Information Item

DATE:	December 14, 2017
TO:	Technical Advisory Committee – Planning Subcommittee
PREPARED BY:	Steve Peterson, Manager of Highway Planning (651-602-1819)
SUBJECT:	2040 TPP Update – Preliminary Draft Highway Chapter

Attached is the preliminary draft of Chapter 5: Highway Investment Direction and Plan for TAC Planning review, prepared as part of the 2040 TPP Update. This memo summarizes the key changes to the chapter, including the following:

- Updated key statistics, trends and recent highway improvements.
- Increased highway funds provided by the 2017 Legislature and the FAST Act.
- Added new 2019-2022 freight projects selected through the Minnesota Highway Freight Program.
- Gained a better understanding of the local preservation investments being made as analyzed in the County Arterial Preservation Study.
- Prioritized key regional highway investments, including the following:
    - The recently completed Principle Arterial Intersection Conversion Study prioritized needed improvements on non-freeway principle arterials.
    - The MnPASS III study identified Tier 1, 2, and 3 investment priorities for MnPASS corridors.
    - The CMSP IV study identified 59 mobility and safety problem on MnDOT's trunk highway system. These problems can be addressed in the short term, with limited dollars and will have a payback period of under 12 years.

Council staff will take comments on this draft from TAC Planning, TAC and TAB and other stakeholders before releasing a revised draft for public comment in spring 2018. Please contact Katie White (katie.white@metc.state.mn.us) for questions on how to submit comments on the initial draft.

Chapter 5

Highway Investment Direction and Plan

The Region's Existing Highway System

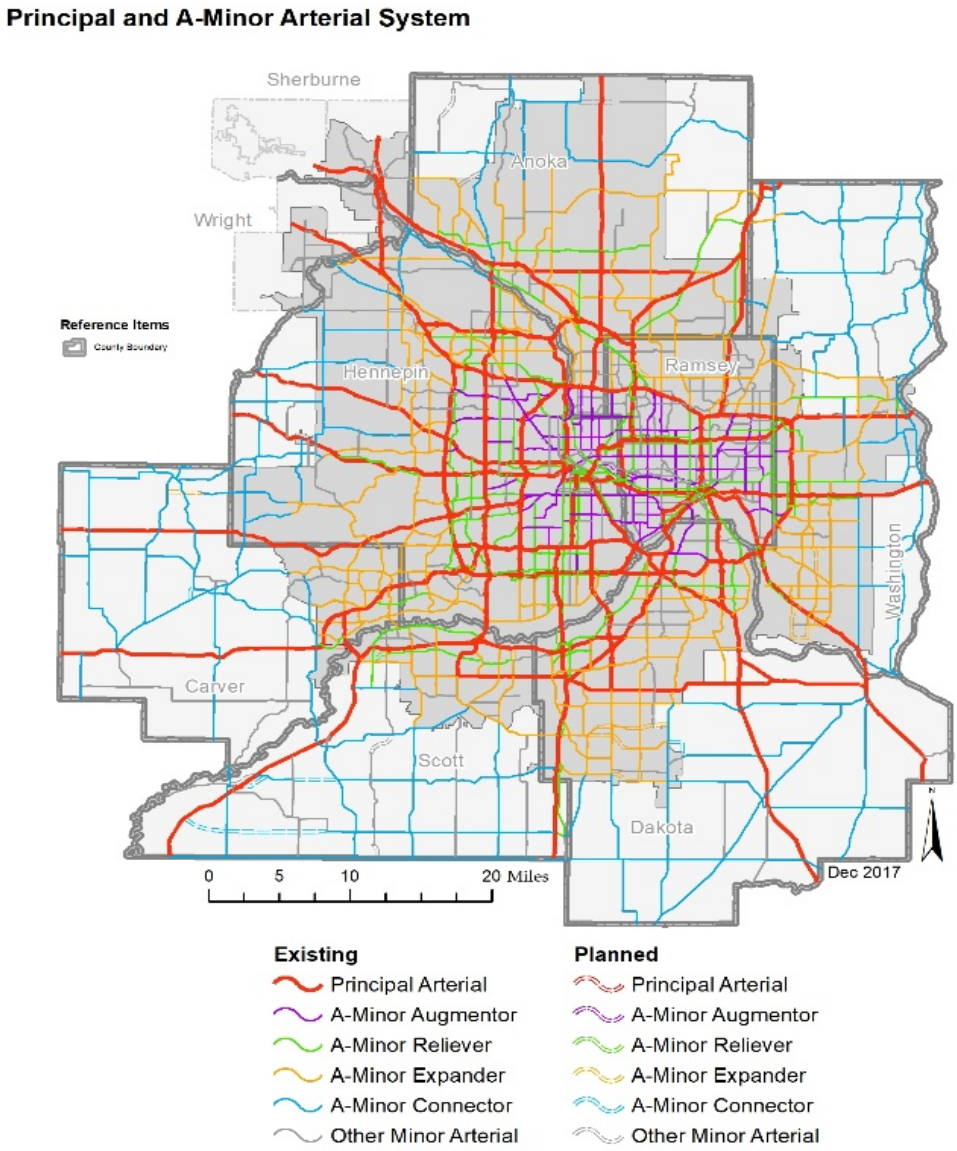
Residents and businesses view a safe and efficient highway system as an essential part of a transportation system. Highways support and contribute to the variety of travel options that the federal government, the state government, and the region acknowledge is required for a sustainable metropolitan area. Virtually all people use roads and almost all freight travels on a highway at some point during its trip.

This chapter deals primarily with the highways designated as principal arterials (see Figure 5-1), sometimes called the Metropolitan Highway System. These roads also make up the federally-designated National Highway System (NHS). MnDOT owns and operates the great majority of the principal arterials, while counties and the City of St. Paul own the remaining six of them. Principal arterials are generally limited-access highways and freeways such as Interstate 94 and U.S. Highway 10.

A-minor arterial roadways, which are critical to support and supplement principal arterials and provide access to jobs, education, and industry, are also addressed by policies in this plan (see Figure 5-1). The A-minor arterials provide less mobility than the principal arterials, but provide more access to other roadways and land uses. The A-minor arterial system is divided into four subclassifications (see Appendix D for definitions and a discussion of highway functional classification [*link to Highway Functional Classification*]). These roadways are also important as first-last mile freight connections between freight-generating businesses and the principal arterial system. Examples of A-minor arterials include MN 51/Snelling Avenue, MN 5, and Scott County State Aid Highway 21 (CSAH 21)/Dakota County 60. Counties own the majority of A-minor arterials (70%), with MnDOT owning 20% and cities owning the remaining 10%.

Together the principal and A-minor arterials make up the Regional Highway System. The Regional Highway System makes up only 2,600 of the region's 17,500 miles (15%), but carries most of the region's motor vehicle traffic (75% of average daily vehicle miles traveled), and 53% of all bus miles traveled (see Table 5-1). The Regional Highway System makes up a vast majority of the federal aid highway system for the region.

Figure 5-1: Principal and A-Minor Arterial System



Beyond the principal arterials and A-minor arterials, the other minor arterials, collectors, and local streets total 14,900 centerline miles (see Table 5-1). They make up almost 85% of road mileage in the region and are the responsibility of local governments. ~~Overall, the greater Twin Cities region has the eighth eighth-largest number of centerline miles of road per person in the United States. This comparatively high proportion of roadway isroadway coverage exists partly because our region has some of the least dense patterns of urban development. This low-level~~

~~of density requires more miles of roadway, especially local streets, to provide access to the land uses.~~

Table 5-1: Usage by Functional Classification

	Total miles	% of total road miles	% of vehicle miles traveled (all)	% of vehicle miles traveled (buses)
Principal Arterial Highways	700	4%	50%	20%
A-Minor Arterial Highways	1,900	11%	25%	33%
Other highways and roads	14,900	85%	25%	47%
Total roads	**17,500**	**100%**	**100%**	**100%**

How the Highway System has changed since the Last Plan

As shown in Figure 5-2, several mobility projects have opened to traffic since the last plan was updated in January 2015. ~~The Minnesota Laws 2008 Chapter 152 bridge improvement, the federal American Recovery and Reinvestment Act and TIGER programs, and 2013 Corridors of Commerce programs advanced several of the projects. However, these intermittent programs are not dedicated sources of funding long term~~. Five major highway mobility projects completed in the region are highlighted below.

Figure 5-2. Major Mobility Projects Since 2015

1. MnDOT completed a $98 million construction project on I-35E in the fall of 2015 between Maryland Avenue in Saint Paul and Little Canada Road in Little Canada. This project replaced the pavement and bridges at six crossing points in the corridor. MnDOT used this as an opportunity to add a MnPASS lane in each direction generally throughout the project limits. This project highlights the priority the region places on preserving a mature highway system and strategically addressing mobility when opportunities present themselves. The efficiencies found in combining bridge and pavement preservation work along with mobility improvements led to significant cost savings. MnPASS lanes serve to add capacity like traditional general purpose lanes, but also provide a congestion-free alternative for high-occupancy vehicle travel such as transit and carpooling. In addition, they also provide a congestion-free alternative to vehicles willing to pay during periods of peak congestion. The MnPASS lanes were extended further north on I-35E in 2017 as part of another preservation project.

2. In November of 2016 a construction project was completed along I-494 between I-94 and I-394 in Plymouth and Maple Grove. This project, which cost approximately $86 million, invested in long term pavement fixes, bridge replacement and repairs, and added a through lane in each direction between MN 55 and I-94/I-694 to match up with an existing six-lane section. This project leveraged the preservation investment to cost-effectively invest in congestion mitigation.
3. A new bridge crossing the St. Croix River between Oak Park Heights, Minnesota and St. Joseph, Wisconsin opened to traffic on August 2, 2017, replacing the St. Croix Lift Bridge for highway traffic. The new crossing cost approximately $636 million including the bridge and approach work in each state. This investment improves traffic safety, supports interstate commerce, and eases congestion in the St. Croix River Valley, especially in downtown Stillwater. The project also provides an alternate route for travelers when the I-94 bridge between Hudson, Wisconsin and Lakeland, Minnesota (just to the south of the project) is under construction or shut down due to an incident.
4. In the summer of 2017 an $81 million construction project connected MN 610 from Hennepin County 81 to I-94. This project completed the last long-planned segment of this highway, including an interchange at MN 610 and Maple Grove Parkway and an overpass at I-94 and 105th Avenue. The result of this investment is increased highway capacity, an alternate route during severe congestion or incidents on I-94, support for economic development, and improved movement of freight in the region.
5. In November of 2017 MnDOT competed a project along I-694 between US 10 and I-35E that reconstructed the pavement and added a lane in each direction to continue the six-lane beltway in the cities of Shoreview and Arden Hills. This project cost approximately $35 million and is another example of leveraging a long-term pavement fix to achieve cost-effective congestion relief. Earlier projects to reconstruct the interchanges at I-35E and at US 10/MN 51 were planned in order to accommodate this improvement. This corridor previously experienced significant congestion, which negatively impacted freight movement on this major freight corridor for trucks traveling through the Twin Cities.

