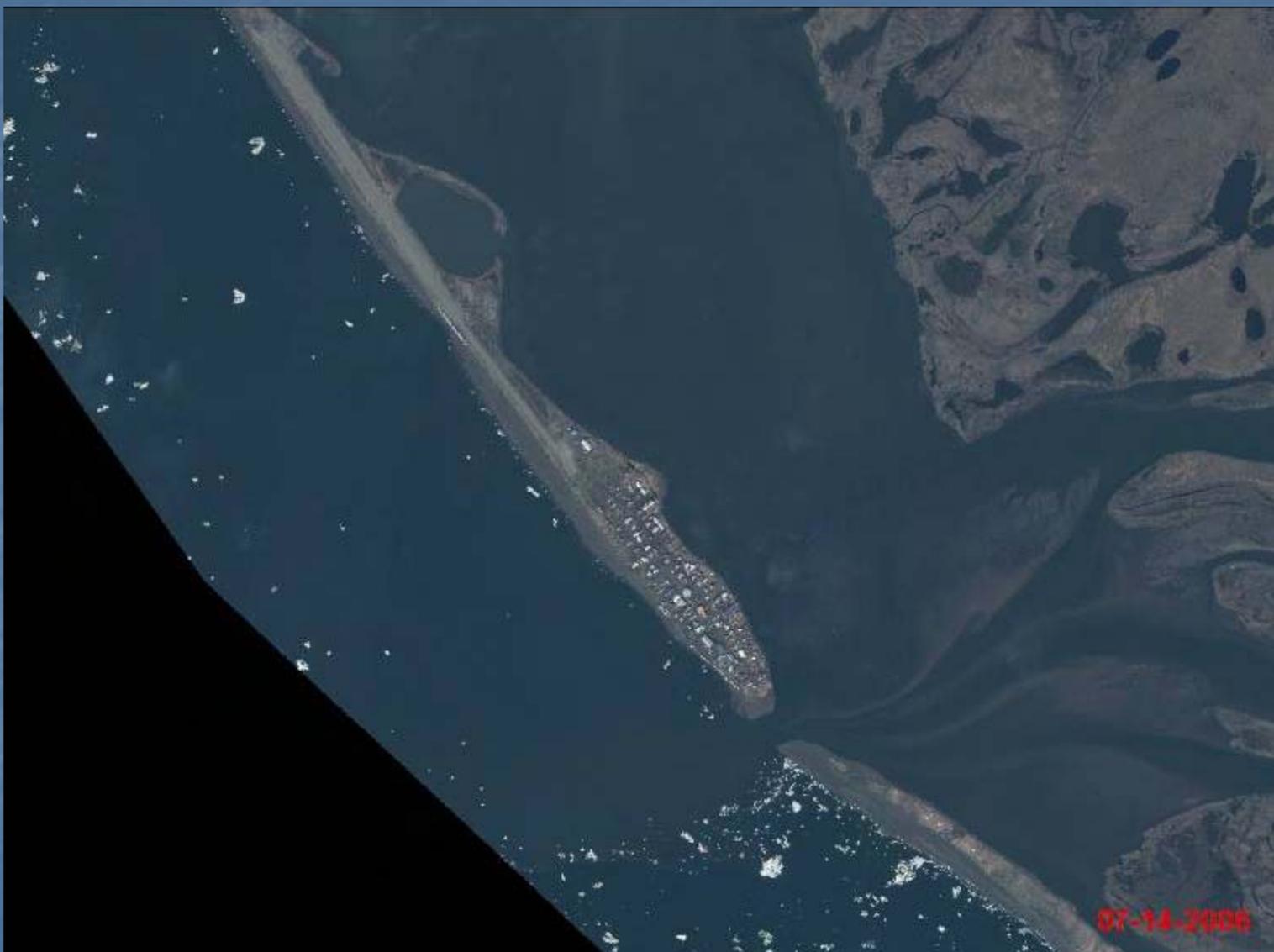
# Current Northern Region DOT&PF Erosion Control Related Projects

Kivalina, Koyukuk, Shaktoolik, Shishmaref, Unalakleet



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# Kivalina



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# Kivalina

DOT&PF owns and operates the Airport.



