ALASKA – CANADA RAIL LINK STUDY

MULTIMODAL PORT ACCESS
WORK PACKAGE B2 (g)
ALTERNATIVES ASSESSMENT

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Prepared for:

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ALCAN RaiLink

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1.0 Introduction

This report is part of the Alaska Canada Rail Link Project and analyzes current ports and existing or proposed terminals in terms of servicing the increased potential natural resource development that will be associated with the proposed Rail Link. Inland truck and rail transportation needed to carry higher volume bulk natural resources from source to overseas markets, and for inbound supplies to reach resource developments, will be limited or facilitated by port and terminal access.

This analysis reviews the ports and terminals identified and assessed in the Port Access Data Development and Operations Evaluation Reports in Work Packages B2 (a) and B2 (d) in the context of their ability to accommodate identified resource development potential.

This resource development potential is defined as ranging from approximately one million tonnes annually (i.e. Cash Minerals) to 15 to 20 million tonnes annually (i.e. Crest iron ore) or large scale potential coal mines in the region.

Appendix A provides illustrations and technical information on marine terminals ranging from the Roberts Bank Outer Port near Vancouver to the Voisey's Bay Nickel Company permanent port and facility in Labrador.

The analysis focuses on current and future terminal capabilities as identified in the previous Port Work Packages and the land transportation requirements needed to realize these terminal capabilities.

Port Group Area I servicing South Central Alaska (Anchorage, Port Mackenzie, Seward, Whittier, Valdez)

Port Group Area II servicing Southeast Alaska and the Yukon (Skagway, Haines)

Port Group Area III servicing Southern Yukon and Northern BC (Hyder/Stewart, Prince Rupert, and Kitimat)

After reviewing the Port Group Area I, II and III ports and terminals the report then expands on those particular ports and terminals where additional strategic infrastructure investment could be key to Alaska and Yukon resource development access to offshore markets with examples and order of magnitude estimates of the typical size and scope of terminal infrastructure that will be needed in each case.

This study also identifies planning information requirements and areas needing further analysis. This information is provided in Appendix B.

2.0 Port Assessment Overview

Southern Alaska and northern British Columbia ports included in this review are identified on the map on the following inserted page of the study region, titled “Multimodal Port Access Hinterland Area”.

<Electronic version of the Map available: P50854_W1_06AJan25_PORTS.pdf>

Key for consideration in determining potential to accommodate new, large volume natural resource shipments is connecting rail and highway infrastructure, contiguous back-up land for storage or staging and deep draft access to accommodate loaded bulk vessels.

2.1 Port Group Area I

For potential natural resource bulk shipments and regional intermodal traffic, **Port Mackenzie** and **Anchorage** have been identified as offering considerable upside potential to handle major bulk resource shipments. This is particularly true if they are developed as complementary ports taking into consideration back-up land expansion possibilities, existing or potential rail and road/bridge access and their geographic location relative to potential natural resource developments.

In the unlikely event handling high volumes of international container traffic from Asia bound for the US mid-west were contemplated, a high throughput container terminal connected to a Rail Link could be developed at Anchorage. This and the natural resource potential at Port Mackenzie and Anchorage are dealt with in more depth in Section 3 of this report.

Other ports in Port Group Area I include Seward, Whittier and Valdez. In terms of bulk natural resource shipments **Seward** currently handles outbound coal with some potential to expand but only incrementally. **Whittier** has little capability for volume bulk shipments as is the case for **Valdez**.

All ports in this group currently have intermodal and project cargo facilities with considerable in-place capacity to handle any foreseen increased volumes necessary to meet increased regional re-supply demand, and in some cases, short term special project cargo imports such as steel pipe over 18 to 24 months. In addition, this Port Group Area I catchment area is well served with existing inbound and outbound liquid petroleum terminalling infrastructure, again with capacity to service the area and to meet anticipated growth in demand.

2.2 Port Group Area II

Again, the ports in this economic catchment area, Haines and Skagway have sufficient in-place capacity to meet normal growth in regional intermodal demand with potential to accommodate short term special project cargo such as steel pipe.

Haines has the potential to develop capacity to meet increased resource development bulk terminalling requirements from Alaska and the Yukon while the **Port of Skagway** may be able to develop a capability to service some bulk commodity exports. In both cases considerable investment in land transportation infrastructure will be needed to meet any significant resource export demand. Potential for both Skagway and Haines is discussed in Section 3.

