Minnesota Comprehensive Statewide Freight and Passenger Rail Plan

Freight and Passenger Rail System Planning

draft technical memorandum 4

prepared for

Minnesota Department of Transportation

prepared by

Cambridge Systematics, Inc.

with

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technical memorandum

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Executive Summary

Existing passenger rail service in the State of Minnesota, not including light rail, utilizes existing freight rail corridors. Many of the proposed passenger rail lines throughout the State also would utilize the existing freight rail corridors. This technical memorandum focuses on these corridors identifying existing demand and corridor characteristics, future demand, and necessary improvements to meet the needs for shared freight and passenger rail service.

This memorandum evaluates 23 city pairs with proposed passenger rail service over existing freight rail corridors. The 23 corridors are:

- BNSF: Minneapolis – Coon Rapids;
- BNSF: Coon Rapids – Big Lake;
- BNSF: Big Lake – St. Cloud;
- BNSF: St. Cloud – Fargo/Moorhead;
- BNSF: Coon Rapids – Cambridge;
- BNSF: Cambridge – Duluth;
- BNSF: Minneapolis – Willmar;
- BNSF: Willmar – Fargo/Moorhead;
- BNSF: Willmar – Sioux Falls, South Dakota;
- BNSF: Minneapolis – St. Paul;
- CP: Minneapolis – St. Paul;
- CP: St. Paul – Hastings;
- CP: Hastings – Winona;
- UP: St. Paul – Northfield;
- UP: Northfield – Albert Lea;
- UP: Minneapolis – Mankato;
- UP: Mankato – Worthington;
- UP: St. Paul – Eau Claire, Wisconsin;
- UP: St. Paul – Owatonna – Rochester;
- DME: Minneapolis – Owatonna – Rochester;
- DME: Rochester – Winona;

- TCWR: Minneapolis – Norwood/Young America; and
- TCWR: Norwood/Young America – Montevideo.

Based on existing track conditions (signaling and track ratio), capacity in trains per day were determined. The highest capacity corridors in the State are those with existing passenger rail service, which currently is only the Amtrak Empire Builder. The existing train counts and projected future train counts were compared to track capacity to determine the level of service for the corridor. From track conditions and capacity information, necessary improvements to accommodate additional freight and passenger service were summarized. Costs for these improvements will be determined in subsequent tasks.

The track conditions and capacity, along with ridership projections from previous tasks, were used to determine the most viable corridors for implementation of passenger service. The impact of high-speed rail opportunities will be addressed in subsequent tasks, as well as the impact of new alignments. Specifically, subsequent studies will cover:

- Twin Cities – Chicago (High Speed);
- Twin Cities – Duluth (High Speed); and
- Twin Cities – Rochester (High Speed).

Freight only corridors are not included in this memorandum, and will be summarized as part of subsequent tasks.

Based on the ridership forecasts from the passenger rail technical memorandum and corridor characteristics summarized in this memorandum, the corridors have been organized into three tiers. The first tier as shown in Table ES.1 appear to be the most viable corridors due to reasonably high ridership, and/or the track and signaling would require relatively few improvements to accommodate passenger rail traffic. Tiers two and three (Tables ES.2 and ES.3) project lower ridership than tier one and/or more necessary track and signaling improvements. These initial assessments are subject to change based on changes in assumptions related to passenger service frequency and speed.

Table ES.1 Tier I Existing and Proposed Passenger/Freight Corridors

Corridor	Potential Ridership	Track Condition	Available Capacity
Coon Rapids – Big Lake	High	Good	Medium
Big Lake – St. Cloud	High	Good	Low
Minneapolis – Willmar	Medium	Fair	High
Minneapolis – St. Paul BNSF)	High	Fair	Medium
Minneapolis – St. Paul (CP)	High	Fair	Medium
St. Paul – Hastings	High	Fair	High
Hastings – Winona	High	Fair	High
St. Paul – Northfield	Medium	Fair	High
Northfield – Albert Lea (Kansas City)	Low	Good	High
Minneapolis – Mankato	Medium	Fair	High
St. Paul – Eau Claire, Wisconsin	Medium	Fair	High
St. Paul – Owatonna – Rochester	Medium	Fair	High

Table ES.2 Tier II Existing and Proposed Passenger/Freight Corridors

Corridor	Potential Ridership	Track Condition	Available Capacity
Minneapolis – Coon Rapids	High	Fair	Low
St. Cloud – Fargo/Moorhead	Medium	Good	Low
Coon Rapids – Cambridge	Medium	Good	Low
Willmar – Fargo/Moorhead	Low	Fair	High
Willmar Sioux Falls, South Dakota	Low	Good	Medium
Mankato – Worthington (Sioux City)	Low	Fair	High
Minneapolis – Owatonna – Rochester	Medium	Poor	High

Table ES.3 Tier III Existing and Proposed Passenger/Freight Corridors

Corridor	Potential Ridership	Track Condition	Available Capacity
Cambridge – Duluth	Medium	Fair	Low
Rochester – Winona	Low	Poor	High
Minneapolis – Norwood/Young America	Low	Poor	High
Norwood/Young America – Montevideo	Low	Poor	High

1.0 Objective

The objective of Task 4 is to integrate projected freight and passenger system planning, identifying infrastructure improvements needed to provide better freight and passenger services and meet capacity, safety, efficiency, reliability, and mobility goals.

2.0 Methodology

Drawing from information compiled for previous tasks, this memorandum summarizes existing conditions on freight rail corridors with existing and proposed passenger rail service. In Section 3.0, we summarize existing and projected freight and passenger rail demand and compare those to the rail line capacity. In Section 4.0, we summarize the current rail line characteristics and capacity as well as highlight significant known issues and bottlenecks. We also will include the identification of rail line improvements that are necessary to meet the needs of rail users. In Section 5.0, we will draw initial conclusions as to the viability of shared passenger and freight rail service on corridors.

Capacity in Section 3.0 is determined using a technical approach built on the analytical techniques developed for the *National Rail Freight Infrastructure Capacity and Investment Study*, completed in 2007 for the Association of American Railroads (AAR). The analytical technique allows for rapid assessment of different levels of future freight and passenger services, levels and phasing of investment, and system configurations. Steps that were taken in this methodology included:

1. **Defined a network** of key freight and passenger rail lines, identifying current and planned rail corridors and lines of most interest to the study. This information was drawn from the results of Tasks 2 and 3. This study developed a track-to-siding ratio to determine the true capacity of a line. It was assumed that sidings 8,000 feet in length or longer would be used to calculate the track-to-siding ratio, as that is an average freight train length and, thus, the siding would be able to hold a freight train allowing passenger trains to pass.

2. **Estimated rail line capacity** based on the number of tracks and type of signal system. To determine whether a corridor is congested, current volume was compared to current capacity. Two variables were used to estimate the current capacity of the primary corridors: the number of tracks, and the type of control system.[1]

   – Tracks – Most sections of the Minnesota rail system are single-tracked with multiple sidings for trains to meet and pass each other, and a portion of the heaviest-volume corridors are double-tracked.

[1] The capacity of rail corridors is determined by a large number of factors, including the number of tracks, the frequency and length of sidings, the capacity of the yards and terminals along a corridor to receive the traffic, the type of control systems, the terrain, the mix of train types, the power of the locomotives, track speed, and individual railroad operating practices. Complete, consistent, and current information on all these factors was not available for the study, so the capacity of the primary corridors was estimated using only the two dominant factors or number of tracks and type of signal system.

- Control System – The type of control system affects capacity by maintaining a safe spacing between trains meeting and passing on the same track. There are three major types of signal systems:
  - Automatic Block Signaling (ABS) is a signal system that controls when a train can advance into the next track block. A block is a section of track with traffic control signals at each end. The length of the block is based on the length of a typical train and the distance needed to stop the train in a safe manner. When a train exits a block, the signal changes to yellow, indicating to the engineer of a following train that the block is now empty, but that the following train should be prepared to stop before entering the next block (currently occupied by the train ahead). Automatic block signaling is governed by block occupancy and cannot be controlled by a railroad dispatcher from a remote location.
  - Centralized Traffic Control (CTC) and Traffic Control System (TCS) are systems that use electrical circuits in the tracks to monitor the location of trains, allowing railroad dispatchers to control train movements from a remote location, typically a central dispatching office. CTC and TCS increase capacity by detecting track occupancy and allowing dispatchers to safely decrease the spacing between trains because the signal systems automatically prevent trains from entering sections of track already occupied by other trains.
  - No Signal (N/S) and Track Warrant Control (TWC) are basic train control systems that require the train crew to obtain permission or warrants before entering a section of track. Crews receive track warrants by radio, phone, or electronic transmission from dispatcher. TWC is used on low-volume track instead of more expensive ABS or CTC/TCS systems.

The *National Rail Freight Infrastructure Capacity and Investment Study* determined there are eight combinations of number of tracks and type of signal system that are in common use across the primary corridors today. Table 2.1 lists the combinations along with several wide cross-sections of five and six tracks, which could be used in this study to accommodate future demand. The first column lists the number of tracks, and the second column lists the type of control system. For each combination of number of tracks and type of control system, the maximum number of trains that can typically be accommodated is determined by the mix of train types operating along the corridor. The third column in the table lists the maximum practical capacity in trains per day that can be accommodated if multiple train types (e.g., merchandise, bulk, and passenger trains) use the corridor. The rightmost column lists the maximum practical capacity in trains per day that can be accommodated if a single train type (e.g., all intermodal trains) uses the corridor.

Table 2.1 Average Capacities of Typical Rail-Freight Corridors
Trains per Day

Number of Tracks	Type of Control	Trains per Day: Practical Maximum If Multiple Train types Use Corridor[a]	Trains per Day: Practical Maximum If Single Train Type Uses Corridor[b]
1	N/S or TWC	16	20
1	ABS	18	25
2	N/S or TWC	28	35
1	CTC or TCS	30	48
2	ABS	53	80
2	CTC or TCS	75	100
3	CTC or TCS	133	163
4	CTC or TCS	173	230
5	CTC or TCS	248	340
6	CTC or TCS	360	415

Source: National Rail Freight Infrastructure Capacity and Investment Study, AAR, 2007. Class I railroad data aggregated by Cambridge Systematics, Inc.

[a] For example, a mix of merchandise, intermodal, and passenger trains.

[b] For example, all intermodal trains.

The table presents average capacities for typical rail freight corridors. The actual capacities of the corridors were estimated using railroad-specific capacity tables. At the request of the railroads, these detailed capacity tables were not included in this report to protect confidential railroad business information.

Key: N/S or TWC: No Signal/Track Warrant Control.

ABS: Automatic Block Signaling.

CTC or TCS: Centralized Traffic Control/Traffic Control System.

