2/10/10 PRESENTATION: PORT MACKENZIE RAIL EXTENSION

2633

Mineral Occurrences and Potential Sources of Freight for the Alaska Railroad Extensions – Port MacKenzie to the Canadian Border

By
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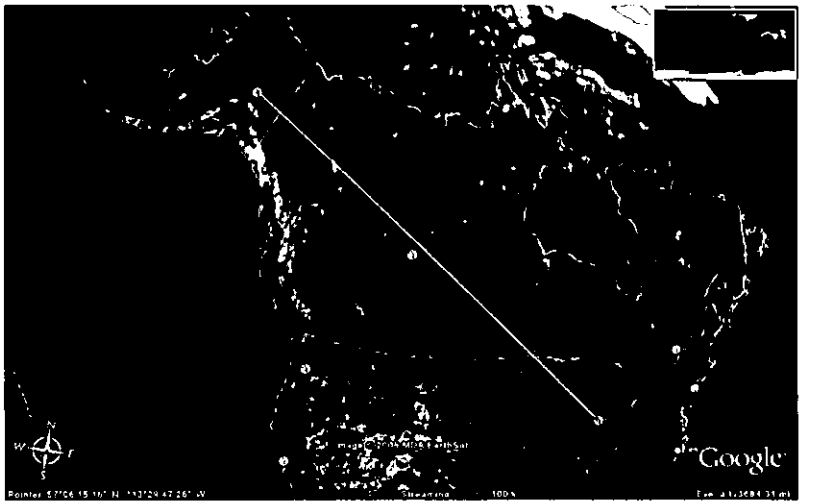
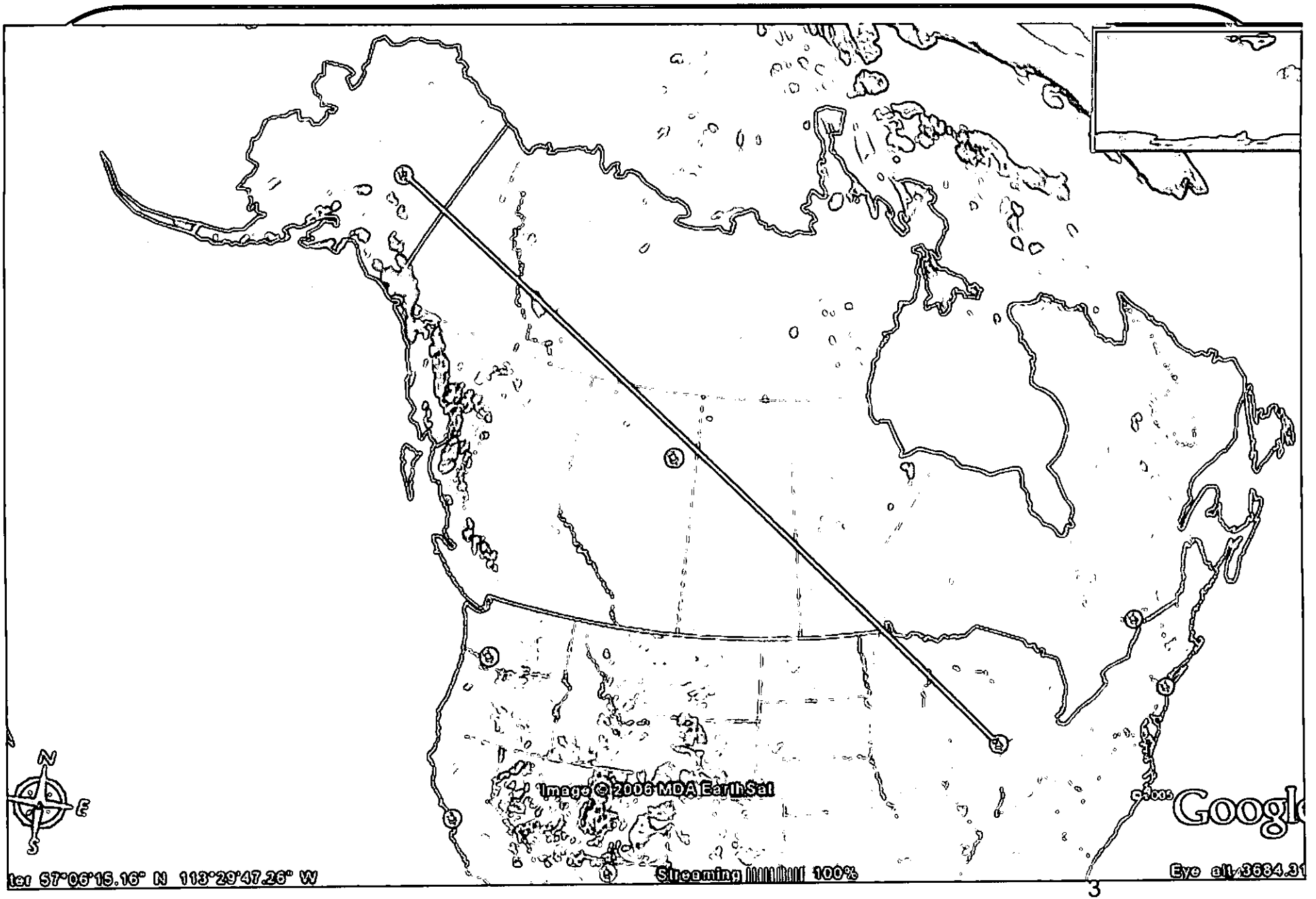
Director, Mineral Industry Research Laboratory
University of Alaska Fairbanks
February 2007-2010

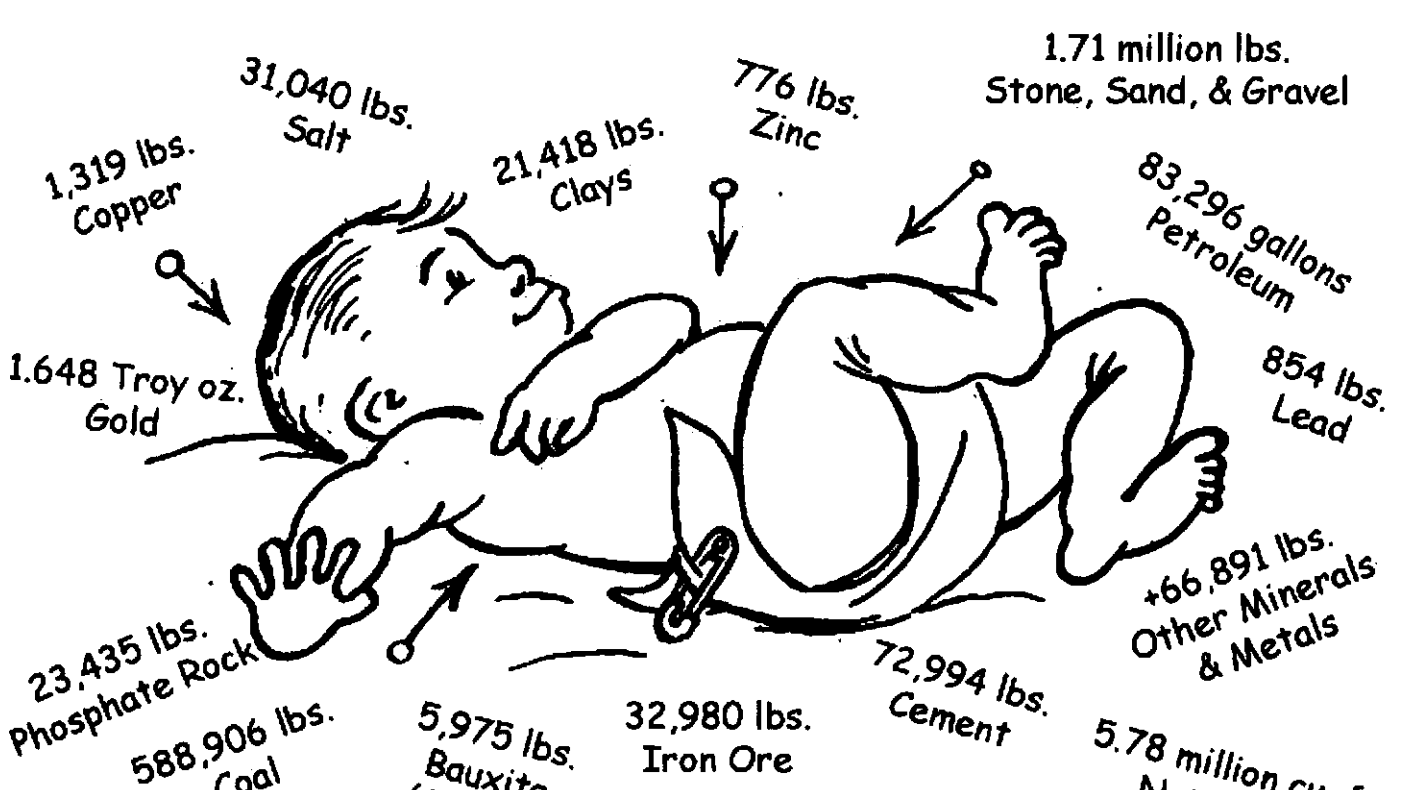
Objectives

- Estimation of the expected tonnage of mineral concentrates that would be generated within a 200 km wide corridor along the proposed route of the railroad extensions from Fairbanks to the Canadian Border over the next 100 years.
- Estimation of the expected economic impact of the mines that would generate those mineral concentrates.




N
E
S
Image © 2006 MDA EarthSat
Google
Streaming 100%
57°06'15.16" N 113°29'47.26" W

Every American Born Will Need . . .

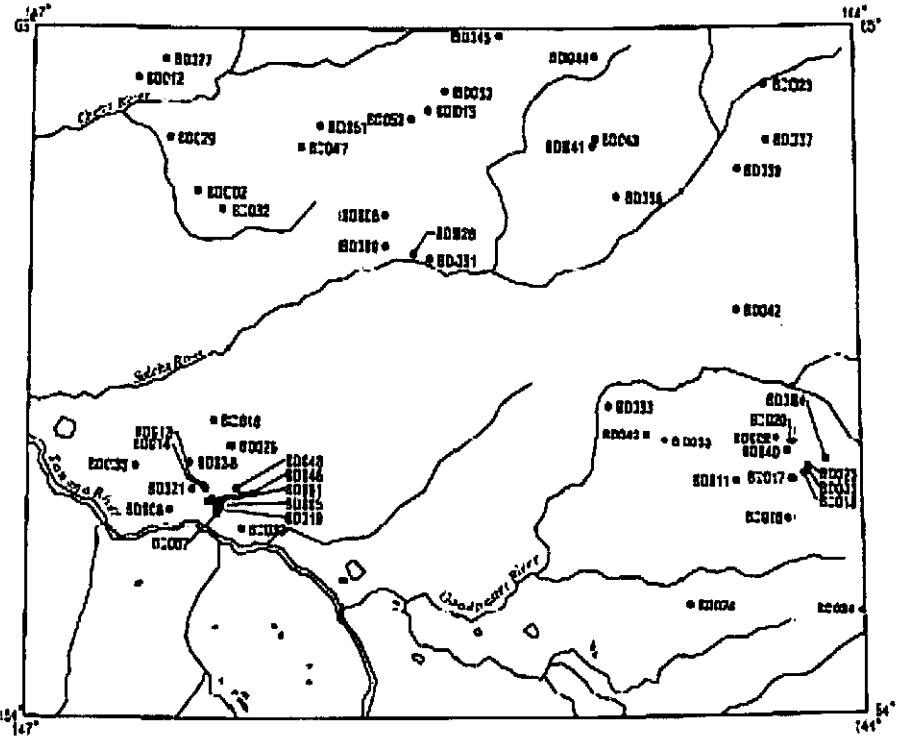


***3.7* million pounds of minerals, metals, and fuels in their lifetime**

Sources of Data

- Alaska Resources Data Files (ARDF)
- Mineral Deposit Models in ARDF from Cox and Singer (1986).
- Mineral Evaluation Models developed for each mineral deposit model utilizing U.S. Bureau of Mines Cost Estimating System adjusted for current costs and mineral commodity prices.

Example of Alaska Resource Data Files Mineral Locations



Distribution of mineral occurrences in the Big Delta 1:250,000-scale quadrangle, Alaska

Example of Tonnage Curve for Mineral Deposit Model from Cox and Singer 1986

Model 16--Con

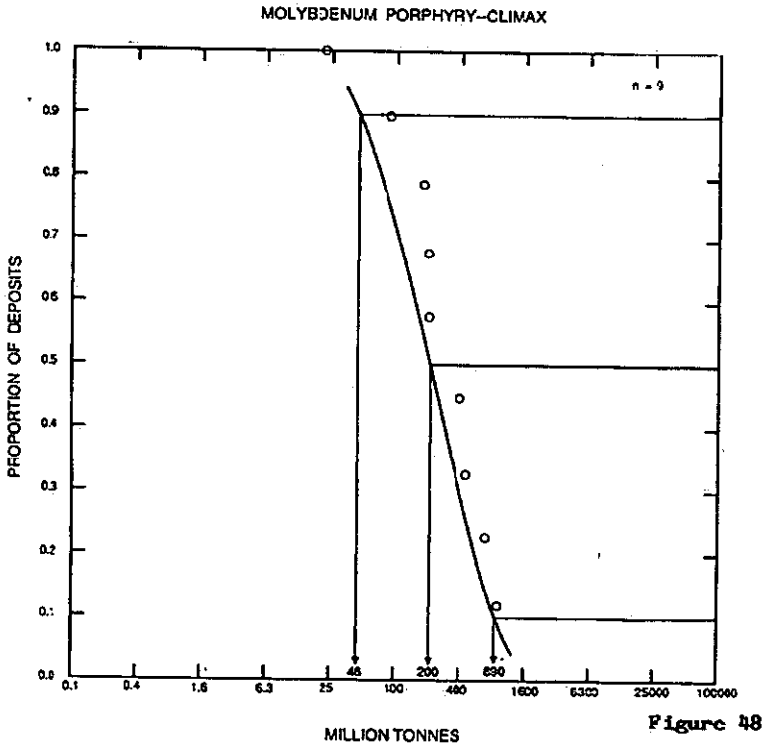


Figure 48. Tonnages of Climax Mo deposits.

Example of Grade Curve from Cox and Singer 1986

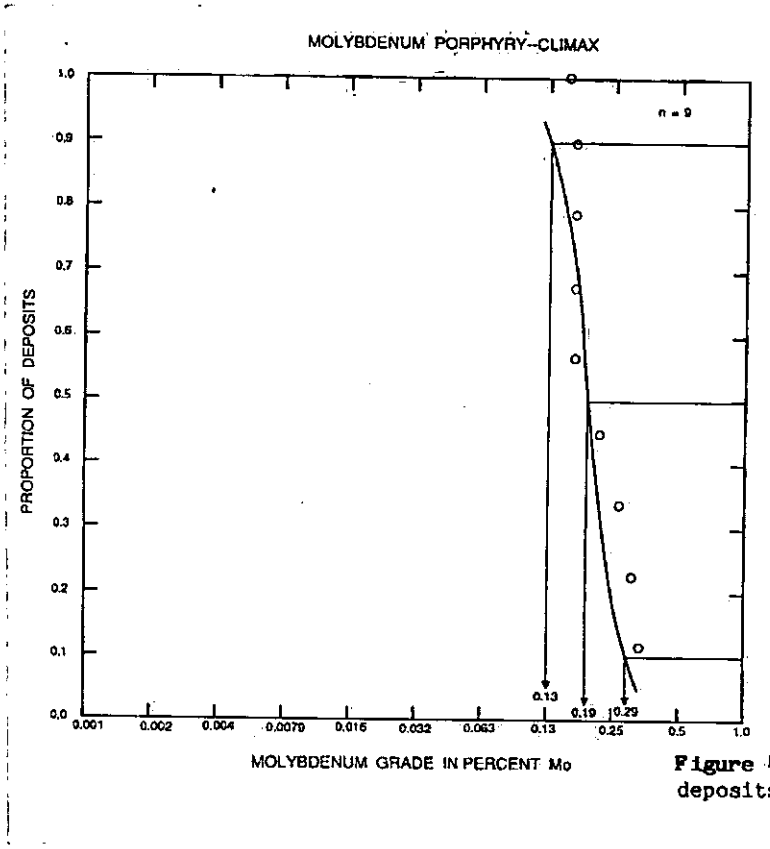


Figure 49. Molybdenum grades of Climax Mo deposits.

Mineral Valuation Models Input and Output Data

- Mineral valuation models for 50 and 90 percentile tonnage and grade for 43 different mineral deposit types.
- Deposit type.
- Surface or underground mining method.
- Total tonnage/grade.
- Extraction rate.
- Dilution/waste rate.
- Proposed mine life.
- Daily production.
- Maximum ore depth.
- Stripping ratio.
- Site haulage distance.
- Distance to power.
- Beneficiation method.

Mineral Valuation Models Input and Output Data

- Mine capital and operating cost estimates
- Mill capital and operating cost estimates
- Infrastructure and operating cost estimates.
- Revenue estimates based on current commodity prices
- Cash flow analysis base on current taxation rates.
- Minimum rate of return on capital = 10%.

Mineral Occurrences in Each Quadrangle Transected by Proposed Railroad Extension Corridor

Quadrangle	No. Min. Occur.
Tyonek	17
Anchorage	98
Talkeetna	37
Talkeetna Mts.	147
Healy	37
Fairbanks	115
Livengood	155
Circle	2
Big Delta	14
Mt Hayes	153
Gulkana	29
Eagle	17
Tanacross	21
Nabesna	45
Total	887

Mineral Deposit Model Types
(After Cox and Singer, 1986)

- 1. Stillwater Ni-Cu
- 7a. Synorogenic-synvolcanic Ni-Cu
- 8a. Minor podiform Cr
- 8b. Major podiform Cr
- 8c. Limassol Forest Co-Ni
- 8d. Serpentine hosted asbestos
- 10. Carbonatite
- 14a. W skarn
- 14b. Sn skarn
- 14c. Replacement Sn
- 15a. W veins
- 16. Climax Mo
- 17. Porphyry Cu

Mineral Deposit Model Types
(After Cox and Singer, 1986)

- 18b. Cu -skarn
- 18c. Zn-Pb skarn
- 18d. Fe skarn
- 20c. Porphyry Cu-Au
- 21a. Porphyry Cu-Mo
- 21b. Porphyry Mo low-F
- 22a. Volcanic hosted Cu-As-Sb
- 22b. Au-Ag-Te veins
- 22c. Polymetallic veins
- 23. Basaltic Cu
- 24b. Besshi massive sulfide
- 25a. Hot-springs Au-Ag
- 25c. Comstock epithermal veins

Mineral Deposit Model Types
(After Cox and Singer, 1986)

- 26a. Carbonated-hosted Au-Ag
- 27d. Sb deposits
- 28a. Kuroko massive sulfide
- 29a. Quartz-pebble conglomerate Au-U
- 36a. Low-sulfide Au-quartz veins
- 36b. Homestake Au
- 37a. Unconformity U-Au
- 39a. Gold on flat faults

Mineral Commodity Prices
(as of January 2007)

Metal Prices Use in this Investigation (January 2007)		
Commodity	Units	Price
Aluminum	$/lb	1.28
Antimony	$/lb	0.85
Arsenic	$/lb	0.45
Asbestos	$/ton	125.00
Barite	$/ton	23.00
Bismuth	$/lb	0.18
Cadmium	$/lb	0.25
Chromite	$/lb	2.18
Cobalt	$/lb	18.00
Columbium	$/lb	8.07
Copper	$/lb	2.85
Fluorite	$/lb	152.00
Germanium	$/lb	391.00
Gold	$/tr oz	625.00

Mineral Commodity Prices
(Continued)

Iron	$/ton-unit	0.60
Lead	$/lb	0.79
Mercury	$/flask	700.00
Molybdenum	$/lb	28.00
Nickel	$/lb	6.75
Palladium	$/tr oz	286.00
Rhodium	$/oz	3095.00
Platinum	$/tr oz	1050.00
Silver	$/tr oz	12.30
Tantalum	$/lb	182.62
Tin	$/lb	2.48
Titanium	$/lb	1.30
Tungsten	$/lb	1.82
Vanadium	$/lb	1.75
Zinc	$/lb	1.94

Probabilities

- Probabilities of discovery and development at a given tonnage and grade
  - Mineral occurrence not in historic mining district – 90th percentile; P = 0.0001
  - Mineral occurrence not in historic mining district – 50th percentile; P = 0.0005
  - Mineral occurrence in historic mining district – 90th percentile; P = 0.001
  - Mineral occurrence in historic mining district – 50th percentile; P = 0.001
  - Mineral occurrence in historic mining district, adjacent to major mine; P = 0.01

Expected Tonnage of Concentrates

- 50 Percentile tonnage and grade; Expected Tonnage = 11,000,000 tons per year for 100 years.
- 90 Percentile tonnage and grade: Expected Tonnage = 26,000,000 tons per year (equivalent tonnage from the development of only one porphyry Mo deposit or one layered mafic complex Cu-Ni deposit every 10 years).

