5 Performance Assessment

Performance measures are a tool used in all steps of the planning and project development process. They help to set appropriate targets for a policy or system plan where tradeoffs involve different system elements or different objectives given varying assumptions about resources available in a set timeframe. This project's performance assessment was based on the six performance factors identified in Technical Memorandum 5 (Performance Measures), applied to both the passenger and freight systems. These performance measures include:

- **System Performance –** The operating characteristics of the rail service and existing or potential demand for the service.
- **System Condition –** Condition of existing infrastructure relative to a state of good repair.
- **Connectivity and Accessibility –** Population and businesses served by new or expanded rail service and the impact of rail investments on the larger multimodal transportation network.
- **Safety and Security –** Ability of rail investments to enhance safety (reduced crashes, injuries, and fatalities) and security of the system.
- **Environmental –** Impact of rail investments on the natural and built environments, as overall quality of life, and consistency with community land use plans.
- **Financial/Economic –** Estimated cost, revenue generating potential, and economic development benefits resulting from new or expanded rail service.

Section 5.1 describes passenger rail project evaluation, and Section 5.2 describes freight rail project evaluation. The end product of this effort is intended to be a passenger and freight rail system that provides Minnesota with improved transportation options, costs, and speeds for intrastate and interstate travelers.

5.1 Passenger Evaluation

This section describes the potential system performance benefits of expanding passenger rail in Minnesota as discussed in the needs assessment. The process for evaluating passenger rail was conducted first at the corridor level and then at the system level. Performance measures were then used to evaluate each of the criteria areas described in Table 5.1.

Table 5.1 Passenger Variable Estimation Procedure

Category	Measure
System Performance	**Ridership.** Total ridership by corridor and scenario (Vision Phase I, Phase II, and Passenger build-out). **System efficiency.** Average riders per train.
System Condition	*Impacts cost estimate, not directly considered in performance analysis.*
Connectivity and Accessibility	**System accessibility.** Total number and percent of Minnesota residents outside of the Twin City metro area with access to the rail system.
Safety and Security	*Not evaluated for passenger investments.*
Environmental	**Environmental impact.** Qualitative assessment of the impact of new track or right-of-way on the environment.
Financial/Economic	**Cost.** Cost of implementing each scenario. **Cost per rider.** Total cost per passenger (over a 30-year period). **Qualitative cost-effectiveness.** Summary of overall benefits achieved by scenario relative to total cost.

5.1.1 Performance Measure Calculation Methodology

The specific measures outlined in Table 5.1 were calculated and applied based on the following methodology. Results of the performance evaluation can be found in Tables 5.2 (Benefits) and 5.3 (Cost and Cost-Effectiveness).

Ridership

Ridership forecasts were developed in Technical Memorandum 3 and summarized in Section 3.0. Sensitivity analyses were run to produce the most favorable results for each city pair. Specific changes since Technical Memorandum 3 (as shown in Section 3.0) include the following:

- For each of the HSR corridors, a low-fare high-speed (110 mph) service combination was calculated and compared to other models;
- For Duluth HSR service, ridership demand for Superior, Wisconsin was included in the estimates; and
- For HSR service to Rochester (or via Rochester on the MWRRI), the Minneapolis-St. Paul International Airport was included as a stop.

In addition to overall ridership, system efficiency was calculated by estimating the total number of riders on an average train and the total number of riders per train mile. These were calculated by estimating daily ridership (assuming 300 service days per year) and dividing it by the number of trains in service each of those days and the number of train miles operated each day. These measures were produced for both the base and best case forecasts.

System Accessibility

System accessibility was calculated as the total population and percent of population living outside of the Twin Cities Metropolitan area that would have access to rail service in the future. County and metropolitan area population projections from the Minnesota Department of Administration were used to evaluate this measure. Every county or metro area with a station was considered to have access to the rail system. Metropolitan estimates were used for stations in Duluth, Fargo, La Crosse, Rochester, and St. Cloud. Only the Minnesota population within each of these metropolitan areas was used. County-level estimates were used for Albert Lea, Mankato, Marshall, Northfield, Red Wing, Willmar, and Winona. Of course, all residents of the Twin Cities metropolitan area would, by definition, have access.

The total population estimated was compared to the total population of the State outside of the Twin City area to estimate the percent with access.

Environmental Impact

A qualitative assessment was made of environmental impacts. Corridors using new alignments have a high potential of impact. Only Rochester currently is expected to be built on entirely new right-of-way at this time. Corridors that would require significant new track, including high-speed corridors that would, in many cases, need separate track, are identified as having a medium potential for impact. Passenger services that would use shared track with freight railroads are expected to have a low potential for environmental impact.

VMT and Greenhouse Gas Emissions

The likely impact on the roadway system was identified through estimates of expected changes in auto vehicle miles of travel (VMT) and greenhouse gas emissions.

