ALASKA CANADA RAIL LINK
FEASIBILITY STUDY
COST ANALYSIS REPORT

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TRANSFORMING THE WORLD OF TRANSPORTATION

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June 1, 2006

Kells Boland, Project Manager
Alaska Canada Rail Link Project
210-212 Main St.
Whitehorse, Yukon, Y1A 2A9
Canada

Dear Mr. Boland:

Innovative Scheduling, Inc. is pleased to submit this Final Report on the work we accomplished in support of the Alaska Canada Rail Link feasibility study. The international dialogue surrounding this proposed rail link will clearly benefit from this study. We are proud to have been part of the team that created this comprehensive inventory of facts that will lay the foundation for future analyses that will determine the appropriate roles for Governments, financiers, shippers, and railroads.

The cost analysis documented in this report is an objective assessment of the proposed railroad operations given the detailed engineering designs and traffic forecasts provided to us. We have also provided you with an electronic copy of this powerful model that will enable others to replicate, modify, and enhance our methodologies in the future.

Our team has performed numerous railway evaluations and provided recommendations concerning the economics, operations, and policy issues associated with many large railroad projects. This document provides details of our work approach. We appreciate your support, and look forward to working with you again in the future.

Sincerely,

Larry A. Shughart

Larry A. Shughart, Vice President

Table of Contents

EXECUTIVE SUMMARY

This study documents the operating costs and capital recovery costs of moving the forecasted freight volumes over each of the proposed alternative routes of the Alaska Canada Rail Link. We implemented a comprehensive cost model that captures the physical attributes of each alternative route. We determined a reasonable operating and service design plan that is consistent with those route attributes and supports the forecasted traffic volumes. These costs will be used by others to evaluate the viability of the Alaska Canada Rail link.

The model calculates the physical workload in terms of train starts, train miles, carloads, car miles, GTM requirements, etc., and applies the appropriate cost factors. The model creates pro-forma operating budgets in standard railroad departments of Transportation; Engineering (MOW – Maintenance of Way), Mechanical (MOE – Maintenance of Equipment) and Administration (SG&A – Sales, General and Administrative). The model easily supports a range of sensitivity analyses, multiple scenario evaluations, and the ability to test a variety of cost assumptions.

We generated a series of results using the model for 27 different scenarios. A scenario is the combination of one route, one of the projected levels of traffic (High, Medium, and Low), and one of the pre-defined Management Strategies (1, 2, and 3). The results of each scenario can be found in the Appendix.

We also performed an analysis for the sub-route on the Alaska Canada Rail Link from Skagway to Braeburn the potential site for a future coalmine. The total life-cycle cost of using the existing White Pass and Yukon narrow gage railway with a narrow gage extension to the mine was found to be similar to the cost of rebuilding the entire route to modern, heavy-haul standard gage specifications. While narrow gage is a much less efficient operation than standard gage, the capital cost of upgrading the route to heavy haul standards offset most of the operating efficiencies gained through the use of standard gage technology. The analysis did not consider the lack of network synergies between a narrow gage branch and the balance of the Alaska Canada Rail Link.

The primary purpose of this Phase I of the project was to examine route alternatives and evaluate the pros and cons of each route from an engineering, marketing, and cost perspective. We concluded the range of cost differences between the various routes was relatively small and route selection should be based primarily on marketing and policy considerations.

The capital recovery costs range from 90% to 95% of total cost per carload. An enhanced version of this cost model will be used to support the Phase II of this Feasibility Study, which includes an assessment of alternative capitalization structures.

BACKGROUND

People have been discussing the potential benefits of connecting the Alaska Railroad to the balance of the North American rail system since before the Alaska Railroad was completed in 1923. The Alaska Railroad is a point-to-point railroad connecting the Alaskan interior with the state's major cities and seaports. It is a stand-alone operation not connected to any other rail lines in North America. Consequently, rail shipments between Alaska and the rest of Canada, the lower 48 States, and Mexico, must be trans-loaded to or from ocean-going vessels or trucked thousands of kilometers over land.

In 2005, the Governments of Alaska and the Yukon Territory commissioned a joint feasibility study to assess the proposed rail link connecting the existing Alaska Railroad to the rest of the North American rail system. Joint funding recognizes the eventual success of the project will require close cooperation between public and private sectors on both sides of the border.

As part of this feasibility study, teams of experts developed comprehensive engineering designs and capital cost estimates to build the railroad along several alternative routes. Other experts identified freight volumes the line would attract from the mining, energy, pipelines and consumer goods sectors. It is likely that existing motor freight flows to Yukon and Alaska will immediately divert to the new, all-rail route assuming significant cost savings to shippers can be achieved. Intermodal container/trailer freight flows across the Gulf of Alaska will divert to the new, all-rail route to the extent that shippers can achieve a higher level of more frequent service at lower total cost. Assuming an Alaska rail link is competed prior to pipeline construction start, it is likely pipeline construction traffic will account for an initial influx of traffic on the new rail link, with volumes decreasing after the pipeline is finished. Mine development and outbound mineral resources will have relatively longer lead times and will be dependant on global prices, the chosen route alternative, and the availability of supporting energy sources and supporting local economies.The purpose of the portion of the study documented in this report is to calculate the operating costs and capital recovery costs of moving the forecasted freight volumes over each of the alternative routes. We implemented a comprehensive cost model that captures the physical attributes of each alternative route. We determined a reasonable operating and service design plan that is consistent with those route attributes, and supports the forecasted traffic volumes. We then attached operating and financial costs to each work activity to project an average cost per car mile and average cost per carload for each segment of traffic. These costs will be used by others to evaluate the economic viability and expected competitiveness of the Alaska Canada Rail link.

In the balance of this paper, we will review our assignment, outline our methodology for evaluating the costs, document the inputs and assumptions of our cost model, review the results of each scenario, summarize key economic principles that are relevant to interpreting these results, and provide an overall conclusion and recommended "next steps".

ASSIGNMENT

Our task was described in the original tender documents as follows:

Work Package B3(c)

Object: Transportation Operating Cost Estimation for Full Rail Route Investment

Statement of Work: Working in consultation with connecting and other rail carriers (Canadian National, Alaska Railroad, regional and short lines), develop preliminary cost estimates for above rail operations. Consider impact of track/train dynamics and line haul distance on major traffic segments for each route option. Prepare conceptual train service design and cost profiles for intermodal, carload and bulk commodity operations on technically feasible rail routes.
Deliverables: Train operations cost estimates for technically feasible all-rail routes.
Prerequisites: Completion of Work Packages B1(d),(e) and (f).

Work Package B3(e)

Object: Cost of Service Evaluation for Full Rail Route Investment

Statement of Work: Based on life-cycle investment and operating cost estimates developed in Work Packages B3(a) and (c), determine and compare cost of service for bulk commodities, intermodal and carload traffic on each technically feasible rail route. Rank rail routes by cost of service. Prepare a cost recovery revenue model with prototype rate tariffs for each traffic segment
Deliverables: Cost of service and prototype tariffs by traffic segment for technically feasible routes.
Prerequisites: Completion of Work Package B3(a) and (c).

METHODOLOGY

We adapted an existing spreadsheet model that describes an entire railroad operation. Inputs include the physical infrastructure (route miles, track miles, terminals and other major facilities); the service design plan (including trains, routes, schedules, cars per train, locos per train, traffic type, etc.); and unit cost inputs (including all standard operating budget accounts of labor, equipment, fuel, maintenance, etc. and all SG&A accounts).

OPERATING COSTS

"Above the rail" operating costs are directly related to traffic volumes and include locomotives, rail cars, train crews, fuel, dispatching, and field management. "Below the Rail" operating costs include Maintenance of Way costs, which are somewhat variable with traffic depending on the individual cost item. We included costs for maintenance and inspection of track, signals, bridges, and buildings. Sales, General, and Administrative costs (SG&A) are generally not variable with traffic volumes but are included to ensure total operating costs are accounted for in the average cost per car-mile projections. We include sufficient clerical forces to support the levels of traffic in the scenarios.

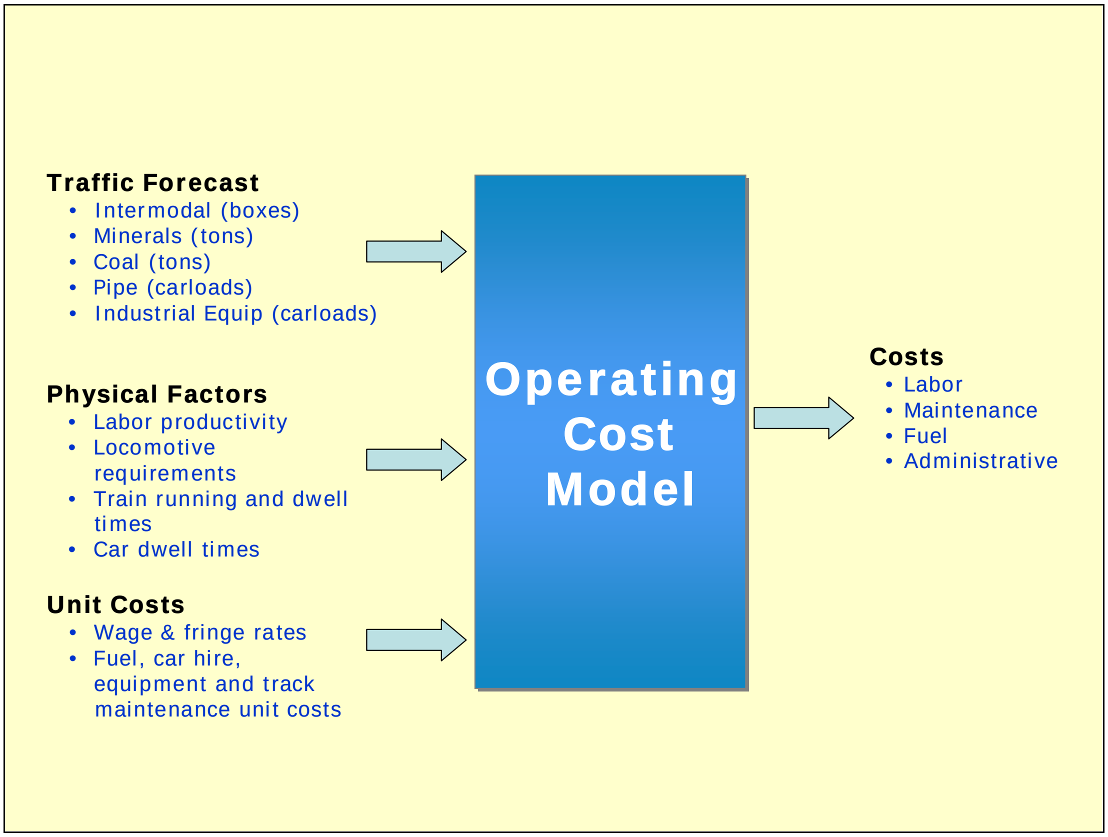
Internal model functions estimate the physical activities required to transport the forecasted traffic: Train starts, Cars per train, Tons per car, Velocity, Working times. Crew requirements are a function of crew districts, crew balance, crew rest, and crew mark-off (availability) rates. Users can change crew size to evaluate cost tradeoffs for train control technology. For example, under a PTC (Positive Train Control) scenario, users may want to assume one-person crews.

