Tri-State II
High Speed Rail Feasibility Study
Chicago - Milwaukee - Twin Cities Corridor

Final Report
Appendices

Prepared by

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February, 2000

46000437

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TECHNOLOGY ISSUES

Train operation in excess of 79 mph requires a combination of advanced locomotive design and higher right-of-way (ROW) standards. Super-elevations that go above three inches on freight railroad rights-of-way will generally require higher levels of maintenance to maintain proper rail alignment, and may encounter freight railroad resistance. In many cases technology solutions, such as steerable bogies and tilt, can be applied to maximize speed in curves.

Tangent Track

On tangent track, the train's performance and the class of track are key limiting factors to train speed. Maximum achievable train speed on straight and level or tangent track is determined by the locomotive's power and the technology used. A technology's speed is primarily determined by its power to weight ratio, gear ratio and its axle weight, particularly its unsprung mass, *i.e.*, the weight on the locomotive's bogie and traction motors. The typical axle weight for North American locomotives is 25-36 tons, whereas the typical European passenger train's axle weight is around 17.5 to 18 tons. Lighter locomotives therefore have a speed advantage, all other factors being equal.

The maximum train speed achievable in commercial operation is dependent on the interaction of the train and the track. The top speed a technology can achieve on a section of track is related to the condition of the track. The FRA has set track classes based on maintenance levels and signaling systems. The speeds shown in Exhibit 2.1.1 are the maximums allowable for passenger service.

Exhibit 2.1.1

FRA Track Classification

Track Class	Maximum Speed
Class III	60 mph
Class IV	80 mph
Class V	90 mph
Class VI	110 mph
Class VII	125 mph

Speeds in excess of 125 mph will require a new classification under the current FRA system. This is currently being reviewed as part of the proposed upgrading of the North East Corridor. In Europe and Japan, to attain speeds in excess of 150 mph, it has been considered necessary to build new track and road bed specifically for the TGV. This separate ROW permits steeper grades than a normal railway. An average railroad designed for freight operations will typically operate with grades of 1 degree to 4 degrees, while steeper grades of 5 degrees to 8 degrees are common for TGV lines, due to available horsepower. At the same time, curvature is dramatically reduced on a TGV line, and there is little or no at-grade interface with other rights of way or highways.

Train Speed on Curved Track

Apart from the degree of curvature, there are a number of factors that influence the train's speed in a curve and dictate how speed can be maintained. These factors include:

Super-elevation

Unbalance

Steerable bogies

Train tilting

Lateral acceleration

Each of these terms is discussed in detail below.

Super-elevation and unbalance are key factors in determining speed and comfort as well as safety in negotiating a curve. Super-elevation represents a physical alteration to the track to accommodate increased speed (similar to banking on a highway), while unbalance is the uncompensated degree of lateral force exerted on the passenger and the track on curves. Steerable bogies and train tilting represent alterations to the train technology itself to accommodate higher speeds and a more comfortable ride on curves.

Lateral acceleration indicates the horizontal force felt by the passenger in a curve, as well as the lateral force being applied by the wheels on the track. Acceleration forces are usually stated in terms of percentages of the force of gravity (e.g., 7 percent g). Lateral acceleration forces are a function of the train speed and the degree of curvature of the track.

Super-elevation

To allow a train to go faster through a curve, super-elevation (*i.e.,* banking) can be provided. This raises the outside rail elevation above that of the inside rail. Super-elevation is typically measured in inches. The greater the super-elevation, the higher is the speed at which at train can negotiate a curve. There is a point, however, at which super-elevation can pose a danger of tipping over or derailing to slower moving freight trains.

For the current study, super-elevation is not increased above 3 inches for the 110 mph and 150 mph scenarios, maintaining compatibility with existing freight operations. Modifications to existing track within this limit will be proposed where appropriate.

In addition to modest infrastructure solutions to increase speed in curves, the current study proposes alternatives to super-elevation. These alternative and complementary strategies encompass unbalance, steerable bogies and tilting systems.

Unbalance (Cant deficiency)

An alternative approach to achieving higher speeds on curves for a passenger train is to incorporate a degree of unbalance, also referred to as *cant deficiency*. Unbalance is the term used to indicate that a train traveling through a curve at a given speed theoretically requires more track banking or super-elevation to retain equilibrium conditions (i.e., no horizontal force felt by passengers or on the track). In addition to operating factors, lateral acceleration also affects passenger sensation. With unbalance, a horizontal force is exerted on the passenger as well as the track. The cant deficiency plus the maximum track cant (super-elevation) determine the maximum speed at which a train can round a curve. Standards for unbalance are established to ensure that the actual horizontal force at a given speed for a particular curve does not exceed specified passenger comfort levels or train safety.

The level of unbalance is traditionally measured in inches. On standard gauge 4 foot 8½ inch track, one inch (25 mm) of cant is the same as 1 degree of cant. British Rail[2*] allows 4.2 inches of unbalance, equal to a gravity or "g" force of 7 percent g, which is well within a passenger's normal tolerance for movement, and is due to the relative high speed of both passenger and freight trains. The North American standard unbalance has traditionally been only 3 inches for passenger trains. Freight trains operate at 4.5 inches to 2.25 inches of unbalance.

The 3 inch passenger unbalance restriction either limits speeds through curves or requires major infrastructure changes to accommodate it. For example, to go through a curve of 1degree 30 minutes at 100 mph, a super-elevation of 7 inches would be required at 3 inches of unbalance. Unfortunately a 7 inch super-elevation or track cant is not compatible with most freight equipment in North America, which in many places is designed for maximum speeds of 60 mph in curves. As noted above, for this study, super-elevation is limited to 3 inches. However, if the unbalance is raised to 9 inches for the passenger train, a super-elevation of 2.5 inches is required to achieve 100 mph in the

[*] Note: Superscript numbers refer to the references at the end of Chapter 2.

curve. The super-elevation of 2.5 inches can easily be negotiated by a standard freight train. (Note that the unbalance of 9 inches for a passenger train can be partially compensated through tilt and steerable bogies, discussed below.)

In summary, to avoid the problems of higher super-elevations and associated higher maintenance costs on mixed-use track, unbalance can be raised to compensate for the level of super-elevation. Amtrak and BNSF have agreed to raise the level of unbalance to five inches as of May, 1998, following extensive testing in the summer of 1997 at levels as high as seven inches. An unbalance level of 4 inches is gradually becoming the passenger train standard in North America, compared to the more conservative traditional North American standard of 2.5 to 3 inches. In Europe[2] 4.5 inches to 6 inches is the standard.

Steerable Bogies

In order to reduce the force that the wheels exert on the track in a curve a steerable bogie has been developed. This is called a 'radial steering' bogie, 'soft' bogie, or 'self steering' bogie. Similar bogies have operated successfully for a number of years in Europe. The self-steering capability results in significantly lower rail-wheel interaction, which reduces wear rates on both wheels and track. This enables higher levels of unbalance to be utilized by equipment fitted with such bogies. The typical level of unbalance[3] can be as high as 9 inches from a physical wear perspective. The steerable bogie can thus increase the unbalance by as much as 5 inches, however, if the train is to operate at more than 100 mph, the train will also need to employ tilt to maintain passenger comfort.

Tilting Systems

Moving passengers through a curve at high speed, even on super-elevated track, results in levels of unbalance that reduce passenger comfort. Levels of cant deficiency of 6 degrees are noticed by a passenger, especially if he/she is standing. One way to counteract this effect is to use tilt. Tilt refers to the physical angle of the train relative to the track and is measured in degrees. Tilting the body of the train essentially offsets the effect of unbalance on the passenger and provides a more comfortable passenger ride.

Tilt is valuable in maintaining passenger comfort on routes that, unlike the French TGV or Japanese Shinkansen trains, are not specifically laid out for high-speed operation. Tilt is required to balance the lateral acceleration and deceleration forces. Passenger trains can have an acceleration force of as much as 10 percent g (% gravity), and a deceleration force of 7-9 percent g. In a curve, such a lateral acceleration would be far beyond passenger comfort levels, therefore railroads set lower levels of permissible gravitational force to be experienced. For example, British Rail (BR) sets a maximum of 7 percent g; and French Railways' (SNCF) standard is 8.6 percent g [2].

Tilt has developed over time as a means to run at higher speeds while preserving passenger comfort, sometimes instead of and sometimes in addition to super-elevating the track. The early passive tilting trains such as the Spanish Railways (RENFE) Talgo had a relatively modest tilting capability, e.g. 3.5 degrees, and suffered from a slow response rate. The slow response time associated with the Talgo's passive tilt system on entering a curve was solved by the development of an active system. By the 1970's the development of active tilt resulted in tilt capabilities of 8 degrees to 10 degrees and much faster response times. These trains[2] were the British Rail APT with maximum 9 degrees tilt, Italian Railways (FR) Fiat Pendolino with a maximum of 10 degrees tilt, and Swedish Railways (SJ) X2000 with 8.5 degrees tilt. Various systems are used but generally the first bogie has an activating sensor that provides the lead-time for the other coaches' tilt systems to work.

For the early active tilt systems, extreme levels of tilt and the effect of going through reverse curves caused nausea[2]. Thus, it has become standard practice to only compensate for 70 percent of unbalance and let the passenger feel some lateral acceleration.

Steerable Trucks Combined With Tilt Technologies

A recent development has been to blend the benefits of a steerable bogie with an active tilt system. Such a system reduces track wear and preserves passenger comfort, without extensive freight track modifications.

At the present time, tilting trains in Europe operating at speeds up to 125 mph are limited to 7 and 9 inches of unbalance, which is made up of 4.5 inches unbalance and 3-5 degrees tilt. The Fiat Pendolino ETR450 is designed to run at 10 degrees tilt plus 4.5 inches unbalance giving a total of 14.5 inches unbalance in the extreme curves[2]. Setting the standard at 8 inches through the combined use of tilt and unbalance makes it possible to increase speeds on large curves by 20-25 percent compared to conventional equipment.

The speed on a curve, relative to safety and railway dynamics, depends mainly on the resistance characteristics of the track and the dynamic quality of the equipment. As a result, the implementation of tilt systems is dependent on maintaining an appropriate track quality, and the use of low axle weights, steerable bogies, super-elevation and unbalance to maximize speed. The tilting only has an effect on the lateral force, which affects the passenger comfort, it does not offset the lateral forces of the wheels on the track itself, and cannot therefore increase the level of unbalance permitted for safe train operation.

TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 2.2
Study References

Appendix 2.2

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Metz, Raymond E., Vice President Main Line, Adtranz, ABB Daimler Benz Transportation, 1501 Lebanon Church Road, Pittsburgh, PA 15236-1491, (412) 655-5360

Davila, Philip R., Principle, Seneca Group, 1901 Stadium Oaks Court, Suite 102, Arlington, TX 76011, (817) 801-3111

Gonzalez, Gustavo, CEO, Talgo, Inc, 10900 NE 4th St., Suite 1100, Bellevue, WA 98004, (425) 990-5180

Lochte, William D., Vice President, Marketing & Business Development, Mass Transit-North America, Bombardier, 3684 Marshall Lane, Bensalem, PA 19020, (215) 639-7966

TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 3.1
Track Assessment by Segment

APPENDIX 3.1

Segment: Milwaukee to Watertown (Watertown Subdivision Milepost 85.93 to 131.2)

The route from Milwaukee Union Station (MP86) to Watertown (MP131) is on track owned by CP Rail. The track is in good condition and has continuous welded rail (CWR) on the eastward main from C&M milepost 85.7 to C&M milepost 104.4 and the westward main from C&M milepost 85.7 to 97.6 and on the single main from C&M milepost 104.4 to milepost 131.2. The westward main from C&M milepost 97.6 to 104.4 is jointed rail. The track appears to be well-maintained. Exhibits 3.1.1 and 3.1.2 are the speed profile for 110 MPH and 150 MPH operations in this segment.

Exhibit 3.1.1

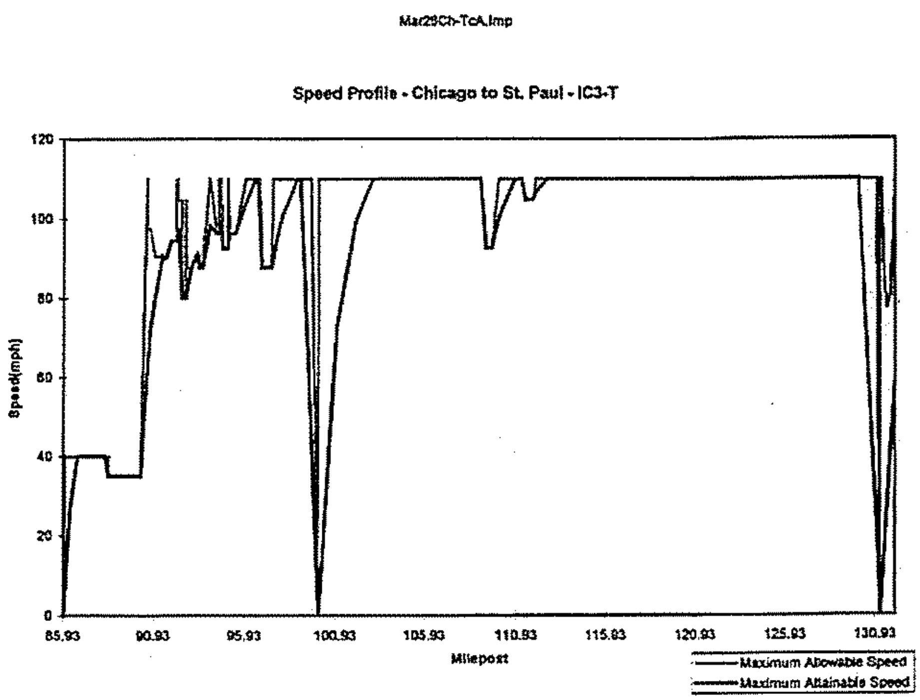
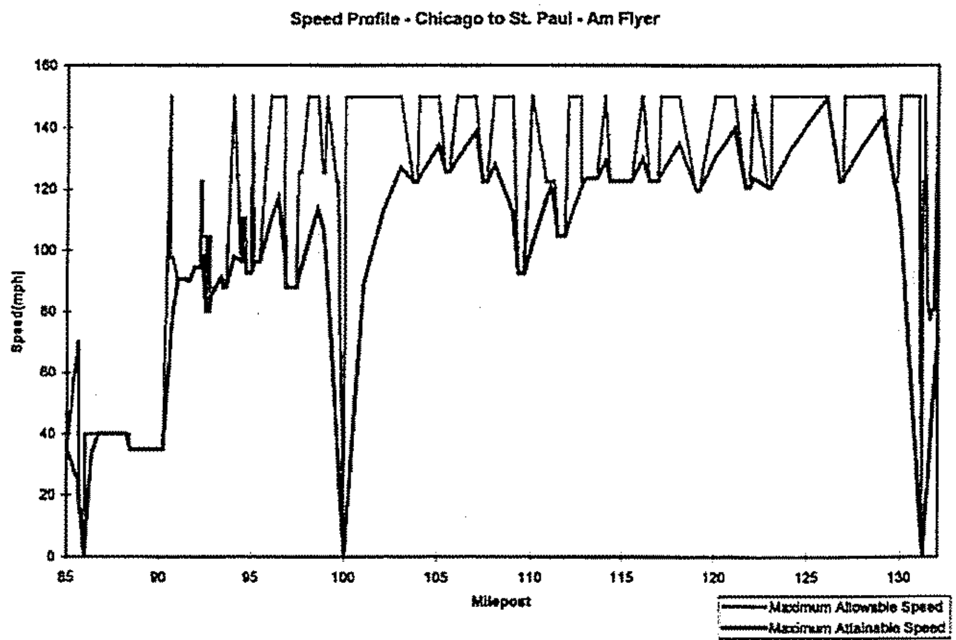


Exhibit 3.1.2



Segment: Watertown to Madison at SR30 (Waterloo Spur Subdivision milepost 131.2 to 163.8)

From Watertown (MP131) to the Madison area (MP163) near the intersection of the track of the Waterloo Subdivision with State Route 30, the route is the right-of-way of the Waterloo Subdivision owned by CP Rail but leased to Wisconsin Southern Railway. This single track is in very poor condition and is limited to a maximum speed of 10 mph, albeit the track charts list the track as a Class II structure. The visual inspection indicated the right-of-way was usable for high-speed rail operations. Exhibits 3.1.3 and 3.1.4 are speed profiles for 110 and 150 MPH operations along the alignment of the Waterloo subdivision. The speed profile reveals that the alignment of the right-of-way, although fairly tangent, has three areas where the curvature is not suitable for 110 MPH operations on this segment. These curves are near Sun Prairie. However, the curvature is severe enough in this segment to restrict 150 MPH technology to slower speeds.

Exhibit 3.1.3

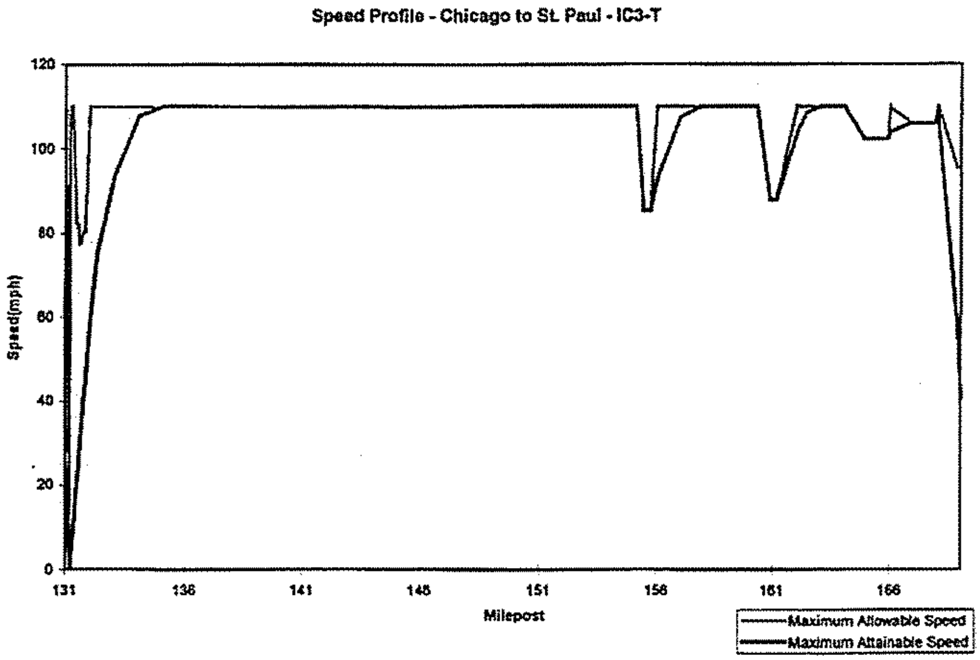
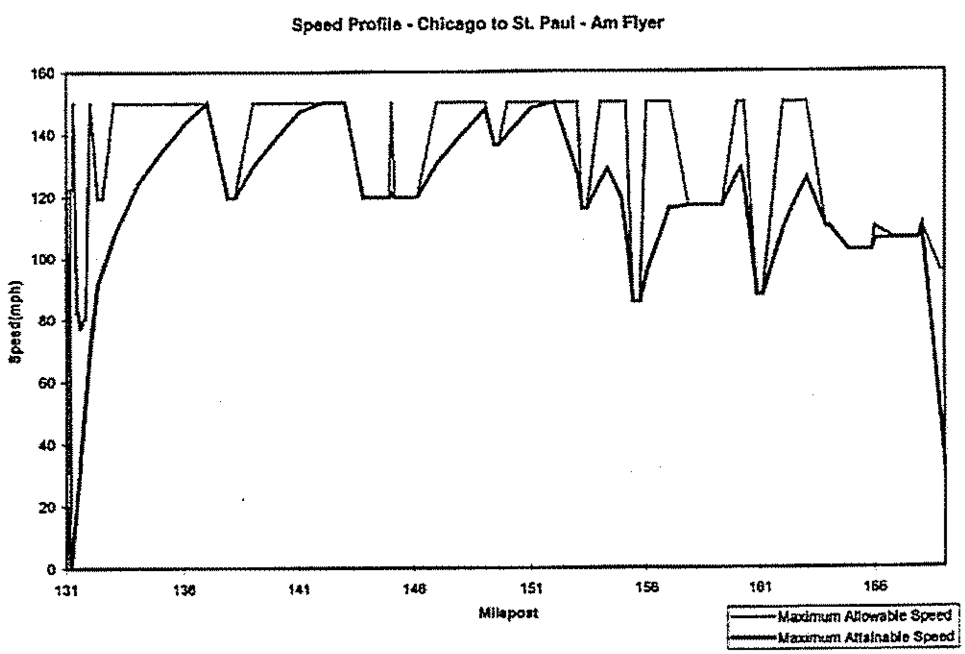


Exhibit 3.1.4



Segment: Madison Connection (Proposed Airport Subdivision milepost 3.0 to 0)

The alignment for the proposed route is along the northern edge of SR30 between Commercial Avenue and SR30. The route will utilize Commercial Avenue right-of-way. Some commercial business near the track of the Waterloo Subdivision and residences bordering Commercial Avenue need to be acquired for the right-of-way. At the interchange of Highway 151 and Highway 39, it will be necessary to construct an extension of the Highway 151 bridge over Route 30 to accommodate an over-bridge for the new track. It will also be necessary to construct two over-bridges for the on and off ramps of Highway 151. The proposed alignment will proceed northward through a commercial area to a train station proposed near the track of the Madison/Portage subdivision and the Dane County Airport Terminal. Right-of-way will be required for eastward and westward tracks.

Segment: Madison to Portage (Madison/Portage Subdivision milepost 30.9 to 0)

The Madison/Portage subdivision between the Dane County Airport and Portage has 31 miles of track. The track charts indicate that this route is FRA Class III that allows speed between 40 and 60 mph. An inspection of the track determined that the entire track infrastructure needs replacement for high- speed rail operations. Exhibits 3.1.5 and 3.1.6 are the speed profiles for 110 and 150 MPH operations on the alignment of this segment. The speed profiles indicate that the alignment is poor for optimum speeds. Consequently, substantial realignment on new right-of-way is required.

Exhibit 3.1.5

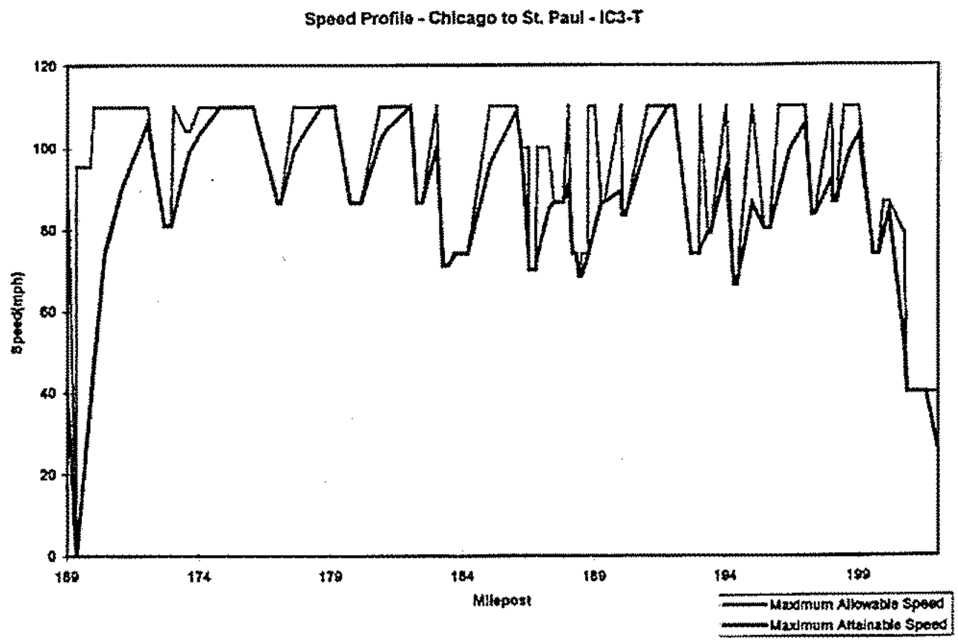
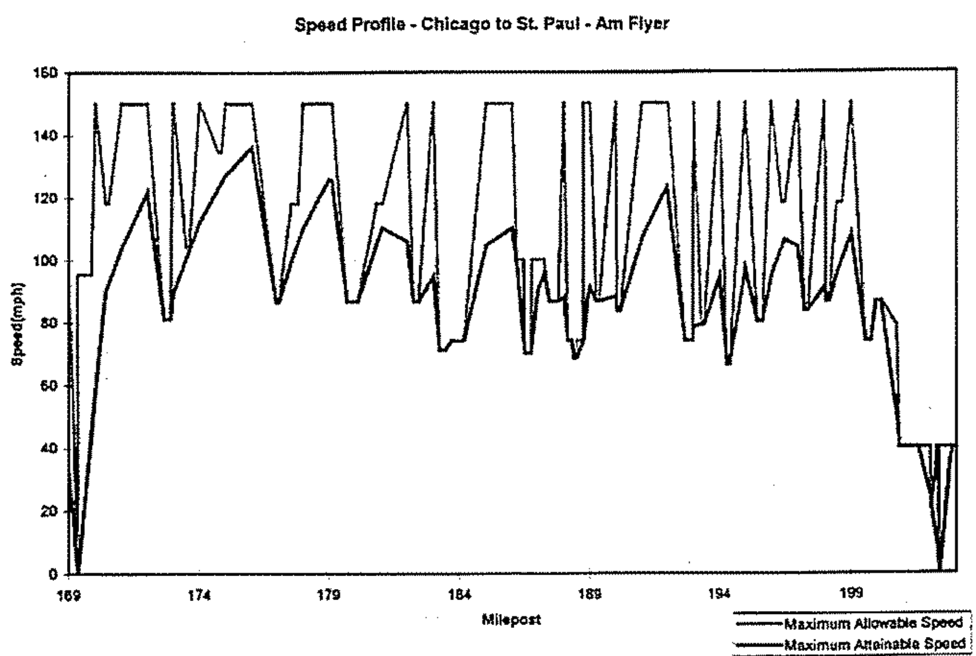


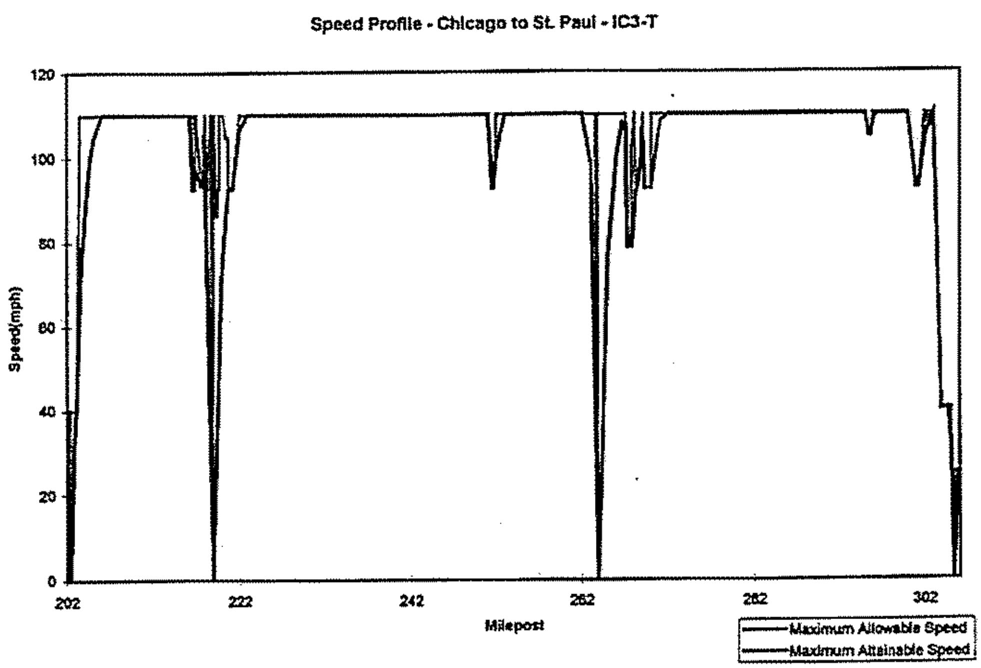
Exhibit 3.1.6



Segment: Portage to LaCrosse (Tomah Subdivision milepost 178.2 to 288.0)

An inspection of the track from Portage to LaCrosse indicates that it is in fair to excellent condition. The track is on right-of-way owned by CP Rail. The track is well maintained. The track is continuous welded rail on the single main from Tomah milepost 178.2 to 246.4, and the eastward main from Tomah milepost 246.4 to 257.1 and again on single main from Tomah milepost 257.1 to 288. The westward main from Tomah milepost 246.4 to 257.1 is jointed rail. Exhibits 3.1.7 and 3.1.8 are the speed profiles for 110 MPH and 150 MPH operations on this segment. The profile reveals that the 110 MPH technology will operate at near optimum speed, whereas, the 150 MPH technology will be restricted in this segment.

Exhibit 3.1.7



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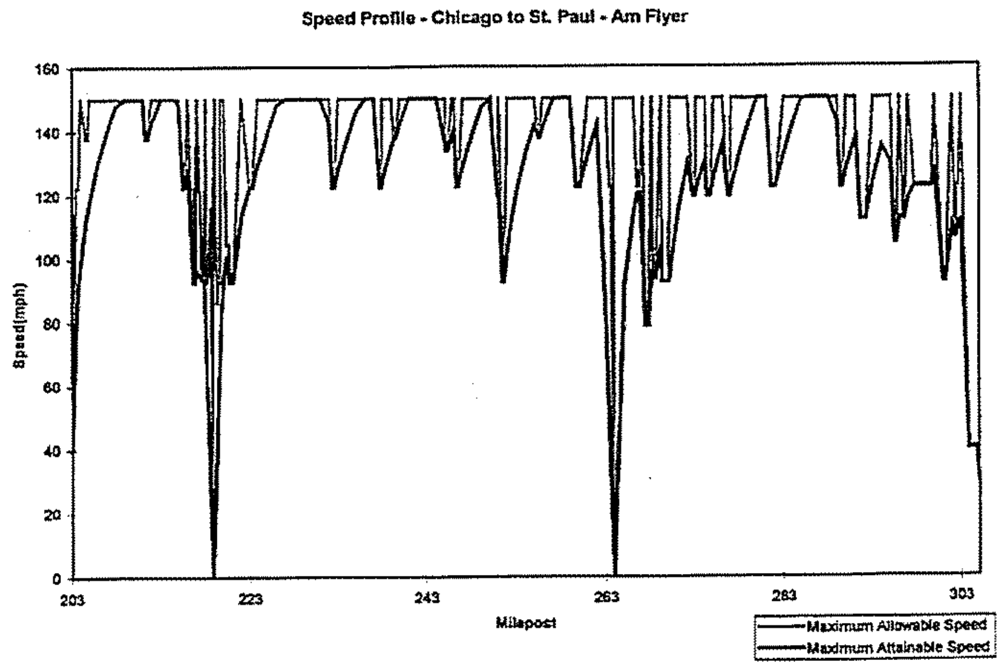


Segment: LaCrosse to St Paul (River Subdivision milepost 288 to 407.4 and Merriman Park Subdivision milepost 407.4 to 410.2)

The track in this segment is in good to excellent condition and is well maintained by CP Rail. The single main track is continuous welded rail from River milepost 288 to 385.9. The #1 main or westward track is continuous welded rail from River milepost 385.9 to 391.2. The #2 main eastward track is jointed rail from River milepost 385.9 to 388.0 and continuous welded rail from River milepost 388.0 to 391.2. The single main track is continuous welded rail from River milepost 391.2 to 392.4. The #1 main or westward track is continuous welded rail from River milepost 392.4 to 402.4. From River milepost 402.4 to 407.4, the track is shared track owned by Burlington Northern and is continuous welded rail. The #2 main or eastward track is continuous welded rail from River milepost 392.4 to 402.4 and is shared track owned by Burlington Northern. The #2 main or eastward is continuous welded rail from River milepost 402.4 to 407.4. In the Merriman Park subdivision, the westward and eastward main track is continuous welded rail from Merriman milepost 407.4 to 410.2 with the #1 main or westward owned by Burlington Northern from Merriman milepost 407.4 to 408.9. Exhibits 3.1.9 and 3.1.10

show the profiles for 110 MPH and 150 MPH operations. The speed profile reveals that the optimum speed for both technologies is near 90 MPH.

Exhibit 3.1.9

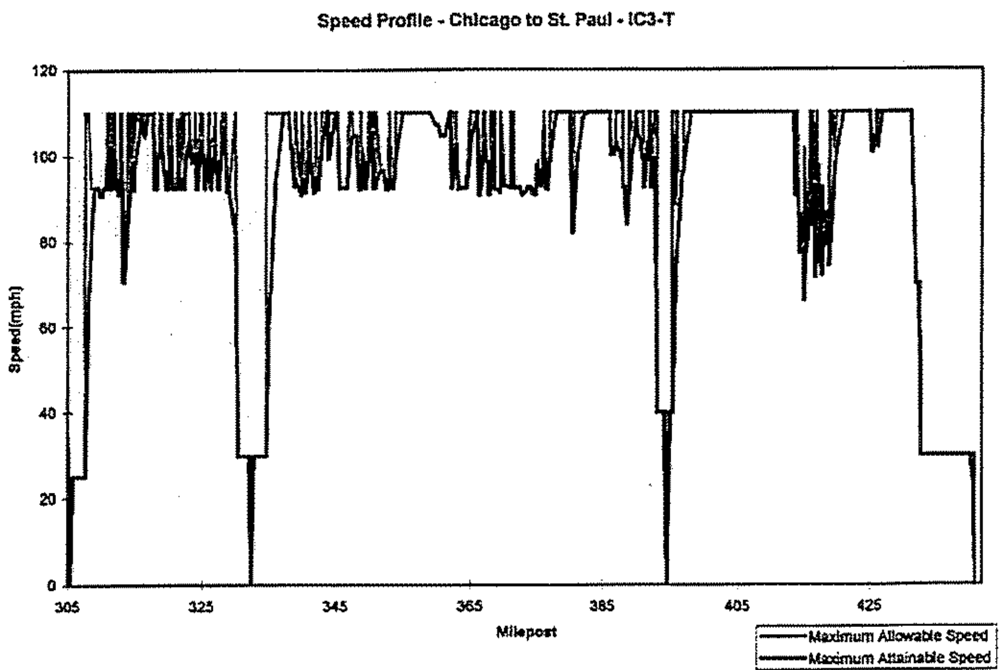
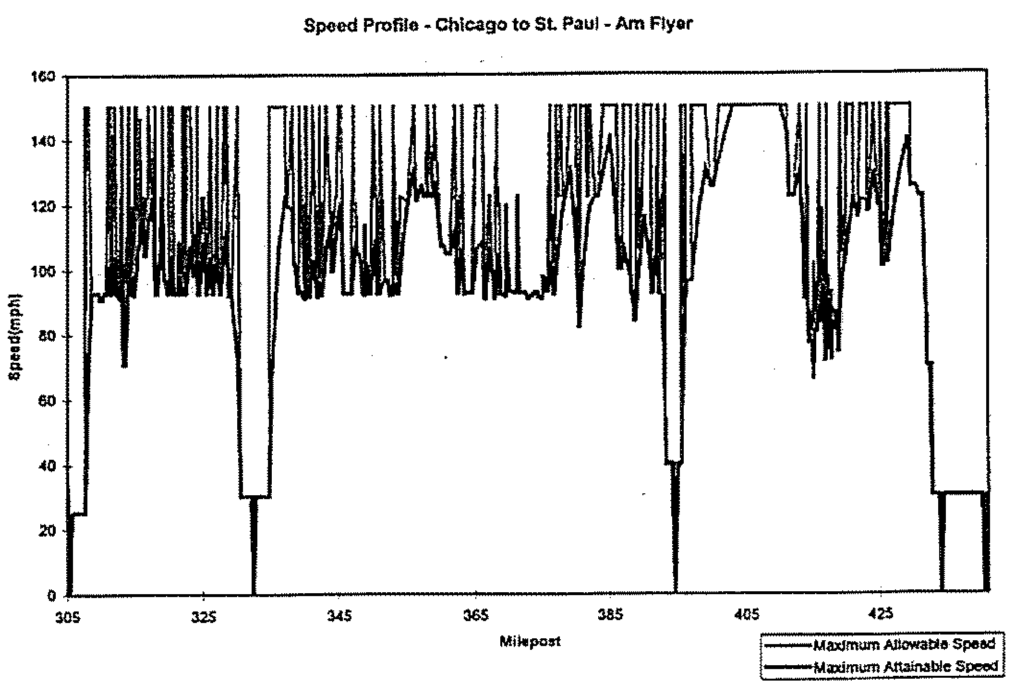


Exhibit 3.1.10



Segment: Winona to Rochester (DM&E Subdivision 0 to 33.0)

The beginning milepost for the Detroit, Minnesota, & Eastern Railroad (DM&E) is north of Winona at a junction with CP Rail. The alignment crosses under Minnesota State Route 61 and from Minnesota City it proceeds in a southwestern direction curving through the Stockton Valley. The excessive curvature of the track between DM&E mileposts 0 and 18.0 limits the potential of high speed operations. Exhibit 11 shows the speed profile for the 110 MPH technology. Exhibit 12 shows the severe restriction of this alignment on the 150 MPS technology. In addition to the poor alignment, the track structure is not sufficient to support high-speed rail operations. Approximately four miles west of St. Charles, high-speed rail operations depart the DM&E track onto a new alignment to the Rochester Airport and northerly to St. Paul.

Exhibit 3.1.11

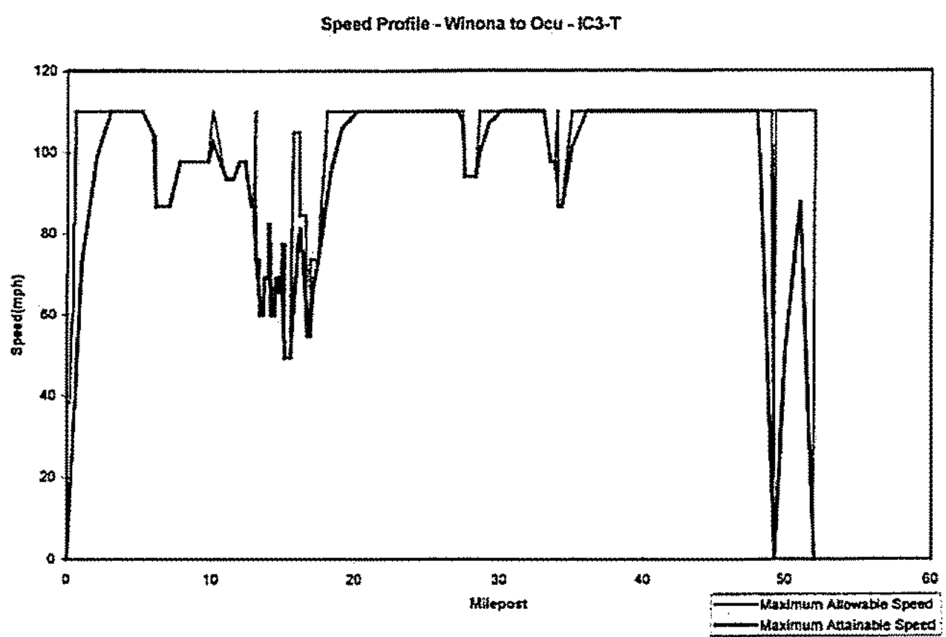
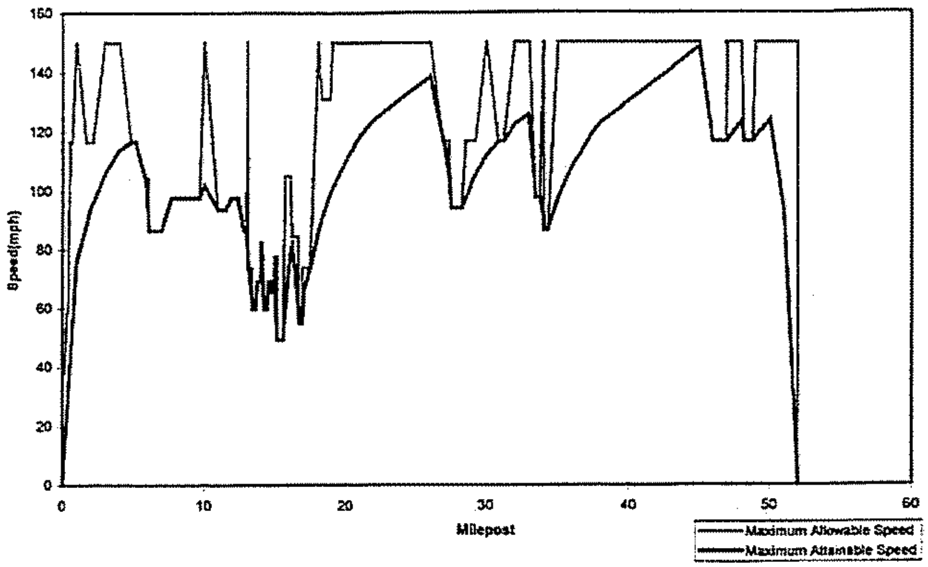


Exhibit 3.1.12

Speed Profile - Winona to Rochester - Am Flyer GT



Segment: La Crosse to St. Paul

The topography in Minnesota is difficult for the planning of a new alignment for high-speed rail operation for speeds of 150 MPH and beyond. The elevation immediately west of the Mississippi River is approximately 1,280 feet. Interstate 90 was constructed to take advantage of the topography. High-speed rail systems do not have this luxury since it is imperative to maintain the alignment with minimum curvature of 0 degrees, 45 minutes for 150 mph operations with tilt technology. The proposed alignment for the 150 MPH and the 185 MPH options in Minnesota begins at the exit from the new Mississippi River Bridge immediately north of the intersection of Highways 14 and 90. The alignment follows the Dakota River valley from an elevation of 700 feet to an elevation of approximately 1,200 feet, an increase in grade of 500 feet in 3.6 miles at an average grade of 2.6%. A bridge over the Dakota River and separate bridges over east bound and west bound lanes of Interstate 90 are required. The alignment follows south of Interstate 90 for approximately 7 miles from the Mississippi River then crosses Interstate 90 to the north side. It follows the north side of Interstate 90 to a location south of Witoka then crosses and continues in a northwesterly direction for a short distance near Centerville.

The alignment curves to a westerly direction and crosses Interstate 90 to the north side immediately west of Wilson. The alignment again crosses Interstate 90 through the southern area near Shelton Hill and continues westerly toward the Rochester Airport crossing Highway 52 and Interstate 90 near Simpson. After crossing Highway 63, it then proceeds towards Dodge Center and then northerly towards Rosemount onto the track of the Union Pacific. Using the Union Pacific track, there are two potential routes into the St. Paul Union Station. The route used in this study requires the construction of a new bridge in the vicinity south of the Metropolitan Water Treatment Facility to carry the track onto the existing CP Rail line from Hastings to Union Station. Since the alignment is new, optimum speeds are attained from near the Mississippi River to Rosemount. Exhibits 3.1.13 and 3.1.14 detail the speed profile for this alignment. The alternative alignment proceeds adjacent to the western boundary of Holman Field and across the Mississippi River directly into Union Station.

Exhibit 3.1.13

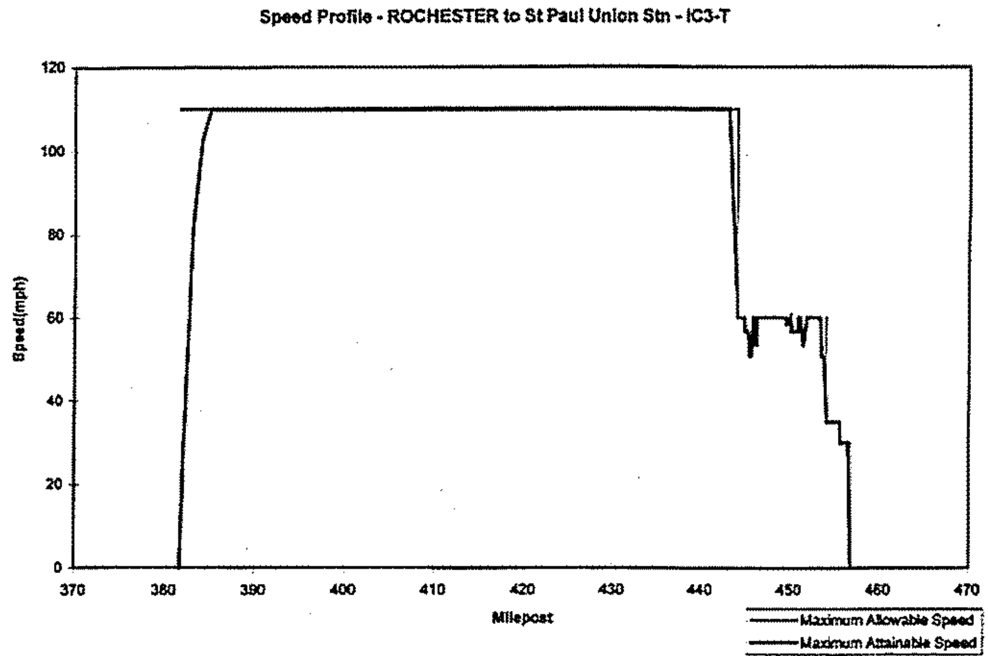
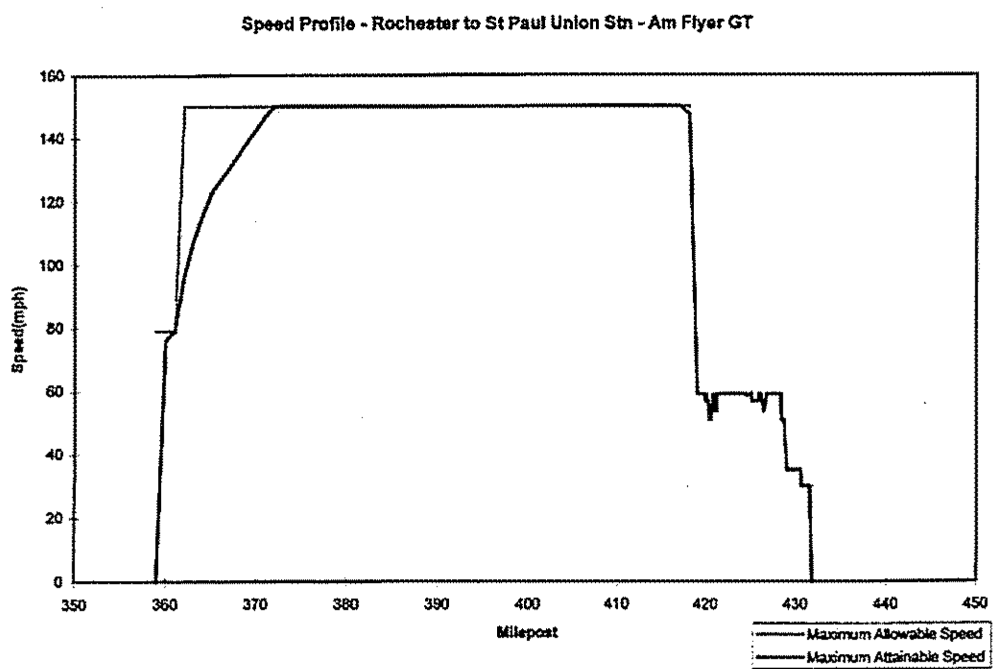


Exhibit 3.1.14



TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 3.2
Urban Area Alternative Alignments

APPENDIX 3.2

URBAN AREA ALTERNATIVE ALIGNMENTS

Twin Cities Airport Access

The airport access alignment departs the right-of-way for existing Union Pacific track and proceeds along the east side of County Road 71 over State Highway 3 and onto an abandoned railroad right-of-way near the western boundary of the right-of-way of State Highway 149. The alignment then follows this abandoned railroad right-of-way through the interchange of Interstates 494 and 35E and State Highway 55 across State Highway 13 and across the Minnesota River Basin and State Highway 5. This alternative alignment utilizes abandoned railroad right-of-way as much as possible. This study did not determine the owner of this abandoned right-of–way or the jurisdiction. A field inspection revealed that a large portion of this railroad right-of-way has not been commercialized. The airport access alignment requires the construction of either a long-span bridge over the Minnesota River Basin and State Highway 5 or a tunnel under the river basin. Based on the engineering assessment of the alternative airport access route, the cost of infrastructure improvements needed to efficiently operate high-speed passenger rail service to the airport was developed. The detailed cost estimate is included in Appendix 6.2.6. Construction of this airport access would add approximately $165 Million to the cost of implementing 150 mph service from Chicago to St. Paul via Rochester.

Madison Access Alternatives

The alignment for high-speed passenger rail service through Madison must be planned to support the 110 mph, 150 mph, or 185 mph technologies. For 110 mph, a single main track with right-of-way for the second track is planned; for the 150 mph and 185 mph, a double track for east and west bound traffic is planned. As previously detailed within this report, the study alignment begins at the intersection of the Waterloo Subdivision track and State Highway 30 and connects to the Madison/Portage Subdivision (milepost 30.9) near the existing airport terminal. The alignment proceeds along the northern edge of State Highway 30 between Commercial Avenue and State Highway 30, then follows the Commercial Avenue right-of-way. At the interchange of U.S. Highway 151 and State Highway 39, the bridge carrying U. S. Highway 151 over State Highway 30 needs to be extended to the north to accommodate an over-bridge for the high-speed passenger rail service. Two RR over-bridges for the "on" and "off" ramps of U. S. Highway 151 will also be needed. The proposed alignment then proceeds northerly through a commercial area to a station planned near the track of the Madison/Portage subdivision in the vicinity of the Dane County Airport terminal. Several RR under-bridges are planned between the intersection with U.S. Highway 151 and the proposed train station.

The Wisconsin Department of Transportation, in association with the Dane County Regional Planning Commission in a 1992 study, considered a second alternative alignment along the eastern boundary of the Dane County Airport. The proposed alternative departs the track of the Waterloo Subdivision at latitude north 43 degrees, 9.91 minutes west, 89 degrees, 14.21 minutes. The alignment follows a right-hand curve, 0 degrees, 42 minutes crossing over U. S. Highway 151. The alignment follows a left-hand curve of 0 degrees, 42 minutes paralleling Hoepker Road crossing under Interstate 90/94 to a right-hand curve 0 degrees, 30 minutes connecting into the existing Madison Portage Subdivision north of the Airport. This alignment carries the route north of the American Family Development. This alternate will require a new station near either U. S. Highway 151 or Interstate 90/94.

A third alternate follows the track of the Waterloo Subdivision under State Highway 30, paralleling St. Paul Avenue into an area bounded by the Yahara River, U. S. Highway 151, Baldwin Street, and Williamson Street. This alternate connects onto the track of the Madison/Portage subdivision in this vicinity.

A fourth alternate follows the alignment of the third alternate but departs the track of the Waterloo Subdivision north of South First Street, crosses under U. S. Highway 151 and connects with the track of the Madison/Portage subdivision near the intersection of Highway 113 and East Johnson Street.

The alignment for the 150 mph and 185 mph technologies from Milwaukee creates a fifth alternate alignment through Madison. This alignment would require a major RR over- or RR under-bridge at the interchange of I-90, I-94 and State Highway 30. This alignment then follows on the north side of State Highway 30 along a route between Commercial Avenue and State Highway 30 under U.S. Highway 51 and onto the alignment of the study alternative.

Milwaukee Alternative

An alternative routing into Milwaukee Amtrak Station through West Allis was considered. This alignment is known as the "Air Line" from Elm Grove through the former shopping area east of Layton Boulevard and into the passenger station. This alignment bisects the Veteran's Hospital. A field view determined that it would be very difficult to provide safe passage through the grounds of the Veteran's Hospital area without significant infrastructure improvements such as an elevated structure or a depressed alignment allowing for pedestrian passage. This alignment was not within the scope of work of this study.

TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 3.3
Environmental Review

Environmental Review

General

An environmental review was performed to identify potential environmental issues relating to passenger rail alignments. The review studied issues that could impact implementation of the high-speed rail service and presented a broad-scale evaluation of the impact within the Milwaukee–Twin Cities corridor. This environmental review did not provide a level of analysis consistent with an environmental impact statement or an environmental assessment. It does recognize environmental issues that might be associated with high-speed rail operations in this corridor. This was accomplished by reviewing environmental information from previous high-speed rail reports, as well as a general assessment of relevant data from studies performed in Wisconsin and Minnesota.

Associated Reports Reviewed

The River Route (Base Case) was previously identified (in general) as the "South Route Modified (Study Route No. 4)" in the *Technical Report 3, Tri-State Study of High Speed Rail Service*, TMS/Benesch for the Tri-State Steering Committee, November 16, 1990. In addition, *Chicago-Milwaukee Rail Corridor Study – Task Six Phase II – Environmental Evaluation* presented to WisDOT and IDOT, Envirodyne Engineers, Inc., March, 1994 was also reviewed. The information contained therein was used to develop the Environmental Criteria presented below. The following review applies to all routes in the study with exceptions noted.

Develop Environmental Criteria and Check Line

A review of the existing reports and an expanded analysis for this corridor have resulted in identifying the following Environmental Criteria:

- **Physical Impact:** Water Quality (Sediment, Nutrients, Toxins, Oil & Grease); Air Quality; Wetlands; Historical and Archeological Resources; Noise; Energy; Visual Impacts
- **Biological Impact**: Shrinking Biological Diversity and Fragmentation of Natural Habitats; Endangered Species

- **Socioeconomic Impact**
- **Land use**
- **Transportation and Traffic Impact**
- **Construction Impacts**: Air Quality; Construction Noise; Water Quality; Temporary Access
- **Environmental Laws**: Clean Air Act (CAA) and subsequent 1990 Clean Air Act Amendments (CAAA); Intermodal Surface Transportation Efficiency Act (ISTEA); Regulatory Agencies

Executive Order on Environmental Justice 12898 *("Federal Actions to Address Environmental Justice in Minority and Low-Income Populations")* relating to community or residential impact of high-speed rail needs to be evaluated. A study of communities affected by the proposed action, including a demographic analysis, needs to be conducted.

Physical Impact

Water Quality

Water quality can be affected by the construction of a new rail corridor primarily through the introduction of non-point source pollution. Stormwater management facilities, while designed to reduce erosion and sedimentation pollution, invariably impact the quality of downstream water resources. Although stormwater detention basins are designed to manage the rate (volume per unit of time) of runoff such that post-development runoff is less than or equal to the pre-development runoff, the total volume of runoff will nonetheless increase. Runoff that previously infiltrated undeveloped and vegetated terrain will now be conveyed by developed land cover that is less pervious. In addition, the quality of the post-development runoff will be affected during construction by silt-laden runoff that cannot be completely mitigated by erosion and sedimentation pollution control (E&S) measures. Once the disturbed areas have been stabilized with mature vegetation, this impact will be minimized.

Sediment – This is the largest runoff pollutant by volume. Unmitigated sediment can smother fish egg beds, tear at the fragile gills of newborn fish, envelope spawning areas, and block light to developing submerged aquatic vegetation, a critical habitat in aquatic ecosystems.

Nutrients – Nutrients originate from agricultural, as well as residential land use. The fertilizers used to encourage growth of crops and well-kept lawns are carried by runoff to riverine systems. Once a low-gradient section is reached, the quiescent environment could result in algae blooms. The uncontrolled growth of algae depletes the oxygen content in the water body critical to the fish habitat and also blocks sunlight to the submerged aquatic vegetation.

Toxins – Stormwater runoff can contain two basic forms of toxin: industrial heavy metals such as cadmium, arsenic and mercury, and organic compounds such as DDT, PCBs and pesticides. The sources of these pollutants are largely due to illegal disposal of household hazardous wastes such as paint thinners, preservatives, pesticides, appliances, etc. Toxins do not biodegrade, but rather bioaccumulate. As toxins are ingested by an organism low on the food chain, they are ingested by a higher-level organism feeding on the contaminated subject. The lingering effects result in malignancies and reproduction system failure.

Oil and Grease – The most common toxin found in developed runoff, oil and grease drippings from vehicles and machinery have the same lingering effects as the toxins noted above. Additionally, they present an aesthetic problem once a slow-moving water body is encountered and an oil sheen results.

Air Quality

The implementation of high-speed rail (HSR) service has direct and indirect impacts on air quality. Diesel locomotives (a potential HSR technology) burn fossil fuels that result in the emission of pollutants such as carbon monoxide (CO), unburned hydrocarbons (HC), nitrous oxide (NO_x), particulate matter (PM), and sulfur dioxide (SO_2). However, HSR diesel technology will result in less petroleum-based fuel consumption per passenger mile than private automobiles, thus reducing some types of air emissions. Additionally, studies in the Boston-New York corridor show that HSR trains produce less air emission than slower moving conventional locomotives.

These studies have shown HSR service, in combination with estimated diversions of private automobiles, resulted in significant reductions in CO emissions.[1] Impact on NO_x and HC emissions (ozone precursors) was found to be negligible. The referenced studies did not derive emissions for PM and SO_2. The study concluded that implementation of HSR technology would result in an aggregate corridor-wide reduction in air emissions of less than one percent. However, it notes that even one-half of one percent of an air quality improvement contributes substantially toward the Clean Air Act Amendments.

Should electric HSR locomotives be employed, locomotive-generated air emissions would be completely eliminated. If electricity is generated by fossil-fuel burning plants within the corridor, some added air emissions will result. However, since most power plants have heavy-duty scrubbers installed, emissions from power plants are generally cleaner than motor vehicles.

Exhibit 3.3.1 shows the positive impact HSR has on air emissions (specifically CO and HC). Note that table comparisons assume various train/traffic volumes and year 2000 conditions.

[1] *Chicago-Milwaukee Rail Corridor Study – Environmental Evaluation*, presented to WisDOT and IDOT, submitted by Envirodyne Engineers, Inc., March 1994.

Exhibit 3.3.1
Air Emission Comparisons
in Chicago/Milwaukee Corridor

Emission Source	Train/Traffic Volume	Emissions in Tons Per Year NO_x	CO	HC	PM	SO_2
Proposed HSR Service[2]	24 trains per day	+234	+13	+8	+8	+69
Elimination of Existing Conventional Service[3]	14 trains per day	-163	-39	-5	-5	-40
Projected Auto Diversion[4, 5]	160,000 auto trips annually	-52	-175	-18	N/A	N/A
Change in emissions due to HSR Service[6]		+19	-201	-15	N/A	N/A

Derived from *Chicago-Milwaukee Rail Corridor Study – Environmental Evaluation, presented to WisDOT and IDOT, submitted by Envirodyne Engineers, Inc., March 1994.*

Wetlands

The loss of native wetlands resulting from the construction of transportation facilities has an adverse impact on water resource quality. Wetlands provide water resource protection through their ability to act as a groundwater recharge area, remove pollutants, nutrients, toxins and sediment from runoff, mitigate peak runoff flow rates, and provide endangered species habitat. Most wetland losses associated with the construction of transportation facilities are mitigated through the mandatory re-creation of restoration of the impacted wetlands.

Section 404 Permits will have to be obtained from the U.S. Army Corps of Engineers and the Environmental Protection Agency when wetlands are impacted. Likewise, each affected state agency will require water quality certifications for the impacted wetlands.

[2] Emission data based on operation of F-69 diesel electric locomotive powered train sets at 80% power in Boston-New York Corridor.
[3] Emission data based on operation of F-40 diesel electric locomotive powered train sets at 80% power.
[4] Diverted auto volume based on 175,000 passenger trips annually with average vehicle occupancy of 1.1.
[5] Emission data derived from MOBILE 5a model assumes year 2000 conditions, average speed of 60 m.p.h. use of reformulated gasoline, summer minimum and maximum temperatures of 61° F and 81° F and no vehicle inspection and maintenance program.
[6] Calculated by subtracting Amtrak and auto diversion emission form HSR emissions.

Historical and Archeological Resources

Whenever historical and archeological resources are anticipated, state and federal guidelines require that the resources possibly affected by construction must be studied and mitigation plans prepared to avert adverse impacts. Archeological resources require studies and preservation before construction.

The Mississippi and Wisconsin Rivers were important historic trade/travel routes and places for hunting, trapping, gathering and settlement. Accordingly, land near these rivers can be expected to be rich in historic and archeological resources. Likewise, the Dakota Valley of Minnesota (near the LaCrosse crossing of the Mississippi) is also reported to be rich in these resources.

Impact on historic and archeological resources can be limited when a proposed route follows an existing railroad right-of-way. Where it appears that additional right-of-way will be needed for the construction of new roadway grade separation structures such as overpasses and underpasses, the potential exists to impact historic and archeological sites. Site-specific mitigation measures can be evaluated once the location and size of these structures is known.

State Historic Preservation Officers are concerned with properties and sites listed (or with the potential to be listed) on the National Register of Historic Places. When federal funding or permitting is involved, research is required to locate any historic sites that could be impacted by the project. This research entails document and field research for building and archeological sites.

The National Parks Service (NPS) will be specifically concerned with the Mississippi National River and Recreation Area (Mississippi NRRA) and the Ice Age Trail, in addition to some general areas of concern.

The Pigs Eye Lake area of the Mississippi NRRA is an important nesting habitat for a variety of wading birds and includes a major heron nesting site. The NPS is concerned with any intrusions on the visual landscape of the Mississippi NRRA.

The Ice Age Trail is a trail network that follows the important edges of the Wisconsin age glacier. It roughly follows the leading edge of the terminal moraine between St. Croix Falls and Janesville and back northeast to Sturgeon Bay, Wisconsin.

The NPS is generally concerned with fenced right-of-way that would destroy vegetation, be a visual intrusion, block the movement of wildlife, and result in the clogging of streams during periods of high runoff.

Noise

HSR trains generate noise attributable to locomotive engines, wheels on rail and horn use, and are measured in units of decibels (dB). Like all train noise events, HSR-generated noise occurs in short duration and is typically infrequent.

A stationary diesel locomotive's noise level, measured 100 feet away, is approximately 73 dB. This stationary noise would occur at train stops and is comparable to a medium truck parked 25 feet away or loud orchestral music. Pass-by noise of HSR trains operating between 80-110 mph, measured 100 feet away, is approximately 76-80 dB. This is similar to conventional Amtrak trains but due to the speed of the HSR trains, would be shorter in duration. Some HSR train manufacturers indicate that HSR trains operate with less noise at 125 mph than conventional trains at lower speeds. The Doppler effect and other variables affect pass-by noise.

As would be expected, station and pass-by noise levels diminish as distance from the track increases. Tests conducted with transit train operations indicate that wayside noise is reduced by one-half as the distance from the noise source increases from 50 feet to 300 feet. The noise is reduced again by one-half at a distance of 1,000 feet. Thus disruptive noise impacts will not extend more than 500 to 1,000 feet from the tracks.

The duration of HSR noise events tends to be very short. At 90 to 125 mph, noise impact per train lasts about 30 seconds. On an average day, if 12 HSR trains operate in each direction, total wayside noise duration would amount to 12 minutes per day. There typically will not be HSR trains running after 10 p.m. or before 7 a.m.

Horn use, required most often when approaching at-grade crossings, is regulated by the FRA and will be of the same intensity as existing conventional trains. Since HSR service in existing railroad rights-of-way usually eliminates at-grade crossings, total horn use is reduced.

In summary, the implementation of HSR service will not have a significant impact on the generation of noise in the corridor. The infrequency and short duration of train events and the elimination of at-grade crossings with the accompanying horn use all contribute to a nominal impact as a result of noise generated by HSR service.

Energy

It is well known that mass transportation modes such as trains and buses are more fuel-efficient and consume less energy per passenger mile than the private automobile (See Exhibit 3.3.2). Auto user diversion to HSR service results in energy savings of approximately 3,200 BTUs per passenger mile (one gallon of gasoline has an energy value of 125,000 BTUs).

At the above energy consumption figures, a diversion of 1.9 million passengers from private autos to HSR service (110 mph technology over 287 miles) would result in total energy savings of 1.75 trillion BTUs or the equivalent of 13.9 million gallons of gasoline annually.

During construction of grade crossings for HSR service, construction activity should consume approximately 1.3 million gallons of gasoline or diesel fuel (one month's auto diversion savings).

Exhibit 3.3.2
Energy Intensity of Selected Modes of Travel

Travel Mode	Average Load	BTU Per Passenger Mile
Automobile	1.1[7]	5,560
Inter-City Bus	N/A	965
Airlines	89.5[9]	4,814
Inter-City Train (Amtrak)	20.5[8]	2,462
Commuter Rail	34.5[10]	3,155
HSR	33[10]	2,340

Derived from *Transportation Energy Data Book*, Edition 11, U.S. Department of Energy, Oak Ridge National Laboratory, Table 2.13.

Visual Impacts

The visual impact that a developed rail corridor has on the surrounding landscape varies by location and vantage point of the viewer. Where the proposed route of HSR service is along an existing railroad right-of way, the obtrusive nature of railroad infrastructure should be minimized. However, when new cross-country right-of-way is developed with the construction of grade-separation structures, the surrounding viewscape is impacted.

From the vantage point of a rail or automobile passenger, the viewscape impacted by the development of the rail corridor would be limited to the time passengers choose to look out their window and their total visual experience (less than an hour). Residents and employees within sight of the corridor, however, do have long-term exposure to the impacted viewscape. Residents in immediate proximity to the corridor and its structures would be subject to permanent visual exposure. Employees, visitors and commuters will have less exposure, but if they find the impacted viewscape objectionable, they may alter their traveling patterns to avoid the view.

Grade-separation structures (underpasses and overpasses to carry the intersecting street above or below the railroad) are potentially substantial in size, extending more than 20 feet above or below grade, with embankments extending in either direction to meet the existing grade. In rural

[7] Passengers per vehicle or aircraft.
[8] Passengers per coach.

settings, these structures are readily assimilated into the surrounding landscape. In urban settings, however, substantial structural work (concrete retaining wall systems, stormwater management, fencing, etc.) has the potential to be obtrusive and unsightly. Unmitigated, these structures can disrupt access, circulation, light, tranquility, views and visibility of adjacent residents and businesses.

Railroad stations in urban areas have traditionally become city landmarks, not only the focal point of intermodal service, but also a reflection of civic values. New intermediate stations will be emphasized less and will have little visual impact on the surrounding area.

Should the HSR service become electrified, catenary structures will be required to carry the electric lines above the railroad tracks. They can be potentially obtrusive but again can be mitigated by appropriate design treatment.

Biological Impact

Shrinking Biological Diversity and Fragmentation of Natural Habitat

A basic tenet of ecology is that a diverse ecosystem is a healthy ecosystem. As transportation corridors are developed through ecosystems, natural habitats are "fragmented." The smaller, fragmented habitats may be below a minimum critical size needed to sustain certain plant and animal species, thus adversely affecting the native diversity of the ecosystem. The less diverse the ecosystem, the more susceptible it is to natural and man-made disturbances. Fragmentation is especially noticeable in the woodlands and wetlands of southern and western Wisconsin. Likewise, the high-quality grasslands have been fragmented statewide. This might apply to the "cross-country" segments of Routes C and D. Additional information concerning the diversity and fragmentation of natural habitats is discussed in more detail in the preliminary environmental review of TRANSLINK 21.

The development of a high-speed rail corridor along existing rights-of-way poses another threat to endangered plants. Since existing rail corridors were most likely constructed prior to the widespread development of countryside, these corridors are repositories of valuable native prairie plants. The expansion of transportation facilities in these rights-of-way will require careful reconstruction and management of these plant reservoirs.

Endangered Species

Impacts on endangered and threatened species can only be identified through additional investigation. In Minnesota, there are 59 endangered animal species (5 federally-listed) and 138 endangered plant species (4 federally-listed), in addition to many special concern and non-listed species. In Wisconsin, there are 101 endangered species of animals and 138 endangered species of plants. Some of these species may be impacted by the construction and/or operation of a high-speed passenger rail system in the Milwaukee to Twin Cities corridor. More detailed environmental studies need to be completed in order to assess potential impacts on these species.

Socioeconomic Impact

The economic base and primary source of employment in the upper mid-west has been shifting steadily since 1980 from manufacturing to services, retail trade, finance, insurance and real estate. In Milwaukee County, employment in manufacturing decreased by 32 percent, while finance, insurance and real estate increased by 36 percent, services by 36 percent, and retail trade by 3 percent. It is forecasted that this trend will continue, albeit at a slower pace.

HSR service will result in more productive use of travel time. The cost and efficiency savings will benefit the finance, insurance, real estate and service industries. The downtown areas of the corridor's major cities will recognize the greatest benefits. Tourism and retail sales will be the greatest beneficiaries of this improved transportation mode.

HSR will also result in improving access to important markets and suppliers between Minneapolis and Milwaukee. A reliable, higher-speed passenger rail service will make the terminal and intermediate cities more attractive locations for business, providing an urban location without the higher land, labor and housing costs found in Chicago.

Dane County Airport, on the northeast side of Madison, will likely attract additional passengers if an HSR rail station is built nearby. Commuters may find the improved accessibility and reduced congestion of the airport preferable to a congested O'Hare Airport in Chicago.

Intermediate station communities may also derive economic benefits. The location of branch offices and other supporting activities may be desirable in proximity to the intermediate stations.

Commuting patterns will be favorably impacted since the major cities will be within a more reasonable commuting time than presently exists. The corridor will become more interdependent in terms of employment and residential opportunities.

Land Use

Historically, the evolving-railway corridor through a countryside led to the development of communities along the route. Many cities, towns and communities can trace their heritage to the railway. Rail access was, and still is, essential for many industrial centers, commercial uses and residential communities housing employees. However, the development of a new or expanded rail corridor has the potential to adversely affect a community's surrounding land use.

Industrial and commercial land uses are readily compatible with the railway corridor. Agricultural land uses are usually affected for the short term during construction of the new railway, but assimilate over the long term. Railway planners must be wary of incompatible land uses that include sensitive classes, such as residential developments, tranquil open space, hospitals, nature conservation areas, nursing homes and schools. Society seems to have evolved to the point where residential development is not necessarily incompatible with an adjoining railway use. Realtors have responded to inquiries in the past and have stipulated that home sales bordering proposed railway right-of-way have not been adversely impacted.

Development of HSR service along an existing railway right-of-way has the benefit of being introduced to an area that presumably has become accustomed to a rail presence. Sensitive uses over the years have probably avoided the rail corridor. Therefore, HSR service should not significantly impact the surrounding land use, except in areas of heavier construction such as grade crossings and terminal stations. The land use surrounding the location of terminal stations normally results in a higher density land use, typically commercial in form to address the needs of the commuter.

Historically, the greatest concerns of local land use planners in the planning of HSR service included safety and treatment of at-grade crossings. Typically, they favored grade separation and opposed the termination of crossings that would truncate community movement patterns.

Much of Wisconsin's best agricultural land is located in the south and west of the state, often very near urban centers. The development of a high-speed rail corridor will likely place these agricultural areas under pressure to be converted to urban uses and uses associated with transportation facilities.

By and large, the locations of terminal stations have the greatest potential to impact local land use. Wherever terminal stations are proposed, local governments should take measures to prepare updated land use plans to address the socioeconomic changes brought about by the railway. If left unchecked, a community could fall prey to the deleterious effects of urban sprawl.

Transportation and Traffic Impact

The implementation of HSR service will have the most impact on regional transportation plans near HSR train stations where the true "intermodal" nature of a regional transportation system occurs. The stations will be comprised of long and short-term parking, automobile and transit access, and multi-modal interfaces. The degree of these impacts will vary depending on the size of the HSR travel demand area, the existing highway and transit infrastructure, and the final location of the train station.

Travel demand for HSR service is expected to be greater in urban versus rural environments. Therefore, the following minimum requirements for an urban train station are greater than for a similar station in a rural setting:

- A station structure incorporating passenger loading and unloading areas, passenger waiting area, ticketing, and other amenities
- Facilities for long-term and short-term parking
- Primary highway access should consist of a minimum of four signalized lanes with left and right-turn lane provisions
- Bus transit access, off-road bus waiting and loading areas and circulation needs
- Other intermodal interfaces with commuter rail, light rail or other fixed guideway systems

- Taxi/limousine loading and queuing areas
- Rental car facilities.

In a rural environment, the minimum requirements proposed for a HSR train station include:

- A station structure incorporating passenger loading and unloading areas, passenger waiting area, ticketing, and other amenities
- Smaller facilities for long-term and short-term parking
- Primary highway access consisting of a minimum of two signalized lanes with left and right-turn lane provisions
- Smaller off-road bus waiting and loading areas and circulation needs
- Combined taxi/limousine loading and queuing areas and rental car facilities.

Construction Impacts

Construction of a new rail line will have immediate but short-term impacts on the environment as described in the paragraphs below.

Air Quality

The most visible impact of construction at a site is due to fugitive dust resulting from the construction activity (earthwork and truck traffic), with the heaviest where existing rail bed is widened or structures are built. Dust mitigation using water sprinkling minimizes this impact.

Nominal air quality impact is also contributed by carbon monoxide, hydrocarbon and nitrogen oxide emissions from construction vehicles.

Construction Noise

Heavy construction equipment will produce noise, which may impact local land use and activities. Since most of the new construction is located in rural settings, these impacts are expected to be minimal. Typical Department of Transportation standard specifications require all machinery to be equipped with adequate mufflers and all construction within 1,000 feet of a receptor to be limited to a period between 7:00 a.m. and 10:00 p.m.

Water Quality

Water quality impact due to erosion and sedimentation pollution is to be expected but will be mitigated by the installation of control measures. These impacts will be short-term in nature and will subside once disturbed earth is stabilized with temporary and permanent vegetation. Erosion control measures will be specified in the construction documents and will be subject to the individual state's earth disturbance regulations.

Since the total area of land to be disturbed will exceed five (5) acres, the project will be required to obtain a National Pollutant Discharge Elimination System (NPDES) permit for stormwater discharges from a construction site. The NPDES permit application will require a Stormwater Pollution Prevention Plan to identify potential sources of pollution and propose pollution control practices to mitigate the water quality impact.

Temporary Access

Measures should be specified in the contract documents to minimize the inconvenience to adjacent properties. Access can be maintained by constructing temporary access roads.

Environmental Laws

Clean Air Act (CAA) and Subsequent 1990 Amendments (CAAA)

This federal law regulates air quality issues. Southeastern Wisconsin is classified as a non-attainment area for ground level ozone.

The CAAA requires a system of stringent control measures and milestones aimed at improving air quality in non-attainment areas, including regulation of stationary sources and transportation measures. A 15% smog reduction mandate is contained in the CAAA. The CAA and CAAA require reductions in auto use and traffic congestion and encourage enhancement of public transportation.

Intermodal Surface Transportation Efficiency Act (ISTEA)

ISTEA requires transportation project planning to assess the impact on future traffic patterns, the environment, and adjacent land use. Incentives are provided to aid in the reduction of congestion and sprawl and to encourage private developments to be integrated into transportation strategies.

Regulatory Agencies

In addition to the Clean Air Act, the Environmental Justice executive order and the requirements of ISTEA and its successor, TEA-21, there are numerous federal, state, and local agencies with regulatory authority over environmental issues impacted by HSR operations. This review identified certain agencies and their regulatory authority, as further described in Exhibit 3.3.3. This listing is not all-inclusive. An environmental assessment or impact study is needed to identify and address all agency requirements affected by HSR operations in Minnesota and Wisconsin.

Exhibit 3.3.3
Federal, State, and Local Regulatory Agencies

Agency	Authority	Comments
U.S. Army Corps of Engineers	Clean Water Act Section 404 (33 U.S.C.)	404 Permit
U.S. Environmental Protection Agency	Clean Water Act	Jointly administers 404 Permit with U.S. Army Corps
U.S. Fish and Wildlife Service	33 CFR 320.4©	Given permit review responsibilities relative to Corps Permit applications
Federal Emergency Management Agency	44 CFR	No permit required but requires a map revision to be on FIRM map (after construction)
Natural Resources Conservation Service (SCS)	7 CFR 658.4(c)(2) Part of Farmland Protection Policy Act	Review Agency for agricultural impact.
State Historic Preservation Officer (SHPO)	36 CFR 800, Section 106 Review	Administers national historic preservation program at state level.
Wisconsin Department of Natural Resources	Clean Water Act, Section 401	Chapter 30 Permit
State Historical Society of Wisconsin (SHSW)	Wisconsin Statutes, Chapter 44	State agency regulating preservation of American, Midwest and Wisconsin history.

Agency	Authority	Comments
Office of Environmental Analysis (OEA)	National and Wisconsin Environmental Policy Acts	State Agency to review and approval environmental documents
Wisconsin Department of Agriculture, Trade, and Consumer	Wisconsin Statutes, Chapters 93-100	Reviewing agency for agricultural impacts
Southeastern Wisconsin Regional Planning Commission (SEWRPC)	Wisconsin Statutes, Section 66.945	Regional clearinghouse given authority to research, analyze and
Minnesota Department of Natural Resources (MinnDNR)	Minnesota Statutes, Section 84.0895	Protects threatened and endangered species.
MinnDNR	Minnesota Statutes, Chapter 97C	Prohibits pollution of fishing habitats.
MinnDNR	Minnesota Statutes, Chapter 103C	Authorizes Soil and Water Conservation Districts to review E&S Plans.
MinnDNR	Minnesota Statutes, Chapter 103E	Regulates drainage systems and construction of drainage projects.
MinnDNR	Minnesota Statutes, Chapter 103F	Regulates floodplain mgmt., shoreland development, wild & scenic rivers, Mississippi Headwaters, soil erosion, Reinvest in Minn. Resources Act, wetland preservation, Clean Water Partnership, lake preservation and protection and wetlands establishment and restoration policy
MinnDNR	Minnesota Statutes, Chapter 103G	Defines public waters designation, wetlands, streams, Miss. Headwaters lakes.
MinnDNR	Minnesota Statutes, Chapter 103H	Regulates groundwater protection.
MinnDNR	Minnesota Statutes, Chapter 116B	Provides civil remedies to protect air, water, land & other natural resources from pollution.
MinnDNR	Minnesota Statutes, Chapter 116D	Requires Environmental Impact Statement.

