Feasibility: Creating Railroads on Paper

Vanness was called upon to determine the overall financial feasibility of a rail line and operations to support moving various tonnage levels of coal traffic (50, 75 and 100 million tons) over the route described in Figure 1 below. A provisional selected route and investment was decided. It resulted in spending about $2.35 Billion ($2.5 Billion including financing charges and capitalized interest) to construct 1,481 track miles (1,144 route miles) of tracks that included a "hypothetical" 247 mile segment.

Figure 1

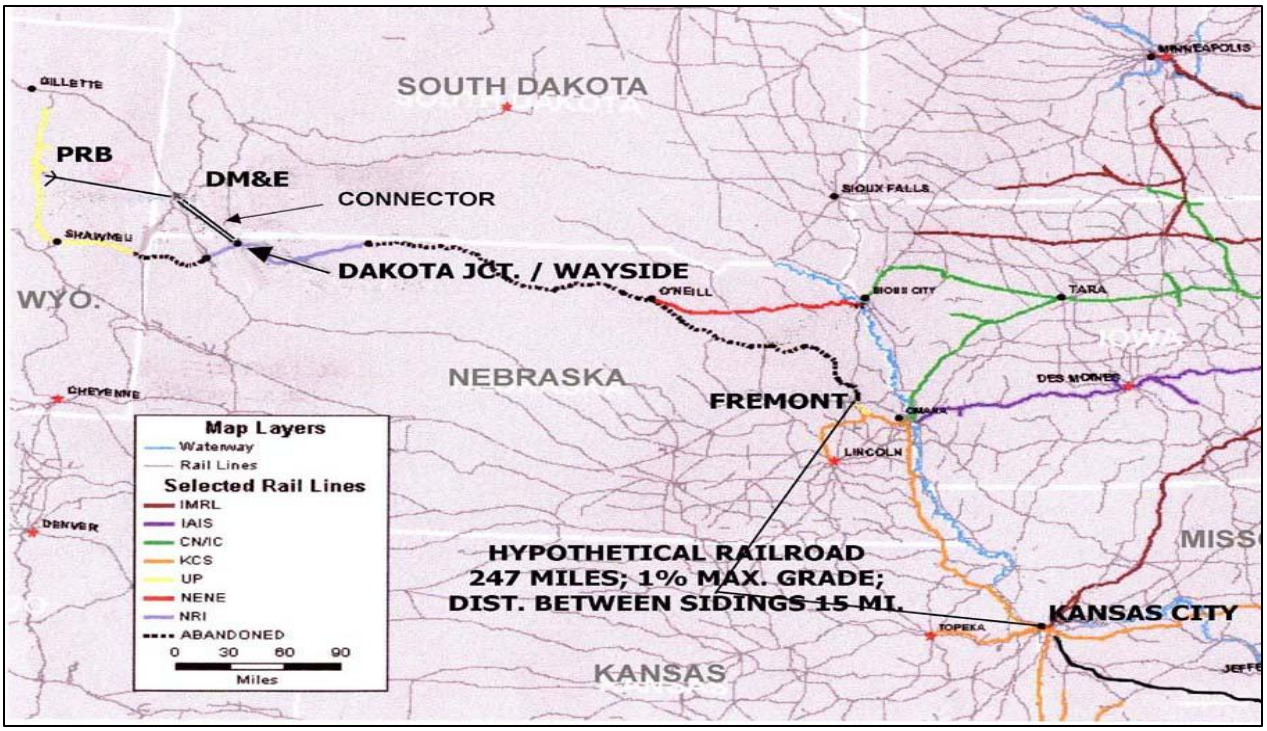


Figure 2

An interesting part of this assignment was creating a “railroad on paper”. Whereas other segments were based on using existing railroads or abandoned rights of way for which track profiles[1] of previous owners were available, the “hypothetical railroad” required Vanness to use geo-position mapping to estimate change in altitude (grade) and follow landforms to plot curves, bridges etc. –Figure 2.

