

3.0 PROPOSED PASSENGER RAIL IMPROVEMENTS AND INVESTMENTS

As a part of the 2010 Statewide Freight and Passenger Rail Plan, a needs analysis was conducted for all potential passenger rail corridors in Minnesota. A process was developed so that a clear understanding of needs on the rail system for passenger operations—today and in the future (2040)—could be derived. Key to this process was the understanding of the cumulative effect projects have on each other and how important the underlying freight infrastructure is to the eventual development of a robust passenger rail network in the state (with a few exceptions where entirely new alignments were considered). Overall infrastructure, rights of way, rolling stock and operating and maintenance costs were identified. These improvements are effectively independent of the other improvements.

The 2010 Plan completed an improvement cost evaluation to identify the prioritized corridors. In this 2015 update, improvement costs have been carried forward from the 2010 Plan. The cost estimates are general in nature and are not detailed engineering cost estimates. These order-of-magnitude cost estimates are used for planning purposes—as was done with the ridership forecasts in [Chapter 2](#). Even though some corridors provide connections to points beyond the state border, this evaluation only reflects costs for work in the state of Minnesota.⁵⁹ Several of the corridors listed have gone through advanced levels of engineering assessment; those cost estimates should take precedence for evaluating subsequent steps of project development. Detailed information on the cost evaluation methodology are found in the [Appendix C](#).

2010 Plan Corridor Prioritization

The 2010 Plan advanced passenger rail corridors that were ranked as Phase I and Phase II corridors. Phase I corridors included:

- High Speed Rail Service
 - Twin Cities to Milwaukee/Chicago
 - Twin Cities to Duluth, MN (Northern Lights Express)
 - Twin Cities to Rochester, MN (Zip Rail)
- Enhanced conventional passenger rail service (sustained speeds of 79 to 90 mph) from the Twin Cities to St. Cloud; Mankato; Fargo, North Dakota; Eau Claire, Wisconsin; and between Minneapolis and St. Paul;

Phase II corridors included:

- Rail connections to additional intercity and commuter rail markets in Minnesota, and to an Interstate I-35 Corridor, Red River Valley, Eastern plains, Wisconsin and Canada.

These corridors have been carried forward into this Plan and are the focus of the 2015 update.

⁵⁹ The one exception is the Eau Claire to Twin Cities corridor which is predominantly in Wisconsin. Including only Minnesota costs and benefits would not have been fully representative of that corridor.