3. **Calculated current levels of service** (LOS) by comparing current freight and passenger train volumes to current line capacities. This was done by calculating a volume-to-capacity ratio expressed as a LOS grade. The LOS grades, listed in Table 2.2, were approved by Class I railroads as part of the *National Rail Freight Infrastructure Capacity and Investment Study*. The LOS maps presented in this technical memorandum show green to indicate rail corridors operating below capacity and yellow, orange, and red to indicate increasing levels of congestion. Freight train volumes for the base year were drawn from information collected in Task 2 from a variety of sources, including the Federal Railroad Administration, Mn/DOT sources, and interviews with railroads. Passenger train volumes were developed from published Amtrak schedules and planned service for the Northstar Corridor.

Table 2.2 Volume-to-Capacity Ratios and Level of Service (LOS) Grades

LOS Grade	Description		Volume/Capacity Ratio
A	Below Capacity	Low to moderate train flows with capacity to accommodate maintenance and recover from incidents	0.0 to 0.2
B			0.2 to 0.4
C			0.4 to 0.7
D	Near Capacity	Heavy train flow with moderate capacity to accommodate maintenance and recover from incidents	0.7 to 0.8
E	At Capacity	Very heavy train flow with very limited capacity to accommodate maintenance and recover from incidents	0.8 to 1.0
F	Above Capacity	Unstable flows; service break-down conditions	> 1.00

Sources: Cambridge Systematics, Inc.

National Rail Freight Infrastructure Capacity and Investment Study, AAR, 2007.

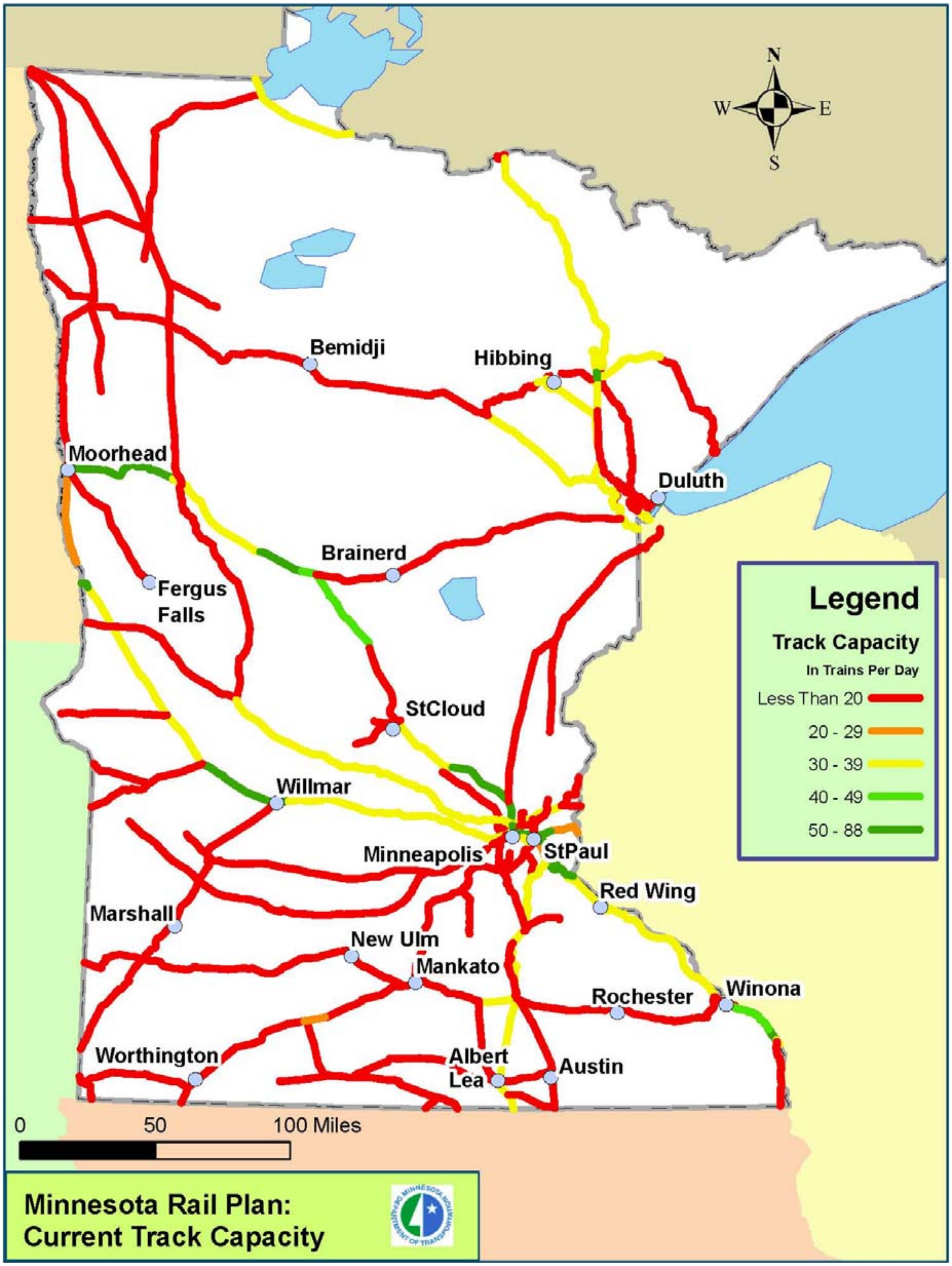
4. **Developed future levels of service** (without the addition of rail improvements) maps to reflect projected 2030 freight and passenger train volumes to current line capacities. Future freight train volumes were estimated using national and Minnesota economic growth data provided in the IHS-Global Insight TRANSEARCH database, as shown in the conclusions of Task 2. Future passenger train volumes were developed from the conclusions of Task 3, which included interviews with Minnesota rail stakeholders, Mn/DOT commuter rail studies and plans, Amtrak, the Midwest Passenger Rail group.

3.0 Existing and Projected Rail Demand

This memorandum focuses on existing freight rail corridors with existing passenger rail service, currently only Amtrak's Empire Builder, and those freight rail corridors with proposed passenger service. Proposed passenger service includes those corridors currently under construction, such as Northstar Commuter Rail, and those that have been recently proposed throughout the State.

Current track capacity is summarized for all rail lines in Figure 3.1.

Figure 3.1 Current Track Capacity



Most corridors have capacity to handle less than 20 trains per day based on existing signaling and track/sidings. The higher capacity corridors in the State include those with existing passenger service between Fargo/Moorhead and Winona. These corridors also are among the busiest freight corridors in the State.

Current LOS is summarized for all rail lines in Figure 3.2. There are existing deficiencies, denoted by LOS E or F, along the corridors between the Twin Cities and Fargo/Moorhead, between the Twin Cities and Duluth, and to the southwest of Willmar. The deficiencies are related to track capacity; track capacity can be improved with upgrades in signaling and track/sidings.

Projected rail demand, freight and passenger, further reduces the LOS for several rail lines. The projected LOS is summarized for all rail lines in Figure 3.3.

Figure 3.2 Current Level of Service

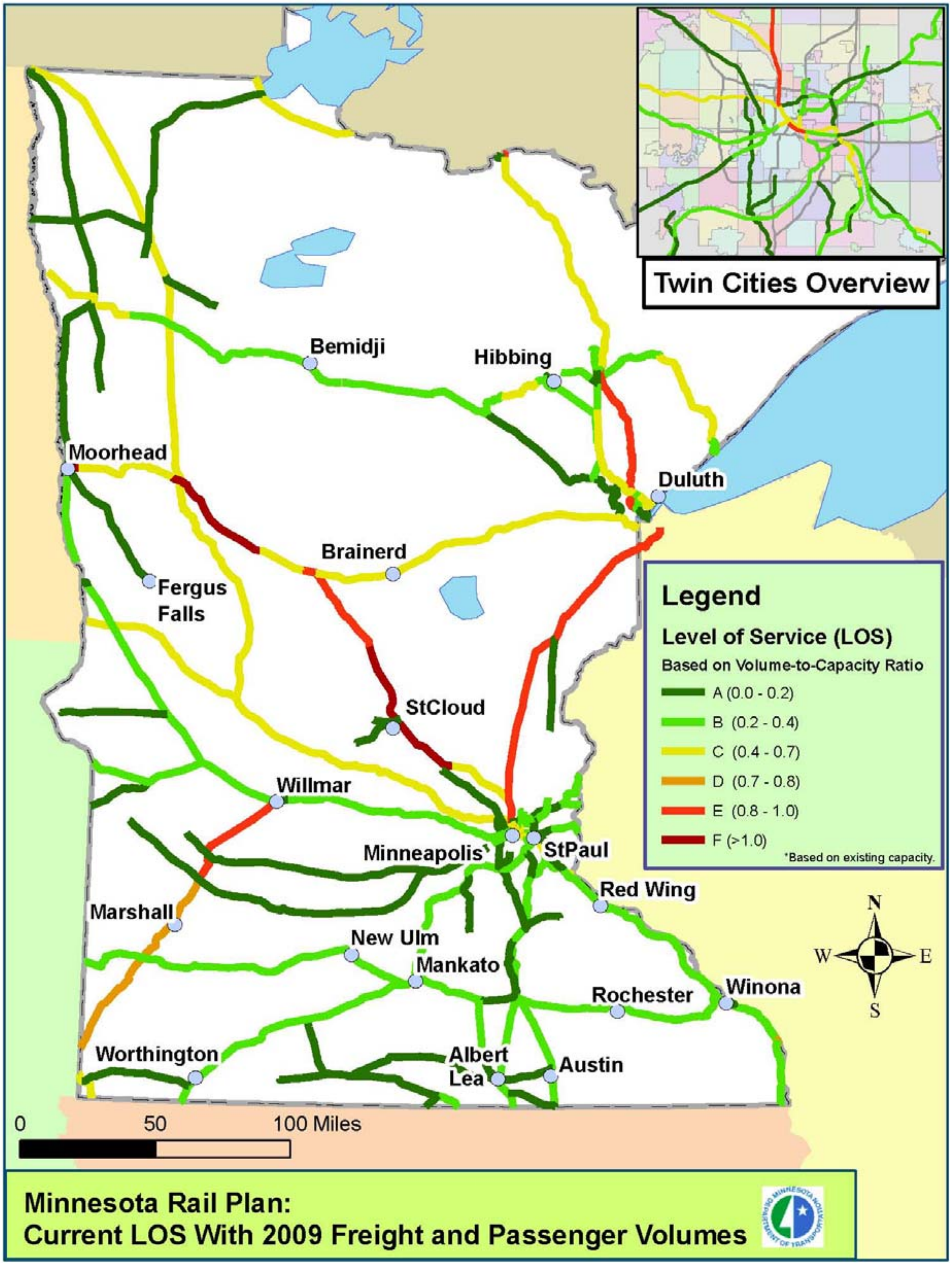
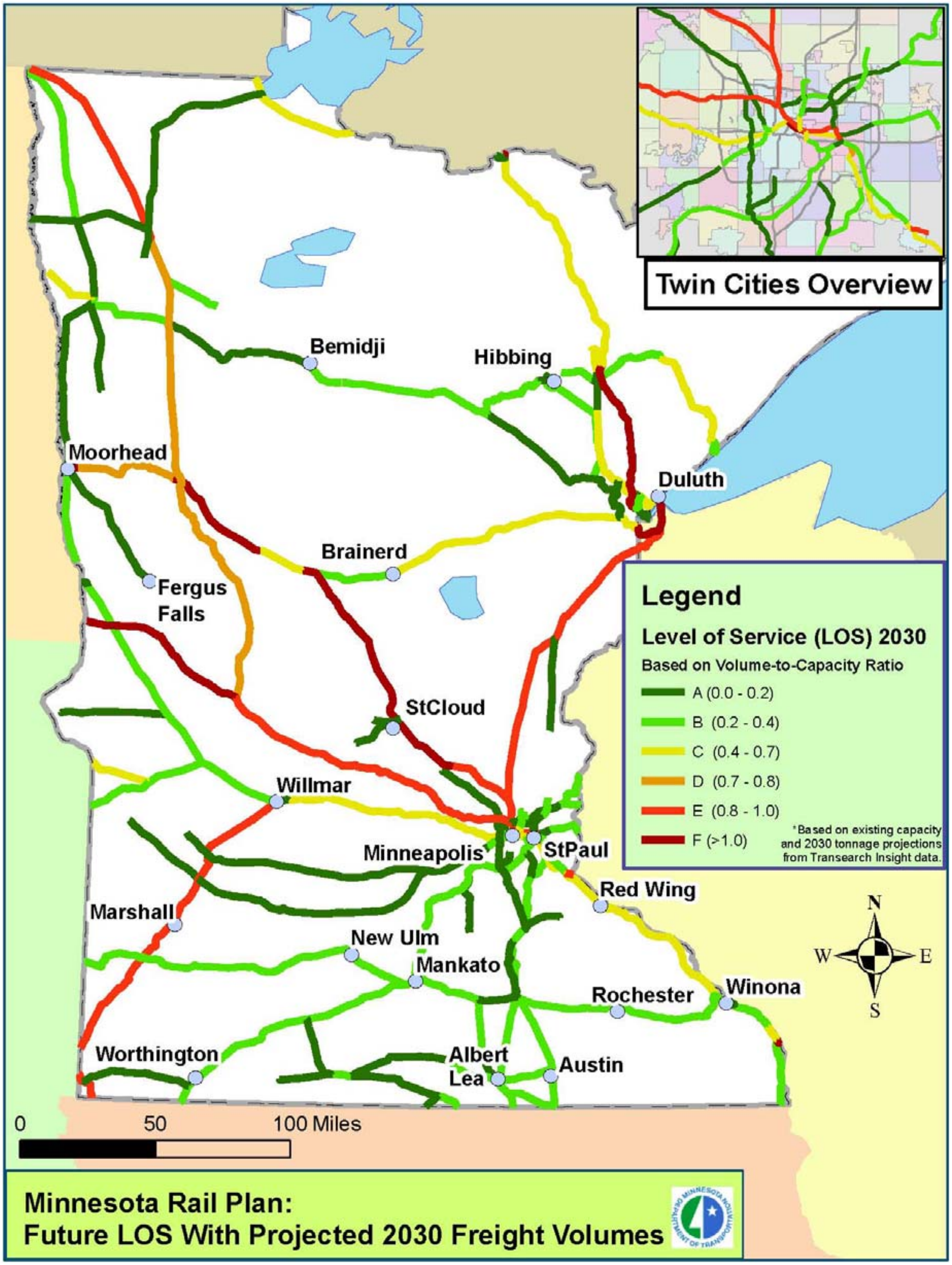


