A New Transportation System in the U.S. Arctic

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A New Transportation System in the U.S. Arctic…

- Two phenomenon have become pronounced in recent times:
  - Abatement of Sea Ice
  - "Globalization"

- Result:
  - Perception of new economic opportunities in the Arctic
    - Shipping
    - Mineral Resource Development

A New Transportation System in the U.S. Arctic…

- Various modes of transportation needed for development activities

- Each mode requires specific facilities to support it (i.e., *transportation infrastructure*)
  - E.g.:
    - Shipping – harbors, aids to navigation, etc.
    - Rail – yards, tracks, etc.
    - Air - runways

- So, **WHAT** should be built **WHERE** to support economic development if the U.S. Arctic region?

A New Transportation System in the U.S. Arctic…

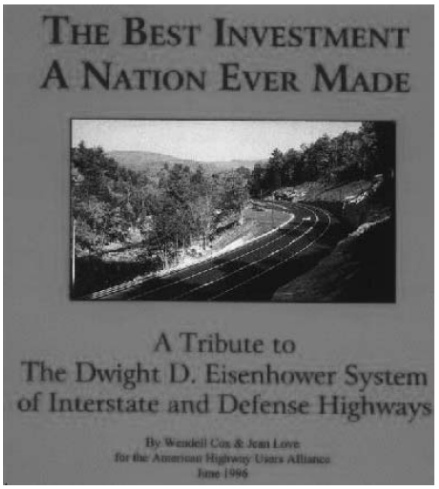
- **WHAT** should be built **WHERE** …?
- This is the theme of my presentation today
- Goals:
  - Define a ***transportation system***
  - Convey the idea of a ***customer base***
  - Inspire a willingness to consider novel approaches

A. Economic Benefits of a Transportation System

- Ability to transport
  - Move goods and people from 'A' to 'B'
    - People can go to/ from work
    - Goods produced somewhere; and sold elsewhere
  - The capacity to which goods/ people can be moved and interconnectivity of a transportation system directly affects economics of the transportation system
    - Cart trails vs. Disjoint network of unimproved roads vs. Paved highway system

A. Economic Benefits of a Transportation System

- Ability to transport
  - National Highway System
    - Great example of the economic benefits of a transportation system that drastically increased capacity and interconnectivity within a nation.



Ike's Interstate
Anniversary o
Highway Syste
Recalls Eisenh
Role as Catal

By David A. P

A. Economic Benefits of a Transportation System

- Benefits of the Eisenhower Interstate System
  - Drastic increase in interstate and intrastate commerce
  - Enhanced the quality of life for the individual
    - Goods more readily available
    - Goods more economical
  - Increased exports
    - Food
    - Manufactured products
    - Raw materials


Canada
Mexico
The Bahamas
Salem
Sacramento
Salt Lake City
Denver
Phoenix
Saint Paul
Madison
Lansing
Des Moines
Lincoln
Topeka
Springfield
Columbus
Oklahoma City
Little Rock
Jackson
Baton Rouge
Austin
Montgomery
Atlanta
Columbia
Raleigh
Richmond
Tallahassee
Boston
Hartford
Providence
Alaska
Anchorage
Hawaii
Puerto Rico
0 250 500 Miles
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U.S. Department of Transp
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FHWA: Effective October
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Department of Defens
Water

B. Transportation 101: What is a Transportation System?

- Infrastructure required to convey goods and people from 'A' to 'B'

- A transportation system exists to provide **service** to **customers**
  - *Customers* are users of the system
  - Customers require particular *types of service*

B. Transportation 101: What is a Transportation System?

- Infrastructure required to convey goods and people from 'A' to 'B'

- The physical transportation system is comprised of **transportation corridors**
  - *Transportation corridors* provide *levels of service*
  - E.g., levels of service:
    - Vehicles per hour
    - Tons of freight per month
    - Kilowatts
    - Barrels-per-day

C. WHAT should be built WHERE?

- Infrastructure required to convey goods and people from 'A' to 'B'

- Having identified the customers;
- defined the type(s) of service required by the customer(s);
- And, the levels of service required for economic viability,

- the answer to **"WHAT should be built WHERE?"** should be obvious!
- This exercise has not occurred in Alaska….