Agency	Authority	Comments
Minnesota State Historical Society	Minnesota Statutes, Chapter 138	State agency regulating preservation of American, Midwest and Minnesota history.
MinnDNR	Minnesota Statutes, Section 219.99	Regulates railroad prairie rights-of-way; requires identification of management practices (mp) to control vegetation along r/w; assess impact of mp's on prairie lands w/in r/w; DNR/railroad jointly develop voluntary Best management Practices for prairie land w/in r/w.
MinnDNR	Minnesota Statutes, Chapter 473H	Regulates eminent domain in agricultural preserves.

TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 4.1
Timetable Development Service Pattern

APPENDIX 4.1

The timetable criteria discussed in Chapter 4 outlines characteristics on daily frequencies in relation with the trip length and corridor demand. The following provides a more detailed service plan for each scenario, including service patterns, rolling stock and maintenance facility requirements.

Timetable Development Service Pattern

110 mph Along River

The service pattern for the '110 mph Along River' Scenario includes four daily Chicago – St. Paul express frequencies, two daily Chicago – St. Paul local service trains, and four daily Madison – Chicago commuter hour frequencies. Four Milwaukee – Chicago local trains are also added, to provide a total of 14 daily frequencies between Milwaukee and Chicago.

Chicago – St. Paul express trains would cover the 434 miles in five hours nineteen minutes, averaging just under 82 mph, with stops in Milwaukee, Madison, and LaCrosse. Chicago – St. Paul local service trains would travel over the distance in six hours, three minutes, averaging nearly 72 mph, with stops in Glenview, IL, General Mitchell Field, Milwaukee, Brookfield, Madison, Wisconsin Dells, Tomah, LaCrosse, WI, Winona, Red Wing, and Hastings, MN.

Hastings, MN is added to provide a stop at the outer terminal of the proposed St. Paul light rail system. Brookfield, WI is added to provide direct service to the western Milwaukee suburbs. A stop at General Mitchell Field is initiated to facilitate air/rail transfers for travelers originating or terminating their trips beyond Milwaukee.

Trains between Madison and Chicago would cover the 169 miles in as little as two hours, six minutes, averaging just over 80 mph, with a stop in Milwaukee. Other Madison – Chicago services would make up to five intermediate stops, including Brookfield, Milwaukee, General Mitchell Field, Sturtevant (Racine), and Glenview, making the trip in two hours, twenty-seven minutes, averaging 69 mph. Nonstop trains between Milwaukee and Chicago would cover the 86 miles in as little as 63 minutes, averaging 82 mph. Other Chicago – Milwaukee trains would stop in Glenview and Sturtevant.

110 mph via Rochester

The service pattern for '110 mph via Rochester' stems from '110 mph Along River' with the same frequencies and express/full stopping patterns as far as Winona. Between Winona and St. Paul, both express and full stop trains travel an extra twenty miles to Rochester and St. Paul. Chicago – St. Paul express trains would cover the 454 miles via Rochester in five hours twenty-six minutes, averaging just under 84 mph. Chicago – St. Paul local service trains would cover the distance in five hours, fifty-eight minutes, averaging 76 mph.

150 mph via Rochester

'150mph via Rochester' would offer a substantial increase in frequencies and a modest increase in speeds over those proposed for the 110 mph technology. The Option C1 service pattern would consist of ten daily express Chicago – St. Paul frequencies (up from four) and eight daily local service Chicago – St. Paul frequencies (up from two). In addition, an early morning departure from Madison to Chicago and a late evening return would be offered. A total of 19 daily trains would operate in each direction between Chicago, Milwaukee, and Madison.

The Chicago – St. Paul express trains would cover the 454 miles in as little as four hours, 49 minutes. Certain business hour departures and arrivals would also stop in Glenview, IL and Brookfield, WI. Chicago – St. Paul local service trains would cover the distance in five hours, 33 minutes, averaging over 82 mph, and making stops in Glenview, Sturtevant, General Mitchell Field, Milwaukee, Brookfield, Madison, Wisconsin Dells, Tomah, LaCrosse (Onalaska), and Rochester.

150 mph via Rochester (New Alignment)

The Rochester route (with a new alignment) has the same express/full stopping patterns as the '150 mph via Rochester' with further increases in speeds. The Chicago – St. Paul express trains would cover the 430 miles in as little as four hours, 14 minutes, averaging over 101 mph. Chicago – St. Paul local service trains would cover the distance in four hours, 42 minutes, averaging over 91 mph.

185 mph via Rochester (Elevated)

'185 mph via Rochester (Elevated)' would offer a substantial increase in frequencies and speeds over those proposed for the 110 mph and 150 mph technologies. The service pattern would consist of fourteen daily express Chicago – St. Paul frequencies (up from ten for the 150 mph options) and nine daily local service Chicago – St. Paul frequencies (up from eight). A total of 23 daily trains would operate in each direction between Chicago, Milwaukee, Madison, and St. Paul.

The Chicago – St. Paul express trains would cover 430 miles in as little as three hours, 11 minutes, averaging over 135 mph. Certain business hour departures and arrivals would also stop in Glenview, IL and Brookfield, WI. Chicago – St. Paul local service trains would cover the distance in three hours, 47 minutes, averaging over 113 mph, and making stops in Glenview, Sturtevant, General Mitchell Field, Milwaukee, Brookfield, Madison, Wisconsin Dells, Tomah, LaCrosse (Onalaska), and Rochester.

Rolling Stock Requirements

'110 mph Along River' and '110 mph via Rochester'

The 110mph technology schedules includes 28 daily trains, of which six do not operate one day a week. Ten active Flexliner trainsets and two protect sets are required. The 28 daily trains generate 2,486,988 train miles annually in Option A. Since all trainsets cycle through all train assignments in a ten-day cycle, the active trainsets average 248,699 annual miles per set if only active trainsets are utilized. If the two protect sets are cycled through all train assignments on the same basis as the active trainsets, the average annual miles per trainset declines to 207,249 miles per set.

Using six-car Flexliner trainsets (which can be divided into two three-car sets, as needed) provides a maximum of 304 seats per six-car set. Both Madison – Chicago and Milwaukee – Chicago local service trains are provided which allows the number of frequencies (and seats) to be varied in response to local demand.

Passenger miles for the entire corridor range from 556,472,000 in 2010 to 763,195,000 in 2030 and are accommodated by consist arrangements, which vary from six to eight cars per train. By varying frequencies and cars per train by route segment, the trains' load factors remain relatively constant and average 70% despite the different sized markets served and their differing passenger generation capabilities.

The same service pattern via Rochester incorporates 20 miles more in travel for 12 out of the 28 daily trains, which moderately increases the annual trainmiles to 2,557,916. Cycling only active trainsets would increase the mileage per train slightly to 249,067. If the two protect sets are cycled through all train assignments on the same basis as the active trainsets, the average annual miles per trainset decline to 207,556 miles per set.

Passenger miles for the Rochester corridor decline slightly and range from 523,656,000 in 2010 to 748,324,000 in 2030. The same consist arrangements are used with a slightly lower load factor of 67% due to the decline in demand.

'150 mph via Rochester (Existing Alignment)' and '150 mph Rochester (New Alignment)'

The 150 mph technology existing alignment schedule includes 38 daily trains, 18 of which do not operate one day a week. Seventeen active American Flyer trainsets and two protect sets would be required. The 38 daily trains generate 5,673,450 annual train miles and average 318,800 annual miles per train with 17 active trainsets. If two protect sets are added, the 19 trainsets would average 301,089 train miles per year.

Using American Flyer trainsets comprised of two fossil-fuel power cars, four 65-seat coaches, one 44-seat premium service car, and one bistro car provides 304 seats per train. All trains, except for one Chicago – Madison round trip, would operate between Chicago and St. Paul. Due to the articulated nature of American Flyer trainsets, the trains cannot be resized en route to vary capacity by route segment. Between 2010 and 2030, 890 million to 1.265 billion projected passenger miles will be generated by 38 daily trains, which would carry an average of 183 passengers per train producing a load factor of 60 percent.

The same service pattern with a new alignment is 24 miles less in travel for 36 out of the 38 daily trains, which decreases the annual trainmiles to 5,378,672 and decreases the number of active trainsets to 16 with three protect sets. By moving set assignments between loops and utilizing the three protect sets, annual miles per trainset could be reduced to an average of 301,718 miles per set.

The 150 mph service pattern with a new alignment incorporates trainsets comprised of two fossil-fuel power cars, five 65-seat coaches, one 44-seat premium service car, and one bistro car. This provides 369 seats per train, to accommodate increased passenger demand. Passenger miles range from 1.08 billion to 1.54 billion between 2010 and 2030. Passengers per train average around 228, which produces a load factor of 62 percent.

185 mph via Rochester (Elevated)

The 185mph technology schedule via Rochester (Elevated) includes 46 daily trains, 20 of which do not operate one day a week. Sixteen active trainsets and five protect sets are required. The 46 daily trains generate 6,752,720 annual trainmiles. By moving set assignments between loops and utlizing the five protect sets, annual miles per trainset average 345,592 miles per set.

The 185mph technology adopts the TGV Thalys characteristics with two electric power cars, one end trailer with 77 coach seats, 4 coaches seating 236 passengers, one 44-seat premium service end car, and one bistro car , for a total seating capacity of 357. All trains would operate between Chicago and St. Paul. Due to the articulated nature of TGV Thalys trainsets, the trains cannot be resized en route to vary capacity by route segment. Passenger miles increase from 1,354,600,000 to 1,924,800,000 between 2010 and 2030, which would result in an average of 227 passengers per train producing a load factor of 64 percent.

Maintenance Facility Locations and Requirements

110mph Flexliner Maintenance Facility Location and Requirements

The 110mph service pattern indicates use of ten active six-car sets and two six-car protect sets. For the 110mph technology, Chicago was chosen as the most appropriate heavy overhaul and maintenance facility location for Option A since all trainsets originate or terminate runs in Chicago at least once a day. Madison and St. Paul would have supplementary service and inspection facilities sized to the number of trainsets overnighting at these locations.

- Galewood Yard, Chicago was selected as a representative of available sites in Chicago. The capital requirement for the Galewood Yard facility in Chicago is a 15 acre service and overhaul facility, including: a 500 ft by 100 ft prefabricated steel Butler building; four 500 foot outside storage tracks with concrete vehicle access lanes and a car washer; three 500 foot interior service tracks with inspection pit carjacks, wheel truing machine, drop table, and concrete flooring.

- In Madison, capital requirements include four 500 foot storage and servicing tracks, with two center island platforms with high intensity lighting, and three trackside service vehicle access lanes, with HEP outlets, potable water supply, toilet dumping facilities, etc., to overnight four trainsets and to allow resizing of trains in Madison.

- In St. Paul, service facility capital needs comprise three 500 foot servicing tracks (with one center island platform and two trackside service vehicle lanes) including high intensity lighting, HEP outlets, potable water supply, toilet dumping facilities, concrete platforms, etc. to overnight and service three trainsets.

110mph Flexliner Maintenance Facility Capital Requirements

Galewood Yard, Chicago	$ 7,000,000
International Drive, Madison	400,000
Bridge Point Park, South St. Paul	300,000
Contingency/Land Acquisition	400,000
Total Maintenance Facility Costs	**$ 8,100,000**

150mph American Flyer Maintenance Facility Location and Requirements

The 150mph technology's service indicates 16 active nine-car American Flyer trainsets (including two power units per set) and three protect American Flyer trainsets and power cars. The service pattern calls for eight American Flyer trainsets to overnight in St. Paul, seven sets to overnight in Chicago and one set to overnight in Madison. These three locations are the logical candidates for the main American Flyer maintenance and heavy overhaul facility.

In contrast to the 110mph technology, St. Paul was chosen as the most appropriate maintenance and heavy overhaul facility for American Flyer trainsets; not only because eight of the active sets overnight there, but also because no trainset spends more than three nights per week between overnight stays at St. Paul. Chicago would have a supplementary service and inspection facility sized to the number of trainsets and locomotives overnighting there. Madison would receive a layover track with minor servicing capabilities.

The main heavy overhaul and maintenance facility could be located at the University of Minnesota's Rosemount Research Facility with smaller turn, service, inspect facilities located in Chicago and Madison.

- The capital requirements for the Rosemount Research Facility yard include: a 240,000 sq ft overhaul shop and power car servicing facility, offices, a 20,000 sq ft component warehouse, eight 900 foot fully equipped overnight service and storage tracks with platforms, three 900 foot shop tracks, inspection pits, carjacking pads, wheel truing machines, trainwasher, drop tables, concrete floor, and 50 ton overhead crane.

- In Chicago, the satellite maintenance and servicing facility capital requirements include: two interior 900 foot maintenance and servicing tracks with drop tables, auxiliary component storage area and offices, and six 900 foot storage tracks, fully outfitted, including concrete platforms, HEP outlets, potable water, and toilet dumping facilities, to overnight and service seven trainsets and their locomotives.

- In Madison, capital needs consist of one 900 foot servicing track with high intensity lighting, fully equipped with HEP, potable water outlets, toilet dumping facilities, etc., to overnight and service one trainset.

150mph American Flyer Maintenance Facility Capital Requirements

Rosemount, MN Research Facility Yard	$ 60,000,000
Galewood Yard, Chicago	20,000,000
International Drive, Madison	800,000
Total Maintenance Facility Costs	**$ 80,800,000**

Estimates for maintenance facility capital requirements do not include land acquisition costs, which can be expected to vary considerably depending on location and acreage to be acquired.

185mph TGV Maintenance Facility Requirements

The 185mph technology's service pattern indicates use of 16 active TGV trainsets and five protect TGV trainsets and power cars. The main overhaul and maintenance facility would be located at the University of Minnesota's Rosemount Research Facility with a smaller maintenance facility located at Galewood Yard in Chicago.

The service pattern for the TGV would require a 100 acre site, including: a 240,000 sq ft overhaul shop and power car servicing facility, offices, a 20,000 sq ft component warehouse, nine 900 ft fully equiped overnight service and storage racks with platforms, three 900 ft shop tracks, inspection pits, carjacking pads, wheel truing machines, trainwasher, drop tables, concrete floor, and a 50 ton overhead crane, to overnight, service and maintain trainsets.

In Chicago, the satellite maintenance and servicing facility capital requirements include: two interior 900 ft maintenance and servicing tracks with drop tables, auxiliary component storage area and offices, and nine 900 ft storage tracks, fully outfitted, including concrete platforms, HEP outlets, potable water, and toilet dumping facilities, to overnight, and service, and maintain ten trainsets and power cars.

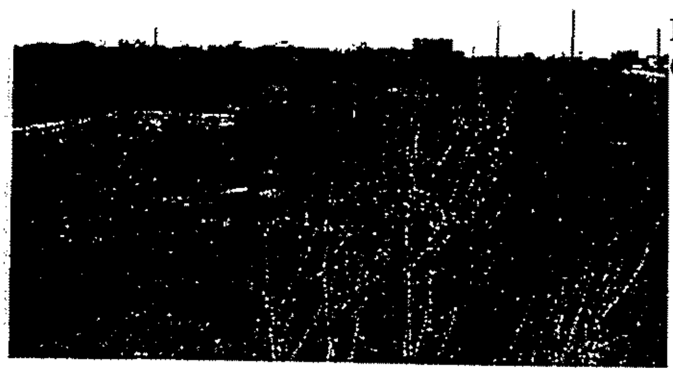
185mph TGV Maintenance Facility Capital Requirements

Rosemount, MN Research Facility Yard	$93,200,000
Galewood Yard, Chicago	$37,280,000
Total Maintenance Facility Costs	**$130,480,000**

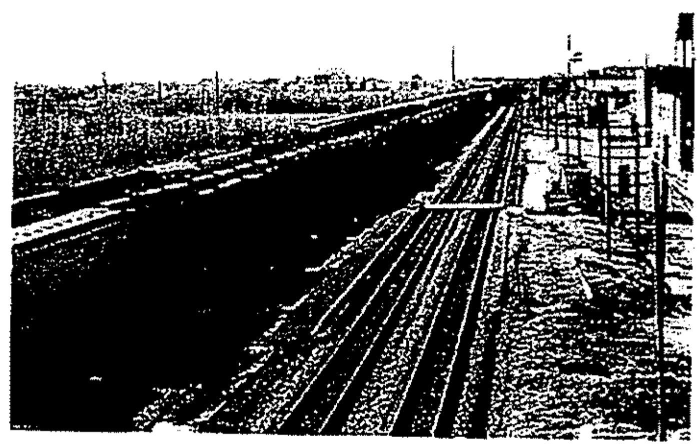
Estimates for maintenance facility capital requirements do not include land acquisition costs, which can be expected to vary considerably depending on location and acreage to be acquired. The infrastructure analysis assumes a total of $162 million for maintenance facilities with land acquisition.

Exhibits 4.1.1, 4.1.2, and 4.1.3 show pictures of the chosen locations for maintenance facilities in Chicago and St. Paul. Following these exhibits are sample operating timetables for each technology, to illustrate potential travel times and frequencies.

Looking east from Central Avenue, with Chicago Skyline and Sears Tower (across from Union Station) in background



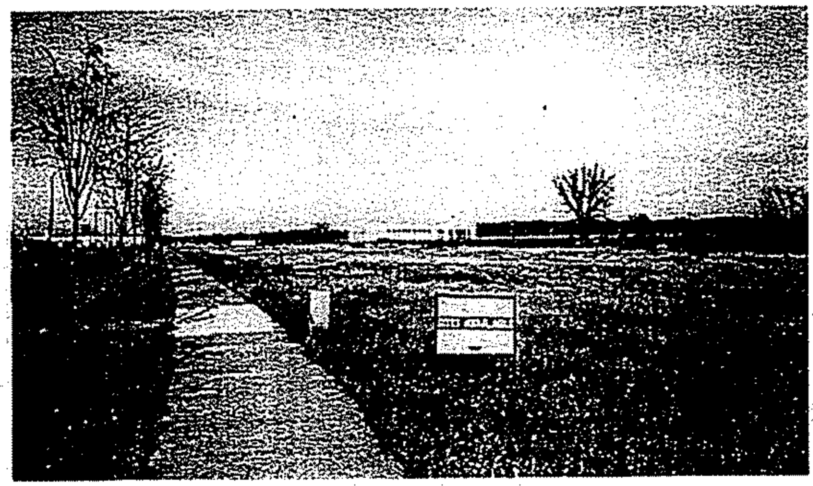
Looking west, toward Narragansett Avenue, CP Rail storage tracks on right.



Looking west, showing Double track METRA line and commuter stop, CP Rail Double track, and three tracks.

Exhibit 4.1.2
South St. Paul Yard Site (Bridge Point Business Park)

Looking upriver toward St. Paul along Hardman Avenue.



Looking east with Union Pacific line to Albert Lea in backgound.

Looking downriver. UP line in backgound.

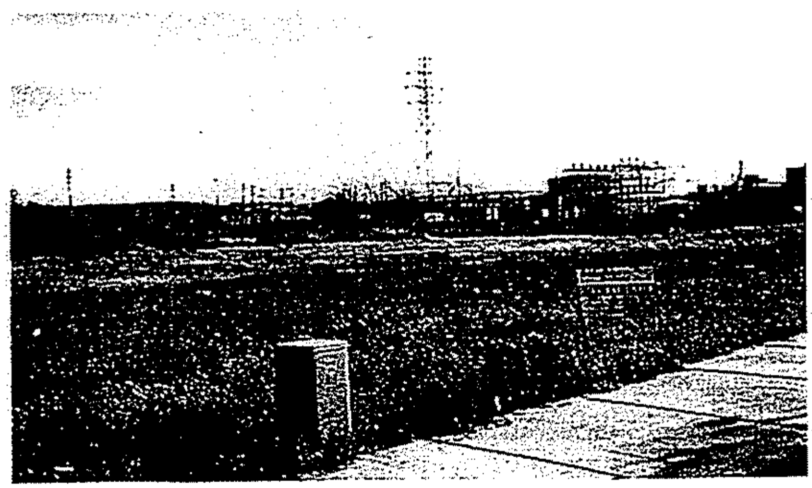


Exhibit 4.1.3

Rosemount Yard (University of Minnesota Rosemount Research Center)

View toward the East, howing only a part of the 7,500 acre site.

View toward the North. Note former World War II era defense factory smoke stacks.

TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 5.1
Zone Detail

Appendix 5.1 - Zone Detail

Exhibit 5.1.1

Zones by State

Number of Zones By State	Midwest Rail Initiative	*Tri-State II* Study
Illinois (Chicago region only)	11	12
Minnesota	27	37
Wisconsin	43	54
Total	81	103
External Zones	N/A	16

Major cities in each state, as defined for model development, are presented in Exhibit 5.1.2. The zone numbers comprising the downtown area refer to the zone numbers in the consolidated zone map that follows (Exhibit 5.1.3). The increased zone detail for Minnesota primarily relates to the Twin Cities and the Rochester area. The added zone detail in Wisconsin is found in Milwaukee and Madison.

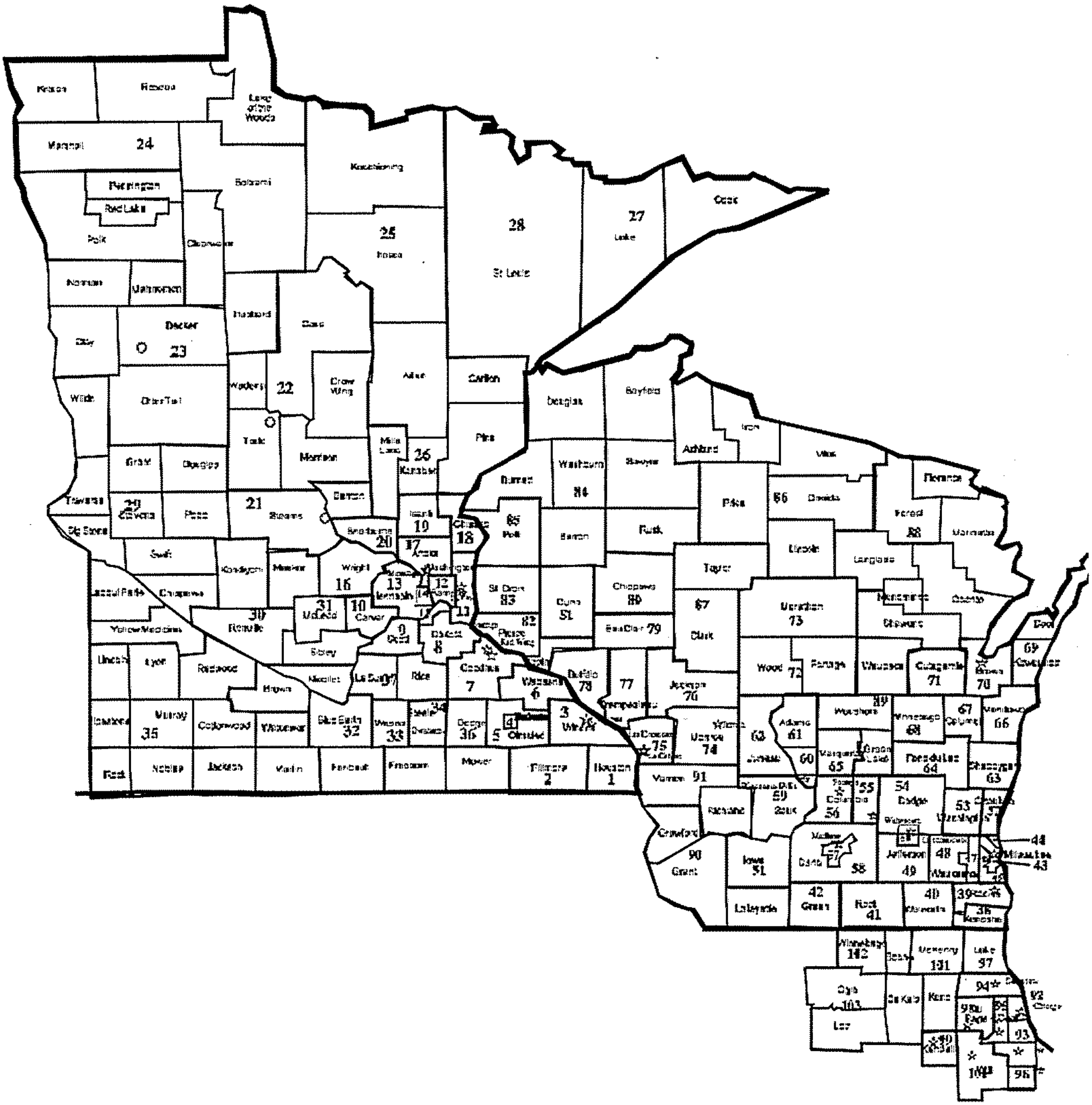
Exhibit 5.1.2

Zone Definitions of Key Cities

City	State Map	Zone Numbers
Chicago	Illinois	92, 93, 95
Madison	Wisconsin	57, 58
Milwaukee	Wisconsin	43, 44, 45, 46, 47
Rochester	Minnesota	4,5
Twin Cities	Minnesota	11, 12, 13, 14, 15

Exhibit 5.1.3

Zone Map



TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 5.2
Socioeconomic Forecast by Zone

Population

Zone	Name	1990	1996	2000	2010	2020	2040
1	Caledonia, MN	18500	18612	19067	19601	20586	22449
2	Preston, MN	20800	20969	21658	22371	23448	25605
3	Winona, MN	47800	50334	52953	57100	61207	68562
4	Rochester, MN	70729	75638	79199	88850	99680	125460
5	Eyota, MN	106500	113153	119584	130072	140138	158481
6	Theilman, MN	19700	20042	20621	21519	22567	24876
7	Red Wing, MN	40700	42379	44352	47299	50419	56184
8	Apple Valley, MN	187755	227039	243540	299400	352540	399882
9	Shakopee, MN	57800	63234	67978	76381	83775	95744
10	Waconia, MN	47900	52440	56372	63278	69354	78998
11	Lake Elmo, MN	145900	156830	166941	183656	199144	225951
12	St. Paul, MN	485800	510392	536781	577921	619448	650301
13	Long Lake, MN	1032400	1095395	1157913	1259921	1358339	1434961
14	Minneapolis, MN	368383	364382	370500	383500	388500	392653
15	Bloomington, MN	209476	220004	228680	235000	239570	246210
16	Maple Lake, MN	68700	74435	79584	88632	96765	109942
17	Coon Rapids, MN	243688	278531	291210	322540	353170	380377
18	Almelund, MN	30500	33149	35440	39629	43263	49389
19	Cambridge, MN	25900	27392	29015	31533	34016	38346
20	Orrock, MN	41900	44170	46528	50388	54052	60796
21	St. Cloud, MN	149000	156358	164454	177158	189676	212603
22	Brainerd, MN	132200	135902	141242	148608	157311	174256
23	Moorhead, MN	142000	145410	150775	157770	166338	184328
24	Thief River Falls, MN	143800	146174	150983	157024	164907	181901
25	Grands Rapids, MN	98900	100131	103107	107062	112397	124139
26	Mora, MN	52800	54546	56787	59976	63739	70625
27	Lake/Cook County border, M	14300	14523	15026	15553	16403	18081
28	Duluth, MN	198200	198710	203624	208265	217088	238935
29	Montevideo, MN	351600	361454	375643	395010	417883	463915
30	Willmar, MN	57700	58092	59688	61680	64400	70746
31	Hutchinson, MN	48200	49570	51502	54330	57354	63708
32	Mankato, MN	70900	71900	76124	81744	90090	113038
33	Albert Lea, MN	31700	32369	33471	34942	36878	40652
34	Owatonna, MN	17700	17464	17720	17790	18494	20022
35	Worthington, MN	191800	194373	200412	208158	218519	240877
36	Austin, MN	15100	14845	15026	15021	15412	16503
37	Northfield, MN	21300	21452	22072	22691	23668	25969
	Sum: Minnesota Zones	5008031	5261791	5505572	5921374	6340540	6905466
38	Kenosha, WI	128200	130193	134657	140981	149652	167704
39	Racine, WI	175000	179781	187087	198124	211626	238374
40	Elkhorn, WI	75000	78362	82331	88877	95799	108543
41	Janesville, WI	139500	143812	150023	159743	171014	193076
42	Monroe, WI	30300	31353	32808	35165	37719	42576
43	Milwaukee, WI	628088	642127	666640	702783	748745	844864
44	Glendale, WI	68351	69879	72546	76480	81481	91941
45	Wauwatosa, WI	172714	176575	183315	193254	205893	232324
46	Greenfield, WI	90230	92247	95768	100961	107563	121372
47	Waukesha, WI	175584	188204	200183	220925	241079	276368
48	Delafield, WI	129116	138396	147205	162458	177278	203228
49	Jefferson, WI	67800	70082	73298	78263	83894	94681
50	Watertown, WI	19142	20800	22027	25420	29340	39080
51	Dodgeville, WI	20100	20734	21699	23157	24923	27971

		Population					
Zone	Name	1990	1996	2000	2010	2020	2040
52	Fredonia, WI	72800	76988	81500	89091	96801	110895
53	West Bend, WI	95300	100102	105483	114500	123949	140846
54	Beaver Dam, WI	67029	67000	68826	70592	73452	78730
55	Wyocena, WI	45100	46708	48796	52104	55855	62997
56	Portage, WI	45100	46708	48796	52104	55855	62997
57	Madison, WI	190766	197630	208981	228110	247479	282139
58	Monona, WI	176334	191202	202184	220691	239430	272963
59	Baraboo, WI	47000	50289	53572	59287	64868	74384
60	Wisconsin Dells, WI	15700	15576	15885	16189	16912	18689
61	Easton, WI	15700	15576	15885	16189	16912	18689
62	New Lisbon, WI	21700	23251	24710	27339	29930	34160
63	Sheboygan, WI	103900	106757	111089	117824	125841	141465
64	Fond Du Lac, WI	90100	92993	97074	103457	110709	124633
65	Montello, WI	12300	12856	13497	14581	15688	17699
66	Manitowoc, WI	80400	81912	84823	89520	95354	107058
67	Chilton, WI	34300	35142	36545	38810	41391	46412
68	Oshkosh, WI	140300	145644	152411	163173	175131	197779
69	Sturgeon Bay	44600	46905	49419	53819	58414	66339
70	Green Bay, WI	194600	202808	212731	228464	245785	278722
71	Appleton, WI	140500	148297	156563	170249	184366	210032
72	Stevens Point	118700	125286	132269	143876	155882	177357
73	Wausau, WI	115400	119732	125209	134120	144088	162629
74	Tomah, WI	36600	38746	41010	44814	48623	55076
75	La Crosse, WI	97900	103265	108909	118360	128066	145921
76	Black River Falls, WI	16600	16725	17234	18011	19026	21164
77	Whitehall, WI	25300	26677	28240	30769	33491	37873
78	Modena, WI	13600	13823	14327	15224	16245	18070
79	Eau Claire, WI	85200	90146	95309	103994	112823	128593
80	Chippewa Falls, WI	52400	53499	55545	58644	62531	70052
81	Menomonie, WI	35900	36855	38310	40525	43282	48393
82	River Falls, WI	39900	42211	44747	49102	53407	60769
83	New Richmond, WI	50300	53575	56791	62396	67872	77354
84	Rice Lake, WI	152700	158617	166115	178183	191710	216344
85	Balsam Lake, WI	34800	36792	38829	42348	45952	52106
86	Rhinelander, WI	114500	120111	126351	136800	147760	167827
87	Owen, WI	50500	51885	53884	57143	61085	68319
88	Shawano, WI	144600	148607	154799	164245	175576	197160
89	Berlin, WI	84200	88695	93647	102278	111043	126366
90	Platteville, WI	81300	83561	87107	92844	99471	111637
91	Richland Center, WI	43100	43969	45474	47601	50514	56314
	Sum: Wisconsin Zones	4946154	5139667	5382464	5773959	6208577	7029053
92	Chicago North, IL	1439308	1480428	1518175	1601337	1700427	1898158
93	Chicago South, IL	1439308	1480428	1518175	1601337	1700427	1898158
94	Arlington Heights, IL	915391	941543	965550	1018440	1081460	1207217
95	Maywood, IL	741922	763118	782575	825443	876521	978446
96	Homewood, IL	588765	606306	622235	657248	698450	780125
97	Waukegan, IL	516400	554005	582081	642774	700968	798835
98	Wheaton, IL	781700	868874	932753	1068653	1185931	1369804
99	Joliet, IL	39400	40774	41890	44462	47368	52648
100	Kankakee, IL	357300	374195	388088	417965	448765	505188
101	DeKalb, IL	578600	612830	640543	700981	759399	858582
102	Rockford, IL	283700	294083	303394	324355	347047	388415
103	Dixon, IL	80400	82652	84897	89966	95811	106480
	Sum: Chicago Area Zones	7762194	8099235	8380357	8992961	9642574	10842057

Population Growth by Zone

Zone	Name	1990-1996	1996-2000	2000-2010	2010-2020	2020-2040	Cum.1996-2040
1	Caledonia, MN	0.6%	2.4%	2.8%	5.0%	9.1%	20.6%
2	Preston, MN	0.8%	3.3%	3.3%	4.8%	9.2%	22.1%
3	Winona, MN	5.3%	5.2%	7.8%	7.2%	12.0%	36.2%
4	Rochester, MN	6.9%	4.7%	12.2%	12.2%	25.9%	65.9%
5	Eyota, MN	6.2%	5.7%	8.8%	7.7%	13.1%	40.1%
6	Theilman, MN	1.7%	2.9%	4.4%	4.9%	10.2%	24.1%
7	Red Wing, MN	4.1%	4.7%	6.6%	6.6%	11.4%	32.6%
8	Apple Valley, MN	20.9%	7.3%	22.9%	17.7%	13.4%	76.1%
9	Shakopee, MN	9.4%	7.5%	12.4%	9.7%	14.3%	51.4%
10	Waconia, MN	9.5%	7.5%	12.3%	9.6%	13.9%	50.6%
11	Lake Elmo, MN	7.5%	6.4%	10.0%	8.4%	13.5%	44.1%
12	St. Paul, MN	5.1%	5.2%	7.7%	7.2%	5.0%	27.4%
13	Long Lake, MN	6.1%	5.7%	8.8%	7.8%	5.6%	31.0%
14	Minneapolis, MN	-1.1%	1.7%	3.5%	1.3%	1.1%	7.8%
15	Bloomington, MN	5.0%	3.9%	2.8%	1.9%	2.8%	11.9%
16	Maple Lake, MN	8.3%	6.9%	11.4%	9.2%	13.6%	47.7%
17	Coon Rapids, MN	14.3%	4.6%	10.8%	9.5%	7.7%	36.6%
18	Almelund, MN	8.7%	6.9%	11.8%	9.2%	14.2%	49.0%
19	Cambridge, MN	5.8%	5.9%	8.7%	7.9%	12.7%	40.0%
20	Orrock, MN	5.4%	5.3%	8.3%	7.3%	12.5%	37.6%
21	St. Cloud, MN	4.9%	5.2%	7.7%	7.1%	12.1%	36.0%
22	Brainerd, MN	2.8%	3.9%	5.2%	5.9%	10.8%	28.2%
23	Moorhead, MN	2.4%	3.7%	4.6%	5.4%	10.8%	26.8%
24	Thief River Falls, MN	1.7%	3.3%	4.0%	5.0%	10.3%	24.4%
25	Grands Rapids, MN	1.2%	3.0%	3.8%	5.0%	10.4%	24.0%
26	Mora, MN	3.3%	4.1%	5.6%	6.3%	10.8%	29.5%
27	Lake/Cook County border, M	1.6%	3.5%	3.5%	5.5%	10.2%	24.5%
28	Duluth, MN	0.3%	2.5%	2.3%	4.2%	10.1%	20.2%
29	Montevideo, MN	2.8%	3.9%	5.2%	5.8%	11.0%	28.3%
30	Willmar, MN	0.7%	2.7%	3.3%	4.4%	9.9%	21.8%
31	Hutchinson, MN	2.8%	3.9%	5.5%	5.6%	11.1%	28.5%
32	Mankato, MN	1.4%	5.9%	7.4%	10.2%	25.5%	57.2%
33	Albert Lea, MN	2.1%	3.4%	4.4%	5.5%	10.2%	25.6%
34	Owatonna, MN	-1.3%	1.5%	0.4%	4.0%	8.3%	14.7%
35	Worthington, MN	1.3%	3.1%	3.9%	5.0%	10.2%	23.9%
36	Austin, MN	-1.7%	1.2%	0.0%	2.6%	7.1%	11.2%
37	Northfield, MN	0.7%	2.9%	2.8%	4.3%	9.7%	21.1%
	Sum: Minnesota Zones	5.1%	4.6%	7.6%	7.1%	8.9%	31.2%
38	Kenosha, WI	1.6%	3.4%	4.7%	6.2%	12.1%	28.8%
39	Racine, WI	2.7%	4.1%	5.9%	6.8%	12.6%	32.6%
40	Elkhorn, WI	4.5%	5.1%	8.0%	7.8%	13.3%	38.5%
41	Janesville, WI	3.1%	4.3%	6.5%	7.1%	12.9%	34.3%
42	Monroe, WI	3.5%	4.6%	7.2%	7.3%	12.9%	35.8%
43	Milwaukee, WI	2.2%	3.8%	5.4%	6.5%	12.8%	31.6%
44	Glendale, WI	2.2%	3.8%	5.4%	6.5%	12.8%	31.6%
45	Wauwatosa, WI	2.2%	3.8%	5.4%	6.5%	12.8%	31.6%
46	Greenfield, WI	2.2%	3.8%	5.4%	6.5%	12.8%	31.6%
47	Waukesha, WI	7.2%	6.4%	10.4%	9.1%	14.6%	46.8%
48	Delafield, WI	7.2%	6.4%	10.4%	9.1%	14.6%	46.8%
49	Jefferson, WI	3.4%	4.6%	6.8%	7.2%	12.9%	35.1%
50	Watertown, WI	8.7%	5.9%	15.4%	15.4%	33.2%	87.9%
51	Dodgeville, WI	3.2%	4.7%	6.7%	7.6%	12.2%	34.9%

Population Growth by Zone

Zone	Name	1990-1996	1996-2000	2000-2010	2010-2020	2020-2040	Cum.1996-2040
52	Fredonia, WI	5.8%	5.9%	9.3%	8.7%	14.6%	44.0%
53	West Bend, WI	5.0%	5.4%	8.5%	8.3%	13.6%	40.7%
54	Beaver Dam, WI	0.0%	2.7%	2.6%	4.1%	7.2%	17.5%
55	Wyocena, WI	3.6%	4.5%	6.8%	7.2%	12.8%	34.9%
56	Portage, WI	3.6%	4.5%	6.8%	7.2%	12.8%	34.9%
57	Madison, WI	3.6%	5.7%	9.2%	8.5%	14.0%	42.8%
58	Monona, WI	8.4%	5.7%	9.2%	8.5%	14.0%	42.8%
59	Baraboo, WI	7.0%	6.5%	10.7%	9.4%	14.7%	47.9%
60	Wisconsin Dells, WI	-0.8%	2.0%	1.9%	4.5%	10.5%	20.0%
61	Easton, WI	-0.8%	2.0%	1.9%	4.5%	10.5%	20.0%
62	New Lisbon, WI	7.1%	6.3%	10.6%	9.5%	14.1%	46.9%
63	Sheboygan, WI	2.7%	4.1%	6.1%	6.8%	12.4%	32.5%
64	Fond Du Lac, WI	3.2%	4.4%	6.6%	7.0%	12.6%	34.0%
65	Montello, WI	4.5%	5.0%	8.0%	7.6%	12.8%	37.7%
66	Manitowoc, WI	1.9%	3.6%	5.5%	6.5%	12.3%	30.7%
67	Chilton, WI	2.5%	4.0%	6.2%	6.6%	12.1%	32.1%
68	Oshkosh, WI	3.8%	4.6%	7.1%	7.3%	12.9%	35.8%
69	Sturgeon Bay	5.2%	5.4%	8.9%	8.5%	13.6%	41.4%
70	Green Bay, WI	4.2%	4.9%	7.4%	7.6%	13.4%	37.4%
71	Appleton, WI	5.5%	5.6%	8.7%	8.3%	13.9%	41.6%
72	Stevens Point	5.5%	5.6%	8.8%	8.3%	13.8%	41.6%
73	Wausau, WI	3.8%	4.6%	7.1%	7.4%	12.9%	35.8%
74	Tomah, WI	5.9%	5.8%	9.3%	8.5%	13.3%	42.1%
75	La Crosse, WI	5.5%	5.5%	8.7%	8.2%	13.9%	41.3%
76	Black River Falls, WI	0.8%	3.0%	4.5%	5.6%	11.2%	26.5%
77	Whitehall, WI	5.4%	5.9%	9.0%	8.8%	13.1%	42.0%
78	Modena, WI	1.6%	3.6%	6.3%	6.7%	11.2%	30.7%
79	Eau Claire, WI	5.8%	5.7%	9.1%	8.5%	14.0%	42.6%
80	Chippewa Falls, WI	2.1%	3.8%	5.6%	6.6%	12.0%	30.9%
81	Menomonie, WI	2.7%	3.9%	5.8%	6.8%	11.8%	31.3%
82	River Falls, WI	5.8%	6.0%	9.7%	8.8%	13.8%	44.0%
83	New Richmond, WI	6.5%	6.0%	9.9%	8.8%	14.0%	44.4%
84	Rice Lake, WI	3.9%	4.7%	7.3%	7.6%	12.8%	36.4%
85	Balsam Lake, WI	5.7%	5.5%	9.1%	8.5%	13.4%	41.6%
86	Rhinelander, WI	4.9%	5.2%	8.3%	8.0%	13.6%	39.7%
87	Owen, WI	2.7%	3.9%	6.0%	6.9%	11.8%	31.7%
88	Shawano, WI	2.8%	4.2%	6.1%	6.9%	12.3%	32.7%
89	Berlin, WI	5.3%	5.6%	9.2%	8.6%	13.8%	42.5%
90	Platteville, WI	2.8%	4.2%	6.6%	7.1%	12.2%	33.6%
91	Richland Center, WI	2.0%	3.4%	4.7%	6.1%	11.5%	28.1%
	Sum: Wisconsin Zones	3.9%	4.7%	7.3%	7.5%	13.2%	36.8%
92	Chicago North, IL	2.9%	2.5%	5.5%	6.2%	11.6%	28.2%
93	Chicago South, IL	2.9%	2.5%	5.5%	6.2%	11.6%	28.2%
94	Arlington Heights, IL	2.9%	2.5%	5.5%	6.2%	11.6%	28.2%
95	Maywood, IL	2.9%	2.5%	5.5%	6.2%	11.6%	28.2%
96	Homewood, IL	3.0%	2.6%	5.6%	6.3%	11.7%	28.7%
97	Waukegan, IL	7.3%	5.1%	10.4%	9.1%	14.0%	44.2%
98	Wheaton, IL	11.2%	7.4%	14.6%	11.0%	15.5%	57.7%
99	Joliet, IL	3.5%	2.7%	6.1%	6.5%	11.1%	29.1%
100	Kankakee, IL	4.7%	3.7%	7.7%	7.4%	12.6%	35.0%
101	DeKalb, IL	5.9%	4.5%	9.4%	8.3%	13.1%	40.1%
102	Rockford, IL	3.7%	3.2%	6.9%	7.0%	11.9%	32.1%
103	Dixon, IL	2.8%	2.7%	6.0%	6.5%	11.1%	28.8%
	Sum: Chicago Area Zones	4.3%	3.5%	7.3%	7.2%	12.4%	33.9%

Employment

Zone	Name	1990	1996	2000	2010	2020	2040
1	Caledonia, MN	7512	7958	8620	9225	9425	9930
2	Preston, MN	10713	11206	12069	12870	13050	13738
3	Winona, MN	28011	30305	33296	36559	37820	40671
4	Rochester, MN	75242	82668	91484	101362	105607	114939
5	Eyota, MN	75242	82668	91484	101362	105607	114939
6	Theilman, MN	9413	9886	10668	11389	11600	12378
7	Red Wing, MN	23119	24725	26939	29156	29966	32101
8	Apple Valley, MN	64951	77227	90435	107570	119130	134496
9	Shakopee, MN	24700	27922	31465	36103	38304	42167
10	Waconia, MN	20889	23720	26831	30864	32745	36046
11	Lake Elmo, MN	52282	58991	66270	75623	79991	88007
12	St. Paul, MN	286835	306720	322300	353550	366800	385291
13	Long Lake, MN	510815	570618	666375	770771	812079	890974
14	Minneapolis, MN	278438	288822	290000	292800	297500	301466
15	Bloomington, MN	127759	153816	163200	179400	187730	202851
16	Maple Lake, MN	26450	29508	32973	37356	39391	42983
17	Coon Rapids, MN	81132	92926	100690	118320	126240	137911
18	Almelund, MN	12990	14732	16594	19020	20179	22308
19	Cambridge, MN	9976	10980	12176	13439	14137	15235
20	Orrock, MN	12890	14649	16594	19247	20541	22716
21	St. Cloud, MN	86171	94843	105277	117421	122645	133166
22	Brainerd, MN	61187	65403	71334	77217	79145	84742
23	Moorhead, MN	66480	70479	76722	82343	84341	89639
24	Thief River Falls, MN	71277	75311	81679	87126	88932	94536
25	Grands Rapids, MN	40799	43541	47520	51137	52562	56313
26	Mora, MN	23646	25373	27801	30181	31054	33326
27	Lake/Cook County border, MN	6466	7064	7758	8428	8821	9522
28	Duluth, MN	96930	102696	111527	119129	121678	130174
29	Montevideo, MN	185240	197207	214541	230741	236106	252866
30	Willmar, MN	33166	34734	37391	39406	40237	42575
31	Hutchinson, MN	26618	28277	30710	33256	33954	36318
32	Mankato, MN	37408	38709	41637	43290	43898	45989
33	Albert Lea, MN	18680	19792	21443	22778	23200	24756
34	Owatonna, MN	9457	9765	10452	10820	10996	11562
35	Worthington, MN	108482	114551	124027	132454	135090	143640
36	Austin, MN	7600	7735	8297	8542	8458	8841
37	Northfield, MN	10712	11226	12176	12756	13050	13738
	Sum: Minnesota Zones	2629677	2866752	3140760	3463009	3602009	3872851
38	Kenosha, WI	51024	53086	57221	60502	61703	66129
39	Racine, WI	86691	92883	101702	110806	114732	124616
40	Elkhorn, WI	38880	41891	46100	50533	52540	57099
41	Janesville, WI	70993	76352	83780	91899	95549	103917
42	Monroe, WI	19108	20367	22348	24292	25170	27229
43	Milwaukee, WI	399568	417005	454143	489539	504279	546954
44	Glendale, WI	44752	47441	51667	55693	57370	62225
45	Wauwatosa, WI	113082	119878	130555	140730	144967	157236
46	Greenfield, WI	59077	62627	68205	73521	75734	82144
47	Waukesha, WI	104380	117487	132081	151145	160744	178045
48	Delafield, WI	76756	86394	97126	111145	118204	130926
49	Jefferson, WI	36970	39578	43293	47210	48996	53070
50	Watertown, WI	8750	7894	8601	9299	9612	10368
51	Dodgeville, WI	11696	12488	13711	15011	15518	16810
52	Fredonia, WI	34218	37945	42430	48012	50951	56265

Employment

Zone	Name	1990	1996	2000	2010	2020	2040
53	West Bend, WI	43506	47614	52794	58898	61826	67657
54	Beaver Dam, WI	24734	16155	17436	18448	18878	20144
55	Wyocena, WI	23746	25484	27963	30595	31768	34454
56	Portage, WI	23746	25484	27963	30595	31768	34454
57	Madison, WI	131590	145044	161349	181020	190418	209067
58	Monona, WI	121468	133887	148938	167096	175771	192985
59	Baraboo, WI	30254	33379	37139	41824	44109	48346
60	Wisconsin Dells, WI	4156	4387	4750	5042	5132	5557
61	Easton, WI	4156	4387	4750	5042	5132	5557
62	New Lisbon, WI	10776	11797	13064	14553	15273	16671
63	Sheboygan, WI	59097	62729	68341	73909	76243	82244
64	Fond Du Lac, WI	48956	51987	56573	61190	62925	67935
65	Montello, WI	4684	5016	5506	5959	6109	6668
66	Manitowoc, WI	39823	41733	45237	48356	49607	53348
67	Chilton, WI	15379	16449	17922	19594	20283	21811
68	Oshkosh, WI	81143	87458	96195	105535	109722	119198
69	Sturgeon Bay	25026	27066	29906	32887	34334	37371
70	Green Bay, WI	116472	126845	140245	155380	162384	177686
71	Appleton, WI	87113	95309	105588	117566	123163	134897
72	Stevens Point	69347	74868	82376	90409	94083	102388
73	Wausau, WI	63408	68391	75143	82503	85774	93219
74	Tomah, WI	19790	21301	23428	25782	26759	28897
75	La Crosse, WI	65493	72079	80109	89607	94205	103500
76	Black River Falls, WI	6984	7331	7881	8479	8675	9308
77	Whitehall, WI	13651	14621	15979	17417	17961	19450
78	Modena, WI	6357	6641	7234	7677	7942	8474
79	Eau Claire, WI	49792	54274	60136	66690	69768	76270
80	Chippewa Falls, WI	25347	27109	29690	32543	33723	36537
81	Menomonie, WI	16152	17180	18786	20397	21016	22645
82	River Falls, WI	18089	19555	21485	23605	24681	26674
83	New Richmond, WI	21807	24039	26775	30022	31524	34454
84	Rice Lake, WI	72036	77265	84751	92701	96160	104194
85	Balsam Lake, WI	15279	16347	17814	19365	19916	21534
86	Rhinelander, WI	57369	61852	68017	74367	77343	84050
87	Owen, WI	25463	26967	29366	31626	32379	34870
88	Shawano, WI	63761	67967	74171	80440	83208	89885
89	Berlin, WI	42188	45586	50203	55346	57671	62794
90	Platteville, WI	42453	45405	49663	54314	56327	60850
91	Richland Center, WI	20525	21546	23428	25095	25659	27507
	Sum: Wisconsin Zones	2767062	2965850	3261055	3581208	3725688	4056582
92	Chicago North, IL	1059334	1120556	1179477	1280425	1321690	1427026
93	Chicago South, IL	1059334	1120556	1179477	1280425	1321690	1427026
94	Arlington Heights, IL	411836	435637	458544	497789	513832	554783
95	Maywood, IL	333792	353083	371648	403457	416459	449650
96	Homewood, IL	264887	280195	294928	320170	330489	356828
97	Waukegan, IL	278190	307975	333078	380650	404898	447411
98	Wheaton, IL	471049	547006	604989	718474	778019	871741
99	Joliet, IL	13169	13755	14392	15435	15946	16952
100	Kankakee, IL	118295	128536	137446	153695	161197	176174
101	DeKalb, IL	281952	307870	329891	370433	389530	425503
102	Rockford, IL	162775	174293	184632	203477	211809	229508
103	Dixon, IL	39807	42507	45027	49348	51421	55551
	Sum: Chicago Area Zones	4494419	4831969	5133530	5673776	5916979	6438155

Employment Growth by Zone

Zone	Name	1990-1996	1996-2000	2000-2010	2010-2020	2020-2040	Cum.1996-2040
1	Caledonia, MN	5.9%	8.3%	7.0%	2.2%	5.4%	24.8%
2	Preston, MN	4.6%	7.7%	6.6%	1.4%	5.3%	22.6%
3	Winona, MN	8.2%	9.9%	9.8%	3.5%	7.5%	34.2%
4	Rochester, MN	9.9%	10.7%	10.8%	4.2%	8.8%	39.0%
5	Eyota, MN	9.9%	10.7%	10.8%	4.2%	8.8%	39.0%
6	Theilman, MN	5.0%	7.9%	6.8%	1.9%	6.7%	25.2%
7	Red Wing, MN	6.9%	9.0%	8.2%	2.8%	7.1%	29.8%
8	Apple Valley, MN	18.9%	17.1%	18.9%	10.7%	12.9%	74.2%
9	Shakopee, MN	13.0%	12.7%	14.7%	6.1%	10.1%	51.0%
10	Waconia, MN	13.6%	13.1%	15.0%	6.1%	10.1%	52.0%
11	Lake Elmo, MN	12.8%	12.3%	14.1%	5.8%	10.0%	49.2%
12	St. Paul, MN	6.9%	5.1%	9.7%	3.7%	5.0%	25.6%
13	Long Lake, MN	11.7%	16.8%	15.7%	5.4%	9.7%	56.1%
14	Minneapolis, MN	3.7%	0.4%	1.0%	1.6%	1.3%	4.4%
15	Bloomington, MN	20.4%	6.1%	9.9%	4.6%	8.1%	31.9%
16	Maple Lake, MN	11.6%	11.7%	13.3%	5.4%	9.1%	45.7%
17	Coon Rapids, MN	14.5%	8.4%	17.5%	6.7%	9.2%	48.4%
18	Almelund, MN	13.4%	12.6%	14.6%	6.1%	10.5%	51.4%
19	Cambridge, MN	10.1%	10.9%	10.4%	5.2%	7.8%	38.7%
20	Orrock, MN	13.7%	13.3%	16.0%	6.7%	10.6%	55.1%
21	St. Cloud, MN	10.1%	11.0%	11.5%	4.4%	8.6%	40.4%
22	Brainerd, MN	6.9%	9.1%	8.2%	2.5%	7.1%	29.6%
23	Moorhead, MN	6.0%	8.9%	7.3%	2.4%	6.3%	27.2%
24	Thief River Falls, MN	5.7%	8.5%	6.7%	2.1%	6.3%	25.5%
25	Grands Rapids, MN	6.7%	9.1%	7.6%	2.8%	7.1%	29.3%
26	Mora, MN	7.3%	9.6%	8.6%	2.9%	7.3%	31.3%
27	Lake/Cook County border, MN	9.2%	9.8%	8.6%	4.7%	7.9%	34.8%
28	Duluth, MN	5.9%	8.6%	6.8%	2.1%	7.0%	26.8%
29	Montevideo, MN	6.5%	8.8%	7.6%	2.3%	7.1%	28.2%
30	Willmar, MN	4.7%	7.6%	5.4%	2.1%	5.8%	22.6%
31	Hutchinson, MN	6.2%	8.6%	8.3%	2.1%	7.0%	28.4%
32	Mankato, MN	3.5%	7.6%	4.0%	1.4%	4.8%	18.8%
33	Albert Lea, MN	6.0%	8.3%	6.2%	1.9%	6.7%	25.1%
34	Owatonna, MN	3.3%	7.0%	3.5%	1.6%	5.1%	18.4%
35	Worthington, MN	5.6%	8.3%	6.8%	2.0%	6.3%	25.4%
36	Austin, MN	1.8%	7.3%	2.9%	-1.0%	4.5%	14.3%
37	Northfield, MN	4.8%	8.5%	4.8%	2.3%	5.3%	22.4%
	Sum: Minnesota Zones	9.0%	9.6%	10.3%	4.0%	7.5%	35.1%
38	Kenosha, WI	4.0%	7.8%	5.7%	2.0%	7.2%	24.6%
39	Racine, WI	7.1%	9.5%	9.0%	3.5%	8.6%	34.2%
40	Elkhorn, WI	7.7%	10.0%	9.6%	4.0%	8.7%	36.3%
41	Janesville, WI	7.5%	9.7%	9.7%	4.0%	8.8%	36.1%
42	Monroe, WI	6.6%	9.7%	8.7%	3.6%	8.2%	33.7%
43	Milwaukee, WI	4.4%	8.9%	7.8%	3.0%	8.5%	31.2%
44	Glendale, WI	6.0%	8.9%	7.8%	3.0%	8.5%	31.2%
45	Wauwatosa, WI	6.0%	8.9%	7.8%	3.0%	8.5%	31.2%
46	Greenfield, WI	6.0%	8.9%	7.8%	3.0%	8.5%	31.2%
47	Waukesha, WI	12.6%	12.4%	14.4%	6.4%	10.8%	51.5%
48	Delafield, WI	12.6%	12.4%	14.4%	6.4%	10.8%	51.5%
49	Jefferson, WI	7.1%	9.4%	9.0%	3.8%	8.3%	34.1%
50	Watertown, WI	-9.8%	9.0%	8.1%	3.4%	7.9%	31.3%
51	Dodgeville, WI	6.8%	9.8%	9.5%	3.4%	8.3%	34.6%
52	Fredonia, WI	10.9%	11.8%	13.2%	6.1%	10.4%	48.3%

Zone	Name	1990-1996	1996-2000	2000-2010	2010-2020	2020-2040	Cum.1996-2040
		Employment Growth by Zone					
53	West Bend, WI	9.4%	10.9%	11.6%	5.0%	9.4%	42.1%
54	Beaver Dam, WI	-34.7%	7.9%	5.8%	2.3%	6.7%	24.7%
55	Wyocena, WI	7.3%	9.7%	9.4%	3.8%	8.5%	35.2%
56	Portage, WI	7.3%	9.7%	9.4%	3.8%	8.5%	35.2%
57	Madison, WI	10.2%	11.2%	12.2%	5.2%	9.8%	44.1%
58	Monona, WI	10.2%	11.2%	12.2%	5.2%	9.8%	44.1%
59	Baraboo, WI	10.3%	11.3%	12.6%	5.5%	9.6%	44.8%
60	Wisconsin Dells, WI	5.5%	8.3%	6.1%	1.8%	8.3%	26.7%
61	Easton, WI	5.5%	8.3%	6.1%	1.8%	8.3%	26.7%
62	New Lisbon, WI	9.5%	10.7%	11.4%	5.0%	9.2%	41.3%
63	Sheboygan, WI	6.1%	8.9%	8.1%	3.2%	7.9%	31.1%
64	Fond Du Lac, WI	6.2%	8.8%	8.2%	2.8%	8.0%	30.7%
65	Montello, WI	7.1%	9.8%	8.2%	2.5%	9.2%	33.0%
66	Manitowoc, WI	4.8%	8.4%	6.9%	2.6%	7.5%	27.8%
67	Chilton, WI	7.0%	9.0%	9.3%	3.5%	7.5%	32.6%
68	Oshkosh, WI	7.8%	10.0%	9.7%	4.0%	8.6%	36.3%
69	Sturgeon Bay	8.2%	10.5%	10.0%	4.4%	8.8%	38.1%
70	Green Bay, WI	8.9%	10.6%	10.8%	4.5%	9.4%	40.1%
71	Appleton, WI	9.4%	10.8%	11.3%	4.8%	9.5%	41.5%
72	Stevens Point	8.0%	10.0%	9.8%	4.1%	8.8%	36.8%
73	Wausau, WI	7.9%	9.9%	9.8%	4.0%	8.7%	36.3%
74	Tomah, WI	7.6%	10.0%	10.0%	3.8%	8.0%	35.7%
75	La Crosse, WI	10.1%	11.1%	11.9%	5.1%	9.9%	43.6%
76	Black River Falls, WI	5.0%	7.5%	7.6%	2.3%	7.3%	27.0%
77	Whitehall, WI	7.1%	9.3%	9.0%	3.1%	8.3%	33.0%
78	Modena, WI	4.5%	8.9%	6.1%	3.4%	6.7%	27.6%
79	Eau Claire, WI	9.0%	10.8%	10.9%	4.6%	9.3%	40.5%
80	Chippewa Falls, WI	7.0%	9.5%	9.6%	3.6%	8.3%	34.8%
81	Menomonie, WI	6.4%	9.3%	8.6%	3.0%	7.8%	31.8%
82	River Falls, WI	8.1%	9.9%	9.9%	4.6%	8.1%	36.4%
83	New Richmond, WI	10.2%	11.4%	12.1%	5.0%	9.3%	43.3%
84	Rice Lake, WI	7.3%	9.7%	9.4%	3.7%	8.4%	34.9%
85	Balsam Lake, WI	7.0%	9.0%	8.7%	2.8%	8.1%	31.7%
86	Rhinelander, WI	7.8%	10.0%	9.3%	4.0%	8.7%	35.9%
87	Owen, WI	5.9%	8.9%	7.7%	2.4%	7.7%	29.3%
88	Shawano, WI	6.6%	9.1%	8.5%	3.4%	8.0%	32.2%
89	Berlin, WI	8.1%	10.1%	10.2%	4.2%	8.9%	37.7%
90	Platteville, WI	7.0%	9.4%	9.4%	3.7%	8.0%	34.0%
91	Richland Center, WI	5.0%	8.7%	7.1%	2.2%	7.2%	27.7%
	Sum: Wisconsin Zones	7.2%	10.0%	9.8%	4.0%	8.9%	36.8%
92	Chicago North, IL	5.8%	5.3%	8.6%	3.2%	8.0%	27.3%
93	Chicago South, IL	5.8%	5.3%	8.6%	3.2%	8.0%	27.3%
94	Arlington Heights, IL	5.8%	5.3%	8.6%	3.2%	8.0%	27.3%
95	Maywood, IL	5.8%	5.3%	8.6%	3.2%	8.0%	27.3%
96	Homewood, IL	5.8%	5.3%	8.6%	3.2%	8.0%	27.3%
97	Waukegan, IL	10.7%	8.2%	14.3%	6.4%	10.5%	45.3%
98	Wheaton, IL	16.1%	10.6%	18.8%	8.3%	12.0%	59.4%
99	Joliet, IL	4.5%	4.6%	7.2%	3.3%	6.3%	23.2%
100	Kankakee, IL	8.7%	6.9%	11.8%	4.9%	9.3%	37.1%
101	DeKalb, IL	9.2%	7.2%	12.3%	5.2%	9.2%	38.2%
102	Rockford, IL	7.1%	5.9%	10.2%	4.1%	8.4%	31.7%
103	Dixon, IL	6.8%	5.9%	9.6%	4.2%	8.0%	30.7%
	Sum: Chicago Area Zones	7.5%	6.2%	10.5%	4.3%	8.8%	33.2%

Employment

Zone	Name	1990	1996	2000	2010	2020	2040
1	Caledonia, MN	7512	7958	8620	9225	9425	9930
2	Preston, MN	10713	11206	12069	12870	13050	13738
3	Winona, MN	28011	30305	33296	36559	37820	40671
4	Rochester, MN	75242	82668	91484	101362	105607	114939
5	Eyota, MN	75242	82668	91484	101362	105607	114939
6	Theilman, MN	9413	9886	10668	11389	11600	12378
7	Red Wing, MN	23119	24725	26939	29156	29966	32101
8	Apple Valley, MN	64951	77227	90435	107570	119130	134496
9	Shakopee, MN	24700	27922	31465	36103	38304	42167
10	Waconia, MN	20889	23720	26831	30864	32745	36046
11	Lake Elmo, MN	52282	58991	66270	75623	79991	88007
12	St. Paul, MN	286835	306720	322300	353550	366800	385291
13	Long Lake, MN	510815	570618	666375	770771	812079	890974
14	Minneapolis, MN	278438	288822	290000	292800	297500	301466
15	Bloomington, MN	127759	153816	163200	179400	187730	202851
16	Maple Lake, MN	26450	29508	32973	37356	39391	42983
17	Coon Rapids, MN	81132	92926	100690	118320	126240	137911
18	Almelund, MN	12990	14732	16594	19020	20179	22308
19	Cambridge, MN	9976	10980	12176	13439	14137	15235
20	Orrock, MN	12890	14649	16594	19247	20541	22716
21	St. Cloud, MN	86171	94843	105277	117421	122645	133166
22	Brainerd, MN	61187	65403	71334	77217	79145	84742
23	Moorhead, MN	66480	70479	76722	82343	84341	89639
24	Thief River Falls, MN	71277	75311	81679	87126	88932	94536
25	Grands Rapids, MN	40799	43541	47520	51137	52562	56313
26	Mora, MN	23646	25373	27801	30181	31054	33326
27	Lake/Cook County border, MN	6466	7064	7758	8428	8821	9522
28	Duluth, MN	96930	102696	111527	119129	121678	130174
29	Montevideo, MN	185240	197207	214541	230741	236106	252866
30	Willmar, MN	33166	34734	37391	39406	40237	42575
31	Hutchinson, MN	26618	28277	30710	33256	33954	36318
32	Mankato, MN	37408	38709	41637	43290	43898	45989
33	Albert Lea, MN	18680	19792	21443	22778	23200	24756
34	Owatonna, MN	9457	9765	10452	10820	10996	11562
35	Worthington, MN	108482	114551	124027	132454	135090	143640
36	Austin, MN	7600	7735	8297	8542	8458	8841
37	Northfield, MN	10712	11226	12176	12756	13050	13738
	Sum: Minnesota Zones	2629677	2866752	3140760	3463009	3602009	3872851
38	Kenosha, WI	51024	53086	57221	60502	61703	66129
39	Racine, WI	86691	92883	101702	110806	114732	124616
40	Elkhorn, WI	38880	41891	46100	50533	52540	57099
41	Janesville, WI	70993	76352	83780	91899	95549	103917
42	Monroe, WI	19108	20367	22348	24292	25170	27229
43	Milwaukee, WI	399568	417005	454143	489539	504279	546954
44	Glendale, WI	44752	47441	51667	55693	57370	62225
45	Wauwatosa, WI	113082	119878	130555	140730	144967	157236
46	Greenfield, WI	59077	62627	68205	73521	75734	82144
47	Waukesha, WI	104380	117487	132081	151145	160744	178045
48	Delafield, WI	76756	86394	97126	111145	118204	130926
49	Jefferson, WI	36970	39578	43293	47210	48996	53070
50	Watertown, WI	8750	7894	8601	9299	9612	10368
51	Dodgeville, WI	11696	12488	13711	15011	15518	16810
52	Fredonia, WI	34218	37945	42430	48012	50951	56265

Employment

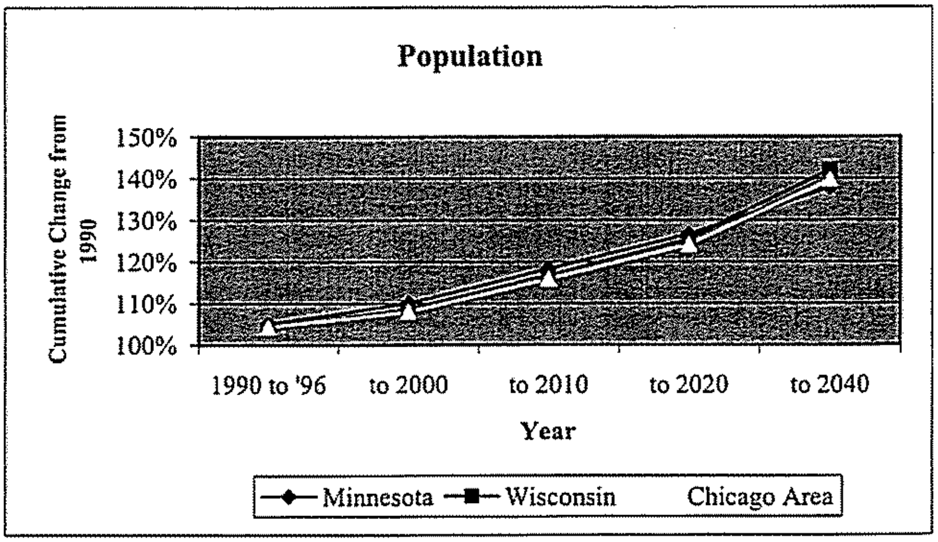
Zone	Name	1990	1996	2000	2010	2020	2040
53	West Bend, WI	43506	47614	52794	58898	61826	67657
54	Beaver Dam, WI	24734	16155	17436	18448	18878	20144
55	Wyocena, WI	23746	25484	27963	30595	31768	34454
56	Portage, WI	23746	25484	27963	30595	31768	34454
57	Madison, WI	131590	145044	161349	181020	190418	209067
58	Monona, WI	121468	133887	148938	167096	175771	192985
59	Baraboo, WI	30254	33379	37139	41824	44109	48346
60	Wisconsin Dells, WI	4156	4387	4750	5042	5132	5557
61	Easton, WI	4156	4387	4750	5042	5132	5557
62	New Lisbon, WI	10776	11797	13064	14553	15273	16671
63	Sheboygan, WI	59097	62729	68341	73909	76243	82244
64	Fond Du Lac, WI	48956	51987	56573	61190	62925	67935
65	Montello, WI	4684	5016	5506	5959	6109	6668
66	Manitowoc, WI	39823	41733	45237	48356	49607	53348
67	Chilton, WI	15379	16449	17922	19594	20283	21811
68	Oshkosh, WI	81143	87458	96195	105535	109722	119198
69	Sturgeon Bay	25026	27066	29906	32887	34334	37371
70	Green Bay, WI	116472	126845	140245	155380	162384	177686
71	Appleton, WI	87113	95309	105588	117566	123163	134897
72	Stevens Point	69347	74868	82376	90409	94083	102388
73	Wausau, WI	63408	68391	75143	82503	85774	93219
74	Tomah, WI	19790	21301	23428	25782	26759	28897
75	La Crosse, WI	65493	72079	80109	89607	94205	103500
76	Black River Falls, WI	6984	7331	7881	8479	8675	9308
77	Whitehall, WI	13651	14621	15979	17417	17961	19450
78	Modena, WI	6357	6641	7234	7677	7942	8474
79	Eau Claire, WI	49792	54274	60136	66690	69768	76270
80	Chippewa Falls, WI	25347	27109	29690	32543	33723	36537
81	Menomonie, WI	16152	17180	18786	20397	21016	22645
82	River Falls, WI	18089	19555	21485	23605	24681	26674
83	New Richmond, WI	21807	24039	26775	30022	31524	34454
84	Rice Lake, WI	72036	77265	84751	92701	96160	104194
85	Balsam Lake, WI	15279	16347	17814	19365	19916	21534
86	Rhinelander, WI	57369	61852	68017	74367	77343	84050
87	Owen, WI	25463	26967	29366	31626	32379	34870
88	Shawano, WI	63761	67967	74171	80440	83208	89885
89	Berlin, WI	42188	45586	50203	55346	57671	62794
90	Platteville, WI	42453	45405	49663	54314	56327	60850
91	Richland Center, WI	20525	21546	23428	25095	25659	27507
	Sum: Wisconsin Zones	2767062	2965850	3261055	3581208	3725688	4056582
92	Chicago North, IL	1059334	1120556	1179477	1280425	1321690	1427026
93	Chicago South, IL	1059334	1120556	1179477	1280425	1321690	1427026
94	Arlington Heights, IL	411836	435637	458544	497789	513832	554783
95	Maywood, IL	333792	353083	371648	403457	416459	449650
96	Homewood, IL	264887	280195	294928	320170	330489	356828
97	Waukegan, IL	278190	307975	333078	380650	404898	447411
98	Wheaton, IL	471049	547006	604989	718474	778019	871741
99	Joliet, IL	13169	13755	14392	15435	15946	16952
100	Kankakee, IL	118295	128536	137446	153695	161197	176174
101	DeKalb, IL	281952	307870	329891	370433	389530	425503
102	Rockford, IL	162775	174293	184632	203477	211809	229508
103	Dixon, IL	39807	42507	45027	49348	51421	55551
	Sum: Chicago Area Zones	4494419	4831969	5133530	5673776	5916979	6438155

Employment Growth by Zone

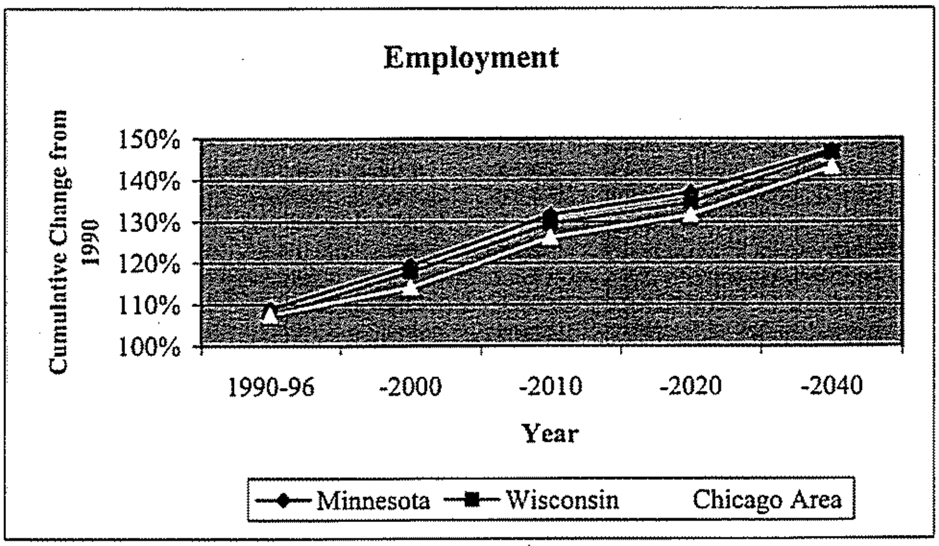
Zone	Name	1990-1996	1996-2000	2000-2010	2010-2020	2020-2040	Cum.1996-2040
1	Caledonia, MN	5.9%	8.3%	7.0%	2.2%	5.4%	24.8%
2	Preston, MN	4.6%	7.7%	6.6%	1.4%	5.3%	22.6%
3	Winona, MN	8.2%	9.9%	9.8%	3.5%	7.5%	34.2%
4	Rochester, MN	9.9%	10.7%	10.8%	4.2%	8.8%	39.0%
5	Eyota, MN	9.9%	10.7%	10.8%	4.2%	8.8%	39.0%
6	Theilman, MN	5.0%	7.9%	6.8%	1.9%	6.7%	25.2%
7	Red Wing, MN	6.9%	9.0%	8.2%	2.8%	7.1%	29.8%
8	Apple Valley, MN	18.9%	17.1%	18.9%	10.7%	12.9%	74.2%
9	Shakopee, MN	13.0%	12.7%	14.7%	6.1%	10.1%	51.0%
10	Waconia, MN	13.6%	13.1%	15.0%	6.1%	10.1%	52.0%
11	Lake Elmo, MN	12.8%	12.3%	14.1%	5.8%	10.0%	49.2%
12	St. Paul, MN	6.9%	5.1%	9.7%	3.7%	5.0%	25.6%
13	Long Lake, MN	11.7%	16.8%	15.7%	5.4%	9.7%	56.1%
14	Minneapolis, MN	3.7%	0.4%	1.0%	1.6%	1.3%	4.4%
15	Bloomington, MN	20.4%	6.1%	9.9%	4.6%	8.1%	31.9%
16	Maple Lake, MN	11.6%	11.7%	13.3%	5.4%	9.1%	45.7%
17	Coon Rapids, MN	14.5%	8.4%	17.5%	6.7%	9.2%	48.4%
18	Almelund, MN	13.4%	12.6%	14.6%	6.1%	10.5%	51.4%
19	Cambridge, MN	10.1%	10.9%	10.4%	5.2%	7.8%	38.7%
20	Orrock, MN	13.7%	13.3%	16.0%	6.7%	10.6%	55.1%
21	St. Cloud, MN	10.1%	11.0%	11.5%	4.4%	8.6%	40.4%
22	Brainerd, MN	6.9%	9.1%	8.2%	2.5%	7.1%	29.6%
23	Moorhead, MN	6.0%	8.9%	7.3%	2.4%	6.3%	27.2%
24	Thief River Falls, MN	5.7%	8.5%	6.7%	2.1%	6.3%	25.5%
25	Grands Rapids, MN	6.7%	9.1%	7.6%	2.8%	7.1%	29.3%
26	Mora, MN	7.3%	9.6%	8.6%	2.9%	7.3%	31.3%
27	Lake/Cook County border, MN	9.2%	9.8%	8.6%	4.7%	7.9%	34.8%
28	Duluth, MN	5.9%	8.6%	6.8%	2.1%	7.0%	26.8%
29	Montevideo, MN	6.5%	8.8%	7.6%	2.3%	7.1%	28.2%
30	Willmar, MN	4.7%	7.6%	5.4%	2.1%	5.8%	22.6%
31	Hutchinson, MN	6.2%	8.6%	8.3%	2.1%	7.0%	28.4%
32	Mankato, MN	3.5%	7.6%	4.0%	1.4%	4.8%	18.8%
33	Albert Lea, MN	6.0%	8.3%	6.2%	1.9%	6.7%	25.1%
34	Owatonna, MN	3.3%	7.0%	3.5%	1.6%	5.1%	18.4%
35	Worthington, MN	5.6%	8.3%	6.8%	2.0%	6.3%	25.4%
36	Austin, MN	1.8%	7.3%	2.9%	-1.0%	4.5%	14.3%
37	Northfield, MN	4.8%	8.5%	4.8%	2.3%	5.3%	22.4%
	Sum: Minnesota Zones	9.0%	9.6%	10.3%	4.0%	7.5%	35.1%
38	Kenosha, WI	4.0%	7.8%	5.7%	2.0%	7.2%	24.6%
39	Racine, WI	7.1%	9.5%	9.0%	3.5%	8.6%	34.2%
40	Elkhorn, WI	7.7%	10.0%	9.6%	4.0%	8.7%	36.3%
41	Janesville, WI	7.5%	9.7%	9.7%	4.0%	8.8%	36.1%
42	Monroe, WI	6.6%	9.7%	8.7%	3.6%	8.2%	33.7%
43	Milwaukee, WI	4.4%	8.9%	7.8%	3.0%	8.5%	31.2%
44	Glendale, WI	6.0%	8.9%	7.8%	3.0%	8.5%	31.2%
45	Wauwatosa, WI	6.0%	8.9%	7.8%	3.0%	8.5%	31.2%
46	Greenfield, WI	6.0%	8.9%	7.8%	3.0%	8.5%	31.2%
47	Waukesha, WI	12.6%	12.4%	14.4%	6.4%	10.8%	51.5%
48	Delafield, WI	12.6%	12.4%	14.4%	6.4%	10.8%	51.5%
49	Jefferson, WI	7.1%	9.4%	9.0%	3.8%	8.3%	34.1%
50	Watertown, WI	-9.8%	9.0%	8.1%	3.4%	7.9%	31.3%
51	Dodgeville, WI	6.8%	9.8%	9.5%	3.4%	8.3%	34.6%
52	Fredonia, WI	10.9%	11.8%	13.2%	6.1%	10.4%	48.3%

Employment Growth by Zone

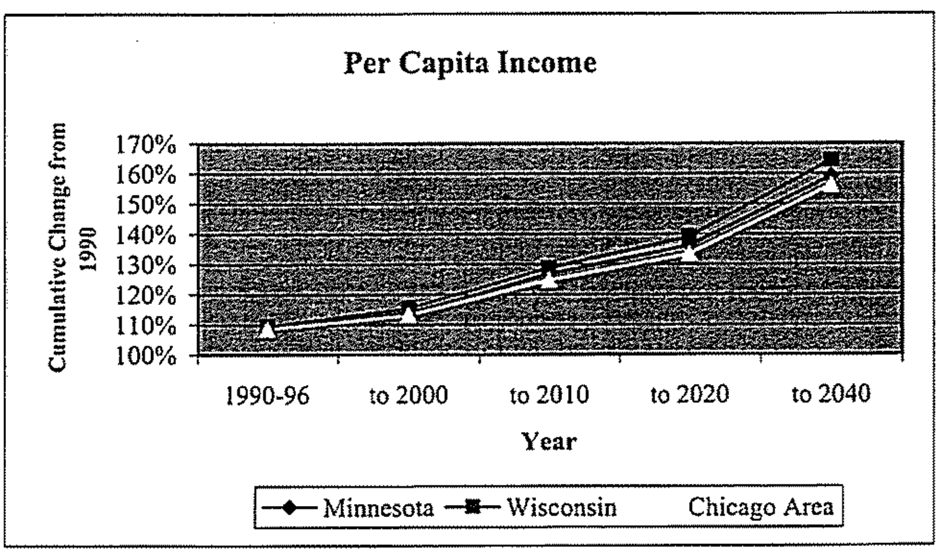
Zone	Name	1990-1996	1996-2000	2000-2010	2010-2020	2020-2040	Cum.1996-2040
53	West Bend, WI	9.4%	10.9%	11.6%	5.0%	9.4%	42.1%
54	Beaver Dam, WI	-34.7%	7.9%	5.8%	2.3%	6.7%	24.7%
55	Wyocena, WI	7.3%	9.7%	9.4%	3.8%	8.5%	35.2%
56	Portage, WI	7.3%	9.7%	9.4%	3.8%	8.5%	35.2%
57	Madison, WI	10.2%	11.2%	12.2%	5.2%	9.8%	44.1%
58	Monona, WI	10.2%	11.2%	12.2%	5.2%	9.8%	44.1%
59	Baraboo, WI	10.3%	11.3%	12.6%	5.5%	9.6%	44.8%
60	Wisconsin Dells, WI	5.5%	8.3%	6.1%	1.8%	8.3%	26.7%
61	Easton, WI	5.5%	8.3%	6.1%	1.8%	8.3%	26.7%
62	New Lisbon, WI	9.5%	10.7%	11.4%	5.0%	9.2%	41.3%
63	Sheboygan, WI	6.1%	8.9%	8.1%	3.2%	7.9%	31.1%
64	Fond Du Lac, WI	6.2%	8.8%	8.2%	2.8%	8.0%	30.7%
65	Montello, WI	7.1%	9.8%	8.2%	2.5%	9.2%	33.0%
66	Manitowoc, WI	4.8%	8.4%	6.9%	2.6%	7.5%	27.8%
67	Chilton, WI	7.0%	9.0%	9.3%	3.5%	7.5%	32.6%
68	Oshkosh, WI	7.8%	10.0%	9.7%	4.0%	8.6%	36.3%
69	Sturgeon Bay	8.2%	10.5%	10.0%	4.4%	8.8%	38.1%
70	Green Bay, WI	8.9%	10.6%	10.8%	4.5%	9.4%	40.1%
71	Appleton, WI	9.4%	10.8%	11.3%	4.8%	9.5%	41.5%
72	Stevens Point	8.0%	10.0%	9.8%	4.1%	8.8%	36.8%
73	Wausau, WI	7.9%	9.9%	9.8%	4.0%	8.7%	36.3%
74	Tomah, WI	7.6%	10.0%	10.0%	3.8%	8.0%	35.7%
75	La Crosse, WI	10.1%	11.1%	11.9%	5.1%	9.9%	43.6%
76	Black River Falls, WI	5.0%	7.5%	7.6%	2.3%	7.3%	27.0%
77	Whitehall, WI	7.1%	9.3%	9.0%	3.1%	8.3%	33.0%
78	Modena, WI	4.5%	8.9%	6.1%	3.4%	6.7%	27.6%
79	Eau Claire, WI	9.0%	10.8%	10.9%	4.6%	9.3%	40.5%
80	Chippewa Falls, WI	7.0%	9.5%	9.6%	3.6%	8.3%	34.8%
81	Menomonie, WI	6.4%	9.3%	8.6%	3.0%	7.8%	31.8%
82	River Falls, WI	8.1%	9.9%	9.9%	4.6%	8.1%	36.4%
83	New Richmond, WI	10.2%	11.4%	12.1%	5.0%	9.3%	43.3%
84	Rice Lake, WI	7.3%	9.7%	9.4%	3.7%	8.4%	34.9%
85	Balsam Lake, WI	7.0%	9.0%	8.7%	2.8%	8.1%	31.7%
86	Rhinelander, WI	7.8%	10.0%	9.3%	4.0%	8.7%	35.9%
87	Owen, WI	5.9%	8.9%	7.7%	2.4%	7.7%	29.3%
88	Shawano, WI	6.6%	9.1%	8.5%	3.4%	8.0%	32.2%
89	Berlin, WI	8.1%	10.1%	10.2%	4.2%	8.9%	37.7%
90	Platteville, WI	7.0%	9.4%	9.4%	3.7%	8.0%	34.0%
91	Richland Center, WI	5.0%	8.7%	7.1%	2.2%	7.2%	27.7%
	Sum: Wisconsin Zones	7.2%	10.0%	9.8%	4.0%	8.9%	36.8%
92	Chicago North, IL	5.8%	5.3%	8.6%	3.2%	8.0%	27.3%
93	Chicago South, IL	5.8%	5.3%	8.6%	3.2%	8.0%	27.3%
94	Arlington Heights, IL	5.8%	5.3%	8.6%	3.2%	8.0%	27.3%
95	Maywood, IL	5.8%	5.3%	8.6%	3.2%	8.0%	27.3%
96	Homewood, IL	5.8%	5.3%	8.6%	3.2%	8.0%	27.3%
97	Waukegan, IL	10.7%	8.2%	14.3%	6.4%	10.5%	45.3%
98	Wheaton, IL	16.1%	10.6%	18.8%	8.3%	12.0%	59.4%
99	Joliet, IL	4.5%	4.6%	7.2%	3.3%	6.3%	23.2%
100	Kankakee, IL	8.7%	6.9%	11.8%	4.9%	9.3%	37.1%
101	DeKalb, IL	9.2%	7.2%	12.3%	5.2%	9.2%	38.2%
102	Rockford, IL	7.1%	5.9%	10.2%	4.1%	8.4%	31.7%
103	Dixon, IL	6.8%	5.9%	9.6%	4.2%	8.0%	30.7%
	Sum: Chicago Area Zones	7.5%	6.2%	10.5%	4.3%	8.8%	33.2%



Population
Cumulative Change from 1990
150%
140%
130%
120%
110%
100%
1990 to '96
to 2000
to 2010
to 2020
to 2040
Year
Minnesota
Wisconsin
Chicago Area



Employment
Cumulative Change from 1990
150%
140%
130%
120%
110%
100%
1990-96
-2000
-2010
-2020
-2040
Year
Minnesota
Wisconsin
Chicago Area



Per Capita Income
Cumulative Change from 1990
170%
160%
150%
140%
130%
120%
110%
100%
1990-96
to 2000
to 2010
to 2020
to 2040
Year
Minnesota
Wisconsin
Chicago Area

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Appendix 5.3
Base Year Trip Detail

Exhibit 5.3.1 identifies trips within the study area by trip purpose.