Figure 3.3 Future Level of Service



4.0 Freight/Passenger Rail Capacity and Constraints

Rail corridors are summarized by city pair with some city pairs having multiple routing options. Information for each corridor is drawn from railroad subdivision information although corridor termini may differ from subdivision limits.

The information summarized includes length (shown in miles); track ratio; trains per day; Federal Railroad Administration (FRA) track class; the number of public and private grade crossings; primary signal system; and average freight and passenger speeds, if available. Track ratio is the total length of track, including sidings divided by the total length of the corridor. There are nine specific FRA classes of track (Class I through IX), plus a category for Excepted Track. Each class has increasing exacting standards for track structure, geometry, and inspection frequency. Most of the track of the proposed passenger rail corridors falls in Class II to Class IV. Classes VI through IX are for high-speed passenger rail. This information along with detailed tables for each corridor are included in the Appendix A. Table 4.1 provides a summary of corridor characteristics for the 21 city pairs with existing or proposed passenger service over existing freight lines.

Table 4.1 Summary of Existing and Proposed Passenger/ Freight Corridors

Corridor	Length[a]	Track Ratio	Trains/ Day	FRA Track Class	At-Grade Crossings	Primary Signal System	Track Speed[b]
Minneapolis – Coon Rapids	14	1.88	49	3	10	CTC	50*
Coon Rapids – Big Lake	26	2	47	4	26	CTC	75*
Big Lake – St. Cloud	27	1.61	47	4	36	CTC	75*
St. Cloud – Fargo/Moorhead	175	1.87	50	4	198	CTC/ABS	75*
Coon Rapids – Cambridge	30	1.14	14	4	38	ABS	50
Cambridge – Duluth	108	1.19	15	4	116	ABS	45
Minneapolis – Willmar	91	1.19	14	3	108	CTC/ABS	40
Willmar – Fargo/Moorhead	155	1.15	11	3	208	CTC/ABS	45
Willmar – Sioux Falls, South Dakota	146*	1.09	14	4	178	TWC	50
Minneapolis – St. Paul (BNSF)	14	1.7	28	3	4	CTC	30
Minneapolis – St. Paul CP)	13	1.17	16	3	10	CTC	30*
St. Paul – Hastings	19	1.96	26	4	9	CTC	60*
Hastings – Winona	108	1.22	29	4	64	CTC	65*
St. Paul – Northfield	40	1.08	11	4	52	CTC/ABS	35
Northfield – Albert Lea (Kansas City)	432*	1.1	11	4	129	CTC	45
Minneapolis – Mankato	84	1.07	5	3	119	TWC/ABS	35
Mankato – Worthington (Sioux City)	184*	1.04	5	4	134	TWC	45
St. Paul – Eau Claire, Wisconsin	100*	1.37	7	4	23	ABS	30
St. Paul – Owatonna – Rochester	107	1.07	9	3	176	CTC/TWC	35
Minneapolis – Owatonna – Rochester	106	1.04	6	2	170	TWC/CTC	25
Rochester – Winona	46	1.01	4	2	87	TWC	30
Minneapolis – Norwood/Young America	37	1.05	4	2	32	TWC	30
Norwood/Young America – Montevideo	147	1.06	3	2	212	TWC	30

[a] Listed length is entire corridor length, including out-of-state mileage for those corridors with a city pair located out of state (denoted by asterisk).

Other corridor characteristics are summarized only for in-state portions of the corridor.

[b] Track speed is passenger speed in miles per hour for corridors with existing passenger service (denoted by asterisk). Track speed for all other corridors is freight speed.

Necessary improvements for improved or added passenger service, in addition to improvements for expanded freight service are summarized for each city pair. One improvement will not be detailed for each city pair as it will affect all corridors with existing or proposed passenger service. The Rail Safety Improvement Act of 2008 requires widespread installation of Positive Train Control (PTC) systems by 2015 for all Class I railroads and those entities providing regularly scheduled intercity or commuter rail passenger service. PTC systems utilize integrated command, control, communications, and information systems technologies to prevent train-to-train collisions, casualties to roadway workers and damage to their equipment, and overspeed derailments. The systems can vary in complexity and sophistication. Therefore, all corridors implementing passenger service would require upgrades to a PTC system. Incremental signaling upgrades prior to the 2015 deadline as well as other necessary capacity improvements will be summarized by corridor.

The existing passenger rail service utilizes corridors operated by Canadian Pacific (CP) and BNSF Railway. Passenger rail service has been proposed on corridors of these same two railroads as well as corridors operated by Union Pacific (UP); Dakota, Minnesota and Eastern (DME), which is now part of CP; and Twin Cities and Western (TCWR). The Class I railroads' corridors will be covered first, in alphabetical order, followed by those corridors operated by DME and TCWR.

BNSF: Minneapolis – Coon Rapids

The Minneapolis to Coon Rapids corridor utilizes the BNSF Wayzata, Midway, and Staples subdivisions. The Empire Builder currently utilizes the Midway and Staples segments of the corridor, and Northstar Commuter Rail will utilize this entire corridor starting later in 2009. This corridor also has been under consideration for the proposed Bethel commuter rail line although service currently is being proposed as the Northstar Commuter Rail Cambridge extension. The Northern Lights Express and proposed reinstatement of Amtrak North Coast Hiawatha service also are under consideration for this corridor.

The corridor is double tracked through the Midway and Staples subdivisions, Federal Railroad Administration (FRA) Class IV through the Staples subdivision, with CTC through the Midway and Staples subdivisions. It is a higher-speed corridor, as passenger trains can average over 50 miles per hour with few grade crossings (10) or structures (8) along its 14 miles. Additionally, the corridor currently is undergoing some upgrades by BNSF to accommodate the Northstar project.

Despite the above strengths of the corridor for passenger rail service, expanded passenger or freight rail service will be a challenge. This is a high-volume freight corridor with average counts of about 50 trains per day, prior to Northstar Commuter Rail service implementation which will add 12 trains each weekday and six trains each weekend day. Speeds are limited through the Northtown Yard, and any increase in volume will trigger the need for additional rail capacity. An expansion of freight or passenger service along this corridor will require a third main line. Additional improvements may be necessary to increase speeds through the Northtown Yard. The current estimate for the third main project is approximately $110 million from Northtown Yard to Coon Creek Junction.

BNSF: Coon Rapids – Big Lake

The Coon Rapids to Big Lake corridor utilizes the BNSF Staples subdivision. The Empire Builder currently utilizes this corridor and Northstar Commuter Rail will begin service along this corridor in late 2009. This corridor also is under consideration for the proposed reinstatement of North Coast Hiawatha service currently under study by Amtrak.

The corridor is double tracked, FRA Class IV, with CTC throughout. It is a high-speed corridor, with passenger speeds averaging over 75 miles per hour. Grade crossings (26) average about one per mile, and there are only three bridges along the 26-mile corridor. Additionally, the corridor currently is undergoing some upgrades by BNSF to accommodate the Northstar project.

This is a high-volume freight corridor with train counts averaging 47 per day. However, there is available capacity. There are not any necessary major improvements along this corridor for an expansion of passenger or freight service.

BNSF: Big Lake – St. Cloud

The Big Lake to St. Cloud corridor utilizes the BNSF Staples subdivision. The Empire Builder utilizes this corridor. An extension of the Northstar Commuter Rail line is under consideration as well as the proposed reinstatement of Amtrak North Coast Hiawatha service.