Beyond the five projects described above, other major highway mobility projects opened ~~or construction started~~ since 2015 include the following:

1. I-94 from MN 101 to MN 241– add one lane in each direction (Rogers and St. Michael)
2. MN 100 from 36th St to I-394 – replace bridges, reconstruct pavement, and add southbound through-lane (St. Louis Park)
3. MN 101 river crossing – raise road out of floodplain and replace bridge, add one lane in each direction, and improve connection to Carver County 61 (Shakopee and Chanhassen)

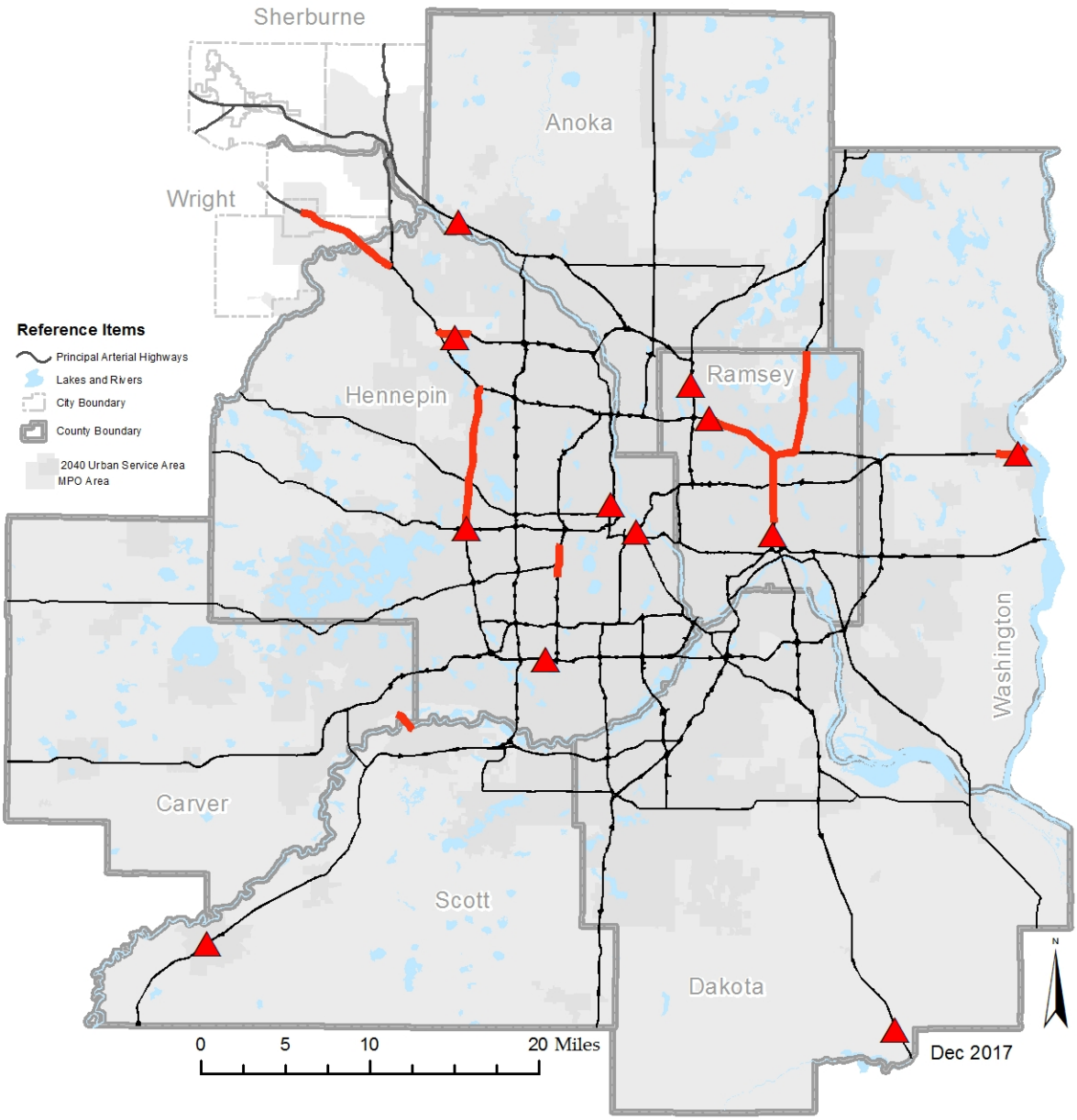
4. US 169 from MN 62 to MN 55 – replace US 169 Bridge over Nine Mile Creek, rehabilitate pavement, and improve interchange (Edina, Minnetonka, Hopkins, St. Louis Park, Golden Valley and Plymouth)

Interchanges opened or improved since 2015:

1. I-35E/Cayuga Street (St. Paul)
2. I-35W/7th Street (Minneapolis)
3. I-35W/Ramsey County H (Arden Hills and Moundsview)
4. US 169/Scott County 3 (Belle Plaine)
5. US 10/Armstrong Boulevard (City of Ramsey)
6. US 52/Dakota County 86 (north of Cannon Falls)

Figure 5-2: Major Mobility Projects Completed Since 2015

Major Mobility Projects Completed Since 2015



Major Mobility Projects Types

Interchange

Roadway

Spot mobility improvements identified through the Congestion Management Safety Plan (CMSP) process opened ~~or advancing~~ since 2015:

1. I-694/US 10 two-lane entrance to eastbound I-694 (Arden Hills)
2. I-94/3rd Street two-lane entrance to westbound I-94 (Minneapolis)
3. MN 51/Larpenpenteur Avenue added turn lanes (Falcon Heights)
4. MN 100/MN 55 extended turn lane on each exit (Golden Valley)
5. I-35E/Diffley Road added second left turn lane to southbound exit (Eagan)
6. I-394/I-494 split combined westbound exit into collector-distributer roadway (Minnetonka)
7. MN 61/MN 55 added second eastbound left turn lane (Hastings)
8. MN 36/MN 120 extended eastbound left turn lane (North St. Paul)
9. I-694/MN 120 added turn lanes (Maplewoood, Mahtomedi, White Bear Lake and Oakdale)

Substantial regional highway planning has also occurred since 2015. These efforts have broadened the region's understanding of the system and the issues facing it. Many of the studies were regionwide prioritization efforts of a specific highway investment type. The results of many of these efforts are being used to inform the investment decisions in both the Current Revenue Scenario and the Increased Revenue Scenario. Some of these efforts include:

1. Principal Arterial Intersection Conversion Study
2. Congestion Management Safety Plan 4
3. MnPASS 3
4. Highway Truck Corridors Study
5. Statewide Freight System and Investment Plan
6. County Arterial Preservation Study
7. 20-Year Statewide Multimodal Transportation Plan
8. 20-Year Minnesota State Highway Investment Plan

Highway Investment Direction

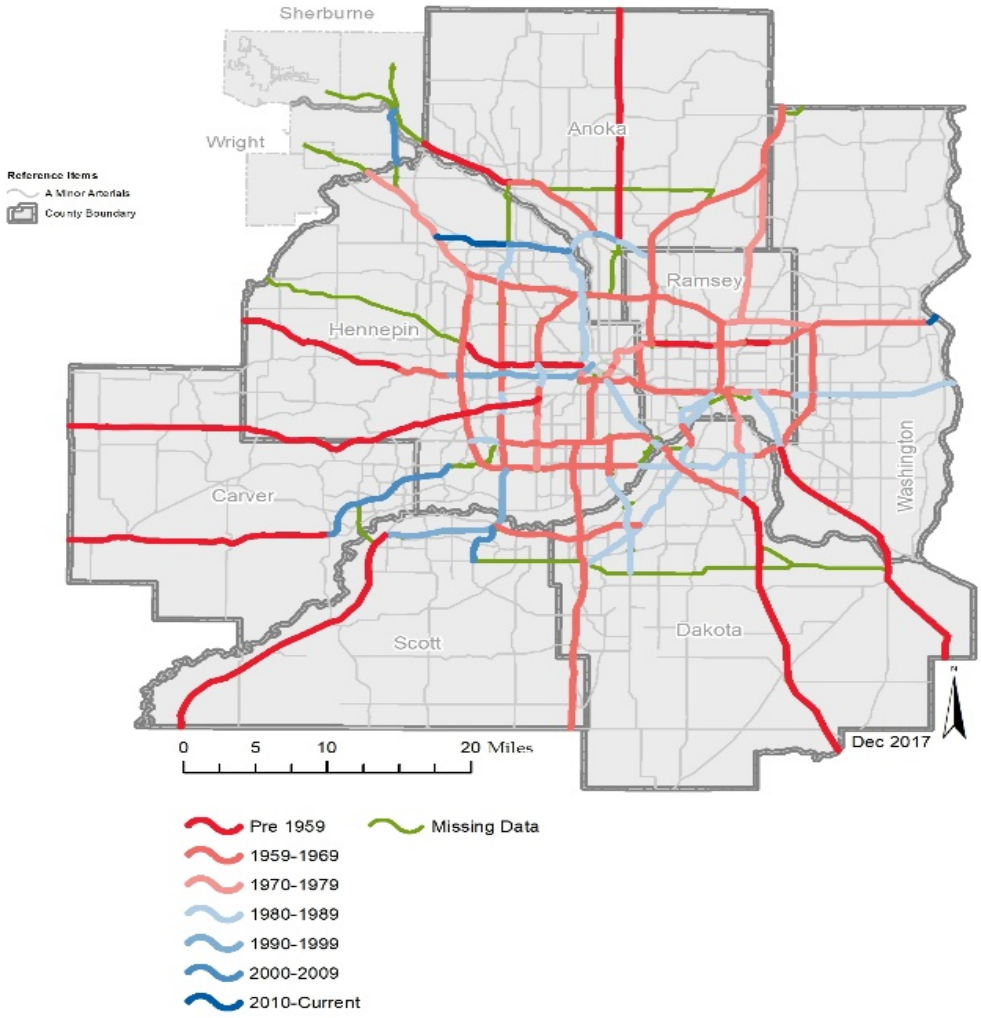
The region's principal arterial system has developed significantly since the 1950s and is now a well-developed and managed ~~freeway~~ system. Over the last decade, the region's approach to improving the system has changed given the large amount of funding required to operate, maintain, and rebuild the existing system ~~that exists, especially as costs are anticipated to grow faster than revenues~~.

Within the modern age of highways, since approximately 1959, many of the region's principal arterial highways in the most densely populated areas were built before 1980 (see Figure 5-3). In the less densely populated border parts of the region many of the principal arterial highways

were constructed before 1959. With nearly all of the region's principal arterial highways greater than 40 years old and significant portions more than 60 years old, the region has entered a part of the lifecycle of many highways where significant investments are needed to preserve their condition.

Figure 5-3

Principal Arterial Roadway Age



Similarly, many of the region's A-minor arterials have pavement originally constructed from the 1950s to the 1970s (see Table 5-2). This pavement is reaching a comparable point in its lifecycle where significant preservation costs are coming due. Other large parts of the A-minor arterial

system were constructed in the 1990s and 2000s as those parts of the region developed and became more densely populated.

Table 5-2: A-Minor Arterials Pavement Construction

	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s	2010s	Sum
Miles Constructed	180	127	699	959	673	576	767	910	684	5,575
Percent	3%	2%	13%	17%	12%	10%	14%	16%	12%	100%

While the region must continue to operate, maintain, and rebuild the existing system – giving priority to the National Highway System – these investments alone will not accommodate the demand of a growing region. Anticipated population and job growth is forecast to push highway traffic to even higher levels. Table 5-3 shows that daily vehicle trips and miles traveled are forecast to increase 29% and 23%, respectively, by 2040. Figure 5-4 illustrates observed 2015 congestion and Figure 5-5 illustrates forecasted congestion (one hour per day or more where the traffic volume exceeds the roadway's capacity) on the principal arterial system in 2040 based on the highway and transit investments described in the Current Revenue Scenario. Additional investment performance outcomes are summarized in Chapter 12, "Transportation System Performance Evaluation" [*insert link*].