C. WHAT should be built WHERE?

Hypothetical examples of what might be needed where.

– Themed on:

Getting goods from ***THE ARCTIC TO MARKET***….

› The following are hypothetical scenarios

– Purpose: to demonstrate the transportation system and corridor concepts describe previously
– Demonstrate scenarios with a customer base
– Makes use of destinational shipping

C. WHAT should be built WHERE?

Hypothetical Scenario: Western Arctic Corridor

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Hypothetical Scenario: Western Arctic Corridor

CUSTOMERS:
- O&G Industry
- Mining Industry
- Local Communities
- Fed: DHS, NOAA, DOD, NSF
- Other Nations?

REVENUE STREAM:
- **Tariffs**
- **Royalties**
- **Leases (space/use)**

TYPES OF SERVICE:
- Dry bulk transport (mining)
- Liquid bulk transport (O&G)
- Transport goods and supplies (NOAA, DHS, NSF, civilian communities, other nations operating in arctic)
- Energy Distribution (Local Communities)
- Communications (Local Communities)

LEVELS OF SERVICE:
- Dry bulk transport – required tons/ day
- Liquid bulk transport – required bbl/day; cu. ft./day
- Transport goods and supplies – deliver required cargo is needed

C. WHAT should be built WHERE?

Hypothetical Corridor: Western Arctic Corridor

WHAT is need
WHERE (inclu
support servic

- Production F
- Subsea Pipe
- Mining
- Potential Po
- Lightering Terminal
- Multimodal

C. WHAT should be built WHERE?

Hypothetical Corridor: Western Arctic Corridor

WHAT is needed
WHERE (includin
support services

- Multimodal Cor
  - Dry bulk – rail
  - Liquid bulk –
  - Supplies (via
  - Energy
    - n.g. pow adjacen areas
    - Electricity distribute corridor
  - Comm.
    - Commun hub in No distribute corridor optic

C. WHAT should be built WHERE?

Hypothetical Corridor: Aleutian [mineral] Transshipment Port

Credits: The Custom-House: The U.S. in the World Economy
http://benmuse.typepad.com/custom_house/2007/01/on-the-north-pa.ht

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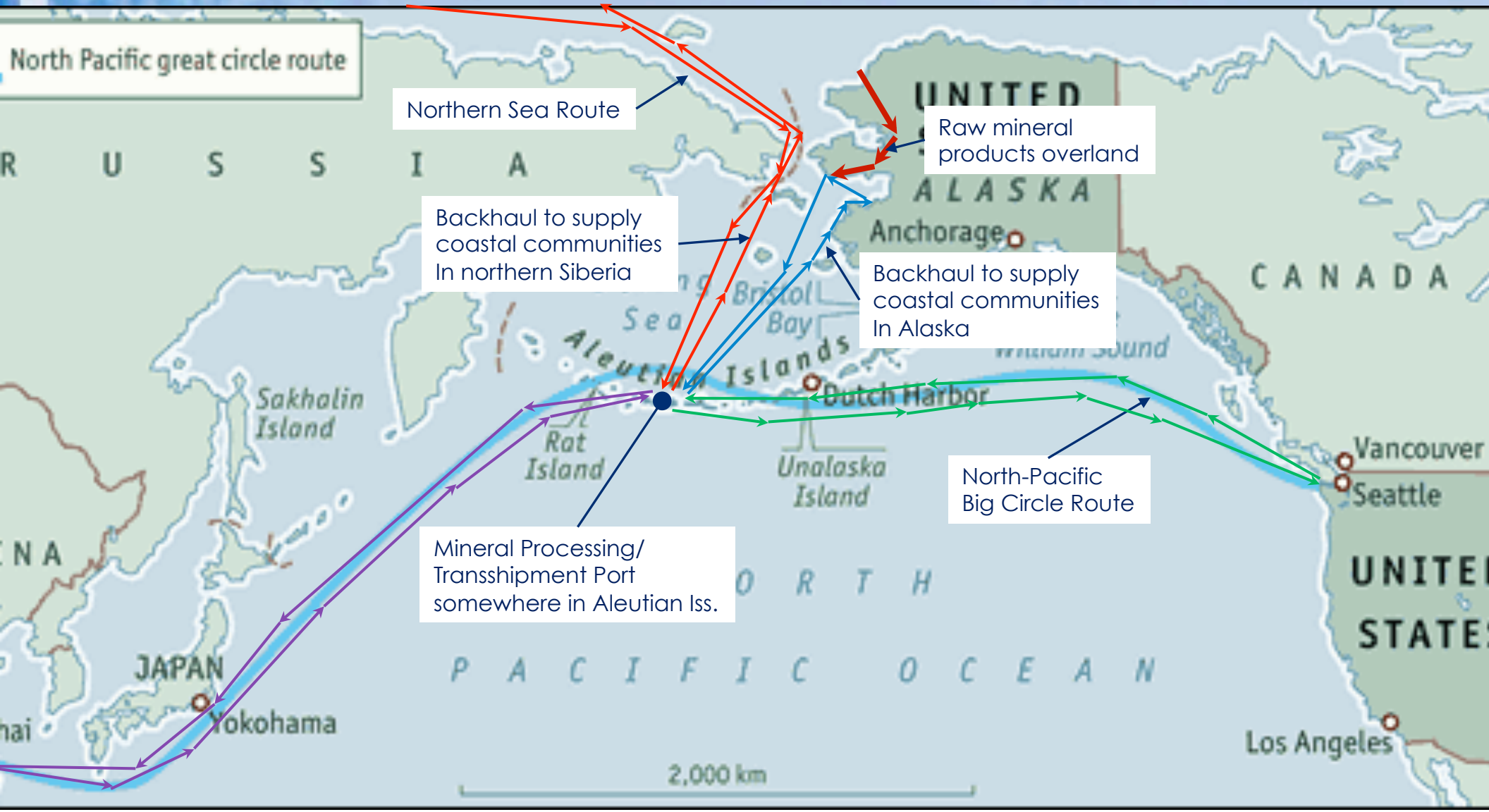


