RAILS TO RESOURCES TO PORTS

The Alaska Canada Rail Link Project
Phase 1 Feasibility Study

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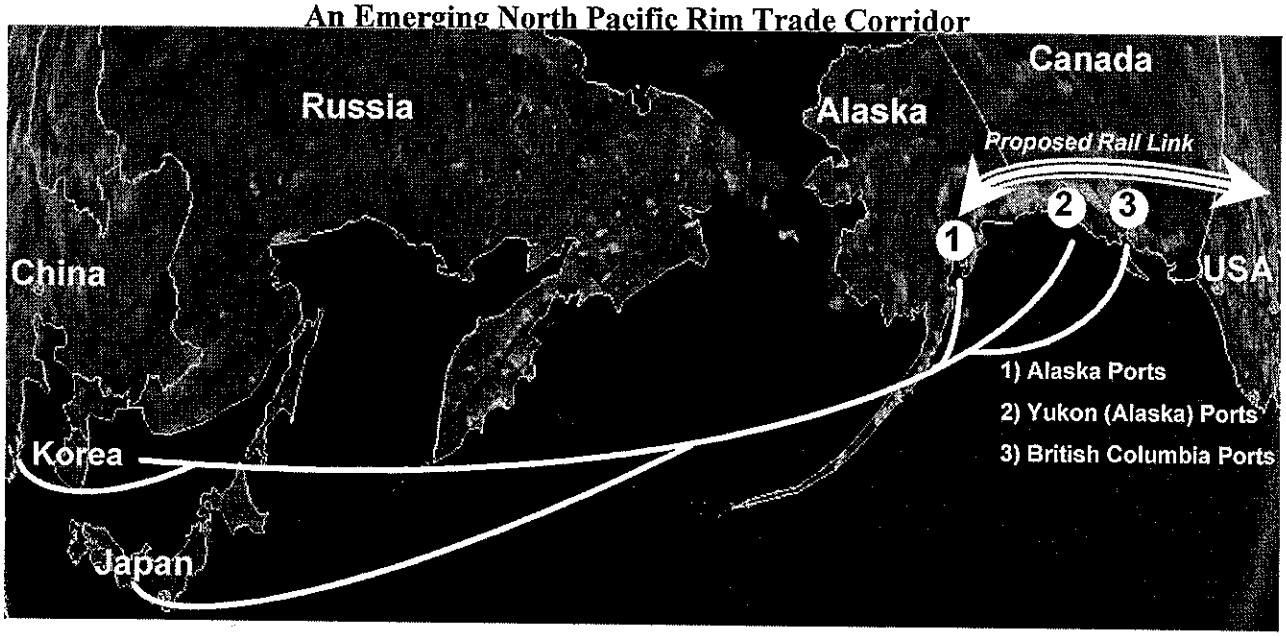
1. Background

The Alaska Canada Rail Link (ACRL) is part of an emerging North Pacific Rim Trade Corridor (See Figure 1). The ACRL Phase 1 Feasibility Study considers a rail connection through Alaska, Yukon and Northern B.C., linking North Pacific Rim markets in the shortest trade corridor between North Asia and North America- via a U.S. port.

In the broadest sense the scope of this project is set by the market, technical, environmental and financial assessment of a rail route for both resources exports to North Asia and intermodal imports to Mid-America.

Figure 1
An Emerging North Pacific Rim Trade Corridor



A rail link from Alaska to the rest of the North American rail system has been under consideration since the Alaska Railroad was started in 1914. Today, a renewed interest in resource deposits in Alaska, Yukon, and British Columbia, as well as changing world markets, global trade dynamics and supply chains, has rekindled interest in that link.

Drastic changes in global demand driven by Asian markets have sharply raised the value of mineral resources in north-western Canada and Alaska. Mutually dependent economics of impending large scale northern resource and railway development are compelling. Rail infrastructure investment is key to increased resource development, productivity and sustainability in this region:

- Larger iron ore and coal mines can only be developed with heavy haul rail capacity.
- Other base metal mines may not survive severe price cycles with high cost trucking.
- Remote resource exploration and development is affordable with low cost rail access.

A new North Pacific Rim Trade Corridor may be well positioned to complement bulk mineral resource traffic for export to Asia, with container import traffic from Asia. A rail connection through Canada would improve the economic security of Alaska and the lower 48 United States by providing both essential supply route redundancy as well as west coast container congestion relief – with a new Alaska sea/rail port gateway on U.S. soil.

In 2000 the U.S. Congress passed "Rail to Resources" legislation that authorized expenditure of $6 million for an international commission proposed to study the feasibility of a rail link from northern British Columbia to the Alaska Railroad. Subsequently Alaska and Yukon agreed to work on a joint approach that would initiate the study.

In 2005 Alaska Governor Frank Murkowski and Yukon Premier Dennis Fentie signed a Memorandum of Understanding to start the Alaska Canada Rail Link Feasibility Study. The Study got underway on July 1, 2005 with the opening of a project office in Whitehorse.

Project oversight was provided with representation from Alaska, Yukon, British Columbia, Yukon First Nations, Alaska Native Corporations and Transport Canada at two levels of governance:

- A Bi-Lateral Advisory Committee, co-chaired by Alaska and Yukon, provided general oversight to the Management Working Group;
- A Multi-Lateral Management Working Group, chaired by Yukon, carried out the study and reported to the Advisory Committee.

A project manager was retained to conduct the study from the Whitehorse Project Office. The project manager contracted consultant teams in two stages:

- In Stage One, expert consultants on shipper markets and railway engineering, maintenance, and operations gathered data on potential traffic and costs for the proposed railway. At this stage, several potential routes were evaluated.
- In Stage Two, the most promising route segments were further assessed in terms of financial viability, regulatory issues, and public interests including bio-physical, social and economic impacts.

2. The Route

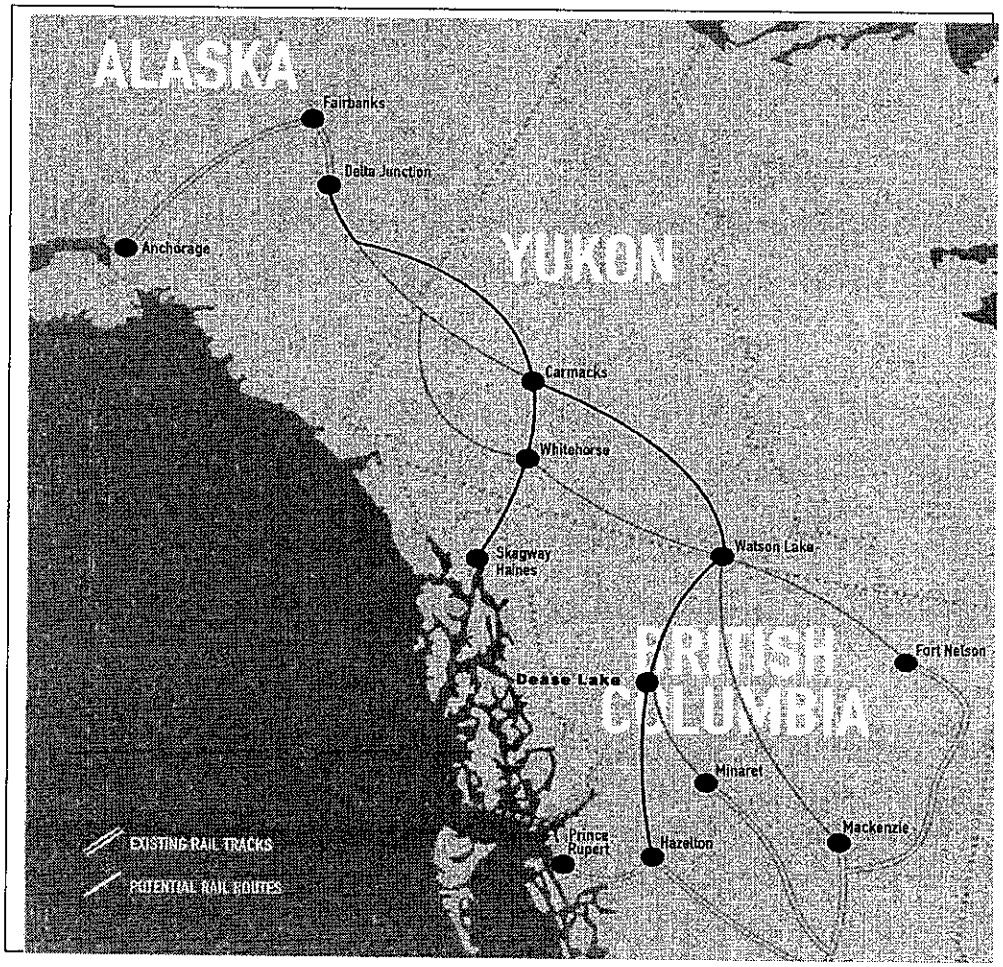
A major purpose of the Alaska Canada Rail Link will be to connect the Alaska Railroad through Yukon to the Canadian National Railway. However a mutually supportive goal is to ensure tidewater access for Yukon and B.C mineral exports.

Full system investment can integrate some or all port access segments along an extension of the North American rail system from the Canadian National Railway at New Hazelton, B.C. to the Alaska Railroad at Delta Junction, Alaska.

2.1 Rail Route Alternatives

A number of alternative routes connecting the Alaska Railroad and Canadian National Railway have been considered. All routes researched for the Pre-Feasibility Study are shown in the following map (See Figure 2), with the working scenario route highlighted in black.

Figure 2
ACRL Route Options



While ongoing market, engineering, operations and environmental evaluation will determine final route selection, the working route scenario for preliminary planning purposes generally follows:

- The Cassiar Highway in Northern British Columbia;
- The Robert Campbell Highway in Yukon; and
- The Alaska Highway in Alaska.

Yukon and British Columbia route options converge at Watson Lake, Yukon. From Watson Lake south four options connect to Canadian National rail heads in British Columbia at Fort Nelson, Mackenzie, Minaret or New Hazelton.

From Watson Lake to Alaska there is a southern route option along the Alaska Highway or a northern route option along the Robert Campbell Highway and through the Tintina Trench. Both of these alternative Yukon routes converge near the Canada/U.S. border and continue along the Alaska Highway to connect with the Alaska Railroad at Delta Junction in Alaska. Both of these routes are also connected through Carmacks and/or Whitehorse to the Southeast Alaska Inside Passage Ports of Skagway and/or Haines.

This working route scenario has been selected based on preliminary engineering evaluation and market identification.

Final route selection may include further consideration of:

(1) Full Alaska Rail Connection

- A Yukon northern route via Nisling River to Beaver Creek (to avoid Ladue River);
- A Yukon southern route via Whitehorse (to Watson Lake and/or Dease Lake); and
- A B.C. route via Grande Prairie, Alberta to Fort Nelson (to avoid CN North Line); or
- Via Rocky Mountain Trench/Williston Reservoir (to minimize grades and curves); or
- Via Dease Lake Extension (to use existing partially completed right-of-way/grade).

(2) Phased Resource Rail/Port Access

- Skagway port access build out (to optimize limited bulk port capacity); and/or
- Haines new high capacity port access (for Yukon iron ore and other large mines);
- Skagway bypass to new Katzehin terminal (with Juneau Access road/rail synergies);
- Stewart/Hyder new port access (to avoid CN bottleneck to Kitimat/Prince Rupert).

The most significant demand-driven shift in routing scenarios would be the development of large scale iron ore operations (28 million tons handled in 15 loaded and empty train movements per day). Staging, berthing and shiploading capabilities owned or controlled by the White Pass and Yukon Route would be overly strained at Skagway.

A separate analysis of alternative export routes for large mines has considered the undeveloped port potential at Haines to address White Pass concerns with conflicting cargo and cruise ship/tour train operations at Skagway (also presenting the prospect of alternative inland tour train access from Haines for cruise ship operators).

2.2 Phased Resource Railway Options

As an initial phase of the full Alaska rail connection there are several resource railway alternatives. First phase resource railway segments would focus on the following port access options:

- Carmacks to Inside Passage Ports (Skagway/Haines);
- Carmacks to Cook Inlet Ports (Port Mackenzie via Delta Junction);
- Carmacks to Northern B.C. Ports (Prince Rupert via New Hazelton).

Each of these segments is consistent with full investment in an Alaska rail connection. Selection of any initial resource railway segments would amount to pre-building a portion of the full connection.

A first phase resource railway segment from Carmacks to Skagway or Haines is the most direct for Yukon mine exports/resupply and would provide the regional port access anticipated as part of a full Alaska rail connection. Beyond practical port limitations at Skagway, nominally capped at two to three million tons per year, Haines could provide a high capacity export alternative for larger Yukon mines.

A first phase resource railway segment from Carmacks to Cook Inlet Ports in South Central Alaska, while considerably longer than to Haines, would complete approximately one third of the full Alaska rail connection to the Canadian National Railway. This route would access existing Cook Inlet port facilities in the Anchorage area as well as at Seward or Whittier. Further development of high-capacity bulk terminals and rail access is anticipated for Port MacKenzie across the Knik Arm of Cook Inlet from the Port of Anchorage[1]. In addition to high volume resource exports from Canada, this route could also support inbound mine supply and pipeline construction staging in eastern Alaska and central Yukon.

A first phase resource railway segment from Carmacks to Northern B.C. Ports, while much longer than to Haines and considerably further than to Anchorage, would complete approximately two thirds of the full Alaska rail connection to the Canadian National Railway at New Hazelton, B.C. This segment could provide Yukon mines with the capacity to handle all potential concentrate, coal and iron ore exports through Ridley Island high-capacity, deep-water bulk terminal facilities at Prince Rupert. As well, Northern B.C. mines could save some 600 miles of rail transport that would otherwise be required east to Prince George via the alternative Dease Lake Extension and back to Prince Rupert. This route would also allow for inbound mining resupply and pipeline construction materials staging via port facilities at Kitimat and Prince Rupert or via eastern CN Rail connections.

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[1] The Port of Anchorage and Port MacKenzie will also be connected by a new bridge currently being tendered as a Public Private Partnership by the Knik Arm Bridge and Toll Authority.

3. The Cost

3.1 Full Rail Route Estimate

Conceptual cost estimates based on engineering evaluation of construction terrain have determined that the baseline track system construction cost is $7.3 billion.

This is a "desk-top" engineering pre-feasibility estimate.

Adding contingency allowances for:
(a) unknown estimating factors and environmental mitigation; and
(b) owner oversight, project engineering and management

-- the appropriate total project cost estimate for business case analysis is $10.9 billion. (See Figure 3 and Table 1).

Figure 3

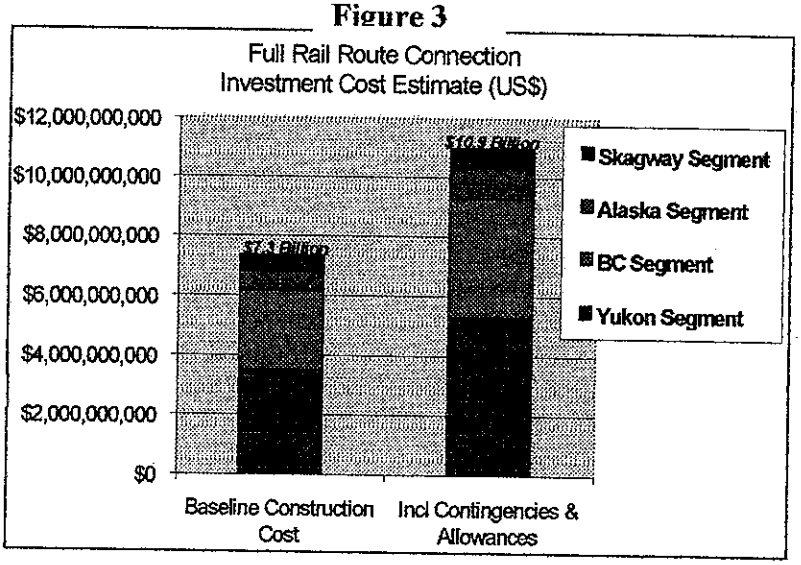


Table 1

Full Rail Route Investment
Infrastructure Cost Estimates
(US$)

Between	And	Miles	Baseline Rail Route Construction Cost*	Contingencies and Environmental Mitigation	Environment, Engineering and Owner/Project Mgmt	Total Project Cost for Business Case Analysis	$mm Mile
Hazelton	Watson	497	**$2,627,211,000**	$722,483,000	$602,945,000	**$3,952,639,497**	$8.0
Watson	Carmacks	403	**$2,194,548,000**	$603,501,000	$503,648,000	**$3,301,697,403**	$8.2
Carmacks	Ladue	223	**$1,339,027,000**	$368,233,000	$307,307,000	**$2,014,567,223**	$9.0
			$6,160,786,000			$9,268,904,123	
Ladue	Delta	192	**$630,377,283**	151,615,457	265,460,486	$1,047,453,226	$5.5
			$6,791,163,283			$10,316,357,349	
Carmacks	Skagway	217	**$538,339,921**	$53,833,992	$88,826,087	$681,000,000	$3.1
Full System Cost			**$7,329,503,204**			**$10,997,357,349**	

*Main Track, Terminals, Detectors Communications and Power

Source: Canada Route Costs - UMA Engineering; Alaska Route Costs - University of Alaska Fairbanks; White Pass Route Costs - PCC/HDR Engineering

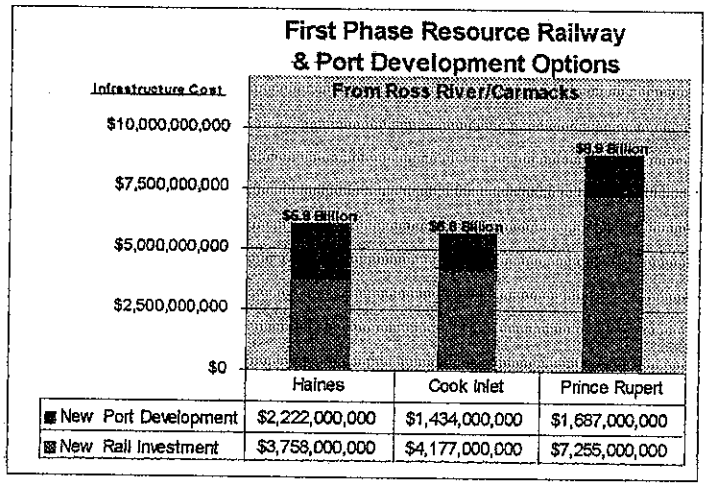
Construction costs along the main route through Canada (New Hazelton to Ladue) are between $8 and $9 million per mile in generally mountainous terrain. Alaska construction costs (Ladue to Delta) are substantially lower at $5.5 million per mile through the broad and generally flat Tanana Valley. White Pass Route construction costs (Skagway to Carmacks) are the lowest at $3.1 million per mile for upgrade and extension of an existing rail line[2].

[2] As well the lead time for regulatory permits and approvals should be relatively short for construction in the most sensitive portion of this route between Skagway and Whitehorse where the railway is already in place.

3.2 Phased Rail/Port Estimates

Within the Full Rail Route System, three port access segments radiating from Carmacks, Yukon have been identified for Phased Investment Analysis (See Figure 4):

Figure 4



- Carmacks to Port MacKenzie,
- Carmacks to Haines; and
- Carmacks to Prince Rupert.

Carmacks is close to the mid-point between Port MacKenzie and Prince Rupert. Haines, with the lowest total rail investment, becomes the benchmark for comparison with the other two resource railway port access alternatives. Combined rail and port investment outcomes are summarized in Table 2 below.[3]

Table 2
Phased Resource Railway & Port Access Investment

From Ross River/Carmacks To:	Haines Benchmark	Cook Inlet Ports	Northern BC Ports
Initial Phase Rail Investment	$2,644,000,000	$3,062,020,449	$7,254,336,900
Port Terminal Development	$2,222,000,000	$1,434,000,000	$1,687,000,000
Total Infrastructure Investment	**$4,866,000,000**	**$4,496,020,449**	**$8,941,336,900**

For Yukon mineral exports, the Alaska Inside Passage port of Haines is much closer. However, Port Mackenzie marine and rail infrastructure investment can save almost $4 billion compared to Prince Rupert and the investment is at least no greater compared to Haines – while extending the full rail link as well as the market reach of both the Alaska Railroad and Anchorage Area Ports.

The existing Cook Inlet port pair of Anchorage and Port MacKenzie, linked by the proposed Knik Arm Bridge and/or Alaska Railroad spur, offer a lower investment alternative compared to equivalent general cargo and bulk marine terminal investment that would be required at Haines. In conjunction with the relative engineering ease of rail constructability through the Tanana Valley for a Carmacks-Delta Junction segment compared to a Carmacks-Haines segment, and with less than half the new track investment compared to a Carmacks-New Hazelton segment, Port MacKenzie is most attractive from a capital cost perspective.

However, from an operating cost perspective, in order to reinforce the economics of an Alaska connection, it will be necessary to equalize Port MacKenzie rates with Haines rates for Yukon mineral exports. Otherwise the most cost-effective export positioning for the Yukon mining industry will remain via the Inside Passage Port of Haines for large scale mining operations (or via Skagway for smaller mines).

[3] Cost data developed by Yukon Engineering Services in association with CH2MHill/Banjar Management

4. The Economics

4.1 Traffic and Revenue

At peak period Years Five to 15, annualized traffic flows are forecast in Table 3 and illustrated in Figure 5 for 10 years after completion of railway construction. By Year 10, it is assumed that the one time influx of pipeline traffic will be replaced by increasing Yukon coal and concentrate exports as well as ongoing Alaska and Yukon resupply traffic.

Table 3

Annualized Traffic and Revenue Forecasts
(Year 10 Forecast within Peak Years 5 to 15))

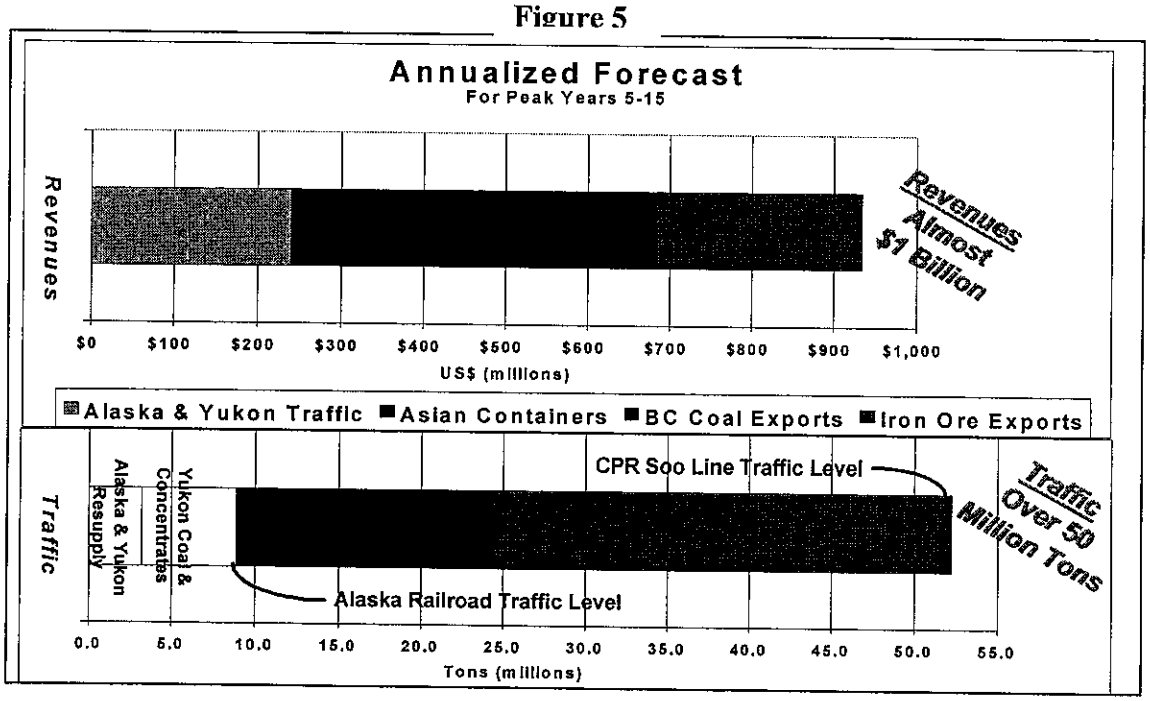
Forecast Traffic Scenarios	Tons (millions)	Revs (millions)
Alaska & Yukon Inbound Resupply	3.2	
Yukon Coal & Concentrate Exports	5.7	
Subtotal Alaska & Yukon Traffic	**8.9**	**$240**
Asian Intermodal Containers	5.0	$350
Subtotal with Land Bridge Taffic	**13.9**	**$590**
British Columbia Coal Exports	10.4	$93
Alaska, Yukon & BC Traffic	**24.3**	**$683**
Yukon Iron Ore Exports	28.0	$252
Total Traffic Potential	**52.3**	**$935**

Approaching nine million tons per year, *this level exceeds current Alaska Railroad traffic.*

Sea/rail capture of some Asian intermodal container traffic via an Alaska gateway is also assumed within 10 years of railway construction. In combination with conventional Alaska and Yukon traffic, the result is almost 14 million tons per year generating almost $600 million in rail revenues annually. *This level of traffic exceeds former BC Rail traffic of 13 million tons per year prior to takeover by Canadian National Railway.*

Although somewhat less certain, the build up of B.C. coal traffic to over 10 million tons per year and of Yukon iron ore traffic up to 28 million tons per year, would raise total system volume to over 52 million tons per year, generating almost $1 billion in annual revenues. *This level of traffic is equivalent to SOO Line Railroad (a U.S. subsidiary of Canadian Pacific Railway).*

Figure 5



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In Table 4 below benchmarks the full traffic potential of the Alaska Canada Rail Link against Soo Line Railroad operating statistics for 2005 with comparable results:

Table 4

BENCHMARK COMPARISON AT FULL TRAFFIC POTENTIAL

Benchmarking	Soo Line Railroad (CPR)	Alaska Canada Rail Link
Track Owned/Leased	*1,700 miles*	*1,600 miles*
Freight Traffic Tons	*52 million tons*	*53 million tons*
Freight Traffic Revenues	*$1billion (approx.)*	*$1billion (approx.)*

The full traffic potential identified to date places the Alaska Canada Rail Link in a comparatively strong revenue position in a North American industry context.

4.2 Full Rail Route Business Case.

This business case assessment seeks to recover ACRL investment from discounted free cash flow available after revenues have been reduced by ongoing expenditures. Life cycle cash flows discounted at five percent provide, at present value, $7.8 billion to cover 74 percent of the $10.5 billion investment:

Business Case Assessment

(US$ billions discounted at 5% over 50 year project life cycle)

	Commercial Revenue Analysis
Nominal US$11 Billion Initial Investment	$10.5
Total Commercial Revenues & Public Benefits	$11.7
Ongoing Capital, Operating & Maintenance Costs	$3.9
Net Commercial Revenues	$7.8
Investment Coverage	74%

At rates of return for standard railway investors – which in many parts of the world, and Alaska[4], are quasi-government corporations - a five percent discount rate is considered appropriate. In particular, for full investment in an Alaska connection, there will be potential access to preferential Alaska Railroad bond rates currently less than 5 percent.

It is apparent from the commercial revenue analysis that potential free cash flow may not be adequate to completely cover required investment in the full Alaska rail connection. A shortfall in revenues may require supplemental financing from alternative funding sources (e.g., through a Public Private Partnership).

[4] An anomaly within the otherwise private sector North American freight rail industry is the Alaska Railroad which is wholly owned by the State of Alaska.

4.3 Phased Railway Economics

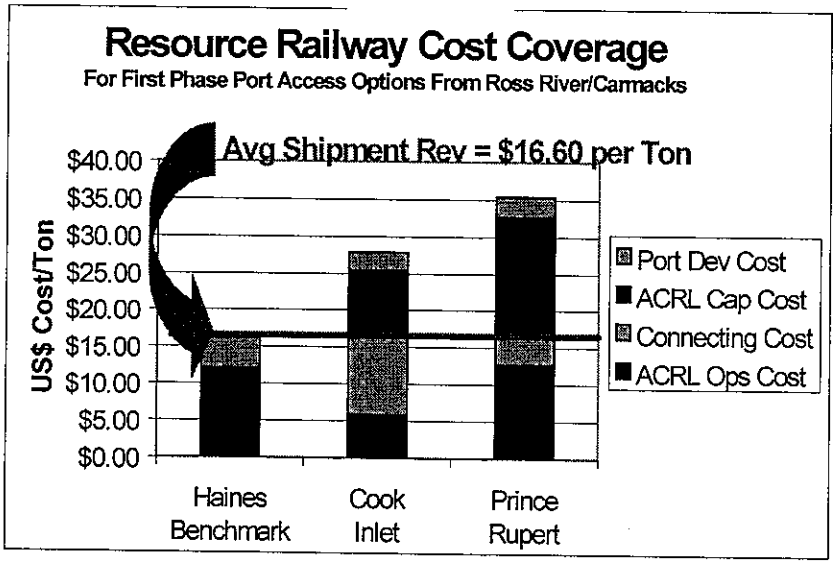
As an alternative to large risk capital investment in a full rail connection to Alaska, phased development of a resource railway from Yukon could support maximum mineral exports with minimum track investment. The Full Alaska Rail Connection can be segmented to provide three much shorter initial resource railway investment options from the Carmacks/Ross River area to Southeast Alaska, South Central Alaska or Northern B.C. Ports

Railway access to Southeast Alaska Inside Passage Ports of Skagway or Haines offers the shortest route for most minerals to tidewater export position. Haines is the closest port with capacity expansion potential to accommodate a phased investment scenario for large scale concentrate, coal and iron ore exports.

The combination of differentially priced iron ore, coal and base metal traffic can cover rail capital and operating costs as well as incremental port investment – but only for the Haines benchmark. This rail/port access option should improve the economics of mines which should help to maximize the volume of ACRL mineral traffic.

A differentially priced, weighted average rate of $16.60 per ton has been determined for the potential combination of concentrate, coal and iron ore traffic regardless of loading port (See Figure 6 below). This rate is what the market can bear for rail transportation determined as competitive with the lower of trucking costs or commodity market prices.

Figure 6



Applying the average shipment revenue equally to rail/port access alternatives, provides a cost coverage context for comparative analysis (See Table 5). These results are presented from the mineral sector perspective of Yukon concentrate, coal and iron ore shipments, including cost coverage requirements for Canadian National or Alaska Railroad connections and for incremental port improvements.

Table 5
First Phase Resource Railway Shipment Cost Coverage
Haines Benchmark Analysis
($/Ton)

Rail & Port Access Via:	*Haines Benchmark*	*Cook Inlet*	*Prince Rupert*
From Ross River/Carmacks	(300 ACRL Miles)	(ACRL 420 miles)	(900 ACRL Miles)
Revenue Available	$16.59	$16.59	$16.59
ACRL Operating Cost	$4.16	$5.78	$12.60
Connecting Rail Cost	0	$10.58	$4.50
Revenue Balance	**$12.43**	**$0.23**	**-$0.51**
ACRL Capital Cost	$7.86	$9.02	$15.53
Port Capital Cost	$4.16	$2.48	$2.70
Net Revenue	**$0.42**	**-$11.27**	**-$18.74**

Based on cost coverage, Haines is the benchmark for phased investment analysis. At full revenue potential, after operating costs, all rail and port capital investment via Haines can be covered with average resource shipment rates determined as competitive with the lower of trucking costs or commodity market prices.

Using the Haines benchmark, other phased resource railway options can be better analyzed from an opportunity cost perspective:

(1) Via Cook Inlet

- Building large cargo export volumes at South Central Alaska ports;
- With total capital investment for Yukon mine traffic determined lower than Haines;
- But offset by rates just covering operating and connecting Alaska Railroad costs.

(2) Via Prince Rupert

- Accessing existing Ridley Island deep water, high volume marine terminal capacity;
- With a rail connection cutting Prince George routings by some 600 miles;
- But offset by rates just below operating and connecting CN Rail costs.

Maximizing mineral traffic and revenues also means targeting specific mine developers for phased rail segment investment. In Yukon, the target(s) can range from very large iron ore and coal mines to a potential consortium of smaller base metal mines. In Northern B.C. the prospect of significant rail rate savings with a short cut to Prince Rupert should stimulate resource developers to invest in this southern ACRL segment.[5]

These phased resource railway scenarios are consistent with full investment in an Alaska rail connection. Selection of any initial investment option would amount to pre-building a portion of the full connection. As mineral traffic and rail revenues build, the risk for subsequent investments in the balance of a full system will be reduced.

Completion of the full connection between Delta Junction and New Hazelton will ultimately position investors to attract higher margin Alaska intermodal and Asian container bridge traffic - as well as locally originating high volume resource traffic.

[5] The potential short cut to Northern B.C. ports (Kitimat as well as Prince Rupert) is an attractive prospect for Mount Klappan coal and larger base metal deposits near the Cassier Highway Corridor that may warrant consideration as a separate Northern B.C.resource railway pre-build phase of the full Alaska Rail connection.

5. Conclusions

The Alaska, Yukon and Northern B.C. Region is in a geographically advantageous position, linked with North Pacific Rim markets through the shortest trade route between North Asia and North America. Development of rail infrastructure in this region will dramatically increase the resource productivity of Alaska and Canada. Large scale mining can become feasible, and smaller mines can become more competitive, with bulk resource heavy haul rail operations to Northern B.C. ports - and/or a new Alaska sea/rail gateway - for Asian exports and imports.

A preliminary ACRL working route scenario is based on the following key findings:

- Market driven route selection, in conjunction with engineering constructability criteria, favors a Tintina Trench Route between Delta, Alaska and New Hazelton, B.C. connecting the most mineral shipping points to Alaska and Northern B.C. ports.

- A Tintina Trench Route through Carmacks supports the shortest Alaska Railroad connection to Canadian National Railway and Northern B.C. Ports; and can support Alaska Highway Pipeline logistics from strategic distribution points in Yukon[6].

- While connection to an Alaska Inside Passage port would provide the shortest route to tidewater for much mineral export traffic, combined port and rail considerations suggest that Anchorage area ports might require less capital investment.

- Commercial analysis of all potential revenues supports the Business Case for private-public partnerships to invest in a full Alaska rail connection; and initial investment in a phased resource railway to Haines appears economically viable in the private sector.

As markets firm up specific traffic timing and demand for some or all track segments of the working route scenario, the long term commercial feasibility for a preliminary business case can be better tested for near term bankability.

In summary, *A Rails to Resources to Ports* northern infrastructure investment program will:

- Be critical to the long run sustainability of larger mines;
- Allow smaller mines to survive future market downturns;
- Provide lower cost access to more distant high capacity, deep water ports;
- Better integrate Asian manufacturing with resource *and* finished goods supply chains;
- Insure economic security with a continental rail connection to the Alaska Railroad;
- Provide shipper and government policy incentives for private-public partnerships;

At full traffic potential, the Alaska Canada Rail Link Project can be an attractive investment from either a strategic economic security or supply chain perspective. The Phase 1 Feasibility Study has demonstrated revenue adequacy to cover capital and operating costs for initial investment in a regional resource railway to tidewater -- or for a private-public partnership to complete a continental connection to the Alaska Railroad through Canada.

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[6] Watson Lake, Whitehorse, Beaver Creek (orTetlin Jct.); Also Fort Nelson B.C. railhead and along Alaska Hwy in Alaska.