Table 5-3: Daily Vehicle Trips and Miles Traveled, ~~2010~~ 2015 and 2040 Update Table

	~~2010~~2015	2040 Current Revenue Scenario	Change	Percent
Population	2,850,000	3,673,860	+823,860	+29%
Daily Vehicle Trips	~~6~~7,600,000	9,776,000	+2,~~152~~176,000	+~~28~~29%
Daily Vehicle Miles Traveled	72,900,000	89,420,000	+16,520,000	+23%
Daily Vehicle Miles Traveled per Resident	25.6 miles per resident within the 7-county region	24.3 miles per resident within the 7-county region	-1.3 miles per resident within the 7-county region	-5%

Figure 5-4: 2013 Principal Arterial Congestion Update Map and Text

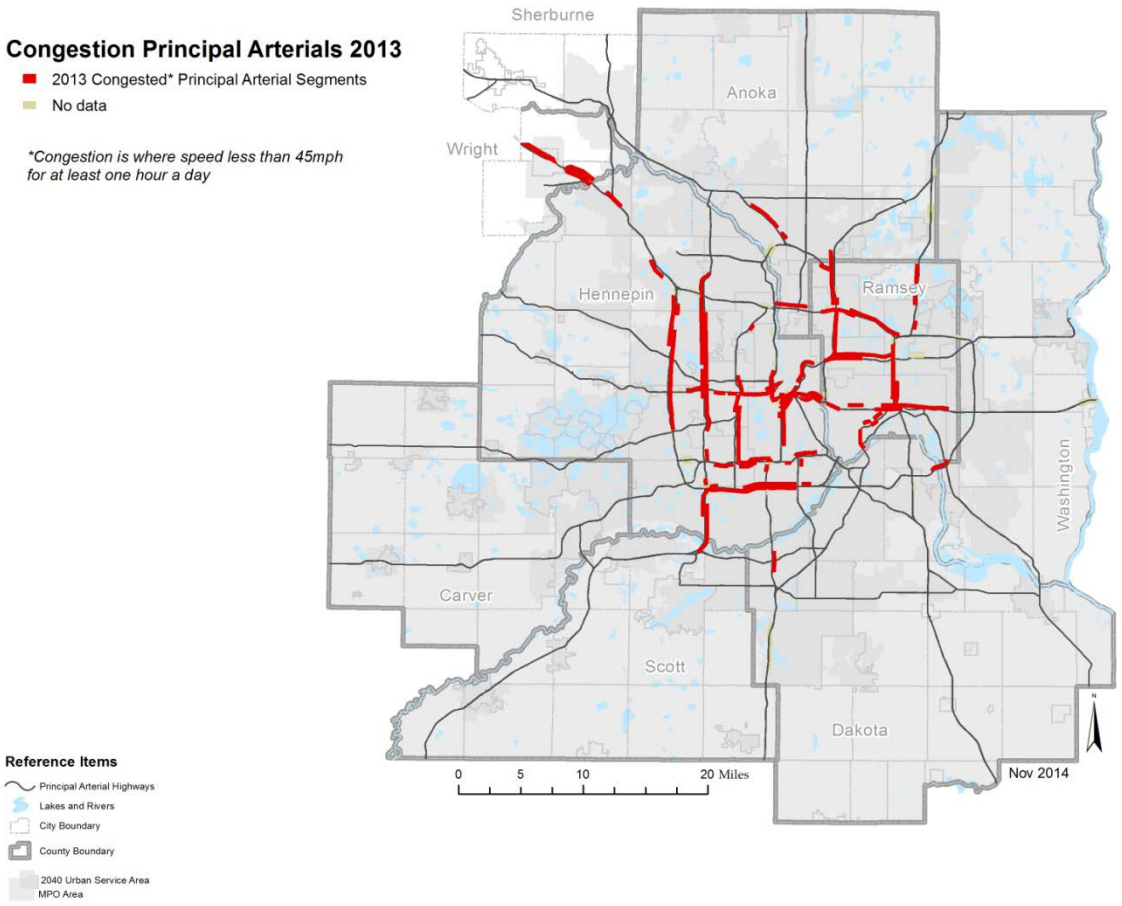
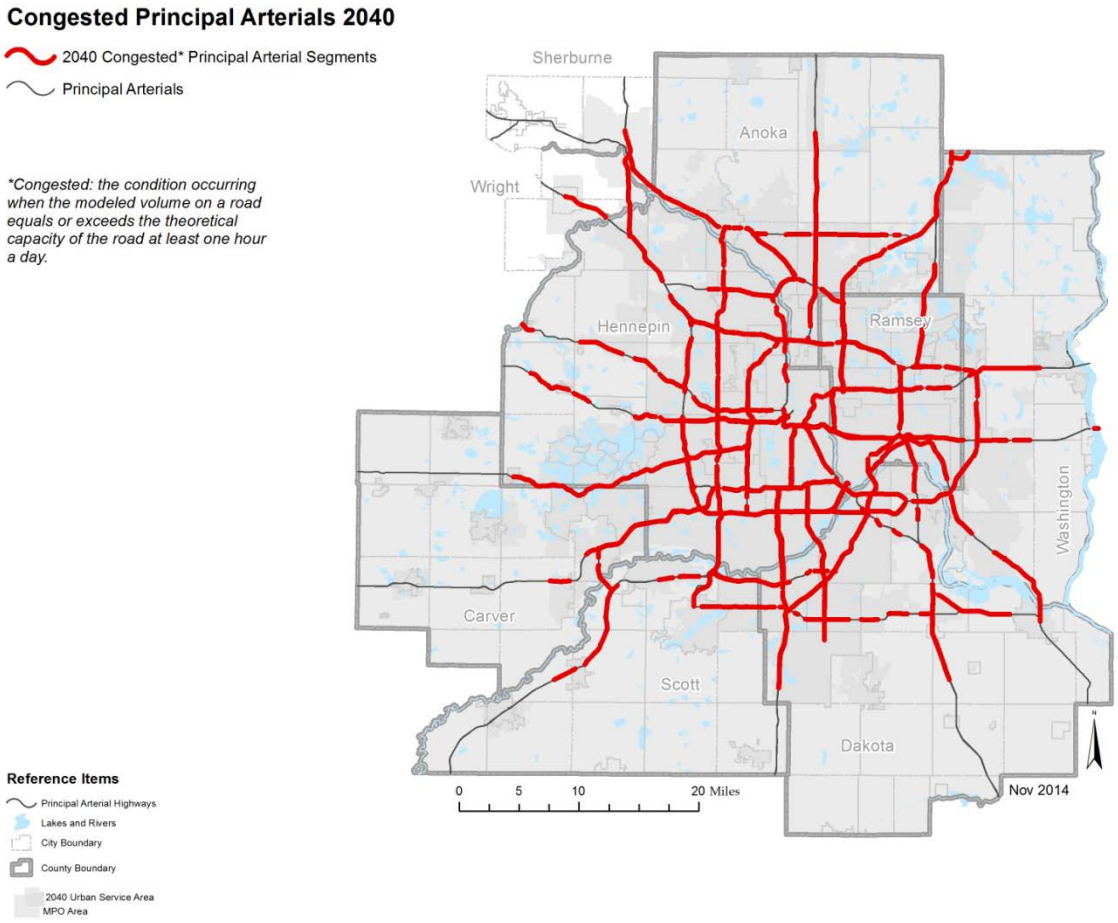


Figure 5-5: 2040 Congested Principal Arterials for Current Revenue Scenario Update Map



In order to be good stewards of public investments, the region must invest in highways strategically, focusing on affordable, multimodal, and flexible solutions that prioritize addressing existing problems throughout the Regional Highway System. The investments must consistently work toward achieving the multiple outcomes, goals, and objectives identified in *Thrive MSP 2040* and the Transportation Policy Plan. These goals and objectives include improving safety and mobility for all people and freight; managing highway travel demand; minimizing travel time; increasing trip reliability; enhancing travel options; and integrating with land use and other regional systems [*insert link to Goals and Objectives*]. Implementing these solutions will require strong collaboration among the region's transportation partners.

Prioritizing investments is mandatory in today's environment of limited fiscal resources. The metropolitan area is required by federal law to prepare a long-range transportation plan and a four-year Transportation Improvement Program (TIP) in which estimated revenues and proposed investments are balanced. This *2040 Transportation Policy Plan* refers to the balanced investment plan as the "Current Revenue Scenario" (also often called the "fiscally constrained plan"). The Minnesota Department of Transportation (MnDOT), in cooperation with the

Council, identified and estimated the revenues and costs for the state highway operations, maintenance, and capital investments in this plan. As part of the update to this plan, the Council worked with the seven counties to estimate revenue and costs to preserve pavement on the county-owned principal arterials and minor arterials through the 2040 horizon year.

Federal law also permits, but does not require, the identification of additional projects that would be funded if additional revenues were made available. This plan refers to these additional investments as the "Increased Revenue Scenario" (also known as the "Illustrative Scenario").

Table 5-4 summarizes the highway system investment prioritization factors that were ranked highest by policymakers, transportation professionals, and the general public during the extensive 2040 TPP public engagement process in 2015. The first two factors listed below – Safety and Security and Operate, Maintain, and Rebuild – are underlying requirements when planning for all regional highway investments and were used by the Council and MnDOT in developing the Current Revenue Scenario. All of the factors in Table 5-4 will also be used to ensure investments in the "Increased Revenue Scenario" help meet the multiple outcomes, goals, and objectives identified in *Thrive MSP 2040* and this plan.

Table 5-4: Relationship of Regional Highway System Investment Prioritization Factors to TPP Goals and Thrive MSP 2040 Outcomes

Highway System Investment Prioritization Factor	Description of Investment Factor and 2040 TPP Goals and Objectives Advanced	Primary *Thrive* Outcome Supported				
		Stewardship	Prosperity	Equity	Livability	Sustainability
Safety and Security Operate, Maintain, and Rebuild	These investment factors are requirements, not prioritization factors, for all regional highway investments. These types of investments advance all goals and objectives in the Transportation Policy Plan.	✓	✓	✓	✓	✓
Improves Economic Vitality	Highways provide most of the access to and within our region. These types of investments advance the "Competitive Economy" goals and objectives.		✓		✓	✓

Highway System Investment Prioritization Factor	Description of Investment Factor and 2040 TPP Goals and Objectives Advanced	Primary *Thrive* Outcome Supported				
		Stewardship	Prosperity	Equity	Livability	Sustainability
Improves Critical Regional Highway System Connectivity	Our region has a well-developed and managed ~~freeway~~ highway system. We need to identify and address critical regional highway connections that are missing or inadequate in the system. These types of investments advance the "Access to Destinations" goal and objectives.		✓	✓		✓
Improve Regional Highway System Travel Time Reliability	Investments like MnPASS and those made to minor arterial highways seek to provide an affordable and reliable alternative to highway congestion. These types of investments advance the "Access to Destinations" goal and objectives.		✓	✓		✓
Supports Job/Population Growth Forecasts and Local Comprehensive Plans	Highways provide foundational access to land. The region's principal and A-minor arterial highways addressed in this plan provide more limited access to larger areas of land, while local streets provide direct access to parcels. These types of investments advance the "Access to Destinations" and "Transportation and Land Use" goals and objectives.		✓	✓	✓	
Regional Balance of Investments	Highway investments should be balanced across the region and over time, and benefits shared across all communities and users, to move toward the goals and objectives of "Healthy Communities "and "Stewardship."	✓	✓		✓	

The following highway investment philosophy addresses the Regional Highway System including the principal arterial and A-minor arterial systems. Given the limited funds available for the transportation system, wise and rigorous investment direction is needed to ascertain and implement the most effective and timely projects. Over the past 15 years, the region and the state have cooperated to revise their highway investment philosophy to address increased

usage, reduced transportation revenues, and increased needs for both preservation and expansion. The key components of this investment philosophy include the following:

1. The overall priority for the region is to operate, maintain, and preserve the existing Regional Highway System.
2. Along with preservation activities, safety improvements continue to be the highest priority investment on the Regional Highway System.
3. Given the projected population and job growth of the region, mobility projects must also be planned and constructed to ensure that people and freight can efficiently move throughout the region.
4. Since most of the total funds available are being used on preservation of the system, these preservation projects should be used as the catalyst to address other identified safety, freight, bicycle, pedestrian, and mobility needs. Integrating these other needs with preservation projects minimizes cost, reduces inconvenience to the traveling public by coordinating separate needs into one construction project, and addresses multiple policy objectives.
5. There may be locations where there are significant mobility or safety needs, but where no preservation project is anticipated. Stand-alone safety projects should be the next priority after preservation. After safety, priority should be given to stand alone mobility projects, then multimodal investments.
6. Where mobility needs are identified, agencies should first explore lower cost solutions such as traffic management technologies, travel demand management, or increased transit service in the corridor. Next, agencies should explore spot mobility improvements such as turn lanes, alternative intersection designs, auxiliary lanes, frontage roads, or better managing access. If none of these options is sufficient for the level of the problem, then MnPASS lanes, priced dynamic shoulders, or increasing capacity on adjacent local system should be evaluated. If MnPASS does not resolve the problem, then additional capacity should be considered.
7. Investments should be made in lower cost projects that produce high benefits, even though these projects may not completely resolve the existing problem recognizing diminishing returns to higher investments. In many cases examined in the early work on CMSP, it was found resolving the last 10% of a problem required a higher proportion of funds. Alternative intersection designs are one way to foster cost savings along with right sizing the investments to the level of the problem. The freed-up funds from the cost savings can then be used to address other needs on the system, thereby stretching the region's transportation funds further.
8. Funding should focus on addressing today's problems given the limited funding and the backlog of existing, unresolved transportation needs. Future needs must be anticipated, but projects should be prioritized to address existing problems before problems that are forecasted to occur in 2040 due to growth.
9. The existing infrastructure and right-of-way should be used to the maximum extent possible when projects are designed and implemented. Right-of-way purchases for

transportation projects can negatively affect local businesses and residents and should therefore be minimized.