2003 Image

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# Kivalina Airport Emergency Repairs



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# Kivalina Airport Emergency Repairs

- Completed in 2005
- FEMA funded
- Repaired Taxiway embankment – added Super Sacks for protection
- Still in place today
- Used Local Labor and materials for repairs



# Kivalina Airport Emergency Repairs

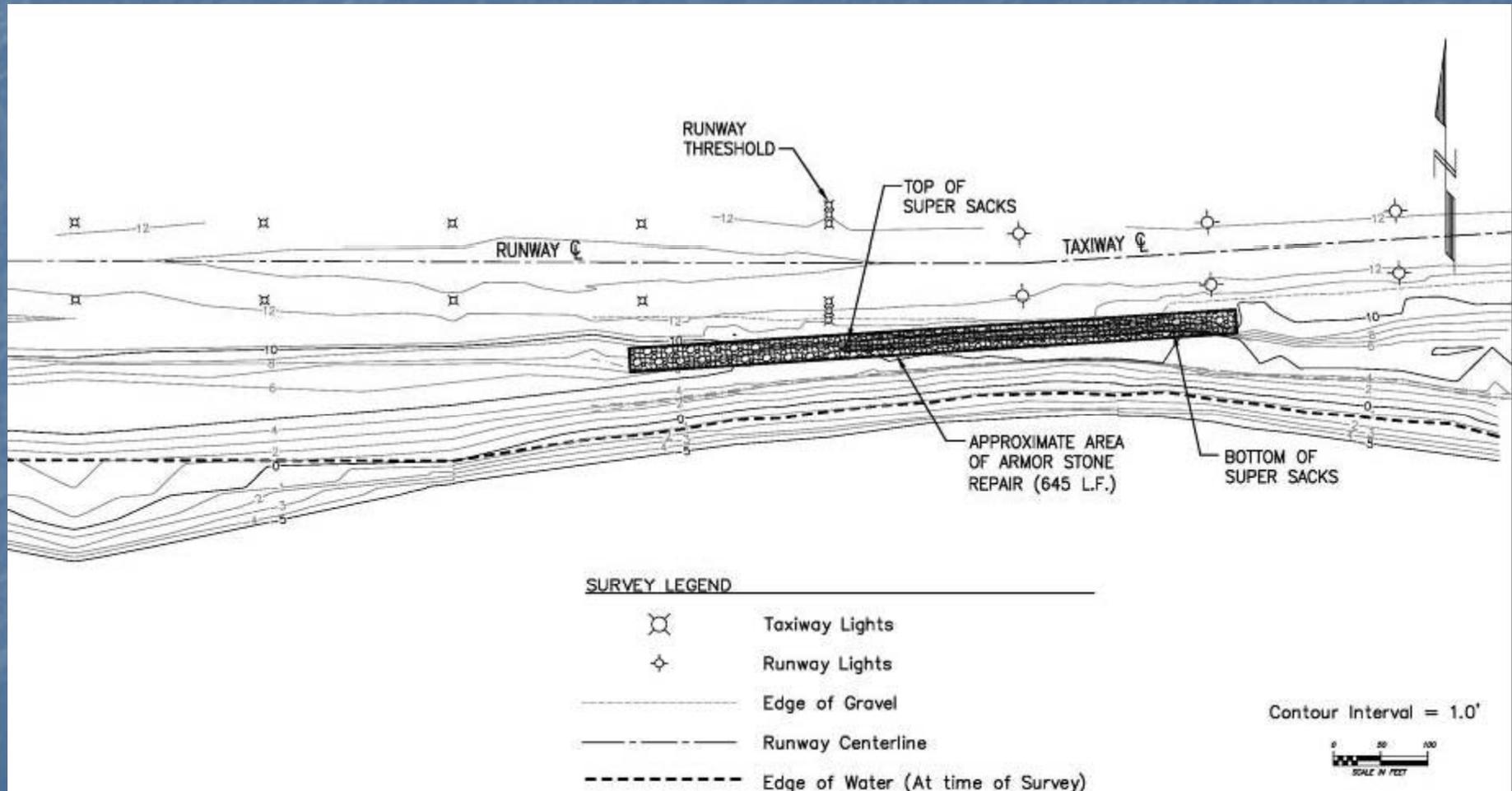


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# Kivalina Airport Permanent Repairs