2.3 Port Group Area III

Ports in this catchment area include Hyder/Stewart, Prince Rupert and Kitimat.

With establishment of rail access to Hyder/Stewart in conjunction with the Rail Link, a proposed terminal at **Hyder** could easily meet the terminalling requirements of major large volume bulk commodity shippers or accommodate large scale international container movements from Asia to the US mid-west, should this be feasible given the geographic and transportation issues involved.

With limited contiguous land on which to accommodate bulk storage, **Stewart Bulk Terminals** has limited upside capability to handle increased mineral concentrates shipments. Available capacity from the present facility will increase in the short term as mineral concentrate shipments from its current two mining customers are, or will be in decline.

At **Prince Rupert** the existing **Ridley Terminals Inc** has major upside potential to handle compatible high volume outbound resource shipments such as coal and petroleum coke or iron ore as does the adjacent **South Kaien Island** greenfields site. Also in Prince Rupert, construction of a new container terminal has commenced at **Fairview Terminal** which will create major capacity within the next few years for the international movement of container traffic from Asia to the US mid-west via existing main line rail.

The **Port of Kitimat** has potential to handle smaller volumes of break-bulk or higher value, low volume bulk shipments compatible with existing pulp exports handled at the **Eurocan** forest products terminal, plus major volumes of various liquid petroleum products mainly linked to pipeline expansion or proposed new pipeline projects.

The potential for terminalling developments at Hyder and Prince Rupert is reviewed in Section 3.

A summary of the existing capability, and more importantly, the potential to accommodate terminal growth for passenger, break-bulk and intermodal freight, dry bulk and liquid bulk products throughout the region is outlined in the following Port Capacity Assessment Matrix on the following page.

Passenger traffic is included in the matrix simply to identify ports with significant domestic or cruise passenger traffic. Similarly liquid bulk traffic is identified in the matrix to set out those ports where this traffic is significant.

Port Capcity Assessment Matrix

Group	Port	Passenger Traffic		Breakbulk Freight		Intermodal Freight		Dry Bulk Products			Liquid Bulk Products	
		Regional Transport	Cruise Market	Regional / Local / Project	International Trade	Regional / Local Supply	International Trade	Small Volume	Medium Volume	High Volume	Regional / Local Supply	International Trade
Group I	Anchorage, Alaska	**Existing**	**Existing**	**Existing**	**Existing**	**Existing**	Potential	**Existing**	Unlikely	Unlikely	**Existing**	Unlikely
Group I	Port Mackenzie, Alaska	Unlikley	Unlikely	**Existing**	Potential	**Existing**	Unlikely	**Existing**	Potential	Potential	Potential	Potential
Group I	Whittier, Alaska	**Existing**	**Existing**	**Existing**	Unlikely	**Existing**	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
Group I	Seward, Alaska	**Existing**	**Existing**	**Existing**	Unlikely	**Existing**	Unlikely	Potential	**Existing**	Unlikely	**Existing**	Unlikely
Group I	Valdez, Alaska	**Existing**	Unlikely	**Existing**	Unlikley	**Existing**	Unlikely	**Existing**	Unlikely	Unlikely	**Existing**	**Existing**
Group II	Skagway, Alaska	**Existing**	**Existing**	**Existing**	**Existing**	**Existing**	Unlikely	Potential	Potential	Unlikely	**Existing**	Unlikely
Group II	Haines, Alaska	**Existing**	Potential	**Existing**	Potential	**Existing**	Unlikley	Potential	Potential	Unlikely	**Existing**	Potential
Group III	Hyder, Alaska	**Existing**	Unlikely	Potential	Potential	Potential	Potential	Potential	Potential	Potential	Unlikley	Unlikley
Group III	Stewart, British Columbia	**Existing**	Unlikely	Potential	Unlikley	Potential	Unlikely	**Existing**	Unlikley	Unlikely	Unlikely	Potential
Group III	Kitimat, British Columbia	Unlikely	Unlikely	Potential	Potential	Potential	Unlikely	Potential	Unlikley	Unlikely	**Existing**	**Existing**
Group III	Prince Rupert, British Columbia	**Exisitng**	**Exisitng**	Potential	Potential	**Existing**	Phase 1 Development	Potential	Potential	**Existing**	Potential	Potential

3.0 Assessment of Strategic Port Opportunities

3.1 Port Group Area I

Anchorage and Port Mackenzie each have unique challenges and opportunities which, with the right additional road and rail infrastructure additions/improvements, could enable them to become very complementary ports.