C. WHAT should be built WHERE?

Hypothetical Corridor: Aleutian [mineral] Transshipment Port

CUSTOMERS: O&G Industry
Mining Industry
Coastal Communities

TYPES OF SERVICE:

- Collection/ Redistribution of dry bulk products (mi
- Collection/ Redistribution of liquid bulk products(C
- Pre-processing/ Refining of products (mining, O&G
- Collect/ Redistribute goods and supplies for coast communities in Alaska and northern Russia

REVENUE STREAM:

- **Tariffs**

LEVELS OF SERVICE:

- Dry bulk throughput – required tons/ day
- Liquid bulk throughput – required bbl/day; cu. ft./
- Transport goods and supplies – deliver as backha
- Pre-processing/ refining of mining materials (abun geothermal energy)

C. WHAT should be built WHERE?

Hypothetical Corridor: Aleutian [mineral] Transshipment Port

WHAT is neede
WHERE (includ
support service

- [Mineral]
  Transshipmer
  +
  Refining Faci

C. WHAT should be built WHERE?

Hypothetical Scenarios

- Take-away points
  - **A higher level assessment of transportation needs should occ prior to building transportation assets**
  - Consider a transportation system and its corridors vs. individu assets (a road, a port, etc.)
  - An **economic study** not an engineering exercise

C. WHAT should be built WHERE?

Hypothetical Scenarios

- Take-away points
  - Western Arctic Corridor
    - Derive a revenue-generating "customer base" through thoughtful cor layout
      - WAC was routed through both O&G and mining opportunities
    - Don't plan/ design the system piecemeal – NEED A COMPREHENSIVE F
      - WAC requires **port(s) + connecting infrastructure** (e.g., upland transportatio corridor) to generate throughput (revenue)