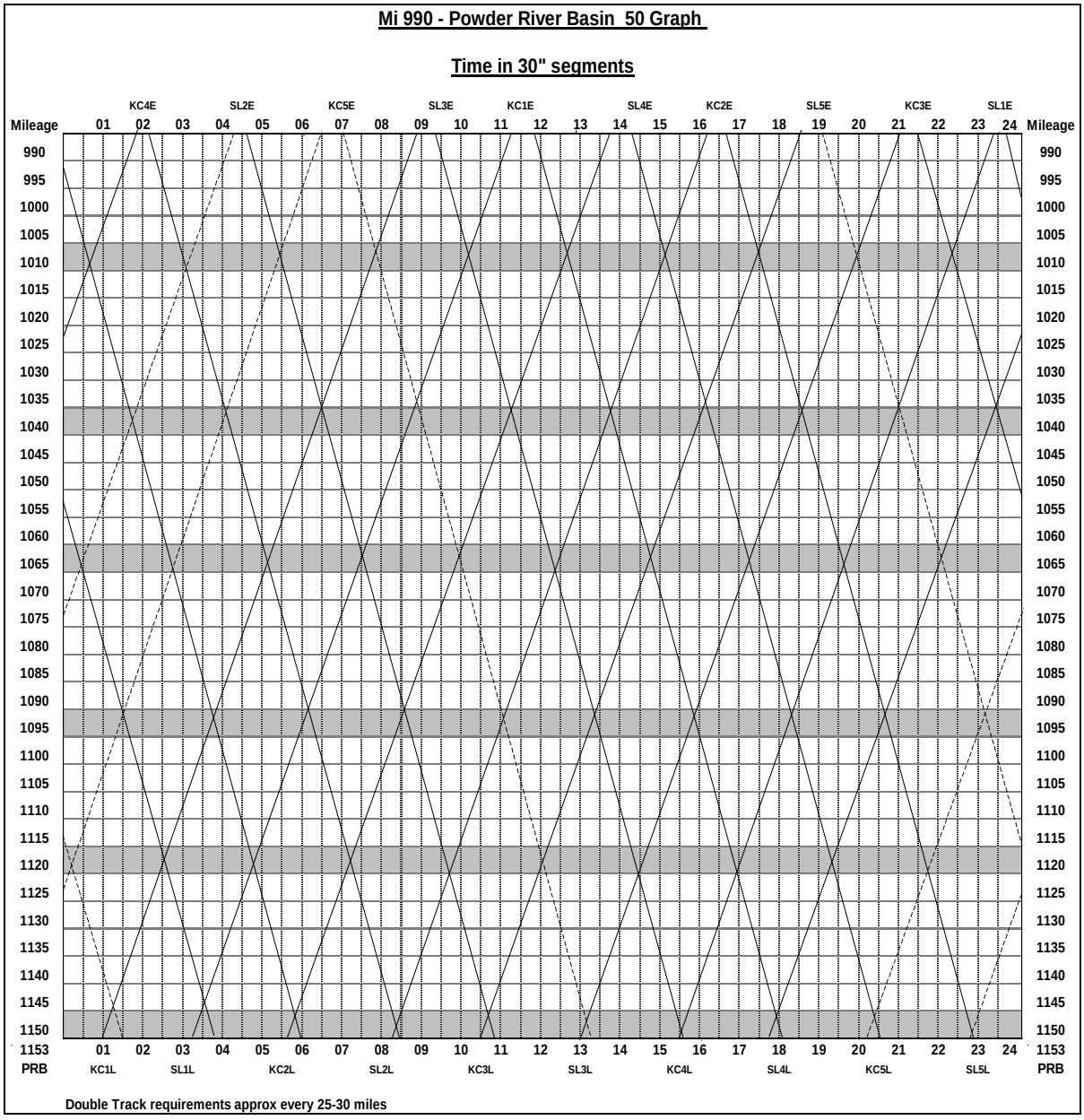
[1] A track profile or diagram shows for each mile the relation of the tracks to the topography: specifically grade, curvature, number of tracks, bridges, and may give information on rails, ties and ballast conditions.

- Operating Expenses were derived from:
  - Operating Plans to Support 50, 75 and 100 Million Tons per Year
  - Locomotive Requirements including servicing options (cars were assumed provided by users but some running car repairs should be anticipated)
  - Staffing Plans including train and engine, operations support (OCC), mechanical, engineering and office forces
  - Any incremental non-track related capital items to accomplish them such as shops (or power by the hour equivalents), maintenance of way machinery, and full CTC signaling systems -- when these were required.
  - Suggested financing alternatives.
- Preliminary Operating Assumptions (some modified based on operations planning):
  - Annual tonnage to be transported is 50, 75 and 100 million tons of PRB coal (for simplicity assumes no general freight)
  - Coal Origin: Black Thunder area of PRB, or West end of Segment on Map.
  - Trains Consist of: (3) locomotives; 130-135 cars; and 15,000 tons of coal lading target.
- Car Equipment:
  - Cars load to 286,000 lbs. Gross Weight
  - Avg. Tare: Bathtub Gondola 42,000 lbs.; Bottom Dump 50,000 lbs.
- Trains over densest segments:
  - 50 M T/Y = 9.3 TRAINS / DAY EACH WAY
  - 75 M T/Y = 13.8 TRAINS / DAY EACH WAY
  - 100 M T/Y = 18.4 TRAINS / DAY EACH WAY