Expected Economic Benefits from the Development of the Mineral Occurrences in the Extension Corridor

- Economic benefits of the Fort Knox Mine – Information Insights, 1999 estimated $100 million per year to Fairbanks North Star Borough
- Over 12 year mine life the mine would provide economic benefits equivalent to the gross metal value of the deposit at the time of completion of the feasibility study.
- Expected gross metal value at 50 percentile = $9 billion
- Expected gross metal value at 90 percentile = $83 billion.

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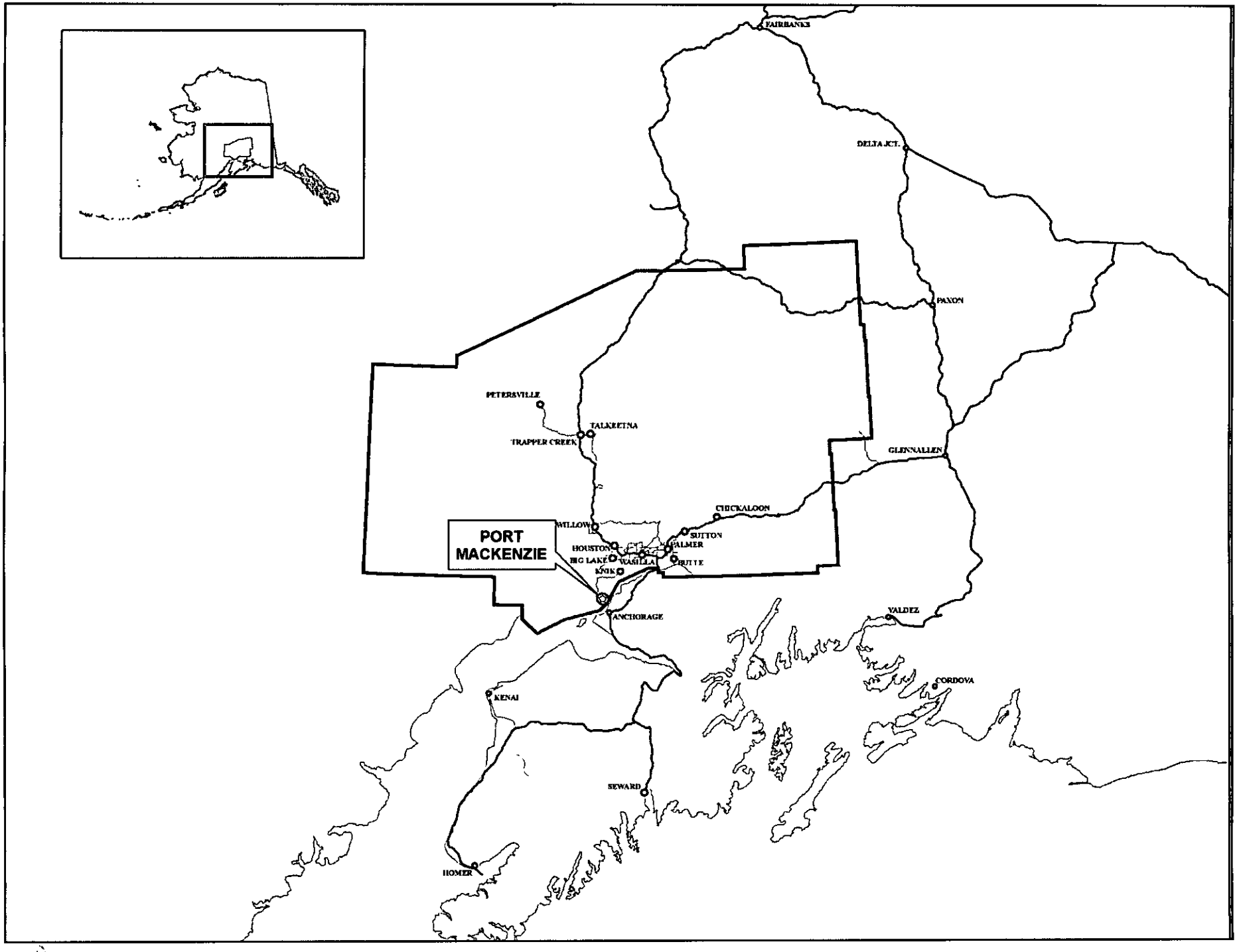
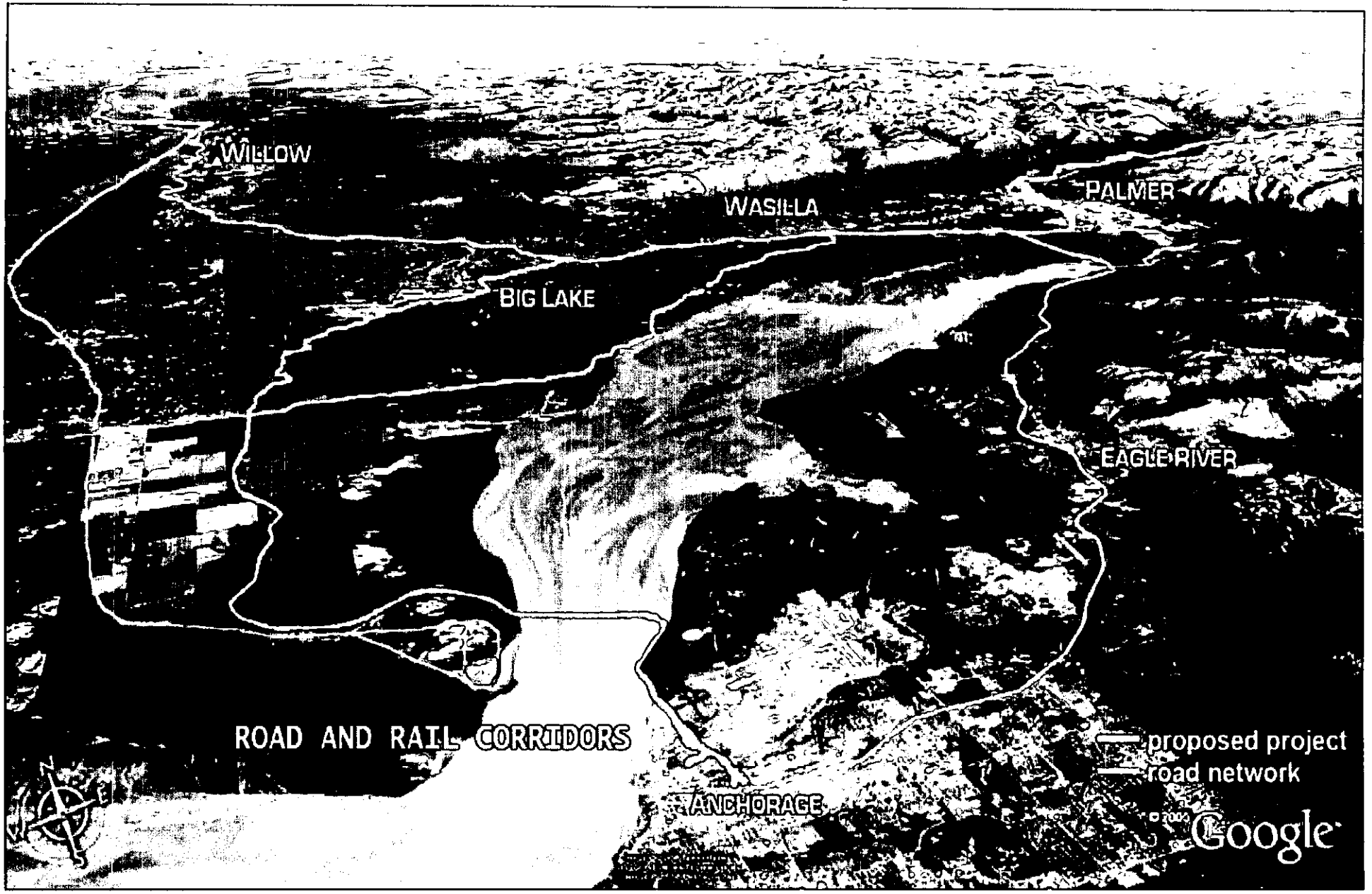
Southcentral Rail Exension Project

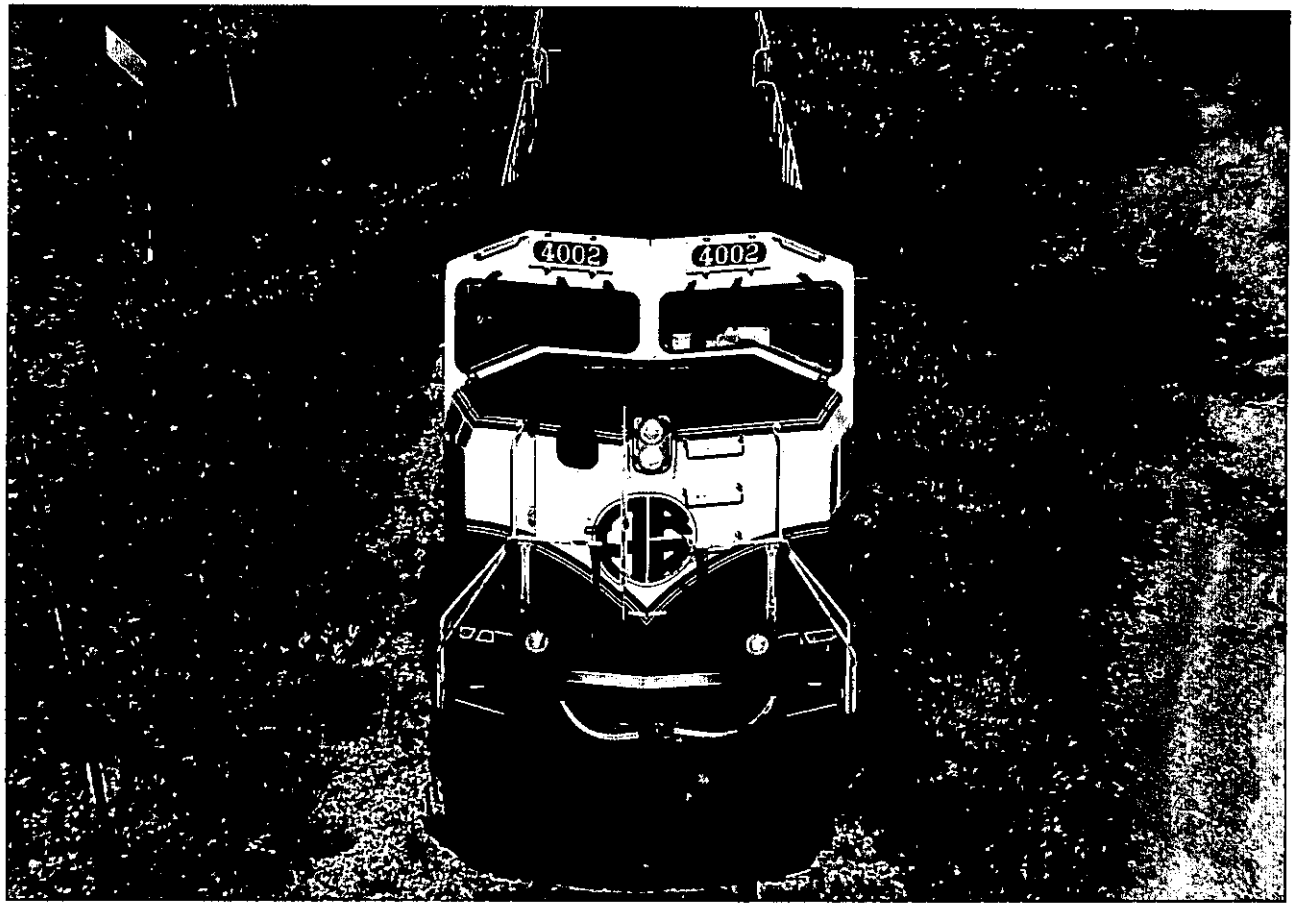
February, 2010


FAIRBANKS
DELTA JCT.
PAXON
PETERSVILLE
TALKEETNA
TRAPPER CREEK
GLENNALLEN
CHICKALOON
WILLOW
SUTTON
PALMER
HOUSTON
BIG LAKE
WASILLA
BUTTE
KNIK
PORT MACKENZIE
ANCHORAGE
VALDEZ
CORDOVA
KENAI
SEWARD
HOMER

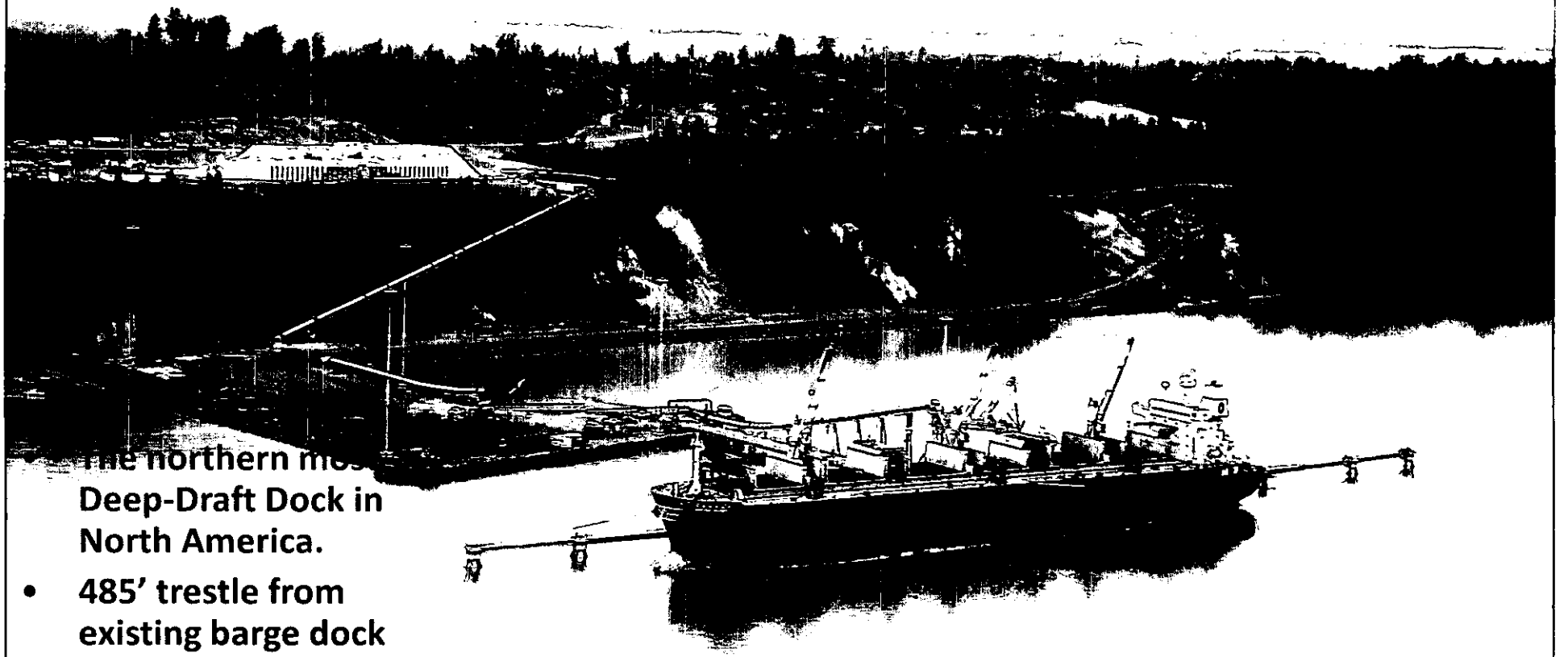
Location Map



South Central Rail Extension



DEEP-DRAFT DOCK (-60' MLLW)



- **The northern most Deep-Draft Dock in North America.**
- **485' trestle from existing barge dock leading to a dock face of 1,200'.**

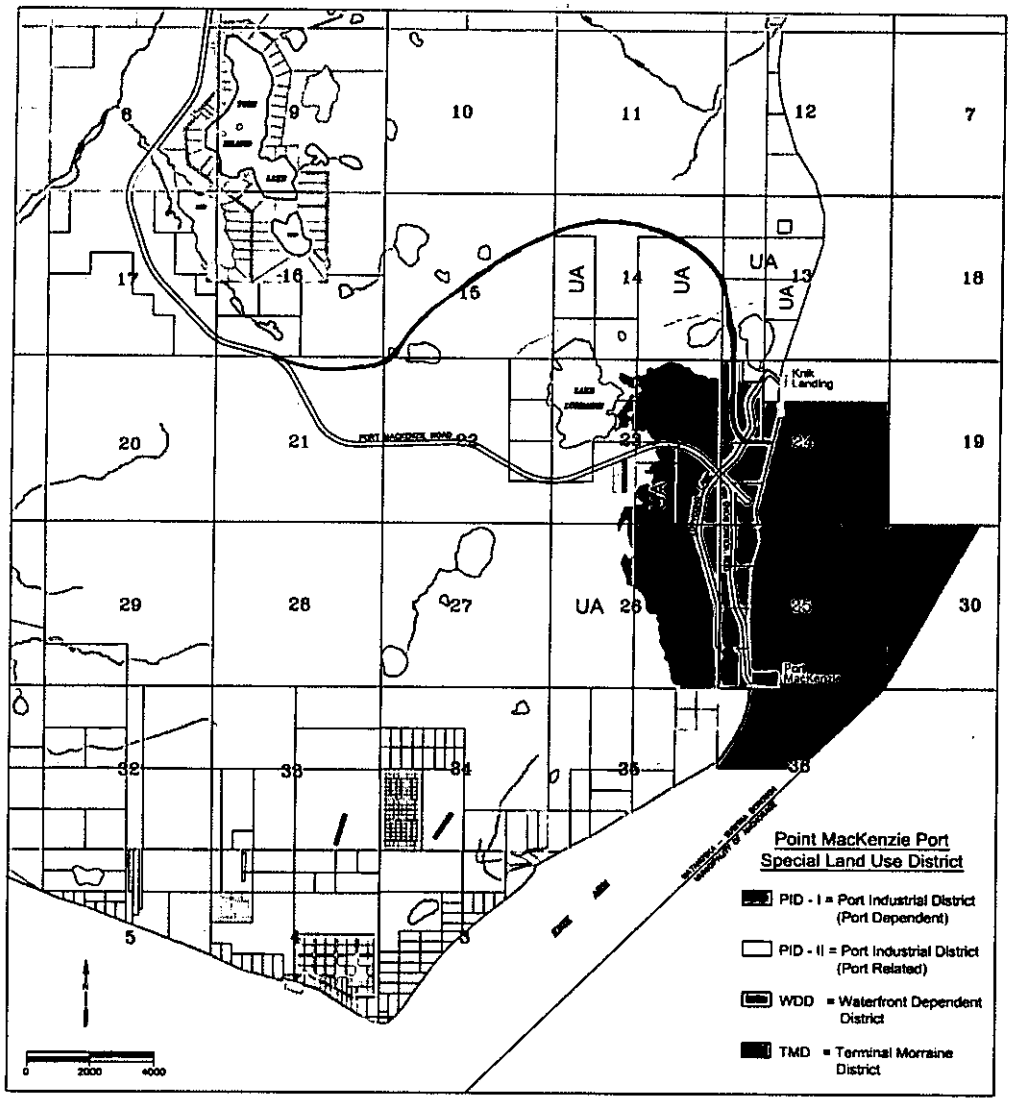
PORT DISTRICT

8,940 Acres

Commercial and Industrial Development

1,130 Acres

Borough Owned Tidelands



This is to certify that this is the official Point MacKenzie Port Special Land Use District adopted by Ordinance Serial No. 00-154. Revised by Ordinance Serial No. 02-208.