The corridor is double tracked between Becker and St. Cloud; it is FRA Class IV with CTC along the entire corridor. The average passenger speed is almost 75 miles per hour. This is a high-volume freight corridor with train counts averaging 47 per day.

An expansion of freight or passenger service along this corridor will require a second main line between Big Lake and Becker. Although the track bed exists for a second track between Big Lake and Becker, the addition of a second main line will require siding relocations and grade crossing improvements as its addition would not meet current American Association of State Highway and Transportation Officials (AASHTO) guidance for spacing from Trunk Highway (TH) 10. Additionally, the corridor averages over one grade crossing per mile with 36 grade crossings over the 27-mile corridor. Nine of the grade crossings currently are unprotected. Additional improvements may be necessary to increase speeds through two short junctions/segments.

BNSF: St. Cloud – Fargo/Moorhead

The St. Cloud to Fargo/Moorhead corridor utilizes the BNSF Staples, KO, and Prosper subdivisions. The Empire Builder currently utilizes this corridor. The proposed reinstatement of North Coast Hiawatha service currently is under study by Amtrak.

The corridor is mostly double tracked with passenger speeds averaging about 75 miles per hour. With the exception of the short section of KO subdivision at FRA Class III, the entire corridor is FRA Class IV. There currently are 198 grade crossings along the 175-mile corridor. This is a high-volume freight corridor with an average of 50 trains per day.

There is available capacity for expanded passenger and freight rail service along some segments of this corridor. There are several segments that require double tracking/siding improvements. Additionally, there are several lower speed segments that may require upgrades for expanded/improved passenger rail service.

BNSF: Coon Rapids – Cambridge

The Coon Rapids to Cambridge corridor utilizes the BNSF Hinkley subdivision. The proposed Northern Lights Express and Northstar Commuter Rail Cambridge extension would use this route. The Northstar Commuter Rail Cambridge extension would serve what has previously been referred to as the Bethel commuter rail line.

The corridor is single track with some sidings, FRA Class IV, with ABS. The average freight speed is 50 miles per hour. There currently are 38 grade crossings and 5 bridges along the 30-mile corridor. The existing train counts are 14 per day.

The track currently is 133-pound welded rail. The introduction of passenger service along this corridor would require a signaling upgrade to CTC. Additionally, siding lengths would need to be extended along with switch upgrades. In order to achieve high-speed operation, new track would be necessary along much of the corridor to reduce curvature and reduce freight conflicts.

BNSF: Cambridge – Duluth

The Cambridge to Duluth corridor extends into Wisconsin between Foxboro, Wisconsin and Superior, Wisconsin along the route. It utilizes the BNSF Hinkley subdivision between Cambridge and Boylston, Wisconsin and the Lakes subdivision and North Shore Scenic Railway railroad north of Boylston, Wisconsin. This corridor is under consideration for Northern Lights Express.

The corridor is single track with some sidings, FRA Class IV, with ABS. The freight speed is about 45 miles per hour. There currently are 116 grade crossings and 8 bridges along the Hinkley subdivision to Boylston. The corridor is 110 miles long with 96 of the miles on the Hinkley subdivision. The existing train counts average 15 per day.

The introduction of passenger service along this corridor would require a signaling upgrade to CTC. Additionally, siding lengths would need to be extended along with switch upgrades. In order to achieve high-speed operation, new track would be necessary along much of the corridor to reduce curvature and reduce freight conflicts. Track improvements near Superior would be necessary for both conventional passenger rail and high-speed passenger rail. Additionally, an alternative alignment may be preferable between Foxboro and Boylston due to poor subgrade conditions.

BNSF: Minneapolis – Willmar

The Minneapolis to Willmar corridor utilizes the BNSF Wayzata subdivision. The proposed Little Crow Transit Way would use this route, and it is part of a route alternative for service between Minneapolis and Fargo/Moorhead. It also would be a component of a proposed Minneapolis to Sioux Falls, South Dakota route.

The corridor is single track with some sidings. It is FRA Class II for the eastern mile of the corridor, and has ABS. The rest of the corridor is FRA Class III with some ABS, but it is mostly a CTC system. The average freight speed is about 40 miles per hour. There currently are 108 grade crossings along the corridor's 91 miles. The existing train counts are 14 per day.

The track currently is welded rail. The addition of passenger service along this corridor would require some improvements to signaling and grade crossings. Limited improvements could increase speeds to 59 miles per hour, and speed would need to be improved along the corridor in order to be competitive with automobile travel times.

BNSF: Willmar – Fargo/Moorhead

The Willmar to Fargo/Moorhead corridor utilizes the BNSF Morris, Moorhead, and Prosper subdivisions as well as the Red River Valley and Western Railroad's first subdivision. This is part of a route alternative for service between Minneapolis and Fargo/Moorhead.

The corridor is single track with limited sidings. It is FRA Class II, III, and IV, with CTC on the Morris subdivision and ABS along the Moorhead and Prosper subs. The average freight speed is about 45 miles per hour. There are 208 grade crossings along the 155-mile corridor. It is a low-volume corridor with average train counts of 11 per day.

The addition of passenger service along this corridor would require significant track improvements as well as signal upgrades to compete with the travel time along the Minneapolis – Coon Rapids – Big Lake – St. Cloud – Fargo/Moorhead corridor.

BNSF: Willmar – Sioux Falls, South Dakota

The Willmar to Sioux Falls, South Dakota corridor utilizes the BNSF Marshall subdivision. It is a component of a proposed Minneapolis to Sioux Falls, South Dakota route.

The corridor currently is single track with limited sidings. It is FRA Class IV, with TWC. The average freight speed is almost 50 miles per hour. There are 178 grade crossings along Marshall subdivision to the Minnesota border. The corridor is 146 miles long with 126 of the miles on the Marshall subdivision in Minnesota. It is a low-volume corridor with an average train count of 14 per day.

The introduction of passenger service along this corridor would require a signal upgrade and some improvements to grade crossings. Siding improvements also are necessary to increase corridor capacity.

BNSF: Minneapolis – St. Paul

This Minneapolis to St. Paul corridor utilizes the BNSF Wayzata, Midway, and St. Paul subdivisions as well as the CP Merriam Park subdivision. This corridor has been under consideration for the Red Rock commuter rail line.

The corridor is double tracked except for the western five miles; the rail line is single track for 2.5 miles near where it passes under TH 280. However, due to congestion, one main line track is often used as a siding in the double tracked sections. It is FRA Class II and III, with four grade crossings over the corridor's 14 miles. The average freight speed is almost 30 miles per hour, and the corridor averages 28 trains per day. Signals have been removed from the corridor.

The need to "back-out" at St. Paul Union Depot to travel from St. Paul to Minneapolis limits capacity and speed along this corridor, and the track geometry at Raymond also limits speed. Track improvements also would be necessary in order to improve speeds along the corridor, and a second main may be necessary to accommodate additional volume near the Midway (Union) yard. The introduction of passenger service along this corridor also would require signaling improvements.

CP: Minneapolis – St. Paul

The Minneapolis to St. Paul corridor utilizes the BNSF Wayzata and Midway subdivisions, the Minnesota Commercial Railway (MNNR), and the CP Merriam Park subdivision. The Empire Builder currently utilizes part of this corridor, and this corridor has been under consideration for the Red Rock commuter rail line.

The corridor is entirely single track, with the exception of the Wayzata subdivision which has a siding and the eastern mile of the 13-mile corridor which is double tracked. It varies in FRA Class from I to IV along the corridor. The average passenger speed is 30 miles per hour. There are 10 grade crossings, and the corridor averages 16 trains per day.

Significant track improvements would be necessary to increase speeds beyond the current 32 miles per hour average. The MMNR portion of the corridor severely limits the speed achievable. In order to improve the MNNR portion, property would need to be acquired. There is an underground steam line along the corridor which would require relocation and add additional cost for improvements along the corridor. As with the BNSF corridor between Minneapolis and St. Paul, the track geometry at Raymond limits speed. A second main line may be necessary to accommodate additional volume near the Midway (Union) yard.

CP: St. Paul – Hastings

The St. Paul to Hastings corridor utilizes the CP Merriam Park and River subdivisions. The Empire Builder currently utilizes this corridor, and this corridor has been under consideration for the Red Rock commuter rail line. Additionally, high-speed passenger service has been proposed along this corridor as part of the Midwest Regional Rail Initiative (MWRRI).

The corridor operates double track through most of the River subdivision through a joint agreement with BNSF; near Hastings it is single track with sidings. The Merriam Park subdivision is FRA Class II, while the remainder of the corridor is FRA Class IV. The entire corridor has CTC. The average passenger speed is almost 60 miles per hour. There are nine grade crossings along the 19-mile corridor, and the corridor averages 26 trains per day.

There are multiple lower speed curves along the corridor, and there are significant speed and capacity limitations due to Hoffman junction and the potential bottleneck at the St. Paul Union Depot. Hoffman junction is where CP and BNSF lines converge to joint track. In addition, Union Pacific uses the Lafayette Bridge which conflicts with the CP/BNSF movement. Increased passenger and freight service along this corridor may require reconfigured or additional track. However, improvements along the corridor can greatly improve speed to 79 miles per hour or faster.

CP: Hastings – Winona

The Hastings to Winona corridor utilizes the CP River and Tomah subdivisions. Amtrak's Empire Builder currently utilizes this corridor. High-speed passenger service has been proposed along this corridor as part of the MWRRI.

The corridor is single track with sidings. It is FRA Class IV with CTC. The average passenger speed is over 65 miles per hour along the 108-mile corridor. There are 64 grade crossings, and the corridor averages 28 trains per day.

Additional volume will require longer sidings at a minimum, if not a double track main line. The right-of-way is constrained north of Winona for double tracking. In addition, the existing single track bridge over the Mississippi River near la Crescent may need rehabilitation or replacement.

UP: St. Paul – Northfield

The St. Paul to Northfield corridor utilizes the CP Merriam Park and UP Albert Lea subdivisions. It is part of a proposed north-south corridor linking the Twin Cities to Des Moines, Iowa and points south.

The corridor is entirely FRA Class IV single track with minimal sidings with the exception of the 1.2-mile section of Merriam Park subdivision; this subdivision is FRA Class II double track. The corridor primarily has CTC with some ABS at the northern end of the Albert Lea subdivision. The average freight speed is over 35 miles per hour along the 40-mile corridor. There are 52 grade crossings, and the corridor averages 11 trains per day.

The addition of passenger service along this corridor would require track improvements to increase average speeds. There are several lower speed curves that may require reconstruction. In addition, passing sidings would need to be added for the introduction of passenger service as well as a signal system upgrade.

UP: Northfield – Albert Lea

The Northfield to Albert Lea corridor utilizes the UP Albert Lea subdivision. It is part of a proposed north-south corridor linking the Twin Cities to Iowa and points south such as Kansas City.