Discussion of Modeling Concepts - Preliminary Steps:

- For each tonnage bracket 50, 75, and 100 Million Tons per Year (MTY), an Operating Plan was created based on the physical tracks, sidings and yards within the given engineering parameters. Two steps to create the Operating Plan were critical to success in making the study realistic.
- A train Performance Calculator (TPC) was run to measure the performance of a typical train over the rail lines grades and curves as specified by the track plans developed from historical as well as hypothetical data.
- The output of the TPC was configured as a series of lines representing time and distance traveled to indicate where trains would meet and therefore where sidings or passing tracks were required as shown in gray on Figure 3 below.

Figure 3



- The number of trains that could be run on predetermined cycles was then scheduled to best fit the tonnage to be handled. Siding placement was determined to fit the higher tonnage cases with sidings so arranged that all trains necessary to move the tonnage could pass and be yarded. [2]

[2] Note: Some adjustment to the 50 MTY Case was made to economize on redundant sidings where possible, as the engineering parameters were based on higher tonnages.

- The Operating Plans examined a number of scenarios to enhance efficiency in addition to the accepted theme of running fixed consist, dedicated trains from origin to destination and return. In general, for financial modeling, the straight forward fixed consist case was adopted for capacity and workload calculations important to the model in as much as the number of tons and cars to be moved remains constant notwithstanding operating modifications.
- From the Operating Plans, besides the track arrangement, the number of operating department personnel, the cycles of cars and locomotives, the required levels of signaling, and other requirements were derived. From the schedules it was also possible to estimate the capacity and workload data (and equipment utilization.
- As a parallel effort, an assessment of locomotive requirements, support facilities such as shops and fueling pads, and mechanical department personnel needs was made. The results of this effort were incorporated for each tonnage level in the cost and investment calculations discussed below.

Timing of Project Investment and Traffic Flows:

- Vanness assumed that the project investment phase would take place over two full calendar years (years -1 and 0). At which time (projection year 1), the railroad would be ready for "turn-key" operation at its theoretical rated capacity of 50, 75 or 100 MTY. During the construction phase, financial expenses (e.g. interest and financing fees) were capitalized as a part of project investment.

Revenue Calculations:

Carload Freight Revenue calculations were based on a range of Revenue Factors expressed as mils per revenue ton mile times the calculated revenue ton miles of product moved. All calculations were in constant dollars.

Cost Factors:

The primary determinants of costs were **fuel, labor, locomotive financing (lease) costs, recurring materials and supplies purchases**, and **purchased services** in that order followed by **property taxes** and **insurance**.

- **Fuel** consumption parameters were taken from similar Duty Cycle experience of a 4400 HP (4040 net HP) AC traction locomotive in Prairie region service.
- **Labor** costs were derived from the staffing tables shown in the CRDC Personnel worksheet for each Case. Manning levels were developed for a full service independent operation. Non-operating personnel levels have a fixed component necessary to cover the functions required, and vary somewhat at the margin corresponding to the level of activity (tons) assumed.
- Next to fuel, the largest of these locomotive costs were "capital holding costs", which in the Income Statement were shown as **Leased Equipment and Rentals**. These

were based on a daily lease rate that can be varied in the Assumptions section of the model.