2015 Plan Corridor Prioritization

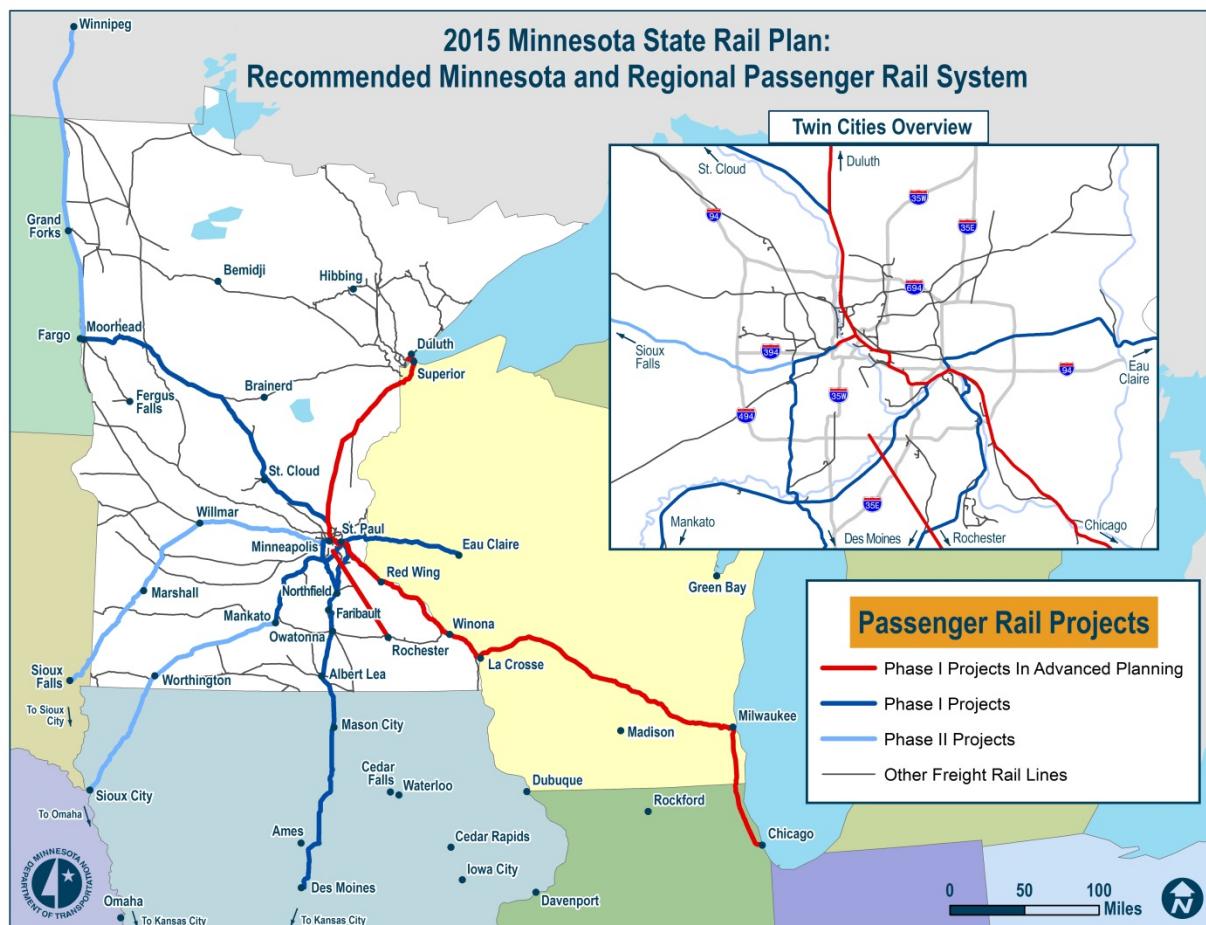
The 2015 Plan establishes three levels of corridor prioritization. The top priority is the corridors that have entered focused planning processes. As of 2015, these include a second Empire Builder frequency between Chicago and the Twin Cities, the Milwaukee to Twin Cities Segment of the Chicago to Twin Cities HSR, Zip Rail and Northern Lights Express. All of these proposed services are presently undergoing in-depth analyses that include some engineering, in-depth demand analysis, and examination of project costs and benefits.

The next two levels apply to projects that have not yet entered corridor-level planning. These corridors are assigned a Phase I or Phase II priority.

- Phase I: Projects that are within a 0-20 year implementation horizon, and
- Phase II: Projects that have a 20+ year implementation horizon

Passenger rail corridors prioritized in this plan are shown in [Figure 3.1](#).

[Figure 3.1: Passenger Rail Corridors](#)



Phase I Corridors in Advanced Planning

Through the phased prioritization that was developed as a part of the 2010 State Rail Plan, four corridors advanced into planning activities. The first is a second frequency on the Amtrak Empire Builder between the Twin Cities and Chicago. High Speed Passenger Rail (110 mph) service was recommended in three corridors that showed significant potential for an upgraded level of service. These corridors include the Milwaukee to Twin Cities segment of the Chicago to Twin Cities Corridor, Twin Cities to Rochester and Twin Cities to Duluth. The specific needs for implementing high-speed service are described below for each of these corridors.

The planning process assumes 110 mph service, but further assumes that new construction should not preclude 150 mph service implementation at a later date. Other than larger radius curves, 150 mph service will require complete grade separation and tighter tolerances in track construction. In addition, electrification may be desirable depending on rolling stock options procured for higher speed service. High-speed service may share right of way with existing freight lines or operate on dedicated track.