The model calculates the required train frequency and train routes given a portfolio of traffic. We assumed different traffic types would be dedicated to specific train types. Each scenario is accompanied by a proposed train service design for intermodal, carload and bulk commodity operations.

The model determines locomotive requirements based on the number of units per train, the number of trains, train running times, servicing and fueling time, and utilization rates (utilization rates reflect idle time for maintenance and simply waiting for the next train). For this project, we assumed rail cars are foreign-owned or private. Thus, Car Hire costs are included, but no capital costs and car repair costs are 100% re-billable to the car owners so are shown as a credit.

The spreadsheet formula calculate the physical workload of each scenario in terms of train starts, train miles, carloads, car-miles, GTM requirements, etc., and apply the appropriate cost factors. The model creates pro-forma operating budgets in standard railroad departments of Transportation; Engineering (MOW – Maintenance of Way), Mechanical (MOE – Maintenance of Equipment) and Administration (SG&A – Sales, General and Administrative). The model easily supports a range of sensitivity analyses, multiple scenario evaluations, and the ability to test a variety of cost assumptions. We use activity-based costing methodology (ABC) to attach appropriate unit costs to an array of operating parameters.

Exhibit 1: Activity Based Costing attaches unit costs to operating parameters.



Capital Costs

Initial investment costs are treated as a capital cost spread evenly over the planning horizon. The user may specify the length of the planning horizon and the required rate of return to amortize the investment. Start-up costs include the cost to construct the physical infrastructure as provided to us by the engineering members of the team. Capital costs were provided for each segment, represented in our model as average investment $/mile.

Our model calculates the necessary investment to purchase locomotives to support a given traffic volume. We also include start-up costs for vehicles, maintenance-of-way equipment, office equipment, and an initial stocking of stores and supplies.

Right-of-way acquisition costs are not included in the model. Per the project scope of work, we did not include financial expenses such as depreciation, interest, and taxes.

Our current model assumes capital replacement of assets occurs beyond the planning horizon. However, we note the financial team members in Phase II would like the model enhanced to show the cyclical replacement of major components of locomotives, ties, rail and ballast. We will continue to assume that replacement of bridges and buildings is beyond the planning horizon.

CALIBRATING THE MODEL

In preparing the data and structuring the cost model, we reviewed the work output from predecessor work modules and ensured we understood the analyses that were performed. We worked closely with the engineering teams and the traffic forecasting teams to properly represent their findings as inputs into our model.

For each route segment, we characterized the track geometry as “Harsh”, “Moderate” or “Normal” after examining the detailed profiles generated by the engineering teams. Generally, “Harsh” territory has grades over 1.5% and/or a significant portion of the route has curves in excess of four degrees. “Moderate” territory has grades over 0.5% and/or curves over three degrees (but less than “Harsh”), while “Normal” territory is marked by low grades and curvatures.

We adjusted operating speeds, fuel consumption, and maintenance costs for harsh and medium track segments to reflect appropriate performance based on benchmark data from other railroad experiences.

We examined the operating statistics and cost data for each of the Class I railroads, the major shortline holding companies, the former BC Rail and the Alaska Railroad to develop a composite set of productivity factors and unit cost inputs. Different railroad companies adopt different management strategies. The approach management chooses to pursue often depends on the objectives the company is trying to achieve. For example, a company focused on minimizing operating costs may be more willing to embrace heavy axle loadings versus a company that is concerned about maximizing the life of its infrastructure and/or minimizing the associated capital costs associated with track replacement. Indeed, large Class I railroads may pursue different strategies for different portions of their network depending on the type of traffic, the physical profile, the competitiveness of other carriers, and/or the physical condition of the track and rolling stock.

In calculating the projected cost of the proposed Alaska Canada Rail Link, it is necessary to first describe the management strategy that underlies the production function for which we are attempting to estimate costs. Until the railroad is actually up and running and professional railroad managers have some experience running the operation, we will not truly know what the right combination of management strategies will be that provides the optimal tradeoff between service, operating costs, and capital costs.

In our cost model, we define three Management Strategies. Each strategy represents a compilation of management decisions that generally represent a commonly accepted approach to running a railroad company. We do not represent that one strategy is necessarily better or worse than another strategy. That qualitative judgment depends on the metrics one chooses to assess the projected outcome. Certainly, the cost function of each strategy is different. The service levels provided by each strategy will be different. Other considerations include: how fragile (or sustainable) is this particular management approach? Does the approach maximize labor expense or capital investment? Does the strategy enable future growth? Does the strategy complement the physical profile of the Alaska Canada Rail Link?

We do not pretend we can calculate the exact cost of the planned project, a particular segment of traffic, or even the cost of a particular input (such as fuel). Rather, our objective is to provide a framework that can be used to understand the relationship of management strategy and costs. Our model should be used to bound the range of costs that might be expected under a variety of operating scenarios and traffic assumptions.

DEFINING A SCENARIO

Users define a scenario by selecting a combination of routes, a volume of traffic, and a cost regime.

- Routes
  - Northern (Tintina Trench)
  - Southern (Alaska Highway)
  - Northern (Tintina Trench) Alternate 1
- Traffic
  - Low
  - Medium
  - High
- Management Strategy
  - 1 (Operations typical of a drag tonnage, low cost railroad)
  - 2 (Operations typical of a regional railroad)
  - 3 (Operations typical of a high cost, high service railroad)

ROUTES

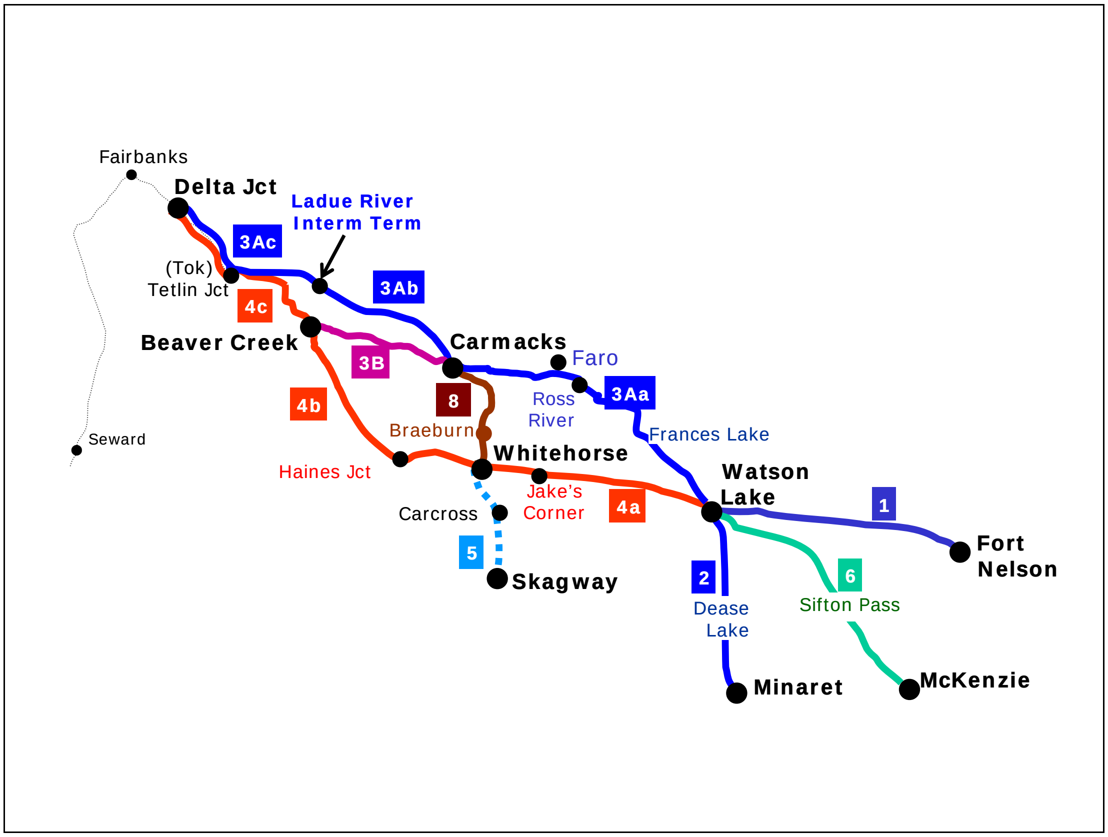
Users can evaluate many alternative routes by combining the various segments.

With four alternative routes connecting Watson Lake to the CN in British Columbia and three alternative routes crossing the Yukon, there is a potential of 12 route alternatives. In addition, we evaluated upgrading the White Pass & Yukon railroad and extending this route to Braeburn for both a standard gage and a narrow gage stand-alone option (I.e. No connection to the rest of the network).

Each proposed route is the compilation of the individual segments that make up that route. The route inherits the attributes of each of its segments. The model rolls up the costs to an overall report for the network.

Costs for each route segment are modeled independently and coded in the spreadsheet to match the following map.

Exhibit 2: Segment codes for railroad cost model.



Traffic

Other team members provided Low, Medium and High traffic volume forecasts by commodity. The forecasts included the on-off route junctions, allowing us to flow each piece of traffic on specific rail segments. Each piece of traffic has an associated annual growth rate, start year and duration (in years). Some traffic is exhausted after 1-3 years, e.g. Pipe, equipment and supplies needed for pipeline and mine construction.

The three levels of traffic: Low, Medium, High, do not refer to increasing volumes on a given set of O-D pairs, but rather the introduction additional O-D pairs to the traffic matrix. “Low” traffic includes those O-D Commodity combinations the forecasters are very confident will divert to the new rail link. “Medium” traffic is likely to divert, and “High” traffic should be viable with a competitive price and service package. Exhibit 3 summarizes the volume of traffic for each scenario.

Exhibit 3: Year 1 Carload volumes by traffic type for each Scenario

Traffic Type	Route 1-Minaret/Tintina Trench			Route 2-Minaret/Alaska Highway			Route 3–Tintina Trench (Alt)		
	Low	Med	High	Low	Med	High	Low	Med	High
Intermodal	155,113	155,113	155,113	155,113	155,113	155,113	155,113	155,113	155,113
Minerals (Begins in Year 3)	1,169	9,937	19,975	-	4,665	20,424	1,169	9,937	19,975
Coal (Begins in Year 3)	-	12,526	12,526	-	12,526	12,526	-	12,526	12,526
Pipe	14,553	14,553	14,553	19,233	19,233	19,233	14,553	14,553	14,553
Industrial Products	4,863	10,978	16,530	6,511	10,021	18,670	5,019	10,978	17,049

Management Strategy

In the following three sections, we review each management strategy and highlight some of the critical assumptions that differentiate them.