Hypothetical Corridor:
Aleutian [mineral] Transshipment Hub

- Take-away points

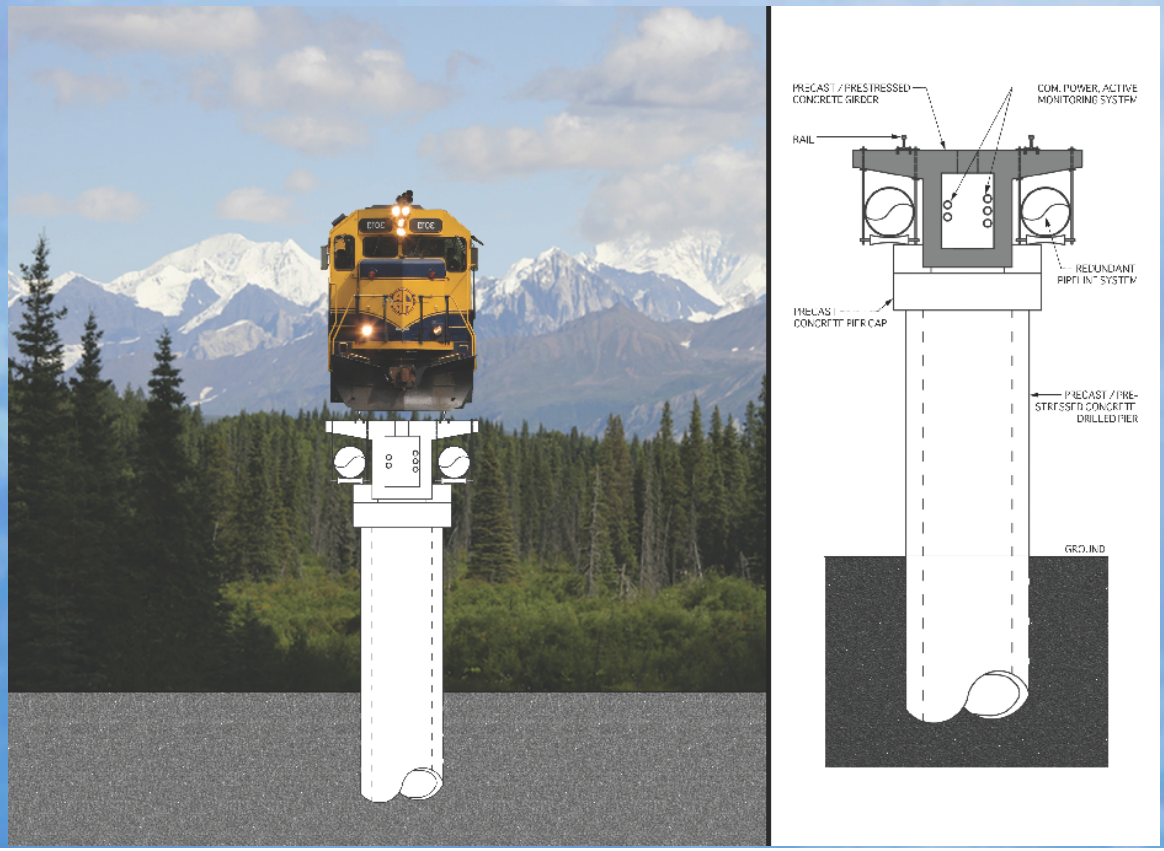
  - Aleutian Transshipment Port
    - Look for low hanging fruit - [Relatively] Modest initial investment
    - Leverage existing transportation system/ corridors:
      - Natural confluence of existing and emerging shipping corridors.
    - Find Partners
      - Russian Federation should have an interest in this (promotes Northern Sea R
    - Look for Political Capital
      - Supply coastal communities via backhaul – reduction in costs to communit
    - Consider unique characteristics of your situation
      - Use geothermal energy to enrich products from the north

D. Not your grandparents infrastructure…

- Cold regions are a challenging place to build/ maintain transportation infrastructure
  - Just because it worked 'then' and 'there' doesn't mean it will work 'here' and 'now'….
- Regulatory environment is more than challenging
- Embrace new technologies
- Consider novel approaches