VMT changes were estimated based on the changing mode share predicted by the demand modeling exercise. These changes in mode share were multiplied by auto distances for the city pairs and average vehicle occupancy to generate an estimate of change in VMT. The National Highway Travel Survey estimates average vehicle occupancy for nonwork trips of 1.14 persons per vehicle. However, given the long distances for many of these corridors, the likely excursion nature of many of the riders, and a desire to be relatively conservative in estimating both VMT changes (and greenhouse gas emissions), the work-based average vehicle occupancy (1.6) was used for all trips.

Greenhouse gas emissions were estimated using data developed by the Center for Clean Air Policy and the Center for Neighborhood Technology for evaluating the impact of HSR.[33] These estimates were based primarily on 90 to 100 mph diesel-powered rail systems. Increased

[33] High-Speed Rail and Greenhouse Gas Emissions in the U.S., July 2006, Center for Clean Air Policy and Center for Neighborhood Technology.

greenhouse gas emissions from rail were estimated by multiplying the total number of train trips by the distance they travel by the emissions factor. Only the overall rail trip was examined (i.e., Twin Cities to Chicago) to avoid double counting. Decreased greenhouse gas emissions from automobiles were estimated by multiplying the estimated VMT change by the automobile emission factor. The difference between the two is the overall greenhouse gas emissions expected to be reduced.

Cost

Several cost values were estimated and a qualitative scale was developed. Because any passenger rail service operating on a freight route would need to be negotiated between the passenger rail provider and the freight railroad, it is difficult to establish a definitive cost. The cost values that were estimated include:

- **Infrastructure Cost –** This value represents the infrastructure needs for passenger service in 2030 above and beyond the total infrastructure needs identified for freight. For example, if the level of freight investment identified in Section 4.0 also can accommodate four passenger trains per day, that scenario would produce no additional infrastructure cost for passenger rail. Track, signal systems, and crossings are included in this cost.
- **Rolling Stock –** This is the cost to purchase rolling stock to operate these services. In general, it is assumed that new rolling stock will be required for each new route, with the exception of the Twin Cities Connection, which can readily be operated as part of another service. There may be opportunities for synergies among the several services, especially if Phase II services are brought on-line. While these synergies cannot be determined at this time, a 20 percent discount to the systemwide cost of rolling stock was applied to the best case forecast.
- **Capacity Rights Cost –** Because the actual cost must be negotiated with the freight railroad for use of the network, it is likely that the freight railroad will expect passenger rail to pay more than just the additional infrastructure cost. This also addresses that the owner (freight railroad) has invested in their own reserve capacity and would likely attempt to maintain the same level of reserve capacity after implementation of passenger service. Further, there is no guarantee that all of the freight needs will be addressed prior to implementing passenger rail service. To account for this, a "capacity rights cost" was estimated based on the negotiated public investment made as part of the Northstar service, roughly $85,000 per train mile for the base case and $40,000 for the best case. This represents a best guess for a potential negotiation and is useful only in helping to qualitatively assess costs.
- **Operations and Maintenance Costs –** This value represents the costs required to operate the service and maintain the track and rolling stock. This is reported as an annual cost. Operating and maintenance costs were estimated at $70 per train mile of service for the base case and $55 for the best case. Operating and maintenance costs were estimated for the entire distance of each route, with the exception of the high-speed routes to Chicago. For these, only the Minnesota portion is estimated.

Revenue

Potential revenue for each of the services is based on the fares used to estimate ridership. The model includes fare estimates on a per mile basis. These were multiplied by ridership by segment to calculate revenue. Except for high-speed routes to Chicago, revenue was estimated for the entire corridor. For the Chicago routes, the revenue was prorated to Minnesota based on the number of trip ends within the State. A minimum of 50 percent of the revenue was assumed to accrue against Minnesota's costs because all trip ends have an origin or destination in the Twin Cities. If the other trip end also was in Minnesota (i.e., Red Wing for the River Route or Rochester for the Rochester alignment), 100 percent of the revenue is assumed to accrue against Minnesota's costs.

A best case revenue forecast was developed assuming 25 percent higher revenue to account for the higher ridership forecasts in the best case. Since some of this additional ridership would likely come from shorter intermediate trips, they would not pay the full fare of the full trip between the Twin Cities and the outlying city pairs.

Cost-Effectiveness

In addition to overall cost, cost-effectiveness was evaluated using several metrics, including:

- **Capital Cost per Mile of Service –** This is the total capital cost divided by the corridor length. This shows the average cost of implementation of each new route and allows a normalized comparison of routes.
- **Farebox Recovery Ratio –** The farebox recovery ratio is the total revenue divided by operations and maintenance costs. It captures the extent to which a new service, once implemented, can pay for itself. According to July, 2009 Amtrak data, farebox ratios for single or bistate corridors range from 18 percent for the Hoosier State service to 96 percent for Washington-Newport News service, with an average of 69 percent. Long distance, multistate Amtrak routes average about 44 percent. Only the Acela has consistently covered its operating costs through revenues.
- **Operating Subsidy per Rider –** In addition to the farebox recovery ratio, an average operating subsidy per rider is estimated. In combination with the capital cost, this captures the magnitude of public expenditures required to support each service.