Management Strategy 1 represents a "drag tonnage" operation.

Management Strategy 1 represents a scenario wherein the railroad operates with as few trains as possible by running less frequent, very long trains. In addition, each train is powered with the minimum number of locomotives, reducing fuel costs, locomotive capital costs, and fleet maintenance costs. Lower cost per gallon for fuel represents an aggressive management of fueling strategy. Consequently, this strategy has the best fuel cost efficiency. Very low horsepower per ton standards and very long trains combine to minimize fuel consumption per ton-mile of freight.

The second important attribute of Management Strategy 1 is the management team is able to achieve very low unit costs and high productivity measures. Such performance has been observed on a Class I (Canadian National) and on many short lines that benefit from entrepreneurial attitudes and intense management focus.

However, in the case of Alaska Canada Rail Link, Management Strategy 1 does not appear to be an optimal strategy because with the long, linear corridor and relatively light traffic volumes, running fewer, slower trains results in increased crew requirements. More crews are required because the trains take more time to get over the line of road. In addition, because there are fewer trains operating, crews must deadhead more often or be held away from home for extended periods, raising crew requirements and costs.

Management Strategy 2 represents the "most likely" scenario.

Management Strategy 2 is our best estimate of the long run average cost function for the Alaska Canada Rail Link. The unit costs, productivity measures, and service package are very typical of a regional railroad, adjusted for benchmarks we had from the BC Rail and the Alaska Railroad. Generally, the costs are superior to the Alaska railroad and to other U.S. Class I railroads. Many of the statistics for this strategy were derived by examining the costs and operating statistics for the mainline portions of the Class I railroads (e.g. discounting the Class I's intense yard and local operations.)

We measure the veracity of our assumptions by asking ourselves if we would be willing to take on the task of operating this railroad with the level of resources and the operating performance implied by this strategy. Indeed, while we believe Management Strategy 1 may be achievable, given the vast amount of unknowns associated with this project and the lack of experience on this particular corridor, we are far more comfortable supporting Management Strategy 2 performance as the likely operating scenario, at least until the railroad is constructed and the local management team has some empirical evidence to suggest otherwise. It is worth noting that CN did achieve more operating efficiencies and lower costs on the former BC Rail properties than what was anticipated by the most optimistic of forecasts prior to the CN takeover of those lines.

Management Strategy 3 represents a typical Class I railroad.

Management Strategy 3 represents a level of performance typical of large, bureaucratic organizations. This strategy has the highest cost per gallon for fuel, representing a "top it off" fueling strategy. This strategy has the worst fuel efficiency due to higher horsepower per ton on trains, less careful management of shut down policy, and fewer cars per train. Crews are less productive in that trains are shorter, but more productive in that there is relatively less deadheading due to the increased train frequency.

Management Strategy 3 also provides the most frequent and fastest service. The relatively higher costs for maintenance of equipment and maintenance of way ensure resources are available to maintain a "best in class" infrastructure typical of the long distance mainlines in the western parts of the U.S. and Canada.

The entire Alaska Canada Rail Link Team had an opportunity to review our model, the inputs, and the assumptions. Several people provided comments and suggestions that we used to enhance the calculations and improve the results. We were unable to have the model inputs and assumptions reviewed by the Canadian National as originally anticipated.

MODEL STRUCTURE AND SUMMARY OF INPUT ASSUMPTIONS

In the following tables, we summarize the structure of the model. We review the purpose, layout, and content for each sheet in the model. We list our assumptions and describe how a user can change inputs to test the sensitivity of results.

Tab Name	Description
I) Factors	The various Factors tabs hold model inputs that do not vary according to cost or route scenario. Users may adjust these factors if they wish to test their own assumptions regarding the values.
Factors – General	This tab contains metric and U.S. measurement conversions and currency exchange rates used elsewhere in the model to ensure all measurements and cost figures are in U.S. terms.
Factors – Locomotives	Contains Locomotive Cost Factors such as type of unit, consist make-up and Capital Cost per Unit.
Factors - Labor	Contains Labor Cost Factors, including Hourly Wage Rates, Fringe Benefit Rates and the formula for calculating U.S. Payroll Taxes.
Factors – MOW	Contains the factors needed to calculate MOW operating expenses as a function of the terrain and of traffic density.
Factors – Cars	Contains factors needed in calculating Car Days and Car Costs: Train Time required to Change Crews; Train Time required for Car Inspection and for Fueling and Servicing Locomotives; Intermediate Work time; Customer time; and Interchange time. Also contains empty car weights and lading capacity by market segment (Intermodal, Minerals, Coal, Pipe and Industrial Products).

II) Scenarios	
Scenarios-Costs	Contains factors common to all routes but varying according to the cost scenario. There are three preset scenarios: Management Strategy 1, Management Strategy 2 and Management Strategy 3. There is also an "Other" scenario in which the user can test his/her set of cost factors. Some of the critical factors include Fuel Per Gallon, Gallon Per GTM, Car Hire Per Day, Car Repair Cost Per Car-mile, Locomotives Per Train, Locomotive Utilization, Servicing Cost Per Unit, Servicing Events Per Year, Cars Per Train, Miles Per Crew and Crew Availability.

III) Calculations	
Calculations-Segments	This tab contains the basic volume calculations that must be done on a segment-by-segment basis because of differences in traffic, terrain, etc. Segment values are then added together elsewhere in the model to provide workloads used to calculate costs for each route and scenario. The user can choose various routes and scenarios combinations using the dropdown boxes at the top of each tab, and observe the resulting changes by segment in data such as: Loads per Year, Empties per Year, Trains per Week (Loaded), Trains per Week (Empty) and Trains per Week (LD+MT).
Calculations-Routes	This tab combines the volume calculations from individual segments into a route chosen by the user. The results are then used elsewhere to generate costs such as for crews and locomotives.

IV) Operating Costs	
Car Hire	For a given route, this tab shows the projection of costs and factors of Total Car Time on Trains (Hours), Detention Time /Car (Hours), Total Car Time (Hours), Total Car Days, Total Car Days, $/Car Day and Car Hire.
Fuel	For a given route and selected cost and traffic type, this tab calculates the Total KGTMs, Total Gallons and Total Fuel Cost.
Crews	This tab calculates the total T&E Employees needed based on route, traffic level and cost scenario. Note that using the “Management Strategy 1” scenario may increase crew requirements because the less powerful locomotives in this scenario result in slower trains.
Car Repair	This tab calculates car repair costs and the manpower needed to support car repair operations. In the final summary tab, the costs are offset by AAR car repair billing credits, as we assume the Alaska Canada Rail Link will not buy any freight cars and thus will be able to re-bill car owners for any repairs.
Locomotives	This tab calculates the locomotives required to haul the given level of traffic on the given route. The number is also influenced by the type (and thus power) of locomotive and fleet availability (how much time is required to service and maintain locomotives, as well as idle time between trains).
Maintenance of Way	This tab estimates the cost to maintain track as a function of traffic density and terrain. Segments with harsh (hilly, curvy) terrain require more resources than segments with straight, level track. For this analysis, only operating expenses were included. These encompass routine maintenance such as rail grinding. The capital costs of replacing rail, ties, etc were not included as this version contemplated only a 10-year planning horizon, and there should be very little need for track component replacement within 10 years of building new track.
Manpower	This tab calculates manpower requirements for the entire rail system. Some of the numbers, such as for T&E and MOW personnel, depend on other calculations in the model (e.g. the Crews and MOW tabs). Other manpower requirements are input directly using averages for railroads of similar size. The total manpower counts are then translated into payroll costs using the wage, fringe and tax rates from the “Factors” and “Scenarios” tabs.

V) Traffic Forecast	This tab is the heart of the cost model analysis. All data are projected for a given route by Origin-Destination for each traffic segment (Intermodal, Minerals, Coal, Pipe and Industrial Products). Each OD pair is then flowed over the appropriate Segment and the model applies empty return ratios, growth rates and tons/car factors to project total traffic by Segment by Year.

VI) Start Up Expenses	This tab includes the one-time purchase of motor vehicles and other equipment for Maintenance of Way, Maintenance of Equipment, Transportation and General & Administrative departments. In addition, the Locomotive Purchases and Track construction costs (Infrastructure Capital Investment) are included for later use in the summary tab.

VII) Summary Report	This tab summarizes all the traffic and cost calculations from the rest of the model into an "Income Statement" – type report. The capital costs are amortized to give equivalent annual amounts that can then be added to the Operating Expenses (OE) for each year. At the bottom of the report are various measures of unit cost, including $OE/Ton-mile and $Total/Revenue Load (Car).

SCENARIO EVALUATION

We generated a series of results using the model. We define a scenario as the combination of a route, one of the projected levels of traffic (High, Medium, and Low), and one of the pre-defined Management Strategies (1, 2, and 3). We had traffic forecasts for three of the route alternatives enabling us to evaluate the costs for the Alaska Canada Rail Link under 27 different possible scenarios. The results of each scenario can be found in the Appendix.