10. The timing of regional projects should be coordinated with local projects to combine multiple projects where appropriate and in other cases to avoid having multiple projects along nearby parallel corridors at the same time.

The region's highway investment factors and highway investment philosophy are put into practice through the technical criteria used in regional studies that ultimately lead to funding decisions. The Congestion Management Safety Plan 4 Study used safety and mobility performance measures to seek small scale, targeted, high return-on-investment improvements that could be made on MnDOT's highway system within the region. The MnPASS 3 Study used similar performance measures to develop potential MnPASS corridors that would especially benefit from the transit and High Occupancy Vehicle (HOV) advantages. The Principal Arterial Intersection Conversion Study used a data-driven approach that considered mobility, safety, and other factors to provide the region with a prioritized list for possible grade separation projects on non-freeway principal arterials. Finally, the Regional Truck Highway Corridor Study identified the most important highways in the region for freight movement based on truck usage and proximity to freight generating land uses.

The highway system investment prioritization factors shown in Table 5-5 are used in the above-mentioned studies. The results of these studies are then used to help make investment decisions in the following ways:

- CMSP 4: Study results are used to select projects for MnDOT's spot mobility set-aside, which continues through 2040. Points are also awarded in the Regional Solicitation for projects at CMSP locations identified in the study.
- MnPASS 3 Study: Study results are used to select projects for MnDOT's $50M per year set-aside for MnPASS that ends in 2024. The study also helps to identify MnPASS priorities for the Increased Revenue Scenario.
- Principal Arterial Intersection Conversion Study: Points are awarded in the Regional Solicitation and MnDOT's Transportation Economic Development Program depending on the prioritization level. The study results also inform Strategic Capacity Enhancement priorities for the Increased Revenue Scenario and the Interchange Approval Process in Appendix F.
- Regional Highway Truck Corridor Study: Points are awarded in the Regional Solicitation and MnDOT's Transportation Economic Development Program depending on the prioritization tier identified in the study. Projects are also required to be on one of the three tiers in the study to be eligible to pursue Minnesota Highway Freight Program funds

Table 5-5: Regional Studies and Investment Prioritization Factors

Highway System Investment Prioritization Factor	Study and Solicitation Criteria			
	CMSP 4 Study	MnPASS 3 Study	Principal Arterial Intersection Conversion Study	Regional Truck Highway Corridor Study
Safety and Security Operate, Maintain, and Rebuild	Frequency and severity of crashes	Implemented through leveraging preservation investments	Critical crash rate index, observed safety deficiencies or concerns, crash frequency, crash severity	
Improves Economic Vitality	Narrowly scoped projects, targeted solutions	Proximity to employment centers, construction cost	Need for new infrastructure, HCAADT	Truck volumes, percent of total volumes that are trucks
Improves Critical Regional Highway System Connectivity	Duration of congestion	Severity of congestion, connections to other MnPASS corridors & major destinations	Connection to a principal or A-minor arterials, supportive of Regional Bicycle Transportation Network	
Increases Regional Highway System Travel Time Reliability	Travel time reliability	Express commuter bus demand	Priority for mobility in region, volume and capacity factors, volume-capacity ratio for existing and alternatives, supportive of transit	
Supports Job/ Population Growth Forecasts and Local	Final evaluation by benefit-cost ratio	2040 mobility benefits	Local planning support, existing land use	Proximity to freight land use clusters and key regional freight

Comprehensive Plans				facilities like intermodal yards
Regional Balance of Investments	Small scale solutions allow for broad distribution	Building towards a regional system	Serving growth areas	

Current Revenue Scenario Investments

While the investment direction in this plan applies to all of the Regional Highway System, the Highway Investment Plan section focuses primarily on investments on the state highway system, those principal and A-minor arterials owned and operated by the Minnesota Department of Transportation, which is made up of the Interstate, U.S., and state trunk highways.

The Highway Investments section is divided into ~~10~~ five primary highway investment categories for the "Current Revenue Scenario" and the "Increased Revenue Scenario."

Highway Investment Categories

1. Maintenance and operation
~~1. Program support~~
2. Preservation of existing highway assets
3. Safety
4. Regional mobility
    a. Traffic management technologies
    b. Spot mobility
    c. MnPASS
    d. Highway strategic capacity enhancements
    e. ~~Regional mobility improvements: Highway access investments~~
5. Multimodal
    a. Freight
    b. Bicycle and pedestrian infrastructure

~~The first six categories of highway investment – operate and maintain; program support; rebuild and replace highway assets; specific highway safety improvements; highway bicycle and accessible pedestrian improvements; and traffic management technologies - are focused on the existing highway system. These investments improve the existing system but do not add physical highway capacity, although some of these improvements, such as traffic management~~

~~technology, can improve traffic flow without adding physical capacity. Operating, maintaining, rebuilding, and replacing the significant public investment in the existing highway system is the highest priority for highway investment.~~

~~As the highway system is being operated, maintained, and rebuilt to a responsible level, cost effective capacity improvements can and should be considered. When highway capacity issues are identified, regional transportation partners should first work to apply traffic management technologies to improve traffic flow without adding physical highway capacity.~~

~~If physical capacity is needed, the next category of investment should be to investigate implementing lower cost/high-return-on-investment spot mobility improvements. Spot mobility improvements include smaller, lower-cost projects such as lane striping, improved signal timing, or adding turn lanes. If traffic management technologies and spot mobility improvements do not address the highway capacity issue identified, adding more physical capacity – expansion improvements – should be explored.~~

~~Expansion improvements include new or extended MnPASS lanes, strategic capacity enhancements, and highway access investments. The regional objective of providing a congestion-free, reliable option for transit users, carpoolers and those willing to pay through MnPASS lanes is the region's priority for expansion improvements. General purpose lane strategic capacity enhancements should only be considered if adding capacity through MnPASS lanes has been evaluated and found to not be feasible, the improvement is affordable, and the improvement is approached with a lower cost/high-return-on-investment philosophy.~~

~~This plan refers to the collection of traffic management technology investments, lower cost/ high-return-on-investment spot mobility improvements, MnPASS lanes, strategic capacity enhancements, and highway access investment categories as "regional mobility improvements."~~

This section has also been updated to include competitively selected Regional Solicitation highway projects, Highway Safety Improvement (HSIP) projects, and Minnesota Highway Freight Program projects. Regionally significant projects on the local system must also be listed in this Plan and are shown on the maps. For highways, these are primarily A-minor arterial lane expansion projects greater than one mile in length or other projects using federal funds (e.g., Minnesota Highway Freight Program). One A-minor arterial expansion project that is greater than one mile is shown in Figure 5-11 in the Strategic Capacity Enhancements section.

The Transportation Advisory Board (TAB) to the Metropolitan Council selects Regional Solicitation projects within the seven-county region (Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington counties) through a prioritization process that considers the outcomes, goals, and objectives of *Thrive MSP 2040* and this policy plan. ~~The Regional Solicitation has~~

~~historically awarded in the range of $50M of federal funds annually to local highway improvement and safety projects across the region.~~ Because the Regional Solicitation selects projects only ~~three~~ four to ~~four~~ five years in advance of construction, long range projects are not shown in the text of this plan, but are included in Appendices B~~, C and E in the regional~~ (Transportation Improvement Program ~~(~~orTIP), C (Long-Range Project List) and ~~in the~~ E (R~~r~~egional air quality conformance analysis) [*insert links*]. Federal highway funds for county and city-owned highway projects in the contiguous, urbanized areas of Wright and Sherburne counties, and Houlton, Wisconsin are allocated through other processes, not the Regional Solicitation, and are also included in Appendices B, C and E.

Approximately $2 billion in federal highway funding is forecast to be available through the Regional Solicitation for investment on ~~state and local~~ non-freeway principal arterials and A-minor arterials. The Regional Solicitation has historically awarded in the ~~range of~~approximately $~~50M~~ 52M of federal funds annually to ~~local~~ highway ~~improvement and safety~~ projects across the region out of the approximately $90M available. While the Regional Solicitation federal funds are available for expenditure on state highways, for simplicity~~ and because the majority of this money will likely be awarded to local projects~~, this plan assumes the $~~1.6~~2 B in federal Regional Solicitation roadway funds will be spent by local agencies. ~~projects, not MnDOT projects.~~ In recent years, many of the interchange and lane expansion projects funded through the Regional Solicitation have been led by local agencies and included projects that improved the state system.

The competitive HSIP process is administered by MnDOT and the recommended projects are approved by the TAB. The Minnesota Highway Freight Program is a new federal funding source that is also administered by MnDOT and the projects are approved for inclusion into the TIP by the Council.

A second major update to this 2040 Plan is the acknowledgement that cities and counties are making significant mobility investments in the state-owned system as MnDOT has had to shift much of its resources into preserving the existing system. Much of the new or expanded county sales taxes or wheelage tax revenues are proposed to be used on the state-owned system. Furthermore, all seven of the roadway expansion projects selected in the 2016 Regional Solicitation were projects that were led by cities or counties, but on MnDOT's system. Several counties and cities also own and operate a small part of the principal arterial system and the majority of the A-minor arterial system. Highway investments made by the counties and cities on these systems are not shown in this section since they are largely funded by state and local taxes, as shown in Chapter 4, "Regional Transportation Finance" [*insert link*] and are identified through the local comprehensive and capital improvement planning processes, which is described in more detail in Chapter 3, "Land Use and Local Planning". [*insert link*].

A third change is how program support (i.e., the resources needed to support the delivery of capital projects) and highway access investments are shown in the plan. Program support activities are funded out of the capital budget and include right-of-way (land) acquisition;

consultant services to supplement agency staff and provide special expertise; supplemental agreements to address unanticipated construction related issues; and construction incentives to encourage early completion. Previously, program support was a separate investment category, but now it will be distributed across the four capital investment categories and adds approximately 16% to project costs. There are few highway access projets being constructed throughout the region, so this invesement category was grouped back with strategic capacity enhancements.

The text that follows identifies and describes the highway investment anticipated between 2015 and 2040 under the Current Revenue Scenario for each of the ~~10~~ five investment categories. All of the major state and local highway projects identified to date in the metropolitan transportation planning area are listed in either Appendices B, C, or E [*insert links*]. MnDOT initiated investments and projects included in the Current Revenue Scenario were identified through the work done for the *Minnesota State Highway Investment Plan* ~~*2014-2033*~~*2018-2035*~~*5*~~*7* (MnSHIP) published by MnDOT in ~~December 2013~~January 2017, which identified expected capital revenues and expenditures for all of the state highway system for the 20-year period. The Metropolitan Council worked closely with MnDOT on the latest MnSHIP.

According to MnSHIP direction there is expected to be a substantial shift of highway resources out of the metro area to Greater Minnesota between 2022 and 2040. The historical share of MnDOT funding provided to the metro area has been in the range of 42-43% of the total statewide highway revenues. If mitigating actions are not taken, this share is expected to fall to 36% of total revenues in the 2022-2027 timeframe, and even lower to about 28% of revenues in the 2028-2040 timeframe.