3.1.1 Port of Anchorage

The Port of Anchorage has advantageous road and rail access with proximity to 80% of Alaska's populated area. Urban growth next to the port area limits expansion possibilities. However a plan in place to increase the port area land footprint by filling in the current foreshore area would considerably increase total available contiguous terminal support land. Taking into consideration city growth and existing residential pressure, this added land base could support organic growth of existing multi-products handled through the port plus, if needed, provide the basis for a new major international intermodal terminal with capacity to handle significant container traffic from Asia destined for the US mid-west.

Development of a bulk natural resource handling capability (such as for high volume coal or iron ore) would seem problematic here given the 'industrial' nature of these materials and their need for low cost, high throughput terminalling which, in this case, would be in an urban residential environment.

For example, a two berth container terminal suitable for Post-Panamax vessels would comprise of a 1975 foot (600 metre) berthing structure with 52 feel (16 metres) depth at low water, back up lands of at least 80 acres (32 Ha), six gantry cranes, an intermodal rail yard and mobile handling equipment and the gate-office-security system. Indicative cost for this type of terminal is in the magnitude of US$ 250 million.

Development in Anchorage (and Port Mackenzie) must reflect and accommodate the laden vessel draft limitations posed by Knik Shoal. In 1999 Knik Shoal was dredged to a depth of minus 42 feet (13 metres) and this improved state has been maintained. This

depth allows for loaded Panamax vessel passage without tidal delay and up to 125,000 DWT loaded Cape Size carriers with tidal windows. This depth would also accommodate the passage of most international container vessels with some tidal delay.

3.1.2 Port Mackenzie

From an overall regional perspective, planning for major terminal development possibilities at Anchorage should take into consideration Port Mackenzie, almost directly across the Knik Arm channel. Exploiting the largely offsetting advantages and limitations of both ports could, for example, allow for an expanded regional intermodal capacity at Anchorage combined with significant additional bulk natural resource capacity at Port Mackenzie to service the Port Group Area I catchment area

Proposals for both a bridge connection between Anchorage and Port Mackenzie and an approximately 50 mile (80 km) rail extension to Port Mackenzie from the Alaska railroad mainline at Willow are actively underway. These infrastructure investments would greatly enhance the possibilities for development of a major bulk terminal at Port Mackenzie, and allow it and Anchorage to be truly complementary ports servicing major natural resource exports as well as regional intermodal and potentially international container traffic through the region.

A deep draft 60 foot (18 metre) berth is available and, as has been constructed already for bulk wood chip exports, plenty of backup land for storage and staging (up to 14 sq miles – 36 sq km) is available to support large volume resource exports such as coal, mineral concentrates or iron ore.

Below is a photograph of Port Mackenzie in its present state of development.

For large volume throughput there is ample land area for a large, loop-track serviced stockpile to accommodate major volumes of low to medium value commodities, (such as

coal and iron ore). The development plan for the port includes provision for multiple conveying of bulk products to the existing berth.

Scope of increasing this facility would include site preparation of 100 acres, loop track, rail car dumper, stacker/reclaimer, environmental protection, conveyor system and shiploader. Indicative capital cost, depending on product mix, is estimated in the range of US$ 100 million to US$ 150 million. With this configuration, for example, Port Mackenzie would be capable of shipping at least 12 million tonnes per year.

3.2 Port Group Area II

As is the case in Port Group Area I with Anchorage and Port Mackenzie, the Group II Area ports of Skagway and Haines have challenges and opportunities which are largely offsetting. Skagway's advantage of good highway access and limited potential narrow gauge rail access for freight is offset by the reliance of the city on its major cruise ship tourism based economy and the cruise ship dependence on, and proximity to, existing and potential terminal facilities in the port.

On the other hand, Haines' advantages of available industrial land on sheltered deep draft tidewater with no urbanization or tourism conflicts is offset by no rail access and a much longer highway access distance to its hinterland compared to Skagway.

3.2.1 Port of Skagway

Two proposed projects have been identified to construct new or renewed natural resource dry bulk terminalling capacity on the site of the Port of Skagway ore dock. These two projects bracket the range of possibilities for the site. One, the Alaska Industrial Development and Export Authority (AIDEA) proposal, envisions a minimal investment to provide sufficient capacity for 1.2 million tonnes per year of coal and a relatively small volume of copper/gold concentrate. The project as designed provides little if any additional capacity for other bulk shipments and does not obviously address all the risks of damage to the tourism based activities with which it would be sharing the port. Furthermore, it may not overcome the urban/environmental concerns of the city and/or State as identified in Work Package B2 (d). (Approximately 920,000 cruise ship passengers visited Skagway in 2005 with 450 + cruise vessel calls over the five month cruise season).