TWIN CITIES TO CHICAGO

Two studies are currently underway on the Twin Cities to Chicago corridor.

[Intercity: Twin Cities to Chicago 2nd Train Feasibility Study](#)

Amtrak is presently conducting a feasibility study for the provision of one additional state-sponsored intercity passenger rail service in the Chicago, IL – Milwaukee, WI - St. Paul, MN - Minneapolis, MN - St. Cloud, MN corridor for MnDOT and WisDOT. With a few modest exceptions, the route being studied essentially follows that of Amtrak's current Empire Builder trains between Chicago, IL and St. Cloud, MN. The study assumes that east of St. Paul, MN station stops will be the same as those of the Empire Builder service. However, within the Twin Cities area and beyond to St. Cloud, four different termini (St. Paul, Minneapolis, St. Cloud via Minneapolis, and St. Cloud via Fridley) are being studied to reflect a different combination of station stops. The study will analyze schedules, infrastructure requirements, operating costs, and rolling stock. Ridership and revenue forecasts will be developed based on current timetable speeds up to 79 mph, where practical. The feasibility study is expected to be completed in early 2015.

[HSR: Twin Cities to Milwaukee Tier 1 EIS](#)

High-speed rail (110 mph) service is proposed between the Twin Cities and Chicago. This scenario addresses HSR service between the Twin Cities and Chicago for the portions of the corridor that are within Minnesota.

The Minneapolis/St. Paul to Milwaukee corridor is a segment of the approximately 435-mile high-speed passenger rail corridor between the Twin Cities and Chicago, which in turn is part of the Chicago Hub Network, one of 10 designated regional high-speed rail systems in President Obama's vision to build a network of high-speed rail corridors across the United States. The Twin Cities to Chicago corridor is one of several major branches in the hub-and-spoke passenger rail system centered in Chicago as identified in the Midwest Regional Rail Initiative (MWRRI) plan.

As part of the broader MWRRI studies, the Minneapolis/St. Paul – Milwaukee High-Speed Rail project completed an Alternatives Selection Report in 2012 that identified the CP Mail Line route (Amtrak' Empire Builder route) as the best locational alternative for the segment between Twin Cities and Milwaukee. Since that time the project team has completed various modeling studies and will release a scoping document under state environmental regulations in 2015, and then begin work on a Tier 1 EIS. The EIS would examine service alternatives on the route and examine potential environmental impacts of developing high-speed passenger rail in this corridor.

In addition, the 2012 East Metro Capacity Study recommends rail mainline expansion in rail yards to the north and east of Union Depot as passenger rail develops and expands in the area. Dedicated HSR track through this area will be likely.

Minneapolis and St. Paul

This connection also is being studied for HSR as part of Minneapolis/St. Paul to Milwaukee HSR Tier 1 EIS. Direct service between separated and distinct Central Business Districts also is recommended in the FRA "Corridor Transportation Plan: A Guidance Manual" (2005).

The "Target Field Station to St. Paul union Depot Alternatives Screening Report" was released in 2014 and further looked into the viability of a passenger rail connection between the two downtown stations. Although no costs were analyzed, the report will be used as a reference for the Tier 1 NEPA analysis for the Twin Cities-Milwaukee High Speed Rail line. From a system standpoint, this connection is an absolute necessity for a statewide passenger rail network since it provides system efficiencies and advantages gained from run-through routing, rider convenience, and time advantages.

The Alternatives Screening Report analyzed three reasonable routes, listed as the North, Central, and South Routes. Moving from Minneapolis to St. Paul, all three routes utilize existing BNSF's Wayzata and Midway Subdivisions between Target Field Station and St. Anthony Junction near Minnesota Highway 280. From there, all three routes diverge into their respective alignments.