5.1.2 Summary of Passenger Performance

Passenger service was evaluated first by the corridors and then as an overall system. Tables 5.2 through 5.5 present a subset of the performance measures identified above for each of the corridors for the base and best cases. Some key findings include:

- Four routes have potential for over 400,000 riders per year – St. Cloud, Chicago, Rochester and Duluth.

- Four routes have ridership better than one passenger per train mile – St. Cloud, Mankato, Eau Claire, and Rochester. St. Cloud has over three riders per train mile, indicating a high likelihood of success for this line.
- Three routes provide access to the passenger rail system for over 200,000 residents – St. Cloud, Duluth, and Rochester.
- High-speed routes have potential environmental issues that will need to be addressed through detailed studies.
- High-speed routes are the most costly to implement.
- St. Cloud is the most cost-effective generator of new riders, with just under $350 in capital cost per new rider and an operating subsidy of under $7 per rider. High-speed service to Chicago (via River Route or Rochester) does not require an operating subsidy and may contribute an operating surplus to other services, though it is difficult to assess without considering the service over its entire length.
- Service to several destinations requires significant capital investment for each annual rider generated.

Annual operating subsidies are highest for Sioux Falls (over $450 per rider/day), Fargo (over $200 per rider), and Albert Lea (over $150 per rider). All other routes have subsidies under $100 per rider.

Table 5.2 Passenger Project Performance Measures – Benefits: Base

In Millions

Corridor	Scenario Evaluated	Phase	Distance	Ridership	Ridership per Train Mile	Population with Rail Service Outside Twin Cities	Potential Environmental Impact
Twin Cities-St. Cloud	Conventional, 8 round trips	Phase I	67	1,044,300	3.25	245,700	Low
Twin Cities-Fargo	Conventional, 2 RTs	Phase I	242	36,500	0.25	66,900	Low
Twin Cities-Duluth	High speed, 8 RTs	Phase I	152	430,155[a]	0.59	283,750[a]	Medium/High
Twin Cities-Willmar/Sioux Falls, South Dakota	Conventional, 4 RTs	Phase II	237	81,000	0.14	68,330	Low
Twin Cities Connection	Conventional, 4 RTs	Phase I	13	N/A	–	N/A	Low
Twin Cities-Northfield-Albert Lea	Conventional, 4 RTs	Phase II	113	110,500	0.41	114,250	Low
Twin Cities-Mankato	Conventional, 4 RTs	Phase I	84	228,000	1.13	68,080	Low
Twin Cities-Eau Claire, Wisconsin	Conventional, 4 RTs	Phase II	86	257,000	1.23		Low
Twin Cities to Chicago *(River Route)*	High speed, 8 RTs	Phase I	410	1,729,800[a]	0.88	206,180[a]	Medium/High
Twin Cities to Rochester	High Speed, 8 RTs new ROW	Phase I	46	531,100	1.23	236,200	High
	MWRRI Rochester alternative	*Alt*	*420*	*1,917,516*	*0.95*	*236,200*	*High*

[a] Includes potential casino demand.

Table 5.3 Passenger Project Performance Measures – Benefits: Best

In Millions

Corridor	Scenario Evaluated	Phase	Distance	Ridership	Ridership per Train Mile	Population with Rail Service Outside Twin Cities	Potential Environmental Impact
Twin Cities-St. Cloud	Conventional, 8 round trips	Phase I	67	1,566,450	4.87	245,700	Low
Twin Cities-Fargo	Conventional, 2 RTs	Phase I	242	54,750	0.38	66,900	Low
Twin Cities-Duluth	High speed, 8 RTs	Phase I	152	645,300[a]	0.88	283,750[a]	Medium/High
Twin Cities-Willmar/Sioux Falls, South Dakota	Conventional, 4 RTs	Phase II	237	121,500	0.21	68,330	Low
Twin Cities Connection	Conventional, 4 RTs	Phase I	13	N/A	-	N/A	Low
Twin Cities-Northfield-Albert Lea	Conventional, 4 RTs	Phase II	113	165,750	0.61	114,250	Low
Twin Cities-Mankato	Conventional, 4 RTs	Phase I	84	342,000	1.70	68,080	Low
Twin Cities-Eau Claire, Wisconsin	Conventional, 4 RTs	Phase II	86	385,500	1.85		Low
Twin Cities to Chicago *(River Route)*	High speed, 8 RTs	Phase I	410	2,544,700[a]	1.29	206,180[a]	Medium/High
Twin Cities to Rochester	High Speed, 8 RTs new ROW	Phase I	46	796,650	1.84	236,200	High
	MWRRI Rochester alternative	*Alt*	*420*	*2,876,250*	*1.43*	*236,200*	*High*

[a] Includes potential casino demand.