Exhibit 5.3.1
Base Year City-to-City Annual Trips within the Study Area by Trip Purpose

Origin Name	Destination Name	Total Business	Total Non-Business	Total	Ratio Business to Total Trips
Milwaukee	Chicago	2,292,401	2,568,349	4,860,750	47%
Milwaukee	Madison	1,544,246	2,341,621	3,885,867	40%
Twin Cities	Chicago	959,124	1,242,934	2,202,058	44%
Rochester	Twin Cities	708,226	1,318,904	2,027,130	35%
Madison	Chicago	451,232	721,333	1,172,565	38%
Milwaukee	Green Bay	375,740	497,630	873,370	43%
Twin Cities	Milwaukee	269,590	517,070	786,660	34%
Twin Cities	Madison	113,278	237,784	351,062	32%
Madison	Green Bay	138,031	143,100	281,131	49%
Rochester	Chicago	94,140	157,574	251,714	37%
Green Bay	Chicago	99,482	145,727	245,209	41%
Rochester	Milwaukee	55,505	88,601	144,106	39%
Twin Cities	Green Bay	42,995	90,878	133,873	32%
Rochester	Madison	33,037	49,697	82,734	40%
Rochester	Green Bay	5,349	8,366	13,715	39%
City Sum	Internal Zones	7,182,373	10,129,570	17,311,943	41%
Total Trips (Including short trips)	Internal Zones	147,069,555	413,806,488	560,876,043	26%

The most significant points from Exhibit 5.3.1 are the varying proportions of business and non-business travelers. Business travelers comprise from about one-third to almost half the market, depending on the city pair. Business and non-business travelers are very different in terms of expectations and preferred trade-offs between price and travel time, and in the typical number of travelers for a given trip. For example, business travelers generally place a higher value on time and on the ability to travel at the last minute, and are therefore willing to pay a higher fare for a faster trip. Non-business travelers in a small group are more likely to use auto, if available, rather than a public mode, due to shared-ride economies. Individual non-business travelers are more likely to plan in advance and take advantage of discounted fares. Therefore the ridership and revenue patterns between cities will vary depending on the mix of business and non-business travelers.

Exhibit 5.3.2 presents the market share by mode for trips within the corridor.

Exhibit 5.3.2

Market Share by Mode for Base City-to-City Trips within the Study Area

Origin Name	Destination Name	Market Share: All Modes			
		Auto	Air	Bus	Rail
Milwaukee	Chicago	92.9%	0.8%	1.5%	4.7%
Milwaukee	Madison	98.5%	0.0%	1.5%	
Twin Cities	Chicago	51.5%	46.6%	0.3%	1.6%
Rochester	Twin Cities	99.4%	0.5%	0.1%	
Madison	Chicago	96.0%	2.3%	1.7%	
Milwaukee	Green Bay	99.6%	0.0%	0.4%	
Twin Cities	Milwaukee	80.4%	18.1%	0.7%	0.9%
Twin Cities	Madison	92.7%	6.8%	0.5%	
Madison	Green Bay	99.8%	0.0%	0.2%	
Rochester	Chicago	89.4%	10.3%	0.3%	
Green Bay	Chicago	93.2%	5.8%	0.9%	
Rochester	Milwaukee	98.9%	0.7%	0.4%	
Twin Cities	Green Bay	89.1%	10.2%	0.6%	
Rochester	Madison	99.6%	0.1%	0.3%	
Rochester	Green Bay	97.3%	2.1%	0.6%	
City Sum	Internal Zones	89.7%	7.7%	1.0%	1.6%
Total Trips	Internal Zones	99.3%	0.3%	0.1%	0.1%
(Including short trips)					

1. Key among the aggregate findings is that auto, as in most areas, is the dominant mode in the corridor, representing almost 90 percent of regional intercity trips. Air carries less than 8 percent of travelers among cities in the region. Rail, currently available in only three of the major cities, carries less than two percent of the travelers. However, rail still carries more travelers than bus, which carries only one percent of travelers, despite bus' broad geographical coverage.
2. For the Milwaukee-Chicago corridor, rail currently carries about five percent of that intercity market- more than double air and bus combined.
3. Also noteworthy is the relatively high share of air traffic between Twin Cities and Chicago (47 percent), compared to Twin Cities and Milwaukee (18 percent), Twin Cities and Green Bay (10 percent) and Rochester and Chicago (10 percent). All represent distances greater than 250 miles (approximately 275 to 400 miles), but the availability and price of connecting air service varies greatly.

Exhibit 5.3.3 details the shares of the current "public" markets, eliminating the large influence of the automobile on market shares for purposes of comparison.

Exhibit 5.3.3

Market Shares for Public Modes for Base City-to-City Trips within the Study Area

Origin Name	Destination Name	Market Share: Public Modes Air	Bus	Rail
Milwaukee	Chicago	11.6%	21.7%	66.7%
Milwaukee	Madison	1.0%	99.0%	
Twin Cities	Chicago	96.0%	0.6%	3.3%
Rochester	Twin Cities	75.8%	24.2%	
Madison	Chicago	57.1%	42.9%	
Milwaukee	Green Bay	3.7%	96.3%	
Twin Cities	Milwaukee	92.1%	3.4%	4.5%
Twin Cities	Madison	93.2%	6.8%	
Madison	Green Bay	4.9%	95.1%	
Rochester	Chicago	97.4%	2.6%	
Green Bay	Chicago	86.5%	13.5%	
Rochester	Milwaukee	65.8%	34.2%	
Twin Cities	Green Bay	94.2%	5.8%	
Rochester	Madison	33.7%	66.3%	
Rochester	Green Bay	78.1%	21.9%	
City Sum	Internal Zones	74.7%	10.1%	15.3%
Total Trips	Internal Zones	64.0%	23.1%	12.9%

1. Rail commands two thirds of the public mode travel (air, bus and rail) between Milwaukee and Chicago. People respond favorably to speed of travel, frequency of service and price.
2. The high modal shares for bus from Green Bay to Milwaukee and Green Bay to Madison suggest the high potential for rail due in part to inadequate air service.

Although rail currently connects only three of the major cities represented in the corridor, because of its success with Milwaukee it carries more passengers than bus among all the major cities. Wherever rail competes directly with bus in this corridor, it clearly claims a much larger share of the market. And, in the case of Milwaukee-Chicago, it carries three times more passengers than bus and almost six times more passengers than air.

Major cities in the corridor are also closely linked to the rest of the Midwest. Approximately 49 million trips per year are generated from the cities in the corridor to other Midwestern cities. Although approximately 81 percent originate or terminate in Chicago, the remaining 19 percent represents 7.9 million trips per year. Milwaukee is responsible for about 10 percent of the trips outside the region, while Minneapolis-St. Paul generates about 5 percent.

Exhibit 5.3.4 presents the top five destination cities or areas outside the study area for each major city within the study area. Detroit ranks among the top five cities in every case. The north- south orientation of travel is also represented. Note that Chicago, Green Bay and Twin Cities all number Indianapolis among the top five, and Twin Cities and Rochester both number St. Louis among the top five destination cities outside the study area.

Exhibit 5.3.4
Base Year External Destination Trips by Mode

Origin	Destination	Auto	Air	Bus	Rail	Total Business	Total Non-Business	Total All Modes
Chicago	Gary, IN	10,049,992	-	16,641	3,049	2,395,958	7,673,724	10,069,682
Chicago	North Indiana	6,432,790	23,594	870	22,140	1,489,800	4,989,594	6,479,394
Chicago	Detroit, MI	1,967,674	1,342,649	5,269	121,872	1,212,508	2,224,956	3,437,464
Chicago	South Michigan	3,194,564	25,154	485	173,236	762,604	2,630,835	3,393,439
Chicago	Indianapolis, IN	2,250,790	377,396	6,194	4,570	870,173	1,768,778	2,638,950
Chicago	All External Zones	34,951,715	3,992,543	50,997	745,367	10,992,305	28,748,317	39,740,622
Green Bay	North Indiana	50,908	750	131	-	13,531	38,258	51,789
Green Bay	Detroit, MI	30,557	18,710	308	-	16,189	33,386	49,575
Green Bay	South Michigan	34,112	1,201	101	-	9,200	26,214	35,414
Green Bay	Gary, IN	29,846	-	217	-	8,155	21,908	30,063
Green Bay	Indianapolis, IN	22,755	1,475	229	-	7,413	17,046	24,459
Green Bay	All External Zones	294,964	31,025	2,248	-	94,931	233,307	328,238
Madison	North Illinois	189,127	189	-	-	13,187	176,129	189,316
Madison	North Indiana	181,262	910	182	-	50,893	131,461	182,354
Madison	Gary, IN	128,418	-	736	-	37,057	92,097	129,154
Madison	Detroit, MI	91,821	31,726	940	-	37,938	86,549	124,487
Madison	South Michigan	113,153	938	226	-	31,713	82,604	114,317
Madison	All External Zones	1,220,362	56,450	5,903	-	346,831	935,884	1,282,715
Milwaukee	North Indiana	793,106	448	696	1,404	207,560	588,094	795,654
Milwaukee	Gary, IN	660,062	-	5,001	231	178,938	486,356	665,294
Milwaukee	South Michigan	468,665	842	1,007	9,956	122,786	357,685	480,470
Milwaukee	Detroit, MI	354,170	106,088	3,189	4,726	144,005	324,168	468,173
Milwaukee	North Illinois	387,037	420	-	5,603	113,565	279,494	393,060

Exhibit 5.3.4 (continued)
Base Year External Destination Trips by Mode

Origin	Destination	Auto	Air	Bus	Rail	Total Business	Total Non-Business	Total All Modes
Milwaukee	All External Zones	4,524,380	240,020	24,798	40,082	1,401,393	3,427,887	4,829,280
Twin Cities	Detroit, MI	138,239	283,995	1,099	-	182,578	240,755	423,333
Twin Cities	North Illinois	363,291	12,502	-	438	82,973	293,258	376,231
Twin Cities	St. Louis, MO	107,994	180,127	880	85	137,346	151,740	289,086
Twin Cities	North Indiana	181,542	13,851	285	43	45,152	150,569	195,721
Twin Cities	Indianapolis, IN	86,754	90,777	758	12	68,433	109,868	178,301
Twin Cities	All External Zones	1,556,100	814,683	7,151	1,380	798,201	1,581,113	2,379,314
Rochester	North Illinois	68,874	500	-	-	20,880	48,494	69,374
Rochester	North Indiana	32,062	749	28	-	10,540	22,299	32,839
Rochester	Detroit, MI	22,668	6,188	112	-	10,051	18,917	28,968
Rochester	South Michigan	22,958	603	22	-	7,399	16,183	23,583
Rochester	St. Louis, MO	19,409	3,055	84	-	8,959	13,588	22,548
Rochester	All External Zones	277,214	15,993	740	-	99,591	194,356	293,947
Major City Sum	External Zones	42,824,735	5,150,714	91,838	786,829	13,733,251	35,120,864	48,854,116
All City Pairs	External Zones	62,008,204	5,980,371	147,594	942,496	18,948,025	50,130,640	69,078,665

Exhibit 5.3.5 presents the modal shares for external trip: trips from within the study area to cities and zones outside the study area. Full detail is available on diskette by request. Of note in this exhibit is the correlation between availability and frequency of public modes and increases in modal share. Note, for example, that rail garners two percent of all trips between Milwaukee and Southern Michigan compared to 0.2 percent for air, and a full 84 percent of public mode trips. In similar fashion, frequent air service between Chicago and Detroit claims thirty-nine percent of the total travel market. Rail claims a respectable four percent of the same market.

Exhibit 5.3.5
Market Share by Mode for Base Year External Destintion Trips

			Market Shares: All Modes				Market Shares: Public Modes		
Origin	Destination	Percent of External Trips	Auto	Air	Bus	Rail	Air	Bus	Rail
Chicago	Gary, IN		99.80%	0.00%	0.17%	0.03%	0.00%	84.51%	15.49%
Chicago	North Indiana		99.28%	0.36%	0.01%	0.34%	50.63%	1.87%	47.51%
Chicago	Detroit, MI		57.24%	39.06%	0.15%	3.55%	91.35%	0.36%	8.29%
Chicago	South Michigan		94.14%	0.74%	0.01%	5.11%	12.65%	0.24%	87.11%
Chicago	Indianapolis, IN		85.29%	14.30%	0.23%	0.17%	97.23%	1.60%	1.18%
Chicago	All External Zones	81.35%							
Green Bay	North Indiana		98.30%	1.45%	0.25%	0.00%	85.10%	14.90%	0.00%
Green Bay	Detroit, MI		61.64%	37.74%	0.62%	0.00%	98.38%	1.62%	0.00%
Green Bay	South Michigan		96.32%	3.39%	0.28%	0.00%	92.27%	7.73%	0.00%
Green Bay	Gary, IN		99.28%	0.00%	0.72%	0.00%	0.00%	100.00%	0.00%
Green Bay	Indianapolis, IN		93.03%	6.03%	0.94%	0.00%	86.56%	13.44%	0.00%
Green Bay	All External Zones	0.67%	89.86%	9.45%	0.68%	0.00%	93.24%	6.76%	0.00%
Madison	North Illinois		99.90%	0.10%	0.00%	0.00%	100.0%	0.00%	0.00%
Madison	North Indiana		99.40%	0.50%	0.10%	0.00%	83.31%	16.69%	0.00%
Madison	Gary, IN		99.43%	0.00%	0.57%	0.00%	0.00%	100.00%	0.00%
Madison	Detroit, MI		73.76%	25.49%	0.75%	0.00%	97.12%	2.88%	0.00%
Madison	South Michigan		98.98%	0.82%	0.20%	0.00%	80.62%	19.38%	0.00%
Madison	All External Zones	2.63%	95.14%	4.40%	0.46%	0.00%	90.53%	9.47%	0.00%
Milwaukee	North Indiana		99.68%	0.06%	0.09%	0.18%	17.58%	27.32%	55.10%
Milwaukee	Gary, IN		99.21%	0.00%	0.75%	0.03%	0.00%	95.59%	4.41%
Milwaukee	South Michigan		97.54%	0.18%	0.21%	2.07%	7.13%	8.53%	83.34%
Milwaukee	Detroit, MI		75.65%	22.66%	0.68%	1.01%	93.06%	2.80%	4.15%
Milwaukee	North Illinois		98.47%	0.11%	0.00%	1.43%	6.97%	0.00%	93.03%
Milwaukee	All External Zones	9.89%	93.69%	4.97%	0.51%	0.83%	78.72%	8.13%	13.15%
Twin Cities	Detroit, MI		32.65%	67.09%	0.26%	0.00%	99.61%	0.39%	0.00%
Twin Cities	North Illinois		96.56%	3.32%	0.00%	0.12%	96.62%	0.00%	3.38%
Twin Cities	St. Louis, MO		37.36%	62.31%	0.30%	0.03%	99.47%	0.49%	0.05%
Twin Cities	North Indiana		92.76%	7.08%	0.15%	0.02%	97.69%	2.01%	0.30%
Twin Cities	Indianapolis, IN		48.66%	50.91%	0.43%	0.01%	99.16%	0.83%	0.01%
Twin Cities	All External Zones	4.87%	65.40%	34.24%	0.30%	0.06%	98.96%	0.87%	0.17%
Rochester	North Illinois		99.28%	0.72%	0.00%	0.00%	100.0%	0.00%	0.00%
Rochester	North Indiana		97.63%	2.28%	0.09%	0.00%	96.40%	3.06%	0.00%

			Market Shares: All Modes				Market Shares: Public Modes		
Origin	Destination	Percent of External Trips	Auto	Air	Bus	Rail	Air	Bus	Rail
Rochester	Detroit, MI		78.25%	21.36%	0.39%	0.00%	98.22%	1.78%	0.00%
Rochester	South Michigan		97.36%	2.56%	0.09%	0.00%	96.56%	3.44%	0.00%
Rochester	St. Louis, MO		86.08%	13.55%	0.37%	0.00%	97.33%	2.67%	0.00%
Rochester	All External Zones	0.60%	94.31%	5.44%	0.25%	0.00%	95.58%	4.42%	0.00%
Total	External Zones		86.66%	10.54%	0.19%	1.16%	85.43%	1.52%	13.05%

TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 5.4
Stated Preference Survey Description and Sample Survey

Appendix 5-4

Stated Preference Survey Description and Sample Survey Forms

Survey Process

An attitudinal survey using "stated preference" techniques was undertaken in November 1997 to identify travel behavior characteristics of individuals in the Tri-State corridor. This appendix describes the process, the rationale, and the sample groups surveyed.

Stated Preference Survey Procedures: The Tri-State II Stated Preference Survey was conducted using a quota sampling approach. A quota survey collects information on the socioeconomic profile of respondents which is then used to factor the survey data to overall populations, *e.g.*, to the travelers in a particular corridor. The expansion of the quota survey is achieved by applying readily available census data on population and income to the travel information (*e.g.*, mode, purpose of travel, travel distance, etc.) collected for the study. Quota surveys provide the advantage of being relatively inexpensive to implement while providing much greater coverage and more statistically significant results than simple random surveys.

The trade-off information collected by this quota survey consists of information on travel options that are relevant to the issues and concerns being assessed. For improved rail service programs, the questions relate to the "general" trade-offs between travel times and costs for existing modes and those associated with the improved rail service, *i.e.*, faster journey times and higher fares.

Development of the Stated Preference Quota Sample: In developing the stated preference quota sample, consideration was given to the three critical factors that determine travel behavior. As shown in previous studies, the response given by any individual within any given trade-off will vary depending on the purpose of the trip (business versus non-business), the mode of travel being used, and the length of the trip (short-distance versus long-distance). The market was therefore segmented into these groups, illustrated in Exhibit 5.4.1.

Exhibit 5.4.1

Quota Groups by Mode and Trip Length

Mode	Trip Distance	Business	Non-Business
Air	Long	X	X
Bus	Long	N/A	X
	Medium	N/A	X
	Short	N/A	X
Rail	Long	X	X
	Short	X	X
Auto	Long	X	X
	Short	X	X
N/A means not an applicable quota group			

Since the population in a segmented travel market may not have a normally distributed ("bell curve") value of time (*e.g.*, the majority of auto non-business travelers in the survey may tend to choose the lower values), a minimum sample in each travel market segment is required to ensure statistical confidence. By applying the statistical Central Limit Theorem, it has been found that a sample size of 40 to 60 is large enough to ensure the statistical validity of each quota sample. For the Tri-State II Stated Preference Survey, a minimum quota of 40 interviews per trip purpose/travel mode was established, while the desired quota target was set at 80 to 100 interviews. Exhibit 5.4.3 displays the survey achievement for the major quota groups.

Questionnaire Design: The survey questionnaire design took into account the travel characteristics of the station zone pairs in the Tri-State II region. The questionnaire was divided into three major sections to capture specific information: general transportation data, demographic data, and stated preference responses. Each section is explained below. Sample forms are provided at the end of this appendix.

General Transportation Data: The first part of the survey questionnaire collected general data to establish the origin and destination of the trip the respondent was making and other travel characteristics of the trip. It included questions on:

- Origin and destination of the trip, as defined by the nearest intersection or landmark.
- Primary residence, with zip code.
- Purpose of the trip, *i.e.*, business (defined by being paid for by their employer), commuter, or other (education, social, personal business, leisure travel, etc.).
- Trip frequency, *i.e.*, daily (3 days per week or more), weekly, monthly, or annually.
- Access to a car, *i.e.*, yes or no.

Demographic Data: The last part of each questionnaire asked for socioeconomic background information on the respondent, such as age and household income.

Stated Preference Questions: Ten separate questionnaires were designed for the Stated Preference Survey portion of the questionnaire to ensure its relevance to the choices travelers faced in using each mode and for business and non-business travel purposes. In developing the specific trade-off questions for each survey questionnaire, an analysis was first made of the likely range of Value of Time (VOT) and Value of Frequency (VOF) responses that individuals might make. Current airline, rail and bus fares and schedules were used as a general guide to obtain the most suitable range of fares and times for use in designing the questionnaires.

Having established the potential range of VOT and VOF responses, five VOT and VOF questions for each of the questionnaires were formulated to ensure that the appropriate range of answers was effectively incorporated in the surveys and that each trade-off question represented a consistent change in the VOT or VOF value. To allow individuals a range of choices for any given trade-off, respondents were able to choose one of five levels of preference to indicate the degree to which they liked or disliked the choices given in the trade-off question.

The essence of the stated preference technique is to ask the traveler to make a series of trade-off choices based on different combinations of travel time, frequency and cost.

The use of a series of questions allows individuals to understand the process and provide improved responses, and also provides consistency and rationality checks for the responses given. The procedures used in trade-off analysis can be briefly described as follows:

- Travel options are organized in a format that enables respondents to consider trade-offs between desirable travel attributes. The trade-offs, which include a range of service options (*e.g.*, level of service, cost, speed, etc.), are presented in such a way as to induce individuals to give a realistic response to the options. This is the key to the successful use of trade-off analysis and requires considerable expertise and knowledge to obtain a realistic and balanced response from interviewees.
- Travel attributes and choice factors are then analyzed using trade-off analysis procedures to provide a ranking that describes the individual's behavior within the trade-off. These rankings are applied to a simulation of the transportation market at different service levels to give quantitative estimates of travel choice. In this way, specific elasticities and cross-elasticities are derived to provide the basis for estimating behavior. These elasticities are then used for different service and accessibility conditions to provide estimates of regional travel demand and market shares.

The stated preference technique:

- requires data that are simple to collect and are thus suitable for hand-out questionnaires or direct interviews.
- quantifies consumer preferences and provides a mathematical utility measurement of the different options available to travelers and, thus, enables the impact of a range of new facilities/levels of service to be tested. This includes biases and elasticities.
- gives an overall picture of the feasibility of any given improvement and suggests ways of promoting the new facility/service in terms of different levels of service, facilities, and charges.
- avoids the usual difficulties of attitudinal research in which there are incentives for individuals to support the provision of facilities and services they have no intention of regularly using. The problem of reconciling "saying" and "doing" is overcome.
- provides a means for relating travel behavior to different travel options and socioeconomic factors.
- provides input to operating/engineering studies in that the response to different costs and levels of service can be quantified in terms of demand. This creates a number of cost/demand options from which preferred engineering, operating, and marketing solutions may be derived.

Survey Implementation: The Tri-State II Stated Preference Survey was conducted via self-administered survey forms handed out on location with trained personnel available to answer questions about the form. The on-location nature of the survey required the survey team to obtain permission from relevant airport, rest stop, and bus station management so that the survey could be conducted on their premises. Surveys were conducted during November 1997.

The surveys were administered as follows:

Exhibit 5.4.2
Survey Implementation

Mode	Location	Dates (November)	Days of Week
Air	Minneapolis-St. Paul International Airport	10, 12, 13, 14	M, Tu, Th, Fr
	General Mitchell International Airport	16, 17	Sunday, Monday
Rail	Chicago-Milwaukee (Hiawatha Service)	19, 20, 22	Wednesday, Thursday, Saturday
	Chicago-Minneapolis/St. Paul (Empire Builder)	8, 15	Saturday, Saturday
Bus	Downtown Minneapolis Greyhound Bus Station	10, 11, 12, 13, 14	Monday through Friday (Tuesday Veteran's Day)
	Downtown Milwaukee Greyhound Bus Station	17, 18, 19, 20, 21	Monday through Friday
Auto	Rest stops between Portage and Wisconsin Dells (I-90/94)	18	Tuesday
	Rest stops between Madison and Portage (I-90/94)	19, 20, 21	Wednesday, Thursday, Friday

Air passenger interviews took place in the departure lounges and public concourses of the airports. Survey hours were arranged to coincide with passengers' pre-boarding times. Rail passenger surveys were conducted on board trains. Bus passenger surveys were conducted in the terminals. The surveys of auto users were undertaken at expressway rest areas.

Survey Sample Results: Findings from the stated preference surveys concerning the values of time and frequency are described in the body of the report, Chapter 5. The number of valid surveys collected by mode, trip purpose, and trip length is provided in Exhibit 5.4.3.

Exhibit 5.4.3
Surveys by Mode, Trip Purpose and Trip Length

Mode	Trip Length	Business	Non-Business	Total
Air	Long	349	241	590
Bus	Long	*17*	219	236
	Medium	*12*	172	184
	Short	*12*	106	118
	Total Bus	*41*	497	538
Rail	Long	45	222	267
	Short	194	364	558
	Total Rail	121	311	432
Auto	Long	*23*	104	127
	Short	*25*	63	88
	Total Auto	48	167	215
Total All Modes		559	1216	1775

* Numbers in *italic* indicate that the subset does not constitute a statistical quota group.

TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 5.5
COMPASS© Program Description

Basic Structure of the *COMPASS*© Model

The *COMPASS*© Multimodal Demand Forecasting Model is a flexible demand forecasting tool used to compare and evaluate alternative network and service scenarios. It is particularly useful in assessing the introduction or expansion of "minor" transportation modes such as air, rail or bus into new markets. It builds from an existing travel network, and tests the sensitivity of future travel demand to such parameters as elasticities, Values of Time, and Values of Frequency. Specific Values of Time and Frequency are developed for the model from the results of the Stated Preference surveys conducted in the study region, as discussed above. Stated Preference market analysis techniques provide an accurate assessment of individual travelers' likely choices when faced with trade-offs between time and money, or frequency and money.

The *COMPASS*© Model structure incorporates two principal models: a Total Demand Model and a Hierarchical Modal Split Model. These two models are calibrated separately for each trip purpose, *e.g.*, business, commuter and "other" (personal, social, and tourism). In each case, the models are calibrated for origin-destination trip-making internal to the region. The Total Demand Model provides a mechanism for replicating and forecasting the total travel market. The total number of trips between any two zones for all modes of travel, segmented by trip purpose, is a function of (1) the socioeconomic characteristics of the two zones and (2) the travel opportunities provided by the overall transportation system that exists (or will exist) between the two zones. Typical socioeconomic variables include household income, employment, and population. The quality of the transportation system is measured in terms of total travel time, travel cost, and worth of travel by all modes for a given trip purpose.

The role of the *COMPASS*© Modal Split Model is to estimate relative modal shares of travel given the estimation of the total market by the Total Demand Model. The relative modal shares are derived by comparing the relative levels of service offered by each of the travel modes. Three levels of binary choice are typically calibrated. The first level of the hierarchy separates "private" auto travel, with its perceived spontaneous frequency, low access/egress times, and highly personalized characteristics, from the "public" modes, i.e., bus, rail and air. The second level of the structure separates air, the fastest and most expensive public mode, from the rail and bus surface modes. The lowest level of the hierarchy separates rail, a potentially faster, more reliable, and more comfortable mode, from the bus mode. The model forecasts changes in riders, revenue and market share based on changes in each mode's travel time, frequency and cost.

Compass Model System and Results

The *COMPASS*© Model System is a flexible multimodal demand forecasting tool that provides comparative evaluations of alternative socioeconomic and network scenarios. It also allows input variables to be modified to test the sensitivity of demand to various parameters such as elasticities, values of time, and values of frequency.

The *COMPASS*© Model System is structured on two principal models: a Total Demand Model and a Hierarchical Modal Split Model. For this study, these two models were calibrated separately for two trip purposes, *i.e.*, business and nonbusiness (commuter, personal, and social). Moreover, since the behavior of short distance trip-making is significantly different from long distance trip-making, the database was segmented by distance and independent models were calibrated for long trips and short trips. For each market segment, the models were calibrated on origin-destination trip data, network characteristics, and base year socioeconomic data.

The models are calibrated on the base data. In applying the models for forecasting, an incremental approach known as the "pivot point" method is used. The "pivot point" method preserves unique travel flows present in the base data, which are not captured by the model variables by applying model growth rates to the base data observations. Details on how this method is implemented are provided in this Appendix.

Total Demand Model

The Total Demand Model, shown in Equation 1, provides a mechanism for assessing overall growth in the travel market.

$$T_{ijp} = e^{\beta_{0p}} (SE_{ijp})^{\beta_{1p}} \; e^{\beta_{2p} U_{ijp}}$$

where

T_{ijp}	=	Number of trips between zones i and j for trip purpose p
SE_{ijp}	=	Socioeconomic variables for zones i and j for trip purpose p
U_{ijp}	=	Total utility of the transportation system for zones i to j for trip purpose p
$\beta_{0p}, \beta_{1p}, \beta_{2p}$	=	Coefficients for trip purpose p

As shown in Equation 1, the total number of trips between any two zones for all modes of travel, segmented by trip purpose, is a function of the socioeconomic characteristics of the zones and the total utility of the transportation system that exists between the two zones. For this study, trip purposes included business and nonbusiness, and socioeconomic characteristics included population, employment, and per capita income. The utility function provides a logical and intuitively sound method of assigning a value to the travel opportunities provided by the overall transportation system.

In the Total Demand Model, the utility function provides a measure of the quality of the transportation system in terms of the times, costs, reliability and level of service provided by all modes for a given trip purpose. The Total Demand Model equation may be interpreted as meaning that travel between zones will increase as socioeconomic factors such as population and income rise or as the utility (or quality) of the transportation system is improved by providing new facilities and services that reduce travel times and costs. The Total Demand Model can therefore be used to evaluate the effect of changes in both socioeconomic and travel characteristics on the total demand for travel.

Socioeconomic Variables

The socioeconomic variables in the Total Demand Model show the impact of economic growth on travel demand. The *COMPASS*© Model System, in line with most intercity modeling systems, uses three variables (population, employment, and per capita income) to represent the socioeconomic characteristics of a zone. Different combinations were tested in the calibration process and it was found, as is typically found elsewhere, that the most reasonable and stable relationships consists of the following formulations:

Trip Purpose	**Socioeconomic Variable**
Business	$E_iE_j(I_i+I_j)/2$
Nonbusiness	$P_iP_j(I_i+I_j)/2$
where	
E	= Employment
I	= Per capita income
P	= Population

The business formulation consists of a product of employment in the origin zone, employment in the destination zone and the average per capita income of the two zones. Since business trips are usually made between places of work, the presence of employment in the formulation is reasonable. The nonbusiness formulation consists of a product of population in the origin zone, population in the destination zone and the average per capita income of the two zones. Nonbusiness trips encompass many types of trips, including social, tourist and personal business travel, but the majority are home-based and thus, greater volumes of trips are expected between zones with higher incomes and population.

Travel Utility

Estimates of travel utility for a transportation network are generated as a function of generalized cost (GC), as shown in Equation 2:

$$U_{ijp} = f(GC_{ijp})$$

where

GC_{ijp} = Generalized cost of travel between zones i and j for trip purpose p

Because the generalized cost variable is used to estimate the impact of improvements in the transportation system on the overall level of trip-making, it needs to incorporate all the key modal attributes that affect an individual's decision to make trips. For the public modes (rail, bus, air), the generalized cost of travel includes all aspects of travel time (access, egress, in-vehicle times), travel cost (fares, tolls, parking charges), schedule convenience (frequency of service, convenience of arrival/departure times) and reliability.

The generalized cost of travel is typically defined in travel time (*i.e.*, minutes) rather than dollars. Costs are converted to time by applying appropriate conversion factors, as shown in Equation 3. The generalized cost (GC) of travel between zones i and j for mode m and trip purpose p is

$$GC_{ijmp} = TT_{ijm} + \frac{TC_{ijmp}}{VOT_{mp}} + \frac{VOF_{mp} x OH}{VOT_{mp} x F_{ijm} x C_{ijm}} + \frac{VOR_{mp} \exp(-OTP_{ijm})}{VOT_{mp}}$$

calculated as follows:

where

TT_{ijm}	=	Travel time between zones i and j for mode m (in-vehicle time + station wait time + connection wait time + access/egress time + interchange penalty), with waiting, connect and access/egress time multiplied by a factor (greater than 1) to account for the additional disutility felt by travelers for these activities
TC_{ijmp}	=	Travel cost between zones i and j for mode m and trip purpose p (fare + access/egress cost for public modes, operating costs for auto)
VOT_{mp}	=	Value of Time for mode m and trip purpose p
VOF_{mp}	=	Value of Frequency for mode m and trip purpose p
VOR_{mp}	=	Value of Reliability for mode m and trip purpose p
F_{ijm}	=	Frequency in departures per week between zones i and j for mode m
C_{ijm}	=	Convenience factor of schedule times for travel between zones i and j for mode m
OTP_{ijm}	=	On-time performance for travel between zones i and j for mode m
OH	=	Operating hours per week

Station wait time is the time spent at the station before departure and after arrival. Air travel generally has higher wait times because of security procedures at the airport, baggage checking and the difficulties of loading a plane. Air trips were assigned wait times of 45 minutes while rail trips were assigned wait times of 30 minutes and bus trips were assigned wait times of 20 minutes. On trips with connections, there would be additional wait times incurred at the connecting station. Wait times are weighted higher than in-vehicle time in the generalized cost formula to reflect their higher disutility as found from previous studies. Wait times are weighted

70 percent higher than in-vehicle time for business trips and 90 percent higher for nonbusiness trips.

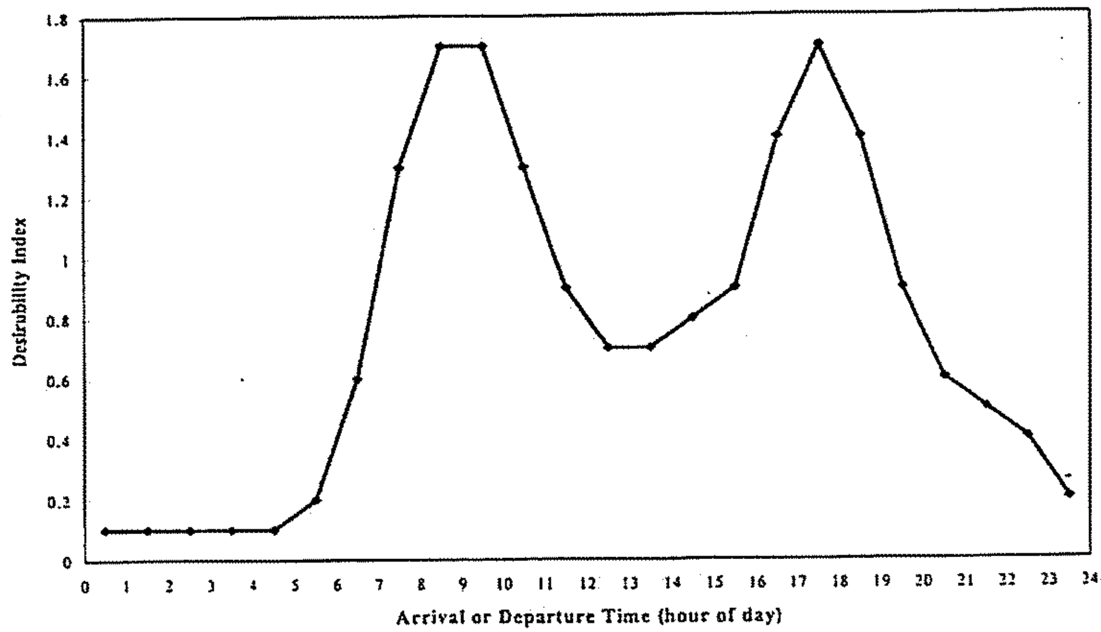
Similarly, access/egress time has a higher disutility than in-vehicle time. As verified by numerous studies, access time tends to be more stressful for the traveler than in-vehicle time because of the uncertainty created by trying to catch the flight or train. Based on current stated preference findings, access time is weighted 30 percent higher than in-vehicle time for air travel and 80 percent higher for rail and bus travel.

TEMS has found from previous studies that the physical act of transferring trains (or buses or planes) has a negative impact beyond the times involved. To account for this disutility, interchanges are penalized time equivalents. For both air and rail travel, each interchange for a trip results in 40 minutes being added to the business generalized cost and 30 minutes being added to the nonbusiness generalized cost. For bus travel, the interchange penalties are 20 minutes and 15 minutes for business and nonbusiness, respectively.

The third term in the generalized cost function converts the frequency attribute into time units. Operating hours divided by frequency is a measure of the headway or time between departures. It is this measure on which tradeoffs are made in the stated preference surveys resulting in the value of frequencies. This function represents the convenience of journeys rather than waiting time, and is therefore unique and distinct from the station wait time in the first term of the generalized cost function. Although the impact is measured as a function of the headway for convenience, it is not the headway time itself that is being added to the generalized cost. The third term represents the impact of perceived frequency valuations on generalized cost.

The convenience of the departure/arrival times was modeled only for the rail mode. It is incorporated in the generalized cost as a factor (C_{ijm}) multiplying the frequency. The factor is based on assigning each departure and arrival time in the timetable a desirability index corresponding to the graph shown in Exhibit 5.5.1. This graph was derived from responses given by rail passengers about preferred arrival and departure times in the *1993 Illinois Rail Passenger Survey*. Note that the peak times are 8 AM to 9 AM and about 5 PM. The product (F_{ijm} x C_{ijm}) can be interpreted as an effective level of service. The modeling of schedule times is more important for rail than the other modes because current timetables result in trains, especially long-distance trains, arriving (or departing) from some stations in the very early morning (1 AM to 5 AM). To explain the lower ridership from these stations, the schedule time must be considered in addition to the frequency of service. One such station currently is Cleveland where the two daily trains are scheduled to stop at 3:01 AM, 3:16 AM, 4:09 AM, and 6:17 AM.

Exhibit 5.5.1
Modeling Convenience of Schedule Times



The fourth term of the generalized cost function is a measure of the value placed on reliability of the mode. Reliability statistics in the form of on-time performance (fraction of trips considered to be on time) were obtained for the rail and air modes only. The negative exponential form of the reliability term implies that improvements from low levels of reliability have slightly higher impacts than similar improvements from higher levels of reliability.

Calibration of the Total Demand Model

In order to calibrate the Total Demand Model, the coefficients are estimated using linear regression techniques. Equation 1, the equation for the Total Demand Model, is transformed by taking the natural logarithm of both sides, as shown in Equation 4:

$$\log(T_{ijp}) = \beta_{0p} + \beta_{1p}\log(SE_{ijp}) + \beta_{2p}(U_{ijp})$$

This provides the linear specification of the model necessary for regression analysis.

The segmentation of the database by trip purpose and trip length resulted in four sets of models. Trips which would cover more than 160 miles on the road are considered long trips. This cutoff was chosen because travel behavior switches significantly around this level with travellers considering faster modes such as air and high speed rail over the automobile. In the base data, the average trip length for the short distance model is approximately 80 miles while the average trip length for the long distance model is about 310 miles. The results of the calibration for the Total Demand Models are given in Exhibit 2.

In evaluating the validity of a statistical calibration, there are two key statistical measures: *t*-statistics and R^2. The *t*-statistics are a measure of the significance of the model's coefficients; values of 1.95 and above are considered *good* and imply that the variable has significant explanatory power in estimating the level of trips. The R^2 is a statistical measure of the "goodness of fit" of the model to the data; any data point that deviates from the model will reduce this measure. It has a range from 0 to a perfect 1, with 0.4 and above considered *good* for large data sets.

Based on these two measures, the total demand calibrations are excellent. The *t*-statistics are very high, aided by the large size of the Midwest dataset. There are about five times as many long distance observations as short distance observations, resulting in higher *t*-statistics for the long distance models. The R^2 values imply very good fits of the equations to the data.

As shown in Exhibit 5.5.2, the socioeconomic elasticity values for the Total Demand Model are close to 0.7, meaning that each one percent growth in the socioeconomic term generates approximately a 0.7 percent growth in trips. Since each component of the socioeconomic term will have this elasticity, a one percent increase in population (or employment) of every zone combined with a one percent increase in income will result in a 2.1 percent growth in trips.

The coefficient on the utility term is not exactly an elasticity but it can be used as an approximation. Thus, the transportation system or network utility elasticity is higher for short distance trips than long distance trips, with each 1 percent improvement in network utility or quality as measured by generalized cost (*i.e.*, travel times or costs) generating approximately an 0.7 percent increase for long trips and 1.1 percent increase for short trips. The higher elasticity on short trips is partly a result of the scale of the generalized costs. For short trips, a 30 minute improvement would be more meaningful than the same time improvement on long trips, reflecting in the higher elasticity on the short distance model.

Exhibit 5.5.2
Total Demand Model Coefficients[1]

<u>Long Distance Trips</u> (*more than 130 miles driving distance*)

R^2

Business $\log(Trips_{OD})$ $- 12.9 + \underset{(39)}{0.75\ Ut} + \underset{(60)}{0.69} \log[E_0E_D(I_0{=}I_D)/2]\ R^2{=}0.91$ — 0.86

where $U_t = \log(\exp(-0.8+0.79\ U_{Public)} + \exp(-0.0050\ GC_{auto}))$

Nonbusiness $\log(Trips_{OD})$ $- 12.+ \underset{(47)}{1.00\ Ut} + \underset{(62)}{0.68} \log[P0PD(I0+ID)/2]$ — 0.76

where $U_t = \log(\exp(-0.75+ 0.68\ U_{Public}) + \exp(-0.0046GC_{Auto}))$

<u>Short Distance Trips</u> (*130 miles driving distance*)

R^2

Business $\log(Trips_{OD})$ $- 6.16 + \underset{(23)}{0.94\ Ut} + \underset{(31)}{0.65} \log[E_0E_D\ (I_0+I_D)/2$ 0.63 — 0.63

where $U_t = \log(\exp(-5.4 + 1.16\ U_{Public}) + \exp(-0.0200\ GC_{auto}))$

Nonbusiness $\log(T_{ij}) = - 5.5 + \underset{(15)}{1.12\ Ut} + \underset{(20)}{0.64} \log[P_0P_D(I_0+I_D)/2)]$ 0.57

where $U_t = \log(\exp(-6.5 + 0.96\ U_{Public}) + \exp(-0.0211\ GC_{auto}))$

(1)-Statistics in parentheses

The utility functions are functions of the generalized costs of the modes of travel. In deriving the total utility term, a special "logsum" approach is used in which utilities are built up from individual modes in a recursive fashion. Thus, the total utility is derived from car generalized cost and the public mode utility which itself is derived from the generalized costs of its constituent modes (i.e. air, rail, bus). The exact form for the public mode utility function is determined from the calibration process for the modal split models to be described in the next section.

Incremental Form of the Total Demand Model

The calibrated Total Demand Models could be used to estimate the total travel market for any zone pair using the population, employment, income and the total utility of all the modes. However, there would be significant differences between estimated and observed levels of trip-making for many zone pairs despite the good fit of the models to the data. For example, travel to summer cottages in the Michigan Upper Peninsula cannot be explained well by the socioeconomic measures used. To preserve the unique travel patterns contained in the base data, the incremental approach or "pivot point" method is used for forecasting.

In the incremental approach, the base travel data assembled in the database are used as "pivot" points and forecasts are made by applying trends to the base data. The total demand equation as described in equation (1) can be rewritten into the following incremental form which can be used for forecasting:

$$\frac{T^f_{ijp}}{T^b_{ijp}} = \left(\frac{SE^f_{ijp}}{SE^b_{ijp}}\right)^{\beta_{1p}} e^{\beta_{2p}(U^f_{ijp} - U^b_{ijp})}$$

where

T^f_{ijp} = Number of trips between zones i and j for trip purpose p in forecast year

Se^f_{ijp} = Socioeconomic variables for zones i and j for trip purpose p in forecast year

U^f_{ijp} = Total utility of the transportation system for zones i to j for trip purpose p in forecast year

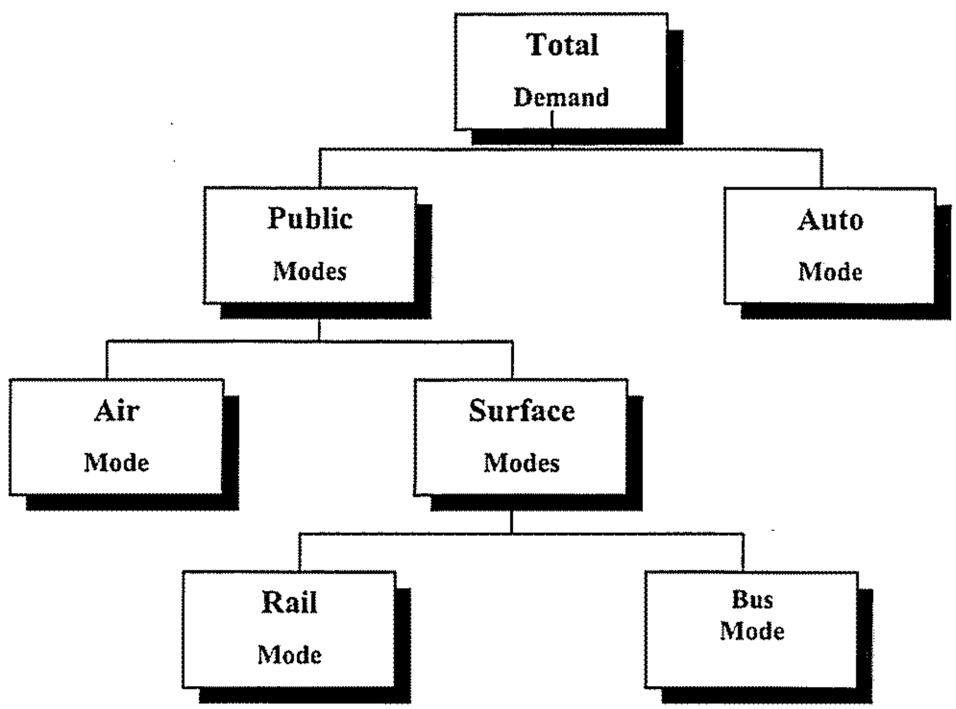
Variables with superscript b refer to base year values.

In the incremental form, the constant term disappears and only the elasticities are important.

Modal Split Model

The role of the Modal Split Model is to estimate relative modal shares, given the Total Demand Model estimate of the total market. The relative modal shares are derived by comparing the relative levels of service offered by each of the travel modes. The *COMPASS*© Modal Split Model uses a nested logit structure, which has been adapted to model the intercity modal choices available in the study area. As shown in Exhibit 5.5.3, three levels of binary choice were calibrated.

Exhibit 5.5.3
Hierarchical Structure of the Modal Split Model



The main feature of the Hierarchical Modal Split Model structure is the increasing commonality of travel characteristics as the structure is descended. The first level of the hierarchy separates private auto travel (with its spontaneous frequency, low access/egress times, low costs, and highly personalized characteristics) from the public modes. The second level of the structure separates air (the fastest, most expensive, and perhaps most frequent and comfortable public mode) from the rail and bus surface modes. The lowest level of the hierarchy separates rail, a potentially faster, more reliable, and more comfortable mode, from the bus mode.

Form of the Modal Split Model

To assess modal split behavior, the logsum utility function, which is derived from travel utility theory, has been adopted. As the modal split hierarchy is ascended, the logsum utility values are derived by combining the generalized costs of travel. Advantages of the logsum utility approach are, one, the introduction of a new mode will increase the overall utility of travel and, two, a new mode can readily be incorporated into the Modal Split Model, even if it was not included in the base-year calibration.

As only two choices exist at each level of the modal split hierarchical structure, a Binary Logit Model is used, as shown in Equation 5:

$$P_{ijmp} = \frac{e^{U_{ijmp}/\rho}}{e^{U_{ijmp}/\rho} + e^{U_{ijnp}/\rho}}$$

where

P_{ijmp} = Percentage of trips between zones i and j by mode m for trip purpose p

U_{ijmp}, U_{ijnp} = Utility functions of modes m and n between zones i and j for trip purpose p

ρ = nesting coefficient

In Equation 6, the utility of travel between zones i and j by mode m for trip purpose p is a function of the generalized cost of travel. Where mode m is a composite mode (*e.g.*, the surface modes in the third level of the Modal Split Model hierarchy, which consist of the rail and bus modes), the utility of travel, as described below, is derived from the utility of the two or more modes it represents.

Utility of Composite Modes

Where modes are combined, as in the upper levels of the modal split hierarchy, it is essential to be able to measure the *inclusive value* of the composite mode, *e.g.*, how the combined utility for bus and rail compares with the utility for bus or rail alone. The combined utility is more than the utility of either of the modes alone, but it is not simply equal to the sum of the utilities of the two modes. A realistic approach to solving this problem, which is consistent with utility theory and the logit model, is to use the logsum function. As the name logsum suggests, the utility of a composite mode is defined as the natural logarithm of the sum of the utilities of the component modes. In combining the utility of separate modes, the logsum function provides a reasonable proportional increase in utility that is less than the combined utilities of the two modes but reflects the value of having two or more modes available to the traveler. For example:

suppose

Utility of Rail or $U_{rail} = \alpha + \beta GC_{rail}$

Utility of Bus or $U_{bus} = \gamma GC_{bus}$

then

Inclusive Utility of Surface Modes, or $U_{surface} = \log(e^{Urail} + e^{Ubus})$

It should be noted that improvements in either rail or bus will result in improvements to the inclusive utility of the surface modes.

In a nested binary logit model, the calibrated coefficients associated with the inclusive values of composite modes are called the nesting coefficients and take on special meaning. If one of these coefficients is equal to 1, then that level of the hierarchical model collapses and two levels of the hierarchy essentially become one. At this point, the Modal Split Model is a multinomial logit model that is analyzing three or more modes, *i.e.*, all the modes comprising the composite mode as well as the other modes in that level of the hierarchy. If one of the coefficients is greater than 1, then the hierarchy has been incorrectly specified and counterintuitive forecasts will result. Because of the assumptions behind the Modal Split Model, the coefficients must decrease as the modal split hierarchy is ascended or counterintuitive results will occur. Thus, the coefficients provide a check on whether the Modal Split Model hierarchy has been specified correctly.

Calibration of the Modal Split Model

Working from the bottom of the hierarchy up to the top, the first analysis is that of the rail mode versus the bus mode. As shown in Exhibit 5.5.4, the model was effectively calibrated for the two trip purposes and the two trip lengths, with reasonable parameters and R^2 and t values. All the coefficients have the correct signs such that demand increases or decreases in the correct direction as travel times or costs are increased or decreased, and all the coefficients appear to be reasonable in terms of the size of their impact. Rail travelers are more sensitive than bus travelers to time and cost. This is as expected, given the general attitude that travelers, and in particular business travelers, have toward the bus mode. The higher coefficients on the short distance models are partly due to the scale effect where the same time or cost improvements would be more meaningful on shorter trips.

Exhibit 5.5.4
Rail versus Bus Modal Split Model Coefficients[1]

Long Distance Trips *(more than 160 miles driving distance)*

							R^2
Business	$\log(T_{Rail}/T_{Bus})$ =	2.9	-	0.0033 GC_{Rail}	+	0.0029 GC_{Bus}	0.44
		(5.2)		(5.2)		(6.2)	
Nonbusiness	$\log(T_{rail}/T_{Bus})$ =	2.9	-	0.0034 GC_{Rail}	+	0.0023 GC_{Bus}	0.40
		(4.6)		(5.4)		(5.7)	

Short Distance Trips *(160 miles driving distance)*

Business	$\log(T_{Rail}/T_{Bus})$ =	2.4	-	0.0050 GC_{Rail}	+	0.0038 GC_{Bus}	0.50
		(3.6)		(4.4)		(3.5)	
Nonbusiness	$\log(T_{ail}/T_{bus})$ =	1.3	-	0.0049 GC_{Rail}	+	0.0034 GC_{Bus}	0.40
		(2.0)		(4.5)		(3.1)	

[1] *t-statistics are given in parentheses.*

The constant term in each equation indicates the degree of bias towards one mode or the other. Since the terms are positive in all the market segments, there is a bias towards rail travel that is not explained by the variables (times, costs, frequencies, reliability) used to model the modes. As expected, this bias is larger for business travelers who tend to have very negative perceptions of intercity bus.

For the second level of the hierarchy, the analysis is of the surface modes (rail and bus) versus air. Accordingly, the utility of the surface modes is obtained by deriving the logsum of the utilities of rail and bus. As shown in Exhibit 5.5.5, the model calibrations for both trip purposes are all statistically significant, with good R^2 and t values and reasonable parameters. As indicated by the air coefficients, short distance travelers are less sensitive to changes in the air costs than long distance travelers. One explanation is some short distance air trips are special trips responding to personal or business emergencies and are thus, cost insensitive. As indicated by the constant terms, there is a large bias towards air travel for long distance trips. However, for short trips, there is only a small bias towards air for business travelers and for nonbusiness travel, the bias, which is large, is actually towards the surface modes.

Exhibit 5.5.5
Surface versus Air Modal Split Model Coefficients[1]

Long Distance Trips (*more than 160 miles driving distance*)

R^2

Business $\log(T_{Surface}/P{=}T_{Air}) = -6.7 + 1.09\ U_{Surface} + 0.0104\ GC_{Air}$ .063
(14) (13) (12)

where $U_{Surface} = \log(\exp(2.9 - 0.0033\ GC_{Rail}) + \exp(-0.0029\ GC_{Bus}))$

Nonbusiness $\log(T_{surface}/T_{Air}) = -4.1 + 1.04U_{Surface} + 0.0072\ C_{Air}$ .44
(13) (14) (27)

where $U_{Surface} = \log(\exp(2.9 - 0.0034\ GC_{Rail}) + \exp(-0.0023\ GC_{Bus})]$

Short Distance Trips (*160 miles driving distance*)

Business $\log(T_{surface}/T_{Air}) = -0.7 + 1.19\ U_{Surface} + 0.0029\ GC_{Air}$ 0.57
(0.8) (5.8) (1.9)
where $U_{Surface}\ \log(\exp(2.4 - 0.005\ GC_{Rail}) + \exp(-0.0038\ GC_{Bus}))$

Nonbusiness $\log(T_{Surf}/T_{Air}) = 1.6 + 1.29\ U_{Surface} + 0.0037\ GC_{Air}$ 0.58
(4) (12) (6)
where $U_{Surface} = \log(\exp(1.32 - 0.0049\ GC_{Rail}) + \exp(-0.0034\ GC_{Bus}))$

[1] *t-statistics are given in parentheses.*

The analysis for the top level of the hierarchy is of auto versus the public modes. The public modes are comprised of air and the surface modes (rail and bus). The utility of the public modes is obtained by deriving the logsum of the utilities of the air, rail, and bus modes.

As shown in Exhibit 5.5.6, the model calibrations for both trip purposes are all statistically significant, with good R^2 and *t* values and reasonable parameters in most cases. The R^2 value for the nonbusiness, short distance model is a bit low and marginally acceptable. Part of the reason for the poor fit is that local transit trips are not included in the public trip database causing some of the observations to deviate significantly from the model equation. The constant terms show that there is a bias towards the auto mode with the bias increasing with shorter trip length.

Exhibit 5.5.6
Public versus Auto Modal Split Model Coefficients[1]

Long Distance Trips (*more than 160 miles driving distance*)

Business $\log(T_{ub}/T_{auto}) = \underset{(3)}{-0.8} + \underset{(21)}{0.79U_{Public}} + \underset{(31)}{0.0050\,GC_{Auto}}$ — R^2 0.69

where $U_{Public} = \log(\exp(-6.7 + 1.09\,U_{Surface}) + \exp(-0.0104\,GC_{Air}))$

Nonbusiness $\log(T_{Pub}/T_{Auto}) = \underset{(12)}{-0.8} + \underset{(24)}{0.68\,U_{Public}} + \underset{(39)}{0.0046\,GC_{Auto}}$ — 0.63

where $U_{Public} = \log(\exp(-4.1 + 1.04\,U_{Surface}) + \exp(-0.0072\,GC_{Air}))$

Short Distance Trips (*160 miles driving distance*)

Business $\log(T_{Public}/T_{Auto}) = \underset{(16)}{-5.4} + \underset{(8)}{1.16\,U_{Public}} \underset{(8)}{+0.200\,GC_{Auto}}$ — 0.51

where $U_{Public} = \log(\exp(-0.7 + 1.19\,U_{Surface}) + \exp(-0.00380\,GC_{Air}))$

Nonbusiness $\log(T_{Public}/T_{Auto}) = \underset{(26)}{-6.5} + \underset{(10)}{0.96\,U_{Public}} + \underset{(10)}{0.0211\,GC_{Auto}}$ — 0.40

where $U_{Public} = \log(\exp(1.6 + 1.29\,U_{Surface}) + \exp(-0.0037\,GC_{Air}))$

(1) *t-statistics are given in parentheses.*

Incremental Form of the Modal Split Model

Using the same reasoning as described in Section 3.1.4, the modal split models are applied incrementally to the base data rather than imposing the model estimated modal shares. Different regions of the corridor may have certain biases toward one form of travel over another and these differences cannot be captured with a single model for the entire Midwest Corridor. Using the "pivot point" method, many of these differences can be retained. To apply the modal split models incrementally, the following reformulation of the modal split models is used:

$$\left(\frac{P^f_A}{P^f_B}\right) / \left(\frac{P^b_A}{P^b_B}\right) = e^{\beta(GC^f_A - GC^b_B) + \gamma(GC^f_B - GC^b_B)}$$

where

P^f_A = Percentage of trips using mode A in the forecast year

GC^f_A = Generalized cost for mode A in the forecast year

β, γ = Estimated coefficients

Variables with superscript b refer to base year values.

For modal split models that involve composite utilities instead of generalized costs, the composite utilities would be used in the above formula in place of generalized costs. Once again, the constant term is not used and the drivers for modal shifts are changes in generalized cost from base conditions.

Another consequence of the "pivot point" method is that **extreme** changes from current trip-making levels and current modal shares are rare. Thus, since very few short distance commuter trips are currently being made on Amtrak, the forecasted growth in these trips will be limited despite the huge auto market.

TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 6.1
Infrastructure Unit Costs

Tri-State Phase II HSR Feasibility Study									
Unit Costs									
Source used for Unit Costs			Source Legend						
Chicago to St. Louis High Speed Rail Capital Cost Estimates of 1993			C/StL						
Chicago/Milwaukee Rail Corridor Study of 1997			C/M						
Midwest Regional Rail Initiative			MRRI						
Charles H. Quandel & Associates, LLC			CHQA						
Illinois Department of Transportation			IDOT						
Item	Unit	**Tri State II Unit Cost thousands**	1993 Unit Cost	Indexed Inflation (2%) 1998 $	CM=4%	GEC=3%	Owner Mgt = 2%	Construction Cost (1998)	Source
1.0 Trackwork									
1.1 HSR on Existing Roadbed	per mile	**$873**	725,520	801,047	32,042	24,031	16,021	873,141	C/StL
1.2 HSR on New Roadbed (Existing ROW)	per mile	**$932**	774,308	854,913	34,197	25,647	17,098	931,856	C/StL
1.2A HSR on New Roadbed (New ROW)	per mile	**$1,376**							CHQA
1.2B HSR on New Roadbed (Double Track)	per mile	**$2,308**							CHQA
1.3 Timber & Surface w/ 33% Tie replacement	per mile	**$136**	112,670	124,399	4,976	3,732	2,488	135,595	C/StL
1.4 Timber & Surface w/ 66% Tie Replacement	per mile	**$224**	185,987	205,348	8,214	6,160	4,107	223,830	C/StL
1.5 Relay Track w/ 136# CWR	per mile	**$329**	273,353	301,809	12,072	9,054	6,036	328,972	C/StL
1.6 Siding	per mile	**$802**	666,440	735,816	29,433	22,074	14,716	802,040	C/StL
1.7 Fencing	per mile	**$49**	40,080	44,252	1,770	1,328	885	48,235	C/StL
1.8 Electrification	per mile	**$991**							CHQA
1.9 Other Track Work Chicago to Milwaukee	LS	**$212,917**	Table 1						C/M
1.10 Land Acquisition Madison	per mile	**$5,000**							CHQA
1.11 Land Acquisition Urban	per mile	**$294**							CHQA
1.12 Land Acquisition Rural	per mile	**$98**							CHQA
Table 1									
Chicago/Milwaukee Rail Corridor Study of 1997									
Computation of Chicago-Milwaukee Infrastructure Costs from page 13 of Final Repor									
1995 dollars									
Infrastructure Improvements	*Track*	*Bridges*	*Crossings*	*Stations*	*Signals*	*Total*			
Trackwork	*98,231*					*98,231*			
Signaling system					*44,174*	*44,174*			
Fencing	*4,708*					*4,708*			
Rail Bridges		*91,549*				*91,549*			
Rail Highway Crossings			*67,386*			*67,386*			
Station Improvements				*19,250*		*19,250*			
ROW Acquistions	*41,600*					*41,600*			
CM &Contingencies	*56,099*					*56,099*			
Total	*200,638*	*91,549*	*67,386*	*19,250*	*44,174*	*422,997*			
Inflation 2% per year	*212,917*	*97,152*	*71,510*	*20,428*	*46,877*	*448,884*			

Page 2									
	Unit	**Unit Cost**							
2.0 Stations		**thousands**							
2.1 Full Service - New	each	$1,000							MRRI
2.2 Full Service - Renovated	each	$500							MRRI
2.3 Terminal - New	each	$2,000							MRRI
2.4 Terminal - Renovated	each	$1,000							MRRI
2.5 Maintenance (110 MPH technology)	each	$10,000							CHQA
2.5A Maintenance (150 MPH technology)	each	$86,000							CHQA
2.5B Maintenance (185 MPH technology)	each	$162,000							CHQA
2.6 Stations Chicago to Milwaukee	LS	$20,428							C/M
		Tri State II	1993	Indexed			Owner	Construction	
	Unit	**Unit Cost**	Unit Cost	Inflation (2%)	CM=4%	GEC=3%	Mgt = 2%	Cost (1998)	Source
4.0 Turnouts		**thousands**		1998 $					
4.1 New #33 - 136# High Speed	each	$555	460,787	508,755	20,350	15,263	10,175	554,543	C/SIL
		Tri State II	1993	Indexed			Owner	Construction	
Item	Unit	**Unit Cost**	Unit Cost	Inflation (2%)	CM=4%	GEC=3%	Mgt = 2%	Cost (1998)	Source
5.0 Bridges - Under		**thousands**		1998 $					CHQA
5.1 Four Lane Urban Expressway	each	$4,848	*Table 2*	4,447,388	177,896	133,422	88,948	4,847,653	CHQA
5.2 Four Lane Rural Expressway	each	$4,036	*Table 2*	3,702,578	148,103	111,077	74,052	4,035,810	CHQA
5.3 Two Lane Highway	each	$3,062	*Table 2*	2,808,806	112,352	84,264	56,176	3,061,599	CHQA
5.4 Rail	each	$3,062	*Table 2*	2,808,806	112,352	84,264	56,176	3,061,599	CHQA
5.5 Minor river	each	$812	*Table 2*	744,810	29,792	22,344	14,896	811,843	CHQA
5.6 Major River	each	$8,118	*Table 2*	7,448,100	297,924	223,443	148,962	8,118,429	CHQA
5.7 Mississippi River	LS	$234,000	*Table 2*	214,654,242	8,586,170	6,439,627	4,293,085	233,973,124	CHQA
5.8 Interstate 90 Dakota Rvier Valley Structure	LS	$74,000	*Table 2*	67,889,432	2,715,577	2,036,683	1,357,789	73,999,480	CHQA
5.9 Elevated Structure Milwaukee	per mile	$39,000	*Table 2*	35,655,544	1,426,222	1,069,666	713,111	38,864,543	CHQA
5.10 Elevated Structure St Paul	per mile	$39,000	*Table 2*	35,655,544	1,426,222	1,069,666	713,111	38,864,543	CHQA
5.11 Elevated Structure Chicago to Milwaukee	per mile	$39,000	*Table 2*	35,655,544	1,426,222	1,069,666	713,111	38,864,543	CHQA
5.12 Bridges Chicago to Milwaukee	LS	$97,152	*Table 1*						C/M

Page 3									
Table 2									
Bridge Under Unit Costs									*Total*
Type of Bridge	*Length*	*Width*	*cost/sf*	*Bridge*	*Approaches*	*Gen Cond*	*Contingency*	*Engineering*	*1998 $*
Urban multi lane	*400*	*37*	*150*	*2,220,000*	*1,094,000*	*331,400*	*546,810*	*. 255,178*	*4,447,388*
Rural Multi lane	*300*	*37*	*150*	*1,665,000*	*1,094,000*	*275,900*	*455,235*	*212,443*	*3,702,578*
Two Lane Highway	*180*	*37*	*150*	*999,000*	*1,094,000*	*209,300*	*345,345*	*161,161*	*2,808,806*
Railroad	*180*	*37*	*150*	*999,000*	*1,094,000*	*209,300*	*345,345*	*161,161*	*2,808,806*
Major River	*1000*	*37*	*150*	*5,550,000*	*0*	*555,000*	*915,750*	*427,350*	*7,448,100*
Minor River	*100*	*37*	*150*	*555,000*	*0*	*55,500*	*91,575*	*42,735*	*744,810*
Mississippi River	*28820*	*37*	*150*	*159,951,000*	*0*	*15,995,100*	*26,391,915*	*12,316,227*	*214,654,242*
Interstate 90 Dakota Rvier Valley Structure	*9115*	*37*	*150*	*50,588,250*	*0*	*5,058,825*	*8,347,061*	*3,895,295*	*67,889,432*
Elevated Structure Milwaukee	*5280*	*37*	*136*	*26,568,960*	*0*	*2,656,896*	*4,383,878*	*2,045,810*	*35,655,544*
Elevated Structure St Paul	*5280*	*37*	*136*	*26,568,960*	*0*	*2,656,896*	*4,383,878*	*2,045,810*	*35,655,544*
Elevated Structure Chicago to Milwaukee	*5280*	*37*	*136*	*26,568,960*	*0*	*2,656,896*	*4,383,878*	*2,045,810*	*35,655,544*
Definitions									
General Conditions: 10%									
Contingency: 15%									
Engineering : 7%									
		Tri State II	1993	Indexed			Owner	Construction	
		Unit Cost	Unit Cost	Inflation (2%)	CM=4%	GEC=3%	Mgt = 2%	Cost (1998)	Source
6.0 Bridges - Over		thousands		1998 $					
6.1 Four Lane Urban Expressway	each	10,516	*Table 3*	9,648,126	385,925	289,444	192,963	10,516,457	CHQA
6.3 Two Lane Highway	each	1,971	*Table 3*	1,808,040	72,322	54,241	36,161	1,970,764	CHQA
6.4 Rail	each	6,572	*Table 3*	6,028,020	241,121	180,841	120,560	6,570,542	CHQA
6.5 Viaducts - Major river	each	n/a							
6.6 Tunnel (East and West Bound)	per LF	10	*Table 3*	9,394	376	282	188	10,239	CHQA

Page 4									
Table 3									
Bridge Under Unit Costs									*Total*
Type of Bridge	*Length*	*Width*	*cost/sf*	*Bridge*	*Earthwork*	*Gen Cond*	*Contingency*	*Engineering*	*1998 $*
Four Lane Urban Expressway	*200*	*96*	*240*	*4,608,000*	*1,250,000*	*2,050,300*	*1,186,245*	*553,581*	*9,648,126*
Two Lane Highway	*100*	*48*	*150*	*720,000*	*420,000*	*342,000*	*222,300*	*103,740*	*1,808,040*
Rail	*120*	*60*	*400*	*2,880,000*	*780,000*	*1,281,000*	*741,150*	*345,870*	*6,028,020*
Tunnel (East and West Bound)				*7,000*		*700*	*1,155*	*539*	*9,394*
Definitions									
General Conditions: 30%									
Contingency: 15%									
Engineering : 7%									
		Tri State II	1993	Indexed			Owner	Construction	
		Unit Cost	Unit Cost	Inflation (2%)	CM=4%	GEC=3%	Mgt = 2%	Cost (1998)	Source
7.0 Crossings		**thousands**		1998 $					
7.1 Private Closure	each	60		50,000	2,000	1,500	1,000	54,500	MRRI
7.2 Rural w/ Quadrant Gates	each	274	216,179	238,683	9,547	7,160	4,774	260,165	C/StL
7.4 Full Width Barrier	each	550		500,000	20,000	15,000	10,000	545,000	IDOT
7.5 Crossings Chicago to Milwaukee	LS	71,510	*Table 1*						C/M
		Tri State II	1993	Indexed			Owner	Construction	
		Unit Cost	Unit Cost	Inflation (2%)	CM=4%	GEC=3%	Mgt = 2%	Cost (1998)	Source
8.0 Signals		**thousands**		1998 $					
8.1 High Speed Turnout	each	1,098	912,664	1,007,672	40,307	30,230	20,153	1,098,363	C/StL
8.2 System Installation for HSR (110MPH)	per mile	150							MRRI
8.2A System Installation for HSR (150MPH)	per mile	350							CHQA
8.2B System Installation for HSR (185MPH)	per mile	980							CHQA
8.3 Signal Costs Chicago to Milwaukee	LS	46,877	*Table 1*						C/M
		Tri State II	1993	Indexed			Owner	Construction	
		Unit Cost	Unit Cost	Inflation (2%)	CM=4%	GEC=3%	Mgt = 2%	Cost (1998)	Source
9.0 Curves		**thousands**		1998 $					
9.1 Elevate & Surface Curves	per mile	42	34,880	38,511	1,540	1,155	770	41,977	C/StL
9.2 Curvature Reduction	per mile	284	235,606	260,133	10,405	7,804	5,203	283,545	C/StL
9.3 Elastic Fasteners	per mile	59	49,332	54,467	2,179	1,634	1,089	59,370	C/StL

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	UNIT TRACK COST ESTIMATE #1.1		
CONSTRUCTION ONE TRACK MILE OF NEW HSR MAIN TRACK			
ON EXISTING ROADBED		$	725,520
Rail (115# - CWR - New Standard) 1 TM @ $121,200/TM		$	121,200
Mainline Crossties (7"x9"x8'-6" New) 3,200/TM @ $27.35/ea.		$	87,520
Tie Plates (13"DS - New) 6,400/TM @ $5.10/ea.		$	32,640
Rail Anchors (115# - New Unit) 6,400/TM @ $.85/ea.		$	5,440
Track Spikes (New) - 25,600/TM @ $.31/ea.		$	7,936
Top Ballast - 12" Depth Under Tie AREA - #4 Granite			
4224 cy/TM x 1.23 NT/cy @ $15/NT		$	77,933
	Subtotal Material	$	332,669
Labor		$	85,500
Overhead (85.34% of Labor)		$	72,966
Equipment (30% of Labor)		$	25,650
Plant Welds - 128/TM @ $40/ea		$	5,120
Field Welds 18/TM @ $400/ea.		$	7,200
Roadbed Preparation 5,280/TF @ $3.00/TF		$	15,840
Subballast in Place 6"x25 ft. x 5,280 ft. @ $10/cy X 115%		$	28,111
Drainage $5,000/TM		$	5,000
Material Handling and Distribution (5% of Subtotal Material)		$	16,633
	Subtotal Installation	$	262,020
	Subtotal	$	594,689
Engineering (7%)		$	41,628
Contingencies (15%)		$	89,203
Source: *Chicago-St. Louis High Speed Rail*			
Capital Cost Estimates			
Envirodyne Engineers, Inc.. 1993			

UNIT TRACK COST ESTIMATE #1.2		
CONSTRUCT ONE MILE TRACK OF NEW HSR MAIN TRACK ON NEW ROADBEI		$ 774,308
All Costs Shown Above in Estimate #2		$ 725,520
Plus		
Site Clearing - 5,280 ft. x 35 ft. @ $2,800/AC		$ 11,879
Subballast in Place 6" x 25 ft. x 5,280 ft. @ $10/cy x 115%		$ 28,111
	Subtotal	$ 39,990
Engineering (7%)		$ 2,799
Contingencies (15%)		$ 5,999
Source: *Chicago-St. Louis High Speed Rail*		
Capital Cost Estimates		
Envirodyne Engineers, Inc.. 1993		
UNIT TRACK COST ESTIMATE #1.3		
TIMBER AND SURFACE ONE TRACK MILE OF MAIN TRACI		
USING 33% TIE REPLACEMENT		$ 112,670
Mainline Crossties (7" x 9" x 8' - 6" New) 3,200/TM x 33% = 1,056 @ $ 27.35/ea.		$ 28,882
Track Spikes 8,488/TM @ $.31/ea.		$ 2,619
Ballast 1,200 NT/TM @ $15/NT		$ 18,000
	Subtotal Material	$ 49,501
Labor		$ 18,750
Overhead (85.34% of labor)		$ 16,001
Equipment (30% of labor)		$ 5,625
Material Handling and Distribution (5% of Subtotal Material)		$ 2,475
	Subtotal Installation	$ 42,851
	Subtotal	$ 92,352
Engineering (7%)		$ 6,465
Contingencies (15%)		$ 13,853
Source: *Chicago-St. Louis High Speed Rail*		
Capital Cost Estimates		
Envirodyne Engineers, Inc.. 1993		

UNIT TRACK COST ESTIMATE #1.4

TIMBER AND SURFACE ONE TRACK MILE OF EXISTING SIDING UPGRADE TO MAIN TRACK USING 60% TIE REPLACEMENT		$	185,987
Mainline Crossties (7" x9" x 8' - 6" New) 3,200/TM X 60% - 1,920 @ 27.35/ea.		$	52,512
Track Spikes 15,360/TM @ $.31/ea.		$	4,762
Ballast 1,200 NT/TM @ $15 NT		$	18,000
	Subtotal Material	$	75,274
Labor		$	34,091
Overhead (85.34% of Labor)		$	29,093
Equipment (30% of Labor)		$	10,227
Material Handling and Distribution (5% of Subtotal Material)		$	3,764
	Subtotal Installation	$	77,175
	Subtotal	$	152,449
Engineering (7%)		$	10,671
Contingencies (15%)		$	22,867
Source:	*Chicago-St. Louis High Speed Rail Capital Cost Estimates Envirodyne Engineers, Inc., 1993*		

UNIT TRACK COST ESTIMATE #1.5

RELAY ONE TRACK MILE WITH NEW 115# CWR		$ 273,353
Labor and Equipment to Pickup One Track Mile of Existing Jointed Rail and OTM		$ 10,000
Salvage Credit		
112# Relay Quality Rail - 187 NT/TM @ $250/NT		$ (46,750)
13" DS Tie Plates - 6,400/TM @ $2.50/ea.		$ (16,000)
36" Joint Bars - 270 prs./TM @ $8.00/pr.		$ (2,160)
Scrap OTM - 19 NT @ $89/NT		$ (1,691)
	Subtotal Salvage Credit	$ (66,601)
Install New 115# CWR		
Rail (115# CWR - New Standard) - 202 NT/TM @ $600/NT		$ 121,200
Tie Plates (13"DS - New) - 6,400/TM @ $5.10/ea		$ 32,640
Rail Anchors (115# - New Unit) - 6,400 @ $.85/ea.		$ 5,440
Track Spikes (New) - 25,600/TM @ $.31/ea.		$ 7,936
	Subtotal Material	$ 167,216
Labor		$ 37,500
Overhead (85.34% of Labor)		$ 32,003
Equipment (30% of Labor)		$ 11,250
Plant Welds - 128/TM @ $40/ea.		$ 5,120
Field Welds - 18/TM @ $400/ea.		$ 7,200
Material Handling and Distribution (5% of Subtotal Material)		$ 8,361
	Subtotal Installation	$ 101,434
	Subtotal Pickup, Material & Installation	$ 278,650
Engineering (7%)		$ 19,506
Contingencies (15%)		$ 41,798
Source:	*Chicago-St. Louis High Speed Rail*	
	Capital Cost Estimates	
	Envirodyne Engineers, Inc.. 1993	

UNIT TRACK COST ESTIMATE # 1.6			
UPGRADE ONE TRACK MILE OF EXISTING SIDINGS		$	219,884
Rail (112# Relay CWR) 187 NT/TM @ 250/NT		$	46,750
Plant Welds 294/TM @ $40/ea.		$	11,760
13" DS Tie Plates - 6400/TM @ 2.50/ea.		$	16,000
Rail Anchors (112# - New Unit) 6,400/TM @ $.85/ea.		$	5,440
Track spikes (New) - 25,600/TM @ $.31/ea.		$	7,936
	Subtotal Material	$	87,886
Labor		$	37,500
Overhead (85.34% of Labor)		$	32,003
Equipment (30% of Labor)		$	11,250
Field Welds - 18/TM @ $400/ea.		$	7,200
Material Handling and Distribution (5% of Subtotal Material)		$	4,394
	Subtotal Installation	$	92,347
	Subtotal	$	180,233
Engineering (7%)		$	12,616
Contingencies (15%)		$	27,035

CONSTRUCT ONE TRACK MILE OF FREIGHT SIDING ON NEW ROADBED USING RELAY MATERIAL		$ 666,440
All Material Shown in Above Estimate #12		$ 87,886
Plus		
Mainline Crossties (7" x 9" x 8'6" New) 3,200/TM @ $27.35/ea.		$ 87,520
Top Ballast - 12" Depth Under Tie - Area #4 Granite		
4,224 cy/TM x 1.23 NT/cy @ $15/NT		$ 77,933
	Subtotal Material	$ 253,339
Labor		$ 85,500
Overhead (85.34% of Labor)		$ 72,966
Equipment (30% of Labor)		$ 25,650
Field Welds 18/TM @ $400/ea.		$ 7,200
Roadbed Preparation 5,280 TF @ $3.00/TF		$ 15,840
Subballast in Place 12" x 25 ft x 5,280 ft @ $10/cy x 115%		$ 56,222
Site Clearing 5,280 ft x 35 ft @ $2,800/AC		$ 11,879
Drainage $5,000/TM		$ 5,000
Material Handling and Distribution (5% of Subtotal Material)		$ 12,667
	Subtotal Installation	$ 292,924
	Subtotal	$ 546,263
Engineering (7%)		$ 38,238
Contingencies (15%)		$ 81,939
Source: *Chicago-St. Louis High Speed Rail Capital Cost Estimates Envirodyne Engineers, Inc.. 1993*		

	UNIT TRACK COST ESTIMATE #4.1	
INSTALL NEW #33 - 136# HIGH SPEED TURNOUT		$ 460,787
Switch Package, OTM, Rail, Concrete Ties and Field Welds		$ 250,000
Ballast 753 NT @ $15/NT		$ 11,295
Filter Fabric 850 sy @ $2/sy		$ 1,700
	Subtotal Material	$ 262,995
Labor		$ 42,000
Overhead (85.34% of labor)		$ 35,843
Equipment		$ 23,706
Material Handling and Distribution (5% of Subtotal Material)		$ 13,150
	Subtotal Installation	$ 114,699
	Subtotal	$ 377,694
Engineering (7%)		$ 26,439
Contingencies (15%)		$ 56,654
Source:	*Chicago-St. Louis High Speed Rail*	
	Capital Cost Estimates	
	Envirodyne Engineers, Inc.. 1993	
	UNIT COST ESTIMATE #9.1	
ELEVATE AND SURFACE CURVES FOR HIGH SPEED RAIL OPERATIONS		
PER FOOT COST		$ 6.61
Ballast 1,200 NT/TM @ $15/NT		$ 18,000
Material Handling and Distribution (5% of Material)		$ 900
Labor		$ 4,500
Overhead (85.34% of Labor)		$ 3,840
Equipment (30% of Labor)		$ 1,350
	Subtotal	$ 28,590
Engineering (7%)		$ 2,001
Contingencies (15%)		$ 4,289
	Total	$ 34,880
Source:	*Chicago-St. Louis High Speed Rail*	
	Capital Cost Estimates	
	Envirodyne Engineers, Inc.. 1993	

UNIT TRACK COST ESTIMATE #9.2		
REALIGN TRACK - PER FOOT COST		$ 44.62
Mainline Crossties Renewal 3,200 x 50% @ $27.35/ea.		$ 43,760
Track Spikes 12,800/TM @ $.31/ea.		$ 3,968
Top Ballast 4,224 cy/TM x 1.23 NT/cy @ $15/NT		$ 77,933
	Subtotal Material	$ 125,661
Labor		$ 28,409
Overhead (85.34% of Labor)		$ 24,244
Equipment (30% of Labor)		$ 8,523
Material Handling and Distribution (5% of Subtotal Material)		$ 6,283
	Subtotal Installation	$ 67,459
	Subtotal	$ 193,120
Engineering (7%)		$ 13,518
Contingencies (15%)		$ 28,968
	Total Track Cost	$ 235,606
Source:	*Chicago-St. Louis High Speed Rail*	
	Capital Cost Estimates	
	Envirodyne Engineers, Inc., 1993	

UNIT TRACK COST ESTIMATE #9.3

INSTALL ELASTIC FASTENERS ON ONE MILE OF EXISTING TRACK		$	81,142
Salvage Credit			
Tie Plates (Relay) - 6400/TM @ $2.50/ea.		$	(16,000)
Rail Anchors (Relay) - 6400/TM @ $.13/ea.		$	(832)
	Subtotal Salvage Credits	$	(16,832)
Tie Plates - 6400/TM @ 5.73/ea.		$	36,672
Lock Spikes - 25,600/TM @ $.60/ea.		$	15,360
Elastic Hold Down Clip - 12,800/TM @ $1.75/ea.		$	22,400
	Subtotal Material	$	74,432
Labor		$	1,000
Overhead (85.34% of Labor)		$	853
Equipment (30% of Labor)		$	300
Material Handling and Distribution (5% of Subtotal Material)		$	3,722
	Subtotal Installation	$	5,875
	Subtotal Material and Installation	$	80,307
Engineering (7% of Subtotal M & I)		$	5,621
Contingencies (15% of Subtotal M & I)		$	12,046

UNIT TRACK COST ESTIMATE #13A		
INSTALL ELASTIC FASTENERS ONONE MILE OF TRACK		
BEHIND CWR INSTALLATION		$ 49,332
Avoided Cost		$ (32,640)
Tie Plates (New) - 6400/TM @ $5.10/ea.		$ (5,440)
Rail Anchors (New) - 6400/TM @ $.85/ea.		$ (7,936)
Track spikes (New) - 25,600/TM @ $.31/ea.		
	Subtotal Avoided Cost	$ (46,016)
Tie Plates - 6400/TM @ $5.73/ea.		$ 36,672
Lock Spikes - 25,600/TM @ $.60/ea.		$ 15,360
Elastic Hold Down Clip - 12,800/TM @ $1.75/ea.		$ 22,400
	Subtotal Material	$ 74,432
Material Handling and Distribution (5% of Subtotal Material)		$ 3,722
	Subtotal	$ 78,154
Engineering (7% of Subtotal)		$ 5,471
Contingencies (15% of Subtotal)		$ 11,723
Source:	*Chicago-St. Louis High Speed Rail*	
	Capital Cost Estimates	
	Envirodyne Engineers, Inc.. 1993	

TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 6.2.1
Infrastructure Detail: (Base Case) River Route
110 mph

Tri-State Phase II HSR Feasibility Study
19-Jan-99

A-1 River Route 110 MPH

Item	Unit	Unit Costs	Quantity	Amount	
1.0 Trackwork					
1.1 HSR on Existing Roadbed	per mile	$873	33	$28,809	
1.2 HSR on New Roadbed (Existing ROW)	per mile	$932	40	$37,280	
1.2A HSR on New Roadbed (New ROW)	per mile	$1,376	12	$16,512	
1.2B HSR on New Roadbed (Double Track)	per mile	$2,308			
1.3 Timber & Surface w/ 33% Tie replacement	per mile	$136	244	$33,184	
1.4 Timber & Surface w/ 66% Tie Replacement	per mile	$224			
1.5 Relay Track w/ 136# CWR	per mile	$329			
1.6 Siding	per mile	$802	60	$48,120	
1.7 Fencing	per mile	$49	331	$16,219	
1.8 Electricfication	per mile	$991			
1.9 Other Track Work Chicago to Milwaukee	LS	$212,917	1	$212,917	
1.10 Land Acquisition Madison	per mile	$5,000	3	$15,000	
1.11 Land Acquisition Urban	per mile	$294			
1.12 Land Acquisition Rural	pe mile	$98	8	$784	
Total Track Costs					$408,825
2.0 Stations					
2.1 Full Service - New	each	$1,000	1	$1,000	
2.2 Full Service - Renovated	each	$500	5	$2,500	
2.3 Terminal - New	each	$2,000	2	$4,000	
2.4 Terminal - Renovated	each	$1,000	1	$1,000	
2.5 Maintenance (110 MPH technology)	each	$10,000	1	$10,000	
2.5A Maintenance (150 MPH technology)	each	$86,000			
2.5B Maintenance (185 MPH technology)	each	$162,000			
2.6 Stations Chicago to Milwaukee	LS	$20,428	1	$20,428	
Total Station Cost					$38,928
4.0 Turnouts					
4.1 New #33 - 136# High Speed	each	$555	20	$11,100	
Total Turnout Cost					$11,100

Page 2
A-1 River Route 110 MPH

Item	Unit	Unit Costs	Quantity	Amount	
5.0 Bridges - Under					
5.1 Four Lane Urban Expressway	each	$4,848	0	$0	
5.2 Four Lane Rural Expressway	each	$4,036			
5.3 Two Lane Highway	each	$3,062	3	$9,186	
5.4 Rail	each	$3,062			
5.5 Minor river	each	$812	6	$4,872	
5.6 Major River	each	$8,118	1	$8,118	
5.7 Mississippi River	LS	$234,000			
5.8 Interstate 90 Dakota Rvier Valley Structure	LS	$74,000			
5.9 Elevated Structure Milwaukee	per mile	$39,000			
5.10 Elevated Structure St Paul	per mile	$39,000			
5.11 Elevated Structure Chicago to Milwaukee	per mile	$39,000			
5.12 Bridges Chicago to Milwaukee	LS	$97,152	1	$97,152	
Total Bridges - Under Costs					$119,328
6.0 Bridges - Over					
6.1 Four Lane Urban Expressway	each	10,516	1	$10,516	
6.2 Four Lane Rural Expressway	each	2,630			
6.3 Two Lane Highway	each	1,971			
6.4 Rail	each	6,572			
6.5 Viaducts - Major river	each				
6.6 Tunnel (East and West Bound)	per LF	10			
Total Bridges Over					$10,516
7.0 Crossings					
7.1 Private Closure	each	60	151	$9,060	
7.2 Rural w/ Quadrant Gates	each	274	246	$67,404	
7.3 Urban w/ Quadrant Gates	each	341	0	$0	
7.4 Full Width Barrier	each	550			
7.5 Crossings Chicago to Milwaukee	LS	71,510	1	$71,510	
Total Crossings Cost					$147,974
8.0 Signals					
8.1 High Speed Turnout	each	1,098	10	$10,980	
8.2 System Installation for HSR (110MPH)	per mile	150	348	$52,200	
8.2A System Installation for HSR (150MPH)	per mile	350			
8.2B System Installation for HSR (185MPH)	per mile	980			
8.3 Signal Costs Chicago to Milwaukee	LS	46,877	1	$46,877	
Total Signals Cost					$110,057
9.0 Curves					
9.1 Elevate & Surface Curves	per mile	42	9	378	
9.2 Curvature Reduction	per mile	284	9	2,556	
9.3 Elastic Fasteners	per mile	59	9	531	
Total Curve Upgrade Cost					3,465
Total Upgrade Cost					$850,193

Tri-State Phase II HSR Feasibility Study																					
12-Jan-99						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7		Total	
A-1 River Route 110 MPH						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Quantity	Amount
Item	Unit	Unit Costs	Quantity	Amount		Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount		
1.0 Trackwork																					
1.1 HSR on Existing Roadbed	per mile	$873	33	$28,809			-		-	33	28,809		-		-	-	-	-	-	33	$ 28,809
1.2 HSR on New Roadbed (Existing ROW)	per mile	$932	40	$37,280			-		-		-		-	22	20,504			18	16,776	40	$ 37,280
1.2A HSR on New Roadbed (New ROW)	per mile	$1,376	12	$16,512			-		-		-	3	4,128	9	12,384		-		-	12	$ 16,512
1.2B HSR on New Roadbed (Double Track)	per mile	$2,308					-		-		-		-		-		-		-	-	$ -
1.3 Timber & Surface w/ 33% Tie replacement	per mile	$136	244	$33,184			-	41	5,576		-		-		-	105	14,280	98	13,328	244	$ 33,184
1.4 Timber & Surface w/ 66% Tie Replacement	per mile	$224					-		-		-		-		-		-		-	-	$ -
1.5 Relay Track w/ 136# CWR	per mile	$329					-		-		-		-		-		-		-	-	$ -
1.6 Siding	per mile	$802	60	$48,120			-	12	9,624	10	8,020	2	1,604	12	9,624	12	9,624	12	9,624	60	$ 48,120
1.7 Fencing	per mile	$49	331	$16,219			-	41	2,009	33	1,617	3	147	31	1,519	105	5,145	118	5,782	331	$ 16,219
1.8 Electrification	per mile	$991					-		-		-		-		-		-		-	-	$ -
1.9 Other Track Work Chicago to Milwaukee	LS	$212,917	1	$212,917		1	212,917		-		-		-		-		-		-	1	$ 212,917
1.10 Land Acquisition Madison	per mile	$5,000	3	$15,000			-		-		-	3	15,000		-		-		-	3	$ 15,000
1.11 Land Acquisition Urban	per mile	$294					-		-		-	-	-	-	-		-		-	-	$ -
1.12 Land Acquisition Rural	pe mile	$98	8	$784			-		-		-		-	8	784		-		-	8	$ 784
																				-	$ -
																				-	$ -
																				-	$ -
Total Track Costs					$408,825		212,917		17,209		38,446		20,879		44,815		29,049		45,510		$ 408,825
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7		Total	
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Quantity	Amount
2.0 Stations						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount		
2.1 Full Service - New	each	$1,000	1	$1,000												1	1,000			1	$ 1,000
2.2 Full Service - Renovated	each	$500	5	$2,500				1	500							2	1,000	2	1,000	5	$ 2,500
2.3 Terminal - New	each	$2,000	2	$4,000								1	2,000					1	2,000	2	$ 4,000
2.4 Terminal - Renovated	each	$1,000	1	$1,000				1	1,000											1	$ 1,000
2.5 Maintenance (110 MPH technology)	each	$10,000	1	$10,000														1	10,000	1	$ 10,000
2.5A Maintenance (150 MPH technology)	each	$100,000																		-	$ -
2.5B Maintenance (185 MPH technology)	each	$162,000																		-	$ -
2.6 Stations Chicago to Milwaukee	LS	$20,428	1	$20,428		1	20,428													1	$ 20,428
Total Station Cost					$38,928		20,428		1,500				2,000				2,000		13,000		$ 38,928

Page 2																					
A-1 River Route 110 MPH						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
Item	Unit	Unit Costs	Quantity	Amount		Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
4.0 Turnouts						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
4.1 New #33 - 136# High Speed	each	$555	20	$11,100				4	2,220	2	1,110	2	1,110	4	2,220	4	2,220	4	2,220	20	$ 11,100
Total Turnout Cost					$11,100				2,220		1,110		1,110		2,220		2,220		2,220		$ 11,100
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
5.0 Bridges - Under						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
5.1 Four Lane Urban Expressway	each	$4,848		$0									-							-	$ -
5.2 Four Lane Rural Expressway	each	$4,036																		-	$ -
5.3 Two Lane Highway	each	$3,062	3	$9,186								3	9,186							3	$ 9,186
5.4 Rail	each	$3,062																		-	$ -
5.5 Minor river	each	$812	6	$4,872						6	4,872									6	$ 4,872
5.6 Major River	each	$8,118	1	$8,118						1	8,118									1	$ 8,118
5.7 Mississippi River	LS	$234,000																		-	$ -
5.8 Interstate 90 Dakota Rvier Valley Structure	LS	$74,000																		-	$ -
5.9 Elevated Structure Milwaukee	per mile	$39,000																		-	$ -
5.10 Elevated Structure St Paul	per mile	$39,000																		-	$ -
5.11 Elevated Structure Chicago to Milwaukee	per mile	$39,000																		-	$ -
5.12 Bridges Chicago to Milwaukee	LS	$97,152	1	$97,152		1	97,152													1	$ 97,152
Total Bridges - Under Costs					$119,328		97,152		-		12,990		9,186		-		-		-	-	$ 119,328
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
6.0 Bridges - Over						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
6.1 Four Lane Urban Expressway	each	10,516	1	$10,516						1	10,516									1	$ 10,516
6.2 Four Lane Rural Expressway	each	2,630																			
6.3 Two Lane Highway	each	1,971																			
6.4 Rail	each	6,572																			
6.5 Viaducts - Major river	each																				
6.6 Tunnel (East and West Bound)	per LF	20																			
Total Bridges-Over Costs					$10,516						10,516									1	$ 10,517

Page 3																					
A-1 River Route 110 MPH						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
Item	Unit	Unit Costs	Quantity	Amount		Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
7.0 Crossings																					
7.1 Private Closure	each	60	151	$9,060				12	720	32	1,920			10	600	46	2,760	51	3,060	151	$ 9,060
7.2 Rural w/ Quadrant Gates	each	274	246	$67,404				45	12,330	21	5,754			26	7,124	76	20,824	78	21,372	246	$ 67,404
7.3 Urban w/ Quadrant Gates	each	341	0	$0																-	$ -
7.4 Full Width Barrier	each	550																		-	$ -
7.5 Crossings Chicago to Milwaukee	LS	71,510	1	$71,510		1	71,510													1	$ 71,510
Total Crossings Cost					$147,974		71,510		13,050		7,674		-		7,724		23,584		24,432		$ 147,974
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
8.0 Signals																					
8.1 High Speed Turnout	each	1,098	10	$10,980				2	2,196	1	1,098	1	1,098	2	2,196	2	2,196	2	2,196	10	$ 10,980
8.2 System Installation for HSR (110MPH)	per mile	150	348	$52,200				46	6,900	32	4,800	6	900	31	4,650	111	16,650	122	18,300	348	$ 52,200
8.2A System Installation for HSR (150MPH)	per mile	350																		-	$ -
8.2B System Installation for HSR (185MPH)	per mile	980																		-	$ -
8.3 Signal Costs Chicago to Milwaukee	LS	46,877	1	$46,877		1	46,877													1	$ 46,877
Total Signals Cost					$110,057		46,877		9,096		5,898		1,998		6,846		18,846		20,496		$ 110,057
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
9.0 Curves																					
9.1 Elevate & Surface Curves	per mile	42	9	378				2	84							7	294			9	$ 378
9.2 Curvature Reduction	per mile	284	9	2,556				2	568							7	1,988			9	$ 2,556
9.3 Elastic Fasteners	per mile	59	9	531				2	118							7	413			9	$ 531
Total Curve Upgrade Cost					3,465				770								2,695				$ 3,465
Total Upgrade Cost					$850,193		$448,884		$43,845		$76,634		$35,173		$61,605		$78,394		$105,658		$850,194

A-1 River Route Trackwork										
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRne	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Watertown Sub	85.7	90.57	4.87							
Watertown Sub	90.57	98.40	7.83					7.83	7.83	
Watertown Sub	98.40	104.20	5.80					5.80	5.80	
Watertown Sub	104.20	131.20	27.00					27.00	27.00	
Waterloo Spur	131.30	163.85	32.55	32.55					32.55	
Airport	0.00	3.00	3.00		0.00	3.00			3.00	3
Madison/Portage	0.00	30.90	30.90		22.30	8.60			30.90	8
Watertown Sub 2	176.90	178.20	1.30							
Tomah	178.20	179.00	0.80							
Tomah	179.00	180.40	1.40					1.40	1.40	
Tomah	180.40	243.40	63.00					63.00	63.00	
Tomah	243.80	246.30	2.50					2.50	2.50	
Tomah	246.30	257.10	10.80					10.80	10.80	
Tomah	257.10	280.00	22.90					22.90	22.90	
Tomah	280.00	283.00	3.00							
Tomah	283.00	284.40	1.40					1.40	1.40	
Tomah	284.40	288.00	3.60					3.60	3.60	
River	288.00	288.05	0.05					0.05	0.05	
River	288.05	306.60	18.55					18.55	18.55	
River	310.80	312.80	2.00					2.00	2.00	
River	312.80	369.30	56.50					56.50	56.50	
River	369.30	371.50	2.20					2.20	2.20	
River	371.50	372.70	1.20					1.20	1.20	
River	372.70	376.30	3.60					3.60	3.60	
River	376.30	389.80	13.50					13.50	13.50	
River	389.90	391.10	1.20		1.20				1.20	
River	391.10	407.40	16.30		16.30	0.00			16.30	
Merriman Park	407.40	408.90	1.50						1.50	
Merriman Park	408.9	410.2	1.30			0			1.30	
	Total		340.55	32.55	39.80	11.60		243.83	330.58	

Page 2										
Definition of Units										
1.1 HSRex	High Speed Rail trackwork on Existing Roadbed with a unit cost of $873,000 per mile									
1.2 HSRnew	High Speed Rail trackwork on New Roadbed (Existing Right of Way) with a unit cost of $932,000 per mile									
1.2AHSR	High Speed Rail trackwork on New Roadbed (New Right of Way) with a unit cost of $1,376,000 per mile									
1.2BHSR	High Speed Rail trackwork on New Roadbed (Double Track) with a unit cost of $2,308,000 per mile									
1.3T&S33	Timber and Surface with 33% Tie Replacement with a unit cost of $136,000 per mile									
1.7Fence	Fencing of High Speed Rail Route on both sides with a unit cost of $49,000 per mile									
Land	Miles of Land required for construction of a high speed rail route at specifed unit costs									
Segment #2 Milwaukee to Watertown										
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnew	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Watertown Sub	85.7	90.57	4.87							
Watertown Sub	90.57	98.40	7.83					7.83	7.83	
Watertown Sub	98.40	104.20	5.80					5.80	5.80	
Watertown Sub	104.20	131.20	27.00					27.00	27.00	
Total			45.50	0.00	0.00	0.00		40.63	40.63	
Segment #3 Watertown to Highway 51										
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnew	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Waterloo Spur	131.30	163.85	32.55	32.55					32.55	
Segment #4 Airport Track										
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnew	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Airport	0.00	3.00	3.00		0.00	3.00			3.00	3
Segment #5 Madison to Portage										
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnew	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Madison/Portage	0.00	30.90	30.90		22.30	8.60			30.90	8

Page 3										
Segment #6 Portage to River										
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnev	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Watertown Sub 2	176.90	178.20	1.30							
Tomah	178.20	179.00	0.80							
Tomah	179.00	180.40	1.40					1.40	1.40	
Tomah	180.40	243.40	63.00					63.00	63.00	
Tomah	243.80	246.30	2.50					2.50	2.50	
Tomah	246.30	257.10	10.80					10.80	10.80	
Tomah	257.10	280.00	22.90					22.90	22.90	
Tomah	280.00	283.00	3.00							
Tomah	283.00	284.40	1.40					1.40	1.40	
Tomah	284.40	288.00	3.60					3.60	3.60	
Total			110.70	0.00	0.00	0.00	0.00	105.60	105.60	0.00
Segment # 7 River ot St Paul										
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnev	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
River	288.00	288.05	0.05					0.05	0.05	
River	288.05	306.60	18.55					18.55	18.55	
River	310.80	312.80	2.00					2.00	2.00	
River	312.80	369.30	56.50					56.50	56.50	
River	369.30	371.50	2.20					2.20	2.20	
River	371.50	372.70	1.20					1.20	1.20	
River	372.70	376.30	3.60					3.60	3.60	
River	376.30	389.80	13.50					13.50	13.50	
River	389.90	391.10	1.20		1.20				1.20	
River	391.10	407.40	16.30		16.30	0.00			16.30	
Merriman Park	407.40	408.90	1.50						1.50	
Merriman Park	408.9	410.2	1.30			0			1.30	
Total			117.90	0.00	17.50	0.00	0.00	97.60	117.90	0.00

Tri-State Phase II HSR Feasibility Study					
19-Jan-99					
A-1 River Route 110 MPH					
Proposed Station Modifications and Maintenance Facilities					
Station	*Type*	*Recommended Action*	*Cost ($000)*		
Milwaukee Union Station	Terminal	Renovation	$ 1,000		
Brookfield/Watertown	Full Service	Renovation	$ 500		
Madison	Terminal	New	$ 2,000		
Wisconsin Dells	Full Service	Renovation	$ 500		
Tomah	Full Service	New	$ 1,000		
LaCrosse	Full Service	Renovation	$ 500		
Red Wing	Full Service	Renovation	$ 500		
Hastings	Full Service	Renovation	$ 500		
St Paul Union Station	Terminal	Major Renovations	$ 2,000		
Maintenance Facility	110 MPH Technology	New	$ 10,000		
Summary					
2.0 Stations					
2.1 Full Service - New	each	$1,000	1	$1,000	
2.2 Full Service - Renovated	each	$500	5	$2,500	
2.3 Terminal - New	each	$2,000	2	$4,000	
2.4 Terminal - Renovated	each	$1,000	1	$1,000	
2.5 Maintenance (110 MPH technology)	each	$10,000	1	$10,000	
2.5A Maintenance (150 MPH technology)	each	$100,000			
2.5B Maintenance (185 MPH technology)	each	$162,000			
2.6 Stations Chicago to Milwaukee	LS	$20,428	1	$20,428	
Total Station Cost					$38,928

Tri-State Phase II HSR Feasibility Study					
19-Jan-99					
A-1 River Route 110 MPH					
Recommended Action for Bridges Under and Bridges Over					
Segment #3 Watertown to Hwy 51					
Name	*North*	*West*	*Type of Bridge*		
Crawfish River	43.19433	88.87683	Major		
Maunesha River	43.18017	89.00800	Minor		
Maunesha River	43.17883	89.03333	Minor		
Maunesha River	43.17833	89.03550	Minor		
Maunesha River	43.18083	89.07733	Minor		
Maunesha River	43.18167	89.08333	Minor		
Maunesha River	43.18217	89.08850	Minor		
Segment #4 Airport Track					
Name	*North*	*West*	*Type of Bridge*		
Highway 51	43.10733	89.33867	4 Lane UrbanExpressway - Over		
Anderson	43.12117	89.35233	2 Lane Under		
Pankrantz	43.12150	89.35233	2 Lane Under		
International Lane	43.12250	89.35300	2 Lane Under		
Summary					
5.0 Bridges - Under					
5.1 Four Lane Urban Expressway	each	$4,848	0	$0	
5.2 Four Lane Rural Expressway	each	$4,036			
5.3 Two Lane Highway	each	$3,062	3	$9,186	
5.4 Rail	each	$3,062			
5.5 Minor river	each	$812	6	$4,872	
5.6 Major River	each	$8,118	1	$8,118	
5.7 Mississippi River	LS	$234,000			
5.8 Interstate 90 Dakota Rvier Valle	LS	$74,000			
5.9 Elevated Structure Milwaukee	per mile	$39,000			
5.10 Elevated Structure St Paul	per mile	$39,000			
5.11 Elevated Structure Chicago to	per mile	$39,000			
5.12 Bridges Chicago to Milwaukee	LS	$97,152	1	$97,152	

Total Bridges - Under Costs					$119,328
page 2					
A-1 River Route 110 MPH					
Recommended Action for Bridges Under and Bridges Over					
6.0 Bridges - Over					
6.1 Four Lane Urban Expressway	each	10,516	1	$10,516	
6.2 Four Lane Rural Expressway	each	2,630			
6.3 Two Lane Highway	each	1,971			
6.4 Rail	each	6,572			
6.5 Viaducts - Major river	each				
6.6 Tunnel (East and West Bound)	per LF	20			
Total Bridges Over					$10,516

Tri-State Phase II HSR Feasibility Study					
19-Jan-99					
A-1 River Route 110 MPH					
Recommended Action for Bridges Under and Bridges Over					
Segment #3 Watertown to Hwy 51					
Name	*North*	*West*	*Type of Bridge*		
Crawfish River	43.19433	88.87683	Major		
Maunesha River	43.18017	89.00800	Minor		
Maunesha River	43.17883	89.03333	Minor		
Maunesha River	43.17833	89.03550	Minor		
Maunesha River	43.18083	89.07733	Minor		
Maunesha River	43.18167	89.08333	Minor		
Maunesha River	43.18217	89.08850	Minor		
Segment #4 Airport Track					
Name	*North*	*West*	*Type of Bridge*		
Highway 51	43.10733	89.33867	4 Lane UrbanExpressway - Over		
Anderson	43.12117	89.35233	2 Lane Under		
Pankrantz	43.12150	89.35233	2 Lane Under		
International Lane	43.12250	89.35300	2 Lane Under		
Summary					
5.0 Bridges - Under					
5.1 Four Lane Urban Expressway	each	$4,848	0	$0	
5.2 Four Lane Rural Expressway	each	$4,036			
5.3 Two Lane Highway	each	$3,062	3	$9,186	
5.4 Rail	each	$3,062			
5.5 Minor river	each	$812	6	$4,872	
5.6 Major River	each	$8,118	1	$8,118	
5.7 Mississippi River	LS	$234,000			
5.8 Interstate 90 Dakota Rvier Valle	LS	$74,000			
5.9 Elevated Structure Milwaukee	per mile	$39,000			
5.10 Elevated Structure St Paul	per mile	$39,000			
5.11 Elevated Structure Chicago to	per mile	$39,000			
5.12 Bridges Chicago to Milwaukee	LS	$97,152	1	$97,152	

Total Bridges - Under Costs					$119,328
page 2					
A-1 River Route 110 MPH					
Recommended Action for Bridges Under and Bridges Over					
6.0 Bridges - Over					
6.1 Four Lane Urban Expressway	each	10,516	1	$10,516	
6.2 Four Lane Rural Expressway	each	2,630			
6.3 Two Lane Highway	each	1,971			
6.4 Rail	each	6,572			
6.5 Viaducts - Major river	each				
6.6 Tunnel (East and West Bound)	per LF	20			
Total Bridges Over					$10,516

A-1 River Route 110 MPH Technology Grade Crossings					
Segment #2 Milwaukee to Watertown					
Subdivision	Milepost	Cost ($000)	Recommended Action		
Watertown sub	93.80	$274	Rural w.Quadrant Gates		
Watertown sub	95.10	$274	Rural w.Quadrant Gates		
Watertown sub	95.30	$274	Rural w.Quadrant Gates		
Watertown sub	97.40	$274	Rural w.Quadrant Gates		
Watertown sub	98.40	$274	Rural w.Quadrant Gates		
Watertown sub	99.40	$274	Rural w.Quadrant Gates		
Watertown sub	100.50	$274	Rural w.Quadrant Gates		
Watertown sub	101.50	$274	Rural w.Quadrant Gates		
Watertown sub	102.20	$274	Rural w.Quadrant Gates		
Watertown sub	102.40	$274	Rural w.Quadrant Gates		
Watertown sub	102.50	$60	Closure		
Watertown sub	104.30	$274	Rural w.Quadrant Gates		
Watertown sub	105.20	$274	Rural w.Quadrant Gates		
Watertown sub	105.75	$274	Rural w.Quadrant Gates		
Watertown sub	106.20	$274	Rural w.Quadrant Gates		
Watertown sub	106.80	$274	Rural w.Quadrant Gates		
Watertown sub	108.20	$274	Rural w.Quadrant Gates		
Watertown sub	109.80	$274	Rural w.Quadrant Gates		
Watertown sub	110.01	$274	Rural w.Quadrant Gates		
Watertown sub	111.30	$274	Rural w.Quadrant Gates		
Watertown sub	113.10	$60	Closure		
Watertown sub	114.50	$274	Rural w.Quadrant Gates		
Watertown sub	114.80	$274	Rural w.Quadrant Gates		
Watertown sub	115.50	$274	Rural w.Quadrant Gates		
Watertown sub	115.90	$274	Rural w.Quadrant Gates		
Watertown sub	117.40	$274	Rural w.Quadrant Gates		
Watertown sub	117.70	$274	Rural w.Quadrant Gates		
Watertown sub	117.80	$274	Rural w.Quadrant Gates		
Watertown sub	117.90	$274	Rural w.Quadrant Gates		
Watertown sub	118.05	$274	Rural w.Quadrant Gates		
Watertown sub	118.20	$274	Rural w.Quadrant Gates		
Watertown sub	118.30	$274	Rural w.Quadrant Gates		
Watertown sub	118.70	$274	Rural w.Quadrant Gates		
Watertown sub	119.50	$274	Rural w.Quadrant Gates		
Watertown sub	122.50	$274	Rural w.Quadrant Gates		
Watertown sub	123.20	$274	Rural w.Quadrant Gates		
Watertown sub	123.70	$60	Closure		
Watertown sub	123.77	$274	Rural w.Quadrant Gates		
Watertown sub	124.60	$60	Closure		
Watertown sub	125.00	$274	Rural w.Quadrant Gates		
Watertown sub	125.45	$60	Closure		
Watertown sub	125.50	$60	Closure		
Watertown sub	125.85	$60	Closure		
Watertown sub	126.30	$60	Closure		
Watertown sub	126.40	$274	Rural w.Quadrant Gates		
Watertown sub	127.30	$60	Closure		
Watertown sub	127.60	$60	Closure		
Watertown sub	128.20	$274	Rural w.Quadrant Gates		

Page 2					
Subdivision	Milepost	Cost ($000)	Recommended Action		
Watertown sub	128.80	$60	Closure		
Watertown sub	129.10	$60	Closure		
Watertown sub	129.40	$274	Rural w.Quadrant Gates		
Watertown sub	129.50	$274	Rural w.Quadrant Gates		
Watertown sub	129.95	$274	Rural w.Quadrant Gates		
Watertown sub	130.10	$274	Rural w.Quadrant Gates		
Watertown sub	130.40	$274	Rural w.Quadrant Gates		
Watertown sub	130.60	$274	Rural w.Quadrant Gates		
Watertown sub	130.99	$274	Rural w.Quadrant Gates		
Summary Segment #2		Unit Cost	Quantity	Amount	
Private Closure		$60	12	$720	
Rural w/Quadrant Gates		$274	45	$12,330	
Total Grade Crossings				$13,050	

Page 3					
Segment #3 Watertown to Hwy 51					
Subdivision	Milepost	Cost ($000)	Recommended Action		
Waterloo Spur	132.10	$274	Rural w/Quadrant Gates		
Waterloo Spur	133.45	$274	Rural w/Quadrant Gates		
Waterloo Spur	133.50	$60	Closure		
Waterloo Spur	133.60	$60	Closure		
Waterloo Spur	133.95	$60	Closure		
Waterloo Spur	134.45	$274	Rural w/Quadrant Gates		
Waterloo Spur	134.65	$60	Closure		
Waterloo Spur	134.80	$60	Closure		
Waterloo Spur	135.45	$274	Rural w/Quadrant Gates		
Waterloo Spur	135.85	$60	Closure		
Waterloo Spur	136.20	$60	Closure		
Waterloo Spur	136.71	$60	Closure		
Waterloo Spur	136.90	$274	Rural w/Quadrant Gates		
Waterloo Spur	137.30	$60	Closure		
Waterloo Spur	137.70	$274	Rural w/Quadrant Gates		
Waterloo Spur	138.30	$274	Rural w/Quadrant Gates		
Waterloo Spur	138.40	$60	Closure		
Waterloo Spur	139.00	$274	Rural w/Quadrant Gates		
Waterloo Spur	139.45	$60	Closure		
Waterloo Spur	139.65	$60	Closure		
Waterloo Spur	139.90	$60	Closure		
Waterloo Spur	140.80	$60	Closure		
Waterloo Spur	141.70	$60	Closure		
Waterloo Spur	143.70	$274	Rural w/Quadrant Gates		
Waterloo Spur	144.00	$60	Closure		
Waterloo Spur	144.30	$274	Rural w/Quadrant Gates		
Waterloo Spur	144.35	$274	Rural w/Quadrant Gates		
Waterloo Spur	144.50	$274	Rural w/Quadrant Gates		
Waterloo Spur	144.60	$274	Rural w/Quadrant Gates		
Waterloo Spur	144.70	$274	Rural w/Quadrant Gates		
Waterloo Spur	145.30	$60	Closure		
Waterloo Spur	145.61	$60	Closure		
Waterloo Spur	145.90	$60	Closure		
Waterloo Spur	146.30	$60	Closure		
Waterloo Spur	147.00	$60	Closure		
Waterloo Spur	148.00	$274	Rural w/Quadrant Gates		
Waterloo Spur	148.40	$60	Closure		
Waterloo Spur	149.60	$60	Closure		
Waterloo Spur	150.45	$60	Closure		
Waterloo Spur	150.85	$60	Closure		
Waterloo Spur	152.40	$60	Closure		
Waterloo Spur	152.90	$60	Closure		
Waterloo Spur	154.40	$60	Closure		
Waterloo Spur	154.90	$60	Closure		
Waterloo Spur	155.60	$274	Rural w/Quadrant Gates		
Waterloo Spur	155.75	$274	Rural w/Quadrant Gates		
Waterloo Spur	156.80	$274	Rural w/Quadrant Gates		

Page 4					
Subdivision	Milepost	Cost ($000)	Recommended Action		
Waterloo Spur	157.60	$60	Closure		
Waterloo Spur	157.80	$60	Closure		
Waterloo Spur	158.30	$60	Closure		
Waterloo Spur	159.40	$274	Rural w/Quadrant Gates		
Waterloo Spur	159.70	$274	Rural w/Quadrant Gates		
Waterloo Spur	161.80	$274	Rural w/Quadrant Gates		
Summary Segment #3		Unit Cost	Quantity	Amount	
Private Closure		$60	32	$1,920	
Rural w/Quadrant Gates		$274	21	$5,754	
Total Grade Crossings				$7,674	

Page 5					
Segment #5 Madison to Portage					
Subdivision	Milepost	Cost ($000)	Recommended Action		
Madison-Portag	30.85	$274	Rural w/Quadrant Gates		
Madison-Portag	30.40	$274	Rural w/Quadrant Gates		
Madison-Portag	28.70	$274	Rural w/Quadrant Gates		
Madison-Portag	27.90	$60	Closure		
Madison-Portag	27.15	$274	Rural w/Quadrant Gates		
Madison-Portag	26.50	$60	Closure		
Madison-Portag	26.30	$60	Closure		
Madison-Portag	25.70	$274	Rural w/Quadrant Gates		
Madison-Portag	25.55	$60	Closure		
Madison-Portag	25.40	$60	Closure		
Madison-Portag	25.30	$60	Closure		
Madison-Portag	25.20	$60	Closure		
Madison-Portag	24.80	$60	Closure		
Madison-Portag	24.30	$274	Rural w/Quadrant Gates		
Madison-Portag	24.20	$274	Rural w/Quadrant Gates		
Madison-Portag	23.75	$274	Rural w/Quadrant Gates		
Madison-Portag	23.10	$60	Closure		
Madison-Portag	22.70	$274	Rural w/Quadrant Gates		
Madison-Portag	22.40	$60	Closure		
Madison-Portag	22.30	$274	Rural w/Quadrant Gates		
Madison-Portag	21.70	$274	Rural w/Quadrant Gates		
Madison-Portag	20.15	$274	Rural w/Quadrant Gates		
Madison-Portag	19.40	$274	Rural w/Quadrant Gates		
Madison-Portag	17.40	$274	Rural w/Quadrant Gates		
Madison-Portag	16.30	$274	Rural w/Quadrant Gates		
Madison-Portag	14.20	$274	Rural w/Quadrant Gates		
Madison-Portag	10.40	$274	Rural w/Quadrant Gates		
Madison-Portag	9.40	$274	Rural w/Quadrant Gates		
Madison-Portag	8.30	$274	Rural w/Quadrant Gates		
Madison-Portag	7.70	$274	Rural w/Quadrant Gates		
Madison-Portag	7.20	$274	Rural w/Quadrant Gates		
Madison-Portag	6.50	$274	Rural w/Quadrant Gates		
Madison-Portag	3.45	$274	Rural w/Quadrant Gates		
Madison-Portag	2.20	$274	Rural w/Quadrant Gates		
Madison-Portag	0.45	$274	Rural w/Quadrant Gates		
Madison-Portag	0.20	$274	Rural w/Quadrant Gates		
Summary Segment #5		Unit Cost	Quantity	Amount	
Private Closure		$60	10	$600	
Rural w/Quadrant Gates		$274	26	$7,124	
Total Grade Crossings				$7,724	

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Subdivision	Milepost	Cost ($000)	Recommended Action		
Tomah, CPSoo	180.20	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	180.90	$60	Closure		
Tomah, CPSoo	181.20	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	182.70	$60	Closure		
Tomah, CPSoo	183.80	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	184.50	$60	Closure		
Tomah, CPSoo	185.20	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	186.60	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	187.00	$60	Closure		
Tomah, CPSoo	190.40	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	191.20	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	191.90	$60	Closure		
Tomah, CPSoo	193.80	$60	Closure		
Tomah, CPSoo	194.20	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	197.75	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	200.10	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	200.50	$60	Closure		
Tomah, CPSoo	201.80	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	203.10	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	203.65	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	203.75	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	204.30	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	204.75	$60	Closure		
Tomah, CPSoo	205.10	$60	Closure		
Tomah, CPSoo	205.50	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	205.80	$60	Closure		
Tomah, CPSoo	207.40	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	208.50	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	209.20	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	210.20	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	210.80	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	212.75	$60	Closure		
Tomah, CPSoo	212.90	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	214.10	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	214.20	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	214.30	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	214.40	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	214.50	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	214.60	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	214.70	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	215.20	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	215.70	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	216.10	$60	Closure		
Tomah, CPSoo	216.40	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	218.50	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	218.80	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	219.95	$60	Closure		
Tomah, CPSoo	220.40	$60	Closure		
Tomah, CPSoo	220.75	$60	Closure		

Page 7					
Subdivision	Milepost	Cost ($000)	Recommended Action		
Tomah, CPSoo	221.20	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	221.90	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	222.20	$60	Closure		
Tomah, CPSoo	222.40	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	223.40	$60	Closure		
Tomah, CPSoo	223.95	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	224.01	$60	Closure		
Tomah, CPSoo	224.50	$60	Closure		
Tomah, CPSoo	225.10	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	226.10	$60	Closure		
Tomah, CPSoo	227.20	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	227.65	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	228.95	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	229.50	$60	Closure		
Tomah, CPSoo	230.20	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	231.20	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	231.90	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	233.60	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	237.50	$60	Closure		
Tomah, CPSoo	239.20	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	239.90	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	240.10	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	240.90	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	241.20	$60	Closure		
Tomah, CPSoo	242.60	$60	Closure		
Tomah, CPSoo	242.80	$60	Closure		
Tomah, CPSoo	243.50	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	247.20	$60	Closure		
Tomah, CPSoo	249.90	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	251.80	$60	Closure		
Tomah, CPSoo	252.40	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	254.05	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	254.60	$60	Closure		
Tomah, CPSoo	255.80	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	256.40	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	256.60	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	256.90	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	257.50	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	258.20	$60	Closure		
Tomah, CPSoo	258.80	$60	Closure		
Tomah, CPSoo	259.50	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	260.40	$60	Closure		
Tomah, CPSoo	260.80	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	261.50	$60	Closure		
Tomah, CPSoo	261.75	$60	Closure		
Tomah, CPSoo	262.50	$60	Closure		
Tomah, CPSoo	263.20	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	265.70	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	266.30	$274	Rural w/Quadrant Gates		

Page 8					
Subdivision	Milepost	Cost ($000)	Recommended Action		
Tomah, CPSoo	266.70	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	266.80	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	267.01	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	267.10	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	267.50	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	268.10	$60	Closure		
Tomah, CPSoo	268.50	$60	Closure		
Tomah, CPSoo	268.70	$60	Closure		
Tomah, CPSoo	268.90	$60	Closure		
Tomah, CPSoo	269.20	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	269.50	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	270.90	$60	Closure		
Tomah, CPSoo	271.30	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	271.40	$60	Closure		
Tomah, CPSoo	271.60	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	274.40	$60	Closure		
Tomah, CPSoo	274.90	$60	Closure		
Tomah, CPSoo	275.90	$60	Closure		
Tomah, CPSoo	279.70	$60	Closure		
Tomah, CPSoo	279.80	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	280.90	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	281.10	$274	Rural w/Quadrant Gates		
Tomah, CPSoo	282.40	$60	Closure		
Tomah, CPSoo	284.80	$60	Closure		
Summary Segment #6		Unit Cost	Quantity	Amount	
Private Closure		$60	46	$2,760	
Rural w/Quadrant Gates		$274	76	$20,824	
Total Grade Crossings				$23,584	

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Subdivision	Milepost	Cost ($000)	Recommended Action		
River, CPSoo	288.16	$274	Rural w/Quadrant Gates		
River, CPSoo	288.20	$60	Closure		
River, CPSoo	288.31	$274	Rural w/Quadrant Gates		
River, CPSoo	288.40	$274	Rural w/Quadrant Gates		
River, CPSoo	288.65	$274	Rural w/Quadrant Gates		
River, CPSoo	288.80	$274	Rural w/Quadrant Gates		
River, CPSoo	288.90	$274	Rural w/Quadrant Gates		
River, CPSoo	289.10	$274	Rural w/Quadrant Gates		
River, CPSoo	289.98	$274	Rural w/Quadrant Gates		
River, CPSoo	293.10	$60	Closure		
River, CPSoo	293.90	$60	Closure		
River, CPSoo	294.70	$60	Closure		
River, CPSoo	295.20	$60	Closure		
River, CPSoo	295.60	$60	Closure		
River, CPSoo	295.70	$60	Closure		
River, CPSoo	295.80	$60	Closure		
River, CPSoo	296.05	$274	Rural w/Quadrant Gates		
River, CPSoo	296.57	$60	Closure		
River, CPSoo	297.40	$60	Closure		
River, CPSoo	297.50	$60	Closure		
River, CPSoo	297.90	$60	Closure		
River, CPSoo	301.05	$60	Closure		
River, CPSoo	302.90	$60	Closure		
River, CPSoo	303.10	$60	Closure		
River, CPSoo	303.80	$274	Rural w/Quadrant Gates		
River, CPSoo	303.90	$274	Rural w/Quadrant Gates		
River, CPSoo	306.80	$274	Rural w/Quadrant Gates		
River, CPSoo	307.20	$274	Rural w/Quadrant Gates		
River, CPSoo	307.50	$274	Rural w/Quadrant Gates		
River, CPSoo	308.00	$274	Rural w/Quadrant Gates		
River, CPSoo	308.40	$274	Rural w/Quadrant Gates		
River, CPSoo	308.48	$274	Rural w/Quadrant Gates		
River, CPSoo	308.75	$274	Rural w/Quadrant Gates		
River, CPSoo	308.80	$274	Rural w/Quadrant Gates		
River, CPSoo	309.05	$274	Rural w/Quadrant Gates		
River, CPSoo	309.20	$274	Rural w/Quadrant Gates		
River, CPSoo	309.50	$274	Rural w/Quadrant Gates		
River, CPSoo	309.55	$274	Rural w/Quadrant Gates		
River, CPSoo	309.65	$274	Rural w/Quadrant Gates		
River, CPSoo	309.70	$274	Rural w/Quadrant Gates		
River, CPSoo	310.11	$274	Rural w/Quadrant Gates		
River, CPSoo	310.75	$274	Rural w/Quadrant Gates		
River, CPSoo	311.50	$274	Rural w/Quadrant Gates		
River, CPSoo	312.10	$274	Rural w/Quadrant Gates		
River, CPSoo	312.70	$274	Rural w/Quadrant Gates		
River, CPSoo	313.30	$274	Rural w/Quadrant Gates		
River, CPSoo	314.40	$274	Rural w/Quadrant Gates		
River, CPSoo	314.55	$60	Closure		
River, CPSoo	314.80	$274	Rural w/Quadrant Gates		

Page 10					
Subdivision	Milepost	Cost ($000)	Recommended Action		
River, CPSoo	314.90	$274	Rural w/Quadrant Gates		
River, CPSoo	319.85	$60	Closure		
River, CPSoo	320.30	$274	Rural w/Quadrant Gates		
River, CPSoo	325.40	$60	Closure		
River, CPSoo	327.85	$60	Closure		
River, CPSoo	329.00	$60	Closure		
River, CPSoo	329.20	$274	Rural w/Quadrant Gates		
River, CPSoo	331.30	$60	Closure		
River, CPSoo	332.80	$274	Rural w/Quadrant Gates		
River, CPSoo	333.65	$60	Closure		
River, CPSoo	334.20	$60	Closure		
River, CPSoo	334.80	$274	Rural w/Quadrant Gates		
River, CPSoo	335.22	$274	Rural w/Quadrant Gates		
River, CPSoo	336.40	$274	Rural w/Quadrant Gates		
River, CPSoo	339.60	$60	Closure		
River, CPSoo	340.60	$274	Rural w/Quadrant Gates		
River, CPSoo	341.10	$274	Rural w/Quadrant Gates		
River, CPSoo	342.01	$274	Rural w/Quadrant Gates		
River, CPSoo	342.30	$60	Closure		
River, CPSoo	343.20	$274	Rural w/Quadrant Gates		
River, CPSoo	345.20	$60	Closure		
River, CPSoo	351.80	$274	Rural w/Quadrant Gates		
River, CPSoo	353.40	$274	Rural w/Quadrant Gates		
River, CPSoo	353.80	$274	Rural w/Quadrant Gates		
River, CPSoo	354.50	$274	Rural w/Quadrant Gates		
River, CPSoo	354.70	$60	Closure		
River, CPSoo	355.02	$274	Rural w/Quadrant Gates		
River, CPSoo	355.65	$274	Rural w/Quadrant Gates		
River, CPSoo	357.10	$274	Rural w/Quadrant Gates		
River, CPSoo	357.50	$60	Closure		
River, CPSoo	357.80	$274	Rural w/Quadrant Gates		
River, CPSoo	359.01	$274	Rural w/Quadrant Gates		
River, CPSoo	359.50	$60	Closure		
River, CPSoo	359.80	$274	Rural w/Quadrant Gates		
River, CPSoo	360.01	$274	Rural w/Quadrant Gates		
River, CPSoo	360.30	$274	Rural w/Quadrant Gates		
River, CPSoo	360.50	$60	Closure		
River, CPSoo	360.85	$274	Rural w/Quadrant Gates		
River, CPSoo	363.80	$274	Rural w/Quadrant Gates		
River, CPSoo	365.20	$274	Rural w/Quadrant Gates		
River, CPSoo	365.75	$60	Closure		
River, CPSoo	365.80	$274	Rural w/Quadrant Gates		
River, CPSoo	366.28	$60	Closure		
River, CPSoo	366.62	$60	Closure		
River, CPSoo	366.83	$60	Closure		
River, CPSoo	367.20	$274	Rural w/Quadrant Gates		
River, CPSoo	370.63	$60	Closure		
River, CPSoo	370.69	$274	Rural w/Quadrant Gates		
River, CPSoo	371.20	$274	Rural w/Quadrant Gates		

Page 11					
Subdivision	Milepost	Cost ($000)	Recommended Action		
River, CPSoo	377.45	$274	Rural w/Quadrant Gates		
River, CPSoo	378.12	$274	Rural w/Quadrant Gates		
River, CPSoo	378.59	$274	Rural w/Quadrant Gates		
River, CPSoo	379.99	$274	Rural w/Quadrant Gates		
River, CPSoo	380.23	$274	Rural w/Quadrant Gates		
River, CPSoo	380.90	$60	Closure		
River, CPSoo	381.50	$60	Closure		
River, CPSoo	382.80	$274	Rural w/Quadrant Gates		
River, CPSoo	383.05	$60	Closure		
River, CPSoo	384.10	$60	Closure		
River, CPSoo	385.85	$274	Rural w/Quadrant Gates		
River, CPSoo	386.55	$60	Closure		
River, CPSoo	387.10	$60	Closure		
River, CPSoo	387.74	$60	Closure		
River, CPSoo	388.70	$60	Closure		
River, CPSoo	389.51	$60	Closure		
River, CPSoo	390.20	$60	Closure		
River, CPSoo	391.02	$274	Rural w/Quadrant Gates		
River, CPSoo	391.09	$274	Rural w/Quadrant Gates		
River, CPSoo	395.94	$60	Closure		
River, CPSoo	396.05	$274	Rural w/Quadrant Gates		
River, CPSoo	396.77	$60	Closure		
River, CPSoo	397.10	$274	Rural w/Quadrant Gates		
River, CPSoo	398.70	$60	Closure		
River, CPSoo	399.61	$274	Rural w/Quadrant Gates		
River, CPSoo	401.90	$274	Rural w/Quadrant Gates		
River, CPSoo	402.80	$274	Rural w/Quadrant Gates		
River, CPSoo	403.20	$274	Rural w/Quadrant Gates		
River, CPSoo	404.30	$60	Closure		
River, CPSoo	404.60	$60	Closure		
River, CPSoo	405.80	$60	Closure		
Summary Segment #7		Unit Cost	Quantity	Amount	
Private Closure		$60	51	$3,060	
Rural w/Quadrant Gates		$274	78	$21,372	
Total Grade Crossings				$24,432	
Total Summary					
7.0 Crossings					
7.1 Private Closu	each	60	151	$9,060	
7.2 Rural w/ Qua	each	274	246	$67,404	
7.3 Urban w/ Qua	each	341	0	$0	
7.4 Full Width Ba	each	550			
7.5 Crossings Cł	LS	71,510	1	$71,510	
Total Crossings Cost					$147,974

CURVES

Curves that require increased elevtion, reduction of curvature, and installation of elastic fasteners are as follows:

				Actual		Proposed Reduction		
Subdivision	MP	Range	Direct	Curvature	Elev	Curvature	Elevation	Description
Watertown sub	109.30	109.60	Left	2* 0'	3.000000"	1* 0'	3.000000"	curvature reduction
Watertown sub	111.40	111.80	Left	1* 30'	2.500000"	1* 7'	2.500000"	curvature reduction
Watertown sub	177.10	177.40	Left	3* 0'	3.000000"	1* 0'	3.000000"	curvature reduction
Watertown sub	177.60	177.70	Right	1* 50'	0.500000"	1* 7'	2.500000"	curvature reduction
Tomah, CPSoo	178.50	178.55	Right	3* 0'	1.000000"	1* 0'	1.000000"	curvature reduction
Tomah, CPSoo	178.70	178.75	Right	2* 47'	1.000000"	1* 7'	2.000000"	curvature reduction
Tomah, CPSoo	178.75	178.80	Right	2* 0'	0.250000"	1* 0'	2.000000"	curvature reduction
Tomah, CPSoo	178.80	178.85	Right	2* 33'	0.250000"	1* 7'	2.000000"	curvature reduction
Tomah, CPSoo	178.85	178.90	Right	1* 42'	0.500000"	1* 7'	2.000000"	curvature reduction
Tomah, CPSoo	192.75	192.99	Right	2* 0'	3.000000"	1* 0"	3.000000"	curvature reduced
Tomah, CPSoo	193.80	194.00	Left	1* 58'	3.000000"	1* 7'	3.000000"	curvature reduced
Tomah, CPSoo	194.20	194.40	Right	2* 0'	3.000000"	1* 0'	3.000000"	curvature reduction
Tomah, CPSoo	195.40	195.50	Right	2* 30'	4.000000"	1* 7'	2.500000"	curvature reduction
Tomah, CPSoo	195.60	195.75	Left	2* 0'	3.000000"	1* 0'	3.000000"	curvature reduction
Tomah, CPSoo	196.50	196.75	Left	1* 30'	2.500000"	1* 7'	2.500000"	curvature reduction
Tomah, CPSoo	196.85	197.20	Right	2* 0'	3.000000"	1* 7'	3.000000"	curvature reduction
Tomah, CPSoo	227.60	227.70	Left	2* 0'	3.000000"	1* 0'	3.000000"	curvature reduction
Tomah, CPSoo	271.60	271.80	Left	1* 30'	2.500000"	1* 15'	2.500000"	curvature reduction
Tomah, CPSoo	277.10	277.40	Left	2* 0'	3.000000"	1* 0'	3.000000"	curvature reduction

TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 6.2.2
Infrastructure Detail: B-1 Rochester Route
110 mph

Tri-State Phase II HSR Feasibility Study

12-Jan-99

Route: Option B-1 110 MPH technology

Item	Unit	Unit Costs	Quantity		
1.0 Trackwork	per mile				
1.1 HSR on Existing Roadbed	per mile	$873	49	$42,777	
1.2 HSR on New Roadbed (Existing ROW)	per mile	$932	22	$20,504	
1.2A HSR on New Roadbed (New ROW)	per mile	$1,376	116	$159,616	
1.2B HSR on New Roadbed (Double Track)	per mile	$2,308			
1.3 Timber & Surface w/ 33% Tie replacement	per mile	$136	165	$22,440	
1.4 Timber & Surface w/ 66% Tie Replacement	per mile	$224			
1.5 Relay Track w/ 136# CWR	per mile	$329			
1.6 Siding	per mile	$802	60	$48,120	
1.7 Fencing (Milwaukee to St. Paul)	per mile	$49	354	$17,346	
1.8 Electricfication	per mile	$991	-	$0	
1.9 Other Track Work Chicago to Milwaukee	LS	$212,917	1	$212,917	
1.10 Land Acquisition Madison	LS	$5,000	3	$15,000	
1.11 Land Acquisition Urban	per mile	$294	10	$2,940	
1.12 Land Acquisition Rural	per mile	$98	110	$10,780	
Total Track Upgrade Cost					$552,440
2.0 Stations					
2.1 Full Service - New	each	$1,000	1	$1,000	
2.2 Full Service - Renovated	each	$500	3	$1,500	
2.3 Terminal - New	each	$2,000	3	$6,000	
2.4 Terminal - Renovated	each	$1,000	1	$1,000	
2.5 Maintenance (110 MPH technology)	each	$10,000	1	$10,000	
2.5A Maintenance (150 MPH technology)	each	$86,000			
2.5B Maintenance (185 MPH technology)	each	$162,000			
2.6 Stations Chicago to Milwaukee	LS	$20,428	1	$20,428	
Total station Upgrade Cost					$39,928
4.0 Turnouts					
4.1 New #33 - 136# High Speed	each	$555	12	$6,660	
4.2 New #20 - 136# Panel	each	$105			
4.3 New #10 - 136# Panel	each	$61			
Total Turnout Upgrade Cost					$6,660

Route: Option B-1 110 MPH technology

5.0 Bridges - Under					
5.1 Four Lane Urban Expressway	each	$4,848	4	$19,392	
5.2 Four Lane Rural Expressway	each	$4,036	15	$60,540	
5.3 Two Lane Highway	each	$3,062	3	$9,186	
5.4 Rail	each	$3,062	3	$9,186	
5.5 Minor river	each	$812	20	$16,240	
5.6 Major River	each	$8,118	2	$16,236	
5.7 Mississippi River	LS	$234,000			
5.8 Interstate 90 Dakota Rvier Valley Structure	LS	$74,000			
5.9 Elevated Structure Milwaukee	per mile	$39,000			
5.10 Elevated Structure St Paul	per mile	$39,000			
5.11 Elevated Structure Chicago to Milwaukee	per mile	$39,000			
5.12 Bridges Chicago to Milwaukee	LS	$97,152	1	$97,152	
Total Bridge Under Upgrade Cost					$227,932
6.0 Bridges - Over					
6.1 Four Lane Urban Expressway	each	$10,516	2	$21,032	
6.2 Four Lane Rural Expressway	each	$2,630		$0	
6.3 Two Lane Highway	each	$1,971	1	$1,971	
6.4 Rail	each	$6,572	2	$13,144	
6.5 Viaducts - Major river	each				
6.6 Tunnel	each				
Total Bridges Over					$36,147
7.0 Crossings					
7.1 Private Closure	each	$60	215	$12,900	
7.2 Rural w/ Quadrant Gates	each	$274	320	$87,680	
7.3 Urban w/ Quadrant Gates	each	$341	-	$0	
7.4 Full Width Barrier	each	$550	1	$550	
7.5 Crossings Chicago to Milwaukee	LS	$71,510	1	$71,510	
Total Crossing Upgrade Cost					$172,640
8.0 Signals					
8.1 High Speed Turnout	each	$1,098	6	$6,588	
8.2 System Installation for HSR (110MPH)	per mile	$150	366	$54,900	
8.2A System Installation for HSR (150MPH)	per mile	$350			
8.2B System Installation for HSR (185MPH)	per mile	$980			
8.3 Signal Costs Chicago to Milwaukee	LS	$46,877	1	$46,877	
Total Signals Upgrade					$108,365
9.0 Curves					
9.1 Elevate & Surface Curves	per mile	$42	9	$378	
9.2 Curvature Reduction	per mile	$284	9	$2,556	
9.3 Elastic Fasteners	per mile	$59	9	$531	
Total Curve Upgrade Cost					$3,465
Total Upgrade Cost					$1,147,577

Tri-State Phase II HSR Feasibility Study
19-Jan-99

B-1 Rochester Route Route 110 MPH
Proposed Station Modifications and Maintenance Facilities

Station	*Type*	*Recommen*	*Cost ($000)*
Milwaukee Union Station	Terminal	Renovation	$ 1,000
Brookfield/Watertown	Full Service	Renovation	$ 500
Madison	Terminal	New	$ 2,000
Wisconsin Dells	Full Service	Renovation	$ 500
Tomah	Full Service	New	$ 1,000
LaCrosse	Full Service	Renovation	$ 500
Rochester	Terminal	New	$ 2,000
St Paul Union Station	Terminal	Major Reno	$ 2,000
Maintenance Facility	110 MPH Technology	New	$ 10,000

Summary

2.0 Stations				
2.1 Full Service - New	each	$1,000	1	$1,000
2.2 Full Service - Renovated	each	$500	3	$1,500
2.3 Terminal - New	each	$2,000	3	$6,000
2.4 Terminal - Renovated	each	$1,000	1	$1,000
2.5 Maintenance (110 MPH technology)	each	$10,000	1	$10,000
2.5A Maintenance (150 MPH technology)	each	$86,000		
2.5B Maintenance (185 MPH technology)	each	$162,000		
2.6 Stations Chicago to Milwaukee	LS	$20,428	1	$20,428
Total Station Cost				$39,928

Tri-State Phase II HSR Feasibility Study																					
12-Jan-99																					
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7			
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
Route: Option B-1 110 MPH technology						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Item	Unit	Unit Costs	Quantity	Amount																	
1.0 Trackwork																					
1.1 HSR on Existing Roadbed	per mile	$873	49	$42,777			-		-	33	28,809		-		-	-	-	16	13,968	49	$ 42,777
1.2 HSR on New Roadbed (Existing ROW)	per mile	$932	22	$20,504			-		-		-		-	22	20,504				-	22	$ 20,504
1.2A HSR on New Roadbed (New ROW)	per mile	$1,376	116	$159,616			-		-		-	3	4,128	9	12,384		-	104	143,104	116	$ 159,616
1.2B HSR on New Roadbed (Double Track)	per mile	$2,308					-		-		-		-		-		-		-	-	$ -
1.3 Timber & Surface w/ 33% Tie replacement	per mile	$136	165	$22,440			-	41	5,576		-		-		-	106	14,416	18	2,448	165	$ 22,440
1.4 Timber & Surface w/ 66% Tie Replacement	per mile	$224					-		-		-		-		-		-		-	-	$ -
1.5 Relay Track w/ 136# CWR	per mile	$329					-		-		-		-		-		-		-	-	$ -
1.6 Siding	per mile	$802	60	$48,120			-	10	8,020	10	8,020		-		-	10	8,020	30	24,060	60	$ 48,120
1.7 Fencing	per mile	$49	354	$17,346			-	41	2,009	32	1,568	3	147	31	1,519	106	5,194	141	6,909	354	$ 17,346
1.8 Electricfication	per mile	$991	-	$0			-		-		-		-		-		-		-	-	$ -
1.9 Other Track Work Chicago to Milwaukee	LS	$212,917	1	$212,917		1	212,917		-		-		-		-		-		-	1	$ 212,917
1.10 Land Acquisition Madison	per mile	$5,000	3	$15,000			-		-		-	3	15,000		-		-		-	3	$ 15,000
1.11 Land Acquisition Urban	per mile	$294	10	$2,940			-		-		-	-	-	-	-		-	10	2,940	10	$ 2,940
1.12 Land Acquisition Rural	per mile	$98	110	$10,780			-		-		-		-	8	784		-	102	9,996	110	$ 10,780
Total Track Costs					$552,440		212,917		15,605		38,397		19,275		35,191		27,630		203,425		$ 552,440
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7			
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
2.0 Stations																					
2.1 Full Service - New	each	$1,000	1	$1,000												1	1,000			1	$ 1,000
2.2 Full Service - Renovated	each	$500	3	$1,500				1	500							2	1,000			3	$ 1,500
2.3 Terminal - New	each	$2,000	3	$6,000								1	2,000					2	4,000	3	$ 6,000
2.4 Terminal - Renovated	each	$1,000	1	$1,000				1	1,000											1	$ 1,000
2.5 Maintenance (110 MPH technology)	each	$10,000	1	$10,000														1	10,000	1	$ 10,000
2.5A Maintenance (150 MPH technology)	each	$86,000																		-	$ -
2.5B Maintenance (185 MPH technology)	each	$162,000																		-	$ -
2.6 Stations Chicago to Milwaukee	LS	$20,428	1	$20,428		1	20,428													1	$ 20,428
Total Station Cost					$39,928		20,428		1,500				2,000				2,000		14,000		$ 39,928

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						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
4.0 Turnouts						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
4.1 New #33 - 136# High Speed	each	$555	12	$6,660				2	1,110	2	1,110					2	1,110	6	3,330	12	$ 6,660
Total Turnout Cost					$6,660				1,110		1,110						1,110		3,330		$ 6,660
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
5.0 Bridges - Under						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
5.1 Four Lane Urban Expressway	each	$4,848	4	$19,392								-	-					4	19,392	4	$ 19,392
5.2 Four Lane Rural Expressway	each	$4,036	15	$60,540														15	60,540	15	$ 60,540
5.3 Two Lane Highway	each	$3,062	3	$9,186								3	9,186					-	-	3	$ 9,186
5.4 Rail	each	$3,062	3	$9,186														3	9,186	3	$ 9,186
5.5 Minor river	each	$812	20	$16,240						5	4,060							15	12,180	20	$ 16,240
5.6 Major River	each	$8,118	2	$16,236						1	8,118							1	8,118	2	$ 16,236
5.7 Mississippi River	LS	$234,000																		-	$ -
5.8 Interstate 90 Dakota Rvier Valley Structure	LS	$74,000																		-	$ -
5.9 Elevated Structure Milwaukee	per mile	$39,000																		-	$ -
5.10 Elevated Structure St Paul	per mile	$39,000																		-	$ -
5.11 Elevated Structure Chicago to Milwaukee	per mile	$39,000																		-	$ -
5.12 Bridges Chicago to Milwaukee	LS	$97,152	1	$97,152		1	97,152													1	$ 97,152
Total Bridges - Under Costs					$227,932		97,152		-		12,178		9,186		-		-		109,416	-	$ 227,932
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
6.0 Bridges - Over						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
6.1 Four Lane Urban Expressway	each	10,516	2	$21,032								1	10,516					1	10,516	2	$ 21,032
6.2 Four Lane Rural Expressway	each	2,630																			
6.3 Two Lane Highway	each	1,971	1	$1,971														1	1,971	1	$ 1,971
6.4 Rail	each	6,572	2	$13,144														2	13,144	2	$ 13,144
6.5 Viaducts - Major river	each																				
6.6 Tunnel (East and West Bound)	per LF	20																			
Total Bridges-Over Costs					$36,147								10,516						25,631		$ 36,147

Page 3																					
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7			
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	#VALUE!	Quantity	Amount	Quantity	Amount
7.0 Crossings																					
7.1 Private Closure	each	60	215	$12,900				12	720	32	1,920			10	600	46	2,760	115	6,900	215	$ 12,900
7.2 Rural w/ Quadrant Gates	each	274	320	$87,680				45	12,330	21	5,754			26	7,124	76	20,824	152	41,648	320	$ 87,680
7.3 Urban w/ Quadrant Gates	each	341	-	$0																-	$ -
7.4 Full Width Barrier	each	550	1	$550														1	550	1	$ 550
7.5 Crossings Chicago to Milwaukee	LS	71,510	1	$71,510		1	71,510													1	$ 71,510
Total Crossings Cost					$172,640		71,510		13,050		7,674		-		7,724		23,584		49,098		$ 172,640
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7			
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
8.0 Signals																					
8.1 High Speed Turnout	each	1,098	6	$6,588				1	1,098	1	1,098					1	1,098	3	3,294	6	$ 6,588
8.2 System Installation for HSR (110MPH)	per mile	150	366	$54,900				46	6,900	32	4,800	3	450	31	4,650	111	16,650	143	21,450	366	$ 54,900
8.2A System Installation for HSR (150MPH)	per mile	350																		-	$ -
8.2B System Installation for HSR (185MPH)	per mile	980																		-	$ -
8.3 Signal Costs Chicago to Milwaukee	LS	46,877	1	$46,877		1	46,877													1	$ 46,877
Total Signals Cost					$108,365		46,877		7,998		5,898		450		4,650		17,748		24,744		$ 108,365
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7			
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
9.0 Curves																					
9.1 Elevate & Surface Curves	per mile	42	9	$378				2	84							7	294		-	9	$ 378
9.2 Curvature Reduction	per mile	284	9	$2,556				2	568							7	1,988		-	9	$ 2,556
9.3 Elastic Fasteners	per mile	59	9	$531				2	118							7	413		-	9	$ 531
Total Curve Upgrade Cost					3,465				770								2,695		-		$ 3,465
Total Upgrade Cost					$1,147,577		$448,884		$40,033		$65,257		$41,427		$47,565		$74,767		$429,644		$1,147,577

Tri State 110 MPH Technology											
B-1 Rochester Route Trackwork											
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRne	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land	
Watertown Sub	85.7	90.57	4.87								
Watertown Sub	90.57	98.40	7.83					7.83	7.83		
Watertown Sub	98.40	104.20	5.80					5.80	5.80		
Watertown Sub	104.20	131.20	27.00					27.00	27.00		
Waterloo Spur	131.30	163.85	32.55	32.55					32.55		
Airport	0.00	3.00	3.00			3.00			3.00	3.00	
Madison/Portage	0.00	30.90	30.90		22.30	8.60			30.90	8.60	
Watertown Sub 2	176.90	178.20	1.30								
Tomah	178.20	179.00	0.80								
Tomah	179.00	180.40	1.40					1.40	1.40		
Tomah	180.40	243.40	63.00					63.00	63.00		
Tomah	243.80	246.30	2.50					2.50	2.50		
Tomah	246.30	257.10	10.80					10.80	10.80		
Tomah	257.10	280.00	22.90					22.90	22.90		
Tomah	280.00	283.00	3.00								
Tomah	283.00	284.40	1.40					1.40	1.40		
Tomah	284.40	288.00	3.60					3.60	3.60		
River	288.00	288.05	0.05					0.05	0.05		
River	288.05	306.60	18.55					18.55	18.55		
River	306.60	308.50	1.90								
DM&E	0.00	33.00	33.00	16.00		17.00			33.00	17.00	
Minnesota	42.00	117.00	75.00			75.00			75.00	75.00	
Union Pacific	0.00	10.00	10.00			10.00			10.00	10.00	
Union Pacific	10.00	11.60	1.60			1.80			1.80		
Merriman Park	407.40	408.90	1.50						1.50		
Merriman Park	408.9	410.2	1.30			0			1.30		
	Total		365.55	48.55	22.30	115.40	0.00	164.83	353.88	113.60	

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Definition of Units												
1.1 HSRex	High Speed Rail trackwork on Existing Roadbed with a unit cost of $873,000 per mile											
1.2 HSRnew	High Speed Rail trackwork on New Roadbed (Existing Right of Way) with a unit cost of $932,000 per mile											
1.2AHSR	High Speed Rail trackwork on New Roadbed (New Right of Way) with a unit cost of $1,376,000 per mile											
1.2BHSR	High Speed Rail trackwork on New Roadbed (Double Track) with a unit cost of $2,308,000 per mile											
1.3T&S33	Timber and Surface with 33% Tie Replacement with a unit cost of $136,000 per mile											
1.7Fence	Fencing of High Speed Rail Route on both sides with a unit cost of $49,000 per mile											
Land	Miles of Land required for construction of a high speed rail route at specifed unit costs											
Segment #2 Milwaukee to Watertown												
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRne	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land		
Watertown Sub	85.7	90.57	4.87									
Watertown Sub	90.57	98.40	7.83				7.83		7.83			
Watertown Sub	98.40	104.20	5.80				5.80		5.80			
Watertown Sub	104.20	131.20	27.00				27.00		27.00			
Total			45.50	0.00	0.00	0.00	40.63	0.00	40.63	0.00	0.00	
Segment #3 Watertown to Highway 51												
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRne	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land		
Waterloo Spur	131.30	163.85	32.55	32.55					32.55			
Segment #4 Airport Track												
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRne	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land		
Airport	0.00	3.00	3.00			3.00			3.00	3.00		
Segment #5 Madison to Portage												
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRne	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land		
Madison/Portage	0.00	30.90	30.90		22.30	8.60			30.90	8.60		

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Segment #6 Portage to River											
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRne	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land	
Watertown Sub 2	176.90	178.20	1.30								
Tomah	178.20	179.00	0.80								
Tomah	179.00	180.40	1.40				1.40		1.40		
Tomah	180.40	243.40	63.00				63.00		63.00		
Tomah	243.80	246.30	2.50				2.50		2.50		
Tomah	246.30	257.10	10.80				10.80		10.80		
Tomah	257.10	280.00	22.90				22.90		22.90		
Tomah	280.00	283.00	3.00								
Tomah	283.00	284.40	1.40				1.40		1.40		
Tomah	284.40	288.00	3.60				3.60		3.60		
Total			110.70	0.00	0.00	0.00	105.60	0.00	105.60	0.00	0.00
Segment #7 River to St. Paul											
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRne	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land	
River	288.00	288.05	0.05				0.05		0.05		
River	288.05	306.60	18.55				18.55		18.55		
River	306.60	308.50	1.90								
DM&E	0.00	33.00	33.00	16.00		17.00			33.00	17.00	
Minnesota	42.00	117.00	75.00			75.00			75.00	75.00	
Union Pacific	0.00	10.00	10.00			10.00			10.00	10.00	
Union Pacific	10.00	11.60	1.60			1.80			1.80		
Merriman Park	407.40	408.90	1.50						1.50		
Merriman Park	408.9	410.2	1.30			0			1.30		
Total			142.90	16.00	0.00	103.80	18.60	0.00	141.20	102.00	0.00

Tri-State Phase II HSR Feasibility Study				
19-Jan-99				
BRIDGES				
B-1 Rochester Route 110 MPH				
Recommended Action for Bridges Under and Bridges Over				
Segment #3 Watertown to Hwy 51				
Name	*North*	*West*	*Type of Bridge*	
Crawfish River	43.19433	88.87683	Major	
Maunesha River	43.18017	89.00800	Minor	
Maunesha River	43.17883	89.03333	Minor	
Maunesha River	43.17833	89.03550	Minor	
Maunesha River	43.18083	89.07733	Minor	
Maunesha River	43.18167	89.08333	Minor	
Maunesha River	43.18217	89.08850	Minor	
Summary Bridges Under		**Unit Cost**	**Quantity**	**Amount**
Minor River		$812	5	$4,060
Major River		$8,118	1	$8,118
Total				$12,178
Segment #4 Airport Track				
Name	*North*	*West*	*Type of Bridge*	
Highway 51	43.10733	89.33867	4 Lane UrbanExpressway - Over	
Anderson	43.12117	89.35233	2 Lane Under	
Pankrantz	43.12150	89.35233	2 Lane Under	
International Lane	43.12250	89.35300	2 Lane Under	
Summary Bridges Under		**Unit Cost**	**Quantity**	**Amount**
2 Lane Under		$3,062	3	$9,186
Summary Bridges Over		**Unit Cost**	**Quantity**	**Amount**
4 Lane Urban Expressway		10,516	1	$10,516

Segment 7C

Minnesota City to St Charles

River/Creek	North	Lat min	West	Long min	Recommended Action
Rolling Stone Creek	44.09050	5.43	91.75733	45.44	Culvert included within trackwork
Garvin Brook	44.08350	5.01	91.76300	45.78	Minor River
Garvin Brook	44.07017	4.21	91.76483	45.89	Culvert included within trackwork
Garvin Brook	44.03767	2.26	91.76483	45.89	Minor River
Garvin Brook	44.03083	1.85	91.76900	46.14	Culvert included within trackwork
Garvin Brook	44.02333	1.40	91.78550	47.13	Minor River
Garvin Brook	44.01933	1.16	91.78983	47.39	Culvert included within trackwork
Garvin Brook	44.01350	0.81	91.79500	47.70	Minor River
Garvin Brook	44.00617	0.37	91.80883	48.53	Culvert included within trackwork
Garvin Brook	43.99033	59.42	91.81217	48.73	Minor River

Comments: The Garvin Brook is a small creek that can be accommodated by culverts. However, five minor river bridges have been planned within the Stockton Valley to accommodate the meandering Garvin Brook.