The "South Route" runs from St. Anthony Junction onto Minnesota Commercial Railroad track, where it connects with CP's Merriam Park Subdivision en route to Union Depot. The South Route is single tracked for its entire length, but contains sufficient right of way for relaying a second mainline track. This routing contains 23 curves greater than two degrees, 9 at grade crossings, and 11 existing rail bridges. It is believed that all at-grade crossings meet current FRA standards for 79 mph corridors. Currently, Amtrak's Empire Builder service to the Twin Cities travels along the South Route and contains a stop at the Union Depot in St. Paul.

The "North Route" and "Central Route" both operate on mostly BNSF right of way from St. Anthony Junction to Hoffman, where they connect with the UP Albert Lea Subdivision into Union Depot. The "North Route" utilizes the St. Paul Subdivision, while the "Central Route" continuously utilizes the Midway Subdivision past St. Anthony. Both of these corridors contain much wider right of ways and hold more mainline track than the South Route. Both alignments also have fewer at-grade crossings and contain fewer critical rail bridges than the South Route, but also bear much more freight congestion. These two routes would also require a longer dwell time at Union Depot than the South Route, thus decreasing overall travel time.

The Screening Report recommended carrying the South Route forward for additional analysis in the Twin Cities-Milwaukee Tier 1 EIS, as it contains the fastest possible travel time between the two downtown areas, and provides the ability to construct additional capacity to accommodate passenger train frequencies and potential freight growth. It was also recommended that the North and Central Routes be excluded from any further consideration as they do not meet the project's purpose and hold significant physical, engineering, and operational challenges.

The three analyzed routes in the Screening Report are shown in [Figure 3.2](#).

HSR: TWIN CITIES TO ROCHESTER (ZIP RAIL)

High-speed rail (186+mph) service is proposed between the Twin Cities and Rochester. This corridor is also known as the Zip Rail project. A large portion of this alignment is greenfield which would require significant investments for HSR implementation.

The Zip Rail Tier I Environmental Impact Statement is scheduled for completion in 2015. The proposed 100-mile corridor travels through seven counties. The proposed project would operate at speeds as high as 186+ mph on dedicated track along the corridor. The system will shorten time of travel between the two termini, and will provide more travel options for the growing population in the Twin Cities and Southeastern Minnesota. The University of Minnesota and Mayo Clinic are predicted to attract travel demand, and would both benefit greatly from a multimodal transportation network. Based on several factors of evaluation, eight corridor alternatives progressed from the scoping stage of the project to the Tier 1 EIS where they would be compared with a no-build alternative. A Service Development Plan will also be developed as part of the Tier 1 EIS.

The Zip Rail Final Scoping Decision document was released in January 2015, but did not include any additional specific cost estimates for various alternatives. The Zip Rail Tier I EIS will include detailed cost estimates for the preferred corridor alternative identified.

The results of the EIS will impact the State Rail Plan since it will provide further insight on the viability of high speed passenger rail service between Rochester and the Twin Cities and will identify a corridor for further study in a Tier 2 EIS.

HSR: TWIN CITIES TO DULUTH (NLX)

The Northern Lights Express (NLX) is a proposed high-speed intercity passenger rail service that would operate between Minneapolis and Duluth, MN. The NLX Project includes planning, environmental review, engineering design and construction of the infrastructure required to implement daily intercity passenger train service at speeds up to 110 mph along a 152-mile corridor on track owned by the BNSF Railway. Terminal stations would be located in Minneapolis at Target Field Station and in Duluth, MN at the historic downtown station known as the Depot. Intermediate stations are planned in Coon Rapids, Cambridge and Hinckley, MN as well as in Superior, WI. Included in the project will be procurement of intercity passenger rail equipment, construction of layover and maintenance facilities, selection of an operator, development of a system safety plan and completion of all necessary agreements to operate over BNSF tracks.

The February 2010 Minnesota Comprehensive Statewide Freight and Passenger Rail Plan identifies this corridor as a phase I project for high-speed intercity passenger rail (service), providing up to eight round trips per day, with speeds up to 110 mph. The NLX corridor meets the definition of 'emerging HSR' as defined in the FRA HSR Strategic Plan. The NLX Service Development Plan (SDP) and Tier 1, Service Level Environmental Assessment (Tier 1 EA) were completed in March 2013. A Finding of No Significant Impact (FONSI) and state Negative Declaration were issued in August 2013. The NLX Project is now in the PE/NEPA phase, which includes preliminary engineering, ridership forecasts, identification of station and facility locations, a financial plan, and completion of the Tier 2 Environmental Assessment (Tier 2 EA). The PE/NEPA phase is expected to be completed in the first quarter of 2016.