Table 5.4 Passenger Project Performance Measures – Costs and Cost-Effectiveness: Base

In Millions

Corridor	Scenario Evaluated	Phase	Capital Cost (Millions of Dollars One-Time)[a]	Operating and Maintenance Cost (Millions of Dollars Annual)	Revenue (Millions of Dollars)	Farebox Recovery (Percent)	Capital Cost per Mile (Millions of Dollars)	Capital Cost per Rider (Dollars)	Operating Subsidy per Rider (Dollars)
Twin Cities-St. Cloud	Conventional, 8 RTs	Phase I	$218.0	$22.5	$15.7	70%	$3.3	$209	$6.56
Twin Cities-Fargo	Conventional, 2 RTs	Phase I	$119.6	$10.2	$2.0	20%	$0.5	$3,277	$223.47
Twin Cities-Duluth	High speed, 8 RTs	Phase I	$878.5	$45.7	$9.6	21%	$5.8	$2,042	$83.82
Twin Cities-Willmar/ Sioux Falls, South Dakota	Conventional, 4 RTs	Phase II	$276.1	$39.8	$2.0	5%	$1.2	$3,409	$466.98
Twin Cities Connection	Conventional, 4 RTs	Phase I	$58.3	*incl. in MWRRI*	*Not est.*	*Not est.*	$4.2	*Not est.*	*Not est.*
Twin Cities-Northfield-Albert Lea	Conventional, 4 RTs	Phase II	$118.5	$19.0	$1.0	5%	$1.0	$1,072	$162.81
Twin Cities-Mankato	Conventional, 4 RTs	Phase I	$223.0	$14.1	$4.1	29%	$2.7	$978	$44.08
Twin Cities-Eau Claire, Wisconsin	Conventional, 4 RTs	Phase II	$156.0	$14.6	$5.1	35%	$1.8	$607	$36.88
Twin Cities to Chicago (*River Route*)	High speed, 8 RTs	Phase I	$689.0	$44.9	$64.5	144%	$5.4	$398	–
Twin Cities to Rochester	High Speed, 8 RTs new ROW	Phase I	$778.7	$28.9	$8.0	28%	$8.7	$1,466	$39.42
	MWRRI Rochester alternative	*Alt*	*$1,258.7*	*$52.8*	*$63.3*	*120%*	*$7.9*	*$656*	–

[a] Includes passenger-specific costs, including capacity rights, but not rolling stock which is expensed as an operating cost in Chapter 7. Does not include freight-related costs.

Table 5.5 Passenger Project Performance Measures – Costs and Cost-Effectiveness: Best

In Millions

Corridor	Scenario Evaluated	Phase	Capital Cost (Millions of Dollars One-Time)[a]	Operating and Maintenance Cost (Millions of Dollars Annual)	Revenue (Millions of Dollars)	Farebox Recovery (Percent)	Capital Cost per Mile (Millions of Dollars)	Capital Cost per Rider (Dollars)	Operating Subsidy per Rider (Dollars)
Twin Cities-St. Cloud	Conventional, 8 RTs	Phase I	$152.3	$17.7	$19.6	111%	$2.3	$97	–
Twin Cities-Fargo	Conventional, 2 RTs	Phase I	$75.2	$5.8	$2.5	43%	$0.3	$1,374	$60.10
Twin Cities-Duluth	High speed, 8 RTs	Phase I	$676.6	$35.9	$12.0	34%	$4.5	$1,049	$36.96
Twin Cities-Willmar/ Sioux Falls, South Dakota	Conventional, 4 RTs	Phase II	$177.7	$31.3	$2.5	8%	$0.7	$1,463	$237.13
Twin Cities Connection	Conventional, 4 RTs	Phase I	$46.7	*incl. in MWRRI*	*Not est.*	*Not est.*	$3.3	*Not est.*	–
Twin Cities-Northfield-Albert Lea	Conventional, 4 RTs	Phase II	$73.6	$14.9	$1.2	8%	$0.7	$444	$82.40
Twin Cities-Mankato	Conventional, 4 RTs	Phase I	$170.3	$11.1	$5.1	46%	$2.0	$498	$17.61
Twin Cities-Eau Claire, Wisconsin	Conventional, 4 RTs	Phase II	$112.1	$11.5	$6.4	56%	$1.3	$291	$13.17
Twin Cities to Chicago (*River Route*)	High speed, 8 RTs	Phase I	$525.4	$35.2	$80.6	229%	$4.1	$206	–
Twin Cities to Rochester	High Speed, 8 RTs new ROW	Phase I	$667.6	$22.7	$10.0	44%	$7.4	$838	$15.99
	MWRRI Rochester alternative	*Alt*	*$1081.1*	$41.5	*$79.0*	190%	*$6.8*	*$376*	–

[a] Includes passenger-specific costs, including capacity rights, but not rolling stock which is expensed as an operating cost in Chapter 7. Does not include freight-related costs.