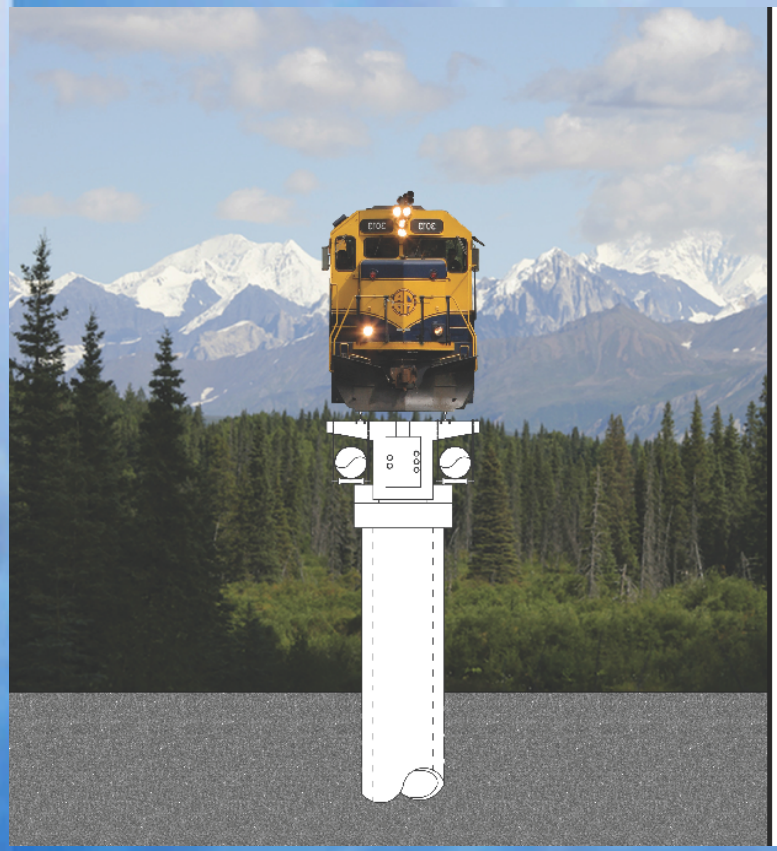
D. Not your grandparents infrastructure…

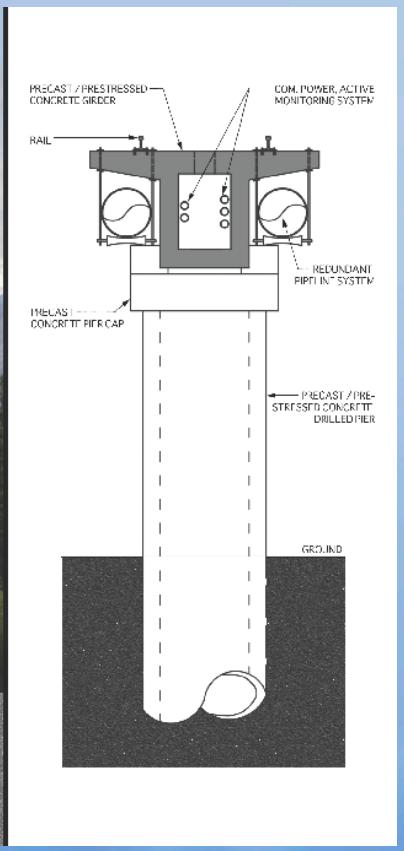
› *A transportation system in the arctic may not look like transportation infrastructure anywhere else, due to the demands placed on it and scrutiny it will receive.*