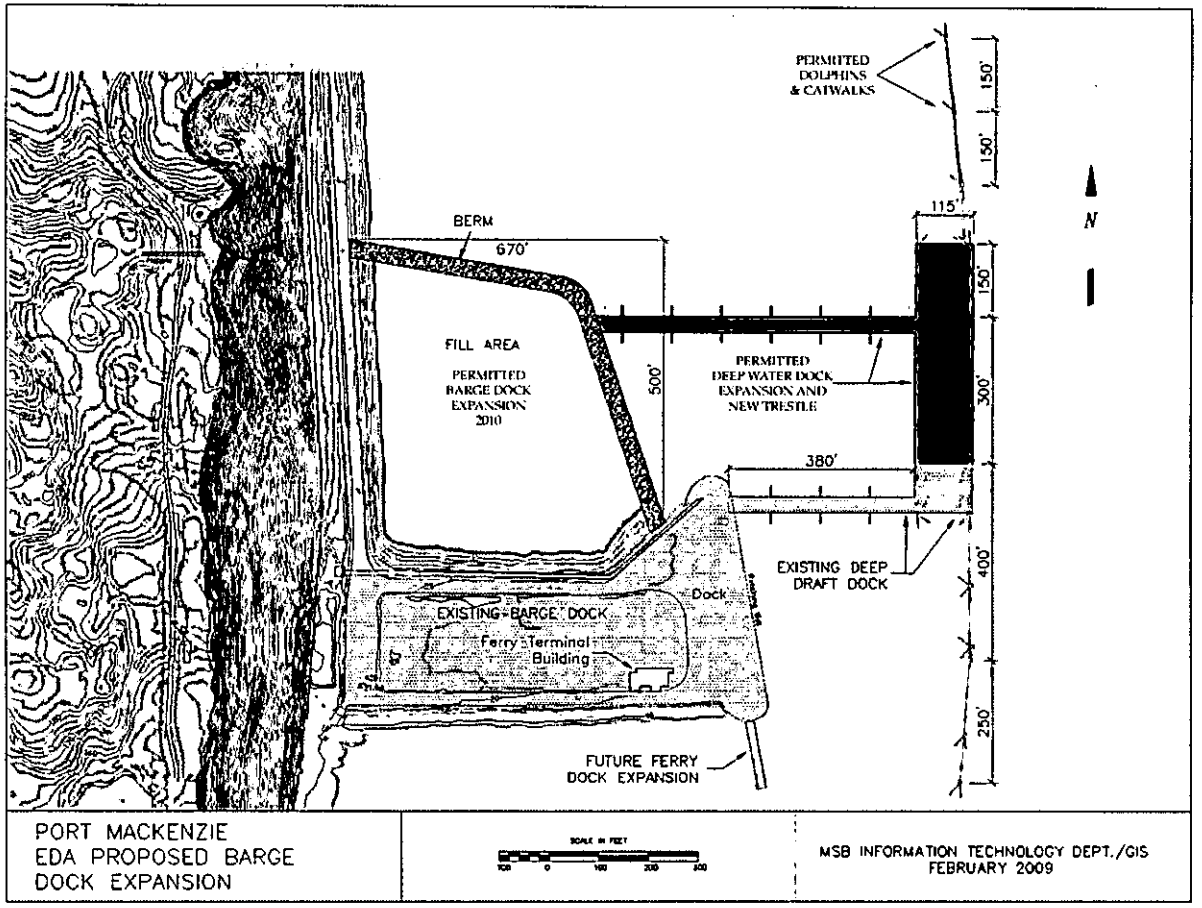
TIMOTHY L. ANDERSON, Borough Mayor

ATTEST:

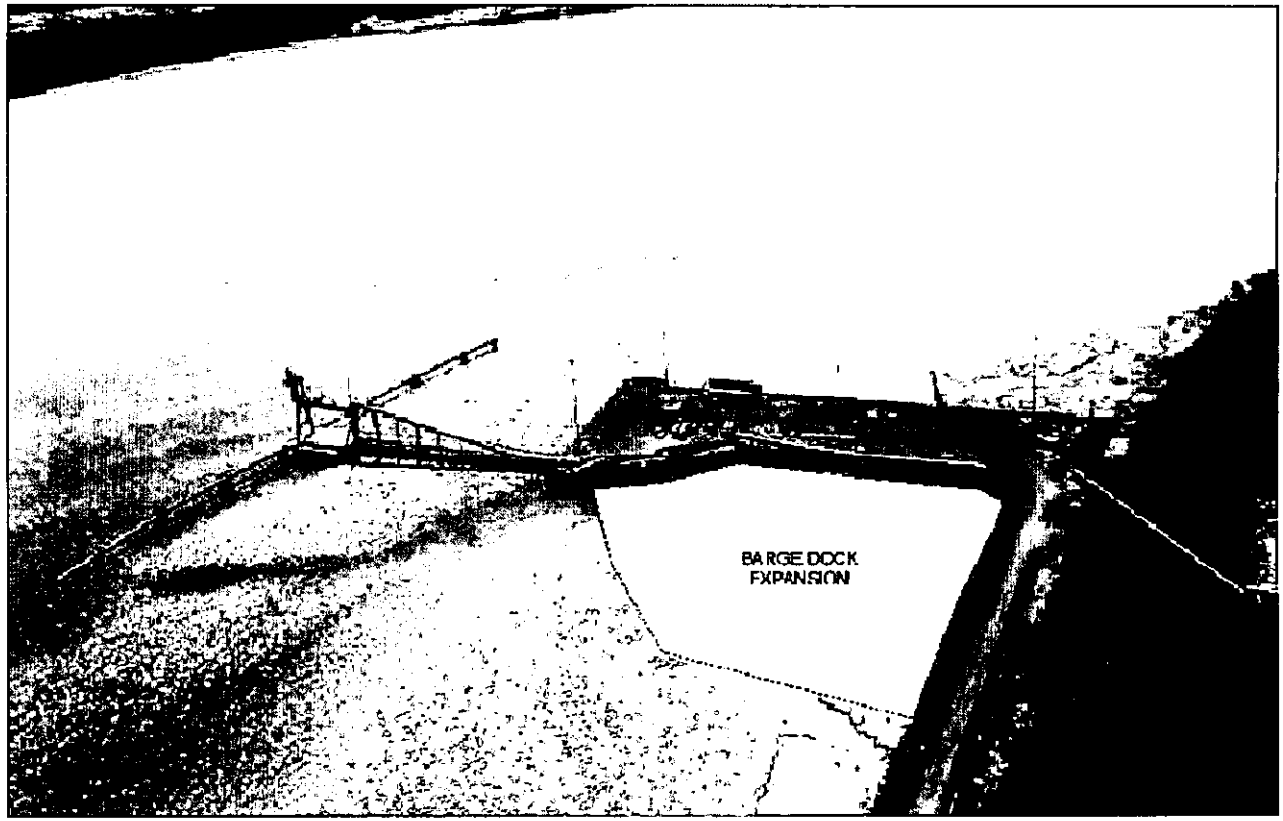
SANDRA A. DILLON, Borough Clerk

OFFICE OF INFORMATION TECHNOLOGY/GIS
February 10, 2004

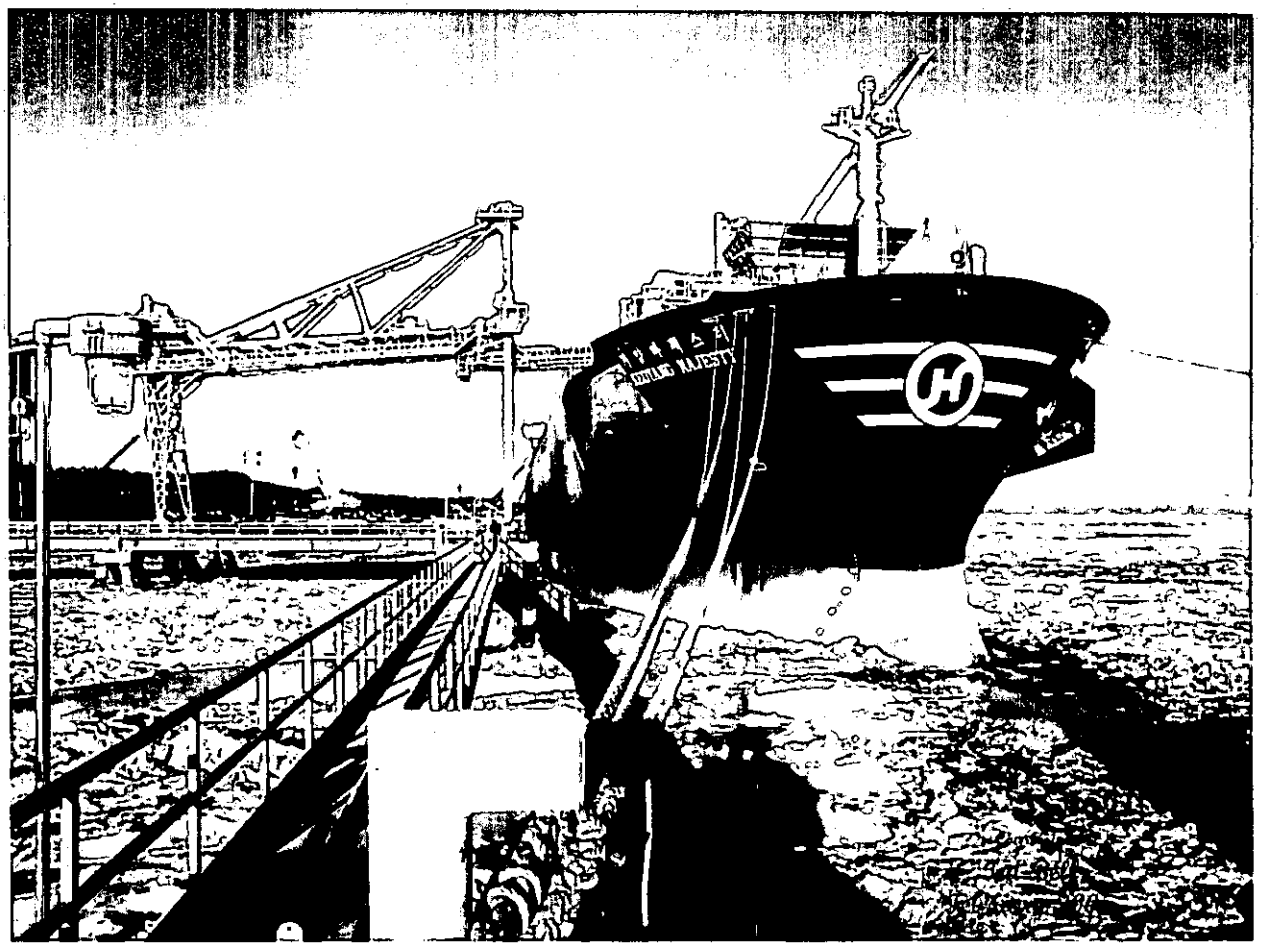
Permitted Expansion of Barge Dock and Deep-Draft Dock