Figures 5.1 (base) and 5.2 (best) summarize three key factors for consideration of new service – ridership, total capital cost, and farebox recovery (i.e., the percent of operating and maintenance costs expected to be covered by revenue from ridership). The ideal project would be located in the lower right-hand corner – high ridership/low cost. The size of the circle indicates the farebox recovery ratios.

Figure 5.1 Summary of Individual Passenger Route Performance – Base

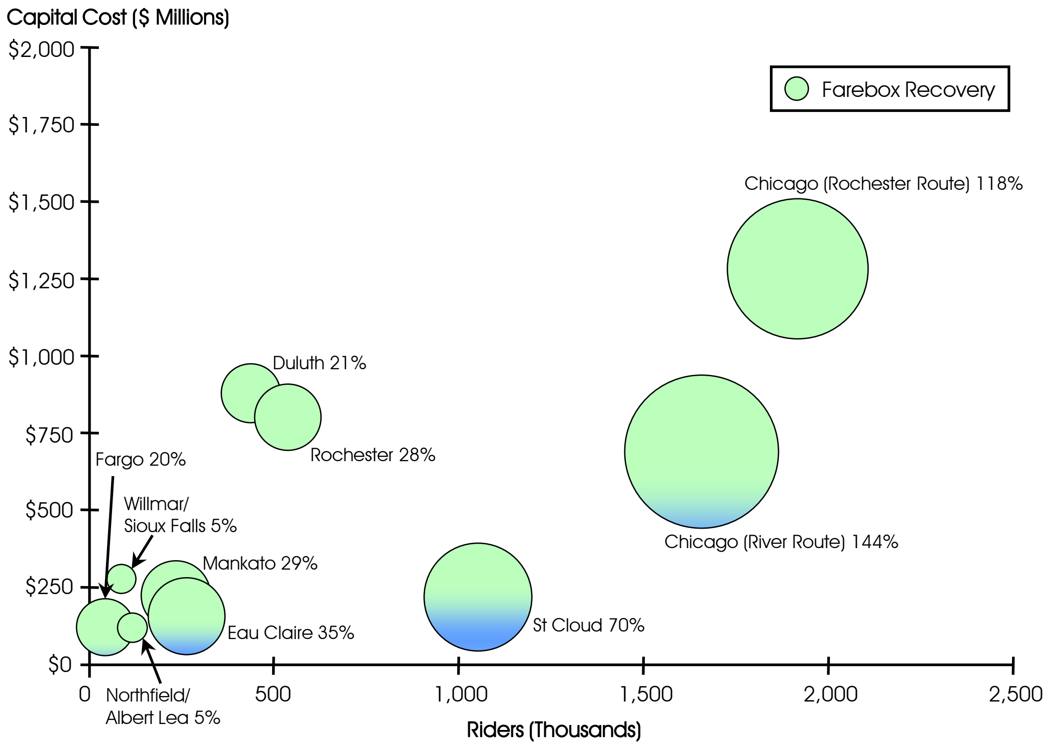
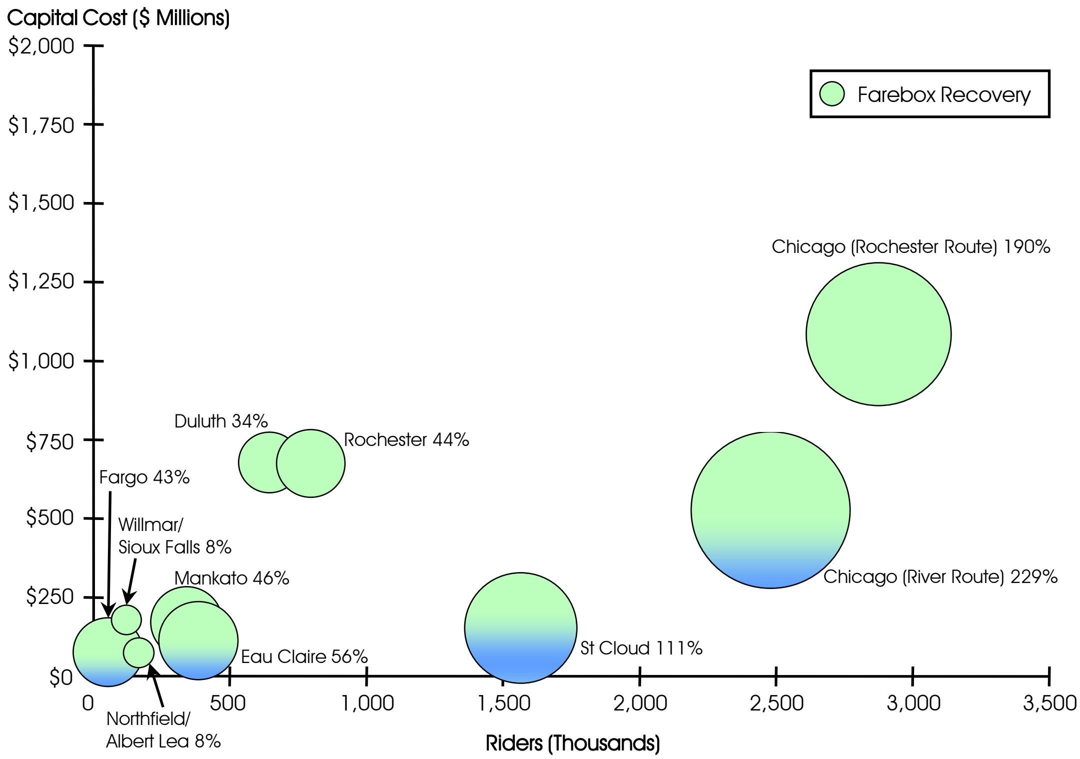