A new conceptual bulk handling methodology being reviewed for the Skagway ore dock would minimize initial fixed terminal investment by employing self discharging barges which would then be towed to sheltered Lutak Inlet near Haines for transloading to deep sea vessels. The idea is that this method could be employed for smaller volume start-up operations and later replaced by fixed infrastructure as volume increases. A similar type of methodology is employed in Alaska to load Teck Cominco's Red Dog concentrate into Panamax vessels. However this is based on high volume rapid loading from stockpiles to large (5,400 DWT) self-discharging barges for high value lead/zinc concentrate. This methodology would be expensive and slow loading without a substantial terminal-based stockpile at Skagway. Furthermore, this technique would be limited to small transhipment volumes and hampered by uneconomic slow loading of typical large sized shipments required by deep sea vessels.

The Pacific Contract Company LLC concept to redevelop the ore dock for higher natural resource volumes and enhanced cruise ship berthage has the potential to more fully address the Skagway issues but may face major challenges in balancing the need to

balance the capital intensive physical requirements being contemplated for only mid range volumes (1.5 million tonnes of coal, 500,000 to 1.3 million tonnes of concentrates and project cargo) with the need for low terminalling costs required by most commodity shippers.

The additional land area that would be created by this project would be needed to support a loop track unloading system necessary to achieve adequate railcar unloading rates and minimize unit costs. This design capability needs to be confirmed. A similar bulk rail car unloading challenge caused by limited land area at Vancouver Wharves resulted in a unique spiral loop track unloading system being successfully employed using minimal area. The Pacific Contracting Company concept for the Ore Dock has even less land area available which may not allow for the design of a loop or spiral track arrangement.

A further concern is the steep foreshore slope common to river delta/fjord topography. This unfavourable hydrographic situation combined with uncertain geotechnical conditions and seismic criteria could further adversely affect economic feasibility. Finally, environmental permitting of marine based industrial facilities on a river estuary is problematic.

3.2.2 Port of Haines – Lutak Inlet

Based on existing road access and development of an approximately 250 mile (400 km) rail extension from the vicinity of Haines Junction, the Chilkoot Lumber Property and adjacent waterfront lands for sale in Lutak Inlet present an opportunity to construct a new bulk commodity terminal with capacity of up to an estimated six million tonnes depending on resource mix. The rectangular-linear nature of the total site would pose rail car receiving challenges for handling higher volume bulk cargoes however this could be overcome by a linear multi-track railcar/dumper system.

The concept for this terminal would involve extensive site preparation to create a “linear” terminal with some 60 acres of land. This concept would require a long linear rail yard combined with a rotary dumper in push/pull mode. Berthing structure(s) would be added offshore of the existing berth face. Conveyors, tracker/reclaimers and shiploader would also be required. Initial capital cost for this type of terminal is estimated to be in the magnitude of US$120 million.

A major issue needing resolution is the potential environmental cleanup challenge related to previous industrial use at the Chilkoot Lumber Property.

3.3 Port Group Area III

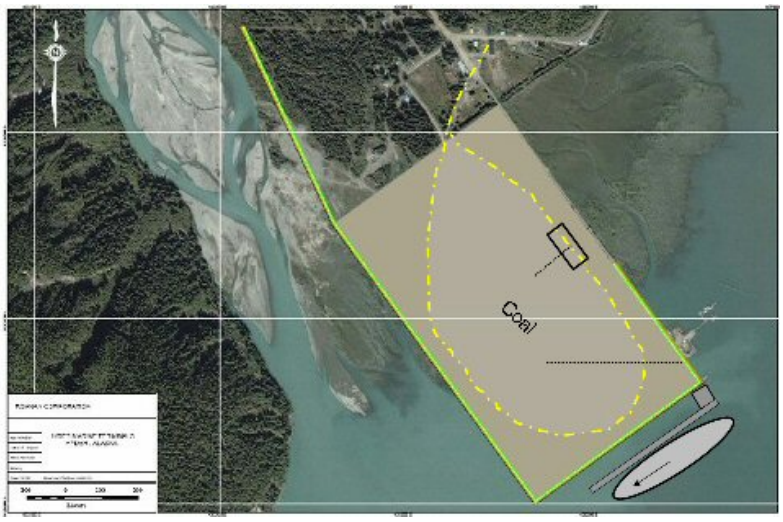
The ports of Hyder, Alaska and Prince Rupert, British Columbia (Fairview Terminals Inc, Ridley Terminals Inc and the South Kaien Island greenfields site) offer existing capacity and/or potential for major bulk natural resource commodity exports as well as international container traffic handling. Hyder's potential for significant volumes is dependent on construction of a lengthy rail connection to access the port. Ridley Terminals Inc has plenty of available bulk handling capacity connected to existing mainline rail while the South Kaien Island site could easily be similarly rail connected and developed for multi-products including bulk resource shipments. Fairview Terminal is currently under construction as a major container facility and is also already connected to mainline rail linked to the intercontinental railway grid.