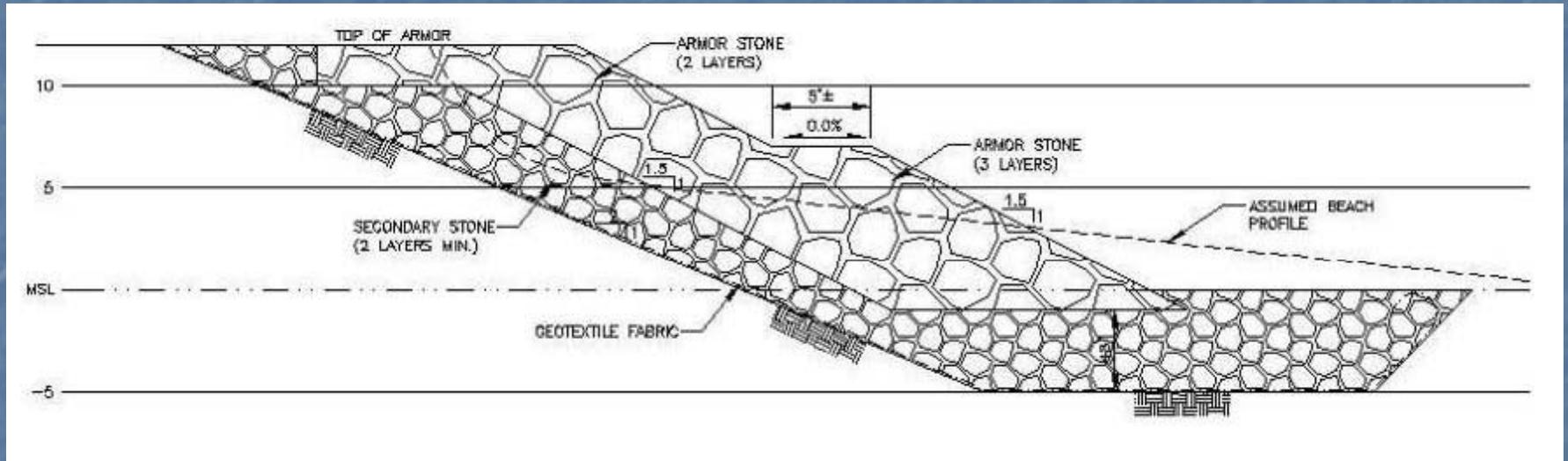
- Currently in Design
- FEMA funded
- Scope: Repair 725 Lineal feet of Taxiway Safety Area, Construct Rip Rap Revetment for future protection. (9,000 CY of Rip Rap to be barged in)
- Status: Requires additional funding – original estimates in 2005 was \$1.2M
- Current Estimate is \$5.3M for Construction
- Scheduled to Construct in 2009 if FEMA approves

# Kivalina Airport Permanent Repairs



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# Kivalina Airport Permanent Repairs



# Kivalina Studies

- Past Studies from DOT&PF include Geotechnical, Environmental and mainly focused on Airport.
- We have been providing comments to the Corp regarding the relocation studies.
- Climate Change paper by UAF – FHWA funded - In progress

# Kivalina

## Embankment Stability Analysis

- Prepared by the Permafrost Lab, Geophysical Institute, UAF
- For FHWA – Western Federal Lands
- “Develop a numerical model for long term permafrost dynamics for sites near Kivalina”
- Model for Embankment thickness – to determine optimum – assist with cost estimates

# Koyukuk



05-16-2007

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# Koyukuk

DOT&PF owns and operates the Airport



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# Koyukuk Airport Improvements



Airport in 1995

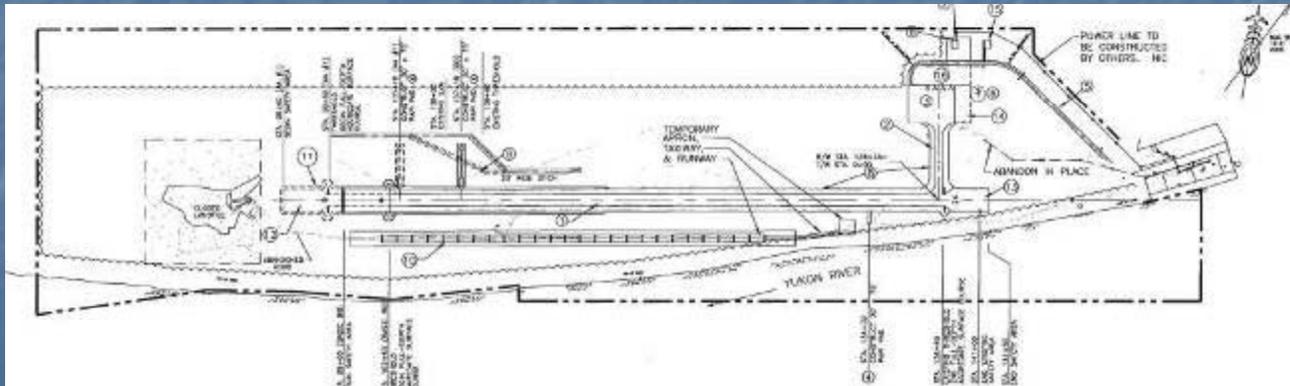
Flooded apron and runway



Flooding in May 2001

# Koyukuk Airport Improvements

- Airport project completed in 2006
- Lengthened and widened runway.
- Raised grade of the Airport above the 100 year flood levels
- Total Cost: \$9.2 Million



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# Koyukuk Airport Improvements