A screening analysis was conducted as part of the Tier 1 EA. Seventeen alternative routes were identified. Screening criteria included population, route distance, presence of route defects and other factors. Additional consideration was given to travel time, proximity to markets, conflicts with freight or future rail projects, conflicts with existing ownership, system connectivity, capital costs and public support. The preferred route, the BNSF mainline between Minneapolis and Duluth, was selected as the result of this screening process.

As part of the current PE/NEPA phase, MnDOT is examining several alternative operating plans to determine the best option to optimize ridership, revenue and benefit-cost. Variables being examined include the number of round trips (four, five, six and eight), maximum speed (90 or 110mph), station locations and facility locations. Each alternative operating plan is associated with a set of infrastructure improvements necessary to ensure schedule reliability and minimize the impact on freight operations. Stations in Minneapolis at Target Field Station and in Duluth at the Duluth Depot both require modification to accommodate the NLX service. New stations need to be constructed

in intermediate cities. Layover and maintenance facilities will be required at locations consistent with the operating plan. Capital costs related to track include upgrade from Class 4 to Class 5 or 6 to accommodate higher speeds, extension of sidings to allow freight trains to pull off the main track for passenger trains, special track work such as crossovers to improve operational flexibility and in some locations new track. All grade crossings would be provided with warning devices, including such features as gates, flashers and medians.

Final design, construction and vehicle procurement would take place upon completion of preliminary engineering and Tier 2 project level environmental review, if sufficient funding is secured. Operations could begin 2019-2020.

Costs for this project are being developed in the current Tier 2 EIS Study and will be released upon completion.

Phase I Corridors

For the Phase I corridors, several cost values were estimated. 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 2040 above and beyond the total infrastructure needs identified for freight. 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. 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. Operating and maintenance costs were estimated for the entire distance of each route.

INTERCITY: TWIN CITIES TO ALBERT LEA (I-35 CORRIDOR)

This corridor is proposed for standard (79 mph) passenger rail service with accommodation for up to four round trips per day. The corridor includes segments from downtown Minneapolis and/or downtown St. Paul to Northfield, Northfield to Albert Lea, and Albert Lea to Des Moines. The segment from Minneapolis to Northfield would utilize the CP MN&S subdivision, while all other service would use the UP ‘Spine Line’ from St. Paul to Des Moines. The Iowa State Rail Plan envisions this route to continue on to Kansas City and other rail connections. For the purpose of this analysis, costs are only provided for the segments within Minnesota between the Twin Cities and Albert Lea. Improvements are summarized in [Table 3.1](#).

Table 3.1: 2040 Passenger Service Needs – Twin Cities to Albert Lea ^a

NEED	COST TO UPGRADE	
Infrastructure	\$30.2 million	
Other Costs	Rolling Stock Positive Train Control Capacity Rights – Twin Cities to state Line ^b Operations and Maintenance Costs ^c	\$72.0 million \$11.5 million \$76.8 million \$19.0 million

a Passenger service need estimates include engineering and contingency costs.

b Negotiated on a case by case basis.

c Cost is post implementation.

INTERCITY: TWIN CITIES TO EAU CLAIRE, WISCONSIN

This corridor is proposed for standard (79 mph) passenger rail service and needs to accommodate four train set per day between the Twin Cities and Eau Claire, Wisconsin. This route has potential to be a bi-state, intercity commuter corridor. While ridership for both states has been reviewed, costs are summarized by state. Since most of this alignment is in Wisconsin, Wisconsin data is essential to evaluating this corridor. Improvements are summarized in [Table 3.2](#).