Figure 5.2 Summary of Individual Passenger Route Performance – Best



Dividing the figures into four quadrants suggests the following findings:

- High-speed services to Chicago (via River and Rochester routes) are in the upper right quadrant. These services are expensive to implement, but generate significant ridership and are likely to cover operating costs or even provide a surplus.
- Service to St. Cloud, in the bottom right quadrant, is a relatively low-cost high-ridership service with ability to cover a significant portion of operating costs. This service has clear, outstanding performance.
- In the top left quadrant, high-speed service to Duluth and Rochester (separate from service to Chicago) provide good ridership, but at significant capital expense.
- In the bottom left quadrant, the remaining services are all relatively inexpensive to implement, but the routes generate only modest or minimal ridership and many are unable to cover operating expenses with revenues. Services to Mankato and Eau Claire are clear exceptions.

In addition to examining the performance of individual routes, overall system performance was considered, taking into account the cost efficiencies described above. Table 5.6 summarizes performance at the system level for the priority Phase I system under the base and best scenarios.

Table 5.6 Annual Passenger Rail Systemwide Performance Analysis

	Scenario	
Metric	Base	Best
Miles of New Service	1,145	1,145
Train Miles	12,252	12,252
Ridership (Thousands)	4,157	6,235
Passenger/Vehicle	154.0	231
Passenger/Train Mile	1.1	1.61
Vehicle Miles of Travel Saved (millions)	489	733
Tons Greenhouse Gases Reduced (thousands)	318	526
Greater Minnesota Population with Access to System by Contiguous County or MPO	1,007	1,007
Pct with Access	41%	41%
Operations and Maintenance Costs (millions of dollars annual)	$182	$141
Farebox Revenue (millions of dollars annual)	$89	$99
Farebox Recovery Ratio	49%	71%
Operating Subsidy/Rider (dollars)	$22	$6.6

From an operating perspective, farebox recovery is 49 percent in the base case and 71 percent in the best case. This assumes that any operating surplus generated by the Minnesota portion of the interstate MWRRI routes cannot be used to offset deficits on intrastate routes. These figures are comparable to a range of Amtrak services today.[34]

5.2 Freight Evaluation

This section describes the performance metrics reviewed related to investing in freight rail in Minnesota as discussed in the needs assessment. The freight rail system evaluation was conducted at the subdivision level within the performance criteria areas described in Table 5.7.

[34] This is why a 25 percent increase in revenue for each route does not produce an overall increase in revenue of 25 percent, since the additional surplus from the Chicago route is not applied to the intrastate routes in this calculation.

Table 5.7 Freight Variable Estimation Procedure

Category	Measure
System Performance	**Operating Speed.** Operating speed/percent of system with track speeds > 25 mph.
System Condition	**Railcar Capacity Rating.** Percent of system with 286,000 railcar capacity rating.
	FRA Track Class. All tracks FRA Class 2 or better.
	Track-to-siding Ratio. Increase in number of mainline tracks to siding tracks by subdivision.
Connectivity and Accessibility	**Intermodal Connectivity**. Proximity to an intermodal facility.
Safety and Security	**Active Warning Devices**. Annual active warning device upgrades.
	Positive Train Control. Implement PTC on all Class I rail lines.

5.2.1 Performance Measure Calculation Methodology

Each metric was reviewed by comparing the 2009 freight condition to the 2030 freight condition by subdivision. The intent was to determine to what extent improvements have been recommended to the freight system.

Operating Speed

A goal of this study is to improve freight track speeds to 25 mph or greater, essentially an FRA Class 2 track condition or better, as warranted. This is needed to ensure commercial viability and safety for operators and current and future shippers that rely on them. Table 5.8 highlights the percent of subdivisions with freight rail speeds greater than 25 mph, and indicates what percent of these subdivisions have been upgraded by 2030. Note that after recommendations are implemented the majority of subdivisions in the State will have speeds of 25 mph or greater. Though not noted in this table, the DM&E railroad currently is upgrading the Waseca Subdivision.