New runway during construction in 2005



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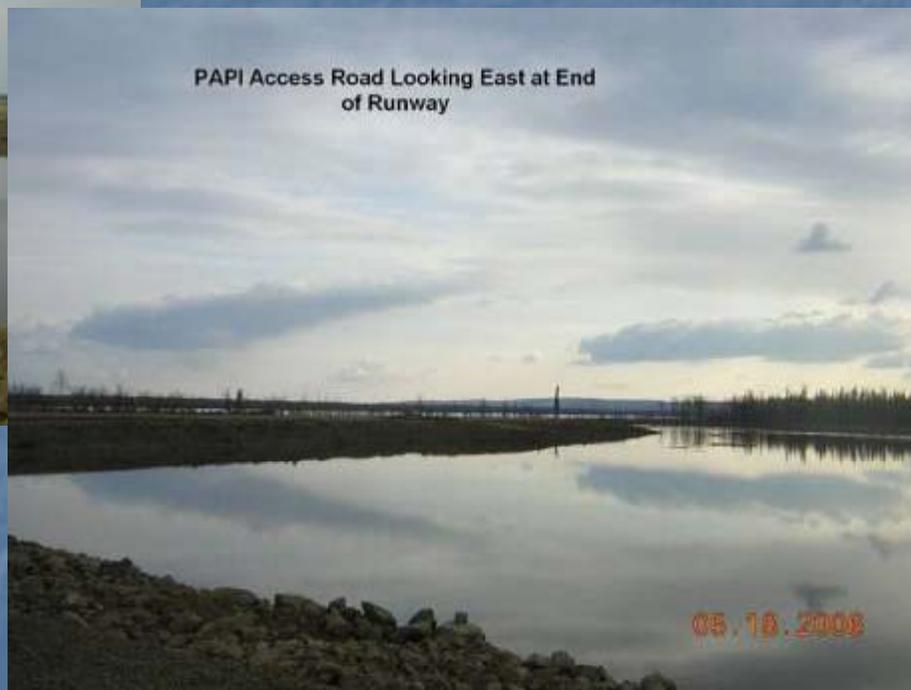
# Koyukuk

PAPI Access Road Looking West at Runway



Completed runway  
above flood levels in  
2006

PAPI Access Road Looking East at End  
of Runway



# Koyukuk



DOT&PF is also asking for funding in FY09 to evaluate evacuation road needs and local roads improvements.