- **Recurring Purchases of Materials and Supplies** consist of purchases for routine (non-capital) track repairs and routine locomotive and car maintenance. These were divided about 40% to car parts, 30% to locomotive parts and supplies and the balance to track. It should be noted that a large part of track expenditures were classified as capital as these were larger, in kind replacement projects assumed to be performed by contractors.
- **Depreciation and Amortization:** In the model capital expenditures have been classified by asset categories of track and equipment and depreciated at the rate of 5% - generally -per year for equipment and 4% per year for track (See Balance Sheet categories). The latter implied track life, which is shorter than most track investment, is due to extremely high utilization. Land and right of way investment is not depreciated.
- **Financing Options – Interest:** Our debt financing options were derived from attributes of the federal rail financing program, the showpiece of which is the Railroad Rehabilitation and Infrastructure Finance (RRIF) Act. The principle features of this financing vehicle are low interest rates equivalent to the rate of interest on US Treasury securities of like maturity (here 6%) and the ability of the government program to accept reasonable risks and extend maturity to 35 years to finance long-lived infrastructure assets. For sensitivity, interest rates were perturbed up to 6.6% and down to 5.4%.

What was measured?

The ranking of investment criteria was done on the basis of the internal rate of return associated with Unlevered and Leveraged investment in the project.

The internal rate of return gives a measure of overall returns as a function of the stream of annual cash flows beginning with the initial investment outflow and conceptually repaid with positive cash flows from the business. In order to accurately reflect the terminal value of the tangible assets put in place here and maintained in perpetuity, Vanness included a terminal value in the calculation of IRR. Net tangible assets excluding cash were used as a proxy for eventual sale value in the 26^{th} year. These consist of working capital other than cash plus tangible fixed assets less depreciation.

- **Unlevered Investment return** is a function of the return on the gross investment in the project produced by free cash flows before taking financing into account. In other words operating cash flows less ongoing capital investments leave free cash flows which may then be applied to project financing and returns to equity providers.
- **Leveraged Investment Return on Equity** assumes that the project is organized as an LLC or LLP structure (for example) with debt leverage and that members contribute the amount of equity backing necessary to complete project funding.

Project cash flows were reduced by ongoing capital expenditure requirements and by interest and principal on leverage funding. Returns were premised on the equity dollar input of members versus the stream of tax adjusted returns available to them. In this case, consideration is given to the tax consequences of distributing to members' returns eligible tax losses due to accelerated depreciation and paying out the distributions necessary to cover members' tax liability on undistributed, allocated taxable profits.

Sensitivity to changes in the variables – favorable and unfavorable – was tested for each scenario. Vanness also tested **Cumulative Sensitivity** in the event all of the variables were to be affected adversely or positively, as shown in the Figure 4.

Figure 4

CONDITIONS	VALUES	50 MTY	75 MTY	100 MTY	VALUES	50 MTY	75 MTY	100 MTY	VALUES	50 MTY	75 MTY	100 MTY
ALL ABOVE CONDITIONS					ALL ABOVE CONDITIONS ADVERSE				ALL ABOVE CONDITIONS FAVORABLE			
TARIFF MILS												
NPV (@ 9% DCF) of Free Cash Flow Stream		678	1,790	2,753		462	1,551	2,493		881	2,021	3,010
IRR (Unlevered Basis)		1.0%	6.0%	9.8%		-0.9%	4.2%	7.9%		2.9%	7.9%	11.9%
IRR (On Equity Outlay incl. Tax Effect)		3.5%	13.8%	21.9%		0.1%	10.5%	18.1%		6.0%	17.5%	26.4%
IRR Difference/Sensitivity						-3.4%	-3.3%	-3.8%		2.5%	3.7%	4.4%
TARIFF MILS												
NPV of Free Cash Flow Stream		1,695	3,259	4,642		1,504	3,024	4,381		1,883	3,490	4,899
IRR (Unlevered Basis)		6.4%	11.5%	16.1%		4.8%	9.6%	13.9%		8.3%	13.7%	18.6%
IRR (On Equity Outlay incl. Tax Effect)		15.0%	26.5%	36.6%		11.8%	22.6%	31.8%		18.6%	31.1%	42.2%
IRR Difference/Sensitivity						-3.2%	-4.0%	-4.8%		3.7%	4.6%	5.6%
TARIFF MILS												
NPV of Free Cash Flow Stream		2,020	3,748	5,271		1,830	3,514	5,010		2,207	3,979	5,528
IRR (Unlevered Basis)		7.9%	13.2%	18.0%		6.2%	11.2%	15.7%		9.8%	15.5%	20.8%
IRR (On Equity Outlay incl. Tax Effect)		18.3%	30.4%	41.1%		15.0%	26.2%	36.0%		22.2%	35.3%	47.2%
IRR Difference/Sensitivity						-3.4%	-4.2%	-5.1%		3.9%	4.9%	6.0%