Table 5.8 Percent Freight Rail Lines More Than 25 mph

Railroad	Subdivision	2009 Percent of miles > 25 mph	2030 Percent of miles > 25 mph	Percent of Subdivision Upgraded	Miles Improved
BNSF	Marshall	99.8	100	0.2	0.3
BNSF	Midway	39.4	93.1	53.7	5.9
BNSF	St. Croix	96	100	4	0.1
BNSF	St. Paul	47.1	61.4	14.3	4.4
BNSF	Staples	96.5	100	3.5	8.4
CN	Osage	32.6	100	67.4	12.4
CN	Rainy	99.9	100	0.1	0.2
CP	Bemidji	0	100	100	22.3
CP	Detroit Lakes	97.4	100	2.6	4.9
CP	Elbow Lake	97.3	100	2.7	1.9
CP	MN&S	0	100	100	18.5
CP	Noyes	94.1	100	5.9	10.0
CP	Paynesville	87.9	100	12.1	14.3
CP/BNSF	River Route	98	100	2	0.7
CTRR	Cloquet Terminal	0	100	100	3.0
DME	Waseca	31.4	31.4	–	0.0
MDW	MDW	0	100	100	4.0
MNN	Ada	0	100	100	15.8
MNN	P-Line	0	100	100	44.5
MNN	Warroad	0	100	100	92.3
MNNR	Fridley	0	100	100	11.5
MNNR	Hugo	0	100	100	13.7
MNNR	MNNR Yard	0	100	100	1.6
MPLI	Redwood Falls	0	100	100	94.3
MSWY	LaVerne	0	100	100	41.5
NLR	Cold Spring	0	100	100	17.0
NLR	East Side	0	100	100	2.0
NLR	St. Joe	0	100	100	5.1
PGR	Cannon Falls	0	100	100	8.9
PGR	Dan Patch	0	100	100	9.2
PGR	Eagandale	0	100	100	8.8
PGR	Faribault	0	100	100	1.8
PGR	Savage	0	100	100	20.9
UP	Albert Lea	93.9	100	6.1	6.9
UP	Hartland	0	100	100	12.4
UP	Montgomery	69.9	100	30.1	7.1
UP	Rake	99.8	100	0.2	0.0
UP	Winona	0	100	100	1.7

Railcar Capacity Rating

A goal of this study is to improve the freight rail network to support the use of 286,000 pound railcars throughout the State. This weight limit has become the industry-wide standard, and the viability of lines that do not have this capacity will diminish over time. Table 5.9 highlights the percent of each subdivision that is not 286,000-pound compliant in 2009, and what percent of these subdivisions have been upgraded by 2030, based on this plan. It is recommended that all rail lines be made 286,000-pound compliant by 2030.

Table 5.9 Percent Freight Rail Lines with 286,000-Pound Railcar Capacity

Railroad	Subdivision	2009 Percent of Line 286,000-Pound Compliant	2030 Percent of Line 286,000-Pound Compliant	Percent of Subdivision Upgraded
BNSF	Browns Valley	–	100.0	100.0
CN	Dresser	–	100.0	100.0
CN	Osage	–	100.0	100.0
CP	Bemidji	–	100.0	100.0
CTRR	Cloquet Terminal	–	100.0	100.0
DME	Waseca	–	100.0	100.0
MNN	Warroad	–	100.0	100.0
MPLI	Redwood Falls	31.0	100.0	69.0
MSWY	LaVerne	–	100.0	100.0
UP	Hartland	–	100.0	100.0
UP	Rake	–	100.0	100.0
UP	Montgomery	98.8	100.0	1.2

Track to Siding Ratio

Track to siding ratio is a measure by which capacity of a line is determined. Table 5.10 highlights the 2009 and 2030 track to siding ratios. In order to accommodate the high traffic freight corridors in the State in 2030 investments in track will be required, e.g., the Staples and Midway subdivisions.

Table 5.10 Percent Freight Rail Lines with Increased Track to Siding Ratio

Railroad	Subdivision	2009 Track to Siding Ratio	2030 Track to Siding Ratio	Increase in Track to Siding Ratio
BNSF	KO	2.00	2.49	0.49
BNSF	Marshall	1.09	1.22	0.13
BNSF	Midway	1.77	2.06	0.28
BNSF	Staples	1.85	2.29	0.44
BNSF	Hinckley	1.11	1.21	0.10
BNSF	St. Paul	2.00	2.27	0.27
BNSF	St. Croix	2.00	2.32	0.32
CP	Detroit Lakes	1.03	1.13	0.09
CP	Noyes	1.02	1.21	0.19
CP	Paynesville	1.08	1.24	0.15
CP	Tomah	1.75	1.82	0.07
CP/BNSF	River Route	2.00	2.35	0.35

Connectivity and Accessibility

A qualitative assessment of freight connectivity and accessibility was made using intermodal connectivity as a measure. This study identified the need for enhanced intermodal connectivity either through expansion of existing intermodal facilities, reinstating service in closed facilities, or through the construction of a new intermodal facility in the Twin Cities. Each of these options will provide enhanced connectivity and accessibility to shippers in the State of Minnesota.