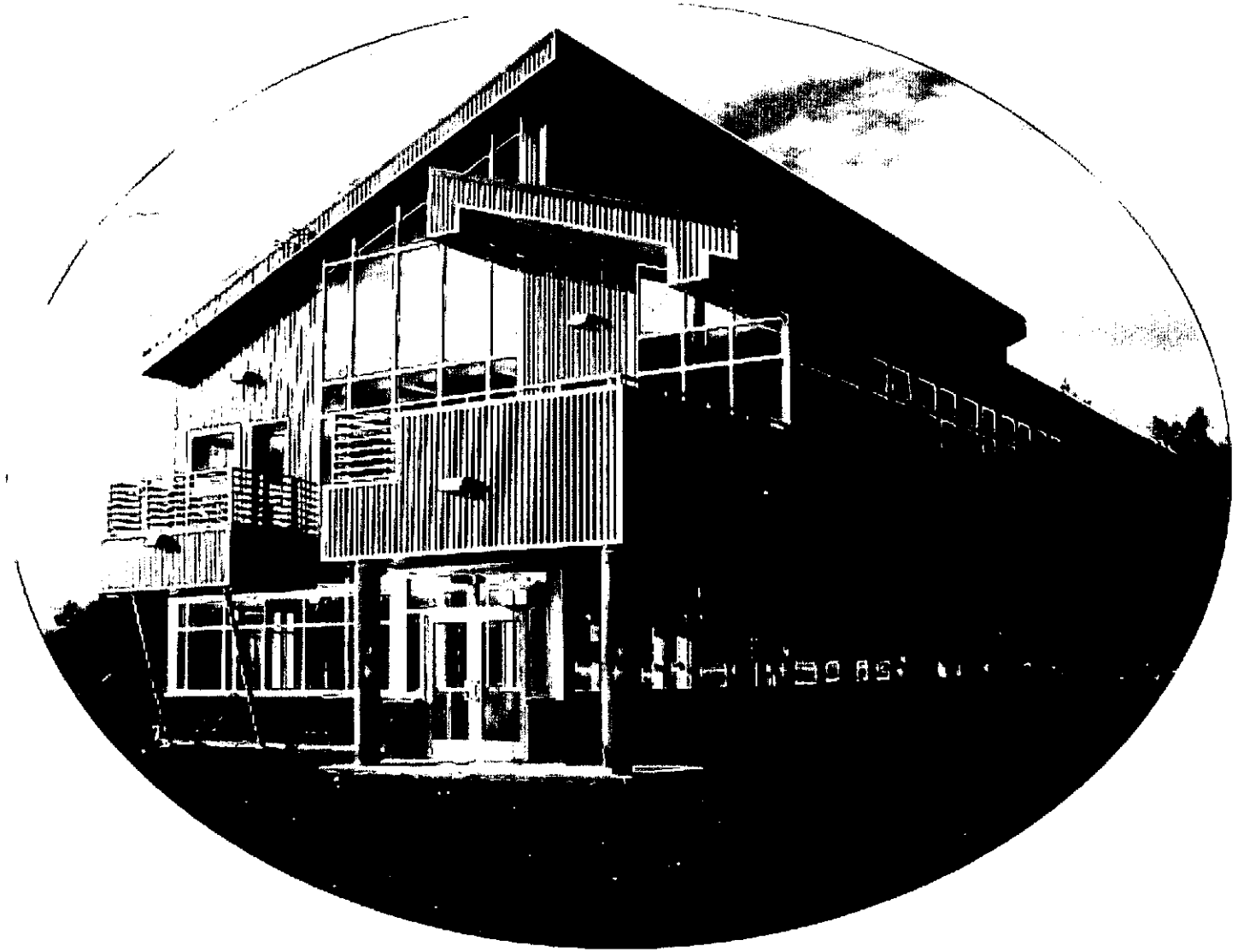


Barge Dock to be constructed Summer 2010



Winter/Summer Operations



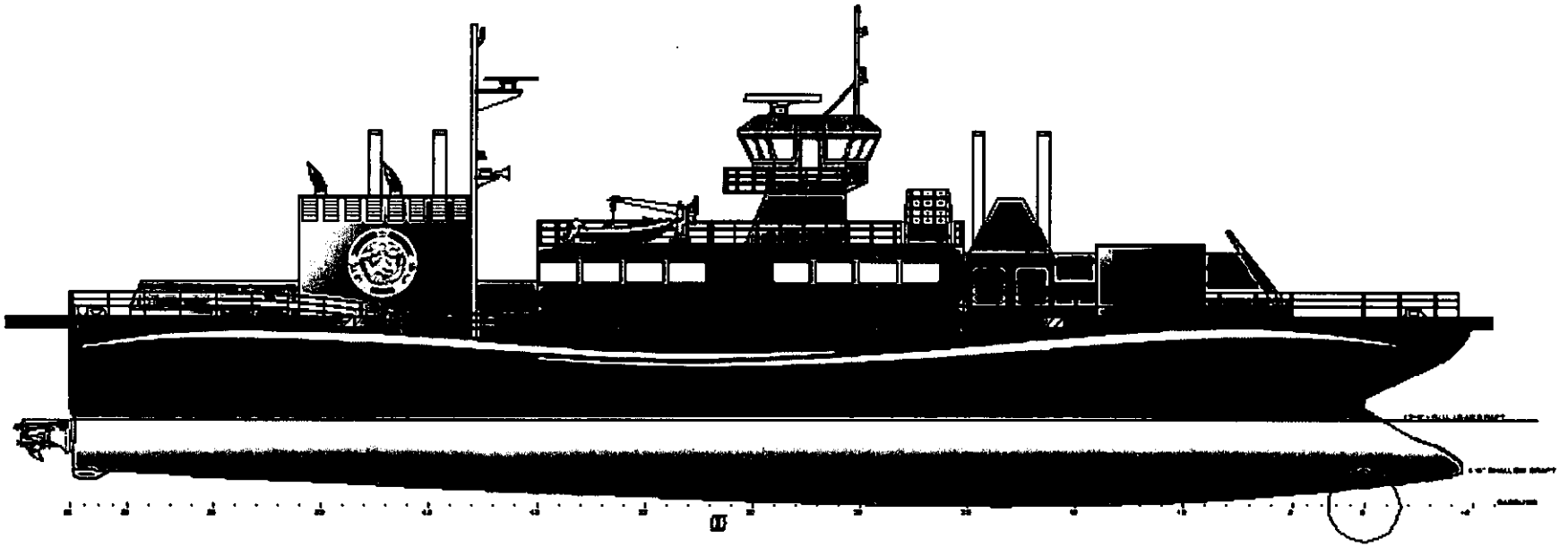


Port MacKenzie Ferry Terminal Building

2662

E-Craft

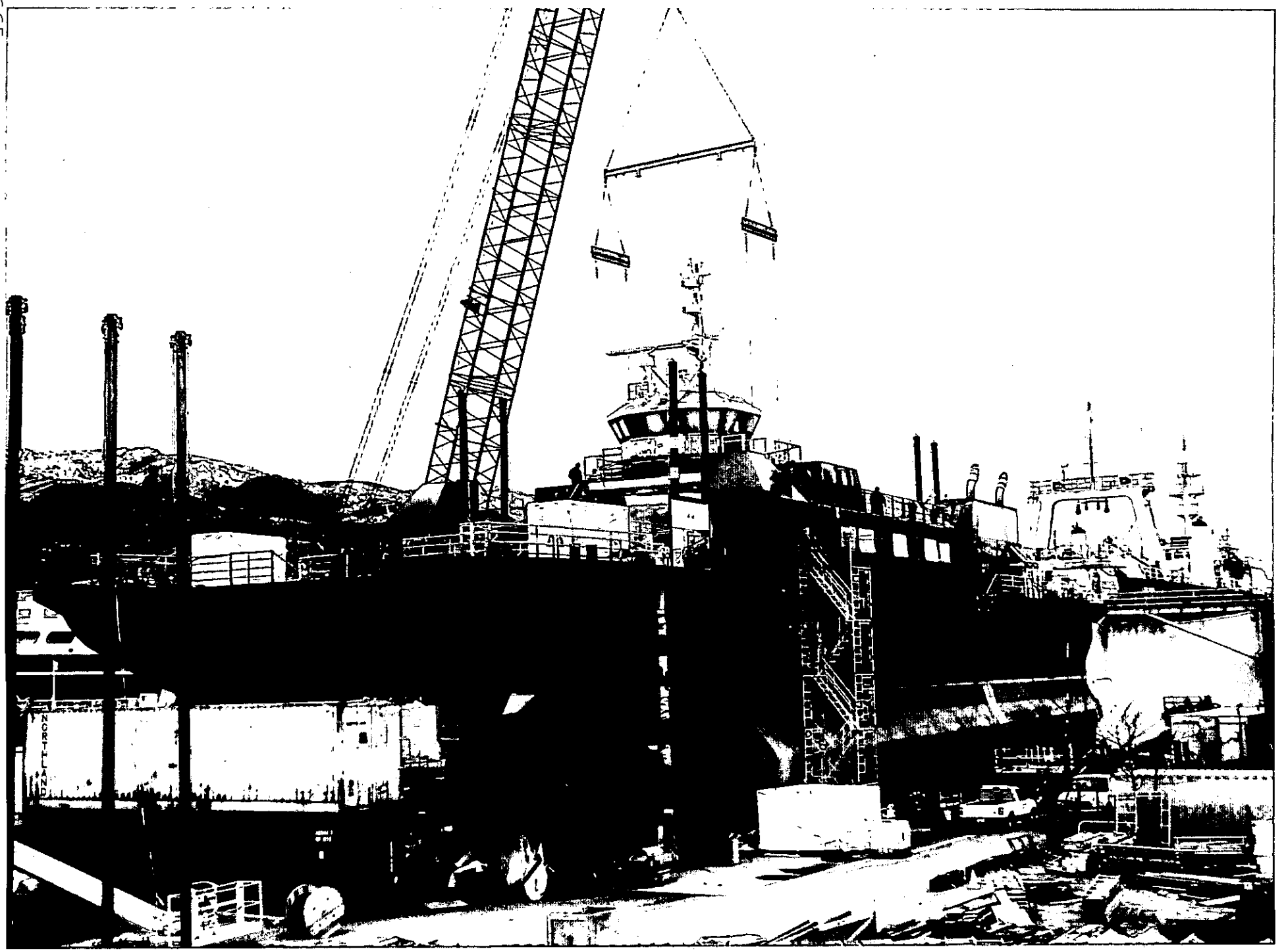
M/V SUSITNA



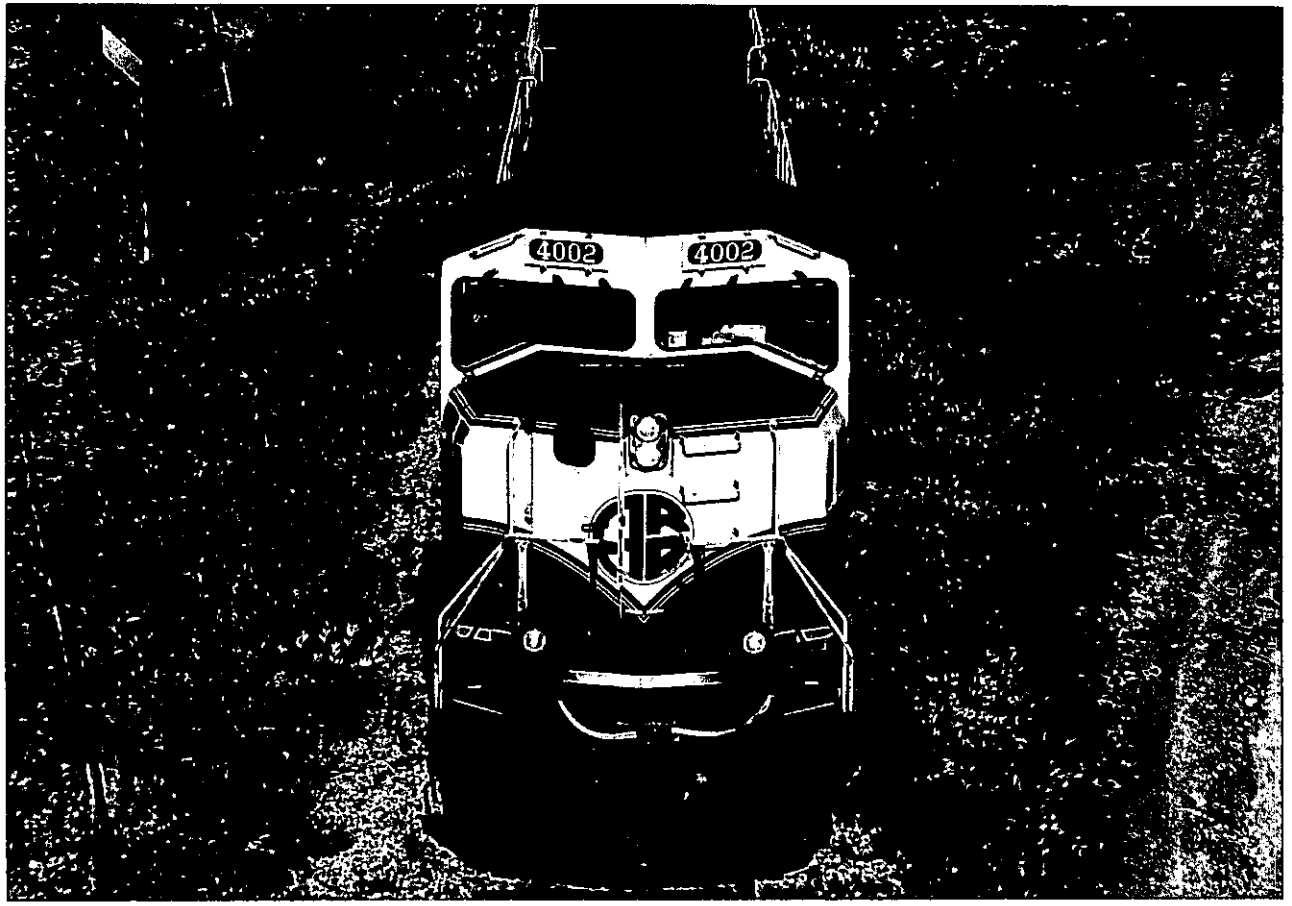
ASD
ALASKA
SHIP AND
DRYDOCK

60 Years
ONR
Relevant Research and Results . . . Yesterday, Today, and Tomorrow

1964
ALASKA


NORTHLAND

South Central Rail Extension



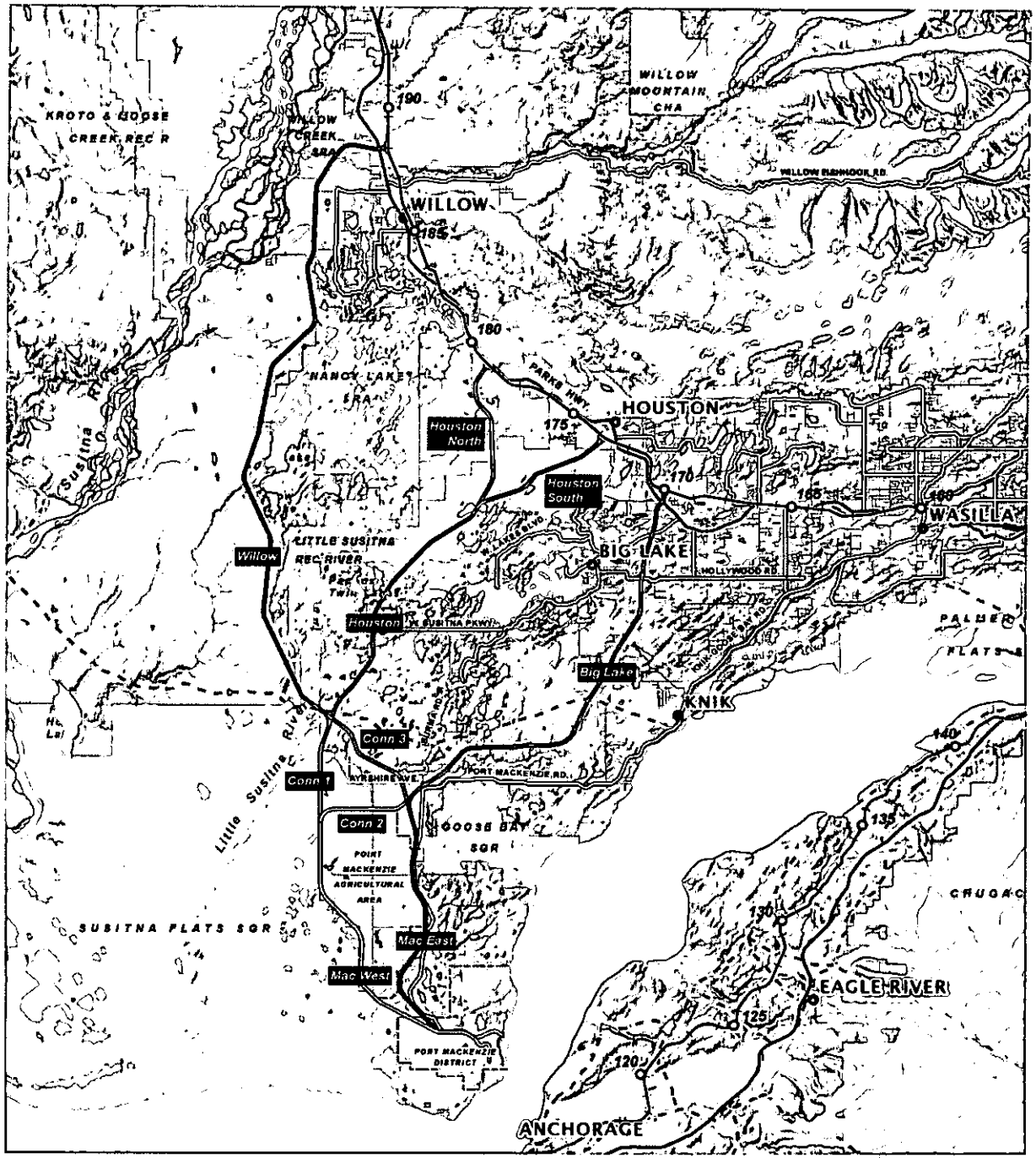
EIS Corridors Under Consideration

Draft EIS – Expected for public review in October 2009

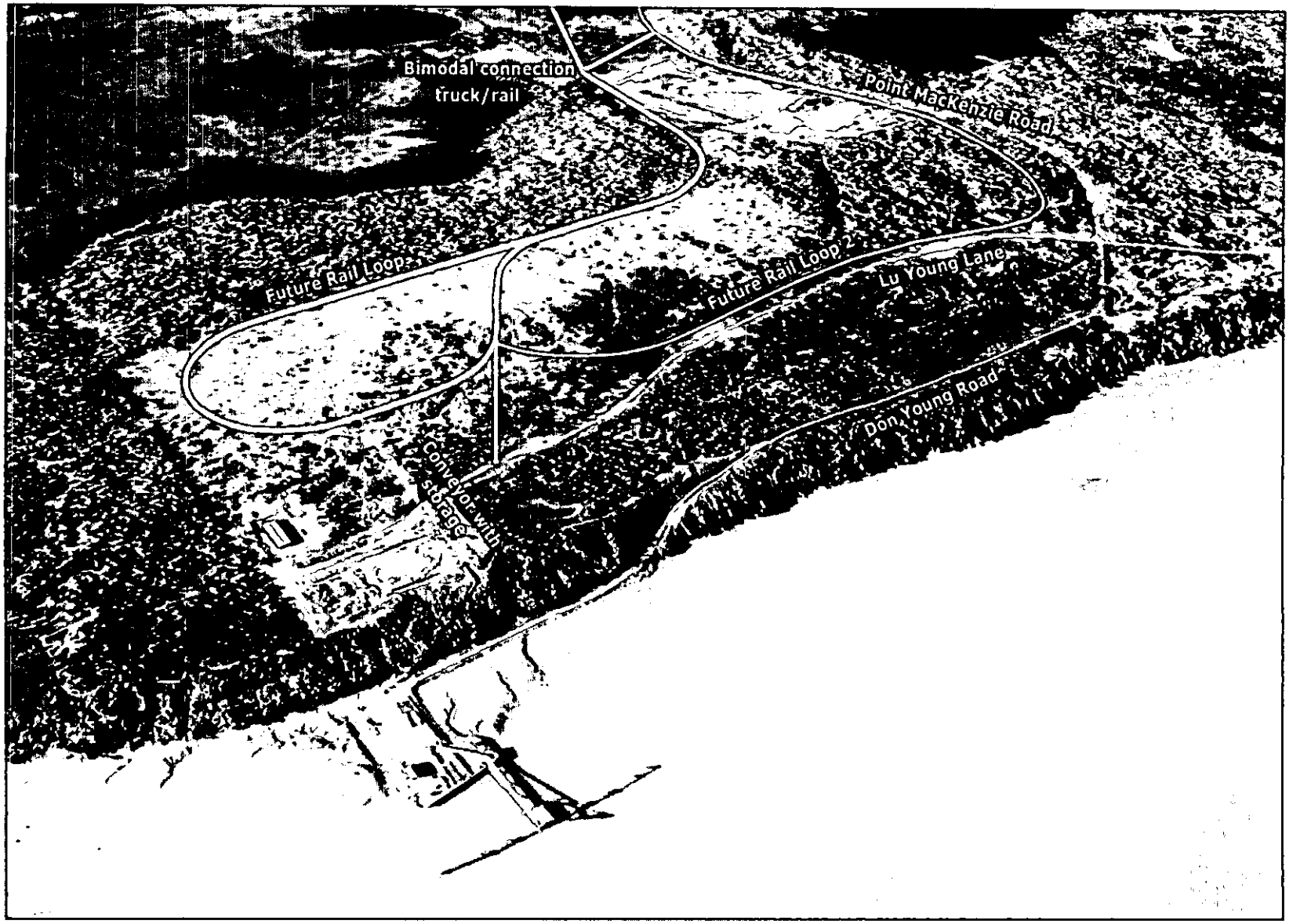
Final EIS – Expected in early Spring 2010

Note: These lines represent possible corridors and are subject to change.

3rd party contractor may arrive at additional routes as part of EIS process.