This shift is occurring primarily due to two factors: a lack of adequate highway financial resources, and the refocusing of MnDOT's highway investment program to pavement and bridge preservation. Greater Minnesota has the vast majority of the state's highway miles and preserving pavement condition throughout the state needs to be a high investment priority. However, the metro area has the majority of the state's population and employment and is forecasted to receive the vast majority of population growth through 2040, leading to increased travel and growing congestion.

MnSHIP currently shows that after 2023, no funding will be available for mobility projects within the metro area. However, since the adoption of MnSHIP, approximately $20M per year of additional mobility funds was allocated to the region starting in 2022 from new revenues received by MnDOT. This modest increase will only allow for continuation of the CMSP program (spot mobility projects) and for contributions to locally-led mobility projects on MnDOT's system. Additional discussion is underway to continue the $50M per year for the MnPASS program, as well as other mobility funding options. These short-term actions will allow for mobility project funding to continue at existing or enhaced levels while finding a

longer-term solution to the state and region's highway funding problems as part of the next MnSHIP update or as new revenues come to the state.

The projects identified in the Current Revenue Scenario are illustrated in Figure 5-6 and listed in Appendices B and C (link). Projects in the first four years of the plan are identified in the ~~2015-18~~2018-2021 TIP. The 10-year Capital Highway Investment Plan (CHIP) additionally identifies projects from 2022-2027. The specific characteristics of projects identified in these years are less certain and will be refined as project development progresses. ~~Specific projects have not yet been identified beyond 2024~~2027.

Figure 5-6: Current Revenue Scenario Highway Projects 2018-2027

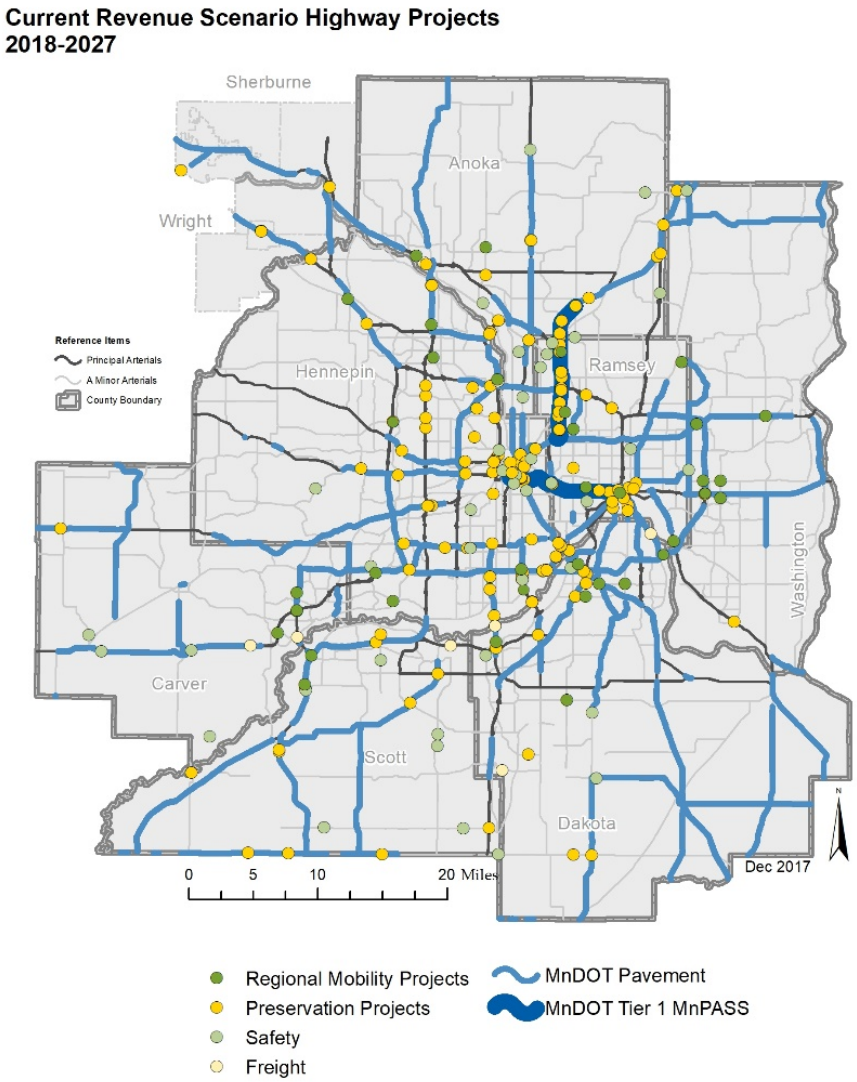


Table 5-6 ~~at the end of this chapter~~ summarizes the revenue and spending for ~~both~~ the Current Revenue Scenario ~~and Increased Revenue Scenarios~~ by category. This table shows that over the 2015-2040 period total revenues and spending for state highways under the Current Revenue Scenario are estimated at $~~11~~ 14.7 billion (reported in year-of-expenditure dollars).

Table 5-6: Current Revneue Highway Investment Summary 2015 to 2040 (MnDOT Spending Only)

	Current Revenue Scenario (reported in year of expenditure dollars-billions)					
Investment Category	2015-2017	2018-2027	2028-2037	2038-2040	Total	Percent
Operation and Maintenance	$0.3	$1.0	$1.2	$0.4	$2.9	20%
Preservation of Highway Assets	$0.9	$3.5	$3.7	$1.6	$9.7	66%
Safety	$0.0	$0.1	$0.1	$0.0	$0.2	1%
Regional Mobility Improvements***	$0.4	$0.9	$0.4	$0.1	$1.8	12%
Multimodal	$0.0	$0.0	$0.1	$0.0	$0.1	1%
Total*	$1.6	$5.5	$5.5	$2.2	$14.7	100%

	~~Current Revenue Scenario** (reported in year-of-expenditure dollars)~~				
~~Investment Category~~	~~2015-2024 (10 years)~~	~~2025-2034 (10 years)~~	~~2035-2040 (6 years)~~	~~2015-2040 (26 years)~~	
~~1. Operate and Maintain Highway Assets~~	~~$0.6 B~~	~~$0.8 B~~	~~$0.6 B~~	~~$2.0 B~~	
~~2. Program Support~~	~~$0.4 B~~	~~$0.3 B~~	~~$0.2 B~~	~~$0.9 B~~	
~~3. Rebuild and Replace Highway Assets (Pavement, Bridge, and Roadside Infrastructure)~~	~~$1.8 B~~	~~$3.0 B~~	~~$2.1 B~~	~~$6.9 B~~	
~~4. Specific Highway Safety Improvements~~	~~$0.1 B~~	~~$0.2 B~~	~~$0.1 B~~	~~$0.4 B~~	
~~5. Highway Bicycle and Accessible~~	~~$0.1 B~~	~~$0.1 B~~	~~$0.1 B~~	~~$0.3 B~~	

	Current Revenue Scenario** (reported in year-of-expenditure dollars)				
Investment Category	2015-2024 (10 years)	2025-2034 (10 years)	2035-2040 (6 years)	2015-2040 (26 years)	
Pedestrian Improvements					
Regional Mobility Improvements (sub-total 6.-10.)	Approx. $720 M	$0	$0	Approx. $0.7 B	
1. TMT	$40-60 M	$0	$0	$40-60 M	
2. Spot Mobility	$75-125 M	$0	$0	$75-125 M	
3. MnPASS***	$275-325 M	$0	$0	$275-325 M	
4. Strategic Capacity***	$225-275 M	$0	$0	$225-275 M	
10. Highway Access***	$15-25 M	$0	$0	$15-25 M	
TOTAL*	$3.7 B *(10 years)*	$4.4 B *(10 years)*	$3.1 B *(6 years)*	$11 B *(26 years)*	

*Local transportation investments are identified in local capital improvement programs and local comprehensive plans per Minnesota Statutes 473.146.

**Current Revenue Scenario investments do not include $1.3 6 billion in federal funding for improvements to the non-freeway principal and A-minor arterial system to be identified by the Transportation Advisory Board through the Regional Solicitation. Investments funded through the Regional Solicitation must be consistent with *Thrive MSP 2040* and the Transportation Policy Plan.

***See lists of specific projects in the text and appendices B, C, and E.

The following pages detail the Current Revenue Scenario investments in the five primary highway investment categories.

Operations and Maintenance

Highway operations and maintenance is a high investment priority for the principal and A-minor arterial system. These investments are essential in achieving highway safety, access, and mobility for the traveling public and freight. Primary operation and maintenance activities include freeway and arterial traffic management; freeway incident response; pavement patching; pavement restriping; traffic signal, sign, and management system maintenance; lighting maintenance; guardrail and cable median barrier repair; snow and debris removal; roadway salting; drainage system maintenance (culverts, inlets, and underground pipes); bridge inspection and maintenance; and maintenance vehicle fleet management. Operations and maintenance costs have increased as traffic management has become more sophisticated and the highway infrastructure has aged.

As shown in Table 5-6, MnDOT anticipates spending approximately $2.9 billion on state highway operations and maintenance in the Current Revenue Scenario. This is the ~~first~~ second Transportation Policy Plan to identify long-term highway operations and maintenance costs~~, which are largely based on the findings in MnDOT's *Highway Systems Operations Plan 2012-2015* (HSOP). Regional transportation partners will continue to work together to develop better understanding of, and costs for, highway operations and maintenance to be included in the update of HSOP, MnSHIP, and the next update of the Transportation Policy Plan [*insert link to Work Program "Identify Regional Highway System Cost of Operations, Preservation and Maintenance"*].~~

Preservation of Existing Highway Assets

The first capital investment priority is to rebuild or replace the existing principal and A-minor arterial system. Like operations and maintenance, these investments are essential for highway safety, access, and mobility for the traveling public and freight. These kinds of activities are often called preservation, asset management, or modernization investments. Primary highway asset management activities include pavement and bridge rehabilitation and replacement.

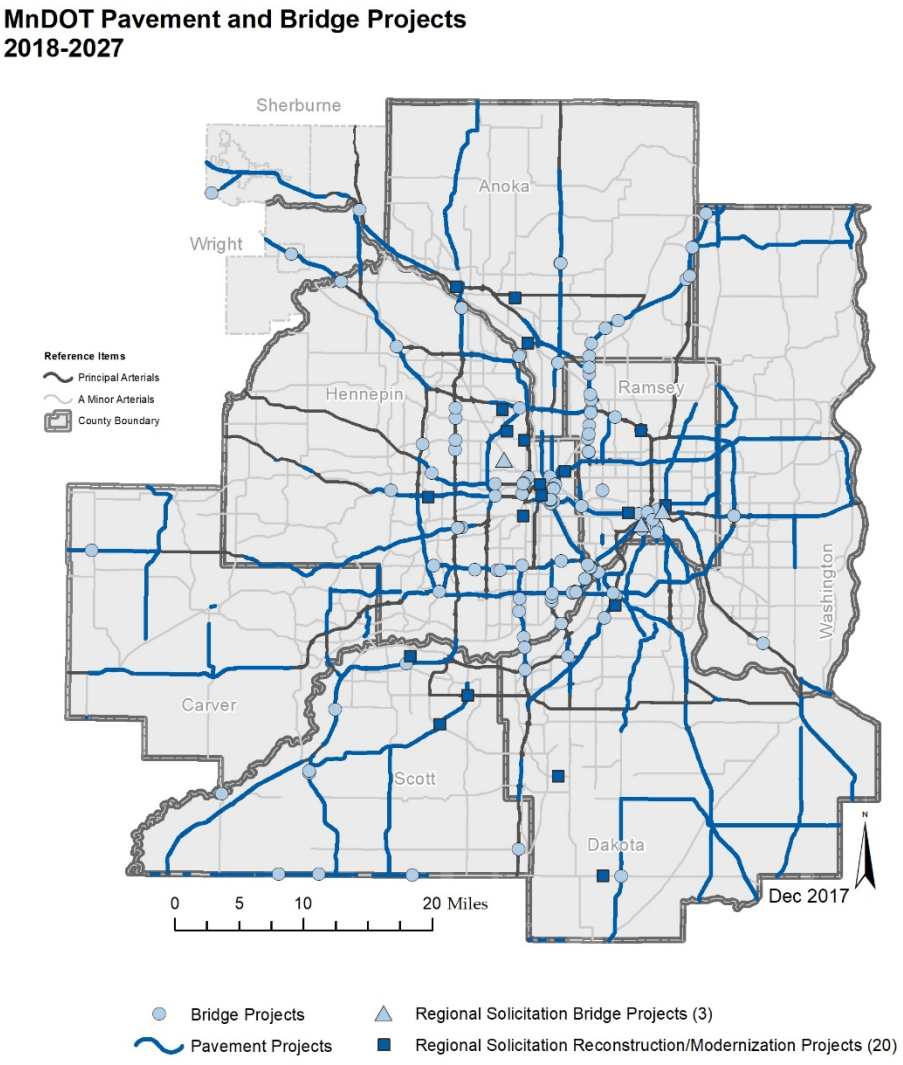
This plan states that long-term pavement fixes should be made whenever possible. Short-term fixes every few years contribute to non-recurring congestion and disruption to the traveling public. The impact is most felt on congested corridors. Shifting to mostly long-term pavement fixes, such as unbonded overlays, will have increased upfront costs and may result in a poorer ability to meet overall pavement performance targets in the short-term as other pavement projects are pushed out to later years. However, in the long-term, the region will experience cost savings and there will be fewer construction projects on each corridor. For the traveling public, this equates to less frequent roadway closures, less time spent in congested corridors, reduced VMT as drivers do not need to divert to alternate routes, less delay to freight movement, and increased safety due to less frequent work zones.