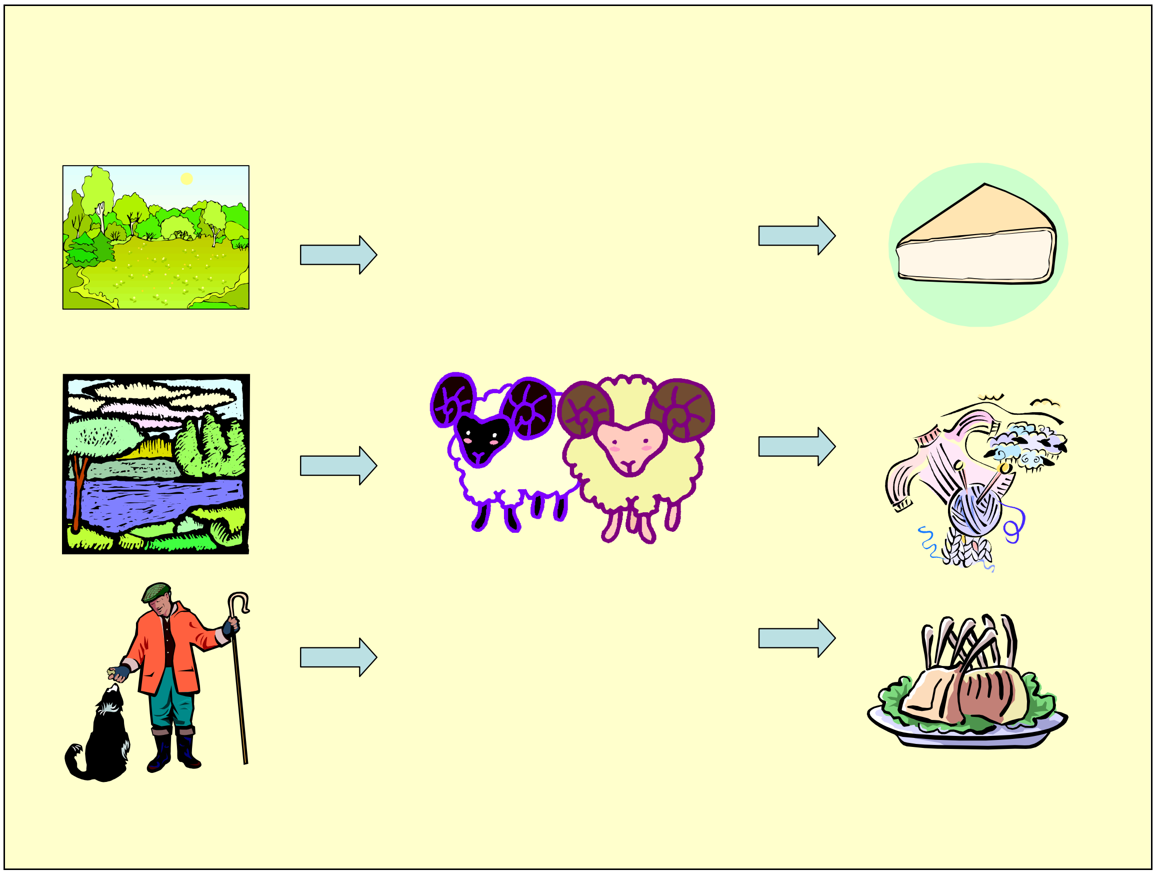
Relevant Economic Principles

It is important for anyone examining these results to be mindful that network economics often skew results such that “average” costs or “incremental” costs are difficult to isolate and quantify. Clearly, building just a portion of the Alaska Canada rail link will not achieve the network benefit of linking the Alaska Railroad to the rest of North America. But there is an additional network effect as well. Because of the proliferation of mineral deposits and natural resources throughout Alaska and the Yukon, each incremental route mile that is constructed exponentially expands the potential origin-destination matrix the new railroad will serve. Any transportation network is comprised of a series of links and nodes. The more nodes on the network, the more potential points of origin and termination for freight and/or passengers.

The “last mile” problem refers to a network phenomenon whereby a common trunk line carries a very large volume of commodity (or electrons in the case of telecommunications or energy grids) to a large number of physically separated endpoints. The trunk line can efficiently move freight as compared to the lighter density feeder lines. Similarly, no single shipper can “afford” to build the entire Alaska Canada rail link, but taken as a group, the composite of all shippers may be able to justify such an investment. In general, economies of scale make a network less expensive per unit of output as the capacity is increased. Furthermore, once the proposed railroad has reached a viable level of freight volumes, incremental traffic need only generate sufficient revenues to offset its own incremental operating costs as the core, or base, traffic is already paying for the capital recovery. The difficulty is determining which set of traffic need only cover its operating costs and which set must help pay for the capital recovery costs. Consequently, the best practice is to price all traffic at the highest level the market will bear, so long as that price is higher than the incremental operating cost for that traffic. This difference is commonly referred to as the “contribution” of that traffic segment. If the total contribution of all traffic is greater than the capital recovery cost for the entire network, then the project is viable.

Railroads are not only complex entities to cost because of the network effects, but also because of the array of different services and products they typically ship. The Alaska Canada Rail Link network is simpler than most railroads because there is no significant yard and local activity. However, the railroad is expected to carry five major commodities of coal, minerals, pipe, intermodal, and industrial products. Each of these traffic groups shares some of the same resources such as crews, track, locomotives and management. At the same time, the railroad must operate each traffic segment at different speeds and with different frequencies to meet shippers’ requirements regarding service and price. The challenge is to determine how to allocate the cost of the various inputs in a way that properly represents the degree to which each service is consuming that shared resource. For example, does a shorter, faster train require relatively more or less management than a longer, slower train? One is a more fragile operation, but the train is on the line for less total hours. The body of work that deals with this problem is called “Multi-product Firm Theory”. A railroad is like a sheep farm in that we can confidently evaluate and understand the cost of each input (grass, water and shepherd in the case of a sheep farm – crews, track and equipment in the case of a railroad) but it is impossible to say exactly how much each product costs (cheese, wool and meat in the case of a sheep farm – ton-miles, speed and frequency in the case of a railroad.)

Exhibit 4: A railroad is like a sheep farm.



NARROW GAGE ONLY SCENARIO FROM SKAGWAY TO BRAEBURN

We performed an analysis for a stand-alone sub-route from Skagway to Braeburn, the potential site for a future coal mine. The purpose of this analysis was to evaluate the economics of using the existing White Pass and Yukon narrow gage railway with an extension to the mine versus rebuilding the entire route to modern, heavy-haul standard gage specifications. In this analysis, there is no rail connection to any other portion of the Alaska Canada Rail Link.

Exhibit 5 summarizes the cost of running the “Narrow Gage Option” for the Alaska Canada Rail Link Railroad Cost Model under 3 different Management Strategies. We chose to show Year 3 costs as they reflect the long-term situation of only Division Mountain coal traffic. There is some initial pipe traffic forecast, but that disappears after 2 years once the pipeline for which it is intended has been built. There is no traffic volume growth forecasted for the coal traffic. Complete 10-year Summary Reports for each scenario appear in the Appendix. The principle differences between the Management Strategies are the type of locomotive, the number of persons per crew, and the unit costs of inputs, with Management Strategy 1 representing an aggressive, very efficient operation and Management Strategy 3 representing the level of performance typical of large, bureaucratic organizations. Management Strategy 2 represents the most probable, sustainable level of performance over the long run.

Exhibit 5: Narrow Gage Costs for Year 3 under Various Management Strategies

	Management Strategy 1	Management Strategy 2	Management Strategy 3
Assumptions			
Locomotive Type	GE Narrow Gage	Average Narrow Gage	EMD Narrow Gage
Locomotive Price	$1.8m	$2.6m	$3.3m
Crew Size	1	2	2
Fuel Efficiency (KGTM / gallon)	1.25	1.5	1.75
Fuel Price per gallon	$1.70	$1.80	$1.90
Tons	1,377,889	1,377,889	1,377,889
Revenue Carloads	19,684	19,684	19,684
Costs			
Operating Cost ($m)	$9.236	$11.084	$11.954
Capital Amortization 30 yrs	$28.842	$49.969	$74.381
Total Cost ($m)	$38.078	$61.053	$86.335
OE / Revenue Load	$469	$563	$607
OE / Revenue Car-Mile	$2.73	$3.27	$3.53
OE / Revenue Ton-mile	$0.04	$0.05	$0.05
OE / Revenue Ton	$6.70	$8.04	$8.68
Total Cost / Revenue Load	$1,937	$3,102	$4,386
Total Cost / Revenue Car-Mile	$11.25	$18.03	$25.50
Total Cost / Revenue Ton-mile	$0.16	$0.26	$0.36
Total Cost / Revenue Ton	$27.64	$44.31	$62.66

NARROW GAGE VERSUS STANDARD GAGE ON SKAGWAY-BRAEBURN

We compared the cost of the Narrow Gage option to the cost of running the same segment as a Standard Gage operation. Standard Gage enables more powerful and readily available locomotives but requires higher capital costs for converting the section between Skagway and Carcross to standard gage ($86.75m vs. $43.0m). The cost to build the remainder of the line (Carcross-Braeburn) as standard gage is the same or slightly less than narrow gage. Narrow Gage materials are lighter and less expensive, but require more expensive, specialized equipment to install. In all cases, the operating costs for a standard gage operation are less than for a narrow gage operation because of the larger capacity of standard gage cars and locomotives. Fewer pieces of equipment and fewer train crew personnel are required to move an equivalent amount of coal. When capital costs are included, the narrow gage option has slightly lower total costs than the standard gage option for Management Strategy 1. For Management Strategies 2 and 3, the total costs of a standard gage operation are slightly lower than the total costs of a narrow gage operation.

The total life-cycle cost of using the existing White Pass and Yukon narrow gage railway with a narrow gage extension to the mine was found to be similar to the cost of rebuilding the entire route to modern, heavy-haul standard gage specifications. While narrow gage is a much less efficient operation than standard gage, the capital cost of upgrading the route to heavy haul standards offset most of the operating efficiencies gained through the use of standard gage technology. The analysis did not consider the lack of network synergies between a narrow gage branch and the balance of the Alaska Canada Rail Link.

Exhibit 6: Narrow Gage versus Standard Gage Operations in Year 3

	Mgt Strategy 1		Mgt Strategy 2		Mgt Strategy 3	
	Narrow Gage	Std Gage	Narrow Gage	Std Gage	Narrow Gage	Std Gage
Assumptions						
Tons/Car	70	110	70	110	70	110
Cars/Train	48	60	48	60	48	75
Locomotives/Train	6	6	6	6	6	5
Coal Tons	1,377,889	1,377,889	1,377,889	1,377,889	1,377,889	1,377,889
Revenue Carloads	19,684	12,526	19,684	12,526	19,684	12,526
Trains	820	418	820	418	820	334
Annual Costs						
Operating Exp ($m)	$9.236	$8.392	$11.084	$9.602	$11.954	$9.361
Capital Amort. ($m)	$28.842	$30.218	$49.969	$51.286	$74.381	$74.852
Total Cost ($m)	$38.078	$38.610	$61.053	$60.888	$86.335	$84.213
COST/TON						
OE/Ton	$ 6.70	$ 6.09	$8.04	$ 6.97	$8.68	$ 6.79
Total Cost/Ton	$27.64	$28.02	$44.31	$44.19	$62.66	$61.12

Low-Cost, High Fuel-Efficiency Scenarios

We also compared the costs of Narrow Gage and Standard Gage operations assuming high fuel efficiency (1.25 Gals/KGTM), low fuel prices ($1.70/gal) and one-person crews for all Management Strategies. These assumptions do not change the relative efficiency of standard gage operations. The only difference in outcome is that under Management Strategy 2, the total cost of a narrow gage operation is *slightly* less than that of a standard gage operation.

Exhibit 7: Narrow Gage versus Standard Gage Operations in Year 3 Assuming High Fuel Efficiency, Low Fuel Price and One-Person Crews in ALL Management Strategies.