D. Not your grandparents infrastructure…

› *Western Arctic Corridor Concept*





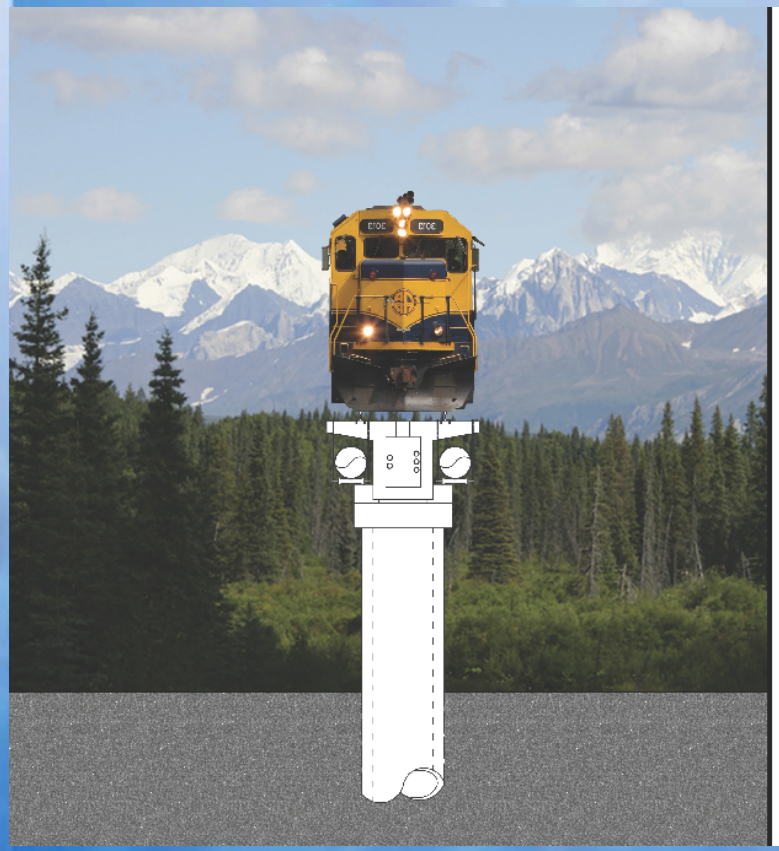
Multimodal Corridor

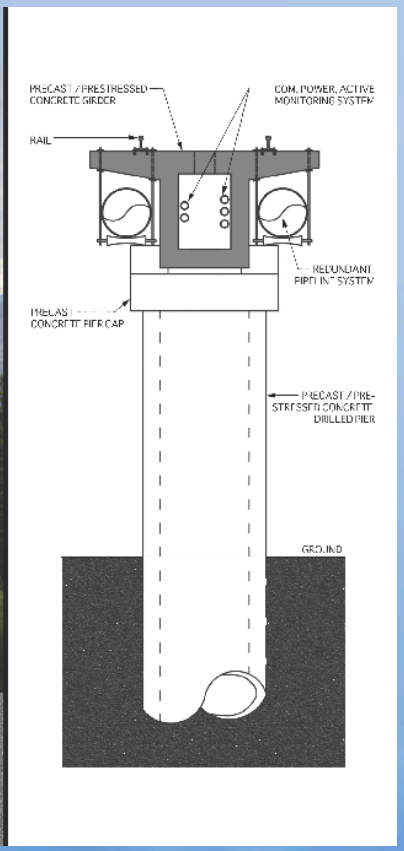
Integrated rail, pipeline, energy and commu corridor

- Dry bulk – rail
  - *Elevated rail*
  - *Trains are electric*
- Liquid bulk – pipeline
  - *Elevated pipelines*
- Energy
  - Electricity distributed from cor
    - *Power lines inside box girder*
    - *"spur-off" to adjacent commur*
- Comm.
  - *Fiber optic within box girder*
  - *"spur-off" to adjacent communities*