Table 3.2: 2040 Passenger Service Needs – Twin Cities to Eau Claire, Wisconsin ^a

NEED	COST TO UPGRADE	
MINNESOTA		
Infrastructure	\$14.8 million	
Other Costs	Rolling Stock Positive Train Control Capacity Rights ^b Operational and Maintenance Costs ^c	\$72.0 million \$1.9 million \$12.2 million \$3.0 million
WISCONSIN		
Infrastructure	\$73.2 million	
Other Costs	Positive Train Control Capacity Rights ^b Operations and Maintenance Costs ^c	\$7.0 million \$46.9 million \$11.6 million

a Passenger service need estimates include engineering and contingency costs.

b Rolling stock may not be necessary if other corridors are implemented

c Negotiated on a case by case basis.

d Cost is post implementation.

INTERCITY: TWIN CITIES TO FARGO/MOORHEAD

The route of the existing Amtrak Empire Builder, this corridor is proposed for standard (79 mph) passenger rail service. This corridor also overlaps the existing Northstar service to Big Lake, as well as the proposed Northstar Cambridge Extension. Segments on this line include Minneapolis to Coon Rapids, Coon Rapids to Big Lake, Big Lake to St. Cloud, and St. Cloud to Fargo/Moorhead. Improvements are summarized in [Table 3.3](#).

Table 3.3: 2040 Passenger Service Needs – Twin Cities to Fargo/Moorhead ^a

NEED	COST TO UPGRADE	
Infrastructure	\$50.6 million	
Other Costs	Rolling Stock (one train set) Positive Train Control (one train set) Grade Crossing Improvements Capacity Rights – Minneapolis to Fargo/Moorhead ^b Operations and Maintenance Costs ^c	\$18 million \$24.3 million \$3.6 million \$41.1 million \$10.2 million

a Passenger service need estimates include engineering and contingency costs. It is possible that from Coon Rapids to St. Cloud rolling stock could be shared with Twin Cities to Duluth

b Negotiated on a case by case basis.

c Cost is post implementation.

INTERCITY: TWIN CITIES TO MANKATO

The Minnesota Valley Line, providing service between the Twin Cities and Mankato, would host four daily round trips of standard (79 mph) passenger rail service. Required improvements for this corridor are summarized in [Table 3.4](#).

Table 3.4: 2040 Passenger Service Needs – Twin Cities to Mankato ^a

NEED	COST TO UPGRADE	
Infrastructure	\$157.4 million	
Other Costs	Rolling Stock Positive Train Control Capacity Rights – Twin Cities to the state line ^b Operations and Maintenance Costs ^c	\$72.0 million \$8.5 million \$57.1 million \$14.1 million

a Passenger service need estimates include engineering and contingency costs.

b Negotiated on a case by case basis.

c Cost is post implementation.

INTERCITY RAIL: TWIN CITIES TO ST. CLOUD

This corridor is proposed for standard (79 mph) passenger rail service, with eight train sets per day. This corridor overlaps Amtrak's Empire Builder. Improvements for this corridor are summarized in [Table 3.5](#).

Table 3.5: 2040 Passenger Service Needs – Twin Cities to St. Cloud ^a

NEED	COST TO UPGRADE	
Infrastructure	\$116 million	
Other Costs	<ul style="list-style-type: none">Rolling Stock (eight train sets)Positive Train Control (eight train sets)Grade Crossing ImprovementsCapacity Rights – Minneapolis to St. Cloud ^bOperations and Maintenance Costs ^c	\$144.0 million
	\$7.4 million	
	\$3.5 million	
	\$91.1 million	
	\$22.5 million	

a Passenger service need estimates include engineering and contingency costs.

b Negotiated on a case by case basis.

c Cost is post implementation.

Phase II Corridors

INTERCITY: TWIN CITIES TO SIOUX FALLS, SOUTH DAKOTA, VIA WILLMAR

This corridor is proposed for standard (79 mph) passenger rail service and needs to accommodate four train sets per day via the proposed Little Crow route. The corridor includes the segments from Minneapolis to Willmar and Willmar to Sioux Falls, South Dakota. For the purpose of this analysis, costs are only provided for the segments within Minnesota between the Twin Cities and the state line.