	Mgt Strategy 1		Mgt Strategy 2		Mgt Strategy 3	
	Narrow Gage	Std Gage	Narrow Gage	Std Gage	Narrow Gage	Std Gage
Assumptions						
Tons/Car	70	110	70	110	70	110
Cars/Train	48	60	48	60	48	75
Locomotives / Train	6	6	6	6	6	5
Coal Tons	1,377,889	1,377,889	1,377,889	1,377,889	1,377,889	1,377,889
Revenue Carloads	19,684	12,526	19,684	12,526	19,684	12,526
Trains	820	418	820	418	820	334
Annual Costs						
Operating Exp ($m)	$9.236	$8.392	$9.807	$8.559	$10.275	$8.368
Capital Amort. ($m)	$28.842	$30.218	$49.969	$51.286	$74.381	$74.852
Total Cost ($m)	$38.078	$38.610	$59.776	$59.845	$84.656	$83.220
COST/TON						
OE/Ton	$ 6.70	$ 6.09	$7.12	$ 6.21	$7.46	$ 6.07
Total Cost/Ton	$27.64	$28.02	$43.38	$43.43	$61.44	$60.40

Skagway-Braeburn Operation Assumptions

- The focus of this analysis is limited to the segment of the Alaska Canada Rail Link from Skagway to Braeburn
- The only long-term traffic is Division Mountain coal to export at Skagway
- Capital cost for port improvements NOT included
- Construction costs are $410.1m for a Narrow Gage operation and $453.9m for a Standard Gage operation, as detailed in Exhibit 7. Standard Gage requires a major rebuild of Skagway-Carcross, while a Narrow Gage operation would require only relatively modest upgrades of the existing line.

Exhibit 8: Construction Costs for Narrow Gage and Standard Gage Operations

From	To Station	To MP	Miles	Build / Rebuild Cost	
				Narrow Gage	Std Gage
Skagway	Carcross	67.5	67.5	$43m	$86.75m
Carcross	South end Utah Yard (Whitehorse)	106.0	38.5	$40m	$40m
Utah Yard (S)	North end Utah Yard (Whitehorse)	108.0	2.0	-	-
Utah Yard (N)	Whitehorse	110.4	2.4	$5m/mile = $12m	$5m/mile = $12m
Whitehorse	Braeburn	172.0	61.6	$5.31m/mile = $327.1m	$5.31m/mile = $327.1m[1]
Skagway	**Braeburn**		**172.0**	**$410.1m**	**$453.85**

- Train composition and speed reflect both the local terrain and the general characteristics of narrow gage and standard gage bulk train operations, as detailed in Exhibit 8.

[1] Per Paul Taylor, the Utah Yard to Braeburn construction is more expensive per track mile than Braeburn to Carmacks due to the following conditions:

- The first crossing of the Yukon River will require a major bridge located upstream from the Yukon River dam at Whitehorse,
- Bypassing Whitehorse (by skirting Riverdale) will require heavy grading,
- The second crossing of the Yukon River near Mile 15 (Takhini) will require construction of a high bridge,
- The climb out of the Takhini valley will require heavy grading to Fox Lake,
- Construction along the west side of Fox Lake will require very heavy grading.

In contrast, the line of railroad from Braeburn to Carmacks will be of average construction with no major river crossings.

Exhibit 9: Operating Assumptions for Narrow Gage and Standard Gage Operations

	Narrow Gage	Std Gage
Trains	Max speed 20 mph 2 crew districts 6 locomotives and 48 cars Each train= 2 locos + 16 cars + 1 locos + 16 cars + 1 locos + 16 cars + 2 locos	Max speed 20 mph 2 crew districts 5-6 locomotives and 60-75 cars Each train= 2 locos + 30 cars + 2 locos + 30 cars + 2 locos
Train Equipment Purchased	2 Train sets * 6 locomotives = 12 units x Approx 55% availability= 16 - 17 units	1 Train sets * 6 locomotives = 6 units x Approx 55% availability= 6-9 units
Coal car[2]	70 tons lading 18 tons empty	110 tons lading 23 tons empty
Locomotive[3]	Narrow Gage 3000 HP 50,000 lb continuous tractive effort $1.8m (GE) to $3.3m (EMD)	SD70M 4400 HP 110,000 lb continuous tractive effort $1.8m (SD70M) to $2.0m (CW44-AC)

The Appendix contains detailed printouts of the model runs for the Narrow Gage and Standard Gage operation from Skagway-Braeburn.

[2] Innovative Scheduling interviewed individuals from Freight Car America to determine specifications for narrow gage rail cars that are now being, or have recently been, manufactured.

[3] Innovative Scheduling interviewed individuals from General Electric and Electro-Motive Diesel to determine specifications for narrow gage locomotives that are now being, or have recently been, manufactured.

CONCLUSIONS AND NEXT STEPS

The primary purpose of this Phase I of the project was to examine route alternatives and evaluate the pros and cons of each route from an engineering, marketing, and cost perspective. This cost analysis highlighted that the route selection should be based much more on the marketing and policy aspects rather than operating or cost considerations. The range of cost differences between the various routes was relatively small.

From a competitiveness perspective, the operating costs per ton of freight are quite reasonable. However, the critical finding of this study is that the enormous capital cost of this project overshadows any shades of differences that may result from the different Management Strategies. The capital recovery costs as a percentage of total costs range from 90% to 95% of total costs. Consequently, it is of critical importance this project be financed in a way that enables investors to recover their costs with as low of a risk premium as possible over as long a time horizon as possible to ensure the freight service can be offered at rates that will attract shippers away from competing modes of barge and truck.

While this version of the model was sufficient for analyzing each route alternative under a number of operating strategies, there are several simplifying assumptions we have been asked to address as part of Phase II of the Feasibility Study. To better support the detailed financial analysis and the due- diligence exercises in Phase II, we will be making the following modifications to the model:

1) We will limit each run of the model analysis to a single route option

2) We will improve the timing of capital expenses so we not only capture “start up” costs in year one, but we also capture incremental capital, such as locomotive purchases, required in future years as new traffic is projected to come onto the railroad.

3) We will enable users to specify how many years each segment takes to construct; traffic will flow over each segment in the year following completion of construction.

4) We will add “maintenance and replacement” capital

5) We will extend the planning horizon to 50 years and detail our traffic, revenue, and cost assumptions for each year.

6) We will re-engineer the traffic tables to better enable user “what if” analyses

7) We will include revenue, operating income, and total profits in the model

8) We will enable users to phase route construction over the planning horizon such that different segments may be built in different years

9) We will enable users to input a factor that indicates the volume of traffic likely to divert if only a portion of the rail route is constructed

10) We will enhance our summary report to display a wider variety of operating and cost statistics

11) We will add summary reports that show the revenue, costs, and profits allocated to each geographic segment and to each type of traffic

Both the Phase I version of the model and the Phase II version of the model will be posted on the project web site. Please feel free to email Larry Shughart at Larry@InnovativeScheduling.com with any questions you may have regarding this work.

ABOUT THE AUTHORS

LARRY SHUGHART

Larry Shughart specializes in performance management, economic analysis, and network operations engineering. Mr. Shughart has over 20 years of experience in government, industry, consulting, and academia. As a Principal at Charles River Associates, a leading international economics consulting company, he co-authored expert testimony for a national railroad labor arbitration, managed a litigation project between a railcar manufacturer and a Class I railroad, and served as the lead advisor to the Province of British Columbia on matters relating to the restructuring and privatization of BC Rail. For the trucking industry, Mr. Shughart helped expedite the implementation of a new technology safety device. The U.S. DOT Office of Inspector General relied on Mr. Shughart’s operations knowledge and service design experience in analysis of Amtrak. Mr. Shughart’s primary engagement at CRA was Strategic Advisor to the Union Pacific Railroad.

Prior to joining CRA, Mr. Shughart utilized his expertise for 14 years at CSX, where he worked in a variety of areas, including intermodal, performance improvement, locomotive operations, strategic planning, service design, finance, operations research, and engineering. Throughout his career at CSX, he championed the application of operations research methods. Prior to CSX, Mr. Shughart worked in the short-line industry. His academic experience includes the Industrial & Systems Engineering Department Advisory Board at the University of Florida and research support for the MIT Center for Transportation Studies. Mr. Shughart also served as a Professor of Economics at the University of North Florida.

ANITA GARD

Anita M. Gard specializes in data analysis, model development and implementation, and presentation preparation. Ms. Gard has over 25 years of experience in government and private industry. As an independent consultant, she has developed analytical and tactical tools for Perdue Farms, Inc., CSX, and other companies. She has also donated her database and organizational skills to support a volunteer group that promotes world peace through the hosting of international government, business, and professional leaders.

Prior to her independent consulting career, Ms. Gard utilized her economics and business expertise for 20 years in the railroad industry, at the United States Railway Association, Amtrak, and CSX, where she worked in a variety of areas, including budgeting, accounting, economic analysis, payroll, and locomotive fleet planning. Throughout her career at CSX, she stressed the need to present not data, but information and advice, and to present them in an easy to follow, structured format. Ms. Gard has experience in both formulating business questions and in developing the tools to answer them.

ABOUT INNOVATIVE SCHEDULING

Dr. Ravindra K. Ahuja, a world-renowned researcher and academician, and a Professor of Industrial & System Engineering at the University of Florida, Gainesville, founded Innovative Scheduling, Inc. in 2000 with the desire to solve complex and large-scale transportation scheduling problems using innovative and state-of-the-art operations research techniques. He believes that universities provide a fertile ground to germinate ideas, while commercial companies are required to package and deliver those ideas to the market place. Innovative Scheduling is delivering cutting-edge academic research to the transportation industry.

We are a highly qualified team of professionals with strong operations research, computer science, and information systems development skills. We also have significant industry and consulting experience. We intend to develop software solutions that can be used for planning as well as real-time scheduling of critical transportation resources. The current focus of the company is in the railroad industry with plans to diversify into other transportation sectors. The company aspires to be among the world's best transportation software development and consulting company. Our motto, "*Transforming the World of Transportation*", represents our aim to create tremendous value for our customers, a profitable and stable enterprise for our employees, and a success story for the discipline of operations research.

APPENDIX

MODEL RESULTS

In the following exhibits, we list the model results for each route, for each cost and traffic scenario. Each table represents a different cost statistic. The shaded column represents our estimation of the most likely cost result. On each table, the highest cost appears in red font while the lowest cost appears in blue font representing the high and low boundaries of the expected range of costs that we forecast for the Alaska Canada Rail Link.