The 73-mile corridor is single track with minimal sidings, FRA Class IV, with CTC. There are 129 grade crossings, and the corridor averages 11 trains per day. The average freight speed is over 45 miles per hour.

The introduction of passenger rail along this corridor will require siding improvements. Minimal improvements could increase speed along much of the corridor.

UP: Minneapolis – Mankato

The Minneapolis to Mankato corridor utilizes the BNSF Wayzata, CP MN&S, and UP Mankato subdivisions. It is part of proposed service to Sioux City, Iowa.

The Wayzata subdivision is FRA Class II and III, the MN&S is FRA Class I with freight speeds limited to 10 miles per hour, and the Mankato subdivision is FRA Class IV. There is a mix of ABS, TWC, and Block Register Territory (BRT) along the corridor. There are minimal sidings along the corridor and 119 grade crossings along its 84 miles. The average freight speed is over 35 miles per hour. The corridor averages five trains per day.

The introduction of passenger rail along this corridor will require significant track upgrades to achieve an acceptable speed, especially along the Wayzata and MN&S subdivisions. Signal improvements from the existing TWC/ABS system also would be necessary. However, this corridor would not likely require many capacity improvements given the low volume on the corridor. Additionally, the MN&S segment has a limited clearance envelope. A wye would need to be added to switch from the Wayzata to the MN&S.

UP: Mankato – Worthington

The Mankato to Worthington corridor utilizes the UP Mankato and Worthington subdivisions. It is part of proposed service to Sioux City, Iowa.

The corridor is single track with very few sidings, FRA Class IV, with TWC. The grade crossings average over one per mile with 134 crossings over the 104-mile corridor. The average freight speed is almost 45 miles per hour, and the corridor averages five trains per day.

Although the track is in fair shape, it is jointed rather than continuous welded rail. The introduction of passenger service would require an upgrade or track and signaling. Sidings would likely need to be added along the Mankato subdivision despite the low volume on the corridor.

UP: St. Paul – Eau Claire, Wisconsin

The St. Paul to Eau Claire, Wisconsin corridor utilizes the CP Merriam Park and St. Paul subdivisions and the UP Altoona subdivision to the Wisconsin border near Lakeland. It has been proposed as an alternate route for the MWRRI.

The corridor is a mix of single and double track to the Wisconsin border. The Merriam Park subdivision is FRA Class II, and the St. Paul and Altoona subs are FRA Class IV. There are 23 grade crossings along the 21 miles between St. Paul and Wisconsin. The corridor averages seven trains per day with an average freight speed of 30 miles per hour.

The corridor is lower speed to the Wisconsin border; the signals and track are in poor condition. Track and signal improvements would be necessary for the introduction of passenger rail along this corridor. Additionally, the St. Croix River Bridge may require replacement necessary for any expansion in service. However, UP has been improving the corridor within Wisconsin.

UP: St. Paul – Owatonna – Rochester

The St. Paul to Rochester corridor utilizes the CP Merriam Park, UP Albert Lea, and DME Waseca subdivisions. It is one possible route connecting Rochester to the Twin Cities on existing freight lines through Owatonna.

The corridor is mostly FRA Class IV single track with minimal sidings with the exception of the 1.2-mile section of Merriam Park subdivision and the Waseca subdivision. The Merriam, Park subdivision is FRA Class II double track and the Waseca subdivision is FRA Class II single track with minimal sidings. The corridor primarily has CTC with some ABS at the northern end of the Albert Lea subdivision and TWC on the Waseca subdivision. The average freight speed is about 35 miles per hour along the 107-mile corridor. There are 176 grade crossings, and the corridor averages nine trains per day.

The addition of passenger service along this corridor would require track improvements to increase average speeds. In addition, passing sidings would need to be added for the introduction of passenger service as well as a signal system upgrade for some of the corridor. Regardless of track upgrades to increase speed, the circuitousness of the route adds excessive time to the trip between the Twin Cities and Rochester and would not be competitive with automobile travel times.

DME: Minneapolis – Owatonna – Rochester

The Minneapolis to Rochester corridor utilizes the BNSF Wayzata, CP MN&S, Progressive Rail (PGR) Savage, UP Albert Lea, and DME Waseca subdivisions. It is one possible route connecting Rochester to the Twin Cities on existing freight lines through Owatonna.

The corridor is a variety of FRA Class I, II, III, and IV. It is single track with minimal sidings. The corridor primarily has a mixture of TWC, CTC, ABS, and BRT. The average freight speed is over 25 miles per hour along the 106-mile corridor. There are 170 grade crossings, and the corridor averages six trains per day.

The addition of passenger service along this corridor would require significant track improvements to increase average speeds. In addition, passing sidings would need to be added for the introduction of passenger service as well as a signal system upgrade through most of the corridor. Regardless of track upgrades to increase speed, the circuitousness of the route adds excessive time to the trip between the Twin Cities and Rochester and would not be competitive with automobile travel times.

DME: Rochester – Winona

The Rochester to Winona corridor utilizes the DME Waseca subdivision. This corridor has been proposed as part of an alternative to the MWRRI river route between La Crosse, Wisconsin and the Twin Cities.

The corridor is single track with minimal sidings. It is FRA Class II with TWC. There are 87 grade crossings along the 46-mile corridor, and the average freight speed is almost 30 miles per hour. The corridor averages four trains per day.

The geometry along the corridor is poor. The addition of passenger service along this corridor would require significant track and alignment improvements to increase average speeds. In addition, passing sidings would need to be added for the introduction of passenger service as well as a signal system upgrade.

TCWR: Minneapolis – Norwood/Young America

The Minneapolis to Norwood/Young America corridor utilizes the BNSF Wayzata, CP Bass Lake Spur, and TC&W Glencoe subdivisions. This corridor has been proposed as part of the Twin Cities commuter rail system plan; it is a tier II corridor.

The corridor is single track with minimal sidings. It is FRA Class II with primarily TWC. There are 32 grade crossings along the 37-mile corridor, and the average freight speed is almost 30 miles per hour. The corridor averages four trains per day.

The corridor is low speed, and the track is in poor condition. The track will need to be replaced along the corridor in order to introduce passenger rail along this corridor along with a signal upgrade.

TCWR: Norwood/Young America – Montevideo

The Norwood/Young America to Montevideo corridor utilizes the TCWR Glencoe subdivision. This corridor has been proposed as part of the public involvement effort for this Statewide Rail Plan.

The corridor is single track with very few sidings. It is FRA Class II with TWC. The average freight speed is almost 30 miles per hour. There are 212 grade crossings along the 147-mile corridor. The average train count is three.

The corridor is low speed, and the track is in poor condition. The track will need to be replaced along the corridor in order to introduce passenger rail along this corridor along with a signal upgrade. Speeds would need to be dramatically improved in order for this corridor to be competitive with automobile trips.

5.0 Conclusion

Based on the ridership forecasts from the passenger rail technical memorandum and corridor characteristics summarized in this memorandum, the corridors were scored and ranked. The impact of high-speed rail opportunities will be addressed in subsequent tasks as high-speed passenger rail service would likely not share the same track as freight service.

The scoring and ranking were conducted as follows. City pairs with comparatively high ridership projections were given three points. City pairs with comparatively low ridership projections were given one point, and the remaining city pairs were scored as medium and given two points. Good track conditions consisted of Class IV track with average passenger speeds of over 70 mph and were given three points. Passenger speeds for corridors without any existing passenger service were adjusted from the freight speeds based on class of track to yield and apples-to-apples speed comparison. The track conditions for remaining Class IV track and Class III track were recorded as fair and given two points. The remaining track was recorded as poor and given one point. Available capacity was recorded as high and given three points if the corridor currently was predominantly LOS A or B. Corridors that were predominantly LOS C or D were recorded as medium and given two points. The corridors that were predominantly LOS E or F were recorded as having low available capacity and given one point. The scoring for the three assessments were summed and the corridors were ranked and split into three tiers based on the total assessment.

The first tier as shown in Table 5.1 appear to be the most viable corridors due to reasonably high ridership, and/or the track and signaling would require relatively few improvements to accommodate passenger rail traffic. Tiers two and three (Tables 5.2 and 5.3) project lower ridership than tier one and/or more necessary track and signaling improvements. These initial assessments are subject to change based on changes in assumptions related to passenger service frequency and speed.

Table 5.1 Tier I Existing and Proposed Passenger/Freight Corridors

Corridor	Potential Ridership	Track Condition	Available Capacity
Coon Rapids – Big Lake	High	Good	Medium
Big Lake – St. Cloud	High	Good	Low
Minneapolis – Willmar	Medium	Fair	High
Minneapolis – St. Paul (BNSF)	High	Fair	Medium
Minneapolis – St. Paul (CP)	High	Fair	Medium
St. Paul – Hastings	High	Fair	High
Hastings – Winona	High	Fair	High
St. Paul – Northfield	Medium	Fair	High
Northfield – Albert Lea (Kansas City)	Low	Good	High
Minneapolis – Mankato	Medium	Fair	High
St. Paul– Eau Claire, Wisconsin	Medium	Fair	High
St. Paul – Owatonna – Rochester	Medium	Fair	High

Table 5.2 Tier II Existing and Proposed Passenger/Freight Corridors

Corridor	Potential Ridership	Track Condition	Available Capacity
Minneapolis – Coon Rapids	High	Fair	Low
St. Cloud – Fargo/Moorhead	Medium	Good	Low
Coon Rapids – Cambridge	Medium	Good	Low
Willmar – Fargo/Moorhead	Low	Fair	High
Willmar – Sioux Falls, South Dakota	Low	Good	Medium
Mankato – Worthington (Sioux City)	Low	Fair	High
Minneapolis – Owatonna – Rochester	Medium	Poor	High

Table 5.3 Tier III Existing and Proposed Passenger/Freight Corridors

Corridor	Potential Ridership	Track Condition	Available Capacity
Cambridge – Duluth	Medium	Fair	Low
Rochester – Winona	Low	Poor	High
Minneapolis – Norwood/Young America	Low	Poor	High
Norwood/Young America – Montevideo	Low	Poor	High

6.0 Sources

Cambridge Systematics, Inc. 2007. National Rail Freight Infrastructure Capacity and Investment Study. Submitted to Association of American Railroads (AAR), September 2007.