INTERCITY: FARGO, NORTH DAKOTA TO WINNIPEG

This corridor is proposed for standard (79 mph) passenger rail service and needs to accommodate X train sets per day.

INTERCITY: MANKATO TO SIOUX CITY, SOUTH DAKOTA

This corridor is proposed for standard (79 mph) passenger rail service and needs to accommodate four train sets per day via the proposed Minnesota Valley Line. The corridor includes segments from Mankato to Worthington and Worthington to Sioux City, Iowa. Service between Mankato and Worthington is projected to have low ridership potential due to the relatively small metropolitan area around Sioux City, as well as the significant distance (more than 250 miles) from the Twin Cities. Making this service viable would require having as end-point a larger market such as Omaha or Kansas City, along with options for connecting services to other markets.

Station Improvements

Currently, only stations along the Amtrak Empire Builder and the Northstar Commuter Rail are in operation for passenger service. New stations will need to be built as passenger rail service is developed in Minnesota. In the long term, existing passenger rail stations will need to be improved to accommodate increased passenger traffic.

Improved Intermodal Connections to Other Passenger Modes

The Union Depot in St. Paul and Target Field Station in Minneapolis are existing intermodal connections that connect commuter and intercity rail to public transit and other interurban transportation modes. Additional large intermodal connections will not be needed in the short term, but as passenger rail is developed throughout the state, station capacity upgrades will be required to accommodate the increased passenger traffic.

State of Good Repair Projects

As freight demand continues to increase and proposed passenger rail demand grows, ongoing maintenance to rail infrastructure will be required to maintain optimal service. Since Amtrak and the Northstar Commuter Rail operate over facilities owned by private rail companies, public-private partnerships and other funding mechanisms will assist in improving infrastructure. As separated track is developed for new passenger rail lines, improvements in the long term will be required to ensure timeliness and safety within the corridor.

Rolling Stock Improvements

Amtrak's Empire Builder and the Northstar Commuter Rail use rolling stock that differ in energy usage, capacity, and design. As new passenger rail corridors are developed, rolling stock will need to be purchased or obtained to meet projected ridership. In addition, new rolling stock for Amtrak long distance and regional services will improve safety and the visual appeal of the trains, and new, energy efficient locomotives will help Minnesota achieve climate change goals.

Opportunities for Improved Coordination or Integration with Freight

The St. Paul Union Depot is projected to see 68 passenger train movements by 2040. Optimized train operations could see the need for activating both downtown-to-downtown routes, which would still concentrate over 70 weekday passenger train movements, along with over 20 average freight movements, on the segment from Minneapolis Junction to St. Anthony Junction. This indicates a possible configuration of two to three through tracks and a multiple track high speed interlocking at St. Anthony Junction.

Target Field Station is projected to see 86 revenue movements by 2040. This would require up to 8 tracks to allow for fluid and flexible operation. Approach and main-line track capacity also would need to be maximized to achieve this goal and accommodate up to 20 freight train movements through the complex. To accommodate this increase in revenue movements, Target Field Station facilities at track grade at the current site would need to be expanded, or a second Minneapolis station stop would have to be created in the vicinity, possibly on the through main-line at Minneapolis Junction or near the University of Minnesota.

Cost of Project Implementation

As previously noted in this study, Minnesotans have been active in the pursuit of passenger rail service from studying corridors to actual service implementation. Much groundwork has been laid to help development of this State Rail Plan. A number of passenger rail studies have developed cost estimates for line construction, capacity rights and annual O&M costs. This study's estimates are not intended to supersede engineering studies that already have been conducted using more detailed data, right of way. As discussed previously, transportation funding for passenger rail projects is scarce and competitive. While grants have been awarded for corridor planning studies and some

infrastructure improvements, the remaining capital and operating expenses for passenger rail projects in Minnesota are currently unfunded.