D. Not your grandparents infrastructure…

› *Western Arctic Corridor Concept*





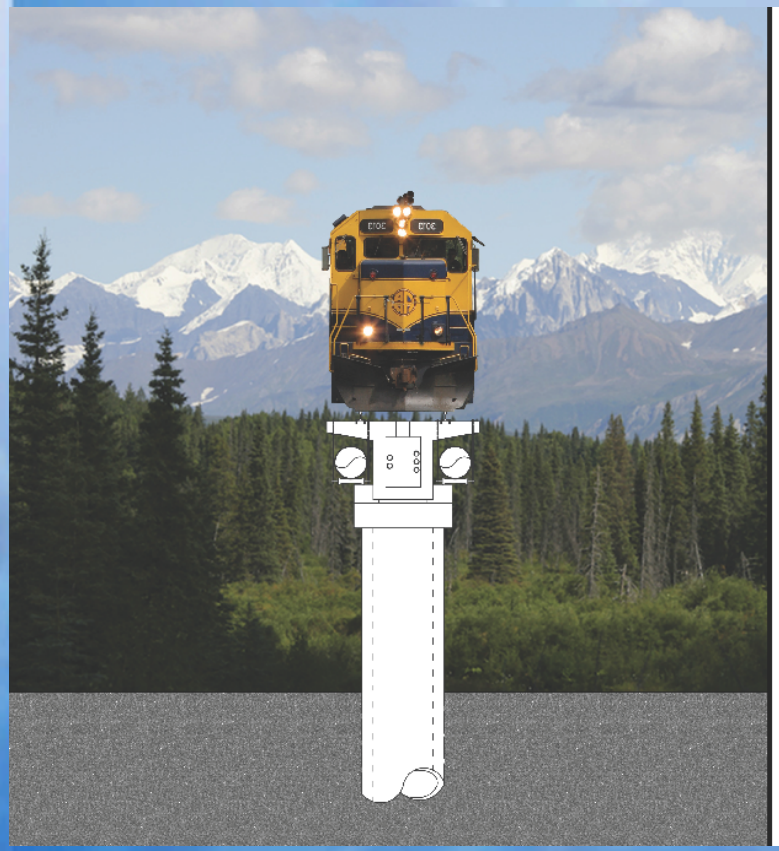
Multimodal Corridor

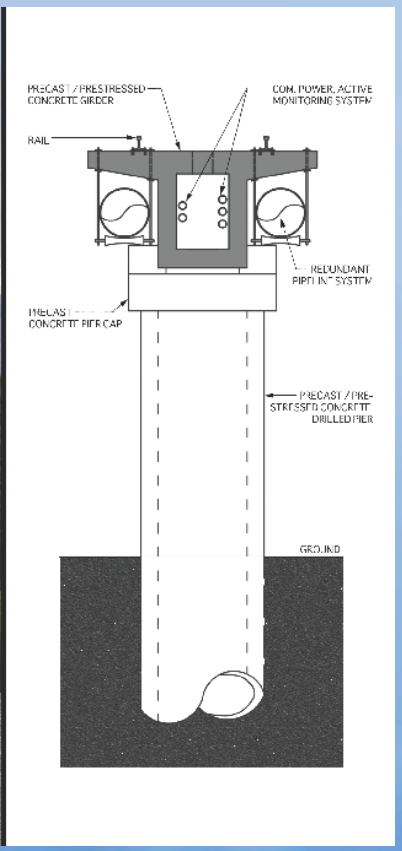
Integrated rail, pipeline, energy and commu corridor

- Construction
  - *Pre-cast concrete construction*
    - *Piers and girders fabricated o*
  - *"Launched" modular construction*
    - *"Build next section from atop section you just built…."*
    - *Minimal disturbance to the la*
- Minimal environmental impact
  - *Small footprint compared to shado*
- Costs (vs. traditional construction)
  - *Expect larger initial cost*
  - *Minimal annual costs (maintenanc*
  - *Relatively low cost to decommissio*

D. Not your grandparents infrastructure…

› *Western Arctic Corridor Concept*





Multimodal Corridor

Integrated rail, pipeline, energy and comm corridor

- Climate Change
  - *This model can accommodate it*

D. Final Thoughts…

- The corridor concept

REF: Zasypkin - Northern latitude route railway…ac to Russian resources

  - Russia has adopted this approach[Zasypkin presentation]
    - Aimed at getting arctic resources to market
  - Finland-Norway rail corridor
    - "Arctic Train Would Open Up Arctic Potential"
      - Barents Observer. February 13, 2015
  - Churchill Gateway [corridor]: 1931

D. Final Thoughts…

- Who should [and should not] lead a high-level system study?
  - Should
    - Economists
    - Logisticians
    - Financiers
    - E.g.: Institute of Social and Economic Research (ISER)
  - Should Not
    - Engineers
  - However, engineering professionals may be need to provide technical input; but not as leads.

D. Final Thoughts…

- Who should manage these systems/ corridors
  - Western Arctic Corridor
    - Candidate for the "Port Authority" model
  - Aleutian Transshipment Hub
    - Candidate for a private corporation
      - Purchase raw materials from arctic
      - Enrich with geothermal energy
      - Sell enriched product to Asia and North America
      - *Overall reduction in carbon load with respect to conventional practice*
        - Selling point for project

D. Final Thoughts…

- Don't go-it alone!
  - Brooks Range Coal
    - A number of attempts [by individuals]
    - …without success…
    - Would collaboration with other interests in the region make coal production viable??

› Thank you!