Appendix A

Detailed Track Condition Charts

Appendix A

BNSF: Minneapolis – Coon Rapids

Train Travel Time: **17**
Auto Travel Time: **23**

	Mile Post			Track	Train	FRA Track	Grade		Speed	
Subdivision	Beginning	Ending	Length	Ratio	Counts	Class	Crossings	Signaling	Freight	Passenger
Wayzata	12.28	9.95	2.33	1.39	14	2	2	ABS	25	25
Wayzata	9.95	9.9	0.05	1.39	14	2	0	CTC	25	25
Wayzata	9.9	9.54	0.36	1.39	14	2	1	CTC	10	10
Midway	9.45	10.3	0.85	2.00	32	3	0	CTC		30
Midway	10.3	11.4	1.1	2.00	32	3	2	CTC		45
Staples	11.4	12.5	1.1	2.00	63	4	0	CTC		25
Staples	12.5	13.8	1.3	2.00	63	4	0	CTC		45
Staples	13.8	15.5	1.7	2.00	63	4	1	CTC		45
Staples	15.5	21.05	5.55	2.00	63	4	4	CTC		79
Total:			14.34				10			
Min:				1.39	14	2			10	10
Max:				2.00	63	4			25	79
Mean:				1.88	49	3.48			4.40	51.54

BNSF: Coon Rapids – Big Lake

Train Travel Time: **20**
Auto Travel Time: **36**

	Mile Post			Track	Train	FRA Track	Grade		Speed	
Subdivision	Beginning	Ending	Length	Ratio	Counts	Class	Crossings	Signaling	Freight	Passenger
Staples	21.05	21.1	0.05	2.00	47	4	0	CTC		79
Staples	21.1	28.2	7.1	2.00	47	4	7	CTC		75
Staples	28.2	37.3	9.1	2.00	47	4	8	CTC		79
Staples	37.3	46.9	9.6	2.00	47	4	11	CTC		75
Staples	46.9	47	0.1	2.00	47	4	0	CTC		79
Total:			25.95				26			
Min:				2.00	47	4				75
Max:				2.00	47	4				79
Mean:				2.00	47	4.00				76.43

BNSF: Big Lake – St. Cloud

Train Travel Time: 22
Auto Travel Time: 30

	Mile Post			Track	Train	FRA Track	Grade		Speed	
Subdivision	Beginning	Ending	Length	Ratio	Counts	Class	Crossings	Signaling	Freight	Passenger
Staples	47	57.3	10.3	1.61	47	4	16	CTC		75
Staples	57.3	57.5	0.2	1.61	47	4	0	CTC		45
Staples	57.5	62.2	4.7	1.61	47	4	5	CTC		75
Staples	62.2	62.7	0.5	1.61	47	4	2	CTC		70
Staples	62.7	73	10.3	1.61	47	4	12	CTC		75
Staples	73	73.5	0.5	1.61	47	4	1	CTC		60
Staples	73.5	73.77	0.27	1.61	47	4	0	CTC		70
Total:			26.77				36			
Min:				1.61	47	4				45
Max:				1.61	47	4				75
Mean:				1.61	47	4.00				74.35

BNSF: St. Cloud – Fargo/Moorhead

Train Travel Time: **139**
Auto Travel Time: **172**

Subdivision	Mile Post Beginning	Mile Post Ending	Length	Track Ratio	Train Counts	FRA Track Class	Grade Crossings	Signaling	Speed Freight	Speed Passenger
Staples	73.77	78.5	4.73	1.89	47	4	9	ABS		70
Staples	78.5	103.05	24.55	1.89	47	4	28	ABS		79
Staples	103.05	103.15	0.1	1.89	47	4	0	TWC/ABS		35
Staples	103.05	105.3	2.25	1.89	47	4	2	CTC		79
Staples	105.3	106.3	1	1.89	47	4	3	CTC		30
Staples	106.3	106.63	0.33	1.89	47	4	1	CTC		50
Staples	106.63	107	0.37	1.44	47	4	0	CTC		50
Staples	107	128.4	21.4	1.44	47	4	19	CTC		75
Staples	128.4	133.92	5.52	1.44	47	4	5	CTC		79
Staples	133.92	134.02	0.1	1.44	47	4	1	CTC		35
Staples	134.02	139.7	5.68	1.44	47	4	8	CTC		79
Staples	139.7	140.02	0.32	1.44	47	4	0	CTC		25
Staples	147.78	148.1	0.32	2.00	47	4	3	CTC		25
Staples	148.1	165.4	17.3	2.00	47	4	17	CTC		75
Staples	165.4	187.2	21.8	2.00	53	4	31	TWC/ABS		75
Staples	187.2	187.4	0.2	2.00	53	4	1	TWC/ABS		60
Staples	187.4	199.5	12.1	2.00	53	4	20	TWC/ABS		75
Staples	199.5	201.1	1.6	2.00	53	4	3	ABS		60
Staples	201.1	208	6.9	2.00	53	4	6	ABS		75
Staples	208	208.4	0.4	2.00	53	4	0	ABS		60
Staples	208.4	210	1.6	2.00	53	4	2	ABS		75
Staples	210	210.1	0.1	2.00	53	4	2	ABS		50
Staples	210.1	210.59	0.49	2.00	53	4	0	ABS		75
Staples	210.59	210.9	0.31	2.00	53	4	0	ABS		75
Staples	210.9	211	0.1	2.00	53	4	0	ABS		40
Staples	211	221.6	10.6	2.00	53	4	12	CTC		79
Staples	221.6	224.4	2.8	2.00	53	4	0	CTC		60
Staples	224.4	228.1	3.7	2.00	53	4	3	CTC		75
Staples	228.1	229.7	1.6	2.00	53	4	2	CTC		70
Staples	229.7	230.59	0.89	2.00	53	4	1	CTC		75
Staples	230.59	234	3.41	2.00	53	4	2	CTC		75
Staples	234	234.5	0.5	2.00	53	4	0	CTC		75
Staples	234.5	236.1	1.6	2.00	53	4	1	CTC		75
Staples	236.1	248.1	12	2.00	53	4	2	CTC		79
Staples	248.1	250.3	2.2	2.00	53	4	4	CTC		75
Staples	250.3	251.1	0.8	2.00	53	4	0	ABS		75
KO	250.3	246	4.3	2.00	67	4	4	ABS		79
Prosper	42.16	42.69	0.53	1.53	57	3	6	ABS		49
Total:			174.50				198			
Min:				1.44	47	3				25
Max:				2.00	67	4				79
Mean:				1.87	50	4.00				75.18

BNSF: Coon Rapids – Cambridge

Train Travel Time: 35
Auto Travel Time: 42

Subdivision	Mile Post Beginning	Mile Post Ending	Length	Track Ratio	Train Counts	FRA Track Class	Grade Crossings	Signaling	Speed Freight	Speed Passenger
Hinkley	136.9	107.4	29.5	1.14	14	4	38	ABS	50	
Total:			29.50				38			
Min:				1.14	14	4			50	
Max:				1.14	14	4			50	
Mean:				1.14	14	4.00			50.00	

BNSF: Cambridge – Duluth

Train Travel Time: 145
Auto Travel Time: 114

Subdivision	Mile Post Beginning	Mile Post Ending	Length	Track Ratio	Train Counts	FRA Track Class	Grade Crossings	Signaling	Speed Freight	Speed Passenger
Hinkley	107.4	72.26	35.14	1.14	14	4	43	ABS	50	
Hinkley	72.26	72	0.26	1.08	15	4	3	ABS	40	
Hinkley	72	63	9	1.08	15	4	4	ABS	50	
Hinkley	63	62.6	0.4	1.08	15	4	1	ABS	40	
Hinkley	62.6	24.82	37.78	1.08	15	4	38	ABS	50	
Hinkley	24.82	24.5	0.32	1.10	15	4	10	ABS	40	
Hinkley	24.5	15.7	8.8	1.10	15	4	10	ABS	35	
Hinkley	15.7	12	3.7	1.10	15	4	6	ABS	35	
Hinkley	12	11.8	0.2	1.10	15	4	1	CTC	35	
Lakes	12.688	7.6	5.088	1.90	26	3			40	
Lakes	7.6	4.66	2.94	1.90	26	3			10	
	4.66	0	4.66	1.67	14	4			10	
Total:			108.29				116			
Min:				1.08	14.00	3.00			10	
Max:				1.90	26.00	4.00			50	
Mean:				1.19	15	3.93			44.87	

BNSF: Minneapolis – Willmar

Train Travel Time: 137
Auto Travel Time: 132

	Mile Post			Track	Train	FRA Track	Grade		Speed	
Subdivision	Beginning	Ending	Length	Ratio	Counts	Class	Crossings	Signaling	Freight	Passenger
Wayzata	12.28	13.21	0.93	1.00	14	2	0	ABS	25	
Wayzata	13.21	13.31	0.1	1.00	14	2	0	ABS	40	
Wayzata	13.31	23.6	10.29	1.15	14	3	3	ABS	40	
Wayzata	23.6	24.9	1.3	1.15	14	3	3	ABS/CTC	30	
Wayzata	24.9	98	73.1	1.15	14	3	94	CTC	40	
Morris	98	102.8	4.8	2.00	13	3	8	CTC	40	
Total:			90.52				108			
Min:				1.00	13	2			25	
Max:				2.00	14	3			40	
Mean:				1.19	14	2.99			39.70	

BNSF: Willmar – Fargo/Moorhead

Train Travel Time: 207
Auto Travel Time: 175

	Mile Post			Track	Train	FRA Track	Grade		Speed	
Subdivision	Beginning	Ending	Length	Ratio	Counts	Class	Crossings	Signaling	Freight	Passenger
Morris	102.8	133.67	30.87	1.24	13	3	50	CTC	40	
Morris	133.67	157.41	23.74	1.00	12	3	32	CTC	40	
Morris	157.41	194.9	37.49	1.17	12	3	54	CTC	40	
Morris	194.9	195	0.1	1.17	12	3		CTC	25	
Morris	195	195.53	0.53	1.17	12	3		CTC	40	
Morris	195.53	212.32	16.79	1.18	12	3	21	CTC	40	
1st	212.32	215.2	2.88	2.00	10	2	4		25	
Moorhead	0	21.3	21.3	1.08	7	4	39	ABS	60	
Moorhead	21.3	21.9	0.6	1.08	7	4		ABS	40	
Moorhead	21.9	40.7	18.8	1.08	7	4		ABS	60	
Moorhead	40.7	41.11	0.41	1.08	7	4		ABS	25	
Prosper	41.3	42.16	0.86	1.39	8	3	2	ABS	40	
Prosper	42.16	42.3	0.14	1.53	57	3	6	ABS	40	
Prosper	42.3	42.69	0.39	1.53	57	3		ABS	25	
Total:			154.90				208			
Min:				1.00	7	2			25	
Max:				2.00	57	4			60	
Mean:				1.15	11	3.25			44.81	

BNSF: Willmar – Sioux Falls, South Dakota

Train Travel Time: **179**
Auto Travel Time: **197**

	Mile Post					FRA			Speed	
Subdivision	Beginning	Ending	Length	Track Ratio	Train Counts	Track Class	Grade Crossings	Signaling	Freight	Passenger
Marshall	0	0.2	0.2	1.09	15	4	70	TWC	10	
Marshall	0.2	32.7	32.5	1.09	15	4		TWC	49	
Marshall	32.7	32.8	0.1	1.09	15	4		TWC	30	
Marshall	32.8	44.54	11.74	1.09	15	4		TWC	49	
Marshall	44.54	80.28	35.74	1.08	14	4	39	TWC	49	
Marshall	80.28	104.4	24.12	1.08	13	4	69	TWC	49	
Marshall	104.4	104.8	0.4	1.08	13	4		TWC	45	
Marshall	104.8	122.6	17.8	1.08	13	4		TWC	49	
	0	23.36	23.36							
Total:			145.96				178			
Min:				1.08	13	4			10	
Max:				1.09	15	4			49	
Mean:				1.09	14	4.00			48.91	