Exhibit 10: Operating Expenses Forecasted by Strategies in Each Route with Max/Min Highlights per Car Load

	Year 5 OE $/Revenue Load								
Route	Mgt Strategy 1 Low Traffic	Mgt Strategy 1 Medium Traffic	Mgt Strategy 1 High Traffic	Mgt Strategy 2 Low Traffic	Mgt Strategy 2 Medium Traffic	Mgt Strategy 2 High Traffic	Mgt Strategy 3 Low Traffic	Mgt Strategy 3 Medium Traffic	Mgt Strategy 3 High Traffic
1 Minaret / Tintina Trench: Minaret-Watson Lake-Carmacks-Ladue River	$ 513	$ 565	$ 603	$ 575	**$ 625**	$ 668	$ 609	$ 654	$ 686
2 Minaret / Alaska Hwy: Minaret-Watson Lake-Whitehorse-Beaver Creek	$ 534	$ 609	$ 647	$ 592	**$ 667**	**$ 705**	$ 630	$ 671	$ 695
3 Tintina Trench (Northern): Fort Nelson-Watson Lake-Carmacks-Ladue River	**$ 491**	$ 543	$ 581	$ 550	**$ 599**	$ 645	$ 603	$ 633	$ 675

Exhibit 11: Total Expenses Forecasted by Strategies in Each Route with Max/Min Highlights per Car Load

	Year 5 Total $/Revenue Load								
Route	Mgt Strategy 1 Low Traffic	Mgt Strategy 1 Medium Traffic	Mgt Strategy 1 High Traffic	Mgt Strategy 2 Low Traffic	Mgt Strategy 2 Medium Traffic	Mgt Strategy 2 High Traffic	Mgt Strategy 3 Low Traffic	Mgt Strategy 3 Medium Traffic	Mgt Strategy 3 High Traffic
1 Minaret / Tintina Trench: Minaret-Watson Lake-Carmacks-Ladue River	$ 5,736	$ 5,088	$ 4,804	$ 9,400	**$ 8,265**	$ 7,764	$ 13,408	$ 11,735	$ 10,976
2 Minaret / Alaska Hwy: Minaret-Watson Lake-Whitehorse-Beaver Creek	$ 6,080	$ 5,572	$ 5,065	$ 9,965	**$ 9,053**	$ 8,167	**$ 14,222**	$ 12,832	$ 11,520
3 Tintina Trench (Northern): Fort Nelson-Watson Lake-Carmacks-Ladue River	$ 4,350	$ 3,890	**$ 3,686**	$ 7,068	**$ 6,250**	$ 5,886	$ 10,055	$ 8,829	$ 8,281

Exhibit 12: Operating Expenses Forecasted by Strategies in Each Route with Max/Min Highlights per Revenue Ton-Mile

Route	Year 5 OE $/Revenue Ton-Mile								
	Mgt Strategy 1 Low Traffic	Mgt Strategy 1 Medium Traffic	Mgt Strategy 1 High Traffic	Mgt Strategy 2 Low Traffic	Mgt Strategy 2 Medium Traffic	Mgt Strategy 2 High Traffic	Mgt Strategy 3 Low Traffic	Mgt Strategy 3 Medium Traffic	Mgt Strategy 3 High Traffic
1 Minaret / Tintina Trench: Minaret-Watson Lake-Carmacks-Ladue River	$ 0.021	$ 0.021	**$ 0.020**	$ 0.023	**$ 0.023**	$ 0.022	$ 0.025	$ 0.024	$ 0.022
2 Minaret / Alaska Hwy: Minaret-Watson Lake-Whitehorse-Beaver Creek	$ 0.021	$ 0.022	$ 0.021	$ 0.023	**$ 0.024**	$ 0.023	$ 0.025	$ 0.024	$ 0.023
3 Tintina Trench (Northern): Fort Nelson-Watson Lake-Carmacks-Ladue River	$ 0.021	$ 0.021	$ 0.020	$ 0.023	**$ 0.023**	$ 0.022	**$ 0.026**	$ 0.024	$ 0.023

Exhibit 13: Total Expenses Forecasted by Strategies in Each Route with Max/Min Highlights per Revenue Ton-Mile

	Year 5 Total Cost $/Revenue Ton-Mile								
Route	Mgt Strategy 1 Low Traffic	Mgt Strategy 1 Medium Traffic	Mgt Strategy 1 High Traffic	Mgt Strategy 2 Low Traffic	Mgt Strategy 2 Medium Traffic	Mgt Strategy 2 High Traffic	Mgt Strategy 3 Low Traffic	Mgt Strategy 3 Medium Traffic	Mgt Strategy 3 High Traffic
1 Minaret / Tintina Trench: Minaret-Watson Lake-Carmacks-Ladue River	$ 0.234	$ 0.186	$ 0.158	$ 0.383	**$ 0.301**	$ 0.255	$ 0.546	$ 0.428	$ 0.360
2 Minaret / Alaska Hwy: Minaret-Watson Lake-Whitehorse-Beaver Creek	$ 0.239	$ 0.198	$ 0.165	$ 0.392	**$ 0.322**	$ 0.267	**$ 0.560**	$ 0.457	$ 0.376
3 Tintina Trench (Northern): Fort Nelson-Watson Lake-Carmacks-Ladue River	$ 0.185	$ 0.148	**$ 0.126**	$ 0.300	**$ 0.238**	$ 0.201	$ 0.427	$ 0.336	$ 0.282

Exhibit 14: Operating Expenses Forecasted by Strategies in Each Route with Max/Min Highlights per Loaded Car-Mile

Route	Year 5 OE $/Loaded Car-Mile								
	Mgt Strategy 1 Low Traffic	Mgt Strategy 1 Medium Traffic	Mgt Strategy 1 High Traffic	Mgt Strategy 2 Low Traffic	Mgt Strategy 2 Medium Traffic	Mgt Strategy 2 High Traffic	Mgt Strategy 3 Low Traffic	Mgt Strategy 3 Medium Traffic	Mgt Strategy 3 High Traffic
1 Minaret / Tintina Trench: Minaret-Watson Lake-Carmacks-Ladue River	$ 0.433	$ 0.520	$ 0.568	$ 0.486	**$ 0.575**	$ 0.629	$ 0.515	$ 0.601	$ 0.646
2 Minaret / Alaska Hwy: Minaret-Watson Lake-Whitehorse-Beaver Creek	**$ 0.429**	$ 0.522	$ 0.590	$ 0.475	**$ 0.573**	$ 0.643	$ 0.506	$ 0.575	$ 0.634
3 Tintina Trench (Northern): Fort Nelson-Watson Lake-Carmacks-Ladue River	$ 0.436	$ 0.525	$ 0.575	$ 0.489	**$ 0.580**	$ 0.639	$ 0.536	$ 0.613	**$ 0.668**

Exhibit 15: Total Expenses Forecasted by Strategies in Each Route with Max/Min Highlights per Loaded Car-Mile

	Year 5 Total $/Loaded Car-Mile								
Route	Mgt Strategy 1 Low Traffic	Mgt Strategy 1 Medium Traffic	Mgt Strategy 1 High Traffic	Mgt Strategy 2 Low Traffic	Mgt Strategy 2 Medium Traffic	Mgt Strategy 2 High Traffic	Mgt Strategy 3 Low Traffic	Mgt Strategy 3 Medium Traffic	Mgt Strategy 3 High Traffic
1 Minaret / Tintina Trench: Minaret-Watson Lake-Carmacks-Ladue River	$ 4.847	$ 4.679	$ 4.527	$ 7.944	**$ 7.602**	$ 7.316	$ 11.331	$ 10.793	$ 10.343
2 Minaret / Alaska Hwy: Minaret-Watson Lake-Whitehorse-Beaver Creek	$ 4.884	$ 4.779	$ 4.621	$ 8.004	**$ 7.766**	$ 7.450	**$ 11.424**	$ 11.007	$ 10.509
3 Tintina Trench (Northern): Fort Nelson-Watson Lake-Carmacks-Ladue River	$ 3.868	$ 3.764	**$ 3.651**	$ 6.285	**$ 6.048**	$ 5.831	$ 8.942	$ 8.543	$ 8.203

EXAMPLE MODEL SUMMARY REPORT TAB

Alaska Canada Rail Link

Summary Report

Route: 3 Tintina Trench (Northern): Fort Nelson-Watson Lake-Carmacks-Ladue River
Cost Scenario: Management Strategy 2
Traffic Scenario: Medium Traffic

	Year 1	Year 2	Year 3	Year 4	Year 5
Traffic (Revenue Loads)					
Intermodal (Boxes)	155,113	157,440	159,801	162,198	164,631
Minerals (C/L)	-	-	9,937	9,937	9,937
Coal (C/L)	-	-	12,526	12,526	12,526
Pipe (C/L)	14,553	9,205	-	-	-
Industrial Products (C/L)	10,978	9,876	8,570	7,040	7,076
Total Revenue Loads	180,644	176,521	190,835	191,701	194,170
Transportation Operating Expenses					
Maintenance of Way					
Labor	6,933,195	7,071,859	7,213,296	7,357,562	7,504,713
Material	6,933,195	7,071,859	7,213,296	7,357,562	7,504,713
Purchased Services	693,320	707,186	721,330	735,756	750,471
Total MoW	$ 14,559,710	$ 14,850,904	$ 15,147,922	$ 15,450,880	$ 15,759,898
Maintenance of Equipment					
Labor - Exec & Admin	502,605	512,657	522,910	533,368	544,036
Loco Mtce & Svc - Labor	1,737,400	1,772,148	3,202,018	3,160,702	3,223,916
Loco Mtce & Svc - Mtrl & Purch Svcs	1,400,000	1,400,000	2,480,000	2,400,000	2,400,000
Car Repair - Labor	3,033,316	2,885,853	3,058,625	3,041,661	3,142,621
Car Repair - Mtrl & Purch Services	3,505,113	3,269,328	3,397,115	3,312,033	3,354,870
Car Repair - AAR Billing	(6,538,429)	(6,155,181)	(6,455,740)	(6,353,694)	(6,497,490)
Other	156,870	158,607	284,101	278,035	281,196
Total MoE	$ 3,796,875	$ 3,843,413	$ 6,489,029	$ 6,372,105	$ 6,449,148
Transportation					
Labor	21,676,995	22,110,535	26,854,685	25,397,243	25,905,188
Locomotive fuel	40,716,917	38,984,442	41,328,024	41,083,872	42,424,376
Car hire	13,128,761	12,027,596	15,319,911	15,049,667	15,194,947
Supplies	1,083,850	1,105,527	1,342,734	1,269,862	1,295,259
Other	3,830,326	3,711,405	4,242,268	4,140,032	4,240,989
Total Transporation	$ 80,436,848	$ 77,939,505	$ 89,087,622	$ 86,940,676	$ 89,060,759

Alaska Canada Rail Link

Summary Report

Route: 3 Tintina Trench (Northern): Fort Nelson-Watson Lake-Carmacks-Ladue River
Cost Scenario: Management Strategy 2
Traffic Scenario: Medium Traffic