# Shaktoolik

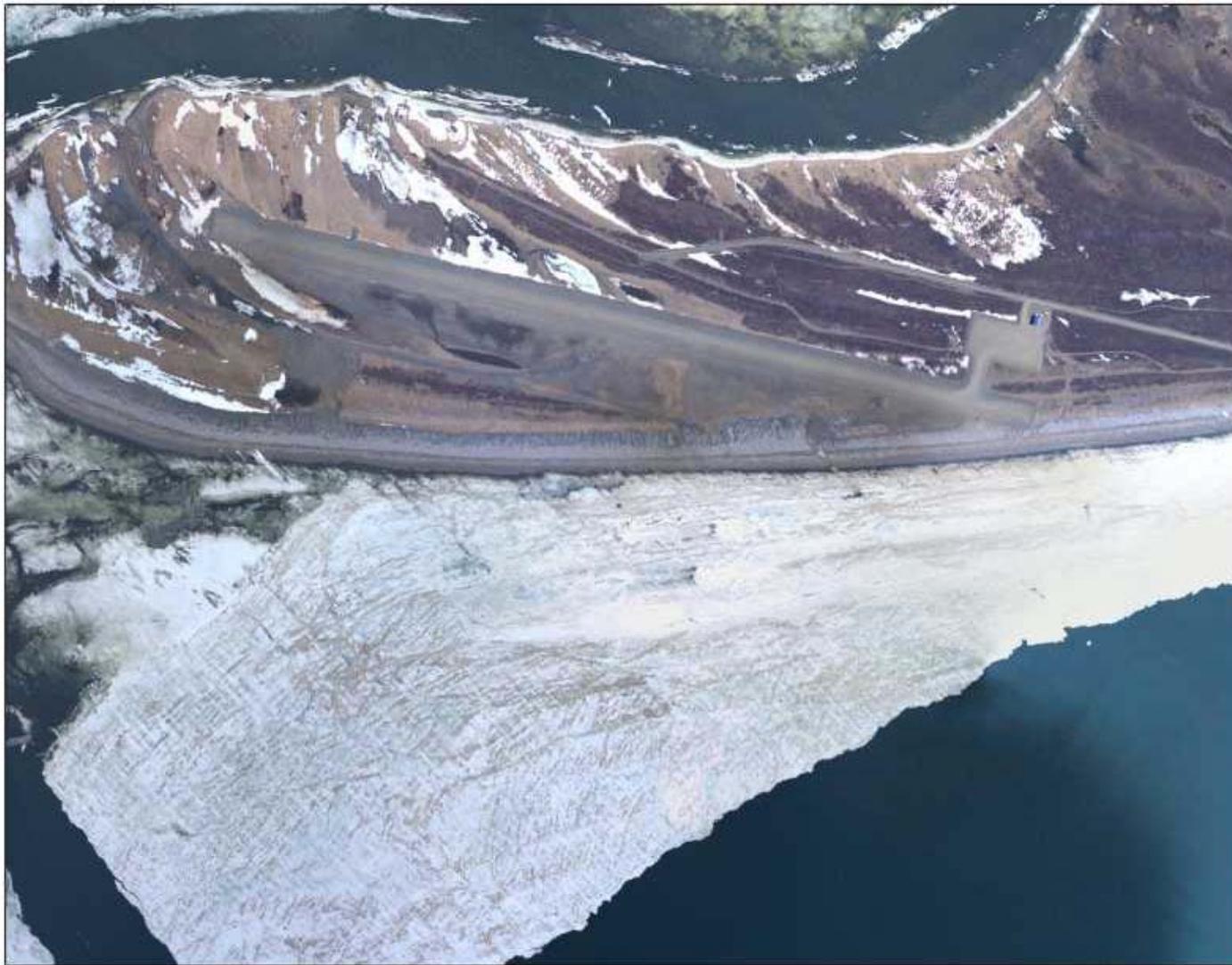


Imagery Acquired in 2007

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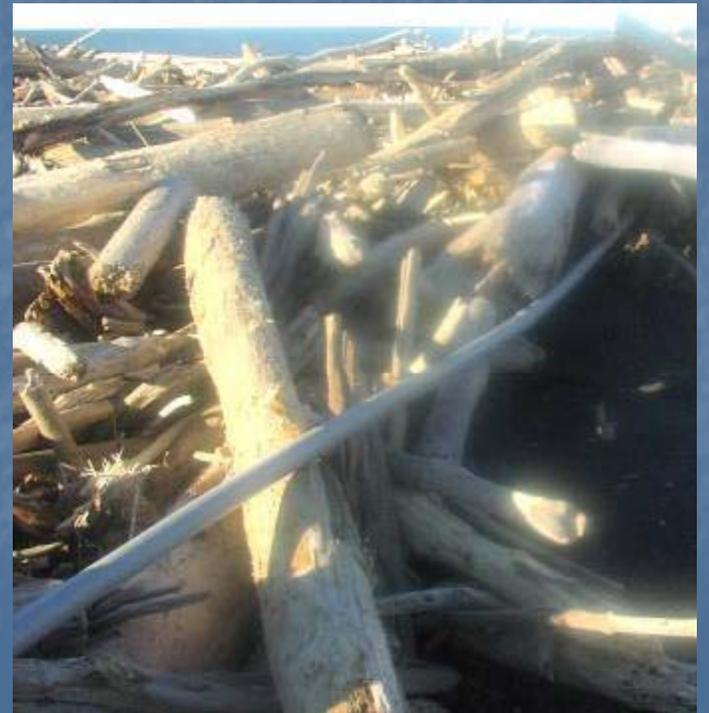
# Shaktoolik

DOT&PF owns and operates the airport.



# Shaktoolik Airport Emergency Repairs

- Debris removal after the 2005 Fall Storm
- Completed shortly after the storm by Local M&O forces



# Shaktoolik Airport Permanent Repairs

- FEMA funded project
- Completed in 2008
- Repaired damages to the Runway Safety Area and Nav-Aids.