Rebuilding and replacement is also needed ~~for~~ to preserve components beyond pavement and bridges. These are referred to as roadside infrastructure and include drainage systems, signs, lighting, and traffic signals~~).~~. Highway preservation efforts create opportunities to implement system-wide safety, multimodal, and congestion mitigation mobility improvements in a cost-effective manner. ~~These include improving transit advantages, adding bicycle or pedestrian facilities, or making existing pedestrian facilities accessible to people with disabilities. See "Transit Investment Direction and Plan (Chapter 6)" and "Bicycle and Pedestrian Investment Direction (Chapter 7)" for more information [*insert links*].~~

As shown in Table 5-~~7~~6, the Minnesota Department of Transportation is anticipated to invest $~~6.98.2~~10 billion towards rebuilding and replacing pavement, bridge, and roadside infrastructure between 2015 and 2040. This is approximately ~~62%~~two-thirds of the total highway funding anticipated to be available in the Current Revenue Scenario. MnDOT has identified ~~asset reconstruction and replacement~~pavement and bridge preservation projects for

the ~~first 10 years of the plan~~2018-2027 timeframe, which are illustrated in Figure 5-~~3~~ 7 and listed in Appendices B and C. Figure 5-7 also includes preservation projects, some of them on non- MnDOT roads, that have already been selected for funding through the Regional Solicitation.

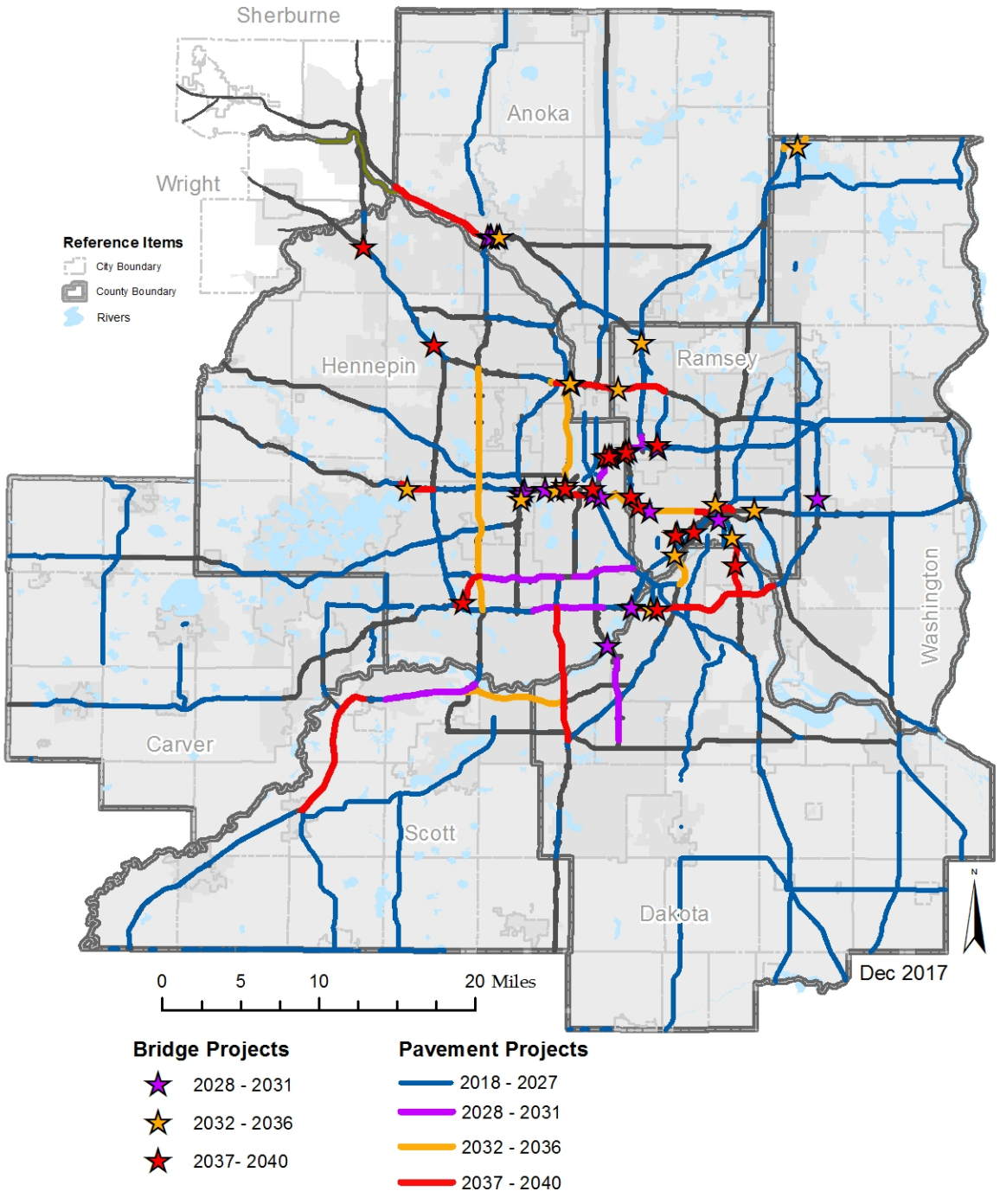
Figure 5-7: Planned Pavement~~, and~~ Bridge~~, and Roadside Infrastructure~~ Preservation Projects 2018-2027



Projects planned for ~~2025~~2028-2040 are ~~not yet determined~~shown in 4-5-year increments in Figure 5-8. This is the first TPP to show major preservation work beyond the 10-year timeframe. The specific characteristics of projects identified and date of construction ~~in years 2019-2024~~ are subject to ~~change,~~change as further study is undertaken. Due to the age of the system, there will be a higher proportion of bridges needing major repair or replacement between 2030 and 2040 in the metro area relative to the rest of the state. This "bridge bubble" will require careful planning. A Work Program item is proposed to further examine these bridges and to determine if other needs (e.g., mobility or multimodal) should be addressed at the same time.

Figure 5-8: Planned Pavement and Bridge Preservation Projects 2028-2040

MnDOT Planned Regionally Significant Pavement and Bridge Preservation Projects 2028-2040



Safety

Highway safety is the highest priority for new improvements that are made to the system. ~~for the region and is being pursued through all types of highway investments~~. While project designs for all highway projects need to identify and integrate affordable, effective safety ~~improvements ,~~improvements, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) law first called for states to develop performance-based, data-driven plans to target specific strategies ~~-~~ for improving the safety of the traveling public. This approach was advanced in Moving Ahead for Progress in the 21st Century (MAP-21), and continues to be a high priority in Fixing America's Surface Transportation (FAST) Act, the current federal transportation funding law. Minnesota's highway safety plans and collaborative interagency strategies for public education, enforcement, improved emergency medical and trauma services, and engineering solutions (the "4E's" of the Toward Zero Deaths, or TZD, initiative) have been remarkably successful, reducing statewide annual traffic fatalities to levels not seen since World War II even while travel has increased significantly.

Despite this progress, there is still a significant amount of safety work to do and limited funding available to do it. In the metropolitan area, specific highway safety investments will include proactive and reactive investments including lower-cost/high-return-on-investment treatments, sustained crash locations treatments, and continuing participation in the TZD initiative aimed at preventing fatalities and serious injuries. Examples of these highway safety investments include adding turn lanes at intersections, especially left turn lanes; lengthening turn lanes at intersections; managing ~~intersections~~ access on non-freeways by constructing frontage roads; constructing reduced conflict intersections (restricting left or through movements off minor street); constructing roundabouts; and installing edge-line rumble strips or cable median barrier.

The Council, in accordance with federal regulation and consistent with the Safety and Security goal of the Transportation Policy Plan, is in the process of setting safety performance measures and specific short-term targets for the metro area. These measures and targets, which are reported annually to MnDOT for inclusion in their HSIP monitoring program, consist of the following:

1. Number of fatal crashes
2. Rate of fatal crashes (per 100 million vehicle miles travelled)
3. Number of serious injury crashes
4. Rate of serious injury crashes (per 100 million vehicle miles travelled)
5. Number of non-motorized (bicycle and pedestrian) fatal and serious injury crashes

In August of 2017, MnDOT officially established state-wide targets for calendar year 2018 for each of these safety performance measures. These targets were based on a 3% annual reduction from 2015 total fatal crashes and a 5% annual reduction from the 2016 total serious

injury crashes. The Council is anticipated to adopt the same methodology and apply it to the Council's MPO planning area boundary.

The metro area has a significantly lower rate of fatal and serious injury crashes than the state as a whole. The proposed 2018 fatal and serious injury crash rate targets for the Council are 0.31 per 100 million VMT and 2.35 per 100 million VMT, respectively. This compares with state-wide targets of 0.62 fatal crashes per 100 million VMT and 3.19 serious injuries per 100 million VMT. Overall, the likelihood of an individual being seriously injured or killed in a car crash is far less for individuals within the metro area than in Greater Minnesota.