	Year 1	Year 2	Year 3	Year 4	Year 5
General & Administrative					
Labor	1,776,330	1,811,857	1,848,094	1,885,056	1,922,757
Insurance	750,000	750,000	750,000	750,000	750,000
Legal & accounting	150,000	150,000	150,000	150,000	150,000
Office supplies	177,633	177,633	177,633	177,633	177,633
Property lease	-	-	-	-	-
Telephone, radio	1,782,992	1,782,992	1,782,992	1,782,992	1,782,992
Other	231,848	233,624	235,436	237,284	239,169
Property tax	100,000	100,000	100,000	100,000	100,001
Total G & A	**$ 4,968,803**	**$ 5,006,106**	**$ 5,044,155**	**$ 5,082,965**	**$ 5,122,552**
Operating Expenses (OE)	**$ 103,762,235**	**$ 101,639,926**	**$ 115,768,728**	**$ 113,846,627**	**$ 116,392,356**
Total Capital Amortization	**$ 1,097,240,136**	**$ 1,097,240,136**	**$ 1,097,240,136**	**$ 1,097,240,136**	**$ 1,097,240,136**
Total Cost	**$ 1,201,002,372**	**$ 1,198,880,063**	**$ 1,213,008,864**	**$ 1,211,086,763**	**$ 1,213,632,493**

Costs Per Unit	Year 1	Year 2	Year 3	Year 4	Year 5
OE $/Revenue Load	$ 574	$ 576	$ 607	$ 594	$ 599
Total $/Revenue Load	$ 6,648	$ 6,792	$ 6,356	$ 6,318	$ 6,250
OE $/Revenue Ton-Mile	$ 0.0193	$ 0.0208	$ 0.0222	$ 0.0226	$ 0.0228
Total Cost $/Revenue Ton-Mile	$ 0.2231	$ 0.2457	$ 0.2329	$ 0.2402	$ 0.2381
OE $/Loaded Car-Mile	$ 0.519	$ 0.520	$ 0.573	$ 0.575	$ 0.580
Total $/Loaded Car-Mile	$ 6.001	$ 6.135	$ 6.006	$ 6.119	$ 6.048

Employee Count by Department	Year 1	Year 2	Year 3	Year 4	Year 5
MoW	112	112	112	112	112
MoE	73	70	91	88	88
Trans	242	242	286	266	266
G&A	24	24	24	24	24
Total	**451**	**448**	**513**	**490**	**490**

Alaska Canada Rail Link

Summary Report

Route: 3 Tintina Trench (Northern): Fort Nelson-Watson Lake-Carmacks-Ladue River
Cost Scenario: Management Strategy 2
Traffic Scenario: Medium Traffic

	Year 1	Year 2	Year 3	Year 4	Year 5
Payroll & Fringes by Department					
MoW	6,933,195	7,071,859	7,213,296	7,357,562	7,504,713
MoE	5,273,321	5,170,658	6,783,553	6,735,731	6,910,572
Trans	21,676,995	22,110,535	26,854,685	25,397,243	25,905,188
G&A	1,776,330	1,811,857	1,848,094	1,885,056	1,922,757
Total	**35,659,840**	**36,164,908**	**42,699,628**	**41,375,592**	**42,243,230**

NARROW GAGE VERSUS STANDARD GAGE ANALYSIS DETAILS

Exhibit 16a: Cost Comparison between Standard and Narrow Gage Operations – Management Strategy 1

Management Strategy 1

	Narrow Gage	Standard Gage	(Negative = Narrow Gage < Std Gage)	Comments
Basic Operating Assumptions				
Tons/Car	70	110	(40)	
Cars/Train	48	60	(12)	
Locomotives/Train	6	6	0	
Annual Traffic Volumes				
Coal Tons	1,377,889	1,377,889	0	
Carloads	19,684	12,526	7,158	
Trains	820	418	403	
Transportation Costs				
Labor	$ 2,166,750	$ 2,166,750	$ -	
Material	$ 2,166,750	$ 2,166,750	$ -	
Purchased Services	$ 216,675	$ 216,675	$ -	
Maintenance of Way (MOW)	$ 4,550,175	$ 4,550,175	$ -	NG requires specialized equipment but lighter axle loads; assume a wash
Labor - Exec & Admin	$ 249,750	$ 249,750	$ -	
Loco Mtce & Svc - Labor	664,800	$ 295,467	$ 369,333	Narrow gage locomotives much less powerful than std gage, so more locomotives needed
Loco Mtce & Svc - Mtrl & Purch Svcs	$ 540,000	$ 240,000	$ 300,000	Narrow gage locomotives much less powerful than std gage, so more locomotives needed
Car Repair - Labor	$ 98,488	$ 62,674	$ 35,814	Narrow gage cars have less capacity than std gage, so more cars needed
Car Repair - Mtrl & Purch Services	$ 116,083	$ 73,871	$ 42,212	Narrow gage cars have less capacity than std gage, so more cars needed
Car Repair - AAR Billing	$ (214,570)	$ (136,545)	$ (78,026)	Narrow gage cars have less capacity than std gage, so more cars needed
Other	$ 60,240	$ 26,773	$ 33,467	
Maintenance of Equipment (MOE)	$ 1,514,790	$ 811,990	$ 702,800	
Labor	$ 1,677,514	$ 1,487,811	$ 189,703	
Locomotive fuel	$ 1,812,416	$ 1,697,391	$ 115,025	Fuel consumption is function of KGTMs, which differs between std & narrow gage only by total weight of cars
Car hire	$ -	$ -	$ -	
Supplies	$ 83,876	$ 74,391	$ 9,485	
Other	$ 178,690	$ 162,980	$ 15,711	
Transportation	$ 3,752,496	$ 3,422,573	$ 329,923	
Labor	$ 850,500	$ 850,500	$ -	
Insurance	$ 750,000	$ 750,000	$ -	
Legal & accounting	$ 150,000	$ 150,000	$ -	
Office supplies	$ 85,050	$ 85,050	$ -	
Property lease	$ -	$ -	$ -	
Telephone, radio	$ 285,390	$ 255,648	$ 29,742	
Other	$ 106,047	$ 104,560	$ 1,487	
Property tax	$ 100,000	$ 100,000	$ -	
General, Sales & Administration (GS&A)	$ 2,326,987	$ 2,295,757	$ 31,230	
Total Operating Expenses (OE)	$ 12,144,448	$ 11,080,495	$ 1,063,953	
Total Capital Amortization	$ 28,497,407	$ 29,756,153	$ (1,258,745)	Narrow gage: less track construction, but more locomotive purchases
Total Cost	$ 40,641,856	$ 40,836,648	$ (194,792)	

Exhibit 17b: Cost Comparison Between Standard and Narrow Gage Operations – Management Strategy 1 (cont)

Management Strategy 1

	Narrow Gage	Standard Gage	(Negative = Narrow Gage < Std Gage)	Comments
Track Construction	$ 403,000,000	$ 446,750,000	$ (43,750,000)	Skagway-Carcross, rehab narrow gage cheaper than rebuild to std gage
Locomotive Purchases	$ 32,400,000	$ 8,000,000	$ 24,400,000	Special purpose narrow gage locomotives less powerful than std gage, so need more of them
Costs Per Unit				
OE $/Revenue Load	617	$ 885	$ (268)	
Total $/Revenue Load	2,065	$ 3,260	$ (1,195)	
OE$/Revenue Car-Mile	$ 3.59	$ 5.14	($1.56)	
Total $/Revenue Car-Mile	$ 12.00	$ 18.95	($6.95)	
OE $/Revenue Ton-Mile	$ 0.05	$ 0.05	$0.00	
Total Cost $/Revenue Ton-Mile	$ 0.17	$ 0.17	($0.00)	
OE$/Ton	$ 8.81	$ 8.04	$0.77	
Total Cost$/Ton	$ 29.50	$ 29.64	($0.14)	
Employee Count by Department				
MOW	35	35	0	
MOE	14	8	6	
Transportation	21	19	2	
SG&A	10	10	0	
Total Employees	80	72	8	
Payroll & Fringes by Department				
MOW	$ 2,166,750	$ 2,166,750	$0	
MOE	$ 1,013,038	$ 607,891	$405,147	
Transportation	$ 1,677,514	$ 1,487,811	$189,703	
SG&A	$ 850,500	$ 850,500	$ -	
Total Payroll, Fringe and Taxes	$ 5,707,802	$ 5,112,952	$ 594,850	

Exhibit 18a: Cost Comparison Between Standard and Narrow Gage Operations – Management Strategy 2

Management Strategy 2

	Narrow Gage	Standard Gage	(Negative = Narrow Gage < Std Gage)	Comments
Basic Operating Assumptions				
Tons/Car	70	110	(40)	
Cars/Train	48	60	(12)	
Locomotives/Train	6	6	0	
Annual Traffic Volumes				
Coal Tons	1,377,889	1,377,889	0	
Carloads	19,684	12,526	7,158	
Trains	820	418	403	
Transportation Costs				
Labor	$ 2,166,750	$ 2,166,750	$ -	
Material	$ 2,166,750	$ 2,166,750	$ -	
Purchased Services	$ 216,675	$ 216,675	$ -	
Maintenance of Way (MOW)	$ 4,550,175	$ 4,550,175	$ -	NG requires specialized equipment but lighter axle loads; assume a wash
Labor - Exec & Admin	$ 249,750	$ 249,750	$ -	
Loco Mtce & Svc - Labor	876,000	$ 438,000	$ 438,000	Narrow gage locomotives much less powerful than std gage, so more locomotives needed
Loco Mtce & Svc - Mtrl & Purch Svcs	$ 720,000	$ 360,000	$ 360,000	Narrow gage locomotives much less powerful than std gage, so more locomotives needed
Car Repair - Labor	$ 110,799	$ 70,508	$ 40,290	Narrow gage cars have less capacity than std gage, so more cars needed
Car Repair - Mtrl & Purch Services	$ 130,593	$ 83,105	$ 47,488	Narrow gage cars have less capacity than std gage, so more cars needed
Car Repair - AAR Billing	$ (241,392)	$ (153,613)	$ (87,779)	Narrow gage cars have less capacity than std gage, so more cars needed
Other	$ 79,800	$ 39,900	$ 39,900	
Maintenance of Equipment (MOE)	$ 1,925,550	$ 1,087,650	$ 837,900	
Labor	$ 2,815,731	$ 2,246,622	$ 569,108	
Locomotive fuel	$ 2,485,142	$ 2,327,423	$ 157,719	Fuel consumption is function of KGTMs, which differs between std & narrow gage only by total weight of cars
Car hire	$ -	$ -	$ -	
Supplies	$ 140,787	$ 112,331	$ 28,455	
Other	$ 272,083	$ 234,319	$ 37,764	
Transportation	$ 5,713,743	$ 4,920,696	$ 793,047	
Labor	$ 850,500	$ 850,500	$ -	
Insurance	$ 750,000	$ 750,000	$ -	
Legal & accounting	$ 150,000	$ 150,000	$ -	
Office supplies	$ 85,050	$ 85,050	$ -	
Property lease	$ -	$ -	$ -	
Telephone, radio	$ 353,476	$ 301,107	$ 52,370	
Other	$ 109,451	$ 106,833	$ 2,618	
Property tax	$ 100,000	$ 100,000	$ -	
General, Sales & Administration (GS&A)	$ 2,398,478	$ 2,343,489	$ 54,988	
Total Operating Expenses (OE)	$ 14,587,946	$ 12,902,010	$ 1,685,936	
Total Capital Amortization	$ 49,749,147	$ 50,503,798	$ (754,651)	Narrow gage: less track construction, but more locomotive purchases
Total Cost	$ 64,337,093	$ 63,405,808	$ 931,284	