3.3.1 Port of Hyder

Roanan Corporation is developing a proposal to construct a new large deep sea terminal at Hyder. This concept involves the creation of deep draft vessel berth(s) supported by approximately 125 acres (50 ha) of land for staging and/or bulk storage. A rail connection of roughly 300 miles (500 km) to integrate with the Alaska-Canada Rail Link options will be essential to support the unit train traffic that would be needed for large volumes of bulk natural resources or containers.

Conceptually, the Hyder concept would be to develop a single berth, loop track delivered bulk terminal for large volume receiving, stockpiling and loading of Cape Size vessels. Specifics include site filling/development, rail loop tracks/rotary dumper, stockyard stacker/reclaimers, berthing structure/shiploaders and environmental protection. Based on the comparative cost of development and equipping the Ridley Terminals Inc facility, the present equivalent cost of this Hyder concept is estimated to be in the magnitude of US$350 million.

The issue of obtaining environmental approval for major foreshore land reclamation on the estuary of the Salmon River is problematic.



3.3.2 Port of Prince Rupert – Ridley Terminals Inc

Ridley Terminals has in-place capacity to handle 12 to 15 million tonnes of coal annually (or other compatible bulk cargo such as iron ore). This can be increased to 26 million tonnes with additional investment in storage and handling capability depending on commodity mix (coal versus iron ore). The indicative incremental capital cost of expanding the Ridley Terminals Inc facility is estimate to be in the magnitude of C$180 million.

Current forecasts indicate that terminal volumes could reach 6 million tonnes over the next two years which leaves a capability for this terminal to accommodate upwards of 10 million tonnes of additional bulk commodity shipments in the near term.

3.3.3 Port of Prince Rupert – South Kaien Island

A range of development concepts have been prepared for this site over the past 25 years ranging from mixed dry/liquid bulk and break-bulk to a large scale container terminal. In this context, development of a three berth bulk terminal for mixed products up to 6 million tonnes per year is possible. Indicative capital cost for this facility is in the magnitude of C$150 million.

The aerial photograph above shows the Ridley Island outerport complex and the adjacent South Kaien Island property. The photo at the top of the next page shows the Ridley Island expansion potential area.

3.3.4 Port of Prince Rupert – Fairview Container Terminal

The Phase I conversion of the former Fairview multi-product facility to a major international container terminal is now underway with plans to be operational in the third quarter of 2007. This involves announced investments of C$110 million to construct the new terminal and C$60 million for equipment including three ultra-post Panamax container cranes. Canadian National Railway is committed to spend more than C$130 million to upgrade its northern mainline to accommodate the height of the double stacked container trains that will be employed to the U.S mid-west.

The new terminal is designed to handle 500,000 TEU's in Phase I with announced Phase II expansion up to 2 million TEU's.

4.0 Factors Influencing Development of International Intermodal Terminal Capacity in Alaska

4.1 Container Traffic Trends

Current international container traffic between Asia and North America is pushing existing container terminal capacity and expansions are taking place at every container port on the west coast of Canada, the United States, plus major new terminals projected for Mexico. All forecasts point to continued growth in containerized trade between Asia and North America and new container terminal capacity will be needed on the west coast, particularly to service trade between Asia (largely People's Republic of China) and the major consumer markets of the US mid-west. This growth has been identified as providing a possible opportunity for a major international container terminal development in Alaska.

Along with this growth in terminals, the major container shipping lines have been commissioning larger and larger ships to handle the growing volume and to achieve the economies of scale necessary to reduce unit costs. Typical are the ultra post Panamax vessels which will carry up to 8,000 TEU's. This will add to the need for new terminals designed to handle these large ships with high throughput handling necessary to accommodate them. This has also been identified as creating an opportunity for development of an Alaska container capability.