Segment 7C Roadway Bridges Under

Roadway	North GPS	Lat Min	West GPS	Long Min	Recommended Action
Hwy 14	44.02450	1.47	91.78283	46.97	4 Lane Rural Expressway
CR 30	43.98400	59.04	91.86950	52.17	4 Lane Rural Expressway
Hwy 74	43.96567	57.94	92.06500	3.90	4 Lane Rural Expressway

Summary of Bridges Under DM&E	Unit Cost	Quantity	Amount
4 Lane Rural Expressway	$4,036	3	$12,108
Minor River	$812	5	$4,060
Total			$16,168

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Segment 7D

Bridges - Under St. Charles to St Paul

Roadway	North GPS	Lat Min	West GPS	Long Min	Recommended Action
Interstate 90	43.95500	57.30	92.17133	10.28	4 Lane Urban Expressway
CR 7	43.93700	56.22	92.23800	14.28	4 Lane Rural Expressway
I-52/65th Ave SE	43.93967	56.38	92.34783	20.87	4 Lane Urban Expressway
I-90	43.93783	56.27	92.37150	22.29	4 Lane Urban Expressway
SR 63	43.90883	54.53	92.48017	28.81	4 Lane Urban Expressway
I-14	44.03000	1.80	92.82417	49.45	4 Lane Rural Expressway
CR 24	44.15300	9.18	92.86533	51.92	4 Lane Rural Expressway
SR 60	44.28350	17.01	92.89450	53.67	4 Lane Rural Expressway
CR 9	44.40667	24.40	92.97600	58.56	4 Lane Rural Expressway
SR 56	44.47950	28.77	92.00983	0.59	4 Lane Rural Expressway
320th St W	44.48617	29.17	92.01300	0.78	4 Lane Rural Expressway
CR 86	44.54383	32.63	92.03750	2.25	4 Lane Rural Expressway
SR 50	44.63033	37.82	92.06217	3.73	4 Lane Rural Expressway
CR 66	44.65950	39.57	92.06283	3.77	4 Lane Rural Expressway
CR 42	44.74067	44.44	92.05667	3.40	4 Lane Rural Expressway
Inver Grove Trail	44.80350	48.21	92.03467	2.08	4 Lane Rural Expressway

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Segment 7D

Bridges Under for Rivers and Creeks St. Charles to St Paul on New Alignment

	North GPS	Lat Min	West GPS	Long Min	Recommended Action
Fort Zumbro River	43.93200	55.92	92.55833	33.50	Culvert included in trackwork
Salem Creek	43.97217	58.33	92.65267	39.16	Minor River
Dodge Center Creek	44.05033	3.02	92.84583	50.75	Culvert included in trackwork
Dodge Center Creek	44.05250	3.15	92.84633	50.78	Culvert included in trackwork
Dodge Center Creek	44.06017	3.61	92.84783	50.87	Culvert included in trackwork
S. Branch Middle Fork Zumbro River	44.07933	4.76	92.85200	51.12	Minor River
Milliken Creek	44.11250	6.75	92.85783	51.47	Minor River
Middle Fork Zumbro River	44.16700	10.02	92.86817	52.09	Minor River
N. Branch Middle Fork Zumbro River	44.20167	12.10	92.87467	52.48	Culvert included in trackwork
Spring Creek	44.26550	15.93	92.88683	53.21	Culvert included in trackwork
N. Fork Zumbro River	44.30217	18.13	92.90650	54.39	Minor River
Little Cannon River	44.35083	21.05	92.94750	56.85	Minor River
Prairie Creek	44.47083	28.25	92.00583	0.35	Culvert included in trackwork
Spring Creek	44.49333	29.60	92.01650	0.99	Culvert included in trackwork
Cannon River	44.51600	30.96	92.02733	1.64	Minor River
Chub Creek	44.52300	31.38	92.02983	1.79	Minor River
S. Branch Vermillion River	44.61800	37.08	92.06217	3.73	Minor River
Vermillion River	44.67033	40.22	92.06300	3.78	Minor River
Mississippi River	44.91800	55.08	93.05083	3.05	Major River

Segment 7D

Bridges Under Railroad St Charles to St Paul

Description	North GPS	Lat Min	West GPS	Long Min	Recommended Action
RR	44.02633	1.58	92.81417	48.85	Railroad Under
RR	44.52200	31.32	92.02967	1.78	Railroad Under
RR	44.87783	52.67	92.02400	1.44	Railroad Under

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Segment 7D								
Summary Bridges Under		Unit Cost	Quantity	Amount				
4 Lane Urban Expressway		$4,848	4	$19,392				
4 Lane Rural Expressway		$4,036	12	$48,432				
Minor River		$812	10	$8,120				
Major River		$8,118	1	$8,118				
Rail		$3,062	3	$9,186				
Total Bridges Under Segment 7D				$93,248				
Defintion of Segments								
Segment 7A: Mississippi River Bridge to Winona								
Segment 7B: Winona to Minnesota City								
Segment 7C: Minnesota City to St Charles								
Segment 7D; St Charles to St Paul								
Quantity Summary Bridges Under of Segment 7 River to St			**Seg 7A**	**Seg 7B**	**Seg 7C**	**Seg 7D**	**Total**	
4 Lane Urban Expressway			0	0	0	4	4	
4 Lane Rural Expressway			0	0	3	12	15	
Minor River			0	0	5	10	15	
Major River			0	0	0	1	1	
Rail			0	0	0	3	3	
Summary of Bridges Under for Segment 7		**Unit Cost**	**Quantity**	**Amount**				
4 Lane Urban Expressway		$4,848	4	$19,392				
4 Lane Rural Expressway		$4,036	15	$60,540				
2 Lane		$3,062	0	$0				
Rail		$3,062	3	$9,186				
Minor River		$812	15	$12,180				
Major River		$8,118	1	$8,118				
Total				$109,416				
Segment 7D								
Bridges Over St Charles to St Paul								
Description	North GPS	Lat Min	West GPS	Long Min	Recommended Action			
SR 52	44.80050	48.03	92.03900	2.34	4 Lane Urban Expressway			
Union Pacific Rail	44.79450	47.67	92.04450	2.67	Rail			
Union Pacific Rail	44.91067	54.64	92.05033	3.02	Rail			
Cr 24	44.85350	51.21	92.01983	1.19	2 Lane			
I-494	44.88033	52.82	92.02433	1.46	Bridge Over with acceptable horizontal clearance			
Summary of Bridges Over for Segment 7		**Unit Cost**	**Quantity**	**Amount**				
4 Lane Urban Expressway		10,516	1	$10,516				
4 Lane Rural Expressway		2,630		$0				
2 Lane		1,971	1	$1,971				
Rail		6,572	2	$13,144				

Total				$25,631					

CROSSINGS B-1 Rochester Route 110 MPH Technology			
Page 1			
Segment #2 Milwaukee to Watertown			
Subdivision	Milepost	Cost ($000)	Recommended Action
Watertown sub	93.80	$274	Rural w.Quadrant Gates
Watertown sub	95.10	$274	Rural w.Quadrant Gates
Watertown sub	95.30	$274	Rural w.Quadrant Gates
Watertown sub	97.40	$274	Rural w.Quadrant Gates
Watertown sub	98.40	$274	Rural w.Quadrant Gates
Watertown sub	99.40	$274	Rural w.Quadrant Gates
Watertown sub	100.50	$274	Rural w.Quadrant Gates
Watertown sub	101.50	$274	Rural w.Quadrant Gates
Watertown sub	102.20	$274	Rural w.Quadrant Gates
Watertown sub	102.40	$274	Rural w.Quadrant Gates
Watertown sub	102.50	$60	Closure
Watertown sub	104.30	$274	Rural w.Quadrant Gates
Watertown sub	105.20	$274	Rural w.Quadrant Gates
Watertown sub	105.75	$274	Rural w.Quadrant Gates
Watertown sub	106.20	$274	Rural w.Quadrant Gates
Watertown sub	106.80	$274	Rural w.Quadrant Gates
Watertown sub	108.20	$274	Rural w.Quadrant Gates
Watertown sub	109.80	$274	Rural w.Quadrant Gates
Watertown sub	110.01	$274	Rural w.Quadrant Gates
Watertown sub	111.30	$274	Rural w.Quadrant Gates
Watertown sub	113.10	$60	Closure
Watertown sub	114.50	$274	Rural w.Quadrant Gates
Watertown sub	114.80	$274	Rural w.Quadrant Gates
Watertown sub	115.50	$274	Rural w.Quadrant Gates
Watertown sub	115.90	$274	Rural w.Quadrant Gates
Watertown sub	117.40	$274	Rural w.Quadrant Gates
Watertown sub	117.70	$274	Rural w.Quadrant Gates
Watertown sub	117.80	$274	Rural w.Quadrant Gates
Watertown sub	117.90	$274	Rural w.Quadrant Gates
Watertown sub	118.05	$274	Rural w.Quadrant Gates
Watertown sub	118.20	$274	Rural w.Quadrant Gates
Watertown sub	118.30	$274	Rural w.Quadrant Gates
Watertown sub	118.70	$274	Rural w.Quadrant Gates
Watertown sub	119.50	$274	Rural w.Quadrant Gates
Watertown sub	122.50	$274	Rural w.Quadrant Gates
Watertown sub	123.20	$274	Rural w.Quadrant Gates
Watertown sub	123.70	$60	Closure
Watertown sub	123.77	$274	Rural w.Quadrant Gates
Watertown sub	124.60	$60	Closure
Watertown sub	125.00	$274	Rural w.Quadrant Gates
Watertown sub	125.45	$60	Closure
Watertown sub	125.50	$60	Closure
Watertown sub	125.85	$60	Closure
Watertown sub	126.30	$60	Closure
Watertown sub	126.40	$274	Rural w.Quadrant Gates
Watertown sub	127.30	$60	Closure
Watertown sub	127.60	$60	Closure
Watertown sub	128.20	$274	Rural w.Quadrant Gates

Page 2				
Subdivision	**Milepost**	**Cost ($000)**	**Recommended Action**	
Watertown sub	128.80	$60	Closure	
Watertown sub	129.10	$60	Closure	
Watertown sub	129.40	$274	Rural w.Quadrant Gates	
Watertown sub	129.50	$274	Rural w.Quadrant Gates	
Watertown sub	129.95	$274	Rural w.Quadrant Gates	
Watertown sub	130.10	$274	Rural w.Quadrant Gates	
Watertown sub	130.40	$274	Rural w.Quadrant Gates	
Watertown sub	130.60	$274	Rural w.Quadrant Gates	
Watertown sub	130.99	$274	Rural w.Quadrant Gates	
Summary Segment #2		**Unit Cost**	**Quantity**	**Amount**
Private Closure		$60	12	**$720**
Rural w/Quadrant Gates		$274	45	**$12,330**
Total Grade Crossings				**$13,050**

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Segment #3 Watertown to Hwy 51			
Subdivision	**Milepost**	**Cost ($000)**	**Recommended Action**
Waterloo Spur	132.10	$274	Rural w/Quadrant Gates
Waterloo Spur	133.45	$274	Rural w/Quadrant Gates
Waterloo Spur	133.50	$60	Closure
Waterloo Spur	133.60	$60	Closure
Waterloo Spur	133.95	$60	Closure
Waterloo Spur	134.45	$274	Rural w/Quadrant Gates
Waterloo Spur	134.65	$60	Closure
Waterloo Spur	134.80	$60	Closure
Waterloo Spur	135.45	$274	Rural w/Quadrant Gates
Waterloo Spur	135.85	$60	Closure
Waterloo Spur	136.20	$60	Closure
Waterloo Spur	136.71	$60	Closure
Waterloo Spur	136.90	$274	Rural w/Quadrant Gates
Waterloo Spur	137.30	$60	Closure
Waterloo Spur	137.70	$274	Rural w/Quadrant Gates
Waterloo Spur	138.30	$274	Rural w/Quadrant Gates
Waterloo Spur	138.40	$60	Closure
Waterloo Spur	139.00	$274	Rural w/Quadrant Gates
Waterloo Spur	139.45	$60	Closure
Waterloo Spur	139.65	$60	Closure
Waterloo Spur	139.90	$60	Closure
Waterloo Spur	140.80	$60	Closure
Waterloo Spur	141.70	$60	Closure
Waterloo Spur	143.70	$274	Rural w/Quadrant Gates
Waterloo Spur	144.00	$60	Closure
Waterloo Spur	144.30	$274	Rural w/Quadrant Gates
Waterloo Spur	144.35	$274	Rural w/Quadrant Gates
Waterloo Spur	144.50	$274	Rural w/Quadrant Gates
Waterloo Spur	144.60	$274	Rural w/Quadrant Gates
Waterloo Spur	144.70	$274	Rural w/Quadrant Gates
Waterloo Spur	145.30	$60	Closure
Waterloo Spur	145.61	$60	Closure
Waterloo Spur	145.90	$60	Closure
Waterloo Spur	146.30	$60	Closure
Waterloo Spur	147.00	$60	Closure
Waterloo Spur	148.00	$274	Rural w/Quadrant Gates
Waterloo Spur	148.40	$60	Closure
Waterloo Spur	149.60	$60	Closure
Waterloo Spur	150.45	$60	Closure
Waterloo Spur	150.85	$60	Closure
Waterloo Spur	152.40	$60	Closure
Waterloo Spur	152.90	$60	Closure
Waterloo Spur	154.40	$60	Closure
Waterloo Spur	154.90	$60	Closure
Waterloo Spur	155.60	$274	Rural w/Quadrant Gates
Waterloo Spur	155.75	$274	Rural w/Quadrant Gates
Waterloo Spur	156.80	$274	Rural w/Quadrant Gates

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Subdivision	**Milepost**	**Cost ($000)**	**Recommended Action**	
Waterloo Spur	157.60	$60	Closure	
Waterloo Spur	157.80	$60	Closure	
Waterloo Spur	158.30	$60	Closure	
Waterloo Spur	159.40	$274	Rural w/Quadrant Gates	
Waterloo Spur	159.70	$274	Rural w/Quadrant Gates	
Waterloo Spur	161.80	$274	Rural w/Quadrant Gates	
Summary Segment #3		**Unit Cost**	**Quantity**	**Amount**
Private Closure		$60	32	**$1,920**
Rural w/Quadrant Gates		$274	21	**$5,754**
Total Grade Crossings				**$7,674**
Segment #5 Madison to Portage				
Subdivision	**Milepost**	**Cost ($000)**	**Recommended Action**	
Madison-Portag	30.85	$274	Rural w/Quadrant Gates	
Madison-Portag	30.40	$274	Rural w/Quadrant Gates	
Madison-Portag	28.70	$274	Rural w/Quadrant Gates	
Madison-Portag	27.90	$60	Closure	
Madison-Portag	27.15	$274	Rural w/Quadrant Gates	
Madison-Portag	26.50	$60	Closure	
Madison-Portag	26.30	$60	Closure	
Madison-Portag	25.70	$274	Rural w/Quadrant Gates	
Madison-Portag	25.55	$60	Closure	
Madison-Portag	25.40	$60	Closure	
Madison-Portag	25.30	$60	Closure	
Madison-Portag	25.20	$60	Closure	
Madison-Portag	24.80	$60	Closure	
Madison-Portag	24.30	$274	Rural w/Quadrant Gates	
Madison-Portag	24.20	$274	Rural w/Quadrant Gates	
Madison-Portag	23.75	$274	Rural w/Quadrant Gates	
Madison-Portag	23.10	$60	Closure	
Madison-Portag	22.70	$274	Rural w/Quadrant Gates	
Madison-Portag	22.40	$60	Closure	
Madison-Portag	22.30	$274	Rural w/Quadrant Gates	
Madison-Portag	21.70	$274	Rural w/Quadrant Gates	
Madison-Portag	20.15	$274	Rural w/Quadrant Gates	
Madison-Portag	19.40	$274	Rural w/Quadrant Gates	
Madison-Portag	17.40	$274	Rural w/Quadrant Gates	
Madison-Portag	16.30	$274	Rural w/Quadrant Gates	
Madison-Portag	14.20	$274	Rural w/Quadrant Gates	
Madison-Portag	10.40	$274	Rural w/Quadrant Gates	
Madison-Portag	9.40	$274	Rural w/Quadrant Gates	
Madison-Portag	8.30	$274	Rural w/Quadrant Gates	
Madison-Portag	7.70	$274	Rural w/Quadrant Gates	
Madison-Portag	7.20	$274	Rural w/Quadrant Gates	
Madison-Portag	6.50	$274	Rural w/Quadrant Gates	
Madison-Portag	3.45	$274	Rural w/Quadrant Gates	
Madison-Portag	2.20	$274	Rural w/Quadrant Gates	
Madison-Portag	0.45	$274	Rural w/Quadrant Gates	
Madison-Portag	0.20	$274	Rural w/Quadrant Gates	
Summary Segment #5		**Unit Cost**	**Quantity**	**Amount**
Private Closure		$60	10	**$600**
Rural w/Quadrant Gates		$274	26	**$7,124**
Total Grade Crossings				**$7,724**

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Subdivision	Milepost	Cost ($000)	Recommended Action
Tomah, CPSoo	180.20	$274	Rural w/Quadrant Gates
Tomah, CPSoo	180.90	$60	Closure
Tomah, CPSoo	181.20	$274	Rural w/Quadrant Gates
Tomah, CPSoo	182.70	$60	Closure
Tomah, CPSoo	183.80	$274	Rural w/Quadrant Gates
Tomah, CPSoo	184.50	$60	Closure
Tomah, CPSoo	185.20	$274	Rural w/Quadrant Gates
Tomah, CPSoo	186.60	$274	Rural w/Quadrant Gates
Tomah, CPSoo	187.00	$60	Closure
Tomah, CPSoo	190.40	$274	Rural w/Quadrant Gates
Tomah, CPSoo	191.20	$274	Rural w/Quadrant Gates
Tomah, CPSoo	191.90	$60	Closure
Tomah, CPSoo	193.80	$60	Closure
Tomah, CPSoo	194.20	$274	Rural w/Quadrant Gates
Tomah, CPSoo	197.75	$274	Rural w/Quadrant Gates
Tomah, CPSoo	200.10	$274	Rural w/Quadrant Gates
Tomah, CPSoo	200.50	$60	Closure
Tomah, CPSoo	201.80	$274	Rural w/Quadrant Gates
Tomah, CPSoo	203.10	$274	Rural w/Quadrant Gates
Tomah, CPSoo	203.65	$274	Rural w/Quadrant Gates
Tomah, CPSoo	203.75	$274	Rural w/Quadrant Gates
Tomah, CPSoo	204.30	$274	Rural w/Quadrant Gates
Tomah, CPSoo	204.75	$60	Closure
Tomah, CPSoo	205.10	$60	Closure
Tomah, CPSoo	205.50	$274	Rural w/Quadrant Gates
Tomah, CPSoo	205.80	$60	Closure
Tomah, CPSoo	207.40	$274	Rural w/Quadrant Gates
Tomah, CPSoo	208.50	$274	Rural w/Quadrant Gates
Tomah, CPSoo	209.20	$274	Rural w/Quadrant Gates
Tomah, CPSoo	210.20	$274	Rural w/Quadrant Gates
Tomah, CPSoo	210.80	$274	Rural w/Quadrant Gates
Tomah, CPSoo	212.75	$60	Closure
Tomah, CPSoo	212.90	$274	Rural w/Quadrant Gates
Tomah, CPSoo	214.10	$274	Rural w/Quadrant Gates
Tomah, CPSoo	214.20	$274	Rural w/Quadrant Gates
Tomah, CPSoo	214.30	$274	Rural w/Quadrant Gates
Tomah, CPSoo	214.40	$274	Rural w/Quadrant Gates
Tomah, CPSoo	214.50	$274	Rural w/Quadrant Gates
Tomah, CPSoo	214.60	$274	Rural w/Quadrant Gates
Tomah, CPSoo	214.70	$274	Rural w/Quadrant Gates
Tomah, CPSoo	215.20	$274	Rural w/Quadrant Gates
Tomah, CPSoo	215.70	$274	Rural w/Quadrant Gates
Tomah, CPSoo	216.10	$60	Closure
Tomah, CPSoo	216.40	$274	Rural w/Quadrant Gates
Tomah, CPSoo	218.50	$274	Rural w/Quadrant Gates
Tomah, CPSoo	218.80	$274	Rural w/Quadrant Gates
Tomah, CPSoo	219.95	$60	Closure
Tomah, CPSoo	220.40	$60	Closure
Tomah, CPSoo	220.75	$60	Closure

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Subdivision	Milepost	Cost ($000)	Recommended Action
Tomah, CPSoo	221.20	$274	Rural w/Quadrant Gates
Tomah, CPSoo	221.90	$274	Rural w/Quadrant Gates
Tomah, CPSoo	222.20	$60	Closure
Tomah, CPSoo	222.40	$274	Rural w/Quadrant Gates
Tomah, CPSoo	223.40	$60	Closure
Tomah, CPSoo	223.95	$274	Rural w/Quadrant Gates
Tomah, CPSoo	224.01	$60	Closure
Tomah, CPSoo	224.50	$60	Closure
Tomah, CPSoo	225.10	$274	Rural w/Quadrant Gates
Tomah, CPSoo	226.10	$60	Closure
Tomah, CPSoo	227.20	$274	Rural w/Quadrant Gates
Tomah, CPSoo	227.65	$274	Rural w/Quadrant Gates
Tomah, CPSoo	228.95	$274	Rural w/Quadrant Gates
Tomah, CPSoo	229.50	$60	Closure
Tomah, CPSoo	230.20	$274	Rural w/Quadrant Gates
Tomah, CPSoo	231.20	$274	Rural w/Quadrant Gates
Tomah, CPSoo	231.90	$274	Rural w/Quadrant Gates
Tomah, CPSoo	233.60	$274	Rural w/Quadrant Gates
Tomah, CPSoo	237.50	$60	Closure
Tomah, CPSoo	239.20	$274	Rural w/Quadrant Gates
Tomah, CPSoo	239.90	$274	Rural w/Quadrant Gates
Tomah, CPSoo	240.10	$274	Rural w/Quadrant Gates
Tomah, CPSoo	240.90	$274	Rural w/Quadrant Gates
Tomah, CPSoo	241.20	$60	Closure
Tomah, CPSoo	242.60	$60	Closure
Tomah, CPSoo	242.80	$60	Closure
Tomah, CPSoo	243.50	$274	Rural w/Quadrant Gates
Tomah, CPSoo	247.20	$60	Closure
Tomah, CPSoo	249.90	$274	Rural w/Quadrant Gates
Tomah, CPSoo	251.80	$60	Closure
Tomah, CPSoo	252.40	$274	Rural w/Quadrant Gates
Tomah, CPSoo	254.05	$274	Rural w/Quadrant Gates
Tomah, CPSoo	254.60	$60	Closure
Tomah, CPSoo	255.80	$274	Rural w/Quadrant Gates
Tomah, CPSoo	256.40	$274	Rural w/Quadrant Gates
Tomah, CPSoo	256.60	$274	Rural w/Quadrant Gates
Tomah, CPSoo	256.90	$274	Rural w/Quadrant Gates
Tomah, CPSoo	257.50	$274	Rural w/Quadrant Gates
Tomah, CPSoo	258.20	$60	Closure
Tomah, CPSoo	258.80	$60	Closure
Tomah, CPSoo	259.50	$274	Rural w/Quadrant Gates
Tomah, CPSoo	260.40	$60	Closure
Tomah, CPSoo	260.80	$274	Rural w/Quadrant Gates
Tomah, CPSoo	261.50	$60	Closure
Tomah, CPSoo	261.75	$60	Closure
Tomah, CPSoo	262.50	$60	Closure
Tomah, CPSoo	263.20	$274	Rural w/Quadrant Gates
Tomah, CPSoo	265.70	$274	Rural w/Quadrant Gates
Tomah, CPSoo	266.30	$274	Rural w/Quadrant Gates

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Subdivision	Milepost	Cost ($000)	Recommended Action
Tomah, CPSoo	266.70	$274	Rural w/Quadrant Gates
Tomah, CPSoo	266.80	$274	Rural w/Quadrant Gates
Tomah, CPSoo	267.01	$274	Rural w/Quadrant Gates
Tomah, CPSoo	267.10	$274	Rural w/Quadrant Gates
Tomah, CPSoo	267.50	$274	Rural w/Quadrant Gates
Tomah, CPSoo	268.10	$60	Closure
Tomah, CPSoo	268.50	$60	Closure
Tomah, CPSoo	268.70	$60	Closure
Tomah, CPSoo	268.90	$60	Closure
Tomah, CPSoo	269.20	$274	Rural w/Quadrant Gates
Tomah, CPSoo	269.50	$274	Rural w/Quadrant Gates
Tomah, CPSoo	270.90	$60	Closure
Tomah, CPSoo	271.30	$274	Rural w/Quadrant Gates
Tomah, CPSoo	271.40	$60	Closure
Tomah, CPSoo	271.60	$274	Rural w/Quadrant Gates
Tomah, CPSoo	274.40	$60	Closure
Tomah, CPSoo	274.90	$60	Closure
Tomah, CPSoo	275.90	$60	Closure
Tomah, CPSoo	279.70	$60	Closure
Tomah, CPSoo	279.80	$274	Rural w/Quadrant Gates
Tomah, CPSoo	280.90	$274	Rural w/Quadrant Gates
Tomah, CPSoo	281.10	$274	Rural w/Quadrant Gates
Tomah, CPSoo	282.40	$60	Closure
Tomah, CPSoo	284.80	$60	Closure

Summary Segment #6	Unit Cost	Quantity	Amount
Private Closure	$60	46	$2,760
Rural w/Quadrant Gates	$274	76	$20,824
Total Grade Crossings			$23,584

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Segment 7A River to Winona				
Subdivision	**Milepost**	**Cost ($000)**	**Recommended Action**	
River, CPSoo	288.16	$274	Rural w/Quadrant Gates	
River, CPSoo	288.20	$60	Closure	
River, CPSoo	288.31	$274	Rural w/Quadrant Gates	
River, CPSoo	288.40	$274	Rural w/Quadrant Gates	
River, CPSoo	288.65	$274	Rural w/Quadrant Gates	
River, CPSoo	288.80	$274	Rural w/Quadrant Gates	
River, CPSoo	288.90	$274	Rural w/Quadrant Gates	
River, CPSoo	289.10	$274	Rural w/Quadrant Gates	
River, CPSoo	289.98	$274	Rural w/Quadrant Gates	
River, CPSoo	293.10	$60	Closure	
River, CPSoo	293.90	$60	Closure	
River, CPSoo	294.70	$60	Closure	
River, CPSoo	295.20	$60	Closure	
River, CPSoo	295.60	$60	Closure	
River, CPSoo	295.70	$60	Closure	
River, CPSoo	295.80	$60	Closure	
River, CPSoo	296.05	$274	Rural w/Quadrant Gates	
River, CPSoo	296.57	$60	Closure	
River, CPSoo	297.40	$60	Closure	
River, CPSoo	297.50	$60	Closure	
River, CPSoo	297.90	$60	Closure	
River, CPSoo	301.05	$60	Closure	
River, CPSoo	302.90	$60	Closure	
River, CPSoo	303.10	$60	Closure	
River, CPSoo	303.80	$274	Rural w/Quadrant Gates	
River, CPSoo	303.90	$274	Rural w/Quadrant Gates	
River, CPSoo	306.80	$274	Rural w/Quadrant Gates	
River, CPSoo	307.20	$274	Rural w/Quadrant Gates	
River, CPSoo	307.50	$274	Rural w/Quadrant Gates	
River, CPSoo	308.00	$274	Rural w/Quadrant Gates	
River, CPSoo	308.40	$274	Rural w/Quadrant Gates	
River, CPSoo	308.48	$274	Rural w/Quadrant Gates	
Summary Segment #7A		**Unit Cost**	**Quantity**	**Amount**
Private Closure		$60	15	**$900**
Rural w/Quadrant Gates		$274	17	**$4,658**
Total Grade Crossings				**$5,558**
Segment #7B Winona to south of Minnesota City				
From Winona the DME parallels the CP Rail track to River subdivision milepost 312.1				
The at grade crossings for the DME and the CP Rail track to this milepost are the same				
Subdivision	**Milepost**	**Cost ($000)**	**Recommended Action**	
River, CPSoo	308.75	$274	Rural w/Quadrant Gates	
River, CPSoo	308.80	$274	Rural w/Quadrant Gates	
River, CPSoo	309.05	$274	Rural w/Quadrant Gates	
River, CPSoo	309.20	$274	Rural w/Quadrant Gates	
River, CPSoo	309.50	$274	Rural w/Quadrant Gates	
River, CPSoo	309.55	$274	Rural w/Quadrant Gates	
River, CPSoo	309.65	$274	Rural w/Quadrant Gates	
River, CPSoo	309.70	$274	Rural w/Quadrant Gates	
River, CPSoo	310.11	$274	Rural w/Quadrant Gates	
River, CPSoo	310.75	$274	Rural w/Quadrant Gates	
River, CPSoo	311.50	$274	Rural w/Quadrant Gates	
River, CPSoo	312.10	$274	Rural w/Quadrant Gates	
Summary		Unit	Quantity	Amount
Rural w/Quadrant Gates		$274	12	$3,288

Segment 7C Minnesota City to St Charles					
Description	North	Lat min	West	Long min	Recommended Action
Unnamed	44.08567	5.14	91.76217	45.73	Rural w/Quadrant Gates
Unnamed	44.08083	4.85	91.76400	45.84	Rural w/Quadrant Gates
Unnamed	44.07317	4.39	91.76600	45.96	Rural w/Quadrant Gates
Unnamed	44.07000	4.20	91.76483	45.89	Rural w/Quadrant Gates
CR 23	44.06350	3.81	91.76100	45.66	Rural w/Quadrant Gates
Twp 6	44.05600	3.36	91.75667	45.40	Rural w/Quadrant Gates
Twp Rd 8	44.04317	2.59	91.76150	45.69	Rural w/Quadrant Gates
CR 23	44.02983	1.79	91.77017	46.21	Rural w/Quadrant Gates
Unnamed	44.01417	0.85	91.79417	47.65	Rural w/Quadrant Gates
Hwy 25	44.00600	0.36	91.80917	48.55	Rural w/Quadrant Gates
Twp 12	44.00133	0.08	91.81400	48.84	Rural w/Quadrant Gates
Unnamed	43.98367	59.02	91.83667	50.20	Rural w/Quadrant Gates
Twp 1	43.98333	59.00	91.83933	50.36	Rural w/Quadrant Gates
CR 25	43.98217	58.93	91.85933	51.56	Rural w/Quadrant Gates
Golfer's Rd	43.98417	59.05	91.88083	52.85	Rural w/Quadrant Gates
Twp 10	43.98117	58.87	91.91950	55.17	Rural w/Quadrant Gates
CR 18	43.97783	58.67	91.93983	56.39	Rural w/Quadrant Gates
CR 33	43.97550	58.53	91.95517	57.31	Rural w/Quadrant Gates
Utica Twp 17	43.97483	58.49	91.95950	57.57	Rural w/Quadrant Gates
CR 115	43.97167	58.30	91.97967	58.78	Rural w/Quadrant Gates
CR 37	43.96700	58.02	92.00783	0.47	Rural w/Quadrant Gates
CR 37	43.96683	58.01	92.00950	0.57	Rural w/Quadrant Gates
CR 119	43.96483	57.89	92.02967	1.78	Rural w/Quadrant Gates
Richland Ave	43.96417	57.85	92.06217	3.73	Rural w/Quadrant Gates
St Charles Ave	43.96650	57.99	92.06650	3.99	Rural w/Quadrant Gates
W 11th St	43.96767	58.06	92.06883	4.13	Rural w/Quadrant Gates
CR 142	43.97033	58.22	92.07900	4.74	Rural w/Quadrant Gates
Connect 142 to	43.97050	58.23	92.09767	5.86	Rural w/Quadrant Gates
Connect 142 to	43.97033	58.22	92.10367	6.22	Rural w/Quadrant Gates

Summary 7C Crossings	Unit	Quantity	Amount
Rural w/Quadrant Gates	$274	29	$7,946

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Segment 7D St Charles to St Paul

Crossing	North GPS	Lat Min	West GPS	Long Min	Recommended Action
CR 42	43.97017	58.21	92.11517	6.91	Rural w/ Quadrant Gates
CR 10	43.96483	57.89	92.13850	8.31	Rural w/ Quadrant Gates
Cr 32	43.95000	57.00	92.17867	10.72	Rural w/ Quadrant Gates
CR 129	43.94817	56.89	92.18800	11.28	Rural w/ Quadrant Gates
CR 136	43.94567	56.74	92.19833	11.90	Rural w/ Quadrant Gates
Unnamed Rd	43.94117	56.47	92.21567	12.94	Rural w/ Quadrant Gates
Unnamed Rd	43.93933	56.36	92.25783	15.47	Rural w/ Quadrant Gates
CR 129	43.93967	56.38	92.27800	16.68	Rural w/ Quadrant Gates
CR 19	43.94017	56.41	92.29817	17.89	Rural w/ Quadrant Gates
75 St SE	43.94067	56.44	92.32800	19.68	Rural w/ Quadrant Gates
70th Ave SE	43.94033	56.42	92.33800	20.28	Rural w/ Quadrant Gates
60th St SE	43.93433	56.06	92.38717	23.23	Rural w/ Quadrant Gates
CR 1	43.92783	55.67	92.40817	24.49	Rural w/ Quadrant Gates
CR 16	43.92383	55.43	92.42050	25.23	Rural w/ Quadrant Gates
CR 20	43.91850	55.11	92.43767	26.26	Rural w/ Quadrant Gates
Unnamed Rd	43.91367	54.82	92.45800	27.48	Rural w/ Quadrant Gates
CR 8	43.92033	55.22	92.52817	31.69	Rural w/ Quadrant Gates
60th Ave SW	43.93167	55.90	92.55767	33.46	Rural w/ Quadrant Gates
CR 126	43.93500	56.10	92.56617	33.97	Rural w/ Quadrant Gates
CR 15	43.93983	56.39	92.57800	34.68	Rural w/ Quadrant Gates
Unnamed Rd	43.94850	56.91	92.59817	35.89	Rural w/ Quadrant Gates
CR 17	43.94983	56.99	92.60117	36.07	Rural w/ Quadrant Gates
CR 3	43.95700	57.42	92.61783	37.07	Rural w/ Quadrant Gates
CR 150	43.96567	57.94	92.63800	38.28	Rural w/ Quadrant Gates
Unnamed Rd	43.97667	58.60	92.66300	39.78	Rural w/ Quadrant Gates
CR 25	43.98317	58.99	92.67800	40.68	Rural w/ Quadrant Gates
CR 15	43.99217	59.53	92.69817	41.89	Rural w/ Quadrant Gates
Unnamed Rd	43.99683	59.81	92.71333	42.80	Rural w/ Quadrant Gates
Unnamed Rd	44.00033	0.02	92.72600	43.56	Rural w/ Quadrant Gates
CR 13	44.00350	0.21	92.73850	44.31	Rural w/ Quadrant Gates
CR 10	44.00783	0.47	92.75400	45.24	Rural w/ Quadrant Gates
CR 13	44.00883	0.53	92.75817	45.49	Rural w/ Quadrant Gates
CR 14	44.01417	0.85	92.77833	46.70	Rural w/ Quadrant Gates
CCR 9	44.02050	1.23	92.79867	47.92	Rural w/ Quadrant Gates
CR 9	44.02783	1.67	92.81867	49.12	Rural w/ Quadrant Gates
Airport Rd N	44.03533	2.12	92.83883	50.33	Rural w/ Quadrant Gates
North St NE	44.03717	2.23	92.84350	50.61	Rural w/ Quadrant Gates
CR 7	44.06983	4.19	92.84967	50.98	Rural w/ Quadrant Gates
Unnamed Rd	44.10250	6.15	92.85583	51.35	Rural w/ Quadrant Gates
CR 7/CR 20	44.11667	7.00	92.85850	51.51	Rural w/ Quadrant Gates
CR 22	44.13850	8.31	92.86267	51.76	Rural w/ Quadrant Gates
Unnamed Rd	44.16617	9.97	92.86800	52.08	Rural w/ Quadrant Gates
CR B	44.01748	1.05	92.86950	52.17	Rural w/ Quadrant Gates
CR B	44.18217	10.93	92.87100	52.26	Rural w/ Quadrant Gates
CR A	44.19683	11.81	92.87367	52.42	Rural w/ Quadrant Gates
CR !	44.20417	12.25	92.87517	52.51	Rural w/ Quadrant Gates
Unnamed Rd	44.20633	12.38	92.87550	52.53	Rural w/ Quadrant Gates
CR 117	44.21833	13.10	92.87783	52.67	Rural w/ Quadrant Gates
CR 23	44.24017	14.41	92.88183	52.91	Rural w/ Quadrant Gates
Unnamed Rd	44.25450	15.27	92.88483	53.09	Rural w/ Quadrant Gates

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Crossing	North GPS	Lat Min	West GPS	Long Min	Recommended Action		
CR 12	44.26900	16.14	92.88750	53.25	Rural w/ Quadrant Gates		
Unnamed Rd	44.27900	16.74	92.89167	53.50	Rural w/ Quadrant Gates		
Unnamed Rd	44.28217	16.93	92.89367	53.62	Rural w/ Quadrant Gates		
Unnamed Rd	44.28733	17.24	92.89700	53.82	Rural w/ Quadrant Gates		
Unnamed Rd	44.29767	17.86	92.90350	54.21	Rural w/ Quadrant Gates		
CR 30	44.31967	19.18	92.91983	55.19	Rural w/ Quadrant Gates		
CR 14	44.34033	20.42	92.93817	56.29	Rural w/ Quadrant Gates		
Unnamed Rd	44.34150	20.49	92.93917	56.35	Rural w/ Quadrant Gates		
CR 44	44.35150	21.09	92.94817	56.89	Rural w/ Quadrant Gates		
Unnamed Rd	44.36483	21.89	92.95867	57.52	Rural w/ Quadrant Gates		
CR 49	44.37033	22.22	92.96100	57.66	Rural w/ Quadrant Gates		
Unnamed Rd	44.38517	23.11	92.96717	58.03	Rural w/ Quadrant Gates		
CR 24	44.41450	24.87	92.97933	58.76	Rural w/ Quadrant Gates		
Unnamed Rd	44.43567	26.14	92.98917	59.35	Rural w/ Quadrant Gates		
Unnamed Rd	44.44983	26.99	92.99583	59.75	Rural w/ Quadrant Gates		
Unnamed Rd	44.47167	28.30	92.00633	0.38	Rural w/ Quadrant Gates		
Skiota Trail	44.51167	30.70	92.02500	1.50	Rural w/ Quadrant Gates		
CR 88	44.52600	31.56	92.03117	1.87	Rural w/ Quadrant Gates		
CR 82	44.55833	33.50	92.04233	2.54	Rural w/ Quadrant Gates		
265th St	44.56550	33.93	92.04483	2.69	Rural w/ Quadrant Gates		
250th St	44.58733	35.24	92.05250	3.15	Rural w/ Quadrant Gates		
CR 80	44.59483	35.69	92.05500	3.30	Rural w/ Quadrant Gates		
CR 79	44.59667	35.80	92.05567	3.34	Rural w/ Quadrant Gates		
230th St E	44.61650	36.99	92.06200	3.72	Rural w/ Quadrant Gates		
CR 72	44.64483	38.69	92.06250	3.75	Rural w/ Quadrant Gates		
Station Trail	44.68917	41.35	92.06333	3.80	Rural w/ Quadrant Gates		
Unnamed Rd	44.69500	41.70	92.06350	3.81	Rural w/ Quadrant Gates		
CR 58	44.70300	42.18	92.06350	3.81	Rural w/ Quadrant Gates		
165th St	44.71100	42.66	92.06350	3.81	Closure		
160th St	44.71750	43.05	92.06333	3.80	Rural w/ Quadrant Gates		
156th St	44.72450	43.47	92.06133	3.68	Closure		
155th St	44.72600	43.56	92.06067	3.64	Rural w/ Quadrant Gates		
153rd St	44.72950	43.77	92.05983	3.59	Closure		
152nd St	44.73083	43.85	92.05950	3.57	Rural w/ Quadrant Gates		
151st St	44.73233	43.94	92.05900	3.54	Closure		
CR 38	44.74400	44.64	92.05583	3.35	Rural w/ Quadrant Gates		
CR 38	44.74750	44.85	92.05467	3.28	Rural w/ Quadrant Gates		
135th St	44.75467	45.28	92.05283	3.17	Closure		
117th St	44.78017	46.81	92.04817	2.89	Rural w/ Quadrant Gates		
105th St	44.79733	47.84	92.04300	2.58	Rural w/ Quadrant Gates		
65th St E	44.85533	51.32	92.02000	1.20	Rural w/ Quadrant Gates		
Edwards Ave E	44.86800	52.08	92.02233	1.34	Rural w/ Quadrant Gates		
Hardman Avenu	44.87350	52.41	92.02317	1.39	Rural w/ Quadrant Gates		
Maltby St	44.87517	52.51	92.02350	1.41	Rural w/ Quadrant Gates		
Hardman Avenu	44.88000	52.80	92.02433	1.46	Full Width Barrier		
Armour Ave	44.88700	53.22	92.02550	1.53	Rural w/ Quadrant Gates		
John Carroll Ave	44.89433	53.66	92.03050	1.83	Rural w/ Quadrant Gates		
Hardman Ave N	44.89533	53.72	92.03167	1.90	Rural w/ Quadrant Gates		
Ranchnot Rd	44.91250	54.75	92.05183	3.11	Rural w/ Quadrant Gates		

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Summary Segment 7D	**Unit**	**Quantity**	**Amount**		
Private Closure	$60	100	**$6,000**		
Rural w/ Quadrant Gates	$274	94	**$25,756**		
Full Width Barrier	$550	1	**$550**		
Total			**$32,306**		
Private Closures is an estimate based on an estimate of private crossings for the entire route.					
Page 12					
Quantity Summary for Segment 7 River to St Paul					
Crossing	Seg 7A	Seg 7B	Seg 7C	Seg 7D	Total
Private Closure	15	0	0	100	115
Rural w/ Quadrant Gates	17	12	29	93	151
Full Width Barrier				1	1
Summary of Costs Segment 7 River to St Paul					
Crossing	**Unit**	**Quantity**	**Amount**		
Private Closure	$60	115	**$6,900**		
Rural w/ Quadrant Gates	$274	151	**$41,374**		
Full Width Barrier	$550	1	**$550**		
Total Cost Crossings			**$48,824**		

TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 6.2.3
Infrastructure Detail: B-2 Rochester Route
150 mph

Tri-State Phase II HSR Feasibility Study

12-Jan-99

Route: Option B-2 - 1 150 MPH technology

Item	Unit	Unit Costs	Quantity		
1.0 Trackwork	per mile				
1.1 HSR on Existing Roadbed	per mile	$873	33	$28,809	
1.2 HSR on New Roadbed (Existing ROW)	per mile	$932			
1.2A HSR on New Roadbed (New ROW)	per mile	$1,376	99	$136,224	
1.2B HSR on New Roadbed (double track)	per mile	$2,308	154	$355,432	
1.3 Timber & Surface w/ 33% Tie replacement	per mile	$136	165	$22,440	
1.4 Timber & Surface w/ 66% Tie Replacement	per mile	$224			
1.5 Relay Track w/ 136# CWR	per mile	$329			
1.6 Siding	per mile	$802	25	$20,050	
1.7 Fencing	per mile	$49	354	$17,346	
1.8 Electrification	per mile	$991	-	$0	
1.9 Other Track Work Chicago to Milwaukee	LS	$212,917	1	$212,917	
1.10 Land Acquisition Madison	LS	$5,000	3	$15,000	
1.11 Land Acquisition Urban	per mile	$294	10	$2,940	
1.12 Land Acquisition Rural	per mile	$98	110	$10,780	
Total Track Upgrade Cost					$821,938
2.0 Stations					
2.1 Full Service - New	each	$1,000	1	$1,000	
2.2 Full Service - Renovated	each	$500	3	$1,500	
2.3 Terminal - New	each	$2,000	3	$6,000	
2.4 Terminal - Renovated	each	$1,000	1	$1,000	
2.5 Maintenance (110 MPH technology)	each	$10,000	-	$0	
2.5A Maintenance (150 MPH technology)	each	$86,000	1	$86,000	
2.5B Maintenance (185 MPH technology)	each	$162,000			
2.6 Stations Chicago to Milwaukee	LS	$20,428	1	$20,428	
Total Station Cost					$115,928
4.0 Turnouts					
4.1 New #33 - 136# High Speed	each	$555	4	$2,220	
4.2 New #20 - 136# Panel	each	$105			
4.3 New #10 - 136# Panel	each	$61			
Total Turnout Upgrade Cost					$2,220

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Route: Option B-2 - 1 150 MPH technology

5.0 Bridges - Under					
5.1 Four Lane Urban Expressway	each	$4,848	5	$24,240	
5.2 Four Lane Rural Expressway	each	$4,036	27	$108,972	
5.3 Two Lane Highway	each	$3,062	193	$590,966	
5.4 Rail	each	$3,062	5	$15,310	
5.5 Minor river	each	$812	24	$19,488	
5.6 Major River	each	$8,118	5	$40,590	
5.7 Mississippi River	LS	$234,000	-	$0	
5.8 Interstate 90 Dakota Rvier Valley Structure	LS	$74,000			
5.9 Elevated Structure Milwaukee	per mile	$39,000			
5.10 Elevated Structure St Paul	per mile	$39,000			
5.11 Elevated Structure Chicago to Milwaukee	per mile	$39,000			
5.12 Bridges Chicago to Milwaukee	LS	$97,152	1	$97,152	
Total Bridge Under Upgrade Cost					$896,718
6.0 Bridges - Over					
6.1 Four Lane Urban Expressway	each	$10,516	4	$42,064	
6.2 Four Lane Rural Expressway	each	$2,630	7	$18,410	
6.3 Two Lane Highway	each	$1,971	15	$29,565	
6.4 Rail	each	$6,572	2	$13,144	
6.5 Viaducts - Major river	each				
6.6 Tunnel (East and West Bound)	each				
Total Bridges Over					$103,183
7.0 Crossings					
7.1 Private Closure	each	$60	215	$12,900	
7.2 Rural w/ Quandrant Gates		$274	93	$25,482	
7.3 Urban w/ Quandrant Gates		$341	-	$0	
7.4 Full Width Barrier		$550	40	$22,000	
7.5 Crossings Chicago to Milwaukee	LS	$71,510	1	$71,510	
Total Crossing Upgrade Cost					$131,892
8.0 Signals					
8.1 High Speed Turnout	each	$1,098	2	$2,196	
8.2 System Installation for HSR (110MPH)	per mile	$150			
8.2A System Installation for HSR (150MPH)	per mile	$350	366	$128,100	
8.2B System Installation for HSR (185MPH)	per mile	$980			
8.3 Signal Costs Chicago to Milwaukee	LS	$46,877	1	$46,877	
Total Signals Upgrade					$177,173
9.0 Curves					
9.1 Elevate & Surface Curves	per mile	$42	9	$378	
9.2 Curvature Reduction	per mile	$284	9	$2,556	
9.3 Elastic Fasteners	per mile	$59	9	$531	
Total Curve Upgrade Cost					$3,465
Total Upgrade Cost					$2,252,517

Tri-State Phase II HSR Feasibility Study																					
12-Jan-99						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7			
Route: Option B-2 - 1 150 MPH technology						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Item	Unit	Unit Costs	Quantity																		
1.0 Trackwork	per mile																				
1.1 HSR on Existing Roadbed	per mile	$873	33	$28,809			-		-	33	28,809		-		-	-	-		-	33	$28,809
1.2 HSR on New Roadbed (Existing ROW)	per mile	$932					-		-		-		-		-				-	-	$0
1.2A HSR on New Roadbed (New ROW)	per mile	$1,376	99	$136,224			-		-		-		-		-	99	136,224		-	99	$136,224
1.2B HSR on New Roadbed (double track)	per mile	$2,308	154	$355,432			-		-		-	3	6,924	31	71,548		-	120	276,960	154	$355,432
1.3 Timber & Surface w/ 33% Tie replacement	per mile	$136	165	$22,440			-	41	5,576		-		-		-	106	14,416	18	2,448	165	$22,440
1.4 Timber & Surface w/ 66% Tie Replacement	per mile	$224					-		-		-		-		-		-		-	-	$0
1.5 Relay Track w/ 136# CWR	per mile	$329					-		-		-		-		-		-		-	-	$0
1.6 Siding	per mile	$802	25	$20,050			-	10	8,020	15	12,030		-		-		-		-	25	$20,050
1.7 Fencing	per mile	$49	354	$17,346			-	41	2,009	33	1,617	3	147	31	1,519	106	5,194	140	6,860	354	$17,346
1.8 Electrification	per mile	$991	-	$0			-		-		-		-		-		-		-	-	$0
1.9 Other Track Work Chicago to Milwaukee	LS	$212,917	1	$212,917		1	212,917		-		-		-		-		-		-	1	$212,917
1.10 Land Acquisition Madison	LS	$5,000	3	$15,000			-		-		-	3	15,000		-		-		-	3	$15,000
1.11 Land Acquisition Urban	per mile	$294	10	$2,940			-		-		-	-	-	-	-		-	10	2,940	10	$2,940
1.12 Land Acquisition Rural	per mile	$98	110	$10,780			-		-		-		-	8	784		-	102	9,996	110	$10,780
Total Track Upgrade Cost					$821,938		212,917		15,605		42,456		22,071		73,851		155,834		299,204		$821,938
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7			
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
2.0 Stations																					
2.1 Full Service - New	each	$1,000	1	$1,000												1	1,000			1	$1,000
2.2 Full Service - Renovated	each	$500	3	$1,500				1	500							2	1,000			3	$1,500
2.3 Terminal - New	each	$2,000	3	$6,000								1	2,000					2	4,000	3	$6,000
2.4 Terminal - Renovated	each	$1,000	1	$1,000				1	1,000											1	$1,000
2.5 Maintenance (110 MPH technology)	each	$10,000	-	$0															-	-	$0
2.5A Maintenance (150 MPH technology)	each	$86,000	1	$86,000														1	86,000	1	$86,000
2.5B Maintenance (185 MPH technology)	each	$162,000																		-	$0
2.6 Stations Chicago to Milwaukee	LS	$20,428	1	$20,428		1	20,428													1	$20,428
Total Station Cost					$115,928		20,428		1,500				2,000				2,000		90,000		$115,928

Page 2						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
Route: Option B-2 - 1 150 MPH technology						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
4.0 Turnouts						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
4.1 New #33 - 136# High Speed	each	$555	4	$2,220				2	1,110	2	1,110									4	$2,220
4.2 New #20 - 136# Panel	each	$105																			
4.3 New #10 - 136# Panel	each	$61																			
Total Turnout Upgrade Cost					$2,220				1,110		1,110										$2,220
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
5.0 Bridges - Under						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
5.1 Four Lane Urban Expressway	each	$4,848	5	$24,240								-	-	1	4,848			4	19,392	5	$24,240
5.2 Four Lane Rural Expressway	each	$4,036	27	$108,972				1	4,036					6	24,216	6	24,216	14	56,504	27	$108,972
5.3 Two Lane Highway	each	$3,062	193	$590,966								3	9,186	28	85,736	88	269,456	74	226,588	193	$590,966
5.4 Rail	each	$3,062	5	$15,310										1	3,062	1	3,062	3	9,186	5	$15,310
5.5 Minor river	each	$812	24	$19,488				2	1,624	5	4,060			3	2,436			14	11,368	24	$19,488
5.6 Major River	each	$8,118	5	$40,590				1	8,118	1	8,118			1	8,118	1	8,118	1	8,118	5	$40,590
5.7 Mississippi River	LS	$234,000	-	$0																-	$0
5.8 Interstate 90 Dakota Rvier Valley Structure	LS	$74,000																		-	$0
5.9 Elevated Structure Milwaukee	per mile	$39,000																		-	$0
5.10 Elevated Structure St Paul	per mile	$39,000																		-	$0
5.11 Elevated Structure Chicago to Milwaukee	per mile	$39,000																			
5.12 Bridges Chicago to Milwaukee	LS	$97,152	1	$97,152		1	97,152													1	$97,152
Total Bridge Under Upgrade Cost					$896,718		97,152		13,778		12,178		9,186		128,416		304,852		331,156	-	$896,718
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul		Total	
6.0 Bridges - Over						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
6.1 Four Lane Urban Expressway	each	$10,516	4	$42,064								1	10,516			2	21,032	1	10,516	4	$42,064
6.2 Four Lane Rural Expressway	each	$2,630	7	$18,410				3	7,890							4	10,520			7	$18,410
6.3 Two Lane Highway	each	$1,971	15	$29,565				4	7,884							10	19,710	1	1,971	15	$29,565
6.4 Rail	each	$6,572	2	$13,144														2	13,144	2	$13,144
6.5 Viaducts - Major river	each																			-	
6.6 Tunnel (East and West Bound)	each																			-	
Total Bridges Over					$103,183				15,774				10,516				51,262		25,631		$103,183

Page 3						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7		Total	
Route: Option B-2 - 1 150 MPH technology						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul			
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
7.0 Crossings																					
7.1 Private Closure	each	$60	215	$12,900				12	720	32	1,920			10	600	46	2,760	115	6,900	215	$12,900
7.2 Rural w/ Quandrant Gates		$274	93	$25,482				27	7,398									66	18,084	93	$25,482
7.3 Urban w/ Quandrant Gates		$341	-	$0																-	$0
7.4 Full Width Barrier		$550	40	. $22,000				18	9,900	21	11,550							1	550	40	$22,000
7.5 Crossings Chicago to Milwaukee	LS	$71,510	1	$71,510		1	71,510													1	$71,510
Total Crossing Upgrade Cost					$131,892		71,510		18,018		13,470				600		2,760		25,534		$131,892
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7		Total	
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul			
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
8.0 Signals																					
8.1 High Speed Turnout	each	$1,098	2	$2,196				1	1,098	1	1,098									2	$2,196
8.2 System Installation for HSR (110MPH)	per mile	$150													-					-	$0
8.2A System Installation for HSR (150MPH)	per mile	$350	366	$128,100				46	16,100	32	11,200	3	1,050	31	10,850	111	38,850	143	50,050	366	$128,100
8.2B System Installation for HSR (185MPH)	per mile	$980																		-	$0
8.3 Signal Costs Chicago to Milwaukee	LS	$46,877	1	$46,877		1	46,877													1	$46,877
Total Signals Upgrade					$177,173		46,877		17,198		12,298		1,050		10,850		38,850		50,050		$177,173
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7		Total	
						Chicago to Milwaukee		Milw to Watertown		Water to Hwy 51		Airport Track		Madison to Portage		Portage to Miss br		Miss br to St paul			
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
9.0 Curves																					
9.1 Elevate & Surface Curves	per mile	$42	9	$378				2	84							7	294		-	9	$378
9.2 Curvature Reduction	per mile	$284	9	$2,556				2	568							7	1,988		-	9	$2,556
9.3 Elastic Fasteners	per mile	$59	9	$531				2	118							7	413		-	9	$531
Total Curve Upgrade Cost					$3,465				770								2,695		-		$3,465
Total Upgrade Cost					$2,252,517		$448,884		$83,753		$81,512		$44,823		$213,717		$558,253		$821,575		$2,252,517

Tri State 150 MPH Technology										
B-2 Milwaukee/Rochester/St Paul Trackwork										
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRne	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Watertown Sub	85.7	90.57	4.87							
Watertown Sub	90.57	98.40	7.83					7.83	7.83	
Watertown Sub	98.40	104.20	5.80					5.80	5.80	
Watertown Sub	104.20	131.20	27.00					27.00	27.00	
Waterloo Spur	131.30	163.85	32.55	32.55	0.00		0.00		32.55	
Airport	0.00	3.00	3.00			0.00	3.00		3.00	3.00
Madison/Portage	0.00	30.90	30.90		0.00	0.00	30.90		30.90	8.60
Watertown Sub 2	176.90	178.20	1.30							
Tomah	178.20	179.00	0.80							
Tomah	179.00	180.40	1.40			0.00		1.40	1.40	
Tomah	180.40	243.40	63.00			63.00		63.00	63.00	
Tomah	243.80	246.30	2.50			2.50		2.50	2.50	
Tomah	246.30	257.10	10.80			10.80		10.80	10.80	
Tomah	257.10	280.00	22.90			22.90		22.90	22.90	
Tomah	280.00	283.00	3.00							
Tomah	283.00	284.40	1.40					1.40	1.40	
Tomah	284.40	288.00	3.60					3.60	3.60	
River	288.00	288.05	0.05					0.05	0.05	
River	288.05	306.60	18.55					18.55	18.55	
River	306.60	308.50	1.90							
DM&E	0.00	33.00	33.00	0.00	0.00	0.00	33.00		33.00	17.00
Minnesota	42.00	117.00	75.00			0.00	75.00		75.00	75.00
Union Pacific	0.00	10.00	10.00			0.00	10.00		10.00	10.00
Union Pacific	10.00	11.60	1.60			0.00	1.80		1.80	
Merriman Park	407.40	408.90	1.50						1.50	
Merriman Park	408.9	410.2	1.30			0	0		1.3	
Total			365.55	32.55	0.00	99.20	153.70	164.83	353.88	113.60

Page 2										
Definition of Units										
1.1 HSRex	High Speed Rail trackwork on Existing Roadbed with a unit cost of $873,000 per mile									
1.2 HSRnew	High Speed Rail trackwork on New Roadbed (Existing Right of Way) with a unit cost of $932,000 per mile									
1.2AHSR	High Speed Rail trackwork on New Roadbed (New Right of Way) with a unit cost of $1,376,000 per mile									
1.2BHSR	High Speed Rail trackwork on New Roadbed (Double Track) with a unit cost of $2,308,000 per mile									
1.3T&S33	Timber and Surface with 33% Tie Replacement with a unit cost of $136,000 per mile									
1.7Fence	Fencing of High Speed Rail Route on both sides with a unit cost of $49,000 per mile									
Land	Miles of Land required for construction of a high speed rail route at specifed unit costs									
Segment #2 Milwaukee to Watertown										
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnew	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Watertown Sub	85.7	90.57	4.87							
Watertown Sub	90.57	98.40	7.83					7.83	7.83	
Watertown Sub	98.40	104.20	5.80					5.80	5.80	
Watertown Sub	104.20	131.20	27.00					27.00	27.00	
Total			45.50	0.00	0.00	0.00	0.00	40.63	40.63	0.00
Segment #3 Watertown to Highway 51										
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnew	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Waterloo Spur	131.30	163.85	32.55	32.55	0.00		0.00		32.55	
Segment #4 Airpot										
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnew	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Airport	0.00	3.00	3.00			0.00	3.00		3.00	3.00
Segment #5 Madison to Portage										
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnew	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Madison/Portage	0.00	30.90	30.90		0.00	0.00	30.90		30.90	8.60

Page 3										
Segment #6 Portage to River										
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRne	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Watertown Sub 2	176.90	178.20	1.30							
Tomah	178.20	179.00	0.80							
Tomah	179.00	180.40	1.40			0.00		1.40	1.40	
Tomah	180.40	243.40	63.00			63.00		63.00	63.00	
Tomah	243.80	246.30	2.50			2.50		2.50	2.50	
Tomah	246.30	257.10	10.80			10.80		10.80	10.80	
Tomah	257.10	280.00	22.90			22.90		22.90	22.90	
Tomah	280.00	283.00	3.00							
Tomah	283.00	284.40	1.40					1.40	1.40	
Tomah	284.40	288.00	3.60					3.60	3.60	
Total			110.70	0.00	0.00	99.20	0.00	105.60	105.60	
Segment #7 River to St. Paul										
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRne	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
River	288.00	288.05	0.05					0.05	0.05	
River	288.05	306.60	18.55					18.55	18.55	
River	306.60	308.50	1.90							
DM&E	0.00	33.00	33.00	0.00	0.00	0.00	33.00		33.00	17.00
Minnesota	42.00	117.00	75.00			0.00	75.00		75.00	75.00
Union Pacific	0.00	10.00	10.00			0.00	10.00		10.00	10.00
Union Pacific	10.00	11.60	1.60			0.00	1.80		1.80	
Merriman Park	407.40	408.90	1.50						1.50	
Merriman Park	408.9	410.2	1.30			0	0		1.3	
Total			142.90	0.00	0.00	0.00	119.80	18.60	141.20	102.00

Tri-State Phase II HSR Feasibility Study

19-Jan-99

B-2 Rochester Route Route 150 MPH

Proposed Station Modifications and Maintenance Facilities

Station	*Type*	*Recommended Action*	*Cost ($000)*		
Milwaukee Union Station	Terminal	Renovation	$ 1,000		
Brookfield/Watertown	Full Service	Renovation	$ 500		
Madison	Terminal	New	$ 2,000		
Wisconsin Dells	Full Service	Renovation	$ 500		
Tomah	Full Service	New	$ 1,000		
LaCrosse	Full Service	Renovation	$ 500		
Rochester	Terminal	New	$ 2,000		
St Paul Union Station	Terminal	Major Renovations	$ 2,000		
Maintenance Facility	150 MPH Technology	New	$ 86,000		
Summary					
2.0 Stations					
2.1 Full Service - New	each	$1,000	1	$1,000	
2.2 Full Service - Renovated	each	$500	3	$1,500	
2.3 Terminal - New	each	$2,000	3	$6,000	
2.4 Terminal - Renovated	each	$1,000	1	$1,000	
2.5 Maintenance (110 MPH technology)	each	$10,000			
2.5A Maintenance (150 MPH technology)	each	$86,000	1	$86,000	
2.5B Maintenance (185 MPH technology)	each	$162,000			
2.6 Stations Chicago to Milwaukee	LS	$20,428	1	$20,428	
Total Station Cost					$115,928

Tri-State Phase II HSR Feasibility Study				
19-Jan-99				
BRIDGES				
B-2 Rochester Route 150 MPH				
Recommended Action for Bridges Under and Bridges Over				
Segment 3 Milwaukee to Watertown				
Subdivision	**MP**	**Type**	**Name**	**Recommended Treatment**
Watertown sub	100.00	Under	Fox River	Major River
Watertown sub	103.50	Over	Hwy F	2 Lane - Over
Watertown sub	104.90	Over	Hwy Xing	4 Lane Rural - Over
Watertown sub	110.80	Over	Campbell Rd	2 Lane - Over
Watertown sub	112.80	Over	Hwy Xing	2 Lane - Over
Watertown sub	115.60	Under	Hwy	4 Lane Rural - Under
Watertown sub	116.30	Under	Oconomowo	Minor River
Watertown sub	116.95	Over	Hwy	2 Lane - Over
Watertown sub	118.80	Under	Oconomowo	Minor River
Watertown sub	119.40	Over	Hwy Br	4 Lane Rural - Over
Watertown sub	120.50	Over	Hwy Br	4 Lane Rural - Over
Summary - Bridges Under		**Unit Cost**	**Quantity**	**Amount**
4 Lane Rural Expressway		$4,036	1	**$4,036**
Minor River		$812	2	**$1,624**
Major River		$8,118	1	**$8,118**
Total Cost Bridges Under				**$13,778**
Summary - Bridges Over		**Unit Cost**	**Quantity**	**Amount**
4 Lane Rural		$2,630	3	**$7,890**
2 Lane		$1,971	4	**$7,884**
Total Cost Bridges Over				**$15,774**

Page 2				
Segment #3 Watertown to Hwy 51				
Name	*North*	*West*	*Type of Bridge*	
Crawfish River	43.19433	88.87683	Major	
Maunesha River	43.18017	89.00800	Minor	
Maunesha River	43.17883	89.03333	Minor	
Maunesha River	43.17833	89.03550	Minor	
Maunesha River	43.18083	89.07733	Minor	
Maunesha River	43.18167	89.08333	Minor	
Maunesha River	43.18217	89.08850	Minor	
Summary Bridges Under		**Unit Cost**	**Quantity**	**Amount**
Minor River		$812	5	**$4,060**
Major River		$8,118	1	**$8,118**
Total				**$12,178**
Segment #4 Airport Track				
Name	*North*	*West*	*Type of Bridge*	
Highway 51	43.10733	89.33867	4 Lane UrbanExpressway - Over	
Anderson	43.12117	89.35233	2 Lane Under	
Pankrantz	43.12150	89.35233	2 Lane Under	
International Lane	43.12250	89.35300	2 Lane Under	
Summary Bridges Under		**Unit Cost**	**Quantity**	**Amount**
2 Lane Under		$3,062	3	**$9,186**
Summary Bridges Over		**Unit Cost**	**Quantity**	**Amount**
4 Lane Urban Expressway		10,516	1	**$10,516**

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Segment 5 Madison to Portage

Subdivision	MP	Type	Name	Recommended Treatment
Madison-Portage	25.95	Over	I-94	Adequate Clearance
Madison-Portage	25.90	Over	I-90	Adequate Clearance

Segment 5 (Madison Airport to connection to CP Rail)

Location	North GPS	Lat min	West GPS	Long min	Recommended Action
Buckley Rd	43.17500	10.50	88.34233	20.54	2 Lane Bridge Under
Daentl Rd	43.18333	11.00	88.34200	20.52	2 Lane Bridge Under
Unnamed Rd	43.19100	11.46	88.34167	20.5	2 Lane Bridge Under
I-90 (existing)	43.19150	11.49	88.34150	20.49	4 Lane Urban Expressway Under
Hwy 19	43.19433	11.66	88.34133	20.48	4 Lane Rural Expressway Under
Duraform Lane	43.19950	11.97	88.34167	20.5	2 Lane Bridge Under
Sequoia Dr	43.21800	13.08	88.34233	20.54	2 Lane Bridge Under
Gray Rd	43.22350	13.41	88.34250	20.55	2 Lane Bridge Under
Vinburn Rd	43.23800	14.28	88.34317	20.59	2 Lane Bridge Under
Commerce St	43.24633	14.78	88.34150	20.49	2 Lane Bridge Under
CR DV	43.24767	14.86	88.34150	20.49	2 Lane Bridge Under
Yahara River	43.25017	15.01	88.34133	20.48	Minor River Under
CR V	43.25283	15.17	88.34133	20.48	4 Lane Rural Expressway Under
Selji Rd	43.27450	16.47	88.34783	20.87	2 Lane Bridge Under
CR DM	43.28117	16.87	88.35083	21.05	2 Lane Bridge Under
Kleinert Rd	43.28967	17.38	88.35450	21.27	2 Lane Bridge Under
Ramsey Rd	43.29600	17.76	88.35767	21.46	2 Lane Bridge Under
Unnamed Rd	43.30183	18.11	88.36050	21.63	2 Lane Bridge Under
CR K (intersects w/Goc	43.30850	18.51	88.36317	21.79	2 Lane Bridge Under
Prairie Lane	43.31650	18.99	88.36717	22.03	2 Lane Bridge Under
Kampen Rd	43.32317	19.39	88.37033	22.22	2 Lane Bridge Under
Unnamed St	43.33583	20.15	88.37583	22.55	2 Lane Bridge Under
SR 60	43.33767	20.26	88.37683	22.61	4 Lane Rural Expressway Under
Richards Rd	43.35233	21.14	88.38350	23.01	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS	Long min	
CR O	43.37917	22.75	88.40267	24.16	4 Lane Rural Expressway Under
CR Q	43.38100	22.86	88.40550	24.33	2 Lane Bridge Under
Rowan Creek	43.38600	23.16	88.40967	24.58	Minor River Under
McMullen Rd	43.38867	23.32	88.41183	24.71	4 Lane Rural Expressway Under
Kent Rd	43.40267	24.16	88.41483	24.89	2 Lane Bridge Under
Hinkson Creek	43.41100	24.66	88.41467	24.88	Major River
Thompson Rd	43.41717	25.03	88.41483	24.89	2 Lane Bridge Under
Bilkie Rd	43.43183	25.91	88.41483	24.89	2 Lane Bridge Under
CR B	43.43900	26.34	88.41483	24.89	2 Lane Bridge Under
Morse Rd	43.44967	26.98	88.41483	24.89	2 Lane Bridge Under
Rocky Run Creek	43.45233	27.14	88.41483	24.89	Minor River Under
CR J	43.45817	27.49	88.41483	24.89	2 Lane Bridge Under
Murry Rd	43.48967	29.38	88.41483	24.89	2 Lane Bridge Under
Unnamed Rd	43.50033	30.02	88.41483	24.89	2 Lane Bridge Under
SR 51	43.51833	31.10	88.42283	25.37	4 Lane Rural Expressway Under
CP Rail	43.53683	32.21	88.43617	26.17	Rail Under

Segment 5 madison to Portage

Summary Bridges Under	Unit Cost	Quantity	Amount
4 Lane Urban Expressway	$4,848	1	$4,848
4 Lane Rural Expressway	$4,036	6	$24,216
2 Lane	$3,062	28	$85,736
Minor River	$812	3	$2,436
Major River	$8,118	1	$8,118
Rail	$3,062	1	$3,062
Total Bridges Under Segment 5			$128,416