BNSF: Minneapolis – St. Paul

Train Travel Time: **29**
Auto Travel Time: **18**

	Mile Post					FRA			Speed	
Subdivision	Beginning	Ending	Length	Track Ratio	Train Counts	Track Class	Grade Crossings	Signaling	Freight	Passenger
Wayzata	12.28	9.95	2.33	1.39	14	2	2	ABS	25	25
Wayzata	9.95	9.9	0.05	1.39	14	2	0	CTC	25	25
Wayzata	9.9	9.54	0.36	1.39	14	2	1	CTC	10	10
Midway	9.45	6.99	2.46	1.00	32	3	1	CTC	30	30
Midway	6.99	0.5	6.49	2.00	32	3	0	CTC	30	30
St. Paul	0	0.9	0.9	2.00	52	4	0	CTC	35	
Merriam Park	408.9	410.1	1.2	2.00	12	2	0	CTC	30	
Total:			13.79				4			
Min:				1.00	12	2			10	10
Max:				2.00	52	4			35	30
Mean:				1.70	28	2.78			28.94	28.37

CP: Minneapolis – St. Paul

Train Travel Time: **26**
Auto Travel Time: **18**

	Mile Post			Track	Train	FRA Track	Grade		Speed	
Subdivision	**Beginning**	**Ending**	**Length**	**Ratio**	**Counts**	**Class**	**Crossings**	**Signaling**	**Freight**	**Passenger**
Wayzata	12.28	9.95	2.33	1.39	14	2	2	ABS	25	25
Wayzata	9.95	9.9	0.05	1.39	14	2	0	CTC	25	25
Wayzata	9.9	9.54	0.36	1.39	14	2	1	CTC	10	10
Midway	9.45	6.99	2.46	1.00	32	3	1	CTC		30
MNNR	0	1.6	1.6	1.00	10	1	1			15
Merriam Park	416.2	412	4.2	1.00	12	4	2	CTC		40
Merriam Park	412	411.3	0.7	1.00	12	4	1	CTC		40
Merriam Park	411.3	411.2	0.1	1.00	12	4		CTC		30
Merriam Park	411.2	410.6	0.6	2.00	12	2	2	CTC		30
Merriam Park	410.6	410.5	0.1	2.00	12	2		CTC		15
Merriam Park	410.5	410.1	0.4	2.00	12	2		CTC		30
Total:			12.90				10			
Min:				1.00	10	1			10	10
Max:				2.00	32	4			25	40
Mean:				1.17	16	2.84			4.89	30.34

CP: St. Paul – Hastings

Train Travel Time: **19**
Auto Travel Time: **25**

	Mile Post			Track	Train	FRA Track	Grade		Speed	
Subdivision	**Beginning**	**Ending**	**Length**	**Ratio**	**Counts**	**Class**	**Crossings**	**Signaling**	**Freight**	**Passenger**
Merriam Park	408.9	410.1	1.2	2.00	12	2	2	CTC		30
Merriam Park	408.3	408.9	0.6	2.00	12	2	1	CTC		30
Merriam Park	407.4	408.3	0.9	2.00	12	2		CTC		70
River	402.5	407.4	4.9	2.00	28	4	1	CTC		70
River	396.1	402.5	6.4	2.00	28	4	5	CTC		70
River	392.5	396.1	3.6	2.00	28	4		CTC		45
River	392.2	392.5	0.3	2.00	28	4		CTC		25
River	392.1	392.2	0.1	2.00	28	4		CTC		35
River	391.5	392.1	0.6	1.20	28	4		CTC		35
River	391.1	391.5	0.4	1.20	28	4		CTC		25
Total:			19.00				9			
Min:				1.20	12	2				25
Max:				2.00	28	4				70
Mean:				1.96	26	3.72				58.53

CP: Hastings – Winona

Train Travel Time: 97
Auto Travel Time: 121

	Mile Post					FRA			Speed	
Subdivision	Beginning	Ending	Length	Track Ratio	Train Counts	Track Class	Grade Crossings	Signaling	Freight	Passenger
River	391	391.1	0.1	1.20	28	4	47	CTC		25
River	390.4	391	0.6	1.20	28	4		CTC		50
River	389.6	390.4	0.8	1.20	28	4		CTC		60
River	389.1	389.6	0.5	1.20	28	4		CTC		70
River	385.9	389.1	3.2	1.20	28	4		CTC		79
River	373.3	385.9	12.6	1.20	28	4		CTC		79
River	371.8	373.3	1.5	1.20	28	4		CTC		65
River	369.2	371.8	2.6	1.20	28	4		CTC		40
River	364.8	369.2	4.4	1.20	28	4		CTC		65
River	364.1	364.8	0.7	1.20	28	4		CTC		60
River	362.3	364.1	1.8	1.20	28	4		CTC		65
River	354.5	362.3	7.8	1.20	28	4		CTC		79
River	338.3	354.5	16.2	1.20	28	4		CTC		65
River	329.9	338.3	8.4	1.20	28	4		CTC		75
River	327.2	329.9	2.7	1.20	28	4		CTC		65
River	326.6	327.2	0.6	1.20	28	4		CTC		60
River	310.2	326.6	16.4	1.20	28	4		CTC		65
River	310.1	310.2	0.1	1.20	28	4		CTC		30
River	306.6	310.1	3.5	1.21	32	4	17	CTC		30
River	304.8	306.6	1.8	1.21	32	4		CTC		60
River	288	304.8	16.8	1.21	32	4		CTC		65
Tomah	285	288	3	2.00	28	4		CTC		50
Tomah	283.6	285	1.4	1.21	28	4		CTC		50
Total:			107.50				64			
Min:				1.20	28	4				25
Max:				2.00	32	4				79
Mean:				1.22	29	4.00				66.19

UP: St. Paul – Northfield

Train Travel Time: **67**
Auto Travel Time: **52**

	Mile Post			Track	Train	FRA Track	Grade		Speed	
Subdivision	**Beginning**	**Ending**	**Length**	**Ratio**	**Counts**	**Class**	**Crossings**	**Signaling**	**Freight**	**Passenger**
Merriam Park	408.9	410.1	1.2	2.00	12	2	2	CTC	30	
Albert Lea	349.4	352.3	2.9	1.00	11	4	4		20	
Albert Lea	348.3	349.4	1.1	1.00	11	4	8	ABS	20	
Albert Lea	346.3	348.3	2	1.00	11	4		ABS	25	
Albert Lea	343.9	346.3	2.4	1.00	11	4		ABS	30	
Albert Lea	343.77	343.9	0.13	1.00	11	4		ABS	40	
Albert Lea	333.5	343.77	10.27	1.00	11	4	14	CTC	40	
Albert Lea	333.4	333.5	0.1	1.10	11	4	24	CTC	25	
Albert Lea	313.8	333.4	19.6	1.10	11	4		CTC	40	
Albert Lea	313.5	313.8	0.3	1.10	11	4		CTC	25	
Albert Lea	313.3	313.5	0.2	1.13	11	4		CTC	25	
Total:			40.20				52			
Min:				1.00	11	2			20	
Max:				2.00	12	4			40	
Mean:				1.08	11	3.94			36.14	

UP: Northfield – Albert Lea

Train Travel Time: **548**
Auto Travel Time: **364**

Subdivision	Mile Post Beginning	Mile Post Ending	Length	Track Ratio	Train Counts	FRA Track Class	Grade Crossings	Signaling	Speed Freight	Speed Passenger
Albert Lea	313.2	313.3	0.1	1.13	11	4	15	CTC	25	
Albert Lea	306.44	313.2	6.76	1.13	11	4		CTC	40	
Albert Lea	306.1	306.44	0.34	1.10	11	4	96	CTC	40	
Albert Lea	306	306.1	0.1	1.10	11	4		CTC	25	
Albert Lea	303.4	306	2.6	1.10	11	4		CTC	50	
Albert Lea	300	303.4	3.4	1.10	11	4		CTC	40	
Albert Lea	296.4	300	3.6	1.10	11	4		CTC	50	
Albert Lea	296.3	296.4	0.1	1.10	11	4		CTC	40	
Albert Lea	288	296.3	8.3	1.10	11	4		CTC	50	
Albert Lea	287.7	288	0.3	1.10	11	4		CTC	40	
Albert Lea	284.7	287.7	3	1.10	11	4		CTC	50	
Albert Lea	281.6	284.7	3.1	1.10	11	4		CTC	40	
Albert Lea	254	281.6	27.6	1.10	11	4		CTC	50	
Albert Lea	252.4	254	1.6	1.10	11	4		CTC	40	
Albert Lea	251.7	252.4	0.7	1.10	11	4		CTC	30	
Albert Lea	251.64	251.7	0.06	1.10	11	4		CTC	40	
Albert Lea	249.9	251.64	1.74	1.00	11	4	10	CTC	40	
Albert Lea	245.87	249.9	4.03	1.00	11	4		CTC	50	
Albert Lea	240	245.87	5.87	1.19	11	4	8	CTC	50	
	0	359	359							
Total:			432.30				129			
Min:				1.00	11	4			25	
Max:				1.19	11	4			50	
Mean:				1.10	11	4.00			47.37	

UP: Minneapolis – Mankato

Train Travel Time: **138**
Auto Travel Time: **92**

	Mile Post					FRA			Speed	
Subdivision	Beginning	Ending	Length	Track Ratio	Train Counts	Track Class	Grade Crossings	Signaling	Freight	Passenger
Wayzata	12.28	13.21	0.93	1.00	14	2	0	ABS	25	
Wayzata	13.21	13.31	0.1	1.00	14	2	0	ABS	40	
Wayzata	13.31	16.5	3.19	1.15	14	3	1	ABS	40	
MN&S	14	16.3	2.3	1.00	2	1	7	BRT	10	
MN&S	16.3	27.8	11.5	1.00	2	1	18	BRT	10	
Mankato	18.67	27.3	8.63	1.00	5	4	36	TWC	40	
Mankato	27.3	28.3	1	1.00	5	4		TWC	10	
Mankato	28.3	34	5.7	1.00	5	4		TWC	49	
Mankato	34	46.3	12.3	1.11	5	4	48	TWC/ABS	49	
Mankato	46.3	46.6	0.3	1.11	5	4		TWC/ABS	40	
Mankato	46.6	50.7	4.1	1.11	5	4		TWC/ABS	49	
Mankato	50.7	51	0.3	1.11	5	4		TWC/ABS	40	
Mankato	51	63	12	1.11	5	4		TWC/ABS	49	
Mankato	63	67	4	1.11	5	4		TWC/ABS	45	
Mankato	67	82.6	15.6	1.11	5	4		TWC/ABS	30	
Mankato	82.6	84	1.4	1.00	5	4	9		30	
Mankato	84	84.2	0.2	1.00	5	4			25	
Total:			83.55				119			
Min:				1.00	2	1			10	
Max:				1.15	14	4			49	
Mean:				1.07	5	3.44			36.36	