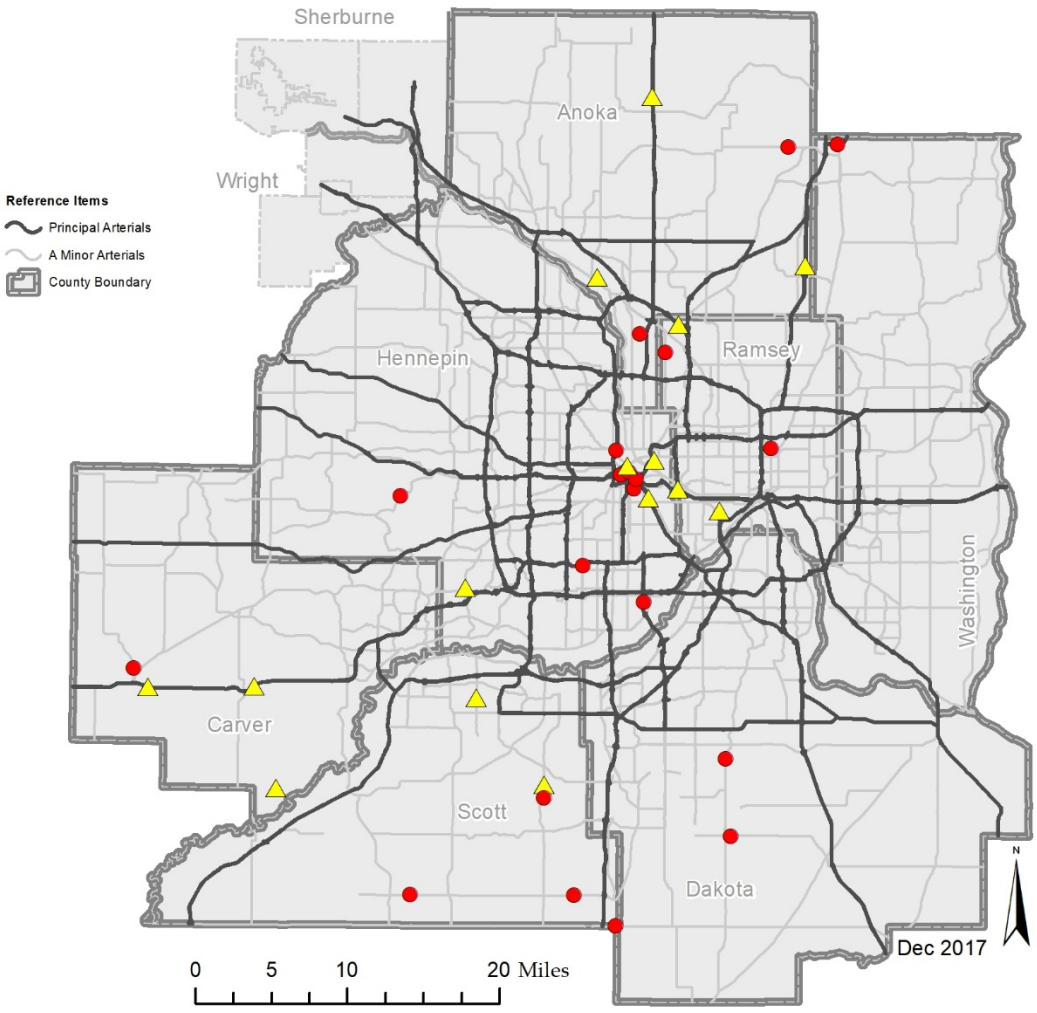
MnDOT is anticipated to invest $~~400~~ 200 million, or about ~~4~~1.3% of the Current Revenue Scenario (see Table 5-6), in specific highway safety investments between 2015-2040. These funds will be supplemented by other safety investments funded through ~~programs like the federal Highway Safety Improvement Program (HSIP) and local sources~~safety improvements that are part of pavement and bridge preservation, and mobility improvement projects.

The location of the projects selected for competitive HSIP funding from 2018-2021 are shown in Figure 5-9 and Table 5-7. The Regional Solicitation also selects other projects, in part, based on the crashes reduced by the project (this methodology gives more points to projects that will reduce fatal and serious injury crashes). Given the importance of safety to the region, this measure is given the highest weight of all measures in the Roadway Expansion and Roadway Reconstruction/Modernization and Spot Mobility application categories.

Figure 5-9

Add Table 5-7 of HSIP projects. Get other MnDOT safety projects.

Highway Safety Improvement Program
Competitive Solicitation Projects, 2018-2021



Regional Mobility

This Plan estimates that the region will grow by 29% between 2015 and 2040, which represents over 800,000 new people using the transportation system as shown previously in Table 5-3. This increase in people is estimated to result in a 23% increase in VMT. Given the limited funds available for regional mobility investments in the region, the end result will be increased congestion. The level of modeled 2040 congestion is unacceptable to the Council and will negatively affect regional travel and goods movement.

Currently, MnDOT has $50M to $70M per year available for regional mobility projects until the end of 2023. Starting in 2024, only approximately $20M per year will be available through 2040. This minimal level of funding (6.5%) available between 2024 and 2040) will only continue spot mobility projects and provide some matching funds for city or county led mobility projects on MnDOT's system after 2023. Special competitive state funding programs like Transportation Economic Development (TED) and Corridors of Commerce programs may bring additional mobility funds to the region. However, it should be noted that these special funding programs should not be seen as dedicated funding sources that will be perpetuated in the future. No funding amounts beyond those already awarded or appropriated are included in the revenue assumptions for the Current Revenue Scenario. Finally, given the importance of mobility to our region's economic health, cities and counties may continue the recent trend of partially paying for and/or leading mobility projects on MnDOT's system. It is clear that more state mobility funds are needed for the region to be successful in the long-term.

A work program item has been proposed related to regional moblity that will focus on the federally-required Congestion Management Process (CMP). The CMP is a cooperative, cohesive, data-driven, and regionally-agreed upon process to identify and mitigate congestion along the transportation network. The study will be used to determine the extent of the CMP network, develop methodologies for analyzing and measuring congestion, establish a comprehensive data collection program for regional coordination and monitoring, and assess the effectiveness of previous CMP strategies in mitigating congestion within the region.

The regional mobility investment approach includes four sub-areas that start with the least costly project types and move to more expensive project types. The region's priority to address mobility issues is traffic management technologies (e.g., retiming traffic signals and comprehensive incident response). Past investments in this area have increased the capacity, reliability, and safety of the existing system. Before pursuing the larger capital costs in the next three regional mobility sub-areas (spot mobility, MnPASS, strategic capacity enhancements), an agency be sure that traffic management technologies have been implemented to the greatest cost-effective extent possible.

The second priority of mobility investments are intended to existing spot locations to maximize the return-on-investment in terms of benefits for highway users. Typically, these are smaller in scope than traditional highway investments with the intent to allow quicker and simpler delivery, and recognize the diminishing returns of many larger projects. The region has in the past and will continue to identify these spot mobility projects through CMSP, a region-wide evaluation of MnDOT's system.

If traffic management or spot mobility projects will not adequately solve the mobility problem, then the third priority of investments is MnPASS lanes. These priced lanes manage demand to provide congestion-~~-~~free travel during peak travel periods for transit riders, carpools and those willing to pay. MnPASS can improve highway efficiency and effectiveness by prioritizing person throughput over vehicles and providing long-term travel time reliability that is not possible with general purpose lanes.

The fourth priority of mobility investments, strategic capacity enhancements, are implemented when other previously described investments cannot improve travel conditions for people and freight. These must utilize the existing pavement and right-of-way to the extent possible. A number of criteria and conditions have been adopted to evaluate the appropriateness of implementing these projects.

In addition to the ~~5~~ four types of regional mobility investments described here, three groups of supporting strategies/investments should be actively pursued in the region to reduce the need for additional highway capacity. These are key elements of the region's federally required "Congestion Management Process" (Chapter 12) [*insert link to "Congestion Management Process"*]:

1. Travel demand management (TDM) strategies including carpools, vanpools, staggered work hours, telework, and compressed work weeks.
2. Transit, bicycle, and pedestrian investments including new transitways, expanded and enhanced transit service, ~~park-and-rides~~ and enhanced bicycle ~~facilities~~connectivity.
3. Land use changes including increased job and housing concentrations.

Combined, these supporting strategies can help ease congestion on the regional highway system by either reducing overall travel demand or by increasing the share of travel by modes other than the single-occupant automobile, particularly during the most congested times of the day.

The Metropolitan Council partners with ~~cities~~ local agencies and Transportation Management Organizations (TMOs) to work ~~on travel demand management (~~TDM~~)~~ strategies that reduces travel demand during peak periods and in congested areas. The region's existing TMOs include:

- ~~Commuter Connection~~Move Minneapolis: ~~p~~Primarily serves downtown Minneapolis by promoting travel options for commuters working downtown.

• Commuter Services: ~~s~~Serves the I-494 corridor by promoting travel options to the destinations along the corridor.

• ~~Saint Paul Smart Trips~~Transit for Livable Communites: ~~s~~Serves the City of Saint Paul by promoting travel options to workers, residents, and policymakers in the city.

• Commute Solutions: ~~s~~Serves Anoka County by promoting travel options for residents in the county and commuters working in the county.

~~The Council works with transit providers and TMOs to promote alternatives to driving alone, support flexible work schedules and telecommuting, and works with local communities to link TDM strategies and supportive land use policies.~~ TMOs are public or private partnerships in highly congested locations comprising employers, building owners, businesses, and local government interests. TDM programs are often dynamic and adapt to promote new programs or services as they become available.

Base-level funding for the TMOs comes from the Regional Solicitation. In addition, the Regional Solicitation has a competitive TDM application category that is open to all agencies. An example of a funded project includes Anoka County's last-mile shuttle transit service between the Northstar Commuter Rail Line's Fridley Station and nearby employment sites.

Consider map of TMO service areas and TDM projects recently funded in Reg. Sol.

Regional Mobility ~~Improvements~~: Traffic Management Technologies

Traffic management technologies lessen the effects of congestion, help improve air quality, and reduce the ~~number~~ negative effects of incidents throughout the highway system. These technologies are often called Active Traffic Management (ATM), Intelligent Transportation Systems (ITS), or roadway system management investments. Benefits of traffic management technologies include increases in average person throughput, improvements in overall capacity, travel time reduction, improved travel time reliability, as well as ~~a~~ a significant decrease~~s~~ in ~~primary and secondary~~ crashes. Examples of traffic management technologies include traveler information systems, incident response programs, dynamic signing and re-routing, ramp meters with HOV bypass lanes, traffic signals, operations, and coordination – including advanced walk signal, countdown timers, and queue warning. On freeways, full ATM implementation can be more effective when done in conjunction with other corridor-wide improvements such as the construction of a new or extended MnPASS lane. In some cases, however, more limited ATM strategies can be implemented in an effective manner, on a case-by-case basis to improve freeway and non-freeway highways.

The existing and planned elements of MnDOT's traffic management technology system are illustrated in Figure 5-~~4~~10, along with selected Regional Solicitation projects from the Traffic Management Technologies application category for 2018-2021. ~~Table 5-7 shows that in the Current Revenue Scenario,~~ MnDOT does not anticipate~~s~~ investing ~~$40 million to $60 million~~

~~($4 million to $6 million per year for 10 years)~~ in new traffic management technologies beyond awards received in the Regional Solicitation. Instead, all available funds will be used to replace/upgrade existing equipment and to manage the system. ~~These funds will be supplemented by o~~Other ~~transportation~~ traffic ~~system~~ management ~~investments~~ technology projects may be funded ~~through the Regional Solicitation,~~ by local governments~~,~~ and by private businesses ~~as businesses continue to improve consumer technologies showing real time traffic and routing recommendations~~.

~~To improve and advance the broader implementation of traffic management technologies, the Metropolitan Council will convene MnDOT and other regional transportation partners to continue exploring the feasibility of developing a regional arterial traffic management center to complement MnDOT's freeway Regional Transportation Management Center (RTMC) [*insert link to Chapter 11, Work Program Arterial Traffic Management Center*].~~