Rail Loop Under Construction

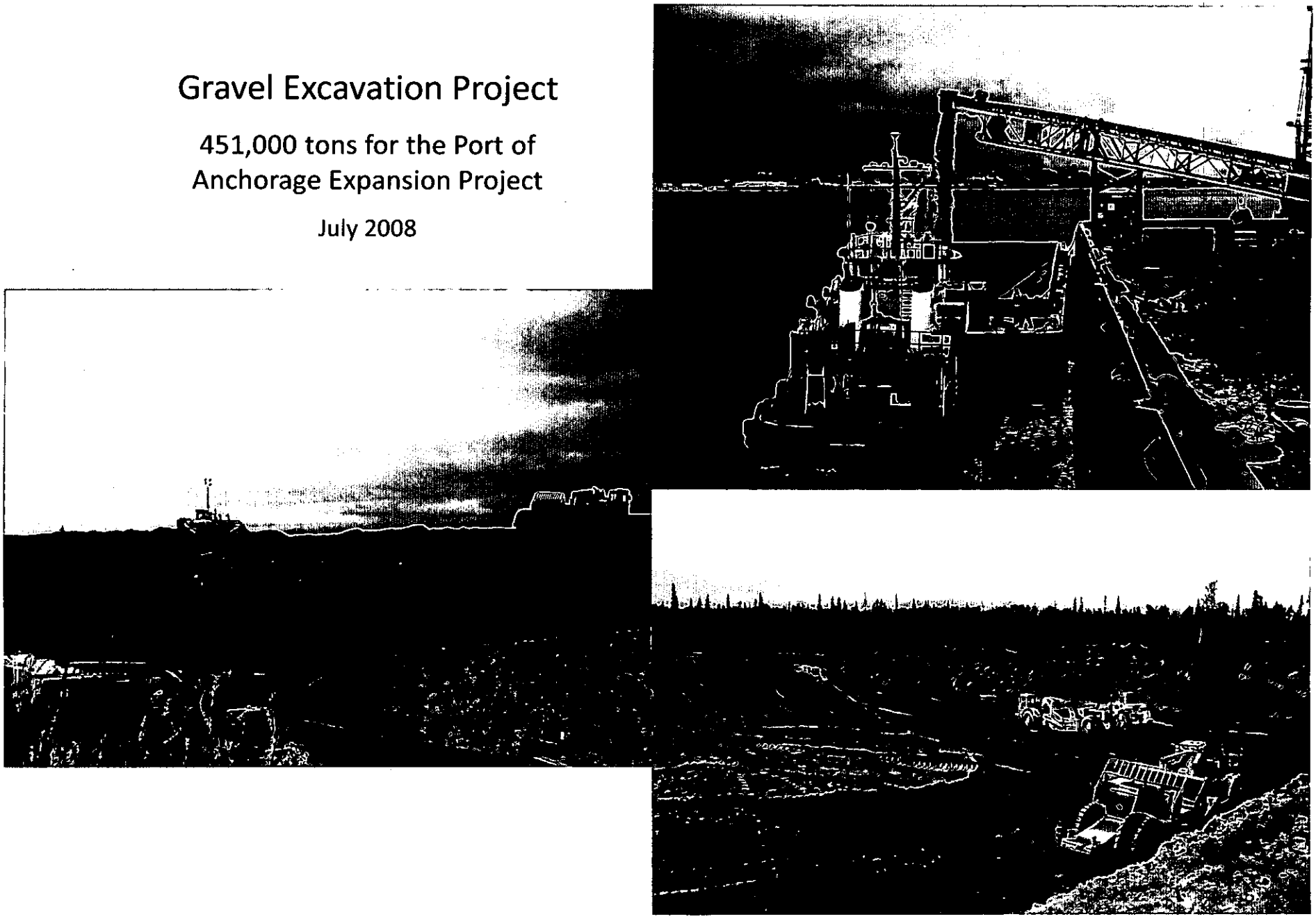


2669

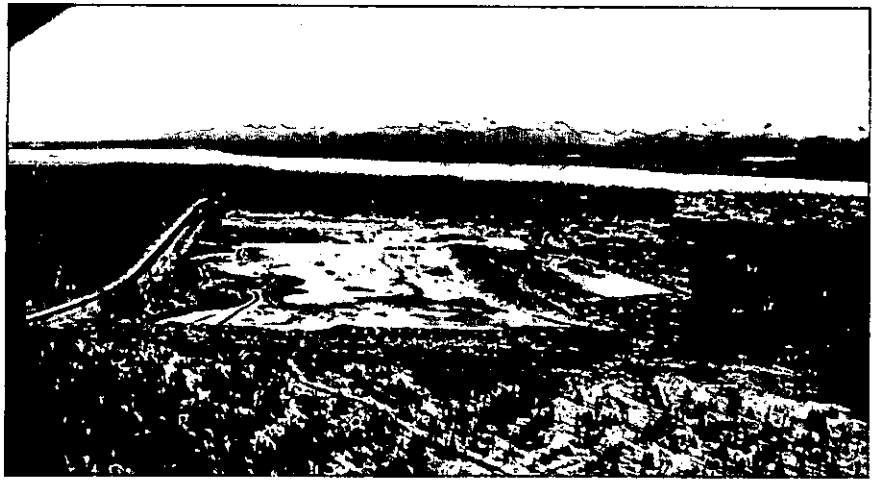
Gravel Excavation Project

451,000 tons for the Port of Anchorage Expansion Project

July 2008

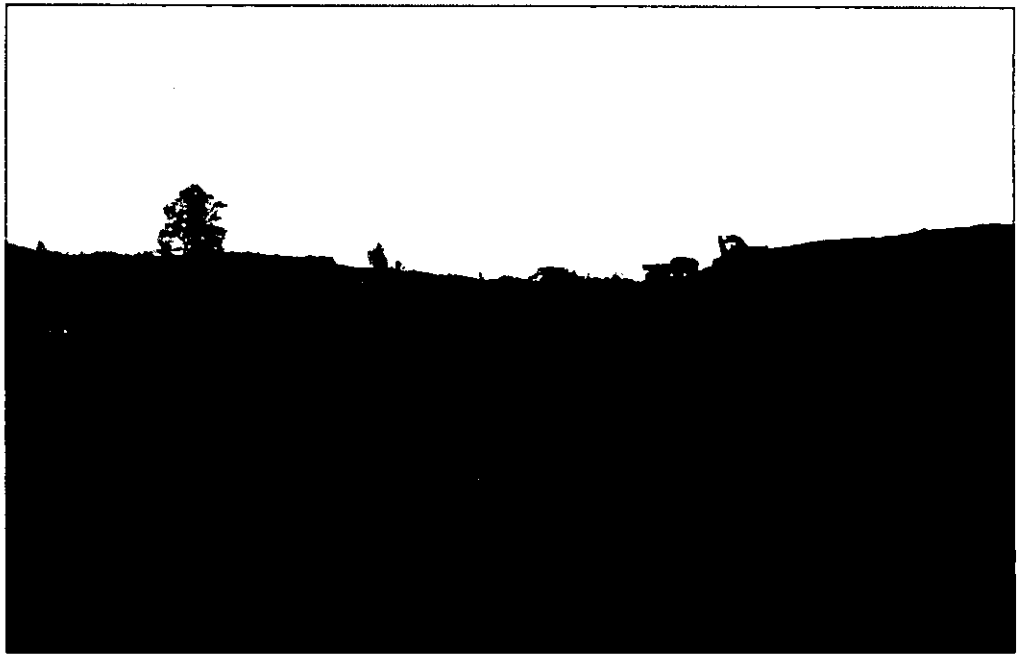


Bi-Modal Alignment Spring Tree Removal



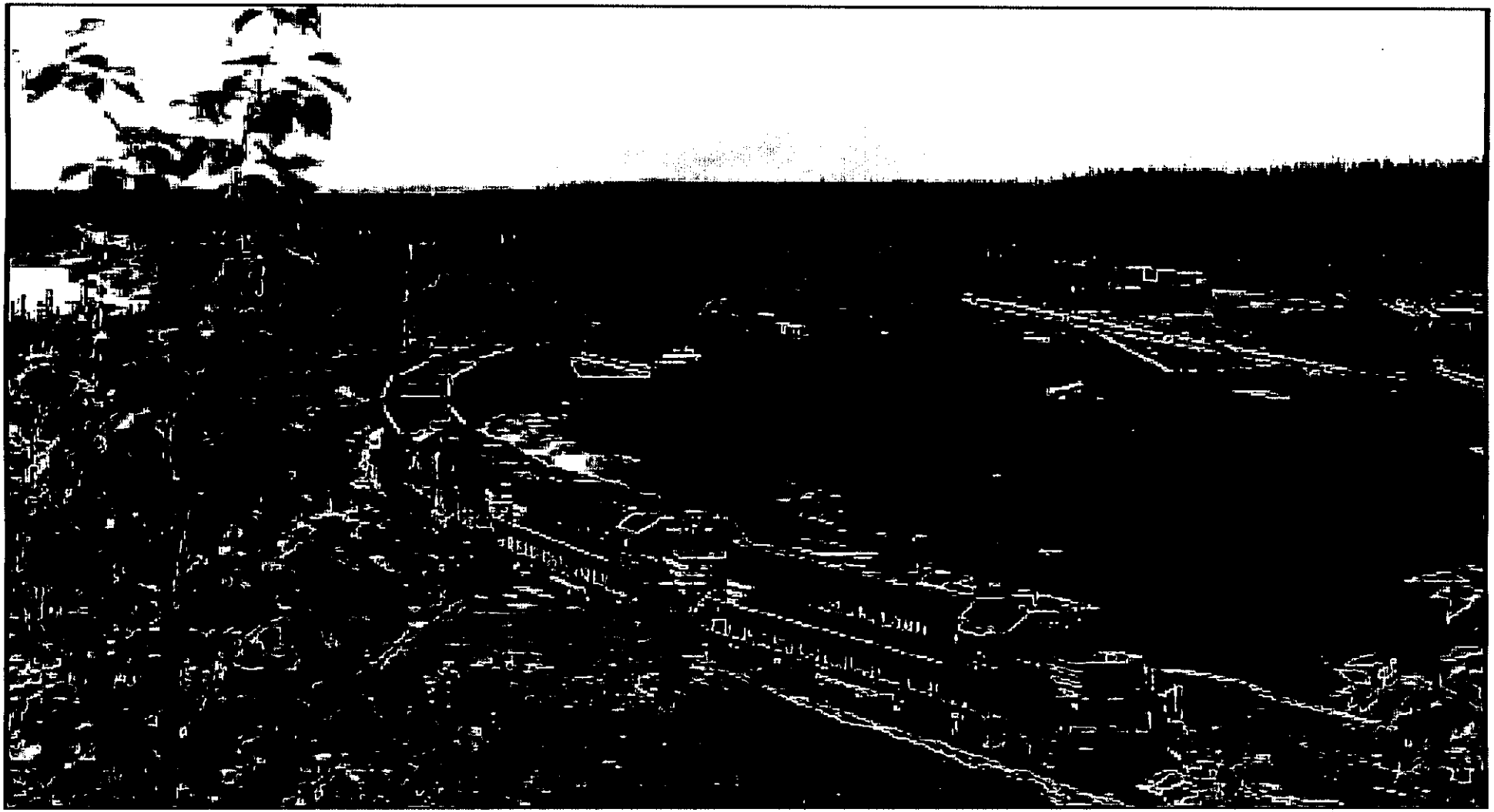
Summer Topsoil Removal Operations

Fall Excavation and Fill Work



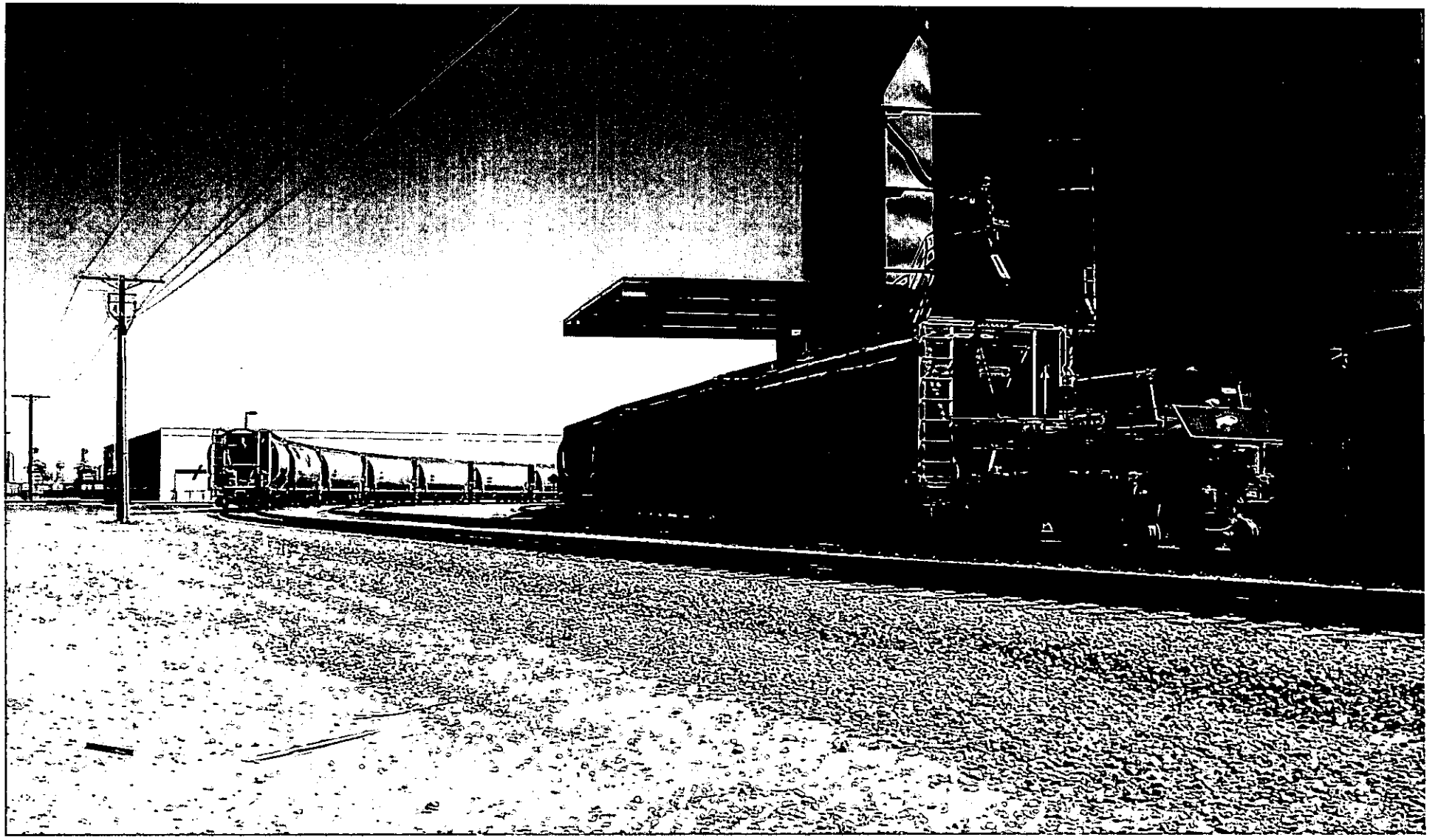
Port Mackenzie; the Shortest Distance to Tidewater

(Coal now has to travel to Seward)

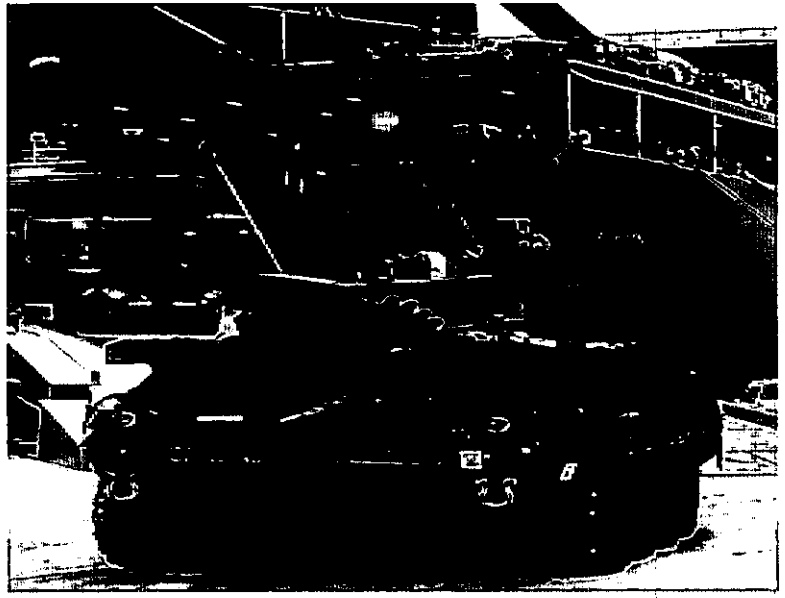


Only Alaskan Port with space for a Mile Long Rail Loop

(Example of loading cement on Loop Track)



Port MacKenzie - Military Logistics Option



Advantages and Savings of Using South Central Rail Extension to Port MacKenzie

- Transportation Savings.....$533 million
  (Benefit/Cost Ratio).....(1.9/1)

- Benefits to Alaska from New Mines
  - Gross Metal Value.....$172 billion
  - Community Benefits.....Permanent Jobs and Long-term Economic Engine

- State Revenue.....$6.3 billion

Summary of Rail Extension Statewide Benefits

- Supports Gas Pipeline Construction (mainline & spur line)
- New Interior Resource Development Opportunities
  (Benefits are $61M to $737M per year for 100+ years)
  - Limestone
  - Portland cement manufacture
  - Strategic Minerals (nickel, molybdenum)
  - Improved global price competitiveness of Alaska coal
- Transport Low Sulfur Fuel North (Interior, Southwest Alaska, North Slope)
- Alternate rail link to Interior (military mobilization/natural disaster /terrorism)
- Decreased rail congestion (Willow to Anchorage)
- Diversified Economy

Rail Project Project Scheduling

- ✓ **Phase 1** – EIS - **$10 Million**: 2007-2009

- ✓ **Phase 2** – Bi-Modal Loop & first 11 mile segment - **$17.5 Million**: 2008-2009
  - Permitting
  - Design of Bi-Modal Loop, Reserve and 11 miles
  - Right-of-way acquisition for Bi-Modal and 11 miles
  - Construction Bi-Modal Loop

- **Phase 3** – First 11 Mile Segment and EIS selected alternative – ($57 Million): **2010**
  - Construction of First 11 Mile Segment
  - Permitting, Design of EIS Selected Alternative

- **Phase 4** – EIS Selected Alternative – (*$150 Million): 2010-2011
  - Construction

- **Phase 5** – Track and Ancillary Facilities – (*$41 Million): 2012
  - Construction (laying rail, installing signals, etc.)
  - Project Completion Fall of 2012

*Note: Projected cost of $274 is expected to be adequate. Cost will be dependent on alternative selected in EIS

Southcentral Rail Exension Project

February, 2010

RAIL EXTENSION PROJECT

Economic Benefits to the Central Alaska Regional Economy

(Anchorage, Mat-Su, Denali Borough, and Fairbanks)

Economic Problems facing Alaska's Economy

1. **Uncertainty about energy availability and costs**
2. **Uncertainty about the Gas Line construction**
3. **Uncertainty about the future of the TransAlaska Pipeline**

1

Economic Problems facing Alaska's Economy (cont'd)

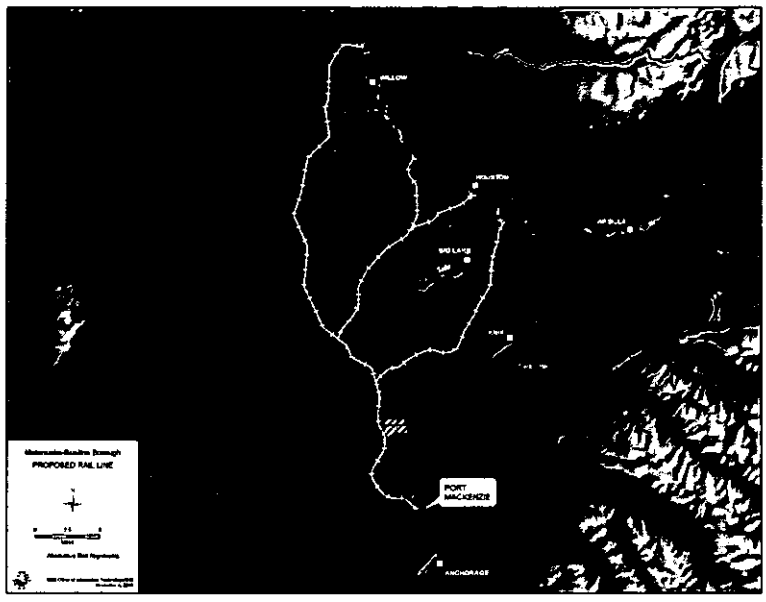
4. **Uncertainty about Small Business Administration contracting program for Native Business**
5. **Uncertainty about explorations permits for Chukchi and Beaufort Sea**
6. **Lack of Diversification of Alaska's Economy**
7. **Lack of Transportation Infrastructure to promote Economic Development**

2

*But a major solution to one of these problems is <u>just months away</u> and the **positive effects** will be felt **next summer**.*

3

The Rail Extension from Port MacKenzie to the Main Line of the Alaska Railroad



4

To Understand the Impact of Port MacKenzie and the Rail Extension, we need to begin thinking of the **Fairbanks North Star Borough, the Denali Borough, the Mat-Su Borough, and Anchorage** as a regional economy

Working, Building, and Growing Together

5

What the Rail Extension Means to this Regional Economy

1. Opens up the Interior to Resource Development
2. Facilitates the Development of a World Class Limestone Deposit in Livengood just north of Fairbanks
3. Facilitates the Development of a Cement Production Facility in or around Fairbanks
4. Opens up a development corridor along the Railbelt to exploration and extraction of strategic minerals (Lead, Zinc, Copper, Molybdenum and Silver)

6

What the Rail Extension Means to this Regional Economy (cont'd)

5. Improves the transportation of Lower Cost Fuel to Interior and Southwest Alaska
6. Dramatically improves the world competitiveness of Alaska Coal
7. Significantly reduces transportation and staging cost for the Gas Pipeline Construction (Important if it goes. Essential if it doesn't.)
8. Increases employment in the Mat-Su Borough, the Denali Borough, the Fairbanks North Star Borough and Anchorage

7

How does the Rail Extension do all these things?

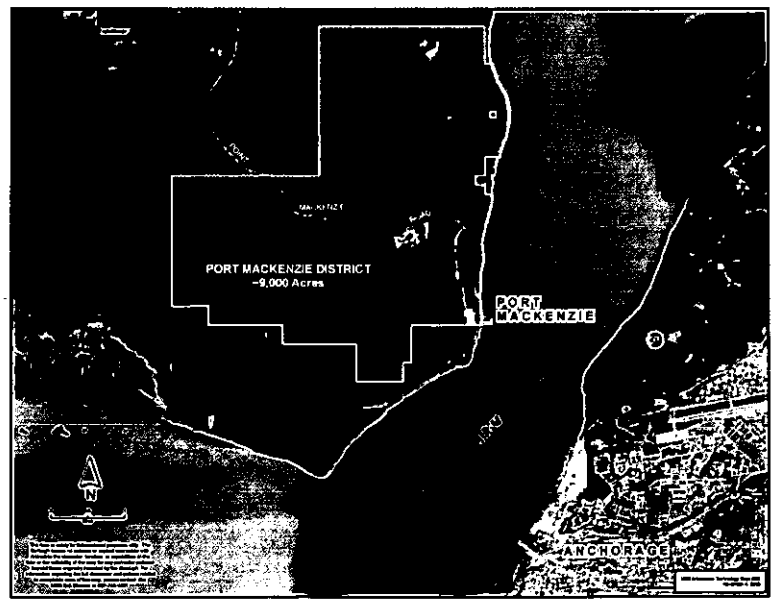
The Answer is <u>Port MacKenzie and the Rail Extension working Together</u>

Port MacKenzie?

Port MacKenzie is a Bulk Commodities Port for minerals, cement, coal, bulk fuel, pipe (Not a Consumer Goods or a Container Port like the Port of Anchorage)

8

It's a Port with 14 Square Miles of Industrial Zoned Land.
(That's nearly 9,000 Acres.)

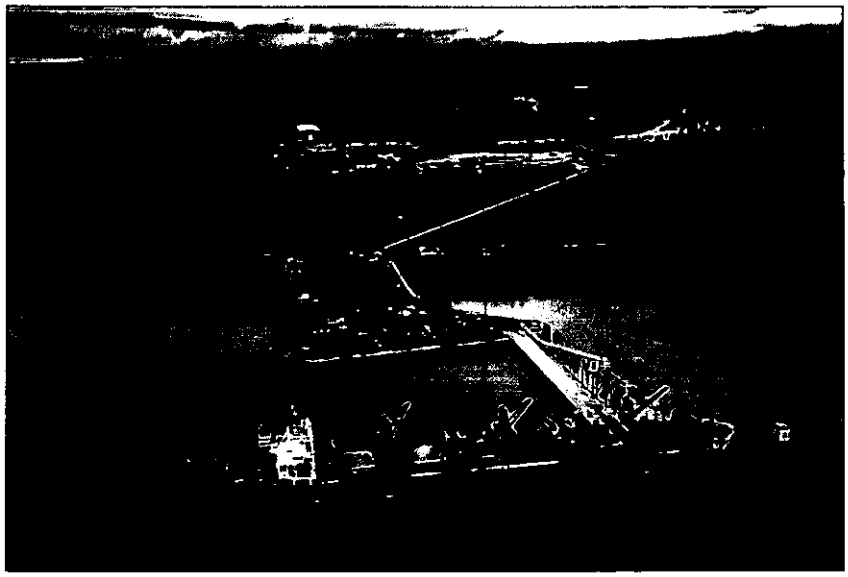


9

Port Mackenzie 20 Years Ago

10

Port MacKenzie 2 Years Ago

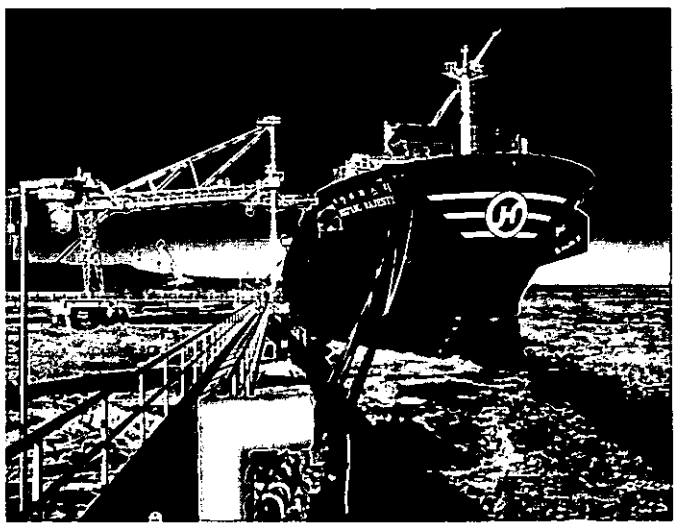


11

Port MacKenzie Now

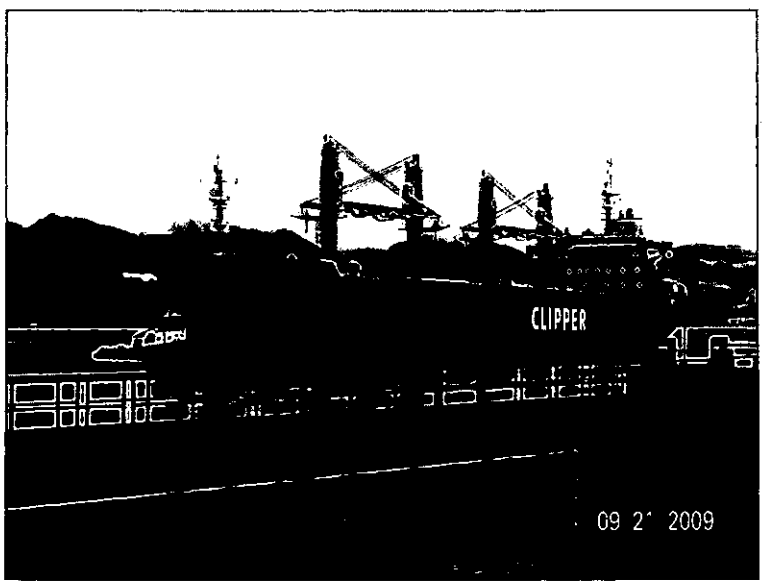
Does not compete with the Port of Anchorage (60' mean low tide compared to 35' for Port of Anchorage)