UP: Mankato – Worthington

Train Travel Time: 256
Auto Travel Time: 221

Subdivision	Mile Post Beginning	Mile Post Ending	Length	Track Ratio	Train Counts	FRA Track Class	Grade Crossings	Signaling	Speed Freight	Speed Passenger
Mankato	84.2	85.5	1.3	1.00	5	4	11		25	
Mankato	85.5	86	0.5	1.00	5	4		TWC	20	
Mankato	86	87.2	1.2	1.00	5	4		TWC	25	
Mankato	87.2	87.3	0.1	1.00	5	4		TWC	20	
Mankato	87.3	88.27	0.97	1.00	5	4		TWC	25	
Mankato	88.27	88.3	0.03	1.00	5	4	40	TWC	25	
Mankato	88.3	99.7	11.4	1.00	5	4		TWC	49	
Mankato	99.7	104	4.3	1.00	5	4		TWC	30	
Mankato	104	120	16	1.00	5	4		TWC	49	
Mankato	120	120.9	0.9	1.00	5	4		TWC	20	
Worthington	120.9	122.6	1.7	1.22	5	4	10	TWC	20	
Worthington	122.6	128.75	6.15	1.22	5	4		TWC	49	
Worthington	128.75	149.3	20.55	1.03	5	4	66	TWC	49	
Worthington	149.3	160.3	11	1.03	5	4		TWC	30	
Worthington	160.3	175.8	15.5	1.03	5	4		TWC	49	
Worthington	175.8	178	2.2	1.03	5	4		TWC	30	
Worthington	178	188	10	1.03	5	4		TWC	40	
Worthington	188	188.06	0.06	1.03	5	4		TWC	49	
Worthington	188.06	188.1	0.04	1	5	4	7	TWC	49	
	0	80.3	80.3							
Total:			184.20				134			
Min:				1.00	5	4			20	
Max:				1.22	5	4			49	
Mean:				1.04	5	4.00			43.23	

UP: St. Paul – Eau Claire, Wisconsin

Train Travel Time: **200**
Auto Travel Time: **90**

Subdivision	Mile Post		Length	Track Ratio	Train Counts	FRA Track Class	Grade Crossings	Signaling	Speed	
	Beginning	Ending							Freight	Passenger
Merriam Park	408.9	410.1	1.2	2.00	12	2	0	CTC	30	
St. Paul	0	0.9	0.9	1.00	52	4	0	CTC	35	
Altoona	0.6	1.3	0.7	2.00	5	4	4	ABS	25	
Altoona	1.3	7	5.7	2.00	5	4		ABS	30	
Altoona	7	18.5	11.5	1.00	5	4	19	ABS	30	
Altoona	18.5	18.6	0.1	1.00	5	4		ABS	20	
Altoona	18.6	19	0.4	1.00	5	4		ABS		
	0	79.46	79.46							
Total:			99.96				23			
Min:				1.00	5	2			20	
Max:				2.00	52	4			35	
Mean:				1.37	7	3.88			30.00	

UP: Minneapolis – Rochester

Train Travel Time: **184**
Auto Travel Time: **81**

	Mile Post					FRA			Speed	
Subdivision	**Beginning**	**Ending**	**Length**	**Track Ratio**	**Train Counts**	**Track Class**	**Grade Crossings**	**Signaling**	**Freight**	**Passenger**
Merriam Park	408.9	410.1	1.2	2.00	12	2	2	CTC	30	
Albert Lea	349.4	352.3	2.9	1.00	11	4	4		20	
Albert Lea	348.3	349.4	1.1	1.00	11	4	8	ABS	20	
Albert Lea	346.3	348.3	2	1.00	11	4		ABS	25	
Albert Lea	343.9	346.3	2.4	1.00	11	4		ABS	30	
Albert Lea	343.77	343.9	0.13	1.00	11	4		ABS	40	
Albert Lea	333.5	343.77	10.27	1.00	11	4	14	CTC	40	
Albert Lea	333.4	333.5	0.1	1.10	11	4	24	CTC	25	
Albert Lea	313.8	333.4	19.6	1.10	11	4		CTC	40	
Albert Lea	313.5	313.8	0.3	1.10	11	4		CTC	25	
Albert Lea	313.2	313.5	0.3	1.13	11	4	15	CTC	25	
Albert Lea	306.44	313.2	6.76	1.13	11	4		CTC	40	
Albert Lea	306.1	306.44	0.34	1.10	11	4	50	CTC	40	
Albert Lea	306	306.1	0.1	1.10	11	4		CTC	25	
Albert Lea	303.4	306	2.6	1.10	11	4		CTC	50	
Albert Lea	300	303.4	3.4	1.10	11	4		CTC	40	
Albert Lea	296.4	300	3.6	1.10	11	4		CTC	50	
Albert Lea	296.3	296.4	0.1	1.10	11	4		CTC	40	
Albert Lea	288	296.3	8.3	1.10	11	4		CTC	50	
Albert Lea	287.7	288	0.3	1.10	11	4		CTC	40	
Albert Lea	284.7	287.7	3	1.10	11	4		CTC	50	
Albert Lea	284.4	284.7	0.3	1.10	11	4		CTC	40	
Albert Lea	87.8	88.8	1	1.00	4	2	0	TWC	25	
Waseca	87.6	87.8	0.2	1.00	4	2		TWC	30	
Waseca	87.5	87.6	0.1	1.03	4	2	59	TWC	30	
Waseca	51	87.5	36.5	1.03	4	2		TWC	25	
Waseca	50.8	51	0.2	1.03	4	2		TWC	30	
Total:			107.10				176			
Min:				1.00	4	2			20	
Max:				2.00	12	4			50	
Mean:				1.07	9	3.27			34.86	

DME: Minneapolis – Rochester

Train Travel Time: **242**
Auto Travel Time: **94**

	Mile Post					FRA			Speed	
Subdivision	Beginning	Ending	Length	Track Ratio	Train Counts	Track Class	Grade Crossings	Signaling	Freight	Passenger
Wayzata	12.28	13.21	0.93	1.00	14	2	0	ABS	25	
Wayzata	13.21	13.31	0.1	1.15	14	3	1	ABS	40	
Wayzata	13.31	16.5	3.19	1.15	14	3		ABS	40	
MN&S	14	16.3	2.3	1.00	2	1	7	BRT	10	
MN&S	16.3	27.8	11.5	1.00	2	1	18	BRT	10	
Savage	32.9	40.4	7.5	1.00	0	1	6		10	
Savage	40.4	53	12.6	1.01	2	1	14		10	
Savage	53	53.8	0.8	1.00	2	1	0		10	
Albert Lea	313.2	313.5	0.3	1.13	11	4	15	CTC	25	
Albert Lea	306.44	313.2	6.76	1.13	11	4		CTC	40	
Albert Lea	306.1	306.44	0.34	1.10	11	4	50	CTC	40	
Albert Lea	306	306.1	0.1	1.10	11	4		CTC	25	
Albert Lea	303.4	306	2.6	1.10	11	4		CTC	50	
Albert Lea	300	303.4	3.4	1.10	11	4		CTC	40	
Albert Lea	296.4	300	3.6	1.10	11	4		CTC	50	
Albert Lea	296.3	296.4	0.1	1.10	11	4		CTC	40	
Albert Lea	288	296.3	8.3	1.10	11	4		CTC	50	
Albert Lea	287.7	288	0.3	1.10	11	4		CTC	40	
Albert Lea	284.7	287.7	3	1.10	11	4		CTC	50	
Albert Lea	284.4	284.7	0.3	1.10	11	4		CTC	40	
Waseca	87.8	88.8	1	1.00	4	2	0	TWC	25	
Waseca	87.6	87.8	0.2	1.00	4	2		TWC	30	
Waseca	87.5	87.6	0.1	1.03	4	2	59	TWC	30	
Waseca	51	87.5	36.5	1.03	4	2		TWC	25	
Waseca	50.8	51	0.2	1.03	4	2		TWC	30	
Total:			106.02				170			
Min:				1.00	0	1			10	
Max:				1.15	14	4			50	
Mean:				1.04	6	2.25			26.29	

DME: Rochester – Winona

Train Travel Time: **98**
Auto Travel Time: **30**

Subdivision	Mile Post Beginning	Mile Post Ending	Length	Track Ratio	Train Counts	FRA Track Class	Grade Crossings	Signaling	Speed Freight	Speed Passenger
Waseca	4.4	20.5	16.1	1.01	4	2	87	TWC	25	
Waseca	20.5	50.8	30.3	1.01	4	2		TWC	30	
Total:			46.40				87			
Min:				1.01	4	2			25	
Max:				1.01	4	2			30	
Mean:				1.01	4.00	2.00			28.27	

TCWR: Minneapolis – Norwood/Young America

Train Travel Time: **77**
Auto Travel Time: **50**

Subdivision	Mile Post Beginning	Mile Post Ending	Length	Track Ratio	Train Counts	FRA Track Class	Grade Crossings	Signaling	Speed Freight	Speed Passenger
Wayzata	12.28	13.21	0.93	1.00	14	2	0	ABS	25	
Wayzata	13.21	13.31	0.1	1.00	14	2	0	ABS	40	
Bass Lake	428.3	429.4	1.1	1.00	5	2	4	BRT	25	
Bass Lake	429.4	435.1	5.7	1.00	5	2	4	TWC	25	
Glencoe	431.8	461	29.2	1.06	3	2	24	TWC	30	
Total:			37.03				32			
Min:				1.00	3	2			25	
Max:				1.06	14	2			40	
Mean:				1.05	4	2.00			28.98	

TCWR: Norwood/Young America – Montevideo

Train Travel Time: **300**
Auto Travel Time: **183**

	Mile Post					FRA			Speed	
Subdivision	Beginning	Ending	Length	Track Ratio	Train Counts	Track Class	Grade Crossings	Signaling	Freight	Passenger
Glencoe	461	543.4	111.6	1.06	3	2	212	TWC	30	
Glencoe	543.4	543.5	0.1	1.06	3	2		TWC	20	
Glencoe	543.5	552	8.5	1.06	3	2		TWC	30	
Glencoe	552	556	4	1.06	3	2		TWC	10	
Glencoe	556	578.9	22.9	1.06	3	2		TWC	30	
Total:			147.10				212			
Min:				1.06	3	2			10	
Max:				1.06	3	2			30	
Mean:				1.06	3	2.00			29.45	