B-2 150 Technology

Segment 6 Portage to River

Subdivision	MP	Type	Name	Recommended Treatment
Tomah, CPSoo	180.20	SO	Hwy Xing	2 Lane Bridge Under
Tomah, CPSoo	180.90	Pvt		Closure
Tomah, CPSoo	181.20	SO	Hwy Xing	2 Lane Bridge Under
Tomah, CPSoo	182.70	Pvt		Closure
Tomah, CPSoo	183.80	SO	Hwy Xing	2 Lane Bridge Under
Tomah, CPSoo	184.50	Pvt		Closure
Tomah, CPSoo	185.20	SO	Hwy Xing	2 Lane Bridge Under
Tomah, CPSoo	186.60	Fl		2 Lane Bridge Under
Tomah, CPSoo	187.00	Pvt		Closure
Tomah, CPSoo	190.40	SO	Petersen	2 Lane Bridge Under
Tomah, CPSoo	191.20	Fl		2 Lane Bridge Under
Tomah, CPSoo	191.90	Pvt		Closure
Tomah, CPSoo	197.75	Fl		2 Lane Bridge Under
Tomah, CPSoo	200.10	SO	Hwy Xing	2 Lane Bridge Under
Tomah, CPSoo	200.50	Pvt		Closure
Tomah, CPSoo	201.80	Fl	Koval Rd	2 Lane Bridge Under
Tomah, CPSoo	203.10	Fl	Industrial Rd	2 Lane Bridge Under
Tomah, CPSoo	203.65	Fl	Woodbridge	2 Lane Bridge Under
Tomah, CPSoo	203.75	Fl	Wisconsin St	2 Lane Bridge Under
Tomah, CPSoo	204.30	Fl	Allen Rd	2 Lane Bridge Under
Tomah, CPSoo	204.75	Pvt		Closure
Tomah, CPSoo	205.10	Pvt		Closure
Tomah, CPSoo	205.50	SO	Hwy Xing	2 Lane Bridge Under
Tomah, CPSoo	205.80	Pvt		Closure
Tomah, CPSoo	207.40	Fl	Springer Rd	2 Lane Bridge Under
Tomah, CPSoo	208.50	SO	Hwy Xing	2 Lane Bridge Under
Tomah, CPSoo	209.20	Fl	21st Ave	2 Lane Bridge Under
Tomah, CPSoo	210.20	Fl	Cemetary Rd	2 Lane Bridge Under
Tomah, CPSoo	210.80	SO	Hwy Xing	2 Lane Bridge Under
Tomah, CPSoo	212.75	Pvt		Closure
Tomah, CPSoo	212.90	Fl & G		2 Lane Bridge Under
Tomah, CPSoo	214.10	Fl	Union St	2 Lane Bridge Under
Tomah, CPSoo	214.20	Fl	Hickory St	2 Lane Bridge Under

Tomah, CPSoo	214.30	Fl	Division St	2 Lane Bridge Under				
Tomah, CPSoo	214.40	Fl	Elm St	2 Lane Bridge Under				
Tomah, CPSoo	214.50	Fl	Hanover St	2 Lane Bridge Under				
Tomah, CPSoo	214.60	Fl	Grove St	2 Lane Bridge Under				
Tomah, CPSoo	214.70	Fl	Martin St	2 Lane Bridge Under				

Segment 6 Portage to River

Subdivision	MP	Type	Name	Recommended Treatment
Tomah, CPSoo	215.20	Fl	State St	2 Lane Bridge Under
Tomah, CPSoo	215.70	Fl	Northern Rd	2 Lane Bridge Under
Tomah, CPSoo	216.10	Pvt		Closure
Tomah, CPSoo	216.40	Fl	Sand Rd	2 Lane Bridge Under
Tomah, CPSoo	218.50	Fl	Sumiec Rd	2 Lane Bridge Under
Tomah, CPSoo	218.80	Fl	Ferdon Rd	2 Lane Bridge Under
Tomah, CPSoo	219.95	Pvt		Closure
Tomah, CPSoo	220.40	Pvt		Closure
Tomah, CPSoo	220.75	Pvt		Closure
Tomah, CPSoo	221.20	Fl	Monroe St	2 Lane Bridge Under
Tomah, CPSoo	221.90	Fl	Allen Rd	2 Lane Bridge Under
Tomah, CPSoo	222.20	Pvt		Closure
Tomah, CPSoo	222.40	Fl	Marshall Xin(	2 Lane Bridge Under
Tomah, CPSoo	223.40	Pvt		Closure
Tomah, CPSoo	223.95	Fl	Connor Rd	2 Lane Bridge Under
Tomah, CPSoo	224.01	Pvt		Closure
Tomah, CPSoo	224.50	Pvt		Closure
Tomah, CPSoo	225.10	Fl	Orange Rd	2 Lane Bridge Under
Tomah, CPSoo	226.10	Pvt		Closure
Tomah, CPSoo	227.20	Fl	W Ashburn S	2 Lane Bridge Under
Tomah, CPSoo	227.65	Fl	STH 94	4 Lane Rural Bridge Under
Tomah, CPSoo	228.95	SO	Hwy Xing	2 Lane Bridge Under
Tomah, CPSoo	229.50	Pvt		Closure
Tomah, CPSoo	230.20	SO	Hwy Xing	2 Lane Bridge Under
Tomah, CPSoo	231.20	Fl	32nd Lane	2 Lane Bridge Under
Tomah, CPSoo	231.90	Fl	32nd Court	2 Lane Bridge Under
Tomah, CPSoo	233.60	SO	Hwy Xing	2 Lane Bridge Under

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Segment 6 Portage to River

Subdivision	MP	Type	Name	Recommended Treatment
Tomah, CPSoo	237.50	Pvt		Closure
Tomah, CPSoo	239.20	SO	Hwy Xing	2 Lane Bridge Under
Tomah, CPSoo	239.90	Fl & G	Glen Dale Av	2 Lane Bridge Under
Tomah, CPSoo	240.10	Fl	Superior St	2 Lane Bridge Under
Tomah, CPSoo	240.90	Fl	24th Ave	2 Lane Bridge Under
Tomah, CPSoo	241.20	Pvt		Closure
Tomah, CPSoo	242.60	Pvt		Closure
Tomah, CPSoo	242.80	Pvt		Closure
Tomah, CPSoo	252.40	Fl		2 Lane Bridge Under
Tomah, CPSoo	254.05	Fl & G	Airport Rd	4 Lane Rural Bridge Under
Tomah, CPSoo	254.60	Pvt		Closure
Tomah, CPSoo	255.80	Fl	Milwaukee S	2 Lane Bridge Under
Tomah, CPSoo	256.40	Fl	Wokott St	2 Lane Bridge Under
Tomah, CPSoo	256.60	Fl	Walrath St	2 Lane Bridge Under
Tomah, CPSoo	256.90	Fl	Clifton St	2 Lane Bridge Under
Tomah, CPSoo	257.50	Fl	S Water St	2 Lane Bridge Under
Tomah, CPSoo	258.20	Pvt		Closure
Tomah, CPSoo	258.80	Pvt		Closure
Tomah, CPSoo	259.50	SO	Hwy Xing	2 Lane Bridge Under
Tomah, CPSoo	260.40	Pvt		Closure
Tomah, CPSoo	260.80	Fl	51st St	2 Lane Bridge Under
Tomah, CPSoo	261.50	Pvt		Closure
Tomah, CPSoo	261.75	Pvt		Closure
Tomah, CPSoo	262.50	Pvt		Closure
Tomah, CPSoo	263.20	Fl	Rockland Av	2 Lane Bridge Under
Tomah, CPSoo	265.70	SO	Hwy Xing	2 Lane Bridge Under
Tomah, CPSoo	266.30	SO	Hwy Xing	2 Lane Bridge Under

Segment 6 Portage to River

Subdivision	MP	Type	Name	Recommended Treatment
Tomah, CPSoo	266.70	FI	15th Ave	2 Lane Bridge Under
Tomah, CPSoo	266.80	FI	16th Ave	2 Lane Bridge Under
Tomah, CPSoo	267.01	FI	18th Ave	2 Lane Bridge Under
Tomah, CPSoo	267.10	FI	19th Ave	2 Lane Bridge Under
Tomah, CPSoo	267.50	FI	Dutck Crk Xi	2 Lane Bridge Under
Tomah, CPSoo	268.10	Pvt		Closure
Tomah, CPSoo	268.50	Pvt		Closure
Tomah, CPSoo	268.70	Pvt		Closure
Tomah, CPSoo	268.90	Pvt		Closure
Tomah, CPSoo	269.20	FI	Krueger Rd	2 Lane Bridge Under
Tomah, CPSoo	269.50	SO	Hwy Xing	2 Lane Bridge Under
Tomah, CPSoo	270.90	Pvt		Closure
Tomah, CPSoo	271.30	FI	Mills St	2 Lane Bridge Under
Tomah, CPSoo	271.40	Pvt		Closure
Tomah, CPSoo	271.60	SO	Hwy Xing	2 Lane Bridge Under
Tomah, CPSoo	274.40	Pvt		Closure
Tomah, CPSoo	274.90	Pvt		Closure
Tomah, CPSoo	275.90	Pvt		Closure
Tomah, CPSoo	279.70	Pvt		Closure
Tomah, CPSoo	279.80	FI		2 Lane Bridge Under
Tomah, CPSoo	280.90	FI	Avon St	2 Lane Bridge Under

Summary of Recommended Treatment	
4 Lane Rural Bridge Under	2
2 Lane Bridge Under	70
Closure	41
Total	113

Widening of Existing Bridges

B-2 150 Technology

Segment 6 Portage to River

Subdivision	MP	Type	Name	Recommended Treatment
Tomah CPSoo	204.50	Under		2 Lane Under
Tomah CPSoo	213.00	Under		4 Lane Rural Under
Tomah CPSoo	213.30	Over		2 Lane Over
Tomah CPSoo	214.05	Under		2 Lane Under
Tomah CPSoo	220.99	Under		2 Lane Under
Tomah CPSoo	227.30	Under	C & NW	Railroad Under
Tomah CPSoo	234.05	Under		2 Lane Under
Tomah CPSoo	234.55	Under		2 Lane Under
Tomah CPSoo	235.80	Over	Hwy Br	4 Lane Rural Over
Tomah CPSoo	237.80	Over	Hwy Br	4 Lane Rural Over
Tomah CPSoo	240.60	Under		4 Lane Rural Under
Tomah CPSoo	242.20	Under	Ballast Desk	2 Lane Under
Tomah CPSoo	252.50	Over	Bike Trail	2 Lane Over
Tomah CPSoo	253.80	Over		2 Lane Over
Tomah CPSoo	256.30	Over	Hwy xing	2 Lane Over
Tomah CPSoo	257.90	Over	Hwy Br	2 Lane Over
Tomah CPSoo	260.00	Under		2 Lane Under
Tomah CPSoo	262.20	Under		2 Lane Under
Tomah CPSoo	263.45	Under		2 Lane Under
Tomah CPSoo	265.50	Under		2 Lane Under
Tomah CPSoo	266.40	Under		2 Lane Under
Tomah CPSoo	266.95	Under		2 Lane Under
Tomah CPSoo	271.10	Over	Hwy xing	4 Lane Rural Over
Tomah CPSoo	272.40	Over	City M	2 Lane Over

Segment 6 Portage to River				
Subdivision	**MP**	**Type**	**Name**	**Recommended Treatment**
Tomah CPSoo	274.80	Over	I 90	4 Lane Expressway Over
Tomah CPSoo	274.85	Over	I 90	4 Lane Expressway Over
Tomah CPSoo	274.90	Under		2 Lane Under
Tomah CPSoo	276.40	Under		4 Lane Rural Under
Tomah CPSoo	276.90	Under		2 Lane Under
Tomah CPSoo	277.10	Under		2 Lane Under
Tomah CPSoo	277.50	Under		2 Lane Under
Tomah CPSoo	277.70	Under		2 Lane Under
Tomah CPSoo	277.95	Under	frm xg	2 Lane Under
Tomah CPSoo	278.50	Over	US Hwy	4 Lane Rural Over
Tomah CPSoo	278.70	Over	Comoco Rd	2 Lane Over
Tomah CPSoo	278.95	Under	La Crosse R	Major River
Tomah CPSoo	279.20	Under	Hwy xing	4 Lane Rural Under
Tomah CPSoo	279.40	Over	Hwy Xing	2 Lane Over
Tomah CPSoo	279.93	Over	Gillette St	2 Lane Over
Tomah CPSoo	280.50	Over	George St	2 Lane Over

Segment 6 Portage to River		
Widening of Bridges		
Summary of Bridges - Under Recommended Treatment		
4 Lane Rural		4
2 Lane		18
Railroad		1
Major River		1
Total Bridges Under		24

Summary of Bridges - Over Recommended Treatment				
4 Lane Expressway	2			
4 Lane Rural	4			
2 Lane	10			
Total Bridges Over	16			
Summary of New Bridges and Widening for Segment 6				
Bridge Under	New	Widening	Total	
4 Lane Expressway				
4 Lane Rural	2	4	6	
2 Lane	70	18	88	
Railroad		1	1	
Minor River			0	
Major River		1	1	
Segment 6 Portage to River				
Summary Bridges Under		**Unit Cost**	**Quantity**	**Amount**
4 Lane Urban Expressway		$4,848	0	**$0**
4 Lane Rural Expressway		$4,036	6	**$24,216**
2 Lane		$3,062	88	**$269,456**
Rail		$3,062	1	**$3,062**
Minor River		$812	0	**$0**
Major River		$8,118	1	**$8,118**
Total Bridges Under Segment 6				**$304,852**
Summary of Bridges - Over		**Unit Cost**	**Quantity**	**Amount**
4 Lane Expressway		$10,516	2	**$21,032**
4 Lane Rural Expressway		$2,630	4	**$10,520**
2 Lane		$1,971	10	**$19,710**
Total Bridges Over				**$51,262**

Segment 7C

Minnesota City to St Charles

River/Creek	North	Lat min	West	Long min	Recommended Action
Rolling Stone Creek	44.09050	5.43	91.75733	45.44	Culvert included within trackwork
Garvin Brook	44.08350	5.01	91.76300	45.78	Minor River
Garvin Brook	44.07017	4.21	91.76483	45.89	Culvert included within trackwork
Garvin Brook	44.03767	2.26	91.76483	45.89	Minor River
Garvin Brook	44.03083	1.85	91.76900	46.14	Culvert included within trackwork
Garvin Brook	44.02333	1.40	91.78550	47.13	Minor River
Garvin Brook	44.01933	1.16	91.78983	47.39	Culvert included within trackwork
Garvin Brook	44.01350	0.81	91.79500	47.70	Minor River
Garvin Brook	44.00617	0.37	91.80883	48.53	Culvert included within trackwork
Garvin Brook	43.99033	59.42	91.81217	48.73	Minor River

Comments: The Garvin Brook is a small creek that can be accommodated by culverts. However, five minor river bridges have been planned within the Stockton Valley to accommodate the meandering Garvin Brook.

Segment 7C Roadway Bridges Under

Roadway	North GPS	Lat Min	West GPS	Long Min	Recommended Action
Hwy 14	44.02450	1.47	91.78283	46.97	4 Lane Rural Expressway
CR 30	43.98400	59.04	91.86950	52.17	4 Lane Rural Expressway
Hwy 74	43.96567	57.94	92.06500	3.90	4 Lane Rural Expressway

Summary of Bridges Under DM&E	Unit Cost	Quantity	Amount
4 Lane Rural Expressway	$4,036	3	$12,108
Minor River	$812	5	$4,060
Total			$16,168

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Segment 7D

Bridges - Under St. Charles to St Paul

Roadway	North GPS	Lat min	West GPS	Long min	Recommended Action
CR 42	43.97017	58.21	92.11517	6.91	2 Lane Bridge Under
CR 10	43.96483	57.89	92.13850	8.31	2 Lane Bridge Under
Interstate 90	43.95500	57.30	92.17133	10.28	4 Lane Urban Expressway Bridge Under
Cr 32	43.95000	57.00	92.17867	10.72	2 Lane Bridge Under
CR 129	43.94817	56.89	92.18800	11.28	2 Lane Bridge Under
CR 136	43.94567	56.74	92.19833	11.90	2 Lane Bridge Under
Unnamed Rd	43.94117	56.47	92.21567	12.94	2 Lane Bridge Under
CR 7	43.93700	56.22	92.23800	14.28	4 Lane Rural Expressway Bridge Under
Unnamed Rd	43.93933	56.36	92.25783	15.47	2 Lane Bridge Under
CR 129	43.93967	56.38	92.27800	16.68	2 Lane Bridge Under
CR 19	43.94017	56.41	92.29817	17.89	2 Lane Bridge Under
75 St SE	43.94067	56.44	92.32800	19.68	2 Lane Bridge Under
70th Ave SE	43.94033	56.42	92.33800	20.28	2 Lane Bridge Under
I-52/65th Ave SE	43.93967	56.38	92.34783	20.87	4 Lane Urban Expressway Bridge Under
I-90	43.93783	56.27	92.37150	22.29	4 Lane Urban Expressway Bridge Under
60th St SE	43.93433	56.06	92.38717	23.23	2 Lane Bridge Under
CR 1	43.92783	55.67	92.40817	24.49	2 Lane Bridge Under
CR 16	43.92383	55.43	92.42050	25.23	2 Lane Bridge Under
CR 20	43.91850	55.11	92.43767	26.26	2 Lane Bridge Under
Unnamed Rd	43.91367	54.82	92.45800	27.48	2 Lane Bridge Under
SR 63	43.90883	54.53	92.48017	28.81	4 Lane Urban Expressway Bridge Under
CR 8	43.92033	55.22	92.52817	31.69	2 Lane Bridge Under
60th Ave SW	43.93167	55.90	92.55767	33.46	2 Lane Bridge Under
Fort Zumbro River	43.93200	55.92	92.55833	33.50	Culvert included in Trackwork
CR 126	43.93500	56.10	92.56617	33.97	2 Lane Bridge Under
CR 15	43.93983	56.39	92.57800	34.68	2 Lane Bridge Under
Unnamed Rd	43.94850	56.91	92.59817	35.89	2 Lane Bridge Under
CR 17	43.94983	56.99	92.60117	36.07	2 Lane Bridge Under

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Segment 7D					
Roadway	North GPS	Lat min	West GPS	Long min	Recommended Action
CR 3	43.95700	57.42	92.61783	37.07	2 Lane Bridge Under
CR 150	43.96567	57.94	92.63800	38.28	2 Lane Bridge Under
Salem Creek	43.97217	58.33	92.65267	39.16	Minor River Bridge Under
Unnamed Rd	43.97667	58.60	92.66300	39.78	2 Lane Bridge Under
CR 25	43.98317	58.99	92.67800	40.68	2 Lane Bridge Under
CR 15	43.99217	59.53	92.69817	41.89	2 Lane Bridge Under
Unnamed Rd	43.99683	59.81	92.71333	42.80	2 Lane Bridge Under
Unnamed Rd	44.00033	0.02	92.72600	43.56	2 Lane Bridge Under
CR 13	44.00350	0.21	92.73850	44.31	2 Lane Bridge Under
CR 10	44.00783	0.47	92.75400	45.24	2 Lane Bridge Under
CR 13	44.00883	0.53	92.75817	45.49	2 Lane Bridge Under
CR 14	44.01417	0.85	92.77833	46.70	2 Lane Bridge Under
CCR 9	44.02050	1.23	92.79867	47.92	2 Lane Bridge Under
RR	44.02633	1.58	92.81417	48.85	Rail Bridge Under
CR 9	44.02783	1.67	92.81867	49.12	2 Lane Bridge Under
I-14	44.03000	1.80	92.82417	49.45	4 Lane Rural Expressway Bridge Under
Airport Rd N	44.03533	2.12	92.83883	50.33	2 Lane Bridge Under
North St NE	44.03717	2.23	92.84350	50.61	2 Lane Bridge Under
Dodge Center Creek	44.05033	3.02	92.84583	50.75	Culvert included in Trackwork
Dodge Center Creek	44.05250	3.15	92.84633	50.78	Culvert included in Trackwork
Dodge Center Creek	44.06017	3.61	92.84783	50.87	Culvert included in Trackwork
CR 7	44.06983	4.19	92.84967	50.98	2 Lane Bridge Under
S. Branch Middle Fork	44.07933	4.76	92.85200	51.12	2 Lane Bridge Under
Unnamed Rd	44.10250	6.15	92.85583	51.35	2 Lane Bridge Under
Milliken Creek	44.11250	6.75	92.85783	51.47	Minor River Bridge Under
CR 7/CR 20	44.11667	7.00	92.85850	51.51	2 Lane Bridge Under
CR 22	44.13850	8.31	92.86267	51.76	2 Lane Bridge Under

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Segment 7D

Roadway	North GPS	Lat min	West GPS	Long min	Recommended Action
CR 24	44.15300	9.18	92.86533	51.92	4 Lane Rural Expressway Bridge Under
Unnamed Rd	44.16617	9.97	92.86800	52.08	2 Lane Bridge Under
Middle Fork Zumbro Ri	44.16700	10.02	92.86817	52.09	Minor River Bridge Under
CR B	44.01748	1.05	92.86950	52.17	2 Lane Bridge Under
CR B	44.18217	10.93	92.87100	52.26	2 Lane Bridge Under
CR A	44.19683	11.81	92.87367	52.42	2 Lane Bridge Under
N. Branch Middle Fork	44.20167	12.10	92.87467	52.48	Culvert included in Trackwork
CR !	44.20417	12.25	92.87517	52.51	2 Lane Bridge Under
Unnamed Rd	44.20633	12.38	92.87550	52.53	2 Lane Bridge Under
CR 117	44.21833	13.10	92.87783	52.67	2 Lane Bridge Under
CR 23	44.24017	14.41	92.88183	52.91	2 Lane Bridge Under
Unnamed Rd	44.25450	15.27	92.88483	53.09	2 Lane Bridge Under
Spring Creek	44.26550	15.93	92.88683	53.21	Culvert included in Trackwork
CR 12	44.26900	16.14	92.88750	53.25	2 Lane Bridge Under
Unnamed Rd	44.27900	16.74	92.89167	53.50	2 Lane Bridge Under
Unnamed Rd	44.28217	16.93	92.89367	53.62	2 Lane Bridge Under
SR 60	44.28350	17.01	92.89450	53.67	4 Lane Rural Expressway Bridge Under
Unnamed Rd	44.28733	17.24	92.89700	53.82	2 Lane Bridge Under
Unnamed Rd	44.29767	17.86	92.90350	54.21	2 Lane Bridge Under
N. Fork Zumbro River	44.30217	18.13	92.90650	54.39	Minor River Bridge Under
CR 30	44.31967	19.18	92.91983	55.19	2 Lane Bridge Under
CR 14	44.34033	20.42	92.93817	56.29	2 Lane Bridge Under
Unnamed Rd	44.34150	20.49	92.93917	56.35	2 Lane Bridge Under
Little Cannon River	44.35083	21.05	92.94750	56.85	Minor River Bridge Under
CR 44	44.35150	21.09	92.94817	56.89	2 Lane Bridge Under
Unnamed Rd	44.36483	21.89	92.95867	57.52	2 Lane Bridge Under
CR 49	44.37033	22.22	92.96100	57.66	2 Lane Bridge Under

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Segment 7D

Roadway	North GPS	Lat min	West GPS	Long min	Recommended Action
Unnamed Rd	44.38517	23.11	92.96717	58.03	2 Lane Bridge Under
CR 9	44.40667	24.40	92.97600	58.56	4 Lane Rural Expressway Bridge Under
CR 24	44.41450	24.87	92.97933	58.76	2 Lane Bridge Under
Unnamed Rd	44.43567	26.14	92.98917	59.35	2 Lane Bridge Under
Unnamed Rd	44.44983	26.99	92.99583	59.75	2 Lane Bridge Under
Prairie Creek	44.47083	28.25	93.00583	0.35	Culvert included in Trackwork
Unnamed Rd	44.47167	28.30	93.00633	0.38	2 Lane Bridge Under
SR 56	44.47950	28.77	93.00983	0.59	4 Lane Rural Expressway Bridge Under
320th St W	44.48617	29.17	93.01300	0.78	4 Lane Rural Expressway Bridge Under
Spring Creek	44.49333	29.60	93.01650	0.99	Culvert included in Trackwork
Skiota Trail	44.51167	30.70	93.02500	1.50	2 Lane Bridge Under
Cannon River	44.51600	30.96	93.02733	1.64	Minor River Bridge Under
RR	44.52200	31.32	93.02967	1.78	Rail Bridge Under
Chub Creek	44.52300	31.38	93.02983	1.79	Minor River Bridge Under
CR 88	44.52600	31.56	93.03117	1.87	2 Lane Bridge Under
CR 86	44.54383	32.63	93.03750	2.25	4 Lane Rural Expressway Bridge Under
CR 82	44.55833	33.50	93.04233	2.54	2 Lane Bridge Under
265th St	44.56550	33.93	93.04483	2.69	2 Lane Bridge Under
250th St	44.58733	35.24	93.05250	3.15	2 Lane Bridge Under
CR 80	44.59483	35.69	93.05500	3.30	2 Lane Bridge Under
CR 79	44.59667	35.80	93.05567	3.34	2 Lane Bridge Under
230th St E	44.61650	36.99	93.06200	3.72	2 Lane Bridge Under
S. Branch Vermillion Ri	44.61800	37.08	93.06217	3.73	Minor River Bridge Under
SR 50	44.63033	37.82	93.06217	3.73	4 Lane Rural Expressway Bridge Under
CR 72	44.64483	38.69	93.06250	3.75	2 Lane Bridge Under
CR 66	44.65950	39.57	93.06283	3.77	4 Lane Rural Expressway Bridge Under
Vermillion River	44.67033	40.22	93.06300	3.78	Minor River Bridge Under

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Segment 7D					
Roadway	North GPS	Lat min	West GPS	Long min	Recommended Action
Station Trail	44.68917	41.35	93.06333	3.80	2 Lane Bridge Under
Unnamed Rd	44.69500	41.70	93.06350	3.81	2 Lane Bridge Under
CR 58	44.70300	42.18	93.06350	3.81	2 Lane Bridge Under
165th St	44.71100	42.66	93.06350	3.81	Closure
160th St	44.71750	43.05	93.06333	3.80	2 Lane Bridge Under
156th St	44.72450	43.47	93.06133	3.68	Closure
155th St	44.72600	43.56	93.06067	3.64	2 Lane Bridge Under
153rd St	44.72950	43.77	93.05983	3.59	Closure
152nd St	44.73083	43.85	93.05950	3.57	2 Lane Bridge Under
151st St	44.73233	43.94	93.05900	3.54	Closure
CR 42	44.74067	44.44	93.05667	3.40	4 Lane Rural Expressway Bridge Under
CR 38	44.74400	44.64	93.05583	3.35	2 Lane Bridge Under
CR 38	44.74750	44.85	93.05467	3.28	2 Lane Bridge Under
135th St	44.75467	45.28	93.05283	3.17	Closure
117th St	44.78017	46.81	93.04817	2.89	2 Lane Bridge Under
105th St	44.79733	47.84	93.04300	2.58	2 Lane Bridge Under
Inver Grove Trail	44.80350	48.21	93.03467	2.08	2 Lane Bridge Under
65th St E	44.85533	51.32	93.02000	1.20	2 Lane Bridge Under
Edwards Ave E	44.86800	52.08	93.02233	1.34	2 Lane Bridge Under
Hardman Avenue S/Ric	44.87350	52.41	93.02317	1.39	2 Lane Bridge Under
Maltby St	44.87517	52.51	93.02350	1.41	2 Lane Bridge Under
RR	44.87783	52.67	93.02400	1.44	Rail Bridge Under
Armour Ave	44.88700	53.22	93.02550	1.53	2 Lane Bridge Under
John Carroll Ave	44.89433	53.66	93.03050	1.83	2 Lane Bridge Under
Hardman Ave N	44.89533	53.72	93.03167	1.90	2 Lane Bridge Under
Ranchnot Rd	44.91250	54.75	93.05183	3.11	2 Lane Bridge Under
Mississippi River	44.91800	55.08	93.05083	3.05	Major River

Segment 7D St Charles to St Paul

Summary Bridges Under	**Unit Cost**	**Quantity**	**Amount**
4 Lane Urban Expressway	$4,848	4	**$19,392**
4 Lane Rural Expressway	$4,036	11	**$44,396**
2 Lane	$3,062	74	**$226,588**
Rail	$3,062	3	**$9,186**
Minor River	$812	9	**$7,308**
Major River	$8,118	1	**$8,118**
Total Bridges Under Segment 7D			**$314,988**

Defintion of Segments
Segment 7A: Mississippi River Bridge to Winona
Segment 7B: Winona to Minnesota City
Segment 7C: Minnesota City to St Charles
Segment 7D; St Charles to St Paul

Quantity Summary Bridges Under of Segment 7	**Seg 7A**	**Seg 7B**	**Seg 7C**	**Seg 7D**	**Total**
4 Lane Urban Expressway	0	0	0	4	**4**
4 Lane Rural Expressway	0	0	3	11	**14**
2 Lane	0	0	0	74	**74**
Rail	0	0	0	3	**3**
Minor River	0	0	5	9	**14**
Major River	0	0	0	1	**1**

Summary of Bridges Under for Se	Unit Cost	Quantity	Amount
4 Lane Urban Expressway	$4,848	4	$19,392
4 Lane Rural Expressway	$4,036	14	$56,504
2 Lane	$3,062	74	$226,588
Rail	$3,062	3	$9,186
Minor River	$812	14	$11,368
Major River	$8,118	1	$8,118
Total			$331,156

Segment 7D

Bridges Over St Charles to St Paul

Description	North GPS	Lat Min	West GPS	Long Min	Recommended Action
SR 52	44.80050	48.03	92.03900	2.34	4 Lane Urban Expressway
Union Pacific Rail	44.79450	47.67	92.04450	2.67	Rail
Union Pacific Rail	44.91067	54.64	92.05033	3.02	Rail
Cr 24	44.85350	51.21	92.01983	1.19	2 Lane
I-494	44.88033	52.82	92.02433	1.46	Bridge Over with acceptable horizontal clearance

Summary of Bridges Over for Segment 7D

Type	Unit Cost	Quantity	Amount
4 Lane Urban Expressway	10,516	1	$10,516
4 Lane Rural Expressway	2,630		$0
2 Lane	1,971	1	$1,971
Rail	6,572	2	$13,144
Total			$25,631

CURVES

Curves that require increased elevtion, reduction of curvature, and installation of elastic fasteners are as follows:

				Actual		Proposed Reduction		
Subdivisior	MP	Range	Direct	Curvature	Elev	Curvature	Elevation	Description
Watertown	109.30	109.60	Left	2* 0'	3.000000"	1* 0'	3.000000"	curvature reduction
Watertown	111.40	111.80	Left	1* 30'	2.500000"	1* 7'	2.500000"	curvature reduction
Watertown	177.10	177.40	Left	3* 0'	3.000000"	1* 0'	3.000000"	curvature reduction
Watertown	177.60	177.70	Right	1* 50'	0.500000"	1* 7'	2.500000"	curvature reduction
Tomah, CF	178.50	178.55	Right	3* 0'	1.000000"	1* 0'	1.000000"	curvature reduction
Tomah, CF	178.70	178.75	Right	2* 47'	1.000000"	1* 7'	2.000000"	curvature reduction
Tomah, CF	178.75	178.80	Right	2* 0'	0.250000"	1* 0'	2.000000"	curvature reduction
Tomah, CF	178.80	178.85	Right	2* 33'	0.250000"	1* 7'	2.000000"	curvature reduction
Tomah, CF	178.85	178.90	Right	1* 42'	0.500000"	1* 7'	2.000000"	curvature reduction
Tomah, CF	192.75	192.99	Right	2* 0'	3.000000"	1* 0"	3.000000"	curvature reduced
Tomah, CF	193.80	194.00	Left	1* 58'	3.000000"	1* 7'	3.000000"	curvature reduced
Tomah, CF	194.20	194.40	Right	2* 0'	3.000000"	1* 0'	3.000000"	curvature reduction
Tomah, CF	195.40	195.50	Right	2* 30'	4.000000"	1* 7'	2.500000"	curvature reduction
Tomah, CF	195.60	195.75	Left	2* 0'	3.000000"	1* 0'	3.000000"	curvature reduction
Tomah, CF	196.50	196.75	Left	1* 30'	2.500000"	1* 7'	2.500000"	curvature reduction
Tomah, CF	196.85	197.20	Right	2* 0'	3.000000"	1* 7'	3.000000"	curvature reduction
Tomah, CF	227.60	227.70	Left	2* 0'	3.000000"	1* 0'	3.000000"	curvature reduction
Tomah, CF	271.60	271.80	Left	1* 30'	2.500000"	1* 15'	2.500000"	curvature reduction
Tomah, CF	277.10	277.40	Left	2* 0'	3.000000"	1* 0'	3.000000"	curvature reduction

CROSSINGS B-2 Rochester Route 150 MPH Technology						
Page 1						
Segment #2 Milwaukee to Watertown						
Subdivision	Milepost	Cost ($000	Recommended Action			
Watertown sub	93.80	$274	Rural w.Quadrant Gates			
Watertown sub	95.10	$274	Rural w.Quadrant Gates			
Watertown sub	95.30	$274	Rural w.Quadrant Gates			
Watertown sub	97.40	$274	Rural w.Quadrant Gates			
Watertown sub	98.40	$274	Rural w.Quadrant Gates			
Watertown sub	99.40	$550	Full Width Barrier			
Watertown sub	100.50	$550	Full Width Barrier			
Watertown sub	101.50	$550	Full Width Barrier			
Watertown sub	102.20	$550	Full Width Barrier			
Watertown sub	102.40	$550	Full Width Barrier			
Watertown sub	102.50	$60	Closure			
Watertown sub	104.30	$550	Full Width Barrier			
Watertown sub	105.20	$550	Full Width Barrier			
Watertown sub	105.75	$550	Full Width Barrier			
Watertown sub	106.20	$550	Full Width Barrier			
Watertown sub	106.80	$550	Full Width Barrier			
Watertown sub	108.20	$550	Full Width Barrier			
Watertown sub	109.80	$550	Full Width Barrier			
Watertown sub	110.01	$550	Full Width Barrier			
Watertown sub	111.30	$550	Full Width Barrier			
Watertown sub	113.10	$60	Closure			
Watertown sub	114.50	$550	Full Width Barrier			
Watertown sub	114.80	$550	Full Width Barrier			
Watertown sub	115.50	$550	Full Width Barrier			
Watertown sub	115.90	$550	Full Width Barrier			
Watertown sub	117.40	$274	Rural w.Quadrant Gates			
Watertown sub	117.70	$274	Rural w.Quadrant Gates			
Watertown sub	117.80	$274	Rural w.Quadrant Gates			
Watertown sub	117.90	$274	Rural w.Quadrant Gates			
Watertown sub	118.05	$274	Rural w.Quadrant Gates			
Watertown sub	118.20	$274	Rural w.Quadrant Gates			
Watertown sub	118.30	$274	Rural w.Quadrant Gates			
Watertown sub	118.70	$274	Rural w.Quadrant Gates			
Watertown sub	119.50	$274	Rural w.Quadrant Gates			
Watertown sub	122.50	$274	Rural w.Quadrant Gates			
Watertown sub	123.20	$274	Rural w.Quadrant Gates			
Watertown sub	123.70	$60	Closure			
Watertown sub	123.77	$274	Rural w.Quadrant Gates			
Watertown sub	124.60	$60	Closure			
Watertown sub	125.00	$274	Rural w.Quadrant Gates			
Watertown sub	125.45	$60	Closure			
Watertown sub	125.50	$60	Closure			
Watertown sub	125.85	$60	Closure			
Watertown sub	126.30	$60	Closure			
Watertown sub	126.40	$274	Rural w.Quadrant Gates			
Watertown sub	127.30	$60	Closure			
Watertown sub	127.60	$60	Closure			
Watertown sub	128.20	$274	Rural w.Quadrant Gates			

Page 2							
Subdivision	**Milepost**	**Cost ($000**	**Recommended Action**				
Watertown sub	128.80	$60	Closure				
Watertown sub	129.10	$60	Closure				
Watertown sub	129.40	$274	Rural w.Quadrant Gates				
Watertown sub	129.50	$274	Rural w.Quadrant Gates				
Watertown sub	129.95	$274	Rural w.Quadrant Gates				
Watertown sub	130.10	$274	Rural w.Quadrant Gates				
Watertown sub	130.40	$274	Rural w.Quadrant Gates				
Watertown sub	130.60	$274	Rural w.Quadrant Gates				
Watertown sub	130.99	$274	Rural w.Quadrant Gates				
Summary Segment #2		**Unit Cost**	**Quantity**	**Amount**			
Private Closure		$60	12	**$720**			
Rural w/Quadrant Gates		$274	27	**$7,398**			
Full Width Barrier		$550	18	**$9,900**			
Total Grade Crossings				**$18,018**			
Segment #3 Watertown to Hwy 51							
Subdivision	**Milepost**	**Cost ($000**	**Recommended Action**				
Waterloo Spur	132.10	$274	Rural w/Quadrant Gates				
Waterloo Spur	133.45	$274	Rural w/Quadrant Gates				
Waterloo Spur	133.50	$60	Closure				
Waterloo Spur	133.60	$60	Closure				
Waterloo Spur	133.95	$60	Closure				
Waterloo Spur	134.45	$274	Rural w/Quadrant Gates				
Waterloo Spur	134.65	$60	Closure				
Waterloo Spur	134.80	$60	Closure				
Waterloo Spur	135.45	$274	Rural w/Quadrant Gates				
Waterloo Spur	135.85	$60	Closure				
Waterloo Spur	136.20	$60	Closure				
Waterloo Spur	136.71	$60	Closure				
Waterloo Spur	136.90	$274	Rural w/Quadrant Gates				
Waterloo Spur	137.30	$60	Closure				
Waterloo Spur	137.70	$274	Rural w/Quadrant Gates				
Waterloo Spur	138.30	$274	Rural w/Quadrant Gates				
Waterloo Spur	138.40	$60	Closure				
Waterloo Spur	139.00	$274	Rural w/Quadrant Gates				
Waterloo Spur	139.45	$60	Closure				
Waterloo Spur	139.65	$60	Closure				
Waterloo Spur	139.90	$60	Closure				
Waterloo Spur	140.80	$60	Closure				
Waterloo Spur	141.70	$60	Closure				
Waterloo Spur	143.70	$274	Rural w/Quadrant Gates				
Waterloo Spur	144.00	$60	Closure				
Waterloo Spur	144.30	$274	Rural w/Quadrant Gates				
Waterloo Spur	144.35	$274	Rural w/Quadrant Gates				
Waterloo Spur	144.50	$274	Rural w/Quadrant Gates				
Waterloo Spur	144.60	$274	Rural w/Quadrant Gates				
Waterloo Spur	144.70	$274	Rural w/Quadrant Gates				
Waterloo Spur	145.30	$60	Closure				
Waterloo Spur	145.61	$60	Closure				
Waterloo Spur	145.90	$60	Closure				

Page 3							
Subdivision	**Milepost**	**Cost ($000**	**Recommended Action**				
Waterloo Spur	146.30	$60	Closure				
Waterloo Spur	147.00	$60	Closure				
Waterloo Spur	148.00	$274	Rural w/Quadrant Gates				
Waterloo Spur	148.40	$60	Closure				
Waterloo Spur	149.60	$60	Closure				
Waterloo Spur	150.45	$60	Closure				
Waterloo Spur	150.85	$60	Closure				
Waterloo Spur	152.40	$60	Closure				
Waterloo Spur	152.90	$60	Closure				
Waterloo Spur	154.40	$60	Closure				
Waterloo Spur	154.90	$60	Closure				
Waterloo Spur	155.60	$274	Rural w/Quadrant Gates				
Waterloo Spur	155.75	$274	Rural w/Quadrant Gates				
Waterloo Spur	156.80	$274	Rural w/Quadrant Gates				
Waterloo Spur	157.60	$60	Closure				
Waterloo Spur	157.80	$60	Closure				
Waterloo Spur	158.30	$60	Closure				
Waterloo Spur	159.40	$274	Rural w/Quadrant Gates				
Waterloo Spur	159.70	$274	Rural w/Quadrant Gates				
Waterloo Spur	161.80	$274	Rural w/Quadrant Gates				
Summary Segment #3		**Unit Cost**	**Quantity**	**Amount**			
Private Closure		$60	32	**$1,920**			
Rural w/Quadrant Gates		$274	21	**$5,754**			
Total Grade Crossings				**$7,674**			
Segment #5 Madison to Portage							
Subdivision	**Milepost**	**Cost ($000**	**Recommended Action**				
Madison-Portag	27.90	$60	Closure				
Madison-Portag	26.50	$60	Closure				
Madison-Portag	26.30	$60	Closure				
Madison-Portag	25.55	$60	Closure				
Madison-Portag	25.40	$60	Closure				
Madison-Portag	25.30	$60	Closure				
Madison-Portag	25.20	$60	Closure				
Madison-Portag	24.80	$60	Closure				
Madison-Portag	23.10	$60	Closure				
Madison-Portag	22.40	$60	Closure				
Summary Segment #5		**Unit Cost**	**Quantity**	**Amount**			
Private Closure		$60	10	**$600**			
Total Grade Crossings				**$600**			

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Segment 6							
Subdivision	**Milepost**	**Cost ($000**	**Recommended Action**				
Tomah, CPSoo	180.90	$60	Closure				
Tomah, CPSoo	182.70	$60	Closure				
Tomah, CPSoo	184.50	$60	Closure				
Tomah, CPSoo	187.00	$60	Closure				
Tomah, CPSoo	191.90	$60	Closure				
Tomah, CPSoo	193.80	$60	Closure				
Tomah, CPSoo	200.50	$60	Closure				
Tomah, CPSoo	204.75	$60	Closure				
Tomah, CPSoo	205.10	$60	Closure				
Tomah, CPSoo	205.80	$60	Closure				
Tomah, CPSoo	212.75	$60	Closure				
Tomah, CPSoo	216.10	$60	Closure				
Tomah, CPSoo	219.95	$60	Closure				
Tomah, CPSoo	220.40	$60	Closure				
Tomah, CPSoo	220.75	$60	Closure				
Tomah, CPSoo	222.20	$60	Closure				
Tomah, CPSoo	223.40	$60	Closure				
Tomah, CPSoo	224.01	$60	Closure				
Tomah, CPSoo	224.50	$60	Closure				
Tomah, CPSoo	226.10	$60	Closure				
Tomah, CPSoo	229.50	$60	Closure				
Tomah, CPSoo	237.50	$60	Closure				
Tomah, CPSoo	241.20	$60	Closure				
Tomah, CPSoo	242.60	$60	Closure				
Tomah, CPSoo	242.80	$60	Closure				
Tomah, CPSoo	247.20	$60	Closure				
Tomah, CPSoo	251.80	$60	Closure				
Tomah, CPSoo	254.60	$60	Closure				
Tomah, CPSoo	258.20	$60	Closure				
Tomah, CPSoo	258.80	$60	Closure				
Tomah, CPSoo	260.40	$60	Closure				
Tomah, CPSoo	261.50	$60	Closure				
Tomah, CPSoo	261.75	$60	Closure				
Tomah, CPSoo	262.50	$60	Closure				
Tomah, CPSoo	268.10	$60	Closure				
Tomah, CPSoo	268.50	$60	Closure				
Tomah, CPSoo	268.70	$60	Closure				
Tomah, CPSoo	268.90	$60	Closure				
Tomah, CPSoo	270.90	$60	Closure				
Tomah, CPSoo	271.40	$60	Closure				
Tomah, CPSoo	274.40	$60	Closure				
Tomah, CPSoo	274.90	$60	Closure				
Tomah, CPSoo	275.90	$60	Closure				
Tomah, CPSoo	279.70	$60	Closure				
Tomah, CPSoo	282.40	$60	Closure				
Tomah, CPSoo	284.80	$60	Closure				
Summary Segment #6		**Unit Cost**	**Quantity**	**Amount**			
Private Closure		$60	46	**$2,760**			
Total Grade Crossings				**$2,760**			

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Segment 7A River to Winona							
Subdivision	**Milepost**	**Cost ($00(**	**Recommended Action**				
River, CPSoo	288.16	$274	Rural w/Quadrant Gates				
River, CPSoo	288.20	$60	Closure				
River, CPSoo	288.31	$274	Rural w/Quadrant Gates				
River, CPSoo	288.40	$274	Rural w/Quadrant Gates				
River, CPSoo	288.65	$274	Rural w/Quadrant Gates				
River, CPSoo	288.80	$274	Rural w/Quadrant Gates				
River, CPSoo	288.90	$274	Rural w/Quadrant Gates				
River, CPSoo	289.10	$274	Rural w/Quadrant Gates				
River, CPSoo	289.98	$274	Rural w/Quadrant Gates				
River, CPSoo	293.10	$60	Closure				
River, CPSoo	293.90	$60	Closure				
River, CPSoo	294.70	$60	Closure				
River, CPSoo	295.20	$60	Closure				
River, CPSoo	295.60	$60	Closure				
River, CPSoo	295.70	$60	Closure				
River, CPSoo	295.80	$60	Closure				
River, CPSoo	296.05	$274	Rural w/Quadrant Gates				
River, CPSoo	296.57	$60	Closure				
River, CPSoo	297.40	$60	Closure				
River, CPSoo	297.50	$60	Closure				
River, CPSoo	297.90	$60	Closure				
River, CPSoo	301.05	$60	Closure				
River, CPSoo	302.90	$60	Closure				
River, CPSoo	303.10	$60	Closure				
River, CPSoo	303.80	$274	Rural w/Quadrant Gates				
River, CPSoo	303.90	$274	Rural w/Quadrant Gates				
River, CPSoo	306.80	$274	Rural w/Quadrant Gates				
River, CPSoo	307.20	$274	Rural w/Quadrant Gates				
River, CPSoo	307.50	$274	Rural w/Quadrant Gates				
River, CPSoo	308.00	$274	Rural w/Quadrant Gates				
River, CPSoo	308.40	$274	Rural w/Quadrant Gates				
River, CPSoo	308.48	$274	Rural w/Quadrant Gates				
Summary Segment #7A		**Unit Cost**	**Quantity**	**Amount**			
Private Closure		$60	15	**$900**			
Rural w/Quadrant Gates		$274	17	**$4,658**			
Total Grade Crossings				**$5,558**			

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Segment #7B Winona to south of Minnesota City

From Winona the DME parallels the CP Rail track to River subdivision milepost 312.1

The at grade crossings for the DME and the CP Rail track to this milepost are the same

Subdivision	Milepost	Cost ($00(	Recommended Action
River, CPSoo	308.75	$274	Rural w/Quadrant Gates
River, CPSoo	308.80	$274	Rural w/Quadrant Gates
River, CPSoo	309.05	$274	Rural w/Quadrant Gates
River, CPSoo	309.20	$274	Rural w/Quadrant Gates
River, CPSoo	309.50	$274	Rural w/Quadrant Gates
River, CPSoo	309.55	$274	Rural w/Quadrant Gates
River, CPSoo	309.65	$274	Rural w/Quadrant Gates
River, CPSoo	309.70	$274	Rural w/Quadrant Gates
River, CPSoo	310.11	$274	Rural w/Quadrant Gates
River, CPSoo	310.75	$274	Rural w/Quadrant Gates
River, CPSoo	311.50	$274	Rural w/Quadrant Gates
River, CPSoo	312.10	$274	Rural w/Quadrant Gates

Summary	Unit	Quantity	Amount
Rural w/Quadrant Gates	$274	12	$3,288

Segment 7C Minnesota City to St Charles

Description	North	Lat min	West	Long min	Recommended Action
Unnamed	44.08567	5.14	91.76217	45.73	Rural w/Quadrant Gates
Unnamed	44.08083	4.85	91.76400	45.84	Rural w/Quadrant Gates
Unnamed	44.07317	4.39	91.76600	45.96	Rural w/Quadrant Gates
Unnamed	44.07000	4.20	91.76483	45.89	Rural w/Quadrant Gates
CR 23	44.06350	3.81	91.76100	45.66	Rural w/Quadrant Gates
Twp 6	44.05600	3.36	91.75667	45.40	Rural w/Quadrant Gates
Twp Rd 8	44.04317	2.59	91.76150	45.69	Rural w/Quadrant Gates
CR 23	44.02983	1.79	91.77017	46.21	Rural w/Quadrant Gates
Unnamed	44.01417	0.85	91.79417	47.65	Rural w/Quadrant Gates
Hwy 25	44.00600	0.36	91.80917	48.55	Rural w/Quadrant Gates
Twp 12	44.00133	0.08	91.81400	48.84	Rural w/Quadrant Gates
Unnamed	43.98367	59.02	91.83667	50.20	Rural w/Quadrant Gates
Twp 1	43.98333	59.00	91.83933	50.36	Rural w/Quadrant Gates
CR 25	43.98217	58.93	91.85933	51.56	Rural w/Quadrant Gates
Golfer's Rd	43.98417	59.05	91.88083	52.85	Rural w/Quadrant Gates
Twp 10	43.98117	58.87	91.91950	55.17	Rural w/Quadrant Gates
CR 18	43.97783	58.67	91.93983	56.39	Rural w/Quadrant Gates
CR 33	43.97550	58.53	91.95517	57.31	Rural w/Quadrant Gates
Utica Twp 17	43.97483	58.49	91.95950	57.57	Rural w/Quadrant Gates
CR 115	43.97167	58.30	91.97967	58.78	Rural w/Quadrant Gates
CR 37	43.96700	58.02	92.00783	0.47	Rural w/Quadrant Gates
CR 37	43.96683	58.01	92.00950	0.57	Rural w/Quadrant Gates
CR 119	43.96483	57.89	92.02967	1.78	Rural w/Quadrant Gates
Richland Ave	43.96417	57.85	92.06217	3.73	Rural w/Quadrant Gates
St Charles Ave	43.96650	57.99	92.06650	3.99	Rural w/Quadrant Gates
W 11th St	43.96767	58.06	92.06883	4.13	Rural w/Quadrant Gates
CR 142	43.97033	58.22	92.07900	4.74	Rural w/Quadrant Gates
Connect 142 to 14	43.97050	58.23	92.09767	5.86	Rural w/Quadrant Gates
Connect 142 to 14	43.97033	58.22	92.10367	6.22	Rural w/Quadrant Gates

Summary 7C Crossings	Unit	Quantity	Amount
Rural w/Quadrant Gates	$274	29	$7,946

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Segment 7D St Charles to St Paul								
Crossing	**North GPS**	**Lat Min**	**West GPS**	**Long Min**	**Recommended Action**			
65th St E	44.85533	51.32	92.02000	1.20	Rural w/ Quadrant Gates			
Edwards Ave E	44.86800	52.08	92.02233	1.34	Rural w/ Quadrant Gates			
Hardman Avenue S/	44.87350	52.41	92.02317	1.39	Rural w/ Quadrant Gates			
Maltby St	44.87517	52.51	92.02350	1.41	Rural w/ Quadrant Gates			
Hardman Avenue S	44.88000	52.80	92.02433	1.46	Full Width Barrier			
Armour Ave	44.88700	53.22	92.02550	1.53	Rural w/ Quadrant Gates			
John Carroll Ave	44.89433	53.66	92.03050	1.83	Rural w/ Quadrant Gates			
Hardman Ave N	44.89533	53.72	92.03167	1.90	Rural w/ Quadrant Gates			
Ranchnot Rd	44.91250	54.75	92.05183	3.11	Rural w/ Quadrant Gates			
Summary Segment 7D		**Unit**	**Quantity**	**Amount**				
Private Closure		$60	100	**$6,000**				
Rural w/ Quadrant Gates		$274	8	**$2,192**				
Full Width Barrier		$550	1	**$550**				
Total				**$8,742**				
Private Closures is an estimate based on an estimate of private crossings for the entire route.								
Quantity Summary for Segment 7 River to St Paul								
Crossing		Seg 7A	Seg 7B	Seg 7C	Seg 7D	Total		
Private Closure		15	0	0	100	115		
Rural w/ Quadrant Gates		17	12	29	8	66		
Full Width Barrier					1	1		
Summary of Costs Segment 7 River to St Paul								
Crossing		**Unit**	**Quantity**	**Amount**				
Private Closure		$60	115	**$6,900**				
Rural w/ Quadrant Gates		$274	66	**$18,084**				
Full Width Barrier		$550	1	**$550**				
Total Cost Crossings				**$25,534**				

TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 6.2.4
Infrastructure Detail: C-2 Rochester Route
New Alignment 150 mph

Tri-State Phase II HSR Feasibility Study
12-Jan-99

C-2 Rochester Route 150 MPH

Item	Unit	Unit Costs	Quantity	Amount	
1.0 Trackwork					
1.1 HSR on Existing Roadbed	per mile	$873	29	$25,317	
1.2 HSR on New Roadbed (Existing ROW)	per mile	$932		$0	
1.2A HSR on New Roadbed (New ROW)	per mile	$1,376		$0	
1.2B HSR on New Roadbed (Double Track)	per mile	$2,308	310	$715,480	
1.3 Timber & Surface w/ 33% Tie replacement	per mile	$136	29	$3,944	
1.4 Timber & Surface w/ 66% Tie Replacement	per mile	$224		$0	
1.5 Relay Track w/ 136# CWR	per mile	$329		$0	
1.6 Siding	per mile	$802		$0	
1.7 Fencing	per mile	$49	339	$16,611	
1.8 Electricfication	per mile	$991		$0	
1.9 Other Track Work Chicago to Milwaukee	LS	$212,917	1	$212,917	
1.10 Land Acquisition Madison	per mile	$5,000	3	$15,000	
1.11 Land Acquisition Urban	per mile	$294	10	$2,940	
1.12 Land Acquisition Rural	per mile	$98	293	$28,714	
Total Track Costs					$1,020,923
2.0 Stations					
2.1 Full Service - New	each	$1,000	2	$2,000	
2.2 Full Service - Renovated	each	$500	2	$1,000	
2.3 Terminal - New	each	$2,000	3	$6,000	
2.4 Terminal - Renovated	each	$1,000	1	$1,000	
2.5 Maintenance (110 MPH technology)	each	$10,000		$0	
2.5A Maintenance (150 MPH technology)	each	$86,000	1	$86,000	
2.5B Maintenance (185 MPH technology)	each	$162,000		$0	
2.6 Stations Chicago to Milwaukee	LS	$20,428	1	$20,428	
Total Station Cost					$116,428
4.0 Turnouts					
4.1 New #33 - 136# High Speed	each	$555			
Total Turnout Cost					

C-2 Rochester Route 150 MPH

5.0 Bridges - Under					
5.1 Four Lane Urban Expressway	each	$4,848	15	$72,720	
5.2 Four Lane Rural Expressway	each	$4,036	42	$169,512	
5.3 Two Lane Highway	each	$3,062	285	$872,670	
5.4 Rail	each	$3,062	15	$45,930	
5.5 Minor river	each	$812	42	$34,104	
5.6 Major River	each	$8,118	10	$81,180	
5.7 Mississippi River	LS	$234,000	1	$234,000	
5.8 Interstate 90 Dakota Rvier Valley Structure	LS	$74,000	1	$74,000	
5.9 Elevated Structure Milwaukee	per mile	$39,000			
5.10 Elevated Structure St Paul	per mile	$39,000			
5.11 Elevated Structure Chicago to Milwaukee	per mile	$39,000			
5.12 Bridges Chicago to Milwaukee	LS	$97,152	1	$97,152	
Total Bridges - Under Costs					$1,681,268
6.0 Bridges - Over					
6.1 Four Lane Urban Expressway	each	10,516	2	$21,032	
6.2 Four Lane Rural Expressway	each	2,630	3	$7,890	
6.3 Two Lane Highway	each	1,971	5	$9,855	
6.4 Rail	each	6,572	2	$13,144	
6.5 Viaducts - Major river	each				
6.6 Tunnel (One track)	per LF	10	10600	$106,000	
Total Bridges - Over					$157,921
7.0 Crossings					
7.1 Private Closure	each	60	190	$11,400	
7.2 Rural w/ Quadrant Gates	each	274	22	$6,028	
7.3 Urban w/ Quadrant Gates	each	341			
7.4 Full Width Barrier	each	550	19	$10,450	
7.5 Crossings Chicago to Milwaukee	LS	71,510	1	$71,510	
Total Crossings Cost					$99,388
8.0 Signals					
8.1 High Speed Turnout	each	1,098			
8.2 System Installation for HSR (110MPH)	per mile	150			
8.2A System Installation for HSR (150MPH)	per mile	350	343	$120,050	
8.2B System Installation for HSR (185MPH)	per mile	980			
8.3 Signal Costs Chicago to Milwaukee	LS	$46,877	1	$46,877	
Total Signals Cost					$166,927
9.0 Curves					
9.1 Elevate & Surface Curves	per mile	42			
9.2 Curvature Reduction	per mile	284			
9.3 Elastic Fasteners	per mile	59			
Total Curve Upgrade Cost					
Total Upgrade Cost					$3,242,855

Tri-State Phase II HSR Feasibility Study																					
12-Jan-99																					
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
C-2 Rochester Route 150 MPH						Chicago to Milwaukee		Milw to Ixonia		Ixonia to Hwy 51		Airport Track		Madison to LaCrosse		Miss. River Basin		River to St Paul		Total	Total
Item	Unit	Unit Costs	Quantity	Amount		Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
1.0 Trackwork																					
1.1 HSR on Existing Roadbed	per mile	$873	29	$25,317			-	29	25,317											29	25,317
1.2 HSR on New Roadbed (Existing ROW)	per mile	$932		$0			-													-	
1.2A HSR on New Roadbed (New ROW)	per mile	$1,376		$0			-													-	
1.2B HSR on New Roadbed (Double Track)	per mile	$2,308	310	$715,480			-			40	92,320	3	6,924	136	313,888			131	302,348	310	715,480
1.3 Timber & Surface w/ 33% Tie replacement	per mile	$136	29	$3,944			-	29	3,944											29	3,944
1.4 Timber & Surface w/ 66% Tie Replacement	per mile	$224		$0			-													-	
1.5 Relay Track w/ 136# CWR	per mile	$329		$0			-													-	
1.6 Siding	per mile	$802		$0			-													-	
1.7 Fencing	per mile	$49	339	$16,611			-	29	1,421	40	1,960	3	147	136	6,664			131	6,419	339	16,611
1.8 Electricfication	per mile	$991		$0			-													-	
1.9 Other Track Work Chicago to Milwaukee	LS	$212,917	1	$212,917		1	212,917													1	212,917
1.10 Land Acquisition Madison	per mile	$5,000	3	$15,000			-					3	15,000							3	15,000
1.11 Land Acquisition Urban	per mile	$294	10	$2,940			-							-				10	2,940	10	2,940
1.12 Land Acquisition Rural	per mile	$98	293	$28,714			-			40	3,920			136	13,328			117	11,466	293	28,714
Total Track Costs					$1,020,923		212,917		30,682		98,200		22,071		333,880		-		323,173		1,020,923
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
						Chicago to Milwaukee		Milw to Ixonia		Ixonia to Hwy 51		Airport Track		Madison to LaCrosse		Miss. River Basin		River to St Paul		Total	Total
2.0 Stations						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
2.1 Full Service - New	each	$1,000	2	$2,000										2	2,000					2	2,000
2.2 Full Service - Renovated	each	$500	2	$1,000				1	500					1	500					2	1,000
2.3 Terminal - New	each	$2,000	3	$6,000								1	2,000					2	4,000	3	6,000
2.4 Terminal - Renovated	each	$1,000	1	$1,000				1	1,000											1	1,000
2.5 Maintenance (110 MPH technology)	each	$10,000		$0																-	
2.5A Maintenance (150 MPH technology)	each	$86,000	1	$86,000														1	86,000	1	
2.5B Maintenance (185 MPH technology)	each	$162,000		$0																-	
2.6 Stations Chicago to Milwaukee	LS	$20,428	1	$20,428		1	20,428													1	20,428
Total Station Cost					$116,428		20,428		1,500		-		2,000		2,500		-		90,000		116,428

Page 2																					
C-2 Rochester Route 150 MPH						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
						Chicago to Milwaukee		Milw to Ixonia		Ixonia to Hwy 51		Airport Track		Madison to LaCrosse		Miss. River Basin		River to St Paul		Total	Total
4.0 Turnouts						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
4.1 New #33 - 136# High Speed	each	$555																			
Total Turnout Cost																					
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
						Chicago to Milwaukee		Milw to Ixonia		Ixonia to Hwy 51		Airport Track		Madison to LaCrosse		Miss. River Basin		River to St Paul		Total	Total
5.0 Bridges - Under						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
5.1 Four Lane Urban Expressway	each	$4,848	15	$72,720						2	9,696			4	19,392			9	43,632	15	72,720
5.2 Four Lane Rural Expressway	each	$4,036	42	$169,512				1	4,036	5	20,180			23	92,828			13	52,468	42	169,512
5.3 Two Lane Highway	each	$3,062	285	$872,670						39	119,418	3	9,186	115	352,130			128	391,936	285	872,670
5.4 Rail	each	$3,062	15	$45,930						2	6,124			10	30,620			3	9,186	15	45,930
5.5 Minor river	each	$812	42	$34,104				2	1,624	7	5,684			19	15,428			14	11,368	42	34,104
5.6 Major River	each	$8,118	10	$81,180				1	8,118	3	24,354			4	32,472			2	16,236	10	81,180
5.7 Mississippi River	LS	$234,000	1	$234,000												1	234,000			1	234,000
5.8 Interstate 90 Dakota Rvier Valley Structure	LS	$74,000	1	$74,000												1	74,000			1	74,000
5.9 Elevated Structure Milwaukee	per mile	$39,000																		-	-
5.10 Elevated Structure St Paul	per mile	$39,000																		-	-
5.11 Elevated Structure Chicago to Milwaukee	per mile	$39,000																			-
5.12 Bridges Chicago to Milwaukee	LS	$97,152	1	$97,152		1	97,152													1	97,152
Total Bridges - Under Costs					$1,681,268		97,152		13,778		185,456		9,186		542,870		308,000		524,826		1,681,268
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
						Chicago to Milwaukee		Milw to Ixonia		Ixonia to Hwy 51		Airport Track		Madison to LaCrosse		Miss. River Basin -		River to St Paul		Total	Total
6.0 Bridges - Over						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
6.1 Four Lane Urban Expressway	each	$10,516	2	$21,032								1	10,516					1	10,516	2	21,032
6.2 Four Lane Rural Expressway	each	$2,630	3	$7,890				3	7,890											3	7,890
6.3 Two Lane Highway	each	$1,971	5	$9,855				4	7,884									1	1,971	5	9,855
6.4 Rail	each	$6,572	2	$13,144														2	13,144	2	13,144
6.5 Viaducts - Major river	each																			-	
6.6 Tunnel (One track)	per LF	$10	10,600	$106,000										10600	106,000					10,600	106,000
Total Bridges - Over					$157,921				15,774				10,516		106,000				25,631		157,921

Page 3						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7		Total	Total
C-2 Rochester Route 150 MPH						Chicago to Milwaukee		Milw to Ixonia		Ixonia to Hwy 51		Airport Track		Madison to LaCrosse		Miss. River Basin		River to St Paul		Quantity	Amount
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount		
7.0 Crossings																					
7.1 Private Closure	each	$60	190	$11,400				2	120	32	1,920			56	3,360			100	6,000	190	11,400
7.2 Rural w/ Quadrant Gates	each	$274	22	$6,028				14	3,836									8	2,192	22	6,028
7.3 Urban w/ Quadrant Gates	each	$341	0	$0																-	-
7.4 Full Width Barrier	each	$550	19	$10,450				18	9,900									1	550	19	10,450
7.5 Crossings Chicago to Milwaukee	LS	$71,510	1	$71,510		1	71,510													1	71,510
Total Crossings Cost					$99,388		71,510		13,856		1,920				3,360				8,742		99,388
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7		Total	Total
						Chicago to Milwaukee		Milw to Ixonia		Ixonia to Hwy 51		Airport Track		Madison to LaCrosse		Miss. River Basin		River to St Paul		Quantity	Amount
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount		
8.0 Signals																					
8.1 High Speed Turnout	each	$1,098																		-	-
8.2 System Installation for HSR (110MPH)	per mile	$150																		-	-
8.2A System Installation for HSR (150MPH)	per mile	$350	343	$120,050				33	11,550	40	14,000	3	1,050	136	47,600			131	45,850	343	120,050
8.2B System Installation for HSR (185MPH)	per mile	$980																		-	-
8.3 Signal Costs Chicago to Milwaukee	LS	$46,877	1	$46,877		1	46,877													1	46,877
Total Signals Cost					$166,927		46,877		11,550		14,000		1,050		47,600				45,850		166,927
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7		Total	Total
						Chicago to Milwaukee		Milw to Ixonia		Ixonia to Hwy 51		Airport Track		Madison to LaCrosse		Miss. River Basin		River to St Paul		Quantity	Amount
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount		
9.0 Curves																					
9.1 Elevate & Surface Curves	per mile	$42																			
9.2 Curvature Reduction	per mile	$284																			
9.3 Elastic Fasteners	per mile	$59																			
Total Curve Upgrade Cost																					
Total Upgrade Cost					$3,242,855		$448,884		$87,140		$299,576		$44,823		$1,036,210		$308,000		$1,018,222		$3,242,855

Tri State 150 MPH Technology

C-2 Milwaukee/Rochester/St Paul

Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnew	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Watertown Sub	85.7	90	4.30							
Watertown Sub	90.00	119.00	29.00	29				29	29	
Madison	0.00	40.00	40.00				40		40	40
Airport	0.00	3.00	3.00				3		3	3
Wisconsin	0.00	135.70	135.70				135.7		135.7	135.7
Minnesota	0.00	117.00	117.00				117		117	117
Union Pacific	0.00	10.00	10.00				10		10	10
Union Pacific	10.00	11.60	1.60				1.6		1.6	
Merriman Park	407.4	410.2	2.80				2.8		2.8	
Total			343.40	29.00	0.00	0.00	310.10	29.00	339.10	305.70

Definition of Units

1.1 HSRex	High Speed Rail trackwork on Existing Roadbed with a unit cost of $873,000 per mile
1.2 HSRnew	High Speed Rail trackwork on New Roadbed (Existing Right of Way) with a unit cost of $932,000 per mile
1.2AHSR	High Speed Rail trackwork on New Roadbed (New Right of Way) with a unit cost of $1,376,000 per mile
1.2BHSR	High Speed Rail trackwork on New Roadbed (Double Track) with a unit cost of $2,308,000 per mile
1.3T&S33	Timber and Surface with 33% Tie Replacement with a unit cost of $136,000 per mile
1.7Fence	Fencing of High Speed Rail Route on both sides with a unit cost of $49,000 per mile
Land	Miles of Land required for construction of a high speed rail route at specifed unit costs

Segment 2 Milwaukee to Ixonia

Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnew	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Watertown Sub	85.7	90	4.30							
Watertown Sub	90.00	119.00	29.00	29				29	29	
Total			33.30	29.00	0.00	0.00	0.00	29.00	29.00	0.00

Segment 3 Ixonia to Hwy 51

Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnew	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Madison	0.00	40.00	40.00				40		40	40

Segment 4 Airport

Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnew	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Airport	0.00	3.00	3.00				3		3	3

Page 2										
Segment 5 Madison to LaCrosse										
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRne	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Wisconsin	0.00	135.70	135.70				135.7		135.7	135.7
Segment 6 Missisippi River Basin										
Mileage included within the Minnesota subdivision										
Segment 7 River to St Paul										
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRne	1.2AHSR	1.2BHSR	1.3T&S33	1.7Fence	Land
Minnesota	0.00	117.00	117.00				117		117	117
Union Pacific	0.00	10.00	10.00				10		10	10
Union Pacific	10.00	11.60	1.60				1.6		1.6	
Merriman Park	407.4	410.2	2.80				2.8		2.8	
Total			131.40	0.00	0.00	0.00	131.40	0.00	131.40	127.00

Tri-State Phase II HSR Feasibility Study				
19-Jan-99				
C-2 Rochester Route Route 150 MPH				
Proposed Station Modifications and Maintenance Facilities				
Station	*Type*	*Recommended Action*	*Cost ($000)*	
Milwaukee Union Station	Terminal	Renovation	$ 1,000	
Brookfield/Watertown	Full Service	Renovation	$ 500	
Madison	Terminal	New	$ 2,000	
Wisconsin Dells	Full Service	Renovation	$ 500	
Tomah	Full Service	New	$ 1,000	
LaCrosse	Full Service	New	$ 1,000	
Rochester	Terminal	New	$ 2,000	
St Paul Union Station	Terminal	Major Renovations	$ 2,000	
Maintenance Facility	150 MPH Technology	New	$ 86,000	
Summary				
2.0 Stations				
2.1 Full Service - New	each	$1,000	2	$2,000
2.2 Full Service - Renovated	each	$500	2	$1,000
2.3 Terminal - New	each	$2,000	3	$6,000
2.4 Terminal - Renovated	each	$1,000	1	$1,000
2.5 Maintenance (110 MPH technology)	each	$10,000		
2.5A Maintenance (150 MPH technology)	each	$86,000	1	$86,000
2.5B Maintenance (185 MPH technology)	each	$162,000		
2.6 Stations Chicago to Milwaukee	LS	$20,428	1	$20,428
Total Station Cost				$116,428

Tri-State Phase II HSR Feasibility Study

19-Jan-99

BRIDGES

C-2 Rochester Route 150 MPH

Recommended Action for Bridges Under and Bridges Over

Segment 2 Milwaukee to Ixonia

Subdivision	MP	Type	Name	Recommended Treatment
Watertown sub	100.00	Under	Fox River	Major River
Watertown sub	103.50	Over	Hwy F	2 Lane - Over
Watertown sub	104.90	Over	Hwy Xing	4 Lane Rural - Over
Watertown sub	110.80	Over	Campbell Rc	2 Lane - Over
Watertown sub	112.80	Over	Hwy Xing	2 Lane - Over
Watertown sub	115.60	Under	Hwy	4 Lane Rural - Under
Watertown sub	116.30	Under	Oconomowo	Minor River
Watertown sub	116.95	Over	Hwy	2 Lane - Over
Watertown sub	118.80	Under	Oconomowo	Minor River
Watertown sub	119.40	Over	Hwy Br	4 Lane Rural - Over
Watertown sub	120.50	Over	Hwy Br	4 Lane Rural - Over

Summary - Bridges Under	Unit Cost	Quantity	Amount
4 Lane Rural Expressway	$4,036	1	**$4,036**
Minor River	$812	2	**$1,624**
Major River	$8,118	1	**$8,118**
Total Cost Bridges Under			**$13,778**

Summary - Bridges Over	Unit Cost	Quantity	Amount
4 Lane Rural	$2,630	3	**$7,890**
2 Lane	$1,971	4	**$7,884**
Total Cost Bridges Over			**$15,774**

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Segment 3 Ixonia to Madison

Location	North GPS	Lat min	West GPS		Recommended Action
Reese Lane	43.14133	8.48	88.60283	36.17	2 Lane Bridge Under
Stream	43.14133	8.48	88.62100	37.26	Minor River
Rockvale Road	43.14133	8.48	88.63633	38.18	2 Lane Bridge Under
Oconomowoc River	43.14117	8.47	88.64317	38.59	Major River
CR P	43.14117	8.47	88.64583	38.75	2 Lane Bridge Under
CR E	43.14117	8.47	88.64717	38.83	2 Lane Bridge Under
Hwy P	43.14117	8.47	88.65117	39.07	4 Lane Rural Expressway Under
CR P	43.14100	8.46	88.65617	39.37	2 Lane Bridge Under
Spooner Rd	43.14100	8.46	88.67533	40.52	2 Lane Bridge Under
CR D	43.14100	8.46	88.68517	41.11	2 Lane Bridge Under
Little Coffee Rd	43.14100	8.46	88.70533	42.32	2 Lane Bridge Under
Johnson Creek	43.14100	8.46	88.70833	42.50	Minor River
CR X	43.14100	8.46	88.71550	42.93	2 Lane Bridge Under
Airport Rd	43.14083	8.45	88.73100	43.86	2 Lane Bridge Under
I-26	43.14083	8.45	88.73517	44.11	4 Lane Rural Expressway Under
High Rd	43.14067	8.44	88.73767	44.26	2 Lane Bridge Under
RR	43.14067	8.44	88.75550	45.33	Rail Under
Co. Hwy. CR Y	43.14067	8.44	88.75867	45.52	2 Lane Bridge Under
Oconomowoc River	43.14067	8.44	88.76417	45.85	Major River
Stream, from Hahn's Lake	43.14050	8.43	88.77950	46.77	Minor River
CR A	43.14050	8.43	88.78583	47.15	2 Lane Bridge Under
Stream	43.14017	8.41	88.81800	49.08	Minor River
West Rd	43.14000	8.40	88.83150	49.89	2 Lane Bridge Under
CR O	43.13983	8.39	88.84317	50.59	2 Lane Bridge Under
Rock River	43.13950	8.37	88.87233	52.34	Major River
Prairie Lane	43.13933	8.36	88.88283	52.97	2 Lane Bridge Under
CR G	43.13900	8.34	88.90117	54.07	2 Lane Bridge Under
Hill View Lane	43.13867	8.32	88.91400	54.84	2 Lane Bridge Under
Springer Rd	43.13850	8.31	88.93100	55.86	2 Lane Bridge Under
SR 89	43.13817	8.29	88.94750	56.85	4 Lane Rural Expressway Under
Abendroth Rd	43.13833	8.30	88.95100	57.06	2 Lane Bridge Under
Road (Stony Brook)	43.13833	8.30	88.96117	57.67	2 Lane Bridge Under
Stony Brook Creek	43.13750	8.25	88.97717	58.63	Minor River
Newville Rd	43.13717	8.23	88.98550	59.13	2 Lane Bridge Under

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Location	**North GPS**	**Lat min**	**West GPS**		**Recommended Action**
CR O	43.13667	8.20	88.99200	59.52	2 Lane Bridge Under
Boxelder Rd	43.13550	8.13	89.01483	0.89	2 Lane Bridge Under
Tower Line Rd	43.13417	8.05	89.04083	2.45	2 Lane Bridge Under
Missouri Rd	43.13350	8.01	89.05083	3.05	2 Lane Bridge Under
Spring Creek	43.13250	7.95	89.06800	4.08	Minor River
SR 73	43.13233	7.94	89.07217	4.33	4 Lane Rural Expressway Under
Oak Park Rd	43.13117	7.87	89.09617	5.77	2 Lane Bridge Under
Ridge Rd	43.12933	7.76	89.13033	7.82	2 Lane Bridge Under
Pierceville Rd	43.12800	7.68	89.15367	9.22	2 Lane Bridge Under
CR TT	43.12750	7.65	89.16717	10.03	2 Lane Bridge Under
Koshkonong Creek	43.12650	7.59	89.18350	11.01	Minor River
CR N	43.12583	7.55	89.19850	11.91	4 Lane Rural Expressway Under
CR T	43.11883	7.13	89.24250	14.55	2 Lane Bridge Under
Thorson Rd	43.11800	7.08	89.24617	14.77	2 Lane Bridge Under
Forest Oak Dr	43.11633	6.98	89.25333	15.20	2 Lane Bridge Under
Reiner Rd	43.11333	6.80	89.26583	15.95	2 Lane Bridge Under
Felland Rd	43.11100	6.66	89.27583	16.55	2 Lane Bridge Under
I-90	43.10867	6.52	89.28617	17.17	4 Lane Urban Expressway Under
Fairview Drive	43.10800	6.48	89.28933	17.36	2 Lane Bridge Under
Eagle Drive	43.10750	6.45	89.29067	17.44	2 Lane Bridge Under
N. Thompson Drive	43.10583	6.35	89.30067	18.04	2 Lane Bridge Under
Nakoosa Trail	43.10700	6.42	89.31867	19.12	2 Lane Bridge Under
I-51	43.10683	6.41	89.31650	18.99	4 Lane Urban Expressway Under
RR Waterloo Spur	43.10683	6.41	89.32350	19.41	Rail Under
Summary Bridges Under		**Unit Cost**	**Quantity**	**Amount**	
4 Lane Urban Expressway		$4,848	2	**$9,696**	
4 Lane Rural Expressway		$4,036	5	**$20,180**	
2 Lane		$3,062	39	**$119,418**	
Rail		$3,062	2	**$6,124**	
Minor River		$812	7	**$5,684**	
Major River		$8,118	3	**$24,354**	
Total Bridges Under Segment 3				**$185,456**	