Segmented Circle Repairs

Safety Area Repairs

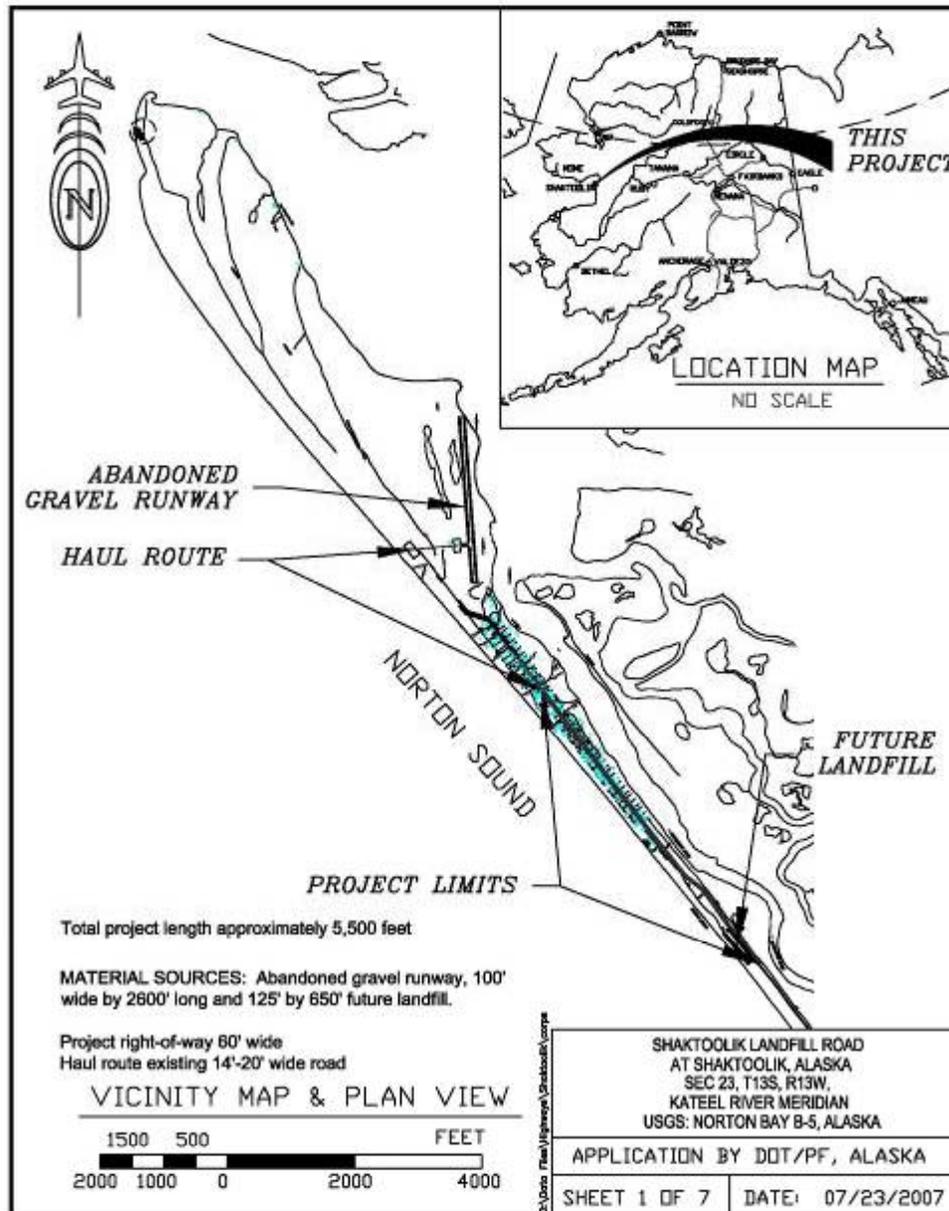
Access Road/Electrical Repairs



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# Shaktoolik Landfill Road

- FHWA Funded project
- Completed in 2008
- Constructed drainage improvements to existing road through town, and a new section of road to a future landfill site.





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# Shishmaref



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# Shishmaref

- Several projects in planning/design
- The last DOT&PF Construction project was in 1992 to reconstruct the Airport.
- 1 FAA funded Master Plan Project
- 1 FHWA funded Reconnaissance Study

# Shishmaref Airport Master Plan – Stage I

- FAA funding
- Started in 2006
- Purpose of a Master Plan:
  - Develop short, medium, and long term development plans to meet future aviation demand
- How do we get there?

# Shishmaref Airport Master Plan – Stage I

- Collect and compile existing engineering information
- Develop a GIS database for easy access to all of the information
- Internet searches, library searches, agency interviews, etc
- The GIS database is complete – but still adding more information
- Data Collection plan has been developed
- This information will assist with alternatives analysis in the future

# Shishmaref Airport Masterplan, Stage II

- FAA funded
- Began in November, 2008
- Collect wind and climate data – representative areas on the mainland
- FAA requires 2 years of wind data for airport siting.
- This information will allow further evaluation of acceptable airport alternatives.