No Dredging Required



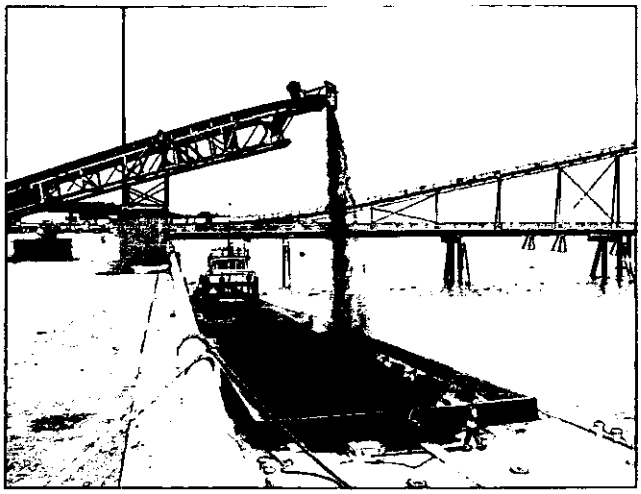
12

A Deep Water Port (MLLW-60) That Can Handle The World's Largest Cargo Ships today (Panamax and Cape Size Vessels)



13

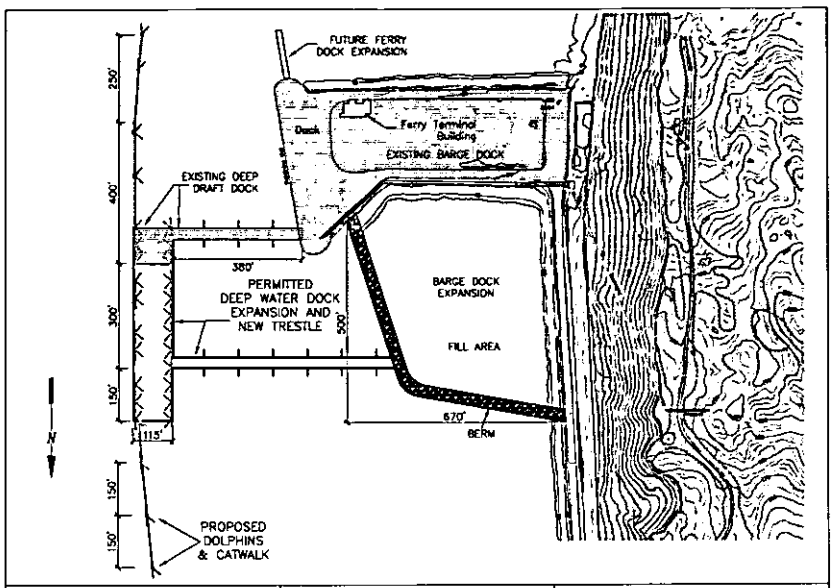
It's also Designed and Built to Easily Handle Barges Carrying Bulk Commodities, Minerals, Coal and Aggregate



14

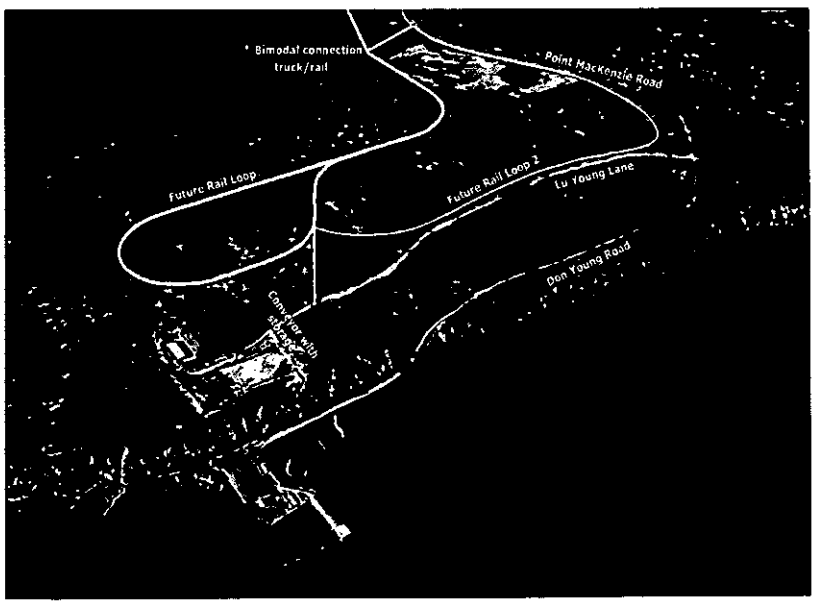
Barge Dock Expansion to be Complete Next Summer

15



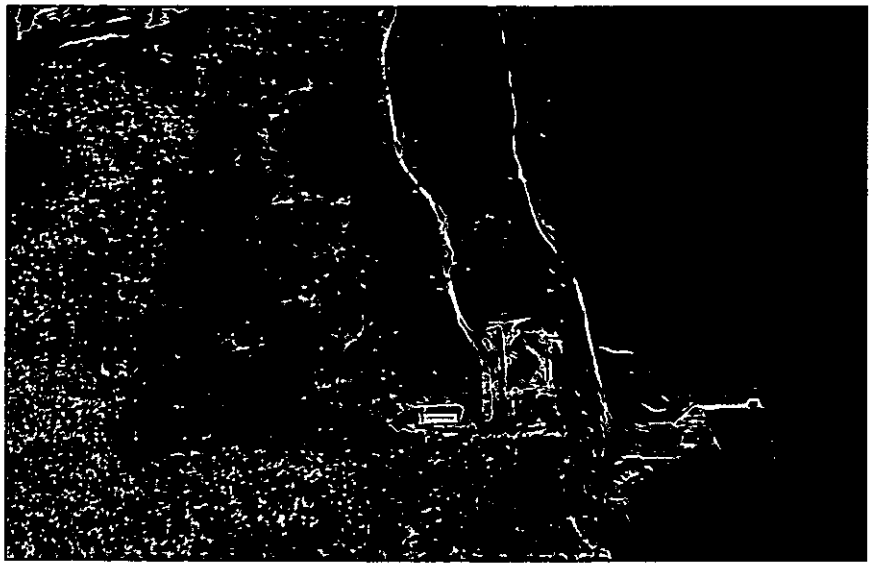
16

Rail Loop Under Construction



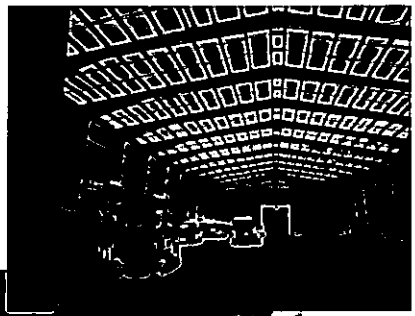
17

Plenty of Storage and Staging Capacity for
All the pipe needed for both Gas Lines



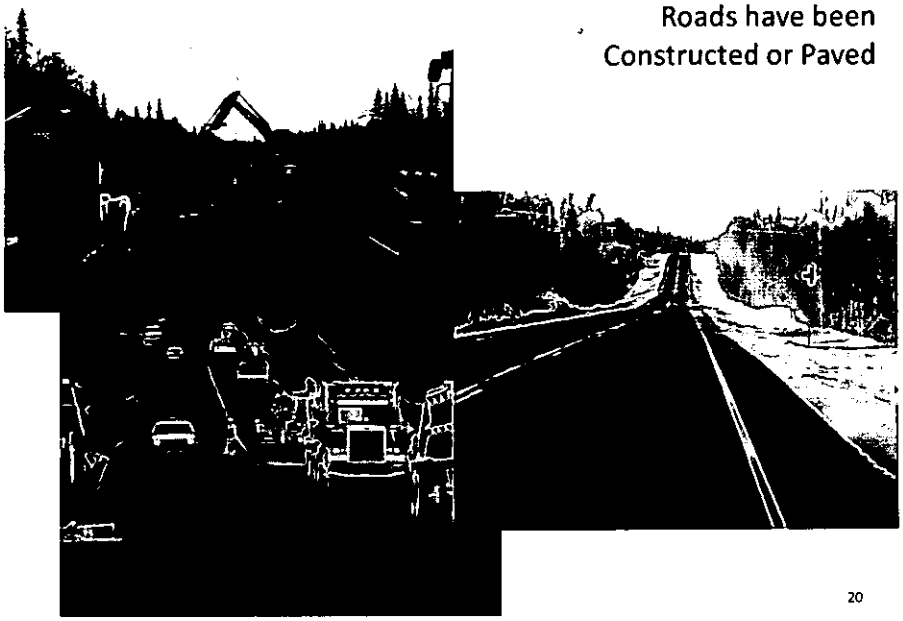
18

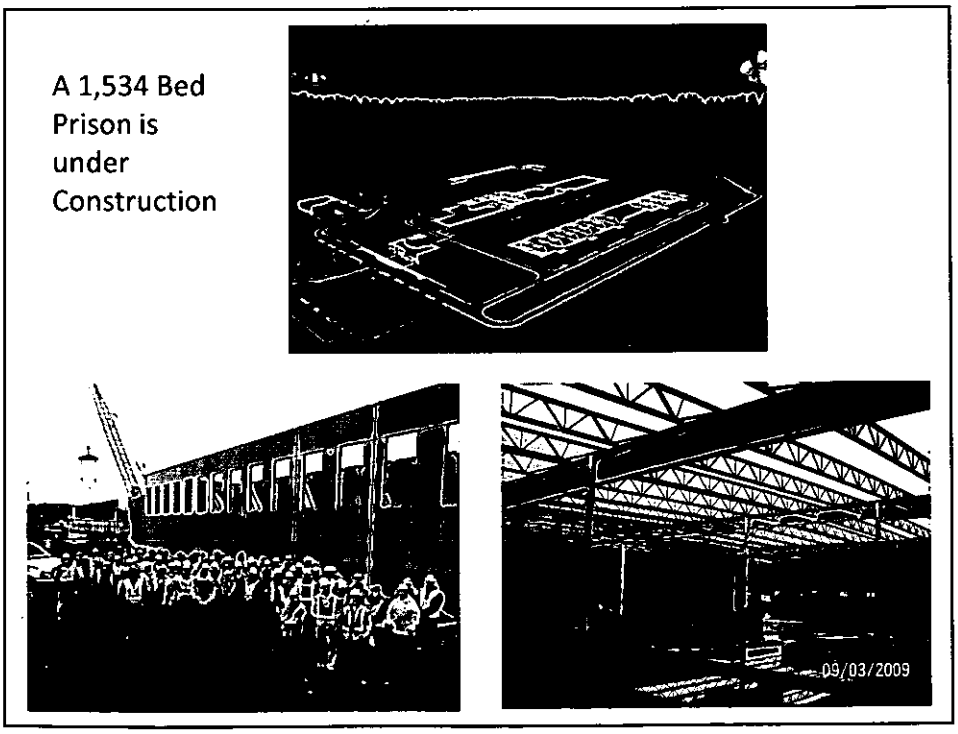
New 24,000 sq ft Warehouse



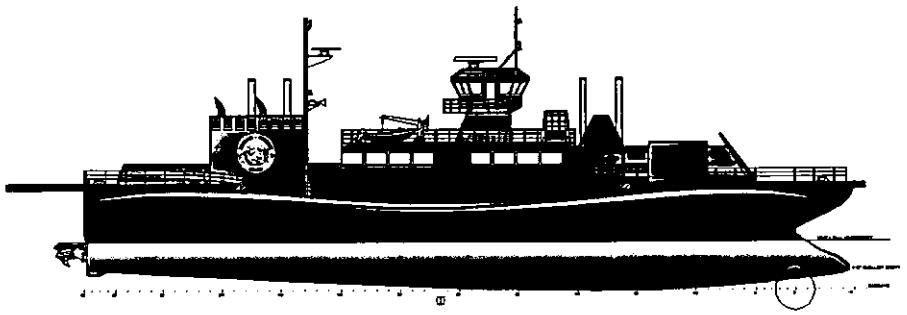
Warehouse &
Storage Areas
have been
Constructed

19


Roads have been
Constructed or Paved
20

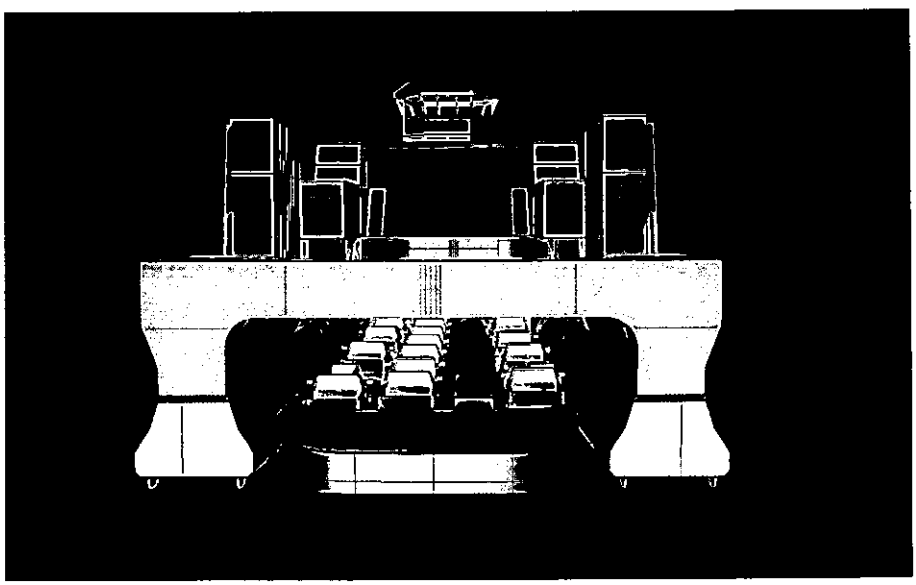

A 1,534 Bed
Prison is
under
Construction
09/03/2009

M/V SUSITNA

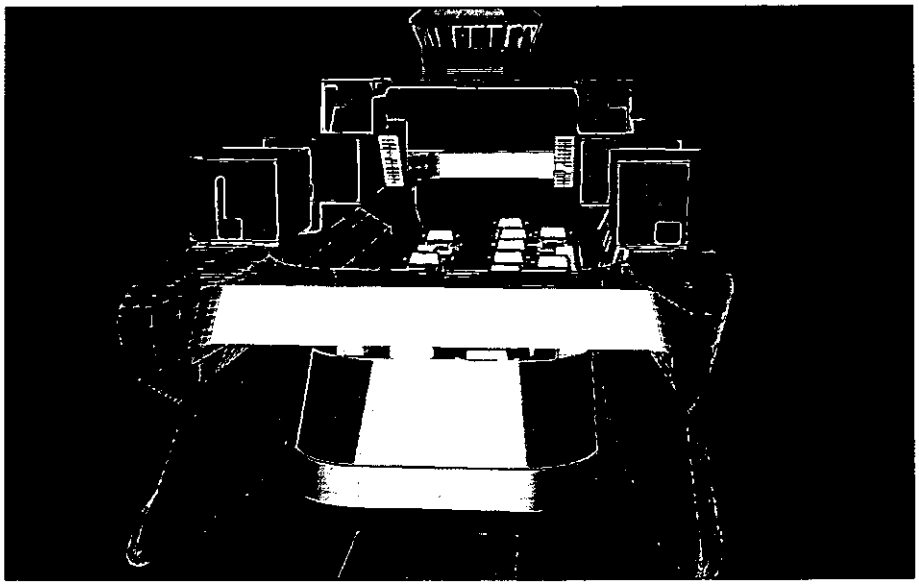


New State of the Art Ice Breaking Ferry currently under construction in **Ketchikan** scheduled to start operations in late 2011

22



23



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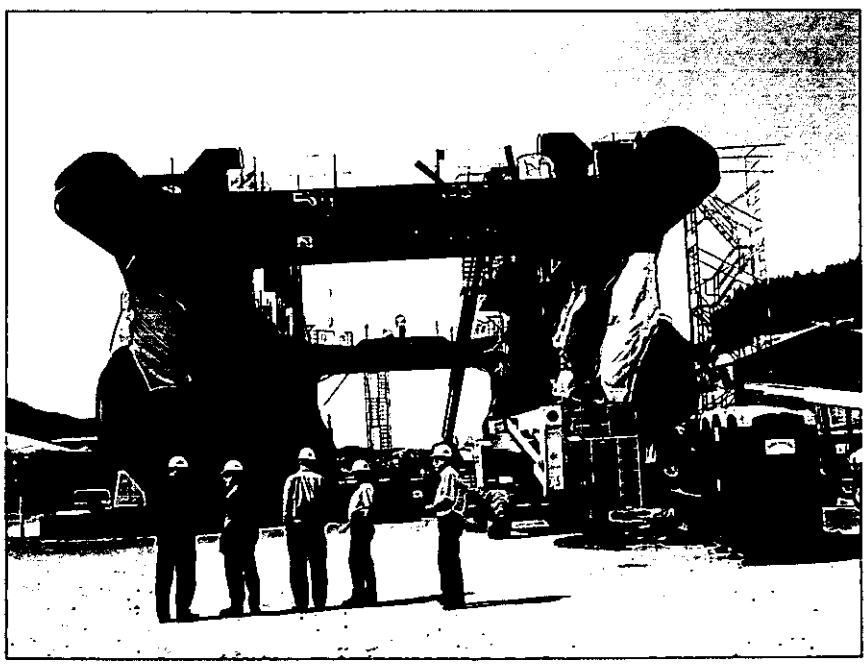