Safety and Security

A qualitative assessment of freight system safety and security was made using active warning devices and positive train controls as measures. It is recommended that by 2030 1,400 active warning devices be replaced, enhancing the safety of the system for railroads and the motoring and nonmotoring public alike. Similarly, it is recommended that by 2030 Positive Train Control (PTC) be added to all Class I rail lines, increasing the efficiency of operations for freight railroads, but also enhancing safety in those freight corridors with shared passenger operations.

In conclusion, based on this cursory evaluation, recommended freight rail system improvements are anticipated to provide enhancements to freight service, shared corridor passenger service, as well as additional benefits to the motoring and nonmotoring public.

5.3 Benefits and Costs of the Program

Potential rail investments will generate a range of economic impacts in the areas served by the improvements. Though not quantified in this study, this section provides a discussion of the range of impacts that these investments may bring about, and the methodology whereby they are typically quantified.

Impacts are usually categorized into direct and indirect benefits and costs. Direct benefits and costs are those that are directly associated with the investment during planning and construction, and subsequent implementation. During construction, typical benefits include construction jobs and direct supplier purchases. Once operational, the range of benefits expands beyond direct system employment and vendor sales to include out-of-pocket cost reductions by system users, time savings, reduced maintenance costs on parallel highways, and gains in safety from a reduction in accidents. Examples would include personal time savings for all riders on any train faster than competing auto or air travel, and lowered costs on rail per passenger mile versus automobile use. The largest cost is usually the financial outlay required to accomplish the program, but there may be other direct costs that are not fully reflected in the financial outlay. These could be uncompensated construction-related impacts on abutters, or revenue losses incurred by a competing service provider. For example, introduction of a new passenger rail service could divert traffic from an existing bus service, with the operator suffering a financial loss.

Beyond the direct financial impacts are indirect benefits and costs. These entail the broader economic effects that an investment will have on a region's economy, as well as other collateral effects. For example, new passenger rail service may expand tourism opportunities and, with it, increase the amount of investment and jobs in that sector. In considering the economic impact of a transportation investment, there are two broad classes of analysis:

1. Transportation as derived demand (e.g., passenger travel); and
2. Transportation as a substitutable input (in competition with raw materials, labor, capital and other inputs necessary for production).

Transportation as a sector is often overlooked since the general public is more aware of 1 than 2. While empirical evidence from research suggests that the quality and quantity (as well as the specific form) of transportation infrastructure is a major contributor to economic growth, it also has been demonstrated that regions that provide more transportation services tend to dominate growth. Obviously, the nature of these services is important – are they provided efficiently, in a timely manner and at competitive prices?

For freight, changes in a region's economy will occur because of changes in the cost of doing business associated with the cost of freight transportation. Business costs end up affecting productivity and profitability, and ultimately also the competitiveness of a region's businesses. Of course, the value of this cost differs by industry, depending on the extent to which it depends on rail freight, trucking, or "on-the-clock" employee travel. Likewise, improvements in passenger rail service also will result in economic benefits, particularly through increased business and tourism travel.

The direct, indirect, and induced economic impacts of a proposed transportation investment are usually examined using an economic impact model.[35] These models provide a framework for evaluating both user impacts and total regional economic impacts of transportation investments, and can account for both short-term and long-term travel cost impacts, as well as the effects of changes in market access and spending patterns. This involves coupling a model of the regional economy with a forecasting and analysis system and a detailed accounting framework for calculating impacts on revenues and costs affecting various classes of shippers, carriers, households, and government. With this approach, the impact on how different industries are likely to be affected by changes in costs of alternative rail, road, and intermodal transportation options can be analyzed.

In practice, these frameworks provide a way of tracking how travel time, reliability, and expense changes will affect the local cost of doing business in future years, as well as direct cost of transportation and transportation-related expenses for businesses and households. Changes in these factors end up shifting local spending patterns and cost-competitiveness, thus affecting business growth and investment, and ultimately jobs and income. The economic analysis also recognizes that some of these changes are absorbed in a regional economy, while others are passed on to customers outside of the region.

As one example, the California High-Speed Rail Project, probably the most advanced and thoroughly analyzed such plan in the country, estimates total benefits through 2050 of $150 billion versus a cost of $53 billion for a benefit/cost ratio of 2.84.[36]

[35] A variety of models are available for this purpose, including the Regional Economic Model, Inc. (REMI), Economic Development Research Group' (EDRG) Transportation Economic Development Impact System (TREDIS), and the University of Illinois' Regional Economics Application Laboratory (REAL).

[36] California High Speed Rail Authority Business Plan 2008.