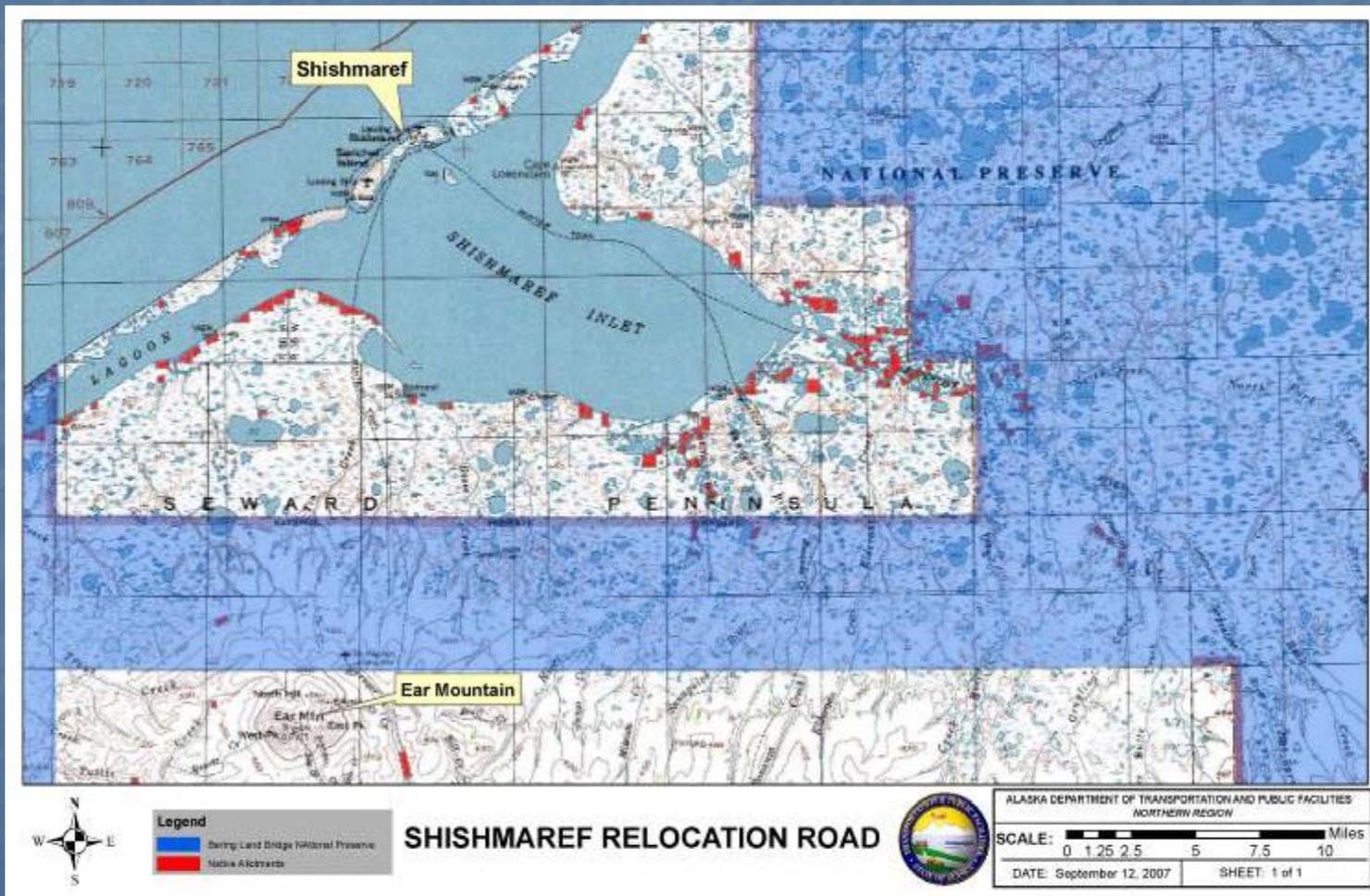
# Shishmaref Relocation Road

## *Reconnaissance Study*

- FHWA funded
- Reconnaissance studies are broad in scope – provide overview of challenges and issues
- Major issue at Shishmaref is materials costs
- Scope: Evaluate the possibilities of a road from Ear Mountain to a barge site on the coast.
- Started in 2007

# Shishmaref Relocation Road *Reconnaissance Study*

Ear Mountain to the Coast – Project Study Area



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# Shishmaref Relocation Road

## *Reconnaissance Study*

### Aerial Photography and Topographic Mapping

- Flew in Late July of 2008
- Controlled Photography
- Orthophoto and Topographic Mapping is Deliverable
- Limited amount of Bathymetry was also performed

# Shishmaref Relocation Road Aerial Photography and Topographic Mapping



# Shishmaref Relocation Road

*Reconnaissance Study*

Geotechnical Studies



# Shishmaref Relocation Road

## *Reconnaissance Study*

### Geotechnical Studies

- In cooperation with the National Park Service
- Unique approaches for remote areas
- Field work started in 2007
- 2 objectives:
  - Find quality materials of sufficient quantity to construct a road from Ear Mountain to the coast, as well as for other projects that may be ongoing in the region.
  - Ensure the material is “safe” – Ear Mountain has been explored for Uranium in the past – UAF assisted

# Shishmaref Relocation Road

## *Reconnaissance Study*



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# Shishmaref Relocation Road

## *Reconnaissance Study*

### Geotechnical Studies

- Currently have drilled along one potential road alignment, including within Park, to characterize subsurface conditions.
- Have drilled several holes on Ear Mountain to prove up material
- This information is combined with detailed Geologic mapping for added confidence.
- Also have found granite material suitable for large rip rap.

# Shishmaref Relocation Road

## *Reconnaissance Study*



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# Shishmaref Relocation Road

## *Reconnaissance Study*

### Geotechnical Studies

- UAF professor specializing in radioactive materials visited the site and evaluated potential for hazardous materials.
- Determination was made that material can be safely mined from Ear Mountain.