Segment 4 Airport Track					
Name	*North*	*West*	*Type of Bridge*		
Highway 51	43.10733	89.33867	4 Lane UrbanExpressway - Over		
Anderson	43.12117	89.35233	2 Lane Under		
Pankrantz	43.12150	89.35233	2 Lane Under		
International Lane	43.12250	89.35300	2 Lane Under		
Summary Bridges Under		**Unit Cost**	**Quantity**	**Amount**	
2 Lane Under		$3,062	3	**$9,186**	
Summary Bridges Over		**Unit Cost**	**Quantity**	**Amount**	
4 Lane Urban Expressway		10,516	1	**$10,516**	
Segment 5 Madison to Mississippi River Basin					
Location	**North GPS**	**Lat min**	**West GPS**		**Recommended Action**
Buckley Rd	43.17500	10.50	89.34233	20.54	2 Lane Bridge Under
Daentl Rd	43.18333	11.00	89.34200	20.52	2 Lane Bridge Under
Unnamed Rd	43.19100	11.46	89.34167	20.50	2 Lane Bridge Under
I-90 (existing)	43.19150	11.49	89.34150	20.49	4 Lane Urban Expressway Under
Hwy 19	43.19433	11.66	89.34133	20.48	4 Lane Rural Expressway Under
Duraform Lane	43.19950	11.97	89.34167	20.50	2 Lane Bridge Under
Sequoia Dr	43.21800	13.08	89.34233	20.54	2 Lane Bridge Under
Gray Rd	43.22350	13.41	89.34250	20.55	2 Lane Bridge Under
Vinburn Rd	43.23800	14.28	89.34317	20.59	2 Lane Bridge Under
Commerce St	43.24633	14.78	89.34150	20.49	2 Lane Bridge Under
CR DV	43.24767	14.86	89.34150	20.49	2 Lane Bridge Under
Yahara River	43.25017	15.01	89.34133	20.48	Minor River
CR V	43.25283	15.17	89.34133	20.48	4 Lane Rural Expressway Under
Selji Rd	43.27450	16.47	89.34783	20.87	2 Lane Bridge Under
CR DM	43.28117	16.87	89.35083	21.05	2 Lane Bridge Under
Kleinert Rd	43.28967	17.38	89.35450	21.27	2 Lane Bridge Under
Ramsey Rd	43.29600	17.76	89.35767	21.46	2 Lane Bridge Under
Unnamed Rd	43.30183	18.11	89.36050	21.63	2 Lane Bridge Under
CR K (intersects w/Goosepond Rd)	43.30850	18.51	89.36317	21.79	2 Lane Bridge Under
Prairie Lane	43.31650	18.99	89.36717	22.03	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS		Recommended Action
Kampen Rd	43.32317	19.39	89.37033	22.22	2 Lane Bridge Under
Unnamed St	43.33583	20.15	89.37583	22.55	2 Lane Bridge Under
SR 60	43.33767	20.26	89.37683	22.61	4 Lane Rural Expressway Under
Richards Rd	43.35233	21.14	89.38350	23.01	2 Lane Bridge Under
CR O	43.37917	22.75	89.40267	24.16	4 Lane Rural Expressway Under
CR Q	43.38100	22.86	89.40550	24.33	2 Lane Bridge Under
Rowan Creek	43.38600	23.16	89.40967	24.58	Minor River
McMullen Rd	43.38867	23.32	89.41183	24.71	4 Lane Rural Expressway Under
Kent Rd	43.40267	24.16	89.41483	24.89	2 Lane Bridge Under
Hinkson Creek	43.41100	24.66	89.41467	24.88	Major River
Thompson Rd	43.41717	25.03	89.41483	24.89	2 Lane Bridge Under
Bilkie Rd	43.43183	25.91	89.41483	24.89	2 Lane Bridge Under
CR B	43.43900	26.34	89.41483	24.89	2 Lane Bridge Under
Morse Rd	43.44967	26.98	89.41483	24.89	2 Lane Bridge Under
Rocky Run Creek	43.45233	27.14	89.41483	24.89	Minor River
CR J	43.45817	27.49	89.41483	24.89	2 Lane Bridge Under
Murry Rd	43.48967	29.38	89.41483	24.89	2 Lane Bridge Under
Unnamed Rd	43.50033	30.02	89.41483	24.89	2 Lane Bridge Under
SR 51	43.51833	31.10	89.42283	25.37	4 Lane Rural Expressway Under
CP Rail	43.53683	32.21	89.43617	26.17	Rail Under
Ontario St	43.54033	32.42	89.43783	26.27	2 Lane Bridge Under
RR	43.54300	32.58	89.43967	26.38	Rail Under
Wauona Trail	43.54500	32.70	89.44100	26.46	2 Lane Bridge Under
RR	43.54683	32.81	89.44217	26.53	Rail Under
Superior Street	43.54750	32.85	89.44250	26.55	2 Lane Bridge Under
SR 33 & Agency House Rd	43.54900	32.94	89.44350	26.61	4 Lane Rural Expressway Under
E Albert Street	43.54967	32.98	89.44417	26.65	2 Lane Bridge Under
Hamilton Street	43.56133	33.68	89.45467	27.28	2 Lane Bridge Under
SR 51	43.56217	33.73	89.46950	28.17	4 Lane Rural Expressway Under
W. Wisconsin & Portage Rd	43.56317	33.79	89.48667	29.20	2 Lane Bridge Under
SR 39	43.56333	33.80	89.48800	29.28	4 Lane Rural Expressway Under
SR 127	43.56350	33.81	89.49217	29.53	4 Lane Rural Expressway Under
Klappstein Rd	43.56650	33.99	89.54017	32.41	2 Lane Bridge Under
Schultz Rd	43.57467	34.48	89.58450	35.07	2 Lane Bridge Under
Weyh Rd	43.57817	34.69	89.59967	35.98	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS		Recommended Action
Wolpram Rd	43.58533	35.12	89.62933	37.76	2 Lane Bridge Under
Lewiston Station Rd	43.58833	35.30	89.64133	38.48	2 Lane Bridge Under
New Haven Rd	43.60000	36.00	89.68933	41.36	2 Lane Bridge Under
Peterson Rd	43.60217	36.13	89.69950	41.97	2 Lane Bridge Under
CR O	43.60700	36.42	89.71917	43.15	2 Lane Bridge Under
I-16, I-127 & Winnebago Rd	43.61200	36.72	89.73933	44.36	4 Lane Rural Expressway Under
Lynch Rd	43.61600	36.96	89.75633	45.38	2 Lane Bridge Under
Bowman Rd	43.61833	37.10	89.76633	45.98	2 Lane Bridge Under
Veteran Drive	43.62200	37.32	89.77300	46.38	2 Lane Bridge Under
Minnesota Avenue	43.62400	37.44	89.77550	46.53	2 Lane Bridge Under
Finnegan Avenue	43.62683	37.61	89.77883	46.73	2 Lane Bridge Under
Rt 13	43.62750	37.65	89.77967	46.78	4 Lane Rural Expressway Under
Wisconsin River	43.62767	37.66	89.78000	46.80	Major River
Unnamed Rd	43.62883	37.73	89.78133	46.88	2 Lane Bridge Under
Pioneer Drive	43.62983	37.79	89.78233	46.94	2 Lane Bridge Under
Unnamed Rd	43.63150	37.89	89.78467	47.08	2 Lane Bridge Under
Commercial Avenue	43.63483	38.09	89.78833	47.30	2 Lane Bridge Under
CR A	43.63650	38.19	89.79050	47.43	2 Lane Bridge Under
60th St	43.65383	39.23	89.81150	48.69	2 Lane Bridge Under
I-90	43.65467	39.28	89.81267	48.76	4 Lane Urban Expressway Under
Dees Rd	43.67867	40.72	89.84400	50.64	2 Lane Bridge Under
RR	43.68067	40.84	89.84500	50.70	Rail Under
Gilmore Creek	43.68150	40.89	89.84600	50.76	Minor River
Southern Rd	43.69900	41.94	89.86883	52.13	2 Lane Bridge Under
Industrial Ave	43.70617	42.37	89.88133	52.88	2 Lane Bridge Under
Honeyaire St	43.71367	42.82	89.89417	53.65	2 Lane Bridge Under
CR RR	43.71450	42.87	89.89567	53.74	4 Lane Rural Expressway Under
Unnamed St	43.71717	43.03	89.90050	54.03	2 Lane Bridge Under
W. Limits Rd	43.72167	43.30	89.90817	54.49	2 Lane Bridge Under
Tracy Creek	43.72317	43.39	89.91117	54.67	Minor River
Holtzlander Creek	43.72900	43.74	89.92133	55.28	Minor River
24th Avenue	43.73300	43.98	89.92833	55.70	2 Lane Bridge Under
Unnamed Rd	43.74850	44.91	89.95517	57.31	2 Lane Bridge Under
I-90	43.76167	45.70	89.97500	58.50	4 Lane Urban Expressway Under
CR N	43.76183	45.71	89.95850	57.51	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS		Recommended Action
55th Street	43.76700	46.02	89.98233	58.94	2 Lane Bridge Under
Unnamed Rd	43.76917	46.15	89.98533	59.12	2 Lane Bridge Under
County Hwy N	43.77400	46.44	89.99200	59.52	2 Lane Bridge Under
Lemonweir River	43.78617	47.17	90.00883	0.53	Major River
19th Ave	43.79433	47.66	90.01983	1.19	2 Lane Bridge Under
I-82	43.79617	47.77	90.02233	1.34	4 Lane Rural Expressway Under
CR G	43.80350	48.21	90.03250	1.95	2 Lane Bridge Under
17th Ave	43.80533	48.32	90.03483	2.09	2 Lane Bridge Under
15th Ave	43.82000	49.20	90.05517	3.31	2 Lane Bridge Under
47th St	43.82950	49.77	90.06800	4.08	2 Lane Bridge Under
CR O	43.83217	49.93	90.07183	4.31	4 Lane Rural Expressway Under
Prairie Rd	43.84683	50.81	90.09183	5.51	2 Lane Bridge Under
Meredith Rd	43.86217	51.73	90.11167	6.70	2 Lane Bridge Under
42nd St	43.87667	52.60	90.13033	7.82	2 Lane Bridge Under
N. Germantown Rd	43.88533	53.12	90.14150	8.49	2 Lane Bridge Under
SR 80	43.88717	53.23	90.14400	8.64	4 Lane Rural Expressway Under
RR	43.89083	53.45	90.14883	8.93	Rail Under
Hog Island Rd/8th Ave	43.89350	53.61	90.15250	9.15	2 Lane Bridge Under
CR M	43.90783	54.47	90.17750	10.65	4 Lane Rural Expressway Under
7th Ave	43.91183	54.71	90.19167	11.50	2 Lane Bridge Under
8th Ave	43.91733	55.04	90.21150	12.69	2 Lane Bridge Under
CR C	43.92017	55.21	90.22150	13.29	2 Lane Bridge Under
Unnamed	43.92600	55.56	90.24300	14.58	2 Lane Bridge Under
CR H	43.93783	56.27	90.28333	17.00	2 Lane Bridge Under
RR	43.93800	56.28	90.28367	17.02	Rail Under
Kleichinger Rd	43.94200	56.52	90.29650	17.79	Rail Under
33rd Lane	43.93250	55.95	90.31883	19.13	Rail Under
32nd Court	43.95833	57.50	90.34750	20.85	Rail Under
Allen Creek	43.96150	57.69	90.35767	21.46	Minor River
CR PP	43.96683	58.01	90.37433	22.46	4 Lane Rural Expressway Under
Indian Creek	43.97117	58.27	90.38800	23.28	Minor River
Field Rd	43.97483	58.49	90.39933	23.96	2 Lane Bridge Under
Bear Creek	43.97500	58.50	90.39983	23.99	Rail Under
CR N	43.97600	58.56	90.40300	24.18	2 Lane Bridge Under
I-90	43.97617	58.57	90.41517	24.91	4 Lane Urban Expressway Under

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Location	North GPS	Lat min	West GPS		Recommended Action
CP Rail	43.97367	58.42	90.42567	25.54	Rail Under
SR 12	43.97283	58.37	90.42900	25.74	2 Lane Bridge Under
28th Ct	43.97200	58.32	90.43183	25.91	4 Lane Rural Expressway Under
Center St	43.96967	58.18	90.44167	26.50	2 Lane Bridge Under
Krever Creek	43.96450	57.87	90.46283	27.77	Minor River
CR C	43.96367	57.82	90.46617	27.97	2 Lane Bridge Under
Cinder St	43.95700	57.42	90.49383	29.63	2 Lane Bridge Under
Council Creek	43.95550	57.33	90.49967	29.98	Minor River
SR 131	43.95417	57.25	90.50483	30.29	4 Lane Rural Expressway Under
CR M	43.94617	56.77	90.53767	32.26	2 Lane Bridge Under
Lemonweir River	43.94517	56.71	90.54233	32.54	Minor River
Cinder Ave	43.94317	56.59	90.55233	33.14	2 Lane Bridge Under
21st Ave	43.94050	56.43	90.57233	34.34	2 Lane Bridge Under
Cliff Ave	43.94000	56.40	90.57633	34.58	2 Lane Bridge Under
CR T	43.93983	56.39	90.57767	34.66	2 Lane Bridge Under
Chub Creek	43.93967	56.38	90.57817	34.69	Minor River
19th Ln	43.93717	56.23	90.59717	35.83	2 Lane Bridge Under
16th Dr	43.93467	56.08	90.66217	39.73	2 Lane Bridge Under
CR A	43.93517	56.11	90.68500	41.10	4 Lane Rural Expressway Under
14th Dr	43.93550	56.13	90.70000	42.00	2 Lane Bridge Under
Cliff Court	43.93600	56.16	90.71433	42.86	2 Lane Bridge Under
Unnamed	43.93617	56.17	90.71733	43.04	2 Lane Bridge Under
13th Dr	43.93617	56.17	90.72017	43.21	2 Lane Bridge Under
Sanitary Landfill Rd	43.93650	56.19	90.76533	45.92	2 Lane Bridge Under
Cliff Ct	43.93467	56.08	90.77500	46.50	2 Lane Bridge Under
I-90	43.93400	56.04	90.77767	46.66	4 Lane Urban Expressway Under
SR 71	43.93350	56.01	90.78067	46.84	4 Lane Rural Expressway Under
Farmer's Valley Creek	43.93283	55.97	90.78433	47.06	Minor River
John St. (9th St)	43.93050	55.83	90.79583	47.75	2 Lane Bridge Under
S. Water St	43.92767	55.66	90.81067	48.64	2 Lane Bridge Under
SR 27	43.92567	55.54	90.82050	49.23	2 Lane Bridge Under
8th Ct	43.92483	55.49	90.82483	49.49	2 Lane Bridge Under
Unnamed Rd	43.92267	55.36	90.83567	50.14	2 Lane Bridge Under
Little La Crosse River	43.91817	55.09	90.85967	51.58	Minor River
Cypress Avenue	43.91400	54.84	90.88067	52.84	2 Lane Bridge Under
CR J	43.90683	54.41	90.92050	55.23	2 Lane Bridge Under

Location	North GPS	Lat min	West GPS		Recommended Action
Fish Creek	43.90533	54.32	90.92833	55.70	Minor River
CR U	43.90317	54.19	90.94133	56.48	2 Lane Bridge Under
Fuchs Rd	43.90000	54.00	90.96067	57.64	2 Lane Bridge Under
La Crosse River	43.89817	53.89	90.97200	58.32	Minor River
SR 162	43.89533	53.72	90.99083	59.45	4 Lane Rural Expressway Under
Dutch Creek	43.89550	53.73	90.99250	59.55	Minor River
Unnamed Rd	43.89717	53.83	91.01483	0.89	2 Lane Bridge Under
Shorewood Court	43.89967	53.98	91.04483	2.69	2 Lane Bridge Under
Tilson St	43.90567	54.34	91.07233	4.34	2 Lane Bridge Under
SR 16	43.90850	54.51	91.08117	4.87	4 Lane Rural Expressway Under
La Crosse River	43.90850	54.51	91.09367	5.62	Minor River
CR M	43.90800	54.48	91.10133	6.08	2 Lane Bridge Under
Gills Rd	43.91200	54.72	91.12133	7.28	2 Lane Bridge Under
Evenson Rd	43.91350	54.81	91.12850	7.71	2 Lane Bridge Under
Gills Coulee Rd	43.91717	55.03	91.14650	8.79	2 Lane Bridge Under
Tunnel Starts	43.91950	55.17	91.19117	11.47	Tunnel
Tunnel Enes	43.91783	55.07	91.14967	8.98	Tunnel
Mississippi River Bridge starts	43.91933	55.16	91.23200	13.92	Mississippi River Bridge
Koss Rd	43.91917	55.15	91.18800	11.28	2 Lane Bridge Under
County Hwy S	43.91933	55.16	91.19667	11.80	2 Lane Bridge Under
MDDS Dr	43.91933	55.16	91.21167	12.70	2 Lane Bridge Under
Cedar Creek Lane	43.91917	55.15	91.22567	13.54	2 Lane Bridge Under

Summary Bridges Under		Unit Cost	Quantity	Amount
4 Lane Urban Expressway		$4,848	4	**$19,392**
4 Lane Rural Expressway		$4,036	23	**$92,828**
2 Lane		$3,062	115	**$352,130**
Rail		$3,062	10	**$30,620**
Minor River		$812	19	**$15,428**
Major River		$8,118	4	**$32,472**
Total Bridges Under Segment 5				**$542,870**

Segment 6 Mississippi River Basin

		Unit Cost	Quantity	Amount
Mississippi River Bridge		$234,000	1	$234,000
Interstate 90 Dakota Rvier Valley Structure		$74,000	1	$74,000
Total Cost				$308,000

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Segment 7 River to St Paul

C-2 150 MPH Rochester Route

	North	Lat min	West	Long min	Recommended Action
I-90	43.92117	55.27	91.37300	22.38	4 Lane Urban Expressway under
Twp Rd 29	43.92283	55.37	91.38617	23.17	2 Lane Bridge Under
CR 101	43.92317	55.39	91.38767	23.26	2 Lane Bridge Under
Twp Rd 32	43.92450	55.47	91.39833	23.90	2 Lane Bridge Under
Unnamed Rd	43.92483	55.49	91.40067	24.04	2 Lane Bridge Under
Dakota Creek	43.92483	55.49	91.41900	25.14	Minor River
Dakota Creek	43.92500	55.50	91.40283	24.17	Minor River
I-90	43.92550	55.53	91.40683	24.41	4 Lane Urban Expressway under
Dakota Creek	43.92650	55.59	91.41400	24.84	Major River
Little Trout Creek	43.92617	55.57	91.43317	25.99	Culvert included in trackwork
CR 12	43.92450	55.47	91.43750	26.25	2 Lane Bridge Under
CR 104	43.92233	55.34	91.44350	26.61	2 Lane Bridge Under
CR 125	43.92250	55.35	91.47083	28.25	2 Lane Bridge Under
CR 104	43.92233	55.34	91.49100	29.46	2 Lane Bridge Under
I-90	43.92167	55.30	91.49417	29.65	4 Lane Urban Expressway under
Unnamed Rd	43.91883	55.13	91.51050	30.63	Closure
CR 12	43.91850	55.11	91.51300	30.78	2 Lane Bridge Under
PH Twp 13	43.91583	54.95	91.52800	31.68	2 Lane Bridge Under
PH Twp 21	43.91567	54.94	91.55033	33.02	2 Lane Bridge Under
PH Twp 23	43.91650	54.99	91.56083	33.65	2 Lane Bridge Under
PH Twp 25	43.91850	55.11	91.58533	35.12	2 Lane Bridge Under
CR 12	43.92033	55.22	91.60750	36.45	2 Lane Bridge Under
I-90	43.92033	55.22	91.60900	36.54	2 Lane Bridge Under
Money Creek	43.92067	55.24	91.61317	36.79	Culvert included in trackwork
CR 17	43.92600	55.56	91.62033	37.22	2 Lane Bridge Under
Money Creek	43.92667	55.60	91.62100	37.26	Culvert included in trackwork
Wiscoy Twp 4	43.93017	55.81	91.62583	37.55	2 Lane Bridge Under
Unnamed Creek	43.93417	56.05	91.63100	37.86	Culvert included in trackwork
Wilson Twp 11	43.94133	56.48	91.64017	38.41	2 Lane Bridge Under
Unnamed Creek	43.94950	56.97	91.65867	39.52	2 Lane Bridge Under
CR 19	43.95300	57.18	91.67517	40.51	2 Lane Bridge Under
Wilson Twp 29	43.95267	57.16	91.69683	41.81	2 Lane Bridge Under
I-90	43.95250	57.15	91.69850	41.91	4 Lane Urban Expressway under
CR 12	43.95250	57.15	91.70300	42.18	2 Lane Bridge Under
Unnamed Rd	43.95100	57.06	91.72017	43.21	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS		Recommended Action
Unnamed Rd	43.94567	56.74	91.74033	44.42	2 Lane Bridge Under
Twp 9	43.94283	56.57	91.76033	45.62	2 Lane Bridge Under
Twp 11	43.94217	56.53	91.78017	46.81	2 Lane Bridge Under
CR 25	43.94250	56.55	91.79050	47.43	2 Lane Bridge Under
Unnamed Rd	43.94300	56.58	91.80033	48.02	2 Lane Bridge Under
Twp 21	43.94317	56.59	91.81017	48.61	2 Lane Bridge Under
Unnamed Rd	43.94350	56.61	91.82033	49.22	2 Lane Bridge Under
Twp 19	43.94400	56.64	91.83950	50.37	2 Lane Bridge Under
Rush Creek?	43.94433	56.66	91.85050	51.03	Minor River
CR 25	43.94450	56.67	91.85933	51.56	2 Lane Bridge Under
CR 29	43.94500	56.70	91.87283	52.37	4 Lane Rural Expressway under
Rush Creek	43.94500	56.70	91.87433	52.46	Minor River
Twp 9	43.94533	56.72	91.88950	53.37	2 Lane Bridge Under
Creek ?	43.94367	56.62	91.90167	54.10	Minor River
Twp 13	43.94133	56.48	91.91950	55.17	2 Lane Bridge Under
Twp 15	43.93867	56.32	91.93967	56.38	2 Lane Bridge Under
CR 33	43.93617	56.17	91.95650	57.39	2 Lane Bridge Under
I-90	43.93517	56.11	91.96483	57.89	4 Lane Urban Expressway under
St. Charles Twp 3	43.93350	56.01	91.97767	58.66	2 Lane Bridge Under
Pine Creek	43.93133	55.88	91.99283	59.57	Culvert included in trackwork
CR 35	43.92983	55.79	92.00433	0.26	2 Lane Bridge Under
CR 117	43.92817	55.69	92.01950	1.17	2 Lane Bridge Under
St. Charles Twp 15	43.92583	55.55	92.03933	2.36	2 Lane Bridge Under
Unnamed Rd	43.92517	55.51	92.04517	2.71	2 Lane Bridge Under
SR 74	43.92283	55.37	92.06533	3.92	4 Lane Urban Expressway under
Unnamed Rd	43.92250	55.35	92.06983	4.19	2 Lane Bridge Under
Unnamed Rd	43.92233	55.34	92.09350	5.61	2 Lane Bridge Under
CR 130	43.92267	55.36	92.11750	7.05	2 Lane Bridge Under
CR 30	43.92350	55.41	92.13850	8.31	2 Lane Bridge Under
CR 10	43.92750	55.65	92.16850	10.11	4 Lane Rural Expressway under
CR 32	43.92883	55.73	92.17850	10.71	2 Lane Bridge Under
Cr 136	43.93167	55.90	92.19817	11.89	2 Lane Bridge Under
CR 7	43.93700	56.22	92.23800	14.28	4 Lane Rural Expressway under
Unnamed Rd	43.93933	56.36	92.25783	15.47	2 Lane Bridge Under
CR 129	43.93967	56.38	92.27800	16.68	2 Lane Bridge Under
CR 19	43.94017	56.41	92.29817	17.89	2 Lane Bridge Under
75 St SE	43.94067	56.44	92.32800	19.68	2 Lane Bridge Under

Location	North GPS	Lat min	West GPS		Recommended Action
70th Ave SE	43.94033	56.42	92.33800	20.28	2 Lane Bridge Under
I-52/65th Ave SE	43.93967	56.38	92.34783	20.87	4 Lane Urban Expressway under
I-90	43.93783	56.27	92.37150	22.29	4 Lane Urban Expressway under
60th St SE	43.93433	56.06	92.38717	23.23	2 Lane Bridge Under
CR 1	43.92783	55.67	92.40817	24.49	2 Lane Bridge Under
CR 16	43.92383	55.43	92.42050	25.23	2 Lane Bridge Under
CR 20	43.91850	55.11	92.43767	26.26	2 Lane Bridge Under
Unnamed Rd	43.91367	54.82	92.45800	27.48	2 Lane Bridge Under
SR 63	43.90883	54.53	92.48017	28.81	4 Lane Urban Expressway under
CR 8	43.92033	55.22	92.52817	31.69	2 Lane Bridge Under
60th Ave SW	43.93167	55.90	92.55767	33.46	2 Lane Bridge Under
Fort Zumbro River	43.93200	55.92	92.55833	33.50	Culvert included in trackwork
CR 126	43.93500	56.10	92.56617	33.97	2 Lane Bridge Under
CR 15	43.93983	56.39	92.57800	34.68	2 Lane Bridge Under
Unnamed Rd	43.94850	56.91	92.59817	35.89	2 Lane Bridge Under
CR 17	43.94983	56.99	92.60117	36.07	2 Lane Bridge Under
CR 3	43.95700	57.42	92.61783	37.07	2 Lane Bridge Under
CR 150	43.96567	57.94	92.63800	38.28	2 Lane Bridge Under
Salem Creek	43.97217	58.33	92.65267	39.16	Minor River
Unnamed Rd	43.97667	58.60	92.66300	39.78	2 Lane Bridge Under
CR 25	43.98317	58.99	92.67800	40.68	2 Lane Bridge Under
CR 15	43.99217	59.53	92.69817	41.89	2 Lane Bridge Under
Unnamed Rd	43.99683	59.81	92.71333	42.80	2 Lane Bridge Under
Unnamed Rd	44.00033	0.02	92.72600	43.56	2 Lane Bridge Under
CR 13	44.00350	0.21	92.73850	44.31	2 Lane Bridge Under
CR 10	44.00783	0.47	92.75400	45.24	2 Lane Bridge Under
CR 13	44.00883	0.53	92.75817	45.49	2 Lane Bridge Under
CR 14	44.01417	0.85	92.77833	46.70	2 Lane Bridge Under
CCR 9	44.02050	1.23	92.79867	47.92	2 Lane Bridge Under
RR	44.02633	1.58	92.81417	48.85	Rail Under
CR 9	44.02783	1.67	92.81867	49.12	2 Lane Bridge Under
I-14	44.03000	1.80	92.82417	49.45	4 Lane Rural Expressway under
Airport Rd N	44.03533	2.12	92.83883	50.33	2 Lane Bridge Under
North St NE	44.03717	2.23	92.84350	50.61	2 Lane Bridge Under
Dodge Center Creek	44.05033	3.02	92.84583	50.75	Culvert included in trackwork
Dodge Center Creek	44.05250	3.15	92.84633	50.78	Culvert included in trackwork
Dodge Center Creek	44.06017	3.61	92.84783	50.87	Culvert included in trackwork

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Location	North GPS	Lat min	West GPS		Recommended Action
CR 7	44.06983	4.19	92.84967	50.98	2 Lane Bridge Under
S. Branch Middle Fork Zumbro River	44.07933	4.76	92.85200	51.12	2 Lane Bridge Under
Unnamed Rd	44.10250	6.15	92.85583	51.35	2 Lane Bridge Under
Milliken Creek	44.11250	6.75	92.85783	51.47	Minor River
CR 7/CR 20	44.11667	7.00	92.85850	51.51	2 Lane Bridge Under
CR 22	44.13850	8.31	92.86267	51.76	2 Lane Bridge Under
CR 24	44.15300	9.18	92.86533	51.92	4 Lane Rural Expressway under
Unnamed Rd	44.16617	9.97	92.86800	52.08	2 Lane Bridge Under
Middle Fork Zumbro River	44.16700	10.02	92.86817	52.09	Minor River
CR B	44.01748	1.05	92.86950	52.17	2 Lane Bridge Under
CR B	44.18217	10.93	92.87100	52.26	2 Lane Bridge Under
CR A	44.19683	11.81	92.87367	52.42	2 Lane Bridge Under
N. Branch Middle Fork Zumbro River	44.20167	12.10	92.87467	52.48	Culvert included in trackwork
CR !	44.20417	12.25	92.87517	52.51	2 Lane Bridge Under
Unnamed Rd	44.20633	12.38	92.87550	52.53	2 Lane Bridge Under
CR 117	44.21833	13.10	92.87783	52.67	2 Lane Bridge Under
CR 23	44.24017	14.41	92.88183	52.91	2 Lane Bridge Under
Unnamed Rd	44.25450	15.27	92.88483	53.09	2 Lane Bridge Under
Spring Creek	44.26550	15.93	92.88683	53.21	Culvert included in trackwork
CR 12	44.26900	16.14	92.88750	53.25	2 Lane Bridge Under
Unnamed Rd	44.27900	16.74	92.89167	53.50	2 Lane Bridge Under
Unnamed Rd	44.28217	16.93	92.89367	53.62	2 Lane Bridge Under
SR 60	44.28350	17.01	92.89450	53.67	4 Lane Rural Expressway under
Unnamed Rd	44.28733	17.24	92.89700	53.82	2 Lane Bridge Under
Unnamed Rd	44.29767	17.86	92.90350	54.21	2 Lane Bridge Under
N. Fork Zumbro River	44.30217	18.13	92.90650	54.39	Minor River
CR 30	44.31967	19.18	92.91983	55.19	2 Lane Bridge Under
CR 14	44.34033	20.42	92.93817	56.29	2 Lane Bridge Under
Unnamed Rd	44.34150	20.49	92.93917	56.35	2 Lane Bridge Under
Little Cannon River	44.35083	21.05	92.94750	56.85	Minor River
CR 44	44.35150	21.09	92.94817	56.89	2 Lane Bridge Under
Unnamed Rd	44.36483	21.89	92.95867	57.52	2 Lane Bridge Under
CR 49	44.37033	22.22	92.96100	57.66	2 Lane Bridge Under
Unnamed Rd	44.38517	23.11	92.96717	58.03	2 Lane Bridge Under
CR 9	44.40667	24.40	92.97600	58.56	4 Lane Rural Expressway under
CR 24	44.41450	24.87	92.97933	58.76	2 Lane Bridge Under
Unnamed Rd	44.43567	26.14	92.98917	59.35	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS		Recommended Action
Unnamed Rd	44.44983	26.99	92.99583	59.75	2 Lane Bridge Under
Prairie Creek	44.47083	28.25	93.00583	0.35	Culvert included in trackwork
Unnamed Rd	44.47167	28.30	93.00633	0.38	2 Lane Bridge Under
SR 56	44.47950	28.77	93.00983	0.59	4 Lane Rural Expressway under
320th St W	44.48617	29.17	93.01300	0.78	4 Lane Rural Expressway under
Spring Creek	44.49333	29.60	93.01650	0.99	Culvert included in trackwork
Skiota Trail	44.51167	30.70	93.02500	1.50	2 Lane Bridge Under
Cannon River	44.51600	30.96	93.02733	1.64	Minor River
RR	44.52200	31.32	93.02967	1.78	Rail Under
Chub Creek	44.52300	31.38	93.02983	1.79	Minor River
CR 88	44.52600	31.56	93.03117	1.87	2 Lane Bridge Under
CR 86	44.54383	32.63	93.03750	2.25	4 Lane Rural Expressway under
CR 82	44.55833	33.50	93.04233	2.54	2 Lane Bridge Under
265th St	44.56550	33.93	93.04483	2.69	2 Lane Bridge Under
250th St	44.58733	35.24	93.05250	3.15	2 Lane Bridge Under
CR 80	44.59483	35.69	93.05500	3.30	2 Lane Bridge Under
CR 79	44.59667	35.80	93.05567	3.34	2 Lane Bridge Under
230th St E	44.61650	36.99	93.06200	3.72	2 Lane Bridge Under
S. Branch Vermillion River	44.61800	37.08	93.06217	3.73	Minor River
SR 50	44.63033	37.82	93.06217	3.73	4 Lane Rural Expressway under
CR 72	44.64483	38.69	93.06250	3.75	2 Lane Bridge Under
CR 66	44.65950	39.57	93.06283	3.77	4 Lane Rural Expressway under
Vermillion River	44.67033	40.22	93.06300	3.78	Minor River
Station Trail	44.68917	41.35	93.06333	3.80	2 Lane Bridge Under
Unnamed Rd	44.69500	41.70	93.06350	3.81	2 Lane Bridge Under
CR 58	44.70300	42.18	93.06350	3.81	2 Lane Bridge Under
165th St	44.71100	42.66	93.06350	3.81	Closure
160th St	44.71750	43.05	93.06333	3.80	2 Lane Bridge Under
156th St	44.72450	43.47	93.06133	3.68	Closure
155th St	44.72600	43.56	93.06067	3.64	2 Lane Bridge Under
153rd St	44.72950	43.77	93.05983	3.59	Closure
152nd St	44.73083	43.85	93.05950	3.57	2 Lane Bridge Under
151st St	44.73233	43.94	93.05900	3.54	Closure
CR 42	44.74067	44.44	93.05667	3.40	4 Lane Rural Expressway under
CR 38	44.74400	44.64	93.05583	3.35	2 Lane Bridge Under
CR 38	44.74750	44.85	93.05467	3.28	2 Lane Bridge Under
135th St	44.75467	45.28	93.05283	3.17	Closure

Location	North GPS	Lat min	West GPS		Recommended Action
117th St	44.78017	46.81	93.04817	2.89	2 Lane Bridge Under
105th St	44.79733	47.84	93.04300	2.58	2 Lane Bridge Under
Inver Grove Trail	44.80350	48.21	93.03467	2.08	2 Lane Bridge Under
RR	44.87783	52.67	93.02400	1.44	Rail Under
Mississippi River	44.91800	55.08	93.05083	3.05	Major River
Summary Bridges Under			**Unit Cost**	**Quantity**	**Amount**
4 Lane Urban Expressway			$4,848	9	**$43,632**
4 Lane Rural Expressway			$4,036	13	**$52,468**
2 Lane			$3,062	128	**$391,936**
Rail			$3,062	3	**$9,186**
Minor River			$812	14	**$11,368**
Major River			$8,118	2	**$16,236**
Total Bridges Under Segment 7					**$524,826**
Bridges Over					
Description	North GPS	Lat Min	West GPS	Long Min	Recommended Action
SR 52	44.80050	48.03	92.03900	2.34	4 Lane Urban Expressway
Union Pacific Rail	44.79450	47.67	92.04450	2.67	Rail
Union Pacific Rail	44.91067	54.64	92.05033	3.02	Rail
Cr 24	44.85350	51.21	92.01983	1.19	2 Lane
I-494	44.88033	52.82	92.02433	1.46	Bridge Over with acceptable horizontal clearance
Summary of Bridges Over for Segment 7					
Type			**Unit Cost**	**Quantity**	**Amount**
4 Lane Urban Expressway			10,516	1	**$10,516**
4 Lane Rural Expressway			2,630		**$0**
2 Lane			1,971	1	**$1,971**
Rail			6,572	2	**$13,144**
Total Bridges Over for Segment 7					**$25,631**

Tri-State Phase II HSR Feasibility Study

19-Jan-99

BRIDGES

C-2 Rochester Route 150 MPH

Recommended Action for Bridges Under and Bridges Over

Segment 2 Milwaukee to Ixonia

Subdivision	MP	Type	Name	Recommended Treatment
Watertown sub	100.00	Under	Fox River	Major River
Watertown sub	103.50	Over	Hwy F	2 Lane - Over
Watertown sub	104.90	Over	Hwy Xing	4 Lane Rural - Over
Watertown sub	110.80	Over	Campbell Rc	2 Lane - Over
Watertown sub	112.80	Over	Hwy Xing	2 Lane - Over
Watertown sub	115.60	Under	Hwy	4 Lane Rural - Under
Watertown sub	116.30	Under	Oconomowo	Minor River
Watertown sub	116.95	Over	Hwy	2 Lane - Over
Watertown sub	118.80	Under	Oconomowo	Minor River
Watertown sub	119.40	Over	Hwy Br	4 Lane Rural - Over
Watertown sub	120.50	Over	Hwy Br	4 Lane Rural - Over

Summary - Bridges Under	Unit Cost	Quantity	Amount
4 Lane Rural Expressway	$4,036	1	**$4,036**
Minor River	$812	2	**$1,624**
Major River	$8,118	1	**$8,118**
Total Cost Bridges Under			**$13,778**

Summary - Bridges Over	Unit Cost	Quantity	Amount
4 Lane Rural	$2,630	3	**$7,890**
2 Lane	$1,971	4	**$7,884**
Total Cost Bridges Over			**$15,774**

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Segment 3 Ixonia to Madison

Location	North GPS	Lat min	West GPS		Recommended Action
Reese Lane	43.14133	8.48	88.60283	36.17	2 Lane Bridge Under
Stream	43.14133	8.48	88.62100	37.26	Minor River
Rockvale Road	43.14133	8.48	88.63633	38.18	2 Lane Bridge Under
Oconomowoc River	43.14117	8.47	88.64317	38.59	Major River
CR P	43.14117	8.47	88.64583	38.75	2 Lane Bridge Under
CR E	43.14117	8.47	88.64717	38.83	2 Lane Bridge Under
Hwy P	43.14117	8.47	88.65117	39.07	4 Lane Rural Expressway Under
CR P	43.14100	8.46	88.65617	39.37	2 Lane Bridge Under
Spooner Rd	43.14100	8.46	88.67533	40.52	2 Lane Bridge Under
CR D	43.14100	8.46	88.68517	41.11	2 Lane Bridge Under
Little Coffee Rd	43.14100	8.46	88.70533	42.32	2 Lane Bridge Under
Johnson Creek	43.14100	8.46	88.70833	42.50	Minor River
CR X	43.14100	8.46	88.71550	42.93	2 Lane Bridge Under
Airport Rd	43.14083	8.45	88.73100	43.86	2 Lane Bridge Under
I-26	43.14083	8.45	88.73517	44.11	4 Lane Rural Expressway Under
High Rd	43.14067	8.44	88.73767	44.26	2 Lane Bridge Under
RR	43.14067	8.44	88.75550	45.33	Rail Under
Co. Hwy. CR Y	43.14067	8.44	88.75867	45.52	2 Lane Bridge Under
Oconomowoc River	43.14067	8.44	88.76417	45.85	Major River
Stream, from Hahn's Lake	43.14050	8.43	88.77950	46.77	Minor River
CR A	43.14050	8.43	88.78583	47.15	2 Lane Bridge Under
Stream	43.14017	8.41	88.81800	49.08	Minor River
West Rd	43.14000	8.40	88.83150	49.89	2 Lane Bridge Under
CR O	43.13983	8.39	88.84317	50.59	2 Lane Bridge Under
Rock River	43.13950	8.37	88.87233	52.34	Major River
Prairie Lane	43.13933	8.36	88.88283	52.97	2 Lane Bridge Under
CR G	43.13900	8.34	88.90117	54.07	2 Lane Bridge Under
Hill View Lane	43.13867	8.32	88.91400	54.84	2 Lane Bridge Under
Springer Rd	43.13850	8.31	88.93100	55.86	2 Lane Bridge Under
SR 89	43.13817	8.29	88.94750	56.85	4 Lane Rural Expressway Under
Abendroth Rd	43.13833	8.30	88.95100	57.06	2 Lane Bridge Under
Road (Stony Brook)	43.13833	8.30	88.96117	57.67	2 Lane Bridge Under
Stony Brook Creek	43.13750	8.25	88.97717	58.63	Minor River
Newville Rd	43.13717	8.23	88.98550	59.13	2 Lane Bridge Under

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Location	**North GPS**	**Lat min**	**West GPS**		**Recommended Action**
CR O	43.13667	8.20	88.99200	59.52	2 Lane Bridge Under
Boxelder Rd	43.13550	8.13	89.01483	0.89	2 Lane Bridge Under
Tower Line Rd	43.13417	8.05	89.04083	2.45	2 Lane Bridge Under
Missouri Rd	43.13350	8.01	89.05083	3.05	2 Lane Bridge Under
Spring Creek	43.13250	7.95	89.06800	4.08	Minor River
SR 73	43.13233	7.94	89.07217	4.33	4 Lane Rural Expressway Under
Oak Park Rd	43.13117	7.87	89.09617	5.77	2 Lane Bridge Under
Ridge Rd	43.12933	7.76	89.13033	7.82	2 Lane Bridge Under
Pierceville Rd	43.12800	7.68	89.15367	9.22	2 Lane Bridge Under
CR TT	43.12750	7.65	89.16717	10.03	2 Lane Bridge Under
Koshkonong Creek	43.12650	7.59	89.18350	11.01	Minor River
CR N	43.12583	7.55	89.19850	11.91	4 Lane Rural Expressway Under
CR T	43.11883	7.13	89.24250	14.55	2 Lane Bridge Under
Thorson Rd	43.11800	7.08	89.24617	14.77	2 Lane Bridge Under
Forest Oak Dr	43.11633	6.98	89.25333	15.20	2 Lane Bridge Under
Reiner Rd	43.11333	6.80	89.26583	15.95	2 Lane Bridge Under
Felland Rd	43.11100	6.66	89.27583	16.55	2 Lane Bridge Under
I-90	43.10867	6.52	89.28617	17.17	4 Lane Urban Expressway Under
Fairview Drive	43.10800	6.48	89.28933	17.36	2 Lane Bridge Under
Eagle Drive	43.10750	6.45	89.29067	17.44	2 Lane Bridge Under
N. Thompson Drive	43.10583	6.35	89.30067	18.04	2 Lane Bridge Under
Nakoosa Trail	43.10700	6.42	89.31867	19.12	2 Lane Bridge Under
I-51	43.10683	6.41	89.31650	18.99	4 Lane Urban Expressway Under
RR Waterloo Spur	43.10683	6.41	89.32350	19.41	Rail Under
Summary Bridges Under		**Unit Cost**	**Quantity**	**Amount**	
4 Lane Urban Expressway		$4,848	2	**$9,696**	
4 Lane Rural Expressway		$4,036	5	**$20,180**	
2 Lane		$3,062	39	**$119,418**	
Rail		$3,062	2	**$6,124**	
Minor River		$812	7	**$5,684**	
Major River		$8,118	3	**$24,354**	
Total Bridges Under Segment 3				**$185,456**	

Segment 4 Airport Track

Name	*North*	*West*	*Type of Bridge*
Highway 51	43.10733	89.33867	4 Lane UrbanExpressway - Over
Anderson	43.12117	89.35233	2 Lane Under
Pankrantz	43.12150	89.35233	2 Lane Under
International Lane	43.12250	89.35300	2 Lane Under

Summary Bridges Under		**Unit Cost**	**Quantity**	**Amount**
2 Lane Under		$3,062	3	**$9,186**
Summary Bridges Over		**Unit Cost**	**Quantity**	**Amount**
4 Lane Urban Expressway		10,516	1	**$10,516**

Segment 5 Madison to Mississippi River Basin

Location	**North GPS**	**Lat min**	**West GPS**		**Recommended Action**
Buckley Rd	43.17500	10.50	89.34233	20.54	2 Lane Bridge Under
Daentl Rd	43.18333	11.00	89.34200	20.52	2 Lane Bridge Under
Unnamed Rd	43.19100	11.46	89.34167	20.50	2 Lane Bridge Under
I-90 (existing)	43.19150	11.49	89.34150	20.49	4 Lane Urban Expressway Under
Hwy 19	43.19433	11.66	89.34133	20.48	4 Lane Rural Expressway Under
Duraform Lane	43.19950	11.97	89.34167	20.50	2 Lane Bridge Under
Sequoia Dr	43.21800	13.08	89.34233	20.54	2 Lane Bridge Under
Gray Rd	43.22350	13.41	89.34250	20.55	2 Lane Bridge Under
Vinburn Rd	43.23800	14.28	89.34317	20.59	2 Lane Bridge Under
Commerce St	43.24633	14.78	89.34150	20.49	2 Lane Bridge Under
CR DV	43.24767	14.86	89.34150	20.49	2 Lane Bridge Under
Yahara River	43.25017	15.01	89.34133	20.48	Minor River
CR V	43.25283	15.17	89.34133	20.48	4 Lane Rural Expressway Under
Selji Rd	43.27450	16.47	89.34783	20.87	2 Lane Bridge Under
CR DM	43.28117	16.87	89.35083	21.05	2 Lane Bridge Under
Kleinert Rd	43.28967	17.38	89.35450	21.27	2 Lane Bridge Under
Ramsey Rd	43.29600	17.76	89.35767	21.46	2 Lane Bridge Under
Unnamed Rd	43.30183	18.11	89.36050	21.63	2 Lane Bridge Under
CR K (intersects w/Goosepond Rd)	43.30850	18.51	89.36317	21.79	2 Lane Bridge Under
Prairie Lane	43.31650	18.99	89.36717	22.03	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS		Recommended Action
Kampen Rd	43.32317	19.39	89.37033	22.22	2 Lane Bridge Under
Unnamed St	43.33583	20.15	89.37583	22.55	2 Lane Bridge Under
SR 60	43.33767	20.26	89.37683	22.61	4 Lane Rural Expressway Under
Richards Rd	43.35233	21.14	89.38350	23.01	2 Lane Bridge Under
CR O	43.37917	22.75	89.40267	24.16	4 Lane Rural Expressway Under
CR Q	43.38100	22.86	89.40550	24.33	2 Lane Bridge Under
Rowan Creek	43.38600	23.16	89.40967	24.58	Minor River
McMullen Rd	43.38867	23.32	89.41183	24.71	4 Lane Rural Expressway Under
Kent Rd	43.40267	24.16	89.41483	24.89	2 Lane Bridge Under
Hinkson Creek	43.41100	24.66	89.41467	24.88	Major River
Thompson Rd	43.41717	25.03	89.41483	24.89	2 Lane Bridge Under
Bilkie Rd	43.43183	25.91	89.41483	24.89	2 Lane Bridge Under
CR B	43.43900	26.34	89.41483	24.89	2 Lane Bridge Under
Morse Rd	43.44967	26.98	89.41483	24.89	2 Lane Bridge Under
Rocky Run Creek	43.45233	27.14	89.41483	24.89	Minor River
CR J	43.45817	27.49	89.41483	24.89	2 Lane Bridge Under
Murry Rd	43.48967	29.38	89.41483	24.89	2 Lane Bridge Under
Unnamed Rd	43.50033	30.02	89.41483	24.89	2 Lane Bridge Under
SR 51	43.51833	31.10	89.42283	25.37	4 Lane Rural Expressway Under
CP Rail	43.53683	32.21	89.43617	26.17	Rail Under
Ontario St	43.54033	32.42	89.43783	26.27	2 Lane Bridge Under
RR	43.54300	32.58	89.43967	26.38	Rail Under
Wauona Trail	43.54500	32.70	89.44100	26.46	2 Lane Bridge Under
RR	43.54683	32.81	89.44217	26.53	Rail Under
Superior Street	43.54750	32.85	89.44250	26.55	2 Lane Bridge Under
SR 33 & Agency House Rd	43.54900	32.94	89.44350	26.61	4 Lane Rural Expressway Under
E Albert Street	43.54967	32.98	89.44417	26.65	2 Lane Bridge Under
Hamilton Street	43.56133	33.68	89.45467	27.28	2 Lane Bridge Under
SR 51	43.56217	33.73	89.46950	28.17	4 Lane Rural Expressway Under
W. Wisconsin & Portage Rd	43.56317	33.79	89.48667	29.20	2 Lane Bridge Under
SR 39	43.56333	33.80	89.48800	29.28	4 Lane Rural Expressway Under
SR 127	43.56350	33.81	89.49217	29.53	4 Lane Rural Expressway Under
Klappstein Rd	43.56650	33.99	89.54017	32.41	2 Lane Bridge Under
Schultz Rd	43.57467	34.48	89.58450	35.07	2 Lane Bridge Under
Weyh Rd	43.57817	34.69	89.59967	35.98	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS		Recommended Action
Wolpram Rd	43.58533	35.12	89.62933	37.76	2 Lane Bridge Under
Lewiston Station Rd	43.58833	35.30	89.64133	38.48	2 Lane Bridge Under
New Haven Rd	43.60000	36.00	89.68933	41.36	2 Lane Bridge Under
Peterson Rd	43.60217	36.13	89.69950	41.97	2 Lane Bridge Under
CR O	43.60700	36.42	89.71917	43.15	2 Lane Bridge Under
I-16, I-127 & Winnebago Rd	43.61200	36.72	89.73933	44.36	4 Lane Rural Expressway Under
Lynch Rd	43.61600	36.96	89.75633	45.38	2 Lane Bridge Under
Bowman Rd	43.61833	37.10	89.76633	45.98	2 Lane Bridge Under
Veteran Drive	43.62200	37.32	89.77300	46.38	2 Lane Bridge Under
Minnesota Avenue	43.62400	37.44	89.77550	46.53	2 Lane Bridge Under
Finnegan Avenue	43.62683	37.61	89.77883	46.73	2 Lane Bridge Under
Rt 13	43.62750	37.65	89.77967	46.78	4 Lane Rural Expressway Under
Wisconsin River	43.62767	37.66	89.78000	46.80	Major River
Unnamed Rd	43.62883	37.73	89.78133	46.88	2 Lane Bridge Under
Pioneer Drive	43.62983	37.79	89.78233	46.94	2 Lane Bridge Under
Unnamed Rd	43.63150	37.89	89.78467	47.08	2 Lane Bridge Under
Commercial Avenue	43.63483	38.09	89.78833	47.30	2 Lane Bridge Under
CR A	43.63650	38.19	89.79050	47.43	2 Lane Bridge Under
60th St	43.65383	39.23	89.81150	48.69	2 Lane Bridge Under
I-90	43.65467	39.28	89.81267	48.76	4 Lane Urban Expressway Under
Dees Rd	43.67867	40.72	89.84400	50.64	2 Lane Bridge Under
RR	43.68067	40.84	89.84500	50.70	Rail Under
Gilmore Creek	43.68150	40.89	89.84600	50.76	Minor River
Southern Rd	43.69900	41.94	89.86883	52.13	2 Lane Bridge Under
Industrial Ave	43.70617	42.37	89.88133	52.88	2 Lane Bridge Under
Honeyaire St	43.71367	42.82	89.89417	53.65	2 Lane Bridge Under
CR RR	43.71450	42.87	89.89567	53.74	4 Lane Rural Expressway Under
Unnamed St	43.71717	43.03	89.90050	54.03	2 Lane Bridge Under
W. Limits Rd	43.72167	43.30	89.90817	54.49	2 Lane Bridge Under
Tracy Creek	43.72317	43.39	89.91117	54.67	Minor River
Holtzlander Creek	43.72900	43.74	89.92133	55.28	Minor River
24th Avenue	43.73300	43.98	89.92833	55.70	2 Lane Bridge Under
Unnamed Rd	43.74850	44.91	89.95517	57.31	2 Lane Bridge Under
I-90	43.76167	45.70	89.97500	58.50	4 Lane Urban Expressway Under
CR N	43.76183	45.71	89.95850	57.51	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS		Recommended Action
55th Street	43.76700	46.02	89.98233	58.94	2 Lane Bridge Under
Unnamed Rd	43.76917	46.15	89.98533	59.12	2 Lane Bridge Under
County Hwy N	43.77400	46.44	89.99200	59.52	2 Lane Bridge Under
Lemonweir River	43.78617	47.17	90.00883	0.53	Major River
19th Ave	43.79433	47.66	90.01983	1.19	2 Lane Bridge Under
I-82	43.79617	47.77	90.02233	1.34	4 Lane Rural Expressway Under
CR G	43.80350	48.21	90.03250	1.95	2 Lane Bridge Under
17th Ave	43.80533	48.32	90.03483	2.09	2 Lane Bridge Under
15th Ave	43.82000	49.20	90.05517	3.31	2 Lane Bridge Under
47th St	43.82950	49.77	90.06800	4.08	2 Lane Bridge Under
CR O	43.83217	49.93	90.07183	4.31	4 Lane Rural Expressway Under
Prairie Rd	43.84683	50.81	90.09183	5.51	2 Lane Bridge Under
Meredith Rd	43.86217	51.73	90.11167	6.70	2 Lane Bridge Under
42nd St	43.87667	52.60	90.13033	7.82	2 Lane Bridge Under
N. Germantown Rd	43.88533	53.12	90.14150	8.49	2 Lane Bridge Under
SR 80	43.88717	53.23	90.14400	8.64	4 Lane Rural Expressway Under
RR	43.89083	53.45	90.14883	8.93	Rail Under
Hog Island Rd/8th Ave	43.89350	53.61	90.15250	9.15	2 Lane Bridge Under
CR M	43.90783	54.47	90.17750	10.65	4 Lane Rural Expressway Under
7th Ave	43.91183	54.71	90.19167	11.50	2 Lane Bridge Under
8th Ave	43.91733	55.04	90.21150	12.69	2 Lane Bridge Under
CR C	43.92017	55.21	90.22150	13.29	2 Lane Bridge Under
Unnamed	43.92600	55.56	90.24300	14.58	2 Lane Bridge Under
CR H	43.93783	56.27	90.28333	17.00	2 Lane Bridge Under
RR	43.93800	56.28	90.28367	17.02	Rail Under
Kleichinger Rd	43.94200	56.52	90.29650	17.79	Rail Under
33rd Lane	43.93250	55.95	90.31883	19.13	Rail Under
32nd Court	43.95833	57.50	90.34750	20.85	Rail Under
Allen Creek	43.96150	57.69	90.35767	21.46	Minor River
CR PP	43.96683	58.01	90.37433	22.46	4 Lane Rural Expressway Under
Indian Creek	43.97117	58.27	90.38800	23.28	Minor River
Field Rd	43.97483	58.49	90.39933	23.96	2 Lane Bridge Under
Bear Creek	43.97500	58.50	90.39983	23.99	Rail Under
CR N	43.97600	58.56	90.40300	24.18	2 Lane Bridge Under
I-90	43.97617	58.57	90.41517	24.91	4 Lane Urban Expressway Under

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Location	North GPS	Lat min	West GPS		Recommended Action
CP Rail	43.97367	58.42	90.42567	25.54	Rail Under
SR 12	43.97283	58.37	90.42900	25.74	2 Lane Bridge Under
28th Ct	43.97200	58.32	90.43183	25.91	4 Lane Rural Expressway Under
Center St	43.96967	58.18	90.44167	26.50	2 Lane Bridge Under
Krever Creek	43.96450	57.87	90.46283	27.77	Minor River
CR C	43.96367	57.82	90.46617	27.97	2 Lane Bridge Under
Cinder St	43.95700	57.42	90.49383	29.63	2 Lane Bridge Under
Council Creek	43.95550	57.33	90.49967	29.98	Minor River
SR 131	43.95417	57.25	90.50483	30.29	4 Lane Rural Expressway Under
CR M	43.94617	56.77	90.53767	32.26	2 Lane Bridge Under
Lemonweir River	43.94517	56.71	90.54233	32.54	Minor River
Cinder Ave	43.94317	56.59	90.55233	33.14	2 Lane Bridge Under
21st Ave	43.94050	56.43	90.57233	34.34	2 Lane Bridge Under
Cliff Ave	43.94000	56.40	90.57633	34.58	2 Lane Bridge Under
CR T	43.93983	56.39	90.57767	34.66	2 Lane Bridge Under
Chub Creek	43.93967	56.38	90.57817	34.69	Minor River
19th Ln	43.93717	56.23	90.59717	35.83	2 Lane Bridge Under
16th Dr	43.93467	56.08	90.66217	39.73	2 Lane Bridge Under
CR A	43.93517	56.11	90.68500	41.10	4 Lane Rural Expressway Under
14th Dr	43.93550	56.13	90.70000	42.00	2 Lane Bridge Under
Cliff Court	43.93600	56.16	90.71433	42.86	2 Lane Bridge Under
Unnamed	43.93617	56.17	90.71733	43.04	2 Lane Bridge Under
13th Dr	43.93617	56.17	90.72017	43.21	2 Lane Bridge Under
Sanitary Landfill Rd	43.93650	56.19	90.76533	45.92	2 Lane Bridge Under
Cliff Ct	43.93467	56.08	90.77500	46.50	2 Lane Bridge Under
I-90	43.93400	56.04	90.77767	46.66	4 Lane Urban Expressway Under
SR 71	43.93350	56.01	90.78067	46.84	4 Lane Rural Expressway Under
Farmer's Valley Creek	43.93283	55.97	90.78433	47.06	Minor River
John St. (9th St)	43.93050	55.83	90.79583	47.75	2 Lane Bridge Under
S. Water St	43.92767	55.66	90.81067	48.64	2 Lane Bridge Under
SR 27	43.92567	55.54	90.82050	49.23	2 Lane Bridge Under
8th Ct	43.92483	55.49	90.82483	49.49	2 Lane Bridge Under
Unnamed Rd	43.92267	55.36	90.83567	50.14	2 Lane Bridge Under
Little La Crosse River	43.91817	55.09	90.85967	51.58	Minor River
Cypress Avenue	43.91400	54.84	90.88067	52.84	2 Lane Bridge Under
CR J	43.90683	54.41	90.92050	55.23	2 Lane Bridge Under

Location	North GPS	Lat min	West GPS		Recommended Action
Fish Creek	43.90533	54.32	90.92833	55.70	Minor River
CR U	43.90317	54.19	90.94133	56.48	2 Lane Bridge Under
Fuchs Rd	43.90000	54.00	90.96067	57.64	2 Lane Bridge Under
La Crosse River	43.89817	53.89	90.97200	58.32	Minor River
SR 162	43.89533	53.72	90.99083	59.45	4 Lane Rural Expressway Under
Dutch Creek	43.89550	53.73	90.99250	59.55	Minor River
Unnamed Rd	43.89717	53.83	91.01483	0.89	2 Lane Bridge Under
Shorewood Court	43.89967	53.98	91.04483	2.69	2 Lane Bridge Under
Tilson St	43.90567	54.34	91.07233	4.34	2 Lane Bridge Under
SR 16	43.90850	54.51	91.08117	4.87	4 Lane Rural Expressway Under
La Crosse River	43.90850	54.51	91.09367	5.62	Minor River
CR M	43.90800	54.48	91.10133	6.08	2 Lane Bridge Under
Gills Rd	43.91200	54.72	91.12133	7.28	2 Lane Bridge Under
Evenson Rd	43.91350	54.81	91.12850	7.71	2 Lane Bridge Under
Gills Coulee Rd	43.91717	55.03	91.14650	8.79	2 Lane Bridge Under
Tunnel Starts	43.91950	55.17	91.19117	11.47	Tunnel
Tunnel Enes	43.91783	55.07	91.14967	8.98	Tunnel
Mississippi River Bridge starts	43.91933	55.16	91.23200	13.92	Mississippi River Bridge
Koss Rd	43.91917	55.15	91.18800	11.28	2 Lane Bridge Under
County Hwy S	43.91933	55.16	91.19667	11.80	2 Lane Bridge Under
MDDS Dr	43.91933	55.16	91.21167	12.70	2 Lane Bridge Under
Cedar Creek Lane	43.91917	55.15	91.22567	13.54	2 Lane Bridge Under

Summary Bridges Under	Unit Cost	Quantity	Amount
4 Lane Urban Expressway	$4,848	4	**$19,392**
4 Lane Rural Expressway	$4,036	23	**$92,828**
2 Lane	$3,062	115	**$352,130**
Rail	$3,062	10	**$30,620**
Minor River	$812	19	**$15,428**
Major River	$8,118	4	**$32,472**
Total Bridges Under Segment 5			**$542,870**

Segment 6 Mississippi River Basin

	Unit Cost	Quantity	Amount
Mississippi River Bridge	$234,000	1	$234,000
Interstate 90 Dakota Rvier Valley Structure	$74,000	1	$74,000
Total Cost			$308,000

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Segment 7 River to St Paul

C-2 150 MPH Rochester Route

	North	Lat min	West	Long min	Recommended Action
I-90	43.92117	55.27	91.37300	22.38	4 Lane Urban Expressway under
Twp Rd 29	43.92283	55.37	91.38617	23.17	2 Lane Bridge Under
CR 101	43.92317	55.39	91.38767	23.26	2 Lane Bridge Under
Twp Rd 32	43.92450	55.47	91.39833	23.90	2 Lane Bridge Under
Unnamed Rd	43.92483	55.49	91.40067	24.04	2 Lane Bridge Under
Dakota Creek	43.92483	55.49	91.41900	25.14	Minor River
Dakota Creek	43.92500	55.50	91.40283	24.17	Minor River
I-90	43.92550	55.53	91.40683	24.41	4 Lane Urban Expressway under
Dakota Creek	43.92650	55.59	91.41400	24.84	Major River
Little Trout Creek	43.92617	55.57	91.43317	25.99	Culvert included in trackwork
CR 12	43.92450	55.47	91.43750	26.25	2 Lane Bridge Under
CR 104	43.92233	55.34	91.44350	26.61	2 Lane Bridge Under
CR 125	43.92250	55.35	91.47083	28.25	2 Lane Bridge Under
CR 104	43.92233	55.34	91.49100	29.46	2 Lane Bridge Under
I-90	43.92167	55.30	91.49417	29.65	4 Lane Urban Expressway under
Unnamed Rd	43.91883	55.13	91.51050	30.63	Closure
CR 12	43.91850	55.11	91.51300	30.78	2 Lane Bridge Under
PH Twp 13	43.91583	54.95	91.52800	31.68	2 Lane Bridge Under
PH Twp 21	43.91567	54.94	91.55033	33.02	2 Lane Bridge Under
PH Twp 23	43.91650	54.99	91.56083	33.65	2 Lane Bridge Under
PH Twp 25	43.91850	55.11	91.58533	35.12	2 Lane Bridge Under
CR 12	43.92033	55.22	91.60750	36.45	2 Lane Bridge Under
I-90	43.92033	55.22	91.60900	36.54	2 Lane Bridge Under
Money Creek	43.92067	55.24	91.61317	36.79	Culvert included in trackwork
CR 17	43.92600	55.56	91.62033	37.22	2 Lane Bridge Under
Money Creek	43.92667	55.60	91.62100	37.26	Culvert included in trackwork
Wiscoy Twp 4	43.93017	55.81	91.62583	37.55	2 Lane Bridge Under
Unnamed Creek	43.93417	56.05	91.63100	37.86	Culvert included in trackwork
Wilson Twp 11	43.94133	56.48	91.64017	38.41	2 Lane Bridge Under
Unnamed Creek	43.94950	56.97	91.65867	39.52	2 Lane Bridge Under
CR 19	43.95300	57.18	91.67517	40.51	2 Lane Bridge Under
Wilson Twp 29	43.95267	57.16	91.69683	41.81	2 Lane Bridge Under
I-90	43.95250	57.15	91.69850	41.91	4 Lane Urban Expressway under
CR 12	43.95250	57.15	91.70300	42.18	2 Lane Bridge Under
Unnamed Rd	43.95100	57.06	91.72017	43.21	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS		Recommended Action
Unnamed Rd	43.94567	56.74	91.74033	44.42	2 Lane Bridge Under
Twp 9	43.94283	56.57	91.76033	45.62	2 Lane Bridge Under
Twp 11	43.94217	56.53	91.78017	46.81	2 Lane Bridge Under
CR 25	43.94250	56.55	91.79050	47.43	2 Lane Bridge Under
Unnamed Rd	43.94300	56.58	91.80033	48.02	2 Lane Bridge Under
Twp 21	43.94317	56.59	91.81017	48.61	2 Lane Bridge Under
Unnamed Rd	43.94350	56.61	91.82033	49.22	2 Lane Bridge Under
Twp 19	43.94400	56.64	91.83950	50.37	2 Lane Bridge Under
Rush Creek?	43.94433	56.66	91.85050	51.03	Minor River
CR 25	43.94450	56.67	91.85933	51.56	2 Lane Bridge Under
CR 29	43.94500	56.70	91.87283	52.37	4 Lane Rural Expressway under
Rush Creek	43.94500	56.70	91.87433	52.46	Minor River
Twp 9	43.94533	56.72	91.88950	53.37	2 Lane Bridge Under
Creek ?	43.94367	56.62	91.90167	54.10	Minor River
Twp 13	43.94133	56.48	91.91950	55.17	2 Lane Bridge Under
Twp 15	43.93867	56.32	91.93967	56.38	2 Lane Bridge Under
CR 33	43.93617	56.17	91.95650	57.39	2 Lane Bridge Under
I-90	43.93517	56.11	91.96483	57.89	4 Lane Urban Expressway under
St. Charles Twp 3	43.93350	56.01	91.97767	58.66	2 Lane Bridge Under
Pine Creek	43.93133	55.88	91.99283	59.57	Culvert included in trackwork
CR 35	43.92983	55.79	92.00433	0.26	2 Lane Bridge Under
CR 117	43.92817	55.69	92.01950	1.17	2 Lane Bridge Under
St. Charles Twp 15	43.92583	55.55	92.03933	2.36	2 Lane Bridge Under
Unnamed Rd	43.92517	55.51	92.04517	2.71	2 Lane Bridge Under
SR 74	43.92283	55.37	92.06533	3.92	4 Lane Urban Expressway under
Unnamed Rd	43.92250	55.35	92.06983	4.19	2 Lane Bridge Under
Unnamed Rd	43.92233	55.34	92.09350	5.61	2 Lane Bridge Under
CR 130	43.92267	55.36	92.11750	7.05	2 Lane Bridge Under
CR 30	43.92350	55.41	92.13850	8.31	2 Lane Bridge Under
CR 10	43.92750	55.65	92.16850	10.11	4 Lane Rural Expressway under
CR 32	43.92883	55.73	92.17850	10.71	2 Lane Bridge Under
Cr 136	43.93167	55.90	92.19817	11.89	2 Lane Bridge Under
CR 7	43.93700	56.22	92.23800	14.28	4 Lane Rural Expressway under
Unnamed Rd	43.93933	56.36	92.25783	15.47	2 Lane Bridge Under
CR 129	43.93967	56.38	92.27800	16.68	2 Lane Bridge Under
CR 19	43.94017	56.41	92.29817	17.89	2 Lane Bridge Under
75 St SE	43.94067	56.44	92.32800	19.68	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS		Recommended Action
70th Ave SE	43.94033	56.42	92.33800	20.28	2 Lane Bridge Under
I-52/65th Ave SE	43.93967	56.38	92.34783	20.87	4 Lane Urban Expressway under
I-90	43.93783	56.27	92.37150	22.29	4 Lane Urban Expressway under
60th St SE	43.93433	56.06	92.38717	23.23	2 Lane Bridge Under
CR 1	43.92783	55.67	92.40817	24.49	2 Lane Bridge Under
CR 16	43.92383	55.43	92.42050	25.23	2 Lane Bridge Under
CR 20	43.91850	55.11	92.43767	26.26	2 Lane Bridge Under
Unnamed Rd	43.91367	54.82	92.45800	27.48	2 Lane Bridge Under
SR 63	43.90883	54.53	92.48017	28.81	4 Lane Urban Expressway under
CR 8	43.92033	55.22	92.52817	31.69	2 Lane Bridge Under
60th Ave SW	43.93167	55.90	92.55767	33.46	2 Lane Bridge Under
Fort Zumbro River	43.93200	55.92	92.55833	33.50	Culvert included in trackwork
CR 126	43.93500	56.10	92.56617	33.97	2 Lane Bridge Under
CR 15	43.93983	56.39	92.57800	34.68	2 Lane Bridge Under
Unnamed Rd	43.94850	56.91	92.59817	35.89	2 Lane Bridge Under
CR 17	43.94983	56.99	92.60117	36.07	2 Lane Bridge Under
CR 3	43.95700	57.42	92.61783	37.07	2 Lane Bridge Under
CR 150	43.96567	57.94	92.63800	38.28	2 Lane Bridge Under
Salem Creek	43.97217	58.33	92.65267	39.16	Minor River
Unnamed Rd	43.97667	58.60	92.66300	39.78	2 Lane Bridge Under
CR 25	43.98317	58.99	92.67800	40.68	2 Lane Bridge Under
CR 15	43.99217	59.53	92.69817	41.89	2 Lane Bridge Under
Unnamed Rd	43.99683	59.81	92.71333	42.80	2 Lane Bridge Under
Unnamed Rd	44.00033	0.02	92.72600	43.56	2 Lane Bridge Under
CR 13	44.00350	0.21	92.73850	44.31	2 Lane Bridge Under
CR 10	44.00783	0.47	92.75400	45.24	2 Lane Bridge Under
CR 13	44.00883	0.53	92.75817	45.49	2 Lane Bridge Under
CR 14	44.01417	0.85	92.77833	46.70	2 Lane Bridge Under
CCR 9	44.02050	1.23	92.79867	47.92	2 Lane Bridge Under
RR	44.02633	1.58	92.81417	48.85	Rail Under
CR 9	44.02783	1.67	92.81867	49.12	2 Lane Bridge Under
I-14	44.03000	1.80	92.82417	49.45	4 Lane Rural Expressway under
Airport Rd N	44.03533	2.12	92.83883	50.33	2 Lane Bridge Under
North St NE	44.03717	2.23	92.84350	50.61	2 Lane Bridge Under
Dodge Center Creek	44.05033	3.02	92.84583	50.75	Culvert included in trackwork
Dodge Center Creek	44.05250	3.15	92.84633	50.78	Culvert included in trackwork
Dodge Center Creek	44.06017	3.61	92.84783	50.87	Culvert included in trackwork

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Location	North GPS	Lat min	West GPS		Recommended Action
CR 7	44.06983	4.19	92.84967	50.98	2 Lane Bridge Under
S. Branch Middle Fork Zumbro River	44.07933	4.76	92.85200	51.12	2 Lane Bridge Under
Unnamed Rd	44.10250	6.15	92.85583	51.35	2 Lane Bridge Under
Milliken Creek	44.11250	6.75	92.85783	51.47	Minor River
CR 7/CR 20	44.11667	7.00	92.85850	51.51	2 Lane Bridge Under
CR 22	44.13850	8.31	92.86267	51.76	2 Lane Bridge Under
CR 24	44.15300	9.18	92.86533	51.92	4 Lane Rural Expressway under
Unnamed Rd	44.16617	9.97	92.86800	52.08	2 Lane Bridge Under
Middle Fork Zumbro River	44.16700	10.02	92.86817	52.09	Minor River
CR B	44.01748	1.05	92.86950	52.17	2 Lane Bridge Under
CR B	44.18217	10.93	92.87100	52.26	2 Lane Bridge Under
CR A	44.19683	11.81	92.87367	52.42	2 Lane Bridge Under
N. Branch Middle Fork Zumbro River	44.20167	12.10	92.87467	52.48	Culvert included in trackwork
CR !	44.20417	12.25	92.87517	52.51	2 Lane Bridge Under
Unnamed Rd	44.20633	12.38	92.87550	52.53	2 Lane Bridge Under
CR 117	44.21833	13.10	92.87783	52.67	2 Lane Bridge Under
CR 23	44.24017	14.41	92.88183	52.91	2 Lane Bridge Under
Unnamed Rd	44.25450	15.27	92.88483	53.09	2 Lane Bridge Under
Spring Creek	44.26550	15.93	92.88683	53.21	Culvert included in trackwork
CR 12	44.26900	16.14	92.88750	53.25	2 Lane Bridge Under
Unnamed Rd	44.27900	16.74	92.89167	53.50	2 Lane Bridge Under
Unnamed Rd	44.28217	16.93	92.89367	53.62	2 Lane Bridge Under
SR 60	44.28350	17.01	92.89450	53.67	4 Lane Rural Expressway under
Unnamed Rd	44.28733	17.24	92.89700	53.82	2 Lane Bridge Under
Unnamed Rd	44.29767	17.86	92.90350	54.21	2 Lane Bridge Under
N. Fork Zumbro River	44.30217	18.13	92.90650	54.39	Minor River
CR 30	44.31967	19.18	92.91983	55.19	2 Lane Bridge Under
CR 14	44.34033	20.42	92.93817	56.29	2 Lane Bridge Under
Unnamed Rd	44.34150	20.49	92.93917	56.35	2 Lane Bridge Under
Little Cannon River	44.35083	21.05	92.94750	56.85	Minor River
CR 44	44.35150	21.09	92.94817	56.89	2 Lane Bridge Under
Unnamed Rd	44.36483	21.89	92.95867	57.52	2 Lane Bridge Under
CR 49	44.37033	22.22	92.96100	57.66	2 Lane Bridge Under
Unnamed Rd	44.38517	23.11	92.96717	58.03	2 Lane Bridge Under
CR 9	44.40667	24.40	92.97600	58.56	4 Lane Rural Expressway under
CR 24	44.41450	24.87	92.97933	58.76	2 Lane Bridge Under
Unnamed Rd	44.43567	26.14	92.98917	59.35	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS		Recommended Action
Unnamed Rd	44.44983	26.99	92.99583	59.75	2 Lane Bridge Under
Prairie Creek	44.47083	28.25	93.00583	0.35	Culvert included in trackwork
Unnamed Rd	44.47167	28.30	93.00633	0.38	2 Lane Bridge Under
SR 56	44.47950	28.77	93.00983	0.59	4 Lane Rural Expressway under
320th St W	44.48617	29.17	93.01300	0.78	4 Lane Rural Expressway under
Spring Creek	44.49333	29.60	93.01650	0.99	Culvert included in trackwork
Skiota Trail	44.51167	30.70	93.02500	1.50	2 Lane Bridge Under
Cannon River	44.51600	30.96	93.02733	1.64	Minor River
RR	44.52200	31.32	93.02967	1.78	Rail Under
Chub Creek	44.52300	31.38	93.02983	1.79	Minor River
CR 88	44.52600	31.56	93.03117	1.87	2 Lane Bridge Under
CR 86	44.54383	32.63	93.03750	2.25	4 Lane Rural Expressway under
CR 82	44.55833	33.50	93.04233	2.54	2 Lane Bridge Under
265th St	44.56550	33.93	93.04483	2.69	2 Lane Bridge Under
250th St	44.58733	35.24	93.05250	3.15	2 Lane Bridge Under
CR 80	44.59483	35.69	93.05500	3.30	2 Lane Bridge Under
CR 79	44.59667	35.80	93.05567	3.34	2 Lane Bridge Under
230th St E	44.61650	36.99	93.06200	3.72	2 Lane Bridge Under
S. Branch Vermillion River	44.61800	37.08	93.06217	3.73	Minor River
SR 50	44.63033	37.82	93.06217	3.73	4 Lane Rural Expressway under
CR 72	44.64483	38.69	93.06250	3.75	2 Lane Bridge Under
CR 66	44.65950	39.57	93.06283	3.77	4 Lane Rural Expressway under
Vermillion River	44.67033	40.22	93.06300	3.78	Minor River
Station Trail	44.68917	41.35	93.06333	3.80	2 Lane Bridge Under
Unnamed Rd	44.69500	41.70	93.06350	3.81	2 Lane Bridge Under
CR 58	44.70300	42.18	93.06350	3.81	2 Lane Bridge Under
165th St	44.71100	42.66	93.06350	3.81	Closure
160th St	44.71750	43.05	93.06333	3.80	2 Lane Bridge Under
156th St	44.72450	43.47	93.06133	3.68	Closure
155th St	44.72600	43.56	93.06067	3.64	2 Lane Bridge Under
153rd St	44.72950	43.77	93.05983	3.59	Closure
152nd St	44.73083	43.85	93.05950	3.57	2 Lane Bridge Under
151st St	44.73233	43.94	93.05900	3.54	Closure
CR 42	44.74067	44.44	93.05667	3.40	4 Lane Rural Expressway under
CR 38	44.74400	44.64	93.05583	3.35	2 Lane Bridge Under
CR 38	44.74750	44.85	93.05467	3.28	2 Lane Bridge Under
135th St	44.75467	45.28	93.05283	3.17	Closure

Location	North GPS	Lat min	West GPS		Recommended Action
117th St	44.78017	46.81	93.04817	2.89	2 Lane Bridge Under
105th St	44.79733	47.84	93.04300	2.58	2 Lane Bridge Under
Inver Grove Trail	44.80350	48.21	93.03467	2.08	2 Lane Bridge Under
RR	44.87783	52.67	93.02400	1.44	Rail Under
Mississippi River	44.91800	55.08	93.05083	3.05	Major River

Summary Bridges Under	Unit Cost	Quantity	Amount
4 Lane Urban Expressway	$4,848	9	**$43,632**
4 Lane Rural Expressway	$4,036	13	**$52,468**
2 Lane	$3,062	128	**$391,936**
Rail	$3,062	3	**$9,186**
Minor River	$812	14	**$11,368**
Major River	$8,118	2	**$16,236**
Total Bridges Under Segment 7			**$524,826**

Bridges Over

Description	North GPS	Lat Min	West GPS	Long Min	Recommended Action
SR 52	44.80050	48.03	92.03900	2.34	4 Lane Urban Expressway
Union Pacific Rail	44.79450	47.67	92.04450	2.67	Rail
Union Pacific Rail	44.91067	54.64	92.05033	3.02	Rail
Cr 24	44.85350	51.21	92.01983	1.19	2 Lane
I-494	44.88033	52.82	92.02433	1.46	Bridge Over with acceptable horizontal clearance

Summary of Bridges Over for Segment 7

Type	Unit Cost	Quantity	Amount
4 Lane Urban Expressway	10,516	1	**$10,516**
4 Lane Rural Expressway	2,630		**$0**
2 Lane	1,971	1	**$1,971**
Rail	6,572	2	**$13,144**
Total Bridges Over for Segment 7			**$25,631**

CROSSINGS C-2 Rochester Route 150 MPH Technology							
Page 1							
Segment #2 Milwaukee to Ixonia							
Subdivision	Milepost	Cost ($000)	Recommended Action				
Watertown sub	93.80	$274	Rural w.Quadrant Gates				
Watertown sub	95.10	$274	Rural w.Quadrant Gates				
Watertown sub	95.30	$274	Rural w.Quadrant Gates				
Watertown sub	97.40	$274	Rural w.Quadrant Gates				
Watertown sub	98.40	$274	Rural w.Quadrant Gates				
Watertown sub	99.40	$550	Full Width Barrier				
Watertown sub	100.50	$550	Full Width Barrier				
Watertown sub	101.50	$550	Full Width Barrier				
Watertown sub	102.20	$550	Full Width Barrier				
Watertown sub	102.40	$550	Full Width Barrier				
Watertown sub	102.50	$60	Closure				
Watertown sub	104.30	$550	Full Width Barrier				
Watertown sub	105.20	$550	Full Width Barrier				
Watertown sub	105.75	$550	Full Width Barrier				
Watertown sub	106.20	$550	Full Width Barrier				
Watertown sub	106.80	$550	Full Width Barrier				
Watertown sub	108.20	$550	Full Width Barrier				
Watertown sub	109.80	$550	Full Width Barrier				
Watertown sub	110.01	$550	Full Width Barrier				
Watertown sub	111.30	$550	Full Width Barrier				
Watertown sub	113.10	$60	Closure				
Watertown sub	114.50	$550	Full Width Barrier				
Watertown sub	114.80	$550	Full Width Barrier				
Watertown sub	115.50	$550	Full Width Barrier				
Watertown sub	115.90	$550	Full Width Barrier				
Watertown sub	117.40	$274	Rural w.Quadrant Gates				
Watertown sub	117.70	$274	Rural w.Quadrant Gates				
Watertown sub	117.80	$274	Rural w.Quadrant Gates				
Watertown sub	117.90	$274	Rural w.Quadrant Gates				
Watertown sub	118.05	$274	Rural w.Quadrant Gates				
Watertown sub	118.20	$274	Rural w.Quadrant Gates				
Watertown sub	118.30	$274	Rural w.Quadrant Gates				
Watertown sub	118.70	$274	Rural w.Quadrant Gates				
Watertown sub	119.50	$274	Rural w.Quadrant Gates				
Summary Segment #2		Unit Cost	Quantity	Amount			
Private Closure		$60	2	**$120**			
Rural w/Quadrant Gates		$274	14	**$3,836**			
Full Width Barrier		$550	18	**$9,900**			
Total Grade Crossings				**$13,856**			