Figure 5-10: Traffic Management Technology System

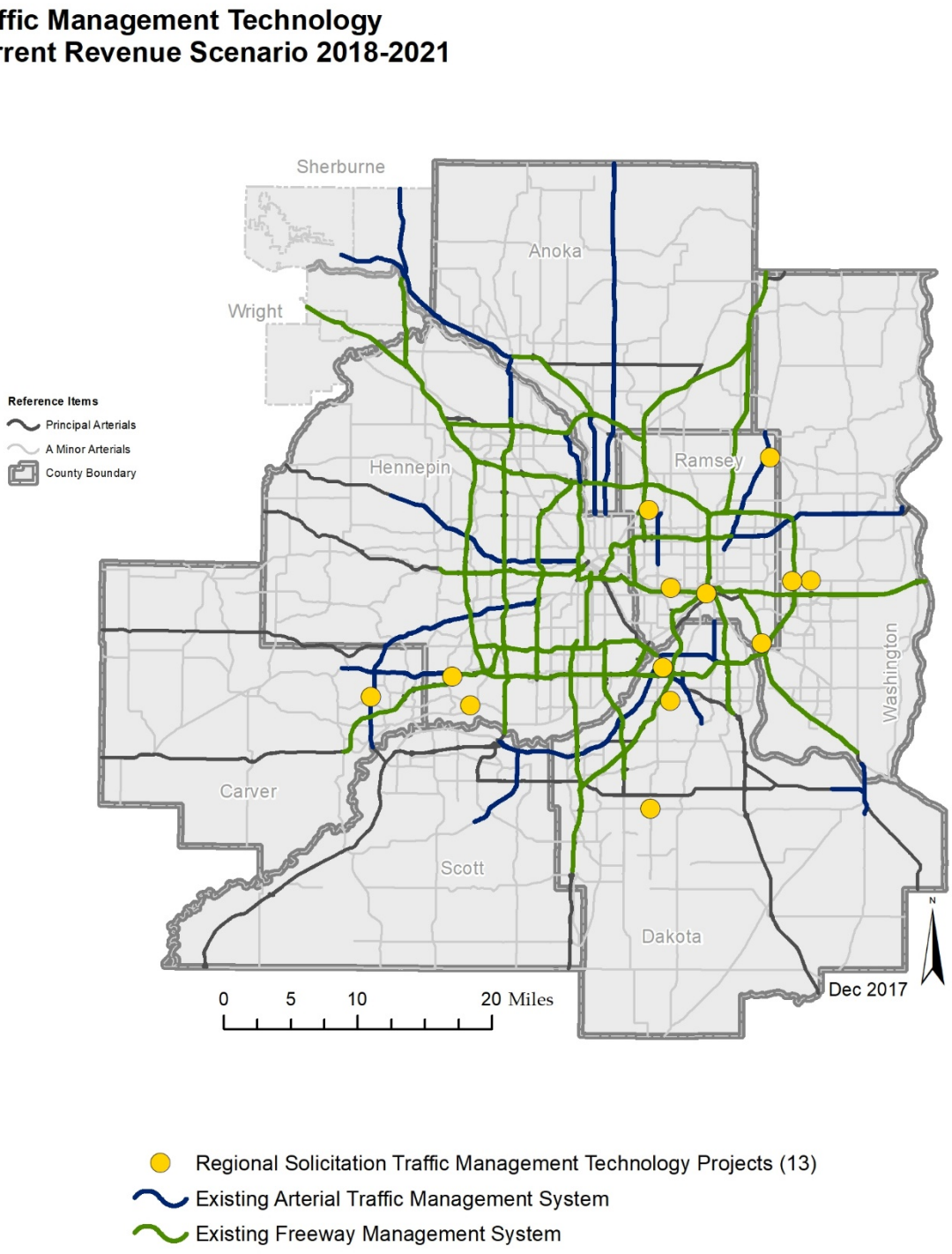


Table 5-8: Traffic Management Technology Projects-insert table

Regional Mobility ~~Improvements~~: Spot Mobility ~~Improvements~~

Spot mobility projects identified through MnDOT's Congestion Management ~~and~~ Safety Plan (CMSP) improve traffic flow by providing bottleneck relief~~, improving geometric design,~~ and addressing safety hazards. These lower-cost/high-return-on-investment projects are generally less than one mile long, are coordinated with other funded projects such as repaving, and can be implemented ~~on~~ in shorter timeframes as compared to traditional highway capacity projects. In some instances, these types of improvements require use of flexible design principles to maximize the use of available pavement and right-of-way.

MnDOT has worked with other regional highway partners over the past several years to identify CMSP opportunity areas. ~~The 2030 *Transportation Policy Plan* (adopted November 2010) discussed and listed examples of what were then called lower-cost/high- benefit improvements.~~ The 2040 Transportation Policy Plan (adopted January 2015) included 50 locations with opportunities to address congestion and safety problems using lower-cost/high-return-on-investment spot mobility improvements. MnDOT has implemented with great success some lower-cost/high-return-on-investment projects such as the widening of State Highway 100 at ~~Excelsior Boulevard~~MN 7 and Minnetonka Boulevard, and the addition of a third lane on I-94 between Century and McKnight avenues. More recent investments include an additional lane on westbound I-494 from I-35W to MN 100, extended turn lanes on the exit ramps from MN 100 to MN 55 and an added left turn lane from eastbound MN 55 onto US 61. In addition, other spot mobility projects have been completed or are under development by MnDOT for implementation, including the five projects shown in Figure 5-11. Some of these projects consist of capacity enhancement and short auxiliary lane additions while others focus on providing transit advantages or improving roadway system management.

In ~~2013~~2018, MnDOT published the results of the latest CMSP process identifying ~~over 50~~54 areas with opportunity to address congestion and safety problems using lower-cost/high-return-on-investment spot mobility improvements. The list published in *CMSP 4* ~~*III*~~ (~~2013~~2018) represents only a ~~snapshot~~ subset of candidate ~~spot mobility improvements~~locations studied; the process identified an additional ~~350~~550 problem locations. While the ~~50~~ 54 areas illustrated in Figure 5-~~5~~ 11 identify potential areas of opportunity, ~~and some of the projects have been implemented,~~ MnDOT needs to complete additional work before most of these potential solutions can become programmed improvements. Improvements to ~~the~~ 48 of the 54 ~~50~~ areas were estimated to cost over $~~200~~ 101 million~~, which is more than the $75 million to $125 million identified in Table 5-7 for spot mobility investments~~, ~~so~~ meaning ~~not~~ all of these ~~50~~ 48 areas can be improved under the Current Revenue Scenario ~~($7.5 million to $12.5 million per year for 10 years)~~. The study identified six locations within the urbanized portions of Wright and Sherburne Counties, which is in MnDOT District 3. MnDOT Metro District has set aside funds specifically for CMSP projects and these are the locations that will be improved in the

Current Revenue Scenario. District 3 is encouraged to fund improvements at the identified CMSP locations as well.

Figure 5-11: Spot Mobility Improvement Opportunity Areas Identified in CMSP ~~IV~~ 4 (MnDOT, 2018)

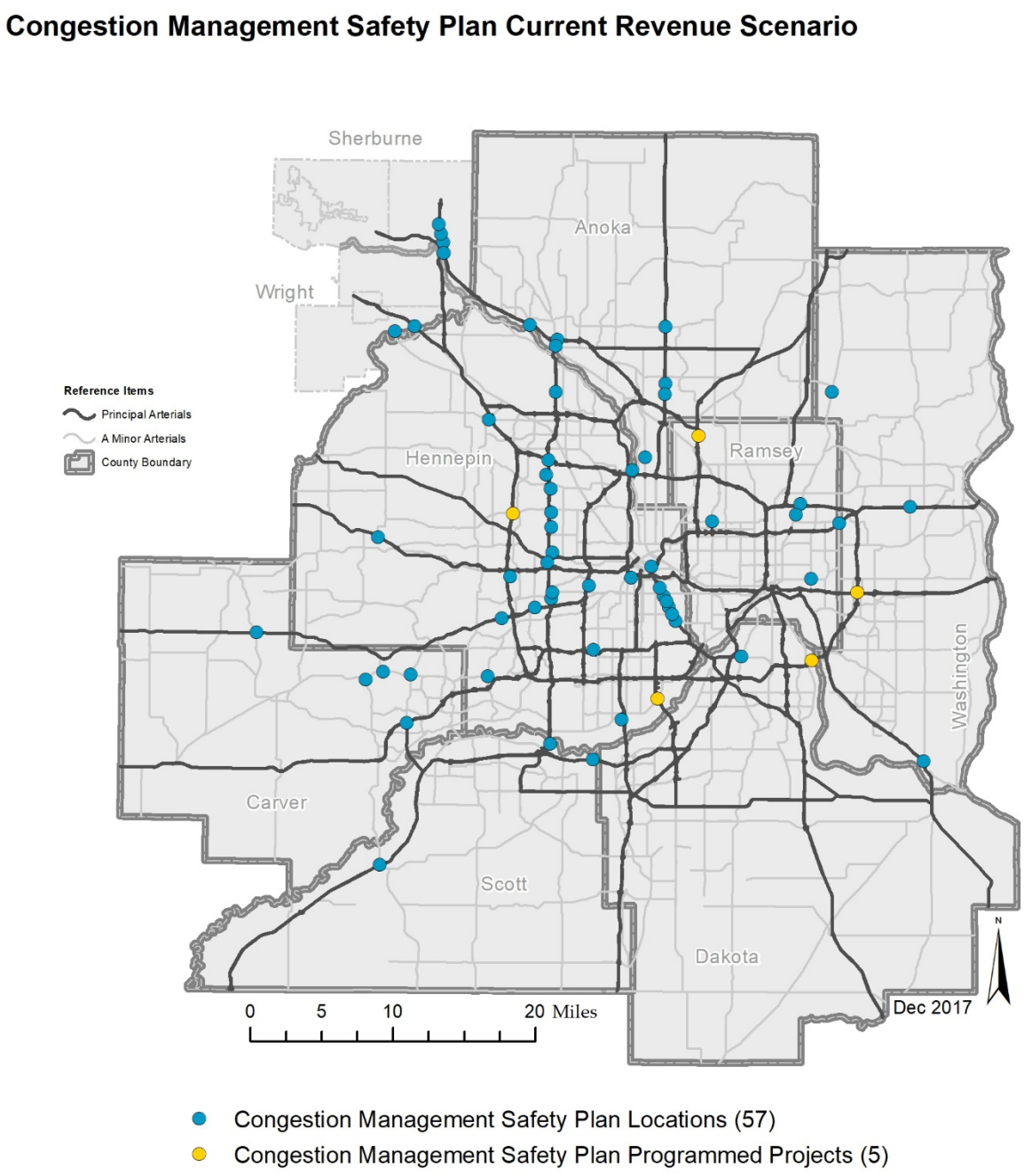


Table 5-9: Programmed CMSP Projects-insert table

The CMSP 4 study utilized a number of criteria to measure proposals against highway system investment prioritization factors described in this plan. These included frequency and severity of crashes, duration of congestion and travel time reliability. The study summarized the benefits of proposals with a benefit-cost ratio that determined final ordering for the study's conclusions. The region is using this list of high priorities as one scoring measure to help allocate competitive funding through the Regional Solicitation.

~~A number of CMSP-related questions have been raised during the process to update the *2040 Transportation Policy Plan* that deserves further study and discussion. In addition to continuing to address and further develop many of the CMSP opportunity areas identified in this plan, MnDOT and the Council will continue to work with regional highway partners to update the CMSP at least every four years and prior to updates to MnSHIP and the Transportation Policy Plan [*insert link to Chapter 11 Work Program Congestion Management and Safety Plan*].~~

Regional Mobility ~~Improvements~~: MnPASS ~~System~~

Priced managed lanes provide a reliable, congestion-free travel option during rush hours for people who ride transit or are in carpools, and other motorists who are willing to pay. In the Twin Cities, these are called MnPASS. Single-occupant vehicles and small trucks can buy their way into the managed lanes during rush hour times as long as the target travel conditions are maintained in the lane. Any vehicle can use the MnPASS lanes during non-rush hour times. A system of MnPASS lanes can improve highway efficiency and effectiveness by moving more people through congested highway corridors during rush hour periods. The choice and reliability offered by MnPASS also supports transit, especially commuters using longer-distance express bus service and park-and-ride facilities. New or extended MnPASS lanes also improve the flow of traffic in adjacent general-purpose lanes.

The three Tier 1 priority corridors are included in the Current Revenue Scenario as shown in Figure 5-12. Adequate funds are either available now or are anticipated to be made available from existing funding sources to allow construction.

One of the Tier 1 corridors, I-35W south of downtown Minneapolis is currently under construction and anticipated to be open in 2021. The second Tier 1 corridor~~s~~ is I-35W from TH 36 in Roseville to Lexington Ave in Blaine. This project will be built in conjunction with a major repavement project. The contract will be let in 2018. The Third Tier 1 priority corridor is the addition of a MnPASS lane between downtown Minneapolis and downtown St. Paul. As of the date of this publication, $100M has been allocated to the project. This corridor is also scheduled for major preservation work. The current Rethinking 94 Study will evaluate mobility options for the MnPASS lane from TH 55 to TH 61.

The MnPASS 3 Study also prioritized corridors across the region beyond the Tier 1 corridors. A discussion of this study and its outcomes are presented in the Increased Revenue Scenario.

Figure 5-12

MnPASS Projects: Current Revenue Scenario