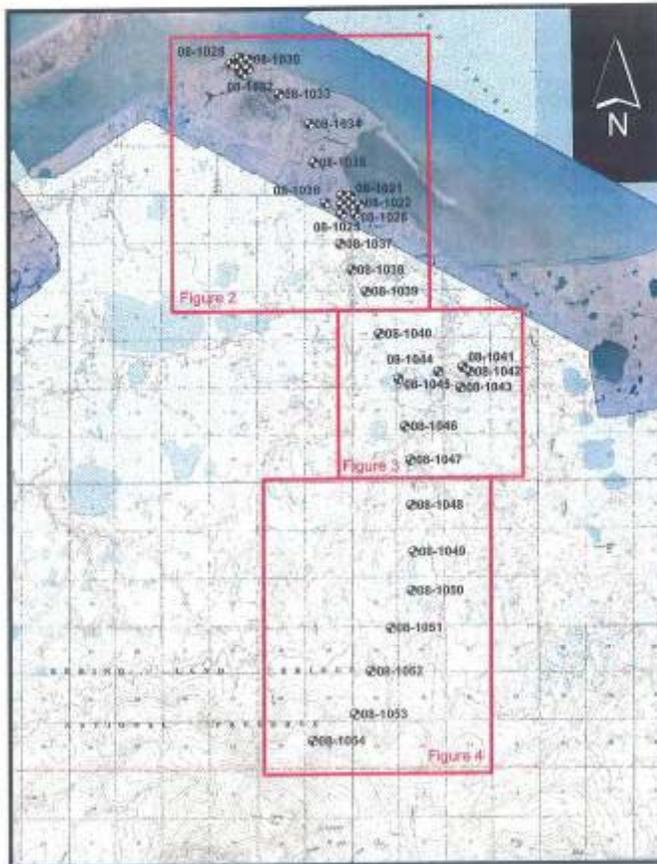
# Shishmaref Relocation Road

## *Reconnaissance Study*

- Reconnaissance engineering work in progress
- Potential road alignments currently being evaluated.
- Cost Estimates
- Alternatives to standard construction methods (Ice Roads, etc)

# Shishmaref Relocation Road

## *Reconnaissance Study*



Shishmaref Relocation Road  
April 2008 Test Holes  
Overview

Figure 1



# Shishmaref Relocation Road

## *Reconnaissance Study*



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# Unalakleet



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2007 Image

# Road Permanent Repairs

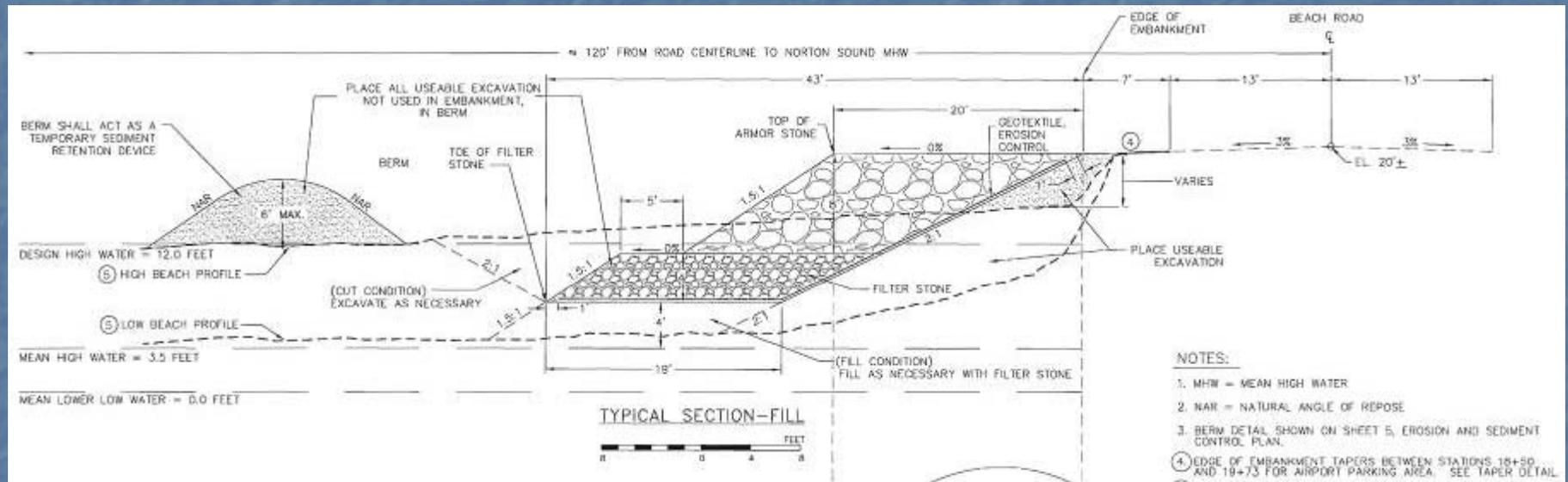


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# Unalakleet Beach Road Permanent Repairs

- FHWA funded (Emergency Repairs)
- Repaired the embankment and constructed a seawall using local materials
- 9200 CY Rip Rap – \$130/CY
- 1073 lineal feet of shore protection along Beach Road
- Project Cost: \$2.2 Million

# Unalakleet Beach Road Permanent Repairs



# Unalakleet Beach Road Permanent Repairs



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# Unalakleet Airport Improvements

- FAA funded - \$22M for Construction
- Construction to be complete in 2009
- Pave Runway, taxiways and Aprons
- Borrow Embankment: 100,000 CY Local Source (\$30/cy)
- Crushed Material: 60,000 CY barged from Stebbins (\$120/CY)

# Unalakleet