For Segment 3, Ixonia to Hwy 51 the number of private closures was assumed to be similar to the Watertown to Hwy 51 segment determined for the B-2 150 MPH technology

Summary Segment 3	Unit Cost	Quantity	Amount
Private Closure	$60	32	**$1,920**

For Segment 5, Madison to LaCrosse, the number of private closures was assumed to be similar to the Madison to Portage segment and the Portage to River segment determined for the B-2 150 MPH technology

Summary Segment #5	Unit Cost	Quantity	Amount
Private Closure	$60	10	**$600**
Private Closure	$60	46	**$2,760**
Total		56	**$3,360**

Segment 7 River to St Paul

Crossing	North GPS	Lat Min	West GPS	Long Min	Recommended Action
65th St E	44.85533	51.32	92.02000	1.20	Rural w/ Quadrant Gates
Edwards Ave E	44.86800	52.08	92.02233	1.34	Rural w/ Quadrant Gates
Hardman Avenue S/Richmond St	44.87350	52.41	92.02317	1.39	Rural w/ Quadrant Gates
Maltby St	44.87517	52.51	92.02350	1.41	Rural w/ Quadrant Gates
Hardman Avenue S	44.88000	52.80	92.02433	1.46	Full Width Barrier
Armour Ave	44.88700	53.22	92.02550	1.53	Rural w/ Quadrant Gates
John Carroll Ave	44.89433	53.66	92.03050	1.83	Rural w/ Quadrant Gates
Hardman Ave N	44.89533	53.72	92.03167	1.90	Rural w/ Quadrant Gates
Ranchnot Rd	44.91250	54.75	92.05183	3.11	Rural w/ Quadrant Gates

Summary Segment 7	Unit	Quantity	Amount
Private Closure	$60	100	**$6,000**
Rural w/ Quadrant Gates	$274	8	**$2,192**
Full Width Barrier	$550	1	**$550**
Total			**$8,742**

Private Closures is an estimate based on an estimate of private crossings for the entire route

TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 6.2.5
Infrastructure Detail: D-3 Rochester Route
Elevated Urban 185 mph

Tri-State Phase II HSR Feasibility Study

12-Jan-99

D-3 Rochester Route 185 MPH

Item	Unit	Unit Costs	Quantity	Amount	
1.0 Trackwork					
1.1 HSR on Existing Roadbed	per mile	$873			
1.2 HSR on New Roadbed (Existing ROW)	per mile	$932			
1.2A HSR on New Roadbed (New ROW)	per mile	$1,376			
1.2B HSR on New Roadbed (Double Track)	per mile	$2,308	428	$987,824	
1.3 Timber & Surface w/ 33% Tie replacement	per mile	$136			
1.4 Timber & Surface w/ 66% Tie Replacement	per mile	$224			
1.5 Relay Track w/ 136# CWR	per mile	$329			
1.6 Siding	per mile	$802			
1.7 Fencing	per mile	$49	367	$17,983	
1.8 Electricfication	per mile	$991	428	$424,148	
1.9 Other Track Work Chicago to Milwaukee	LS	$212,917			
1.10 Land Acquisition Madison	per mile	$5,000	3	$15,000	
1.11 Land Acquisition Urban	per mile	$294	108	$31,752	
1.12 Land Acquisition Rural	per mile	$98	317	$31,066	
Total Track Costs					$1,507,773
2.0 Stations					
2.1 Full Service - New	each	$1,000	2	$2,000	
2.2 Full Service - Renovated	each	$500	2	$1,000	
2.3 Terminal - New	each	$2,000	3	$6,000	
2.4 Terminal - Renovated	each	$1,000	1	$1,000	
2.5 Maintenance (110 MPH technology)	each	$10,000			
2.5A Maintenance (150 MPH technology)	each	$86,000			
2.5B Maintenance (185 MPH technology)	each	$162,000	1	$162,000	
2.6 Stations Chicago to Milwaukee	LS	$20,428	1	$20,428	
Total Station Cost					$192,428
4.0 Turnouts					
4.1 New #33 - 136# High Speed	each	$555			
Total Turnout Cost					

5.0 Bridges - Under					
5.1 Four Lane Urban Expressway	each	$4,848	15	$72,720	
5.2 Four Lane Rural Expressway	each	$4,036	41	$165,476	
5.3 Two Lane Highway	each	$3,062	282	$863,484	
5.4 Rail	each	$3,062	14	$42,868	
5.5 Minor river	each	$812	40	$32,480	
5.6 Major River	each	$8,118	9	$73,062	
5.7 Mississippi River	LS	$234,000	1	$234,000	
5.8 Interstate 90 Dakota Rvier Valley Structure	LS	$74,000	1	$74,000	
5.9 Elevated Structure Milwaukee	per mile	$39,000	33	$1,287,000	
5.10 Elevated Structure St Paul	per mile	$39,000	14	$546,000	
5.11 Elevated Structure Chicago to Milwaukee	per mile	$39,000	61	$2,379,000	
Total Bridges - Under Costs					$5,770,090
6.0 Bridges - Over					
6.1 Four Lane Urban Expressway	each	10,516	1	$10,516	
6.2 Four Lane Rural Expressway	each	2,630			
6.3 Two Lane Highway	each	1,971			
6.4 Rail	each	6,572			
6.5 Viaducts - Major river	each				
6.6 Tunnel (One track)	per LF	10	10,600	$106,000	
Total Bridges - Over					$116,516
7.0 Crossings					
7.1 Private Closure	each	60	188	$11,280	
7.2 Rural w/ Quadrant Gates	each	274			
7.3 Urban w/ Quadrant Gates	each	341			
7.4 Full Width Barrier	each	550			
Total Crossings Cost					$11,280
8.0 Signals					
8.1 High Speed Turnout	each	1,098			
8.2 System Installation for HSR (110MPH)	per mile	150			
8.2A System Installation for HSR (150MPH)	per mile	350			
8.2B System Installation for HSR (185MPH)	per mile	980	428	$419,440	
Total Signals Cost					$419,440
9.0 Curves					
9.1 Elevate & Surface Curves	per mile	42			
9.2 Curvature Reduction	per mile	284			
9.3 Elastic Fasteners	per mile	59			
Total Curve Upgrade Cost					
Total Upgrade Cost					$8,017,527

Tri-State Phase II HSR Feasibility Study																					
12-Jan-99																					
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7			
D-3 Rochester Route 185 MPH						Chicago to Milwaukee		Milw to Ixonia		Ixonia to Hwy 51		Airport Track		Madison to LaCrosse		Miss. River Basin		River to St Paul		Total	Total
Item	Unit	Unit Costs	Quantity	Amount		Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
1.0 Trackwork																					
1.1 HSR on Existing Roadbed	per mile	$873					-		-											-	-
1.2 HSR on New Roadbed (Existing ROW)	per mile	$932					-													-	
1.2A HSR on New Roadbed (New ROW)	per mile	$1,376					-													-	
1.2B HSR on New Roadbed (Double Track)	per mile	$2,308	428	$987,824		85	196,160	33	76,164	40	92,320	3	6,924	136	313,888			131	302,348	428	987,824
1.3 Timber & Surface w/ 33% Tie replacement	per mile	$136					-		-											-	-
1.4 Timber & Surface w/ 66% Tie Replacement	per mile	$224					-													-	
1.5 Relay Track w/ 136# CWR	per mile	$329					-													-	
1.6 Siding	per mile	$802					-													-	
1.7 Fencing	per mile	$49	367	$17,983		24	1,176	33	1,617	40	1,960	3	147	136	6,664			131	6,419	367	17,983
1.8 Electricfication	per mile	$991	428	$424,148		85	84,235	33	32,703	40	39,640	3	2,973	136	134,776			131	129,821	428	424,148
1.9 Other Track Work Chicago to Milwaukee	LS	$212,917																		-	-
1.10 Land Acquisition Madison	per mile	$5,000	3	$15,000			-					3	15,000							3	15,000
1.11 Land Acquisition Urban	per mile	$294	108	$31,752		61	17,934	33	9,702					-				14	4,116	108	31,752
1.12 Land Acquisition Rural	per mile	$98	317	$31,066		24	2,352			40	3,920			136	13,328			117	11,466	317	31,066
Total Track Costs					$1,507,773		301,877		120,186		137,840		25,044		468,656				454,170		1,507,773
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7			
						Chicago to Milwaukee		Milw to Ixonia		Ixonia to Hwy 51		Airport Track		Madison to LaCrosse		Miss. River Basin		River to St Paul		Total	Total
2.0 Stations						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
2.1 Full Service - New	each	$1,000	2	$2,000										2	2,000					2	2,000
2.2 Full Service - Renovated	each	$500	2	$1,000				1	500					1	500					2	1,000
2.3 Terminal - New	each	$2,000	3	$6,000								1	2,000					2	4,000	3	6,000
2.4 Terminal - Renovated	each	$1,000	1	$1,000				1	1,000											1	1,000
2.5 Maintenance (110 MPH technology)	each	$10,000																		-	
2.5A Maintenance (150 MPH technology)	each	$86,000																		-	
2.5B Maintenance (185 MPH technology)	each	$162,000	1	$162,000														1	162,000	1	162,000
2.6 Stations Chicago to Milwaukee	LS	$20,428	1	$20,428		1	20,428													1	20,428
Total Station Cost					$192,428		20,428		1,500				2,000		2,500				166,000		192,428

Page 2																					
D-3 Rochester Route 185 MPH						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
4.0 Turnouts						Chicago to Milwaukee		Milw to Ixonia		Ixonia to Hwy 51		Airport Track		Madison to LaCrosse		Miss. River Basin		River to St Paul		Total	Total
4.1 New #33 - 136# High Speed	each	$555				Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Total Turnout Cost																					
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
						Chicago to Milwaukee		Milw to Ixonia		Ixonia to Hwy 51		Airport Track		Madison to LaCrosse		Miss. River Basin		River to St Paul		Total	Total
5.0 Bridges - Under						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
5.1 Four Lane Urban Expressway	each	$4,848	15	$72,720						2	9,696			4	19,392			9	43,632	15	60,540
5.2 Four Lane Rural Expressway	each	$4,036	41	$165,476						5	20,180			23	92,828			13	52,468	41	125,542
5.3 Two Lane Highway	each	$3,062	282	$863,484						39	119,418	3	9,186	115	352,130			125	382,750	282	863,484
5.4 Rail	each	$3,062	14	$42,868						2	6,124			10	30,620			2	6,124	14	11,368
5.5 Minor river	each	$812	40	$32,480						7	5,684			19	15,428			14	11,368	40	324,720
5.6 Major River	each	$8,118	9	$73,062						3	24,354			4	32,472			2	16,236	9	2,106,000
5.7 Mississippi River	LS	$234,000	1	$234,000												1	234,000			1	74,000
5.8 Interstate 90 Dakota Rvier Valley Structure	LS	$74,000	1	$74,000												1	74,000			1	74,000
5.9 Elevated Structure Milwaukee	per mile	$39,000	33	$1,287,000				33	1,287,000											33	1,287,000
5.10 Elevated Structure St Paul	per mile	$39,000	14	$546,000														14	546,000	14	546,000
5.11 Elevated Structure Chicago to Milwaukee	per mile	$39,000	61	$2,379,000		61	2,379,000													61	2,379,000
Total Bridges - Under Costs					$5,770,090		2,379,000		1,287,000		185,456		9,186		542,870		308,000		1,058,578		5,770,090
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg.ment 7			
						Chicago to Milwaukee		Milw to Ixonia		Ixonia to Hwy 51		Airport Track		Madison to LaCrosse		Miss. River Basin		River to St Paul		Total	Total
6.0 Bridges - Over						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
6.1 Four Lane Urban Expressway	each	10,516	1	$10,516								1	10,516							1	10,516
6.2 Four Lane Rural Expressway	each	2,630																		-	-
6.3 Two Lane Highway	each	1,971																		-	-
6.4 Rail	each	6.572																		-	-
6.5 Viaducts - Major river	each																			-	
6.6 Tunnel (One track)	per LF	10	10,600	$106,000										10600	106,000					10,600	106,000
Total Bridges - Over					$116,516								10,516		106,000						116,516

Page 3																					
D-3 Rochester Route 185 MPH						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7		Total	Total
						Chicago to Milwaukee		Milw to Ixonia		Ixonia to Hwy 51		Airport Track		Madison to LaCrosse		Miss. River Basin		River to St Paul		Quantity	Amount
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount		
7.0 Crossings																					
7.1 Private Closure	each	60	188	$11,280						32	1,920			56	3,360			100	6,000	188	11,280
7.2 Rural w/ Quadrant Gates	each	274																		-	-
7.3 Urban w/ Quadrant Gates	each	341																		-	-
7.4 Full Width Barrier	each	550																		-	-
Total Crossings Cost					$11,280						1,920				3,360				6,000		11,280
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7		Total	Total
						Chicago to Milwaukee		Milw to Ixonia		Ixonia to Hwy 51		Airport Track		Madison to LaCrosse		Miss. River Basin		River to St Paul		Quantity	Amount
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount		
8.0 Signals																					
8.1 High Speed Turnout	each	1,098																		-	-
8.2 System Installation for HSR (110MPH)	per mile	150																		-	-
8.2A System Installation for HSR (150MPH)	per mile	350																		-	-
8.2B System Installation for HSR (185MPH)	per mile	980	428	$419,440		85	83,300	33	32,340	40	39,200	3	2,940	136	133,280			131	128,380	428	419,440
																				-	-
Total Signals Cost					$419,440		83,300		32,340		39,200		2,940		133,280				128,380		419,440
						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Seg,ment 7		Total	Total
						Chicago to Milwaukee		Milw to Ixonia		Ixonia to Hwy 51		Airport Track		Madison to LaCrosse		Miss. River Basin		River to St Paul		Quantity	Amount
						Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount		
9.0 Curves																					
9.1 Elevate & Surface Curves	per mile	42																			
9.2 Curvature Reduction	per mile	284																			
9.3 Elastic Fasteners	per mile	59																			
Total Curve Upgrade Cost																					
Total Upgrade Cost					$8,017,527		$2,784,605		$1,441,026		$364,416		$49,686		$1,256,666		$308,000		$1,813,128		$8,017,527

Tri State 185 MPH Technology

D-3 Milwaukee/Rochester/St Paul

Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnew	1.2AHSR	1.2BHSR	1.3T&S33	Elevate	1.7Fence	Land
Chicago	0	85.7	85.70				85		61	24	85
Watertown Sub	85.70	119.00	33.30	0			33	0	33	0	33
Madison	0.00	40.00	40.00				40			40	40
Airport	0.00	3.00	3.00				3			3	3
Wisconsin	0.00	135.70	135.70				135.7			135.7	135.7
Minnesota	0.00	117.00	117.00				117			117	117
Union Pacific	0.00	10.00	10.00				10		10	10	10
Union Pacific	10.00	11.60	1.60				1.6		1.6	1.6	1.6
Merriman Park	407.4	410.2	2.80				2.8		2.8	2.8	2.8
Total			429.10	0.00	0.00	0.00	428.10	0.00	108.40	334.10	428.10

Definition of Units

1.1 HSRex	High Speed Rail trackwork on Existing Roadbed with a unit cost of $873,000 per mile
1.2 HSRnew	High Speed Rail trackwork on New Roadbed (Existing Right of Way) with a unit cost of $932,000 per mile
1.2AHSR	High Speed Rail trackwork on New Roadbed (New Right of Way) with a unit cost of $1,376,000 per mile
1.2BHSR	High Speed Rail trackwork on New Roadbed (Double Track) with a unit cost of $2,308,000 per mile
1.3T&S33	Timber and Surface with 33% Tie Replacement with a unit cost of $136,000 per mile
1.7Fence	Fencing of High Speed Rail Route on both sides with a unit cost of $49,000 per mile
Land	Miles of Land required for construction of a high speed rail route at specifed unit costs

Segment 1 Chicago to Milwaukee

Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnew	1.2AHSR	1.2BHSR	1.3T&S33	Elevate	1.7Fence	Land
Chicago	0	85.7	85.70				85		61	24	85

Segment 2 Milwaukee to Ixonia

Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnew	1.2AHSR	1.2BHSR	1.3T&S33	Elevate	1.7Fence	Land
Watertown Sub	85.70	119.00	33.30	0			33	0	33	0	33

Segment 3 Ixonia to Hwy 51

Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRnew	1.2AHSR	1.2BHSR	1.3T&S33	Elevate	1.7Fence	Land
Madison	0.00	40.00	40.00				40			40	40

page 2											
Segment 4 Airport											
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRne	1.2AHSR	1.2BHSR	1.3T&S33	Elevate	1.7Fence	Land
Airport	0.00	3.00	3.00				3			3	3
Segment 5 Madison to LaCrosse											
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRne	1.2AHSR	1.2BHSR	1.3T&S33	Elevate	1.7Fence	Land
Wisconsin	0.00	135.70	135.70				135.7			135.7	135.7
Segment 6 Mississippi River Basin											
Miepost for the basin are included within the Minnesota Subdivision											
Segment 7 Mississippi River to St Paul											
Subdivision	Begin MP	End MP	miles	1.1HSREx	1.2HSRne	1.2AHSR	1.2BHSR	1.3T&S33	Elevate	1.7Fence	Land
Minnesota	0.00	117.00	117.00				117			117	117
Union Pacific	0.00	10.00	10.00				10		10	10	10
Union Pacific	10.00	11.60	1.60				1.6		1.6	1.6	1.6
Merriman Park	407.4	410.2	2.80				2.8		2.8	2.8	2.8
Total			131.40	0.00	0.00	0.00	131.40	0.00	14.40	131.40	131.40

Tri-State Phase II HSR Feasibility Study				
19-Jan-99				
D-3 Rochester Route Route 185 MPH				
Proposed Station Modifications and Maintenance Facilities				
Station	*Type*	*Recommended Acti*	*Cost ($000)*	
Milwaukee Union Station	Terminal	Renovation	$ 1,000	
Brookfield/Watertown	Full Service	Renovation	$ 500	
Madison	Terminal	New	$ 2,000	
Wisconsin Dells	Full Service	Renovation	$ 500	
Tomah	Full Service	New	$ 1,000	
LaCrosse	Full Service	New	$ 1,000	
Rochester	Terminal	New	$ 2,000	
St Paul Union Station	Terminal	Major Renovations	$ 2,000	
Maintenance Facility	185 MPH Technology	New	$ 162,000	
Summary				
2.0 Stations				
2.1 Full Service - New	each	$1,000	2	$2,000
2.2 Full Service - Renovated	each	$500	2	$1,000
2.3 Terminal - New	each	$2,000	3	$6,000
2.4 Terminal - Renovated	each	$1,000	1	$1,000
2.5 Maintenance (110 MPH technology)	each	$10,000		
2.5A Maintenance (150 MPH technology)	each	$86,000		
2.5B Maintenance (185 MPH technology)	each	$162,000	1	$162,000
2.6 Stations Chicago to Milwaukee	LS	$20,428	1	$20,428
Total Station Cost				$192,428

Tri-State Phase II HSR Feasibility Study

19-Jan-99

BRIDGES

D-3 Rochester Route 150 MPH

Recommended Action for Bridges Under and Bridges Over

Segment 1 Chicago to Milwaukee

Subdivision	Begin MP	End MP	miles	Recommended Treatment
Chicago	0	45	45	Elevated Structure
Chicago	70	85.7	16	Elevated Structure
Total			61	

Summary Bridges Under	Unit Cost	Quantity	Amount
Chicago to Milwaukee	$39,000	61	$2,379,000

Segment 2 Milwaukee to Ixonia

Subdivision	Begin MP	End MP	miles	Recommended Treatment
Watertown sub	86.00	119	33	Elevated Structure

Summary Bridges Under	Unit Cost	Quantity	Amount
Milwaukee to Ixonia	$39,000	33	$1,287,000

Segment 3 Ixonia to Madison

Location	North GPS	Lat min	West GPS	Long min	Recommended Action
Reese Lane	43.14133	8.48	88.60283	36.17	2 Lane Bridge Under
Stream	43.14133	8.48	88.62100	37.26	Minor River
Rockvale Road	43.14133	8.48	88.63633	38.18	2 Lane Bridge Under
Oconomowoc R	43.14117	8.47	88.64317	38.59	Major River
CR P	43.14117	8.47	88.64583	38.75	2 Lane Bridge Under
CR E	43.14117	8.47	88.64717	38.83	2 Lane Bridge Under
Hwy P	43.14117	8.47	88.65117	39.07	4 Lane Rural Expressway Under
CR P	43.14100	8.46	88.65617	39.37	2 Lane Bridge Under
Spooner Rd	43.14100	8.46	88.67533	40.52	2 Lane Bridge Under
CR D	43.14100	8.46	88.68517	41.11	2 Lane Bridge Under
Little Coffee Rd	43.14100	8.46	88.70533	42.32	2 Lane Bridge Under
Johnson Creek	43.14100	8.46	88.70833	42.50	Minor River
Page 2					
Location	North GPS	Lat min	West GPS	Long min	Recommended Action

CR X	43.14100	8.46	88.71550	42.93	2 Lane Bridge Under
Airport Rd	43.14083	8.45	88.73100	43.86	2 Lane Bridge Under
I-26	43.14083	8.45	88.73517	44.11	4 Lane Rural Expressway Under
High Rd	43.14067	8.44	88.73767	44.26	2 Lane Bridge Under
RR	43.14067	8.44	88.75550	45.33	Rail Under
Co. Hwy. CR Y	43.14067	8.44	88.75867	45.52	2 Lane Bridge Under
Oconomowoc R	43.14067	8.44	88.76417	45.85	Major River
Stream, from Ha	43.14050	8.43	88.77950	46.77	Minor River
CR A	43.14050	8.43	88.78583	47.15	2 Lane Bridge Under
Stream	43.14017	8.41	88.81800	49.08	Minor River
West Rd	43.14000	8.40	88.83150	49.89	2 Lane Bridge Under
CR O	43.13983	8.39	88.84317	50.59	2 Lane Bridge Under
Rock River	43.13950	8.37	88.87233	52.34	Major River
Prairie Lane	43.13933	8.36	88.88283	52.97	2 Lane Bridge Under
CR G	43.13900	8.34	88.90117	54.07	2 Lane Bridge Under
Hill View Lane	43.13867	8.32	88.91400	54.84	2 Lane Bridge Under
Springer Rd	43.13850	8.31	88.93100	55.86	2 Lane Bridge Under
SR 89	43.13817	8.29	88.94750	56.85	4 Lane Rural Expressway Under
Abendroth Rd	43.13833	8.30	88.95100	57.06	2 Lane Bridge Under
Road (Stony Brc	43.13833	8.30	88.96117	57.67	2 Lane Bridge Under
Stony Brook Cre	43.13750	8.25	88.97717	58.63	Minor River
Newville Rd	43.13717	8.23	88.98550	59.13	2 Lane Bridge Under
CR O	43.13667	8.20	88.99200	59.52	2 Lane Bridge Under
Boxelder Rd	43.13550	8.13	89.01483	0.89	2 Lane Bridge Under
Tower Line Rd	43.13417	8.05	89.04083	2.45	2 Lane Bridge Under
Missouri Rd	43.13350	8.01	89.05083	3.05	2 Lane Bridge Under
Spring Creek	43.13250	7.95	89.06800	4.08	Minor River
SR 73	43.13233	7.94	89.07217	4.33	4 Lane Rural Expressway Under
Oak Park Rd	43.13117	7.87	89.09617	5.77	2 Lane Bridge Under
Ridge Rd	43.12933	7.76	89.13033	7.82	2 Lane Bridge Under
Pierceville Rd	43.12800	7.68	89.15367	9.22	2 Lane Bridge Under

Page 3					
Location	**North GPS**	**Lat min**	**West GPS**	**Long min**	**Recommended Action**
CR TT	43.12750	7.65	89.16717	10.03	2 Lane Bridge Under
Koshkonong Cre	43.12650	7.59	89.18350	11.01	Minor River
CR N	43.12583	7.55	89.19850	11.91	4 Lane Rural Expressway Under
CR T	43.11883	7.13	89.24250	14.55	2 Lane Bridge Under
Thorson Rd	43.11800	7.08	89.24617	14.77	2 Lane Bridge Under
Forest Oak Dr	43.11633	6.98	89.25333	15.20	2 Lane Bridge Under
Reiner Rd	43.11333	6.80	89.26583	15.95	2 Lane Bridge Under
Felland Rd	43.11100	6.66	89.27583	16.55	2 Lane Bridge Under
I-90	43.10867	6.52	89.28617	17.17	4 Lane Urban Expressway Under
Fairview Drive	43.10800	6.48	89.28933	17.36	2 Lane Bridge Under
Eagle Drive	43.10750	6.45	89.29067	17.44	2 Lane Bridge Under
N. Thompson Di	43.10583	6.35	89.30067	18.04	2 Lane Bridge Under
Nakoosa Trail	43.10700	6.42	89.31867	19.12	2 Lane Bridge Under
I-51	43.10683	6.41	89.31650	18.99	4 Lane Urban Expressway Under
RR Waterloo Sp	43.10683	6.41	89.32350	19.41	Rail Under
Summary Bridges Under		**Unit Cost**	**Quantity**	**Amount**	
4 Lane Urban Expressway		$4,848	2	**$9,696**	
4 Lane Rural Expressway		~ $4,036	5	**$20,180**	
2 Lane		$3,062	39	**$119,418**	
Rail		$3,062	2	**$6,124**	
Minor River		$812	7	**$5,684**	
Major River		$8,118	3	**$24,354**	
Total Bridges Under Segment 3				**$185,456**	
Page 4					
Segment 4 Airport Track					
Name	*North*	*West*	*Type of Bridge*		
Highway 51	43.10733	89.33867	4 Lane UrbanExpressway - Over		
Anderson	43.12117	89.35233	2 Lane Under		
Pankrantz	43.12150	89.35233	2 Lane Under		
International Lar	43.12250	89.35300	2 Lane Under		
Summary Bridges Under		**Unit Cost**	**Quantity**	**Amount**	
2 Lane Under		$3,062	3	**$9,186**	
Summary Bridges Over		**Unit Cost**	**Quantity**	**Amount**	
4 Lane Urban Expressway		10,516	1	**$10,516**	

Page 4					
Location	**North GPS**	**Lat min**	**West GPS**	**Long min**	**Recommended Action**
Segment 5 Madison to Mississippi River Basin					
Location	**North GPS**	**Lat min**	**West GPS**		**Recommended Action**
Buckley Rd	43.17500	10.50	89.34233	20.54	2 Lane Bridge Under
Daentl Rd	43.18333	11.00	89.34200	20.52	2 Lane Bridge Under
Unnamed Rd	43.19100	11.46	89.34167	20.50	2 Lane Bridge Under
I-90 (existing)	43.19150	11.49	89.34150	20.49	4 Lane Urban Expressway Under
Hwy 19	43.19433	11.66	89.34133	20.48	4 Lane Rural Expressway Under
Duraform Lane	43.19950	11.97	89.34167	20.50	2 Lane Bridge Under
Sequoia Dr	43.21800	13.08	89.34233	20.54	2 Lane Bridge Under
Gray Rd	43.22350	13.41	89.34250	20.55	2 Lane Bridge Under
Vinburn Rd	43.23800	14.28	89.34317	20.59	2 Lane Bridge Under
Commerce St	43.24633	14.78	89.34150	20.49	2 Lane Bridge Under
CR DV	43.24767	14.86	89.34150	20.49	2 Lane Bridge Under
Yahara River	43.25017	15.01	89.34133	20.48	Minor River
CR V	43.25283	15.17	89.34133	20.48	4 Lane Rural Expressway Under
Selji Rd	43.27450	16.47	89.34783	20.87	2 Lane Bridge Under
CR DM	43.28117	16.87	89.35083	21.05	2 Lane Bridge Under
Kleinert Rd	43.28967	17.38	89.35450	21.27	2 Lane Bridge Under
Ramsey Rd	43.29600	17.76	89.35767	21.46	2 Lane Bridge Under
Unnamed Rd	43.30183	18.11	89.36050	21.63	2 Lane Bridge Under
CR K (intersects	43.30850	18.51	89.36317	21.79	2 Lane Bridge Under
Prairie Lane	43.31650	18.99	89.36717	22.03	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS		Recommended Action
Kampen Rd	43.32317	19.39	89.37033	22.22	2 Lane Bridge Under
Unnamed St	43.33583	20.15	89.37583	22.55	2 Lane Bridge Under
SR 60	43.33767	20.26	89.37683	22.61	4 Lane Rural Expressway Under
Richards Rd	43.35233	21.14	89.38350	23.01	2 Lane Bridge Under
CR O	43.37917	22.75	89.40267	24.16	4 Lane Rural Expressway Under
CR Q	43.38100	22.86	89.40550	24.33	2 Lane Bridge Under
Rowan Creek	43.38600	23.16	89.40967	24.58	Minor River
McMullen Rd	43.38867	23.32	89.41183	24.71	4 Lane Rural Expressway Under
Kent Rd	43.40267	24.16	89.41483	24.89	2 Lane Bridge Under
Hinkson Creek	43.41100	24.66	89.41467	24.88	Major River
Thompson Rd	43.41717	25.03	89.41483	24.89	2 Lane Bridge Under
Bilkie Rd	43.43183	25.91	89.41483	24.89	2 Lane Bridge Under
CR B	43.43900	26.34	89.41483	24.89	2 Lane Bridge Under
Morse Rd	43.44967	26.98	89.41483	24.89	2 Lane Bridge Under
Rocky Run Cree	43.45233	27.14	89.41483	24.89	Minor River
CR J	43.45817	27.49	89.41483	24.89	2 Lane Bridge Under
Murry Rd	43.48967	29.38	89.41483	24.89	2 Lane Bridge Under
Unnamed Rd	43.50033	30.02	89.41483	24.89	2 Lane Bridge Under
SR 51	43.51833	31.10	89.42283	25.37	4 Lane Rural Expressway Under
CP Rail	43.53683	32.21	89.43617	26.17	Rail Under
Ontario St	43.54033	32.42	89.43783	26.27	2 Lane Bridge Under
RR	43.54300	32.58	89.43967	26.38	Rail Under
Wauona Trail	43.54500	32.70	89.44100	26.46	2 Lane Bridge Under
RR	43.54683	32.81	89.44217	26.53	Rail Under
Superior Street	43.54750	32.85	89.44250	26.55	2 Lane Bridge Under
SR 33 & Agency	43.54900	32.94	89.44350	26.61	4 Lane Rural Expressway Under
E Albert Street	43.54967	32.98	89.44417	26.65	2 Lane Bridge Under
Hamilton Street	43.56133	33.68	89.45467	27.28	2 Lane Bridge Under
SR 51	43.56217	33.73	89.46950	28.17	4 Lane Rural Expressway Under
W. Wisconsin &	43.56317	33.79	89.48667	29.20	2 Lane Bridge Under
SR 39	43.56333	33.80	89.48800	29.28	4 Lane Rural Expressway Under
SR 127	43.56350	33.81	89.49217	29.53	4 Lane Rural Expressway Under
Klappstein Rd	43.56650	33.99	89.54017	32.41	2 Lane Bridge Under
Schultz Rd	43.57467	34.48	89.58450	35.07	2 Lane Bridge Under
Weyh Rd	43.57817	34.69	89.59967	35.98	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS		Recommended Action
Wolpram Rd	43.58533	35.12	89.62933	37.76	2 Lane Bridge Under
Lewiston Statior	43.58833	35.30	89.64133	38.48	2 Lane Bridge Under
New Haven Rd	43.60000	36.00	89.68933	41.36	2 Lane Bridge Under
Peterson Rd	43.60217	36.13	89.69950	41.97	2 Lane Bridge Under
CR O	43.60700	36.42	89.71917	43.15	2 Lane Bridge Under
I-16, I-127 & Wir	43.61200	36.72	89.73933	44.36	4 Lane Rural Expressway Under
Lynch Rd	43.61600	36.96	89.75633	45.38	2 Lane Bridge Under
Bowman Rd	43.61833	37.10	89.76633	45.98	2 Lane Bridge Under
Veteran Drive	43.62200	37.32	89.77300	46.38	2 Lane Bridge Under
Minnesota Aven	43.62400	37.44	89.77550	46.53	2 Lane Bridge Under
Finnegan Avenu	43.62683	37.61	89.77883	46.73	2 Lane Bridge Under
Rt 13	43.62750	37.65	89.77967	46.78	4 Lane Rural Expressway Under
Wisconsin River	43.62767	37.66	89.78000	46.80	Major River
Unnamed Rd	43.62883	37.73	89.78133	46.88	2 Lane Bridge Under
Pioneer Drive	43.62983	37.79	89.78233	46.94	2 Lane Bridge Under
Unnamed Rd	43.63150	37.89	89.78467	47.08	2 Lane Bridge Under
Commercial Ave	43.63483	38.09	89.78833	47.30	2 Lane Bridge Under
CR A	43.63650	38.19	89.79050	47.43	2 Lane Bridge Under
60th St	43.65383	39.23	89.81150	48.69	2 Lane Bridge Under
I-90	43.65467	39.28	89.81267	48.76	4 Lane Urban Expressway Under
Dees Rd	43.67867	40.72	89.84400	50.64	2 Lane Bridge Under
RR	43.68067	40.84	89.84500	50.70	Rail Under
Gilmore Creek	43.68150	40.89	89.84600	50.76	Minor River
Southern Rd	43.69900	41.94	89.86883	52.13	2 Lane Bridge Under
Industrial Ave	43.70617	42.37	89.88133	52.88	2 Lane Bridge Under
Honeyaire St	43.71367	42.82	89.89417	53.65	2 Lane Bridge Under
CR RR	43.71450	42.87	89.89567	53.74	4 Lane Rural Expressway Under
Unnamed St	43.71717	43.03	89.90050	54.03	2 Lane Bridge Under
W. Limits Rd	43.72167	43.30	89.90817	54.49	2 Lane Bridge Under
Tracy Creek	43.72317	43.39	89.91117	54.67	Minor River
Holtzlander Cre(	43.72900	43.74	89.92133	55.28	Minor River
24th Avenue	43.73300	43.98	89.92833	55.70	2 Lane Bridge Under
Unnamed Rd	43.74850	44.91	89.95517	57.31	2 Lane Bridge Under
I-90	43.76167	45.70	89.97500	58.50	4 Lane Urban Expressway Under
CR N	43.76183	45.71	89.95850	57.51	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS		Recommended Action
55th Street	43.76700	46.02	89.98233	58.94	2 Lane Bridge Under
Unnamed Rd	43.76917	46.15	89.98533	59.12	2 Lane Bridge Under
County Hwy N	43.77400	46.44	89.99200	59.52	2 Lane Bridge Under
Lemonweir Rive	43.78617	47.17	90.00883	0.53	Major River
19th Ave	43.79433	47.66	90.01983	1.19	2 Lane Bridge Under
I-82	43.79617	47.77	90.02233	1.34	4 Lane Rural Expressway Under
CR G	43.80350	48.21	90.03250	1.95	2 Lane Bridge Under
17th Ave	43.80533	48.32	90.03483	2.09	2 Lane Bridge Under
15th Ave	43.82000	49.20	90.05517	3.31	2 Lane Bridge Under
47th St	43.82950	49.77	90.06800	4.08	2 Lane Bridge Under
CR O	43.83217	49.93	90.07183	4.31	4 Lane Rural Expressway Under
Prairie Rd	43.84683	50.81	90.09183	5.51	2 Lane Bridge Under
Meredith Rd	43.86217	51.73	90.11167	6.70	2 Lane Bridge Under
42nd St	43.87667	52.60	90.13033	7.82	2 Lane Bridge Under
N. Germantown	43.88533	53.12	90.14150	8.49	2 Lane Bridge Under
SR 80	43.88717	53.23	90.14400	8.64	4 Lane Rural Expressway Under
RR	43.89083	53.45	90.14883	8.93	Rail Under
Hog Island Rd/8	43.89350	53.61	90.15250	9.15	2 Lane Bridge Under
CR M	43.90783	54.47	90.17750	10.65	4 Lane Rural Expressway Under
7th Ave	43.91183	54.71	90.19167	11.50	2 Lane Bridge Under
8th Ave	43.91733	55.04	90.21150	12.69	2 Lane Bridge Under
CR C	43.92017	55.21	90.22150	13.29	2 Lane Bridge Under
Unnamed	43.92600	55.56	90.24300	14.58	2 Lane Bridge Under
CR H	43.93783	56.27	90.28333	17.00	2 Lane Bridge Under
RR	43.93800	56.28	90.28367	17.02	Rail Under
Kleichinger Rd	43.94200	56.52	90.29650	17.79	Rail Under
33rd Lane	43.93250	55.95	90.31883	19.13	Rail Under
32nd Court	43.95833	57.50	90.34750	20.85	Rail Under
Allen Creek	43.96150	57.69	90.35767	21.46	Minor River
CR PP	43.96683	58.01	90.37433	22.46	4 Lane Rural Expressway Under
Indian Creek	43.97117	58.27	90.38800	23.28	Minor River
Field Rd	43.97483	58.49	90.39933	23.96	2 Lane Bridge Under
Bear Creek	43.97500	58.50	90.39983	23.99	Rail Under
CR N	43.97600	58.56	90.40300	24.18	2 Lane Bridge Under
I-90	43.97617	58.57	90.41517	24.91	4 Lane Urban Expressway Under

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Location	North GPS	Lat min	West GPS		Recommended Action
CP Rail	43.97367	58.42	90.42567	25.54	Rail Under
SR 12	43.97283	58.37	90.42900	25.74	2 Lane Bridge Under
28th Ct	43.97200	58.32	90.43183	25.91	4 Lane Rural Expressway Under
Center St	43.96967	58.18	90.44167	26.50	2 Lane Bridge Under
Krever Creek	43.96450	57.87	90.46283	27.77	Minor River
CR C	43.96367	57.82	90.46617	27.97	2 Lane Bridge Under
Cinder St	43.95700	57.42	90.49383	29.63	2 Lane Bridge Under
Council Creek	43.95550	57.33	90.49967	29.98	Minor River
SR 131	43.95417	57.25	90.50483	30.29	4 Lane Rural Expressway Under
CR M	43.94617	56.77	90.53767	32.26	2 Lane Bridge Under
Lemonweir Rive	43.94517	56.71	90.54233	32.54	Minor River
Cinder Ave	43.94317	56.59	90.55233	33.14	2 Lane Bridge Under
21st Ave	43.94050	56.43	90.57233	34.34	2 Lane Bridge Under
Cliff Ave	43.94000	56.40	90.57633	34.58	2 Lane Bridge Under
CR T	43.93983	56.39	90.57767	34.66	2 Lane Bridge Under
Chub Creek	43.93967	56.38	90.57817	34.69	Minor River
19th Ln	43.93717	56.23	90.59717	35.83	2 Lane Bridge Under
16th Dr	43.93467	56.08	90.66217	39.73	2 Lane Bridge Under
CR A	43.93517	56.11	90.68500	41.10	4 Lane Rural Expressway Under
14th Dr	43.93550	56.13	90.70000	42.00	2 Lane Bridge Under
Cliff Court	43.93600	56.16	90.71433	42.86	2 Lane Bridge Under
Unnamed	43.93617	56.17	90.71733	43.04	2 Lane Bridge Under
13th Dr	43.93617	56.17	90.72017	43.21	2 Lane Bridge Under
Sanitary Landfill	43.93650	56.19	90.76533	45.92	2 Lane Bridge Under
Cliff Ct	43.93467	56.08	90.77500	46.50	2 Lane Bridge Under
I-90	43.93400	56.04	90.77767	46.66	4 Lane Urban Expressway Under
SR 71	43.93350	56.01	90.78067	46.84	4 Lane Rural Expressway Under
Farmer's Valley	43.93283	55.97	90.78433	47.06	Minor River
John St. (9th St)	43.93050	55.83	90.79583	47.75	2 Lane Bridge Under
S. Water St	43.92767	55.66	90.81067	48.64	2 Lane Bridge Under
SR 27	43.92567	55.54	90.82050	49.23	2 Lane Bridge Under
8th Ct	43.92483	55.49	90.82483	49.49	2 Lane Bridge Under
Unnamed Rd	43.92267	55.36	90.83567	50.14	2 Lane Bridge Under
Little La Crosse	43.91817	55.09	90.85967	51.58	Minor River
Cypress Avenue	43.91400	54.84	90.88067	52.84	2 Lane Bridge Under
CR J	43.90683	54.41	90.92050	55.23	2 Lane Bridge Under

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Location	**North GPS**	**Lat min**	**West GPS**		**Recommended Action**
Fish Creek	43.90533	54.32	90.92833	55.70	Minor River
CR U	43.90317	54.19	90.94133	56.48	2 Lane Bridge Under
Fuchs Rd	43.90000	54.00	90.96067	57.64	2 Lane Bridge Under
La Crosse River	43.89817	53.89	90.97200	58.32	Minor River
SR 162	43.89533	53.72	90.99083	59.45	4 Lane Rural Expressway Under
Dutch Creek	43.89550	53.73	90.99250	59.55	Minor River
Unnamed Rd	43.89717	53.83	91.01483	0.89	2 Lane Bridge Under
Shorewood Cou	43.89967	53.98	91.04483	2.69	2 Lane Bridge Under
Tilson St	43.90567	54.34	91.07233	4.34	2 Lane Bridge Under
SR 16	43.90850	54.51	91.08117	4.87	4 Lane Rural Expressway Under
La Crosse River	43.90850	54.51	91.09367	5.62	Minor River
CR M	43.90800	54.48	91.10133	6.08	2 Lane Bridge Under
Gills Rd	43.91200	54.72	91.12133	7.28	2 Lane Bridge Under
Evenson Rd	43.91350	54.81	91.12850	7.71	2 Lane Bridge Under
Gills Coulee Rd	43.91717	55.03	91.14650	8.79	2 Lane Bridge Under
Tunnel Starts	43.91950	55.17	91.19117	11.47	Tunnel
Tunnel Enes	43.91783	55.07	91.14967	8.98	Tunnel
Mississippi Rive	43.91933	55.16	91.23200	13.92	Mississippi River Bridge
Koss Rd	43.91917	55.15	91.18800	11.28	2 Lane Bridge Under
County Hwy S	43.91933	55.16	91.19667	11.80	2 Lane Bridge Under
MDDS Dr	43.91933	55.16	91.21167	12.70	2 Lane Bridge Under
Cedar Creek La	43.91917	55.15	91.22567	13.54	2 Lane Bridge Under
Summary Bridges Under		**Unit Cost**	**Quantity**	**Amount**	
4 Lane Urban Expressway		$4,848	4	**$19,392**	
4 Lane Rural Expressway		$4,036	23	**$92,828**	
2 Lane		$3,062	115	**$352,130**	
Rail		$3,062	10	**$30,620**	
Minor River		$812	19	**$15,428**	
Major River		$8,118	4	**$32,472**	
Total Bridges Under Segment 5				**$542,870**	
Segment 6 Mississippi River Basin					
		Unit Cost	**Quantity**	**Amount**	
Mississippi River Bridge		$234,000	1	$234,000	
Interstate 90 Dakota Rvier Val		$74,000	1	$74,000	
Total Cost				$308,000	

Segment 7 River to St Paul

C-2 150 MPH Rochester Route

	North	Lat min	West	Long min	Recommended Action
I-90	43.92117	55.27	91.37300	22.38	4 Lane Urban Expressway under
Twp Rd 29	43.92283	55.37	91.38617	23.17	2 Lane Bridge Under
CR 101	43.92317	55.39	91.38767	23.26	2 Lane Bridge Under
Twp Rd 32	43.92450	55.47	91.39833	23.90	2 Lane Bridge Under
Unnamed Rd	43.92483	55.49	91.40067	24.04	2 Lane Bridge Under
Dakota Creek	43.92483	55.49	91.41900	25.14	Minor River
Dakota Creek	43.92500	55.50	91.40283	24.17	Minor River
I-90	43.92550	55.53	91.40683	24.41	4 Lane Urban Expressway under
Dakota Creek	43.92650	55.59	91.41400	24.84	Major River
Little Trout Cree	43.92617	55.57	91.43317	25.99	Culvert included in trackwork
CR 12	43.92450	55.47	91.43750	26.25	2 Lane Bridge Under
CR 104	43.92233	55.34	91.44350	26.61	2 Lane Bridge Under
CR 125	43.92250	55.35	91.47083	28.25	2 Lane Bridge Under
CR 104	43.92233	55.34	91.49100	29.46	2 Lane Bridge Under
I-90	43.92167	55.30	91.49417	29.65	4 Lane Urban Expressway under
Unnamed Rd	43.91883	55.13	91.51050	30.63	Closure
CR 12	43.91850	55.11	91.51300	30.78	2 Lane Bridge Under
PH Twp 13	43.91583	54.95	91.52800	31.68	2 Lane Bridge Under
PH Twp 21	43.91567	54.94	91.55033	33.02	2 Lane Bridge Under
PH Twp 23	43.91650	54.99	91.56083	33.65	2 Lane Bridge Under
PH Twp 25	43.91850	55.11	91.58533	35.12	2 Lane Bridge Under
CR 12	43.92033	55.22	91.60750	36.45	2 Lane Bridge Under
I-90	43.92033	55.22	91.60900	36.54	2 Lane Bridge Under
Money Creek	43.92067	55.24	91.61317	36.79	Culvert included in trackwork
CR 17	43.92600	55.56	91.62033	37.22	2 Lane Bridge Under
Money Creek	43.92667	55.60	91.62100	37.26	Culvert included in trackwork
Wiscoy Twp 4	43.93017	55.81	91.62583	37.55	2 Lane Bridge Under
Unnamed Creek	43.93417	56.05	91.63100	37.86	Culvert included in trackwork
Wilson Twp 11	43.94133	56.48	91.64017	38.41	2 Lane Bridge Under
Unnamed Creek	43.94950	56.97	91.65867	39.52	2 Lane Bridge Under
CR 19	43.95300	57.18	91.67517	40.51	2 Lane Bridge Under
Wilson Twp 29	43.95267	57.16	91.69683	41.81	2 Lane Bridge Under
I-90	43.95250	57.15	91.69850	41.91	4 Lane Urban Expressway under
CR 12	43.95250	57.15	91.70300	42.18	2 Lane Bridge Under
Unnamed Rd	43.95100	57.06	91.72017	43.21	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS		Recommended Action
Unnamed Rd	43.94567	56.74	91.74033	44.42	2 Lane Bridge Under
Twp 9	43.94283	56.57	91.76033	45.62	2 Lane Bridge Under
Twp 11	43.94217	56.53	91.78017	46.81	2 Lane Bridge Under
CR 25	43.94250	56.55	91.79050	47.43	2 Lane Bridge Under
Unnamed Rd	43.94300	56.58	91.80033	48.02	2 Lane Bridge Under
Twp 21	43.94317	56.59	91.81017	48.61	2 Lane Bridge Under
Unnamed Rd	43.94350	56.61	91.82033	49.22	2 Lane Bridge Under
Twp 19	43.94400	56.64	91.83950	50.37	2 Lane Bridge Under
Rush Creek?	43.94433	56.66	91.85050	51.03	Minor River
CR 25	43.94450	56.67	91.85933	51.56	2 Lane Bridge Under
CR 29	43.94500	56.70	91.87283	52.37	4 Lane Rural Expressway under
Rush Creek	43.94500	56.70	91.87433	52.46	Minor River
Twp 9	43.94533	56.72	91.88950	53.37	2 Lane Bridge Under
Creek ?	43.94367	56.62	91.90167	54.10	Minor River
Twp 13	43.94133	56.48	91.91950	55.17	2 Lane Bridge Under
Twp 15	43.93867	56.32	91.93967	56.38	2 Lane Bridge Under
CR 33	43.93617	56.17	91.95650	57.39	2 Lane Bridge Under
I-90	43.93517	56.11	91.96483	57.89	4 Lane Urban Expressway under
St. Charles Twp	43.93350	56.01	91.97767	58.66	2 Lane Bridge Under
Pine Creek	43.93133	55.88	91.99283	59.57	Culvert included in trackwork
CR 35	43.92983	55.79	92.00433	0.26	2 Lane Bridge Under
CR 117	43.92817	55.69	92.01950	1.17	2 Lane Bridge Under
St. Charles Twp	43.92583	55.55	92.03933	2.36	2 Lane Bridge Under
Unnamed Rd	43.92517	55.51	92.04517	2.71	2 Lane Bridge Under
SR 74	43.92283	55.37	92.06533	3.92	4 Lane Urban Expressway under
Unnamed Rd	43.92250	55.35	92.06983	4.19	2 Lane Bridge Under
Unnamed Rd	43.92233	55.34	92.09350	5.61	2 Lane Bridge Under
CR 130	43.92267	55.36	92.11750	7.05	2 Lane Bridge Under
CR 30	43.92350	55.41	92.13850	8.31	2 Lane Bridge Under
CR 10	43.92750	55.65	92.16850	10.11	4 Lane Rural Expressway under
CR 32	43.92883	55.73	92.17850	10.71	2 Lane Bridge Under
Cr 136	43.93167	55.90	92.19817	11.89	2 Lane Bridge Under
CR 7	43.93700	56.22	92.23800	14.28	4 Lane Rural Expressway under
Unnamed Rd	43.93933	56.36	92.25783	15.47	2 Lane Bridge Under
CR 129	43.93967	56.38	92.27800	16.68	2 Lane Bridge Under
CR 19	43.94017	56.41	92.29817	17.89	2 Lane Bridge Under
75 St SE	43.94067	56.44	92.32800	19.68	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS		Recommended Action
70th Ave SE	43.94033	56.42	92.33800	20.28	2 Lane Bridge Under
I-52/65th Ave SE	43.93967	56.38	92.34783	20.87	4 Lane Urban Expressway under
I-90	43.93783	56.27	92.37150	22.29	4 Lane Urban Expressway under
60th St SE	43.93433	56.06	92.38717	23.23	2 Lane Bridge Under
CR 1	43.92783	55.67	92.40817	24.49	2 Lane Bridge Under
CR 16	43.92383	55.43	92.42050	25.23	2 Lane Bridge Under
CR 20	43.91850	55.11	92.43767	26.26	2 Lane Bridge Under
Unnamed Rd	43.91367	54.82	92.45800	27.48	2 Lane Bridge Under
SR 63	43.90883	54.53	92.48017	28.81	4 Lane Urban Expressway under
CR 8	43.92033	55.22	92.52817	31.69	2 Lane Bridge Under
60th Ave SW	43.93167	55.90	92.55767	33.46	2 Lane Bridge Under
Fort Zumbro Riv	43.93200	55.92	92.55833	33.50	Culvert included in trackwork
CR 126	43.93500	56.10	92.56617	33.97	2 Lane Bridge Under
CR 15	43.93983	56.39	92.57800	34.68	2 Lane Bridge Under
Unnamed Rd	43.94850	56.91	92.59817	35.89	2 Lane Bridge Under
CR 17	43.94983	56.99	92.60117	36.07	2 Lane Bridge Under
CR 3	43.95700	57.42	92.61783	37.07	2 Lane Bridge Under
CR 150	43.96567	57.94	92.63800	38.28	2 Lane Bridge Under
Salem Creek	43.97217	58.33	92.65267	39.16	Minor River
Unnamed Rd	43.97667	58.60	92.66300	39.78	2 Lane Bridge Under
CR 25	43.98317	58.99	92.67800	40.68	2 Lane Bridge Under
CR 15	43.99217	59.53	92.69817	41.89	2 Lane Bridge Under
Unnamed Rd	43.99683	59.81	92.71333	42.80	2 Lane Bridge Under
Unnamed Rd	44.00033	0.02	92.72600	43.56	2 Lane Bridge Under
CR 13	44.00350	0.21	92.73850	44.31	2 Lane Bridge Under
CR 10	44.00783	0.47	92.75400	45.24	2 Lane Bridge Under
CR 13	44.00883	0.53	92.75817	45.49	2 Lane Bridge Under
CR 14	44.01417	0.85	92.77833	46.70	2 Lane Bridge Under
CCR 9	44.02050	1.23	92.79867	47.92	2 Lane Bridge Under
RR	44.02633	1.58	92.81417	48.85	Rail Under
CR 9	44.02783	1.67	92.81867	49.12	2 Lane Bridge Under
I-14	44.03000	1.80	92.82417	49.45	4 Lane Rural Expressway under
Airport Rd N	44.03533	2.12	92.83883	50.33	2 Lane Bridge Under
North St NE	44.03717	2.23	92.84350	50.61	2 Lane Bridge Under
Dodge Center C	44.05033	3.02	92.84583	50.75	Culvert included in trackwork
Dodge Center C	44.05250	3.15	92.84633	50.78	Culvert included in trackwork
Dodge Center C	44.06017	3.61	92.84783	50.87	Culvert included in trackwork

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Location	**North GPS**	**Lat min**	**West GPS**		**Recommended Action**
CR 7	44.06983	4.19	92.84967	50.98	2 Lane Bridge Under
S. Branch Middl	44.07933	4.76	92.85200	51.12	2 Lane Bridge Under
Unnamed Rd	44.10250	6.15	92.85583	51.35	2 Lane Bridge Under
Milliken Creek	44.11250	6.75	92.85783	51.47	Minor River
CR 7/CR 20	44.11667	7.00	92.85850	51.51	2 Lane Bridge Under
CR 22	44.13850	8.31	92.86267	51.76	2 Lane Bridge Under
CR 24	44.15300	9.18	92.86533	51.92	4 Lane Rural Expressway under
Unnamed Rd	44.16617	9.97	92.86800	52.08	2 Lane Bridge Under
Middle Fork Zun	44.16700	10.02	92.86817	52.09	Minor River
CR B	44.01748	1.05	92.86950	52.17	2 Lane Bridge Under
CR B	44.18217	10.93	92.87100	52.26	2 Lane Bridge Under
CR A	44.19683	11.81	92.87367	52.42	2 Lane Bridge Under
N. Branch Middl	44.20167	12.10	92.87467	52.48	Culvert included in trackwork
CR !	44.20417	12.25	92.87517	52.51	2 Lane Bridge Under
Unnamed Rd	44.20633	12.38	92.87550	52.53	2 Lane Bridge Under
CR 117	44.21833	13.10	92.87783	52.67	2 Lane Bridge Under
CR 23	44.24017	14.41	92.88183	52.91	2 Lane Bridge Under
Unnamed Rd	44.25450	15.27	92.88483	53.09	2 Lane Bridge Under
Spring Creek	44.26550	15.93	92.88683	53.21	Culvert included in trackwork
CR 12	44.26900	16.14	92.88750	53.25	2 Lane Bridge Under
Unnamed Rd	44.27900	16.74	92.89167	53.50	2 Lane Bridge Under
Unnamed Rd	44.28217	16.93	92.89367	53.62	2 Lane Bridge Under
SR 60	44.28350	17.01	92.89450	53.67	4 Lane Rural Expressway under
Unnamed Rd	44.28733	17.24	92.89700	53.82	2 Lane Bridge Under
Unnamed Rd	44.29767	17.86	92.90350	54.21	2 Lane Bridge Under
N. Fork Zumbro	44.30217	18.13	92.90650	54.39	Minor River
CR 30	44.31967	19.18	92.91983	55.19	2 Lane Bridge Under
CR 14	44.34033	20.42	92.93817	56.29	2 Lane Bridge Under
Unnamed Rd	44.34150	20.49	92.93917	56.35	2 Lane Bridge Under
Little Cannon Ri	44.35083	21.05	92.94750	56.85	Minor River
CR 44	44.35150	21.09	92.94817	56.89	2 Lane Bridge Under
Unnamed Rd	44.36483	21.89	92.95867	57.52	2 Lane Bridge Under
CR 49	44.37033	22.22	92.96100	57.66	2 Lane Bridge Under
Unnamed Rd	44.38517	23.11	92.96717	58.03	2 Lane Bridge Under
CR 9	44.40667	24.40	92.97600	58.56	4 Lane Rural Expressway under
CR 24	44.41450	24.87	92.97933	58.76	2 Lane Bridge Under
Unnamed Rd	44.43567	26.14	92.98917	59.35	2 Lane Bridge Under

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Location	North GPS	Lat min	West GPS	Long min	Recommended Action
Unnamed Rd	44.44983	26.99	92.99583	59.75	2 Lane Bridge Under
Prairie Creek	44.47083	28.25	93.00583	0.35	Culvert included in trackwork
Unnamed Rd	44.47167	28.30	93.00633	0.38	2 Lane Bridge Under
SR 56	44.47950	28.77	93.00983	0.59	4 Lane Rural Expressway under
320th St W	44.48617	29.17	93.01300	0.78	4 Lane Rural Expressway under
Spring Creek	44.49333	29.60	93.01650	0.99	Culvert included in trackwork
Skiota Trail	44.51167	30.70	93.02500	1.50	2 Lane Bridge Under
Cannon River	44.51600	30.96	93.02733	1.64	Minor River
RR	44.52200	31.32	93.02967	1.78	Rail Under
Chub Creek	44.52300	31.38	93.02983	1.79	Minor River
CR 88	44.52600	31.56	93.03117	1.87	2 Lane Bridge Under
CR 86	44.54383	32.63	93.03750	2.25	4 Lane Rural Expressway under
CR 82	44.55833	33.50	93.04233	2.54	2 Lane Bridge Under
265th St	44.56550	33.93	93.04483	2.69	2 Lane Bridge Under
250th St	44.58733	35.24	93.05250	3.15	2 Lane Bridge Under
CR 80	44.59483	35.69	93.05500	3.30	2 Lane Bridge Under
CR 79	44.59667	35.80	93.05567	3.34	2 Lane Bridge Under
230th St E	44.61650	36.99	93.06200	3.72	2 Lane Bridge Under
S. Branch Vermi	44.61800	37.08	93.06217	3.73	Minor River
SR 50	44.63033	37.82	93.06217	3.73	4 Lane Rural Expressway under
CR 72	44.64483	38.69	93.06250	3.75	2 Lane Bridge Under
CR 66	44.65950	39.57	93.06283	3.77	4 Lane Rural Expressway under
Vermillion River	44.67033	40.22	93.06300	3.78	Minor River
Station Trail	44.68917	41.35	93.06333	3.80	2 Lane Bridge Under
Unnamed Rd	44.69500	41.70	93.06350	3.81	2 Lane Bridge Under
CR 58	44.70300	42.18	93.06350	3.81	2 Lane Bridge Under
165th St	44.71100	42.66	93.06350	3.81	Closure
160th St	44.71750	43.05	93.06333	3.80	2 Lane Bridge Under
156th St	44.72450	43.47	93.06133	3.68	Closure
155th St	44.72600	43.56	93.06067	3.64	2 Lane Bridge Under
153rd St	44.72950	43.77	93.05983	3.59	Closure
152nd St	44.73083	43.85	93.05950	3.57	2 Lane Bridge Under
151st St	44.73233	43.94	93.05900	3.54	Closure
CR 42	44.74067	44.44	93.05667	3.40	4 Lane Rural Expressway under
CR 38	44.74400	44.64	93.05583	3.35	2 Lane Bridge Under
CR 38	44.74750	44.85	93.05467	3.28	2 Lane Bridge Under
135th St	44.75467	45.28	93.05283	3.17	Closure

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Location	North GPS	Lat min	West GPS	Long min	Recommended Action
Start Elevate	44.75467	45.28	93.05283	3.17	Elevated Structure
End Elevate	44.91800	55.08	93.05083	3.05	Elevated Structure
Mississippi Rive	44.91800	55.08	93.05083	3.05	Major River
Location of start and end of elevated structure is approximate.					
Summary Bridges Under			**Unit Cost**	**Quantity**	**Amount**
4 Lane Urban Expressway			$4,848	9	$43,632
4 Lane Rural Expressway			$4,036	13	$52,468
2 Lane			$3,062	125	$382,750
Rail			$3,062	2	$6,124
Minor River			$812	14	$11,368
Major River			$8,118	2	$16,236
Total Bridges Under Segment 7					$512,578
Summary of Bridges Over for Segment 7					
Type			**Unit Cost**	**Quantity**	**Amount**
4 Lane Urban Expressway			10,516	1	$10,516
4 Lane Rural Expressway			2,630		$0
2 Lane			1,971	1	$1,971
Rail			6,572	2	$13,144
Total Bridges Over for Segment 7					$25,631
Summary Bridges Under		**Unit Cost**	**Quantity**	**Amount**	
St Paul		$39,000	14	$546,000	

CROSSINGS D-3 Rochester Route 185 MPH Technology
Page 1
Segment 2 Milwaukee to Ixonia

Segment 2 is elevated. Therefore, no action is required for crossings.

For Segment 3, Ixonia to Hwy 51 the number of private closures was assumed to be similar to the Watertown to Hwy 51 segment determined for the B-2 150 MPH technology

Summary Segment 3	**Unit Cost**	**Quantity**	**Amount**
Private Closure	$60	32	**$1,920**

For Segment 5, Madison to LaCrosse, the number of private closures was assumed to be similar to the Madison to Portage segment and the Portage to River segment determined for the B-2 150 MPH technology

Summary Segment 5	**Unit Cost**	**Quantity**	**Amount**
Private Closure	$60	10	**$600**
Private Closure	$60	46	**$2,760**
Total		56	**$3,360**

Summary Segment 7	**Unit**	**Quantity**	**Amount**
Private Closure	$60	100	**$6,000**

Private Closures is an estimate based on an estimate of private crossings for the entire segment.

TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 6.3
Infrastructure Cost by Category

Appendix 6.3

COSTS BY CATEGORY						
Option: A-1 110 MPH River route						
Item	Trackwork	Bridges	Crossings	Stations	Signals	Total
1.0 Trackwork	392,785					$392,785
2.0 Stations				38,928		$38,928
4.0 Turnouts	4,440					$4,440
5.0 Bridges- Under	-	119,328				$119,328
6.0 Bridges - Over		10,516				$10,516
7.0 Crossings			147,974			$147,974
8.0 Signals			-		103,469	$103,469
9.0 Curves	3,465					$3,465
Total Upgrade Cost	400,690	129,844	147,974	38,928	103,469	$820,905
Option: B-1 110 MPH Rochester Route						
Item	Trackwork	Bridges	Crossings	Stations	Signals	Total
1.0 Trackwork	552,440					$552,440
2.0 Stations				39,928		$39,928
4.0 Turnouts	6,660					$6,660
5.0 Bridges- Under	-	227,932				$227,932
6.0 Bridges - Over		36,147				$36,147
7.0 Crossings			172,640			$172,640
8.0 Signals					108,365	$108,365
9.0 Curves	3,465					$3,465
Total Upgrade Cost	562,565	264,079	172,640	39,928	108,365	$1,147,577
Option: B-2 150 MPH Rochester Route						
Item	Trackwork	Bridges	Crossings	Stations	Signals	Total
1.0 Trackwork	821,938					$821,938
2.0 Stations				115,928		$115,928
4.0 Turnouts	2,220					$2,220
5.0 Bridges- Under		896,718				$896,718
6.0 Bridges - Over		103,183				$103,183
7.0 Crossings			131,892			$131,892
8.0 Signals					177,173	$177,173
9.0 Curves	3,465					$3,465
Total Upgrade Cost	827,623	999,901	131,892	115,928	177,173	$2,252,517

Page 2						
Option: C-2 150 MPH Rochester New Alignment						
Item	Trackwork	Bridges	Crossings	Stations	Signals	Total
1.0 Trackwork	1,020,923					$1,020,923
2.0 Stations				116,428		$116,428
4.0 Turnouts						$0
5.0 Bridges- Under		1,681,268				$1,681,268
6.0 Bridges - Over		157,921				$157,921
7.0 Crossings			99,388			$99,388
8.0 Signals					166,927	$166,927
9.0 Curves						$0
Total Upgrade Cost	1,020,923	1,839,189	99,388	116,428	166,927	$3,242,855
Option: D-3 185 MPH Rochester New Alignment						
Item	Trackwork	Bridges	Crossings	Stations	Signals	Total
1.0 Trackwork	1,507,773					$1,507,773
2.0 Stations				192,428		$192,428
4.0 Turnouts						$0
5.0 Bridges- Under		5,770,090				$5,770,090
6.0 Bridges - Over		116,516				$116,516
7.0 Crossings			11,280			$11,280
8.0 Signals					419,440	$419,440
9.0 Curves						$0
Total Upgrade Cost	1,507,773	5,886,606	11,280	192,428	419,440	$8,017,527

TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 6.4
Conceptual Engineering Bridge Plans

Not Available

TRI-STATE II HIGH SPEED RAIL FEASIBILITY STUDY

Appendix 6.5
Infrastructure Improvements

APPENDIX 6.5

Track Improvements

An inspection of the track from Milwaukee to St. Paul was conducted during a series of visits in 1998. The purpose of the inspection was to determine the present condition of the trackage, assess its suitability to accommodate joint rail freight and passenger operations based on FRA regulations and track safety standards, and gather sufficient data to identify needed infrastructure improvements. The track inspection included the main line of CP Railway from Milwaukee to St Paul, the Waterloo Spur subdivision between Watertown and Madison, the Madison/Portage subdivision between Madison and Portage, the DM&E right-of-way between Winona and Rochester, and the Union Pacific track in the St. Paul area. The inspection was accomplished by walking short segments of the track at several locations. The physical condition of the following were reviewed during the field inspection:

- Cross Ties
  - Average number of defective ties per mile
- Rail
  - Pattern weight
  - Age
  - Jointed or welded
  - Condition (bent, battered, wear)
- Rail Anchors
  - Type
  - Number per rail
  - Effectiveness
- Grade Crossings
  - Number
  - Condition
  - Type crossing surface
  - Type of crossing protection

  - Approximate length
- Bridges
  - General conditions
- Surface and Alignment
  - Low joints
  - Irregular cross level and/or alignment
  - Profile deficiencies
- Ballast Section
  - Full or lean
  - Type ballast (gravel, limestone, granite)
  - Condition (clean or fouled)
- Industrial Side Tracks
  - Number
  - Active or inactive
  - Location
- Railroad Company Side Tracks
  - Type (storage track or passing track)
  - Approximate length
  - Condition (ties, rail, other track material, etc.)
  - Location
- Connections Between the Various Lines
  - Existing
  - Required

In assessing track condition, particular consideration was given to ballast, cross ties, and rail joints. The definition and importance of these elements to the integrity of the track structure are as follows:

Ballast: Ballast supports the track on the roadbed. Generally it consists of crushed rock or similar material which will transmit and distribute the load of the track and railroad rolling equipment to the roadbed. It must provide adequate drainage for the track and maintain proper track cross level, surface, and alignment.

Cross Ties: Cross ties are made of a material to which the rails can be fastened and which support the rails on the ballast. Cross ties can be made of wood, concrete, or steel. Each 39-foot rail segment shall have the following:

1. A sufficient number of cross ties which (in combination) provide effective support to hold the gauge and maintain alignment within prescribed limits.

2. The minimum number and type of cross ties specified, effectively distributed to support the rail segment.

3. At least one cross tie of the type specified located at a rail joint (where two rails are jointed together).

The number of cross ties per 39-foot rail segment that must be in good condition varies by class of track (five cross ties for Class 1 track to 14 cross ties for Class 6 track). In addition, Class 1 and Class 2 track must have one cross tie whose centerline is within 24 inches of the rail joint location, and Classes 3 through 6 shall have one cross tie whose centerline is within 18 inches of the rail joint location.

Rail Joints: Any mismatch of rail ends at rail joints must not be more than ¼" for Classes 1 and 2 track, and not more than 1/8" for Classes 4, 5, and 6 track. If a joint bar (joining the ends of rails at a rail joint) on Classes 3 through 6 track is broken, cracked, or because of wear allows vertical movement of either rail when all bolts are tight, it must be replaced. In case of conventional joined track, each rail must be bolted with at least two bolts in Classes 2 through 6 track, and with at least one bolt in Class 1 track.

Alignment

Route alignment is important to the physical condition of the track structure. Curves restrict speed and increase timetables. For high-speed rail operations, it is essential to minimize the effect of the route curvature on the operations. This can be accomplished by reducing the curvature, increasing the super-elevation, increasing unbalance, and/or the use of tilt technology.

The Tri-State II route for 110 MPH operation will operate on CP Railway trackage. Freight and passenger trains operate over the same trackage at different speeds. Therefore, it is not possible to attain an equilibrium speed for a given curve.

Curve Improvements

Maintaining curves to accommodate both freight and passenger trains operating at different speeds should be considered when selecting the most appropriate speed of operation. For this study, curvature reduction and change in super-elevation was minimized. Any proposed change in super-elevation should be coordinated with CP Railway. The use of passenger equipment with car body tilting technology was assumed for the technology options. An active body tilting system tilts the car body towards the center of the curve via hydraulic cylinders positioned on both sides of the coach. This system allows trains to operate at higher speeds with no increase in super-elevation.

Recommended Track Improvements

The recommended track improvements for each route/technology option are detailed in Appendix 6.2. Generally, the condition of the main line of CP Railway trackage is sufficient to permit increases in speed to 110 mph with minimal improvements to the track infrastructure, such as some tie replacement and ballast renewal. It is anticipated that speeds of 110 mph can be attained in Wisconsin. Due to the rail alignment along the Mississippi River, speeds will be restricted to 90 mph. It is assumed concrete ties will be installed for construction on new alignments.

The track of the DM&E right of way, Madison/Portage subdivision, and Waterloo Spur subdivision is not suitable for high speed rail operation and would need to be completely rebuilt. Exhibits 6.5.1, 6.5.2 and 6.5.3 (respectively) display pictures representative of the condition of the infrastructure in these three sections.

Exhibit 6.5.1
DM&E Track

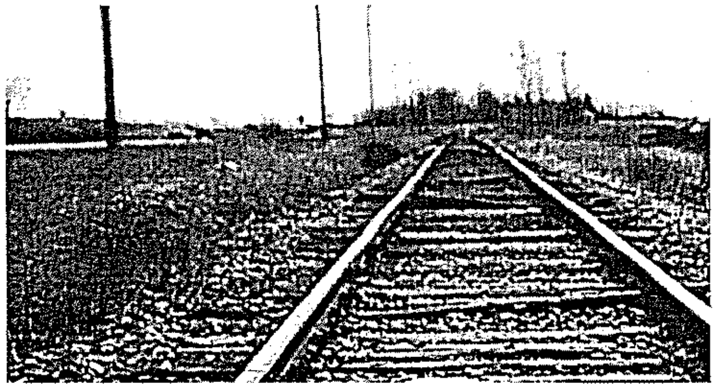


Exhibit 6.5.2
Madison-Portage Subdivision

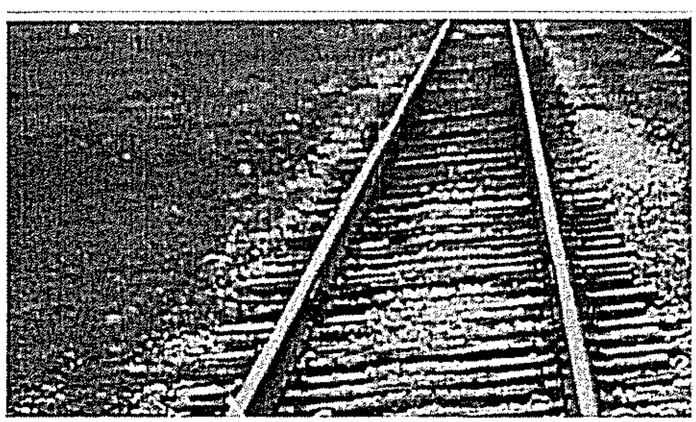
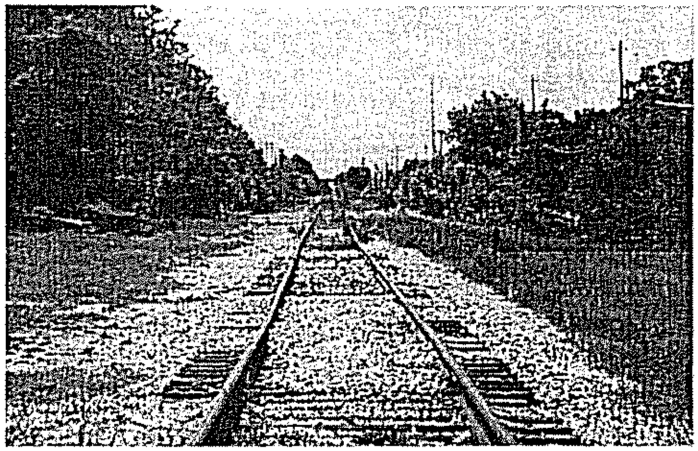


Exhibit 6.5.3
Waterloo Spur Subdivision



Stations

The recommended treatment of each station for each route/technology option is detailed in Appendix 6.2. Based on the technology selected, considerable improvements are required to make platforms compatible with the technology, in addition to substantial improvements in station amenities. Adequate parking is also needed. The engineering assessment (Chapter 3) addressed each station and its requirements. An allowance for improvements developed in the MWRRI was included in the estimate of improvement costs (Appendix 6.2).

Bridges Under

A complete bridge inventory developed for each route/technology option is contained in Appendix 6.2. In order to estimate the cost of new crossings required for new routes or bridge replacements, conceptual engineering plans were developed (Appendix 6.4) for a bridge to carry either single or double tracks over highways, streams, valleys, and rivers. The unit cost basis for these structures is contained in the final unit costs in Appendix 6.1.

Bridges Over

There are several locations where the construction of a bridge over will be necessary. The most notable is the Highway 151 bridge in Madison. The basis of the unit costs is contained in Appendix 6.1.

Crossings

The unit cost for improving public crossings used in this study was $274,000. An evaluation of each crossing was not within the scope of the study. Therefore, a weighted average unit cost was determined that considered the level of improvement associated with public crossings to be related to an existing protection system. For example, if a crossing had signals and gates recently installed, the cost to improve this crossing differed from a crossing that only had signals as protection, or sometimes no protection. An inventory of crossings for each route and a given technology is contained in Appendix 6.2. For crossings on existing track, the crossings identified on the track charts were used to maintain consistency with other categories and may vary slightly from the state lists. Numerous grade crossing issues were addressed in this study and the accepted FRA guidelines are as follows:

Public Crossings – 80 mph to 110 mph

Eliminate redundant or unnecessary crossings and install the most sophisticated traffic control/warning devices compatible with the location; e.g., median barriers, special signing (consider active advance warning signs), four quadrant gates. Automated devices should be equipped with constant warning time.

Public Crossings – 111 mph to 125 mph

Protect rail movement with full-width barriers capable of absorbing the impact of a highway vehicle. Include a fail-safe vehicle detection capability between barriers. Notify approaching trains of warning device or barrier failure or an intruding vehicle in sufficient time for the train to stop short of the crossing without resorting to emergency brake application.

Private Crossings – 80 mph to 110 mph

Close, grade separate, or provide a secured barrier or automatic device; the device or barrier should extend across the entire highway on both sides of the track, and should normally be closed and opened on request if no train is approaching, for a period of time sufficient to cross the track.

Private Crossings – 111 mph to 125 mph

Protect rail movement with full width barrier or gate, normally closed and locked, capable of absorbing impact of a highway vehicle. Gate lock or control should be interlocked with train signal and control system and released by a railroad dispatcher. A fail safe vehicle detection or video system should monitor the area between the barriers. The crossing should be equipped with a direct link telephone to the railroad dispatcher.

Private Crossings – Above 125 mph

Close or grade separate all private rail crossings. The unit cost used for grade crossings is shown in Appendix 6.1. The unit costs compare favorably with the construction cost to install several full quadrant gates in North Carolina.

Signals and Communications

State-of-the-art signal and communications systems are necessary to successfully implementing high-speed technology in the Tri-State Corridor. It is necessary to properly coordinate freight and passenger operations in order to permit joint service to share the same track. Several studies are currently underway in the Midwest to evaluate different technologies. The Illinois Department of Transportation, in cooperation with the FRA and the AAR, are developing a Positive Train Control system on a 120-mile segment of the Union Pacific corridor between Chicago and St. Louis. This project will require four years to complete at a cost of $60 million. The project will involve using the Nationwide Differential Global Positioning System to automatically locate each train. Additionally, the U.S Department of Transportation through the FRA, Michigan Department of Transportation, and Amtrak undertook a $23 million project in

1995 to implement a High Speed Positive Train Control System on a 71-mile portion of the Chicago to Detroit corridor between Kalamazoo and Grand Beach, Michigan. The Illinois project uses the Automated Train Control System (ATCS), whereas the Michigan project uses the Incremental Train Control System (ITCS). The selection of a system for the Tri-State corridor has been deferred until the results of these studies are finalized. Conservative per mile unit costs have been developed based on discussions with representatives of the various state Departments of Transportation in the Midwest, Amtrak, and equipment manufacturers.