It should be noted that in light of recent container intermodal rate reductions related to current vessel carrying overcapacity in certain trades, some container lines have announced pullbacks from the larger ship trend. This is in recognition of the huge risks associated with having to fill larger vessels in the event of economic slowdown or oversupply of container vessel capacity in the trans-Pacific trades.

4.2 Alaska International Container Terminal Development Issues

Construction of the new Fairview international container terminal at Prince Rupert is now underway in response to container growth trends and should be recognized in any consideration of the international container development possibilities identified in Alaska at Anchorage/Port Mackenzie or Hyder. Assuming a completed Alaska Canada Rail Link, Anchorage's (and to a much lesser extent, Hyder's) apparent advantage would be a shorter ocean distance and ocean transit time to and from Asia (particularly Northern China) compared to Prince Rupert, offset by a longer rail transit time and distance to the US mid-west.

4.2.1 An Alaska Routing - Transit Time versus Cost

Container traffic routing decisions are largely based on achieving the fastest transit time at the least cost. This involves balancing relatively low ocean freight costs with relatively high inland rail freight costs. As mentioned above, future routing consideration to justify an Alaskan international container terminal will be in the context of the possible shorter ocean transit time to Alaska measured against a longer and more expensive rail transit time to US mid-west markets.

Potential for a possible one and one half day shorter ocean transit time from China to Anchorage/Port Mackenzie compared to Prince Rupert would be offset by an estimated two days longer rail transit time to Chicago compared to Prince Rupert. Normally, container shipping lines maximize the use of their vessels to travel by ocean as close as possible to market to minimize more costly rail transit. In any case, for Anchorage/Port Mackenzie, the advantage of the shorter ocean distance to China would be realized only if the carrying container ships were in pendulum service traversing directly between Asia and Anchorage/Port Mackenzie.

Only limited revenue containers for backhaul to China would be available in Alaska and it is reasonable to assume vessel routing considerations could include triangulation to more southern North American west coast ports where more return trade revenue containers would be available. This would negate the advantage of the shorter northern terminal ocean distance to/from Asia.

4.2.2 An Alaska Routing - Rail Connection Economics

The Alaska-Canada Rail Link will involve Canadian National (CN) Rail as the long haul rail carrier through Canada and the US to the Chicago area and beyond. CN is committing significant capital to creating double stack container rail capacity on their presently underutilized northern mainline to Prince George in order to service the new Prince Rupert container terminal. CN's interests will be to maximize volumes through this new service. Until sufficient container traffic demand develops to fill this capacity, dilution of container traffic on its northern mainline would not be in CN's interests.

4.3 Conclusion

Accordingly, with a major Prince Rupert container terminal coming on stream, demand for a similar facility in Anchorage/Port Mackenzie or Hyder would seem unlikely in the medium term and then only when overall international container traffic volume between Asia and the US mid-west increases sufficiently to stretch all existing and oncoming new container terminal capacity in Prince Rupert, Vancouver and the mainland US northwest coast.

5.0 Summary of Port Access Alternatives Assessment

Five ports offer potential to develop terminalling capacity for significant levels of commodity exports from Alaska and the Yukon, one for the catchment area serviced by Port Group Area I, two in Area II and two in Area III.

- **Port Mackenzie** requires access to the Alaska Rail system and improved road access (both of which are under active consideration) to upgrade its existing terminal to handle potential large scale bulk natural resource exports. Depending on the type and variety of resources handled, order of magnitude estimates indicate a 12+/-million tonne annual capacity could be developed for an investment in the range of US$100 million to US$150 million. Particularly if considered a complementary facility with the Port of Anchorage, Port Mackenzie has considerable potential to service future resource exports from the Port Group Area I catchment area.

- **Skagway** terminal development concepts have been proposed to handle bulk commodity exports through a limited land base at the ore dock in Skagway. These concepts range from the estimated US$20 million level to over the US$100 million range. The US$100 million concept may address some environmental and civic challenges however may not satisfactorily meet other technical challenges (particularly geotechnical/hydrographic conditions), specific environmental requirements or overcome civic issues and economic hurdles given the investment per tonne of capacity involved. The lower capital level project may not fully cover off the environmental and civic issues and would provide only limited potential for commodity exports from the region.

- **Haines**, **Lutak Inlet** offers a greenfields opportunity for a medium to large scale bulk terminal with annual throughput capacity of up to six million tonnes with an estimated investment of US$120 million. This potential is dependent on building a rail connection and integration into Alaska-Canada Rail Link network.

- **Hyder** presents a potential greenfields opportunity to develop a large scale terminal depending on construction of a lengthy rail connection to the Alaska-Canada Rail Link network. Depending on resource mix, Ridley Terminals Inc type annual volumes of up to 26 million tonnes could be accommodated for an estimated total investment in the vicinity of US$350 million.

- **Prince Rupert** – Ridley Terminals Inc has existing capacity of 12 to 15 million tonnes of which up to 6 million tonnes is forecast to employed within the next two or three years. This annual capacity could be expanded to 26 million tonnes to handle additional coal or other compatible products such as iron ore at an estimated cost of C$180 million depending on product mix. Availability of this capacity for Alaska and Yukon shippers would require an Alaska Rail Link to CN and its northern mainline. Additional expansion is possible at the nearby South Kaien Island development site.

Appendix A – Marine Terminal Illustrations

Roberts Bank Outerport

Photo Credit: Vancouver Port Authority

Westshore Terminals (Foreground)

Number of Berths:	two
Depth of Water:	65 feet (20 metres)
Terminal Area:	125 acres (50 Ha)
Capacity:	25 million tonnes coal

Deltaport Container Terminal (Background)

Number of Berths:	two
Depth of Water:	56 feet (17 metres)
Terminal Area:	125 acres (50 Ha)
Capacity:	one million TEU

Photo credit: Westmar Consultants

Westshore Terminals Dual Quadrant Shiploader

Berth Length:	985 feet (300 metres)
Depth of Water:	65 feet (20 metres)
Design Ship:	150,000 DWT
Loading Rate:	6,000 tonnes per hour

Texada Island Single Quadrant Shiploader

Berth Length:	200 metres
Depth of Water:	12 metres
Design Ship:	60,000 DWT
Loading Rate:	4,000 tonnes per hour

Vancouver Wharves - Lead Concentrate Receiving and Shipping System

Photo Credits: Westmar Consultants

Berth Length:	250 metres
Depth of Water:	14 metres
Design Ship:	80,000 DWT
Site Area:	25 acres (10 Ha)
Unloading Rate:	100 tonnes per hour

Ridley Terminals – Coal and Iron Export Facility

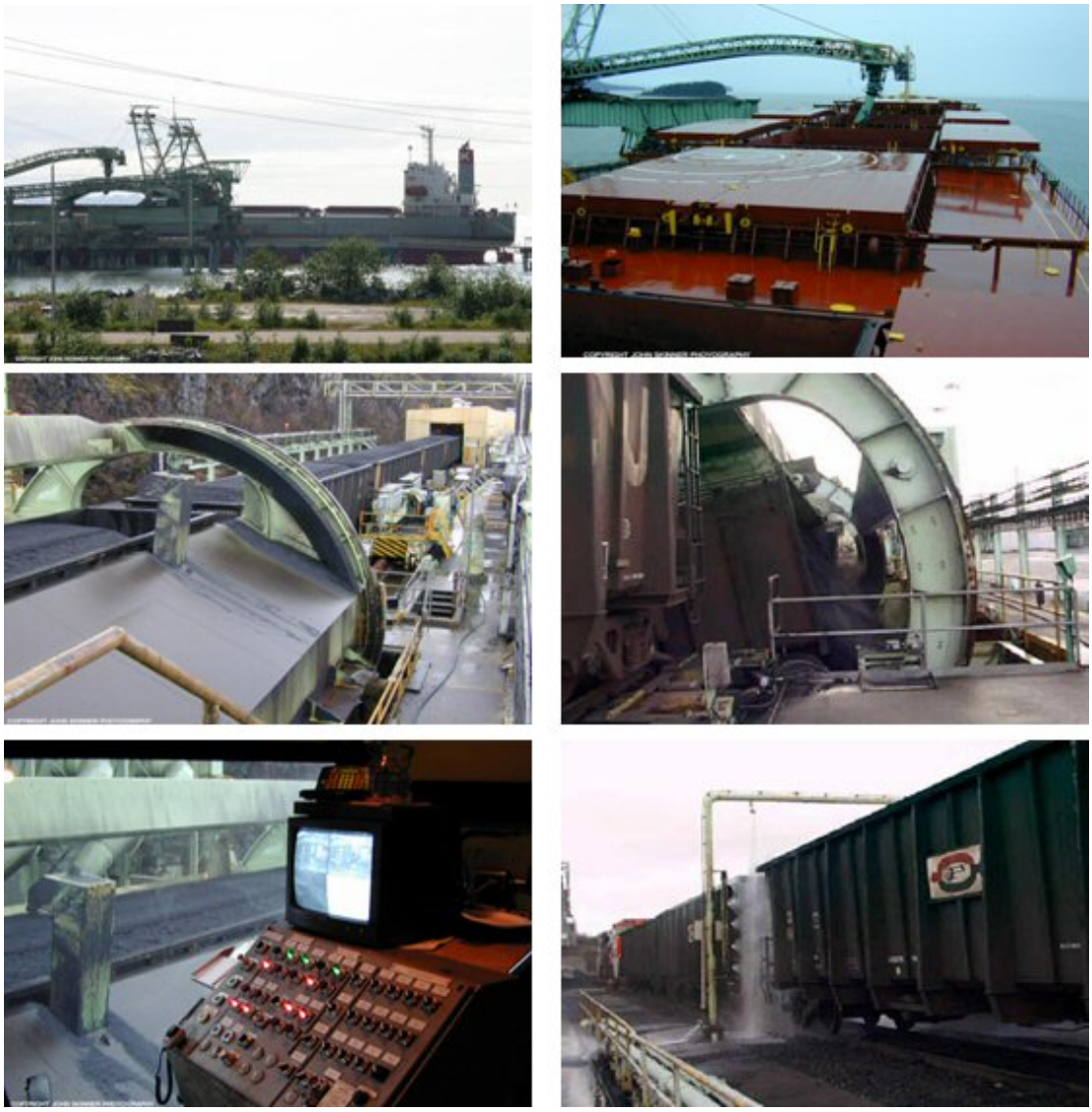


Photo Credits: Ridley Terminals Inc

Berth Length:	1,065 feet (325 metres)
Design Ship:	250,000 DWT
Land Area:	140,000 acres (55 Ha)
Loading Rate:	9,000 tonnes per hour
Rail Car Dumping Rate:	4,500 tonnes per hour
Capacity:	12 to 15 million tonnes per year expandable to 26 million tonnes per year

Voisey's Bay Nickel Company – Edwards Cove Permanent Port Facility

Photo Credits: Voisey's Bay Nickel Company Limited

Design Ship:	35,000 DEW
Depth of Water:	33 feet (10 metres)
Site Area:	30 acres (12 Ha)
Annual Throughput:	up to 500,000 tonnes
Local Conditions:	subject to two ice condition closures per year

Photo Credits: Voisey's Bay Nickel Company Limited

Appendix B – Planning Information and Further Analysis Requirements

Marine Terminal Planning Data Requirements

Information/analysis for terminal development and/or expansion for all ports in the Alaska-Canada Study Region includes additional data in the following areas:

- wind/wave
- ice conditions where applicable
- hydrographic/geotechnical
- offsite services/utilities
- environmental assessment
- socio-community issues

Vessel Approach Navigational Information

Assessment of larger vessel transiting of inshore access to regional ports:

- Cook Inlet/Kinnik Arm – Port Anchorage, Port Mackenzie
- Lynn Canal – Haines, Skagway
- Portland Canal – Hyder, Stewart
- Douglas Channel – Kitimat

Rail Link Information Required for Marine Terminal Integration

Further analysis is required to determine the preliminary feasibility of rail integration of the proposed port and terminal project initiatives. Examples include:

- **Port Mackenzie** – planning of connection to the Alaska Railroad mainline is underway
- **Skagway** – rail integration involves the upgrade/extension of the existing narrow gauge railway
- **Haines/Lutak Inlet** – rail integration calls for assessment of the feasibility of a new rail line from the port to the hinterland similar to the earlier proposed Alaska Midland
- **Stewart and Hyder** – rail integration calls for the assessment of the long-term concept of a rail line over the Bear Pass to Mezziadin Junction and from that point to connect to a North-South rail expansion in Northern British Columbia
- **Prince Rupert and Kitimat, British Columbia** – rail integration of these British Columbia ports with existing CN Rail network calls for the construction of portions

of the Alaska-Canada Rail Link to the existing trackage at Prince George on the east or a new North-South line connecting the Yukon hinterland to the East-West trackage somewhere between Hazelton and Kitwanga.