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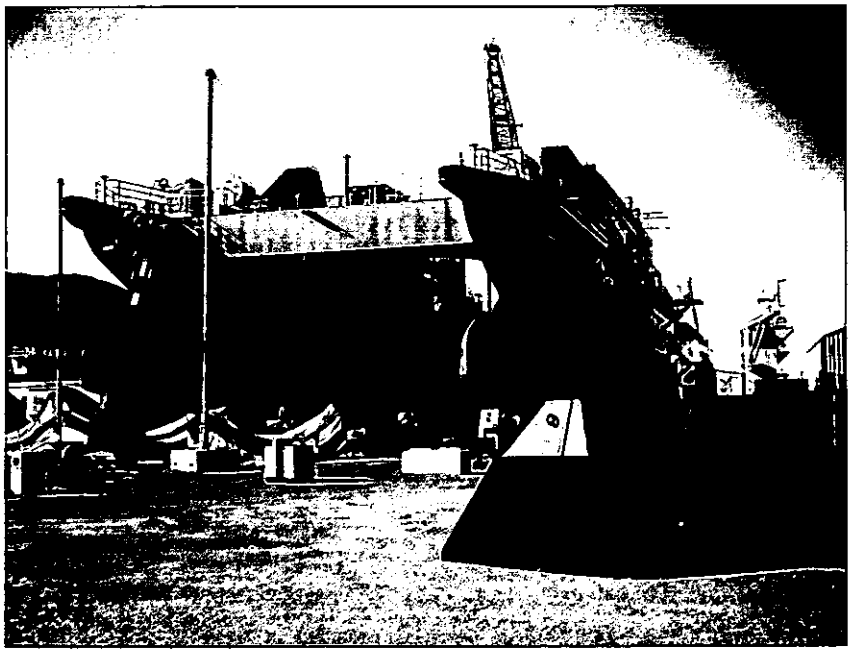
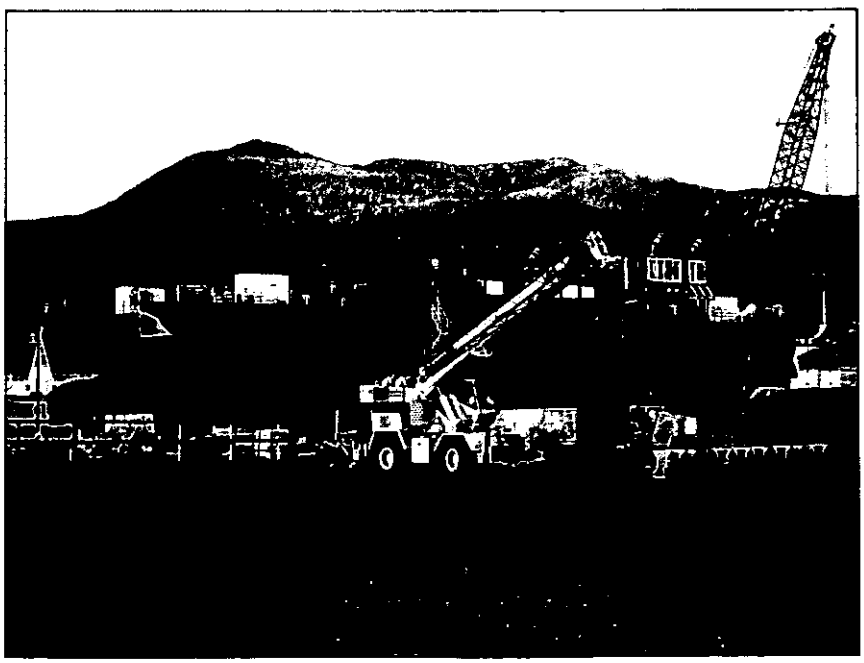
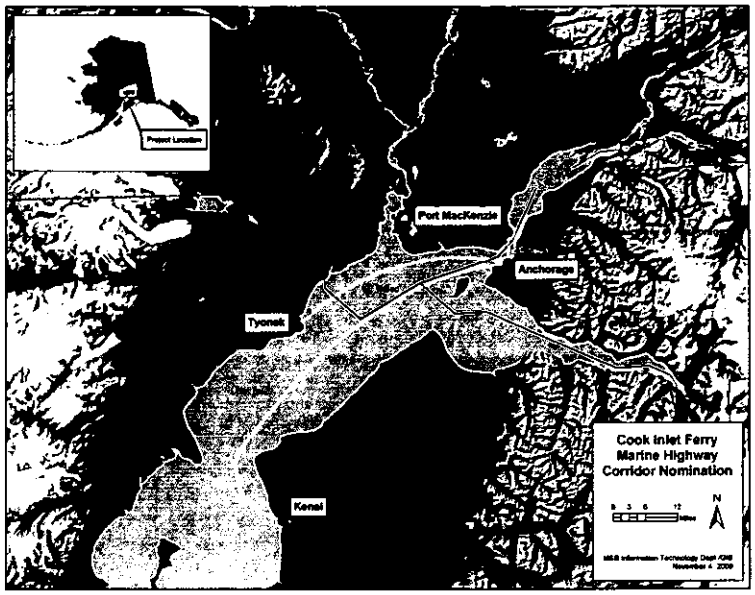


26



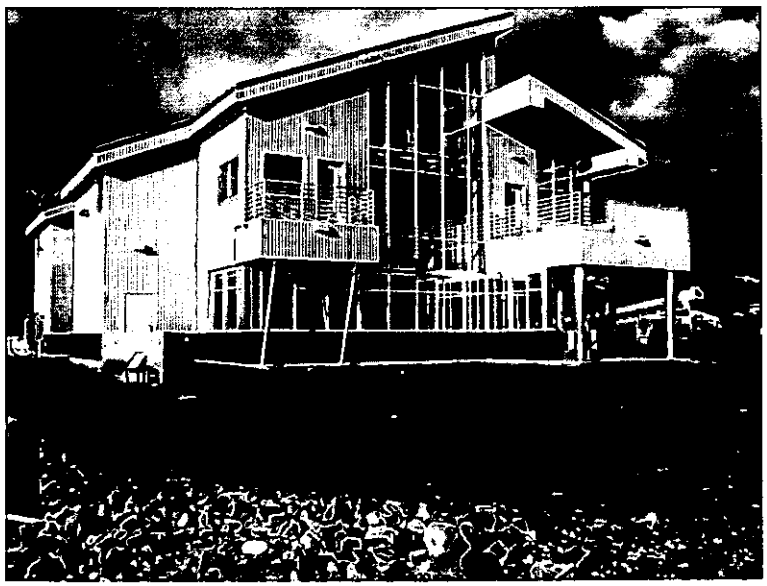
27

Hourly Service between Anchorage and Mat-Su Plus Service to Kenai and Tyonek



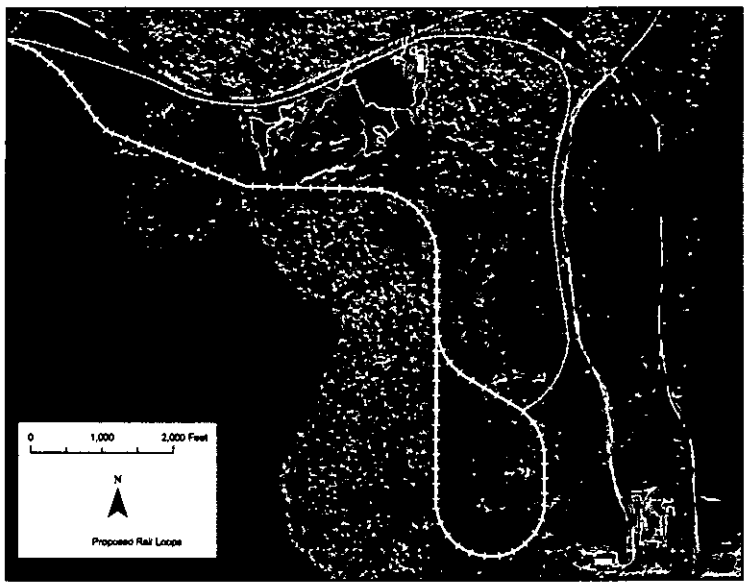
28

Port MacKenzie also has a Recently Constructed Ferry Terminal for **Anchorage-Port MacKenzie hourly runs**



29

Port MacKenzie and the Rail Extension Together are a Major Key to the Economic Development of the Region



30

What the Rail Extension Means to this Regional Economy

1. **Opens up the Interior to Resource Development**
2. **Facilitates the Development of a World Class Limestone Deposit in Livengood just north of Fairbanks**
3. **Facilitates the Development of a Cement Production Facility in or around Fairbanks**
4. **Opens up a development corridor along the Railbelt to exploration and extraction of strategic minerals (Lead, Zinc, Copper, Molybdenum and Silver)**

31

What the Rail Extension Means to this Regional Economy (cont'd)

5. **Improves the transportation of Lower Cost Fuel to Interior and Southwest Alaska**
6. **Dramatically improves the world competitiveness of Alaska Coal**
7. **Significantly reduces transportation and staging cost for the Gas Pipeline Construction (Important if it goes. Essential if it doesn't.)**
8. **Increases employment in the Mat-Su Borough, the Denali Borough, the Fairbanks North Star Borough and Anchorage**

32

Jobs Created by Rail Extension and Port MacKenzie Expansion*

Project Segment	JOBS
Rail Extension Construction Related Jobs (2010-2013)	3000
Port MacKenzie Constructon Related Jobs (2010-2013)	500

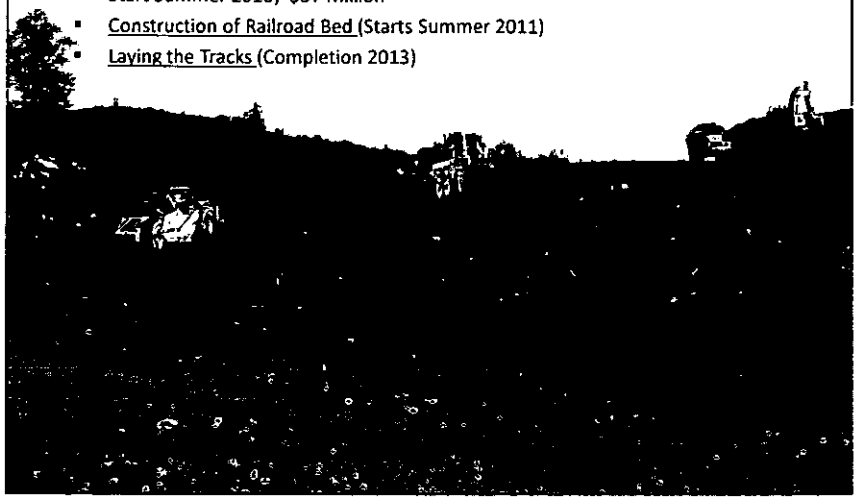
Private Development	JOBS
Mining Development Jobs along Rail Line	4000
Industrial Development of Port MacKenzie	3500

*Estimates by HDR and ISER

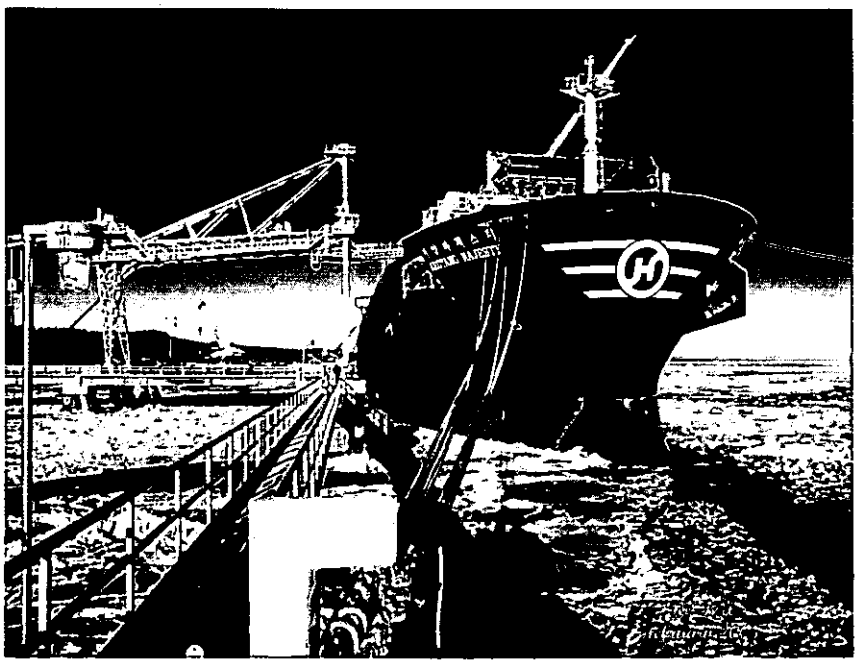
33

What's Next for the Rail Extension?

- Completion of the Environmental Impact Study (Spring 2010) $10 Million
- Construction of the Road/Rail Bimodal Loop (Under Construction) $17 Million
- Permitting, Design and Begin Construction of EIS Selected Alternative (Can Start Summer 2010) $57 Million
- Construction of Railroad Bed (Starts Summer 2011)
- Laying the Tracks (Completion 2013)



34



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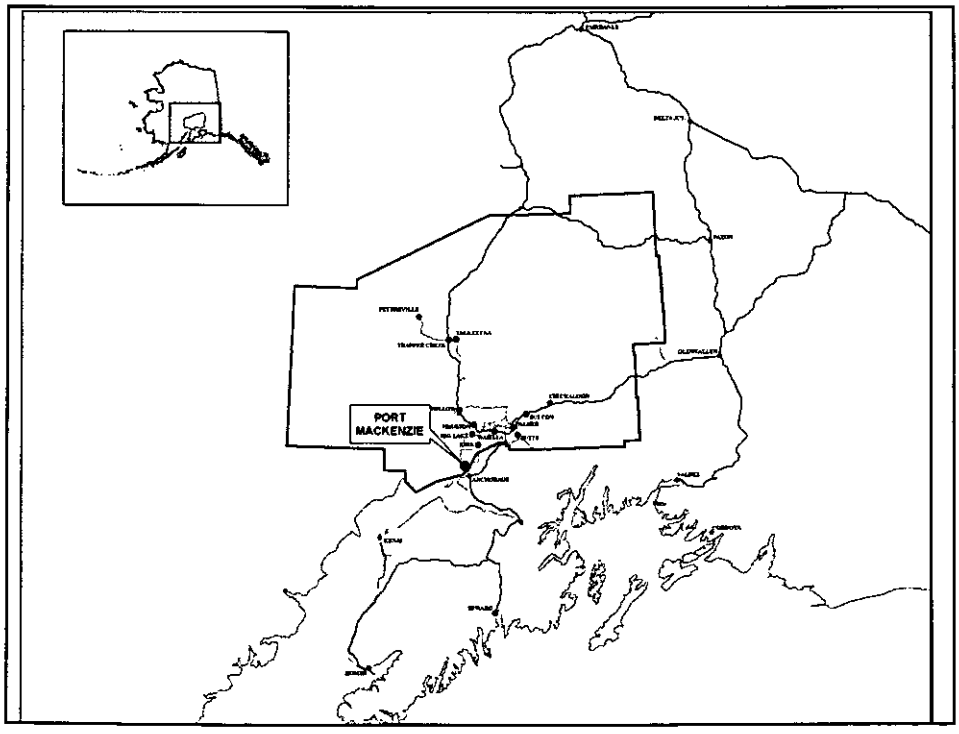
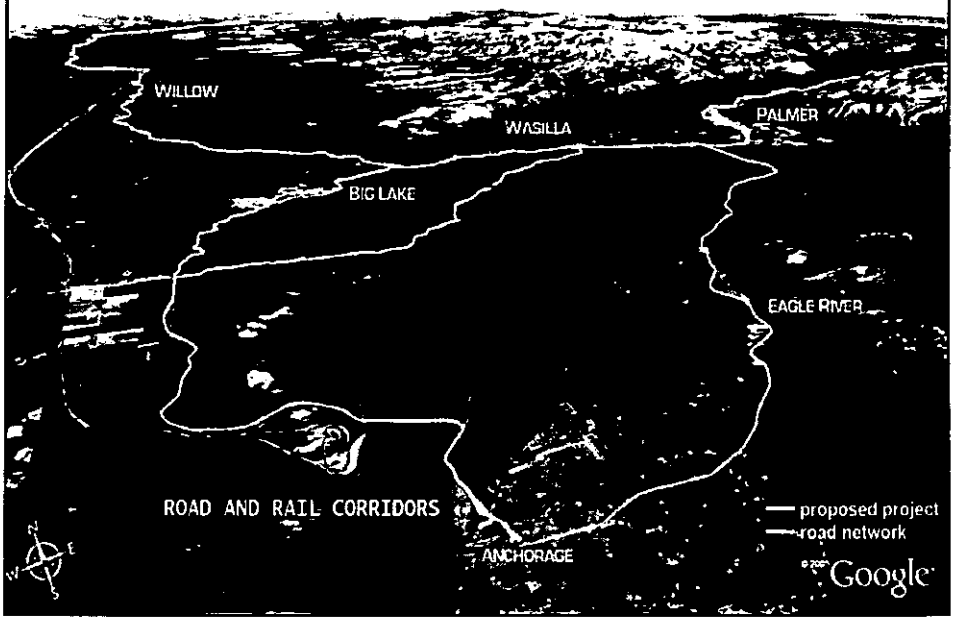
Southcentral Rail Exension Project

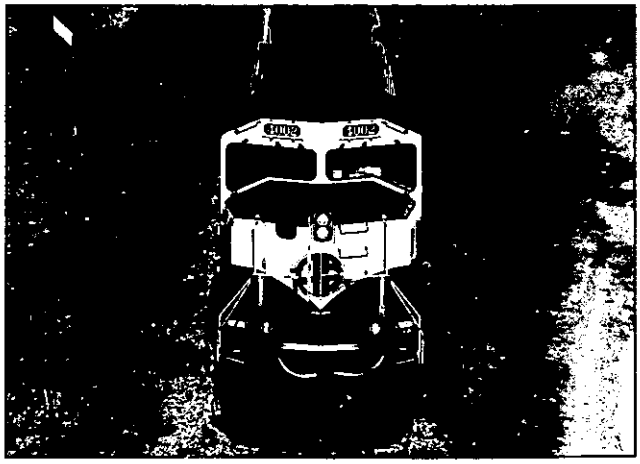
February, 2010



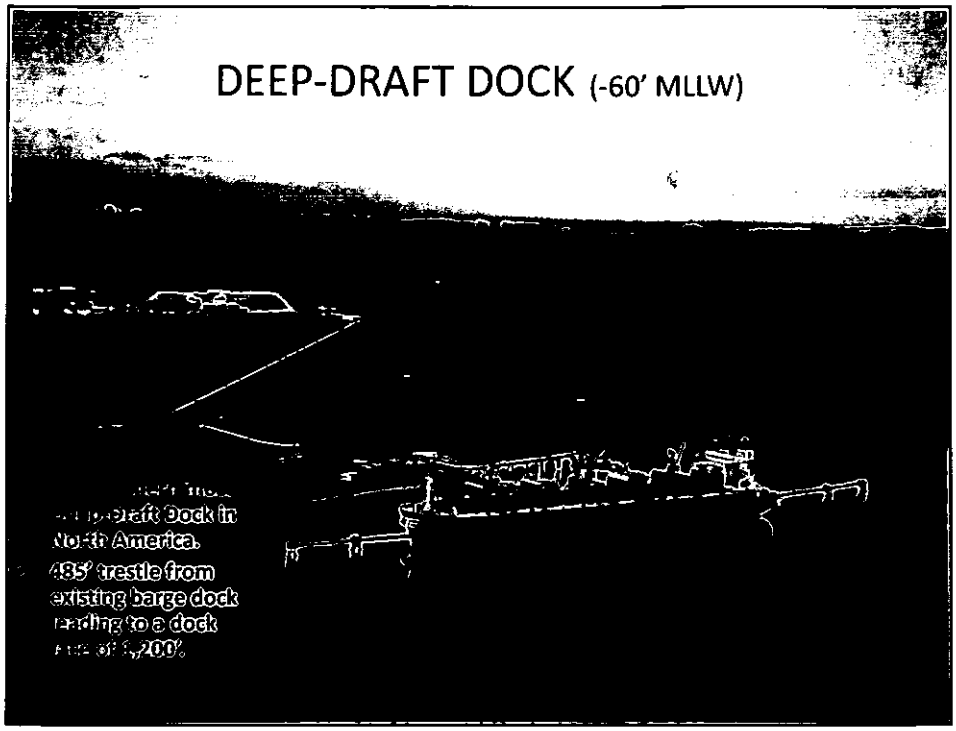
Location Map



South Central Rail Extension



DEEP-DRAFT DOCK (-60' MLLW)



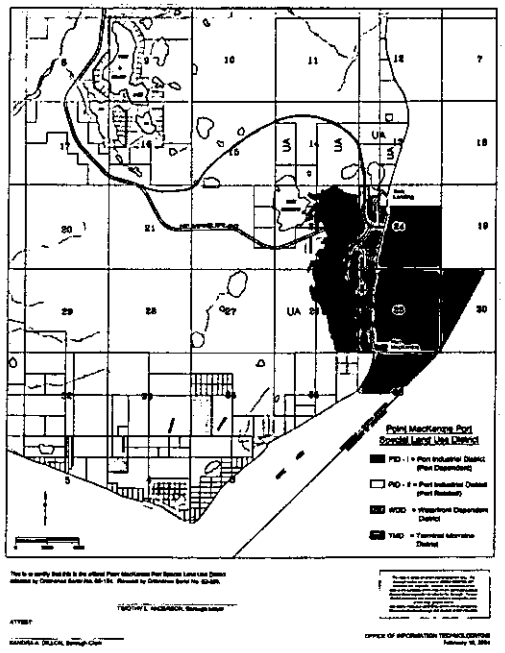
PORT DISTRICT

8,940 Acres

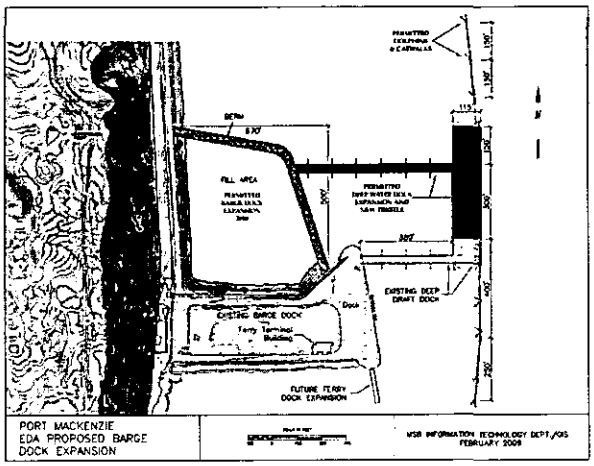
Commercial and Industrial Development

1,130 Acres

Borough Owned Tidelands

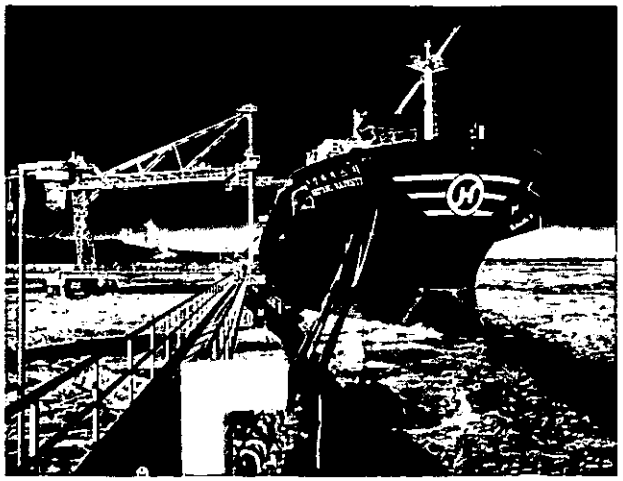


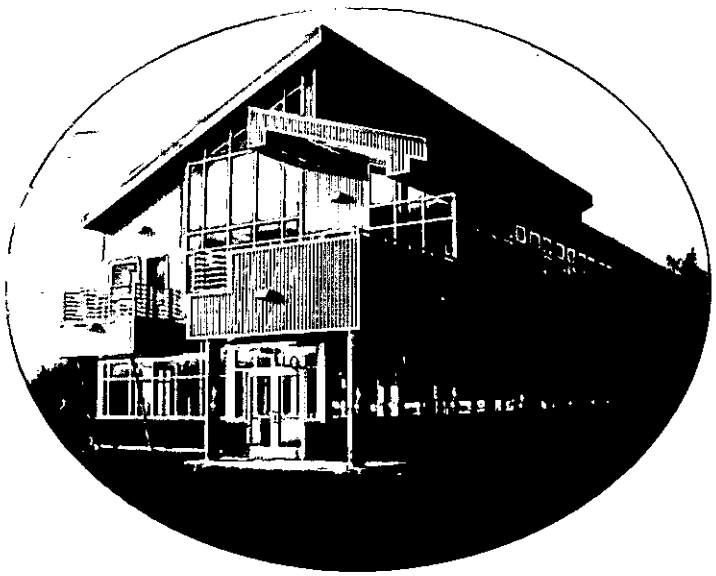
Permitted Expansion of Barge Dock and Deep-Draft Dock



Barge Dock to be constructed Summer 2010

Winter/Summer Operations

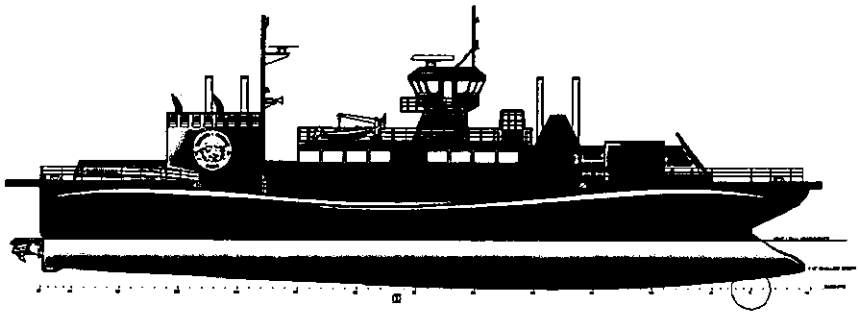




Port MacKenzie Ferry Terminal Building

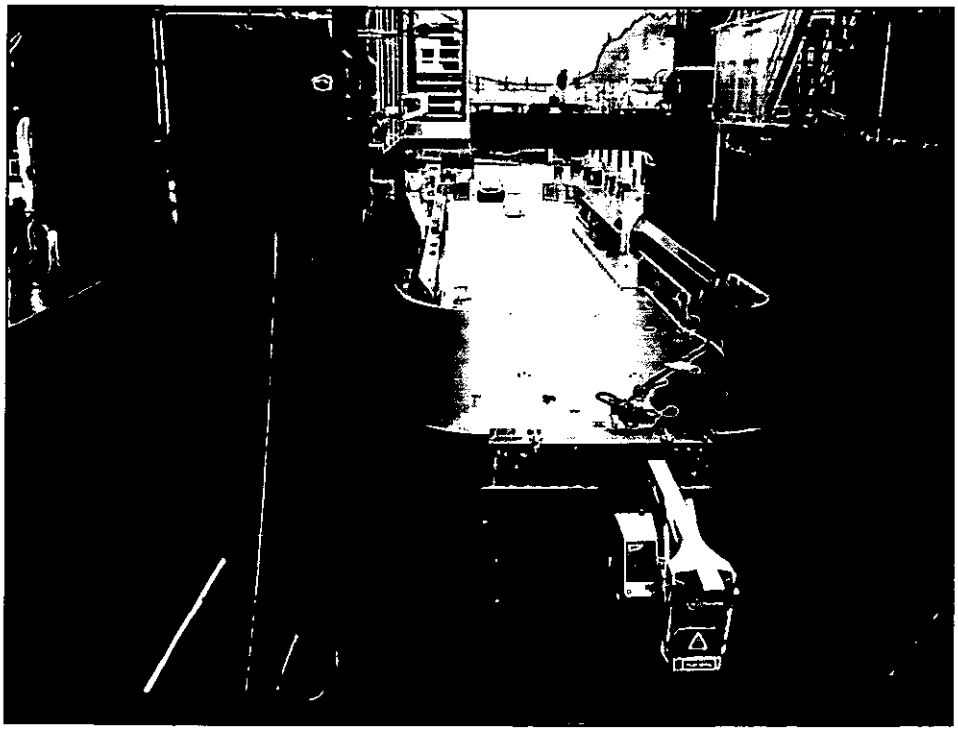
E-Craft

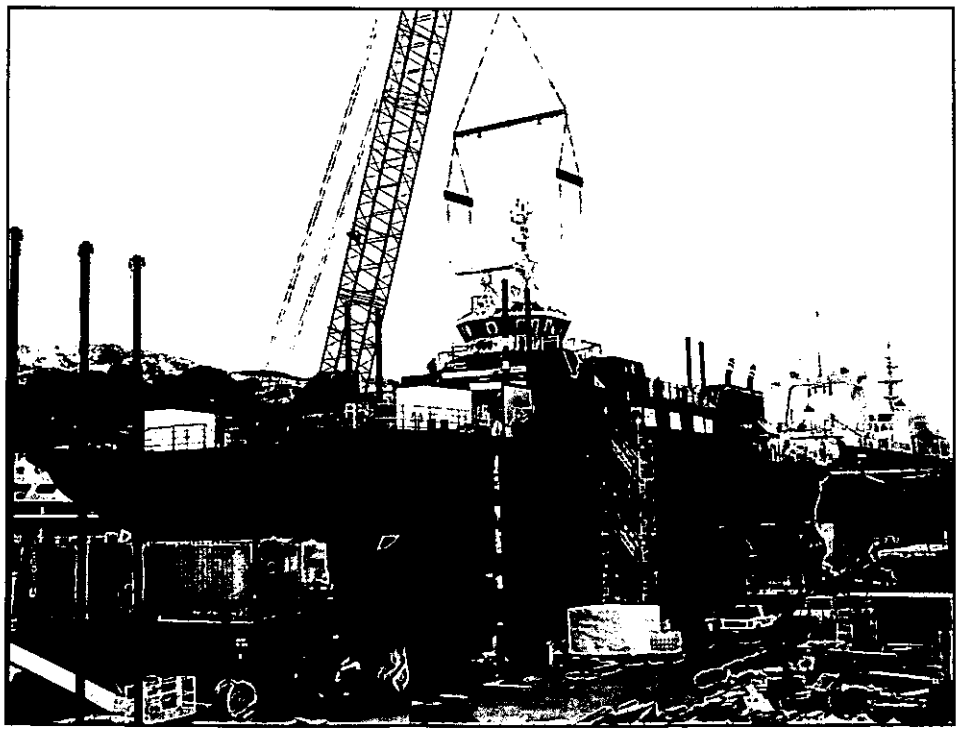
M/V SUSITNA



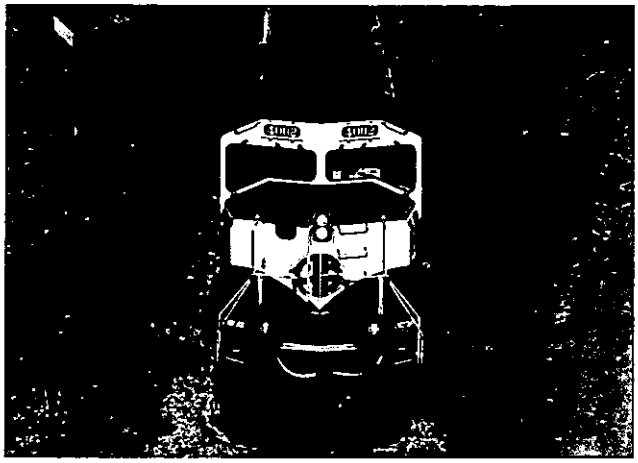
ASD
ALASKA
SHIP AND
DRYDOCK

ONR





South Central Rail Extension



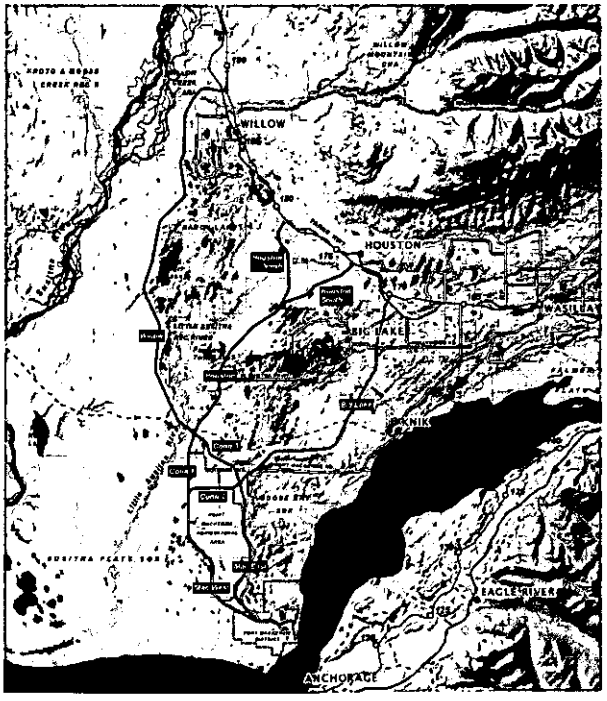
EIS Corridors Under Consideration

Draft EIS – Expected for public review in October 2009

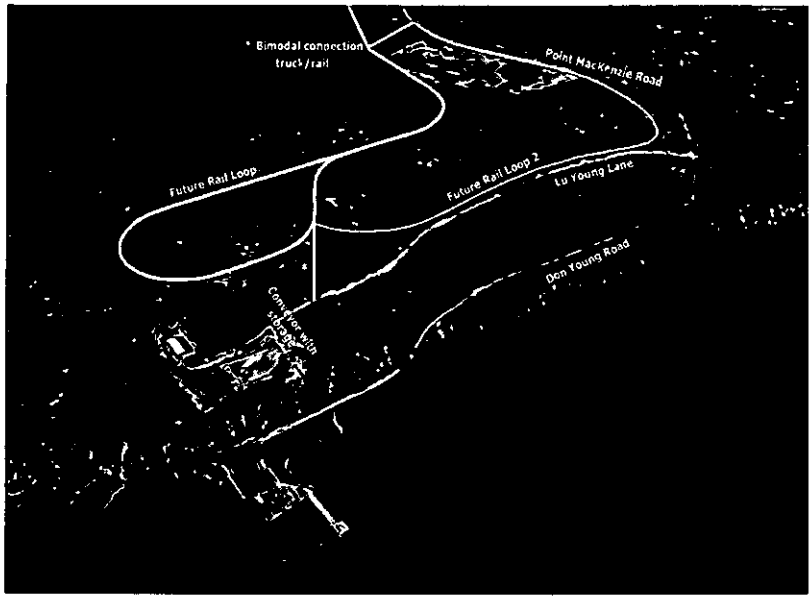
Final EIS – Expected in early Spring 2010

Note: These lines represent possible corridors and are subject to change.

3rd party contractor may arrive at additional routes as part of EIS process.



Rail Loop Under Construction

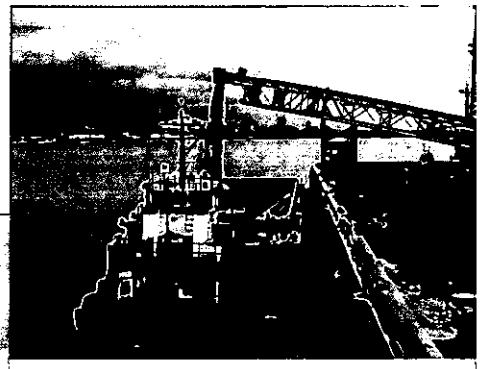


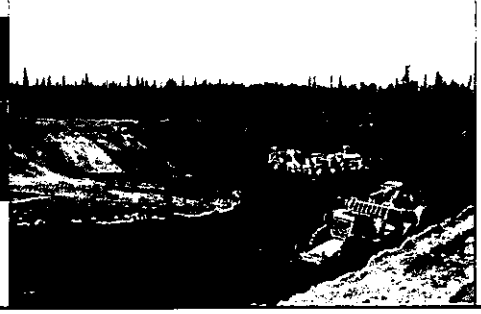
17

Gravel Excavation Project

451,000 tons for the Port of Anchorage Expansion Project

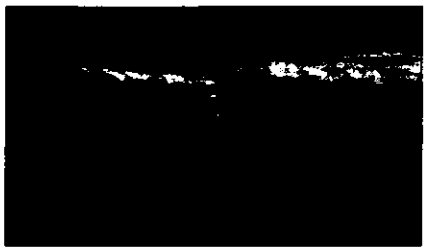
July 2008





Bi-Modal Alignment Spring Tree Removal

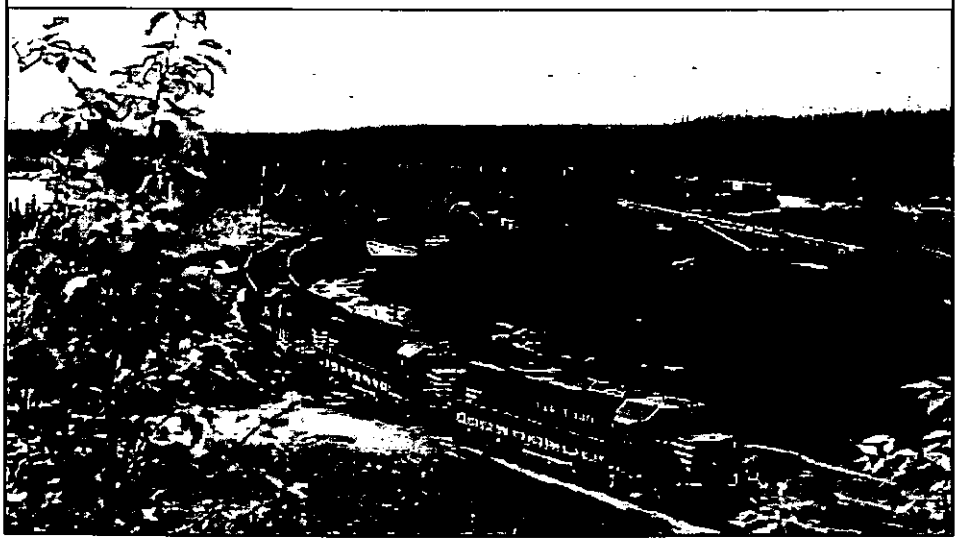
Summer Topsoil Removal Operations



Fall Excavation and Fill Work

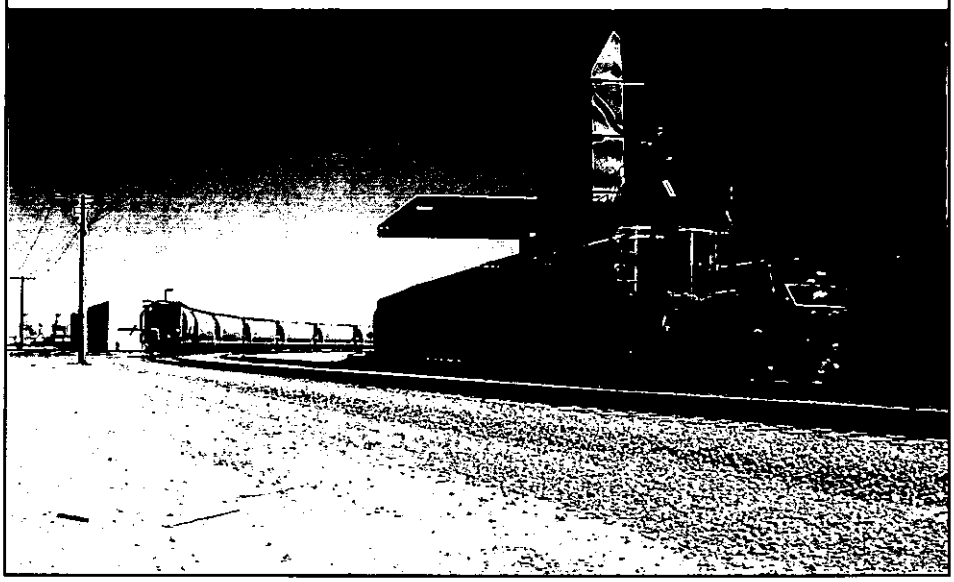
Port Mackenzie; the Shortest Distance to Tidewater

(Coal now has to travel to Seward)

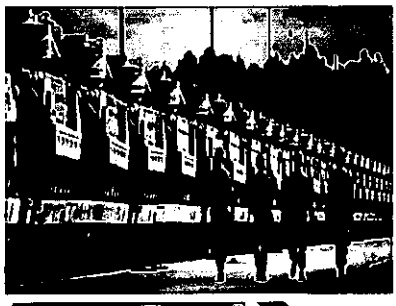


Only Alaskan Port with space for a Mile Long Rail Loop

(Example of loading cement on Loop Track)



Port MacKenzie - Military Logistics Option



Advantages and Savings of Using South Central Rail Extension to Port MacKenzie

- Transportation Savings.....$533 million
  (Benefit/Cost Ratio).....(1.9/1)
- Benefits to Alaska from New Mines
  - Gross Metal Value.....$172 billion
  - Community Benefits.....Permanent Jobs and Long-term Economic Engine
- State Revenue.....$6.3 billion

Summary of Rail Extension Statewide Benefits

- Supports Gas Pipeline Construction (mainline & spur line)
- New Interior Resource Development Opportunities
  (Benefits are $61M to $737M per year for 100+ years)
  - Limestone
  - Portland cement manufacture
  - Strategic Minerals (nickel, molybdenum)
  - Improved global price competitiveness of Alaska coal
- Transport Low Sulfur Fuel North (Interior, Southwest Alaska, North Slope)
- Alternate rail link to Interior (military mobilization/natural disaster /terrorism)
- Decreased rail congestion (Willow to Anchorage)
- Diversified Economy

Rail Project Project Scheduling

- ✓ **Phase 1** – EIS - **$10 Million**: 2007-2009
- ✓ **Phase 2** – Bi-Modal Loop & first 11 mile segment - **$17.5 Million**: 2008-2009
  - Permitting
  - Design of Bi-Modal Loop, Reserve and 11 miles
  - Right-of-way acquisition for Bi-Modal and 11 miles
  - Construction Bi-Modal Loop
- **Phase 3** – First 11 Mile Segment and EIS selected alternative – ($57 Million): **2010**
  - Construction of First 11 Mile Segment
  - Permitting, Design of EIS Selected Alternative
- **Phase 4** – EIS Selected Alternative – (*$150 Million): 2010-2011
  - Construction
- **Phase 5** – Track and Ancillary Facilities – (*$41 Million): 2012
  - Construction (laying rail, installing signals, etc.)
  - Project Completion Fall of 2012

*Note: Projected cost of $274 is expected to be adequate. Cost will be dependent on alternative selected in EIS

Southcentral Rail Exension Project

February, 2010