Exhibit 19b: Cost Comparison Between Standard and Narrow Gage Operations – Management Strategy 2 (cont)

Management Strategy 2

	Narrow Gage	Standard Gage	(Negative = Narrow Gage < Std Gage)	Comments
Track Construction	$ 403,000,000	$ 446,750,000	$ (43,750,000)	Skagway-Carcross, rehab narrow gage cheaper than rebuild to std gage
Locomotive Purchases	$ 45,900,000	$ 9,000,000	$ 36,900,000	Special purpose narrow gage locomotives less powerful than std gage, so need more of them
Costs Per Unit				
OE $/Revenue Load	741	$ 1,030	$ (289)	
Total $/Revenue Load	3,268	$ 5,062	$ (1,793)	
OE $/Revenue Car-Mile	$ 4.31	$ 5.99	($1.68)	
Total $/Revenue Car-Mile	$ 19.00	$ 29.43	($10.43)	
OE $/Revenue Ton-Mile	$ 0.06	$ 0.05	$0.01	
Total Cost $/Revenue Ton-Mile	$ 0.27	$ 0.27	$0.00	
OE $/Ton	$ 10.59	$ 9.36	$1.22	
Total Cost $/Ton	$ 46.69	$ 46.02	$0.68	
Employee Count by Department				
MOW	35	35	0	
MOE	17	10	7	
Transportation	33	27	6	
SG&A	10	10	0	
Total Employees	95	82	13	
Payroll & Fringes by Department				
MOW	$ 2,166,750	$ 2,166,750	$0	
MOE	$ 1,236,549	$ 758,258	$478,290	
Transportation	$ 2,815,731	$ 2,246,622	$569,108	
SG&A	$ 850,500	$ 850,500	$ -	
Total Payroll, Fringe and Taxes	$ 7,069,530	$ 6,022,131	$ 1,047,399	

Exhibit 20a: Cost Comparison Between Standard and Narrow Gage Operations – Management Strategy 3

Management Strategy 3

	Narrow Gage	Standard Gage	(Negative = Narrow Gage < Std Gage)	Comments
Basic Operating Assumptions				
Tons/Car	70	110	(40)	
Cars/Train	48	75	(27)	
Locomotives/Train	6	5	1	
Annual Traffic Volumes				
Coal Tons	1,377,889	1,377,889	0	
Carloads	19,684	12,526	7,158	
Trains	820	334	486	
Transportation Costs				
Labor	$ 2,166,750	$ 2,166,750	$ -	
Material	$ 2,166,750	$ 2,166,750	$ -	
Purchased Services	$ 216,675	$ 216,675	$ -	
Maintenance of Way (MOW)	$ 4,550,175	$ 4,550,175	$ -	NG requires specialized equipment but lighter axle loads; assume a wash
Labor - Exec & Admin	$ 249,750	$ 249,750	$ -	
Loco Mtce & Svc - Labor	1,087,200	$ 362,400	$ 724,800	Narrow gage locomotives much less powerful than std gage, so more locomotives needed
Loco Mtce & Svc - Mtrl & Purch Svcs	$ 900,000	$ 300,000	$ 600,000	Narrow gage locomotives much less powerful than std gage, so more locomotives needed
Car Repair - Labor	$ 123,171	$ 78,381	$ 44,789	Narrow gage cars have less capacity than std gage, so more cars needed
Car Repair - Mtrl & Purch Services	$ 145,042	$ 92,299	$ 52,743	Narrow gage cars have less capacity than std gage, so more cars needed
Car Repair - AAR Billing	$ (268,213)	$ (170,681)	$ (97,532)	Narrow gage cars have less capacity than std gage, so more cars needed
Other	$ 99,360	$ 33,120	$ 66,240	
Maintenance of Equipment (MOE)	$ 2,336,310	$ 945,270	$ 1,391,040	
Labor	$ 3,005,434	$ 2,056,920	$ 948,514	
Locomotive fuel	$ 2,785,257	$ 2,608,491	$ 176,766	Fuel consumption is function of KGTMs, which differs between std & narrow gage only by total weight of cars
Car hire	$ -	$ -	$ -	
Supplies	$ 150,272	$ 102,846	$ 47,426	
Other	$ 297,048	$ 238,413	$ 58,635	
Transportation	$ 6,238,011	$ 5,006,670	$ 1,231,341	
Labor	$ 850,500	$ 850,500	$ -	
Insurance	$ 750,000	$ 750,000	$ -	
Legal & accounting	$ 150,000	$ 150,000	$ -	
Office supplies	$ 85,050	$ 85,050	$ -	
Property lease	$ -	$ -	$ -	
Telephone, radio	$ 374,140	$ 288,235	$ 85,905	
Other	$ 110,485	$ 106,189	$ 4,295	
Property tax	$ 100,000	$ 100,000	$ -	
General, Sales & Administration (GS&A)	$ 2,420,175	$ 2,329,974	$ 90,200	
Total Operating Expenses (OE)	$ 15,544,670	$ 12,832,089	$ 2,712,581	
Total Capital Amortization	$ 74,301,066	$ 73,717,936	$ 583,129	Narrow gage: less track construction, but more locomotive purchases
Total Cost	$ 89,845,736	$ 86,550,026	$ 3,295,711	

Exhibit 21b: Cost Comparison Between Standard and Narrow Gage Operations – Management Strategy 3 (cont)

Management Strategy 3

	Narrow Gage	Standard Gage	(Negative = Narrow Gage < Std Gage)	Comments
Track Construction	$ 403,000,000	$ 446,750,000	$ (43,750,000)	Skagway-Carcross, rehab narrow gage cheaper than rebuild to std gage
Locomotive Purchases	$ 59,400,000	$ 12,000,000	$ 47,400,000	Special purpose narrow gage locomotives less powerful than std gage, so need more of them
Costs Per Unit				
OE $/Revenue Load	790	$ 1,024	$ (235)	
Total $/Revenue Load	4,564	$ 6,909	$ (2,345)	
OE $/Revenue Car-Mile	$ 4.59	$ 5.96	($1.36)	
Total $/Revenue Car-Mile	$ 26.54	$ 40.17	($13.63)	
OE $/Revenue Ton-Mile	$ 0.07	$ 0.06	$0.01	
Total Cost $/Revenue Ton-Mile	$ 0.38	$ 0.37	$0.01	
OE $/Ton	$ 11.28	$ 9.31	$1.97	
Total Cost $/Ton	$ 65.21	$ 62.81	$2.39	
Employee Count by Department				
MOW	35	35	0	
MOE	20	9	11	
Transportation	35	25	10	
SG&A	10	10	0	
Total Employees	100	79	21	
Payroll & Fringes by Department				
MOW	$ 2,166,750	$ 2,166,750	$0	
MOE	$ 1,460,121	$ 690,531	$769,589	
Transportation	$ 3,005,434	$ 2,056,920	$948,514	
SG&A	$ 850,500	$ 850,500	$ -	
Total Payroll, Fringe and Taxes	$ 7,482,805	$ 5,764,701	$ 1,718,103	

Exhibit 22a: Estimation of Construction Costs

White Pass & Yukon Report (Paul Taylor, et al)	Appendix 7A	Appendix 7B	Appendix 7C	Appendix 7D
	No Coal	*Std Gage, Heavy Haul*	*=7B + 3rd rail*	*=7C + Heavy Haul Rehab + Carmacks Extension*
Port	$ 33,900	$ 110,000	$ 110,000	$ 110,000
Rehab track	$ 93,000	$ 100,000	$ 104,000	$ 190,000
Skagway buildings	$ 4,000	$ 9,000	$ 9,000	$ 9,000
Bridges	$ 17,000	$ 17,000	$ 17,000	$ 27,000
Tunnels	$ 750	$ 750	$ 750	$ 750
MP&E	$ 46,775	$ 48,675	$ 49,275	$ 65,375
Whitehorse-Carmacks	$ -	$ -	$ -	$ 455,000
Total	$ 195,425	$ 285,425	**$ 290,025**	**$ 857,125**
Total Less Port and MP&E		$ 126,750	$ 130,750	$ 681,750
Total Miles		110.4	110.4	217.0
Net Cost/Mile		**$ 1,148**	**$ 1,184**	$ 3,142

From	To Station	To MP	Miles	Cost
Skagway	Carcross	67.5	67.5	-
Carcross	South end Utah Yard	106	38.5	$5m/mile = $192.5m
Utah Yard (S)	North end Utah Yard	108	2	-
Utah Yard (N)	Whitehorse	110.4	2.4	$5m/mile = $12m
Whitehorse	Braeburn	172	61.6	$5m/mile = $308m
Skagway	**Braeburn**		**172**	**$512.5m**

From	To Station	To MP	Miles	Cost
Braeburn	Carmacks	217	45	
Skagway	**Carmacks**		**217**	

From	To Station		Miles
Whitehorse	Carmacks		106.6

From	To Station		Miles
Carcross	Braeburn		104.5
		Less Yard	-2.0
Carcross	Braeburn		102.5

Initial Capital Cost Estimate

Narrow Gage (Skagway-Braeburn)

Cost for Whitehorse-Carmacks = Diff in total cost between 7D and 7C	$	567,100
Divided by distance from Whitehorse-Carmacks		106.6
= Cost/mile	$	5,320
Rounded to Cost/Mile	$	5,000
x Distance to be built (Carcross-Braeburn)		102.5
Initial Estimate	**$**	**512,500**

According to Paul Taylor (telephone conversation May 11, 2006), costs to build new narrow gauge would be same or slightly higher, because of specialized equipment) than for std gage, so okay to use this cost even though his study represented std gage construction costs.

Final Capital Cost Estimates

Narrow Gage (Skagway-Braeburn)

Cost/mile	$	5,000
x Distance from N End Utah Yard (Whitehorse)-Braeburn: built new		64.0
=Whitehorse-Braeburn	$	320,000
+ Cost to rebuild Carcross-Whitehorse, per Paul Taylor email 2	$	40,000
+ Cost to rehab Skagway-Carcross, per Paul Taylor email	$	43,000
= Total cost for Narrow Gage	**$**	**403,000**

Standard Gage (Skagway-Braeburn)

Cost/mile from 1st run	$	5,000
x Distance from N End Utah Yard (Whitehorse)-Braeburn: built new		64.0
= Whitehorse-Braeburn	$	320,000
+ Cost to rebuild Carcross-Whitehorse, per Paul Taylor email 2	$	40,000
+ Cost to convert Skagway-Carcross to Std Gage (7B Less Port, MPE & $40m)	$	86,750
= Total cost for Standard Gage	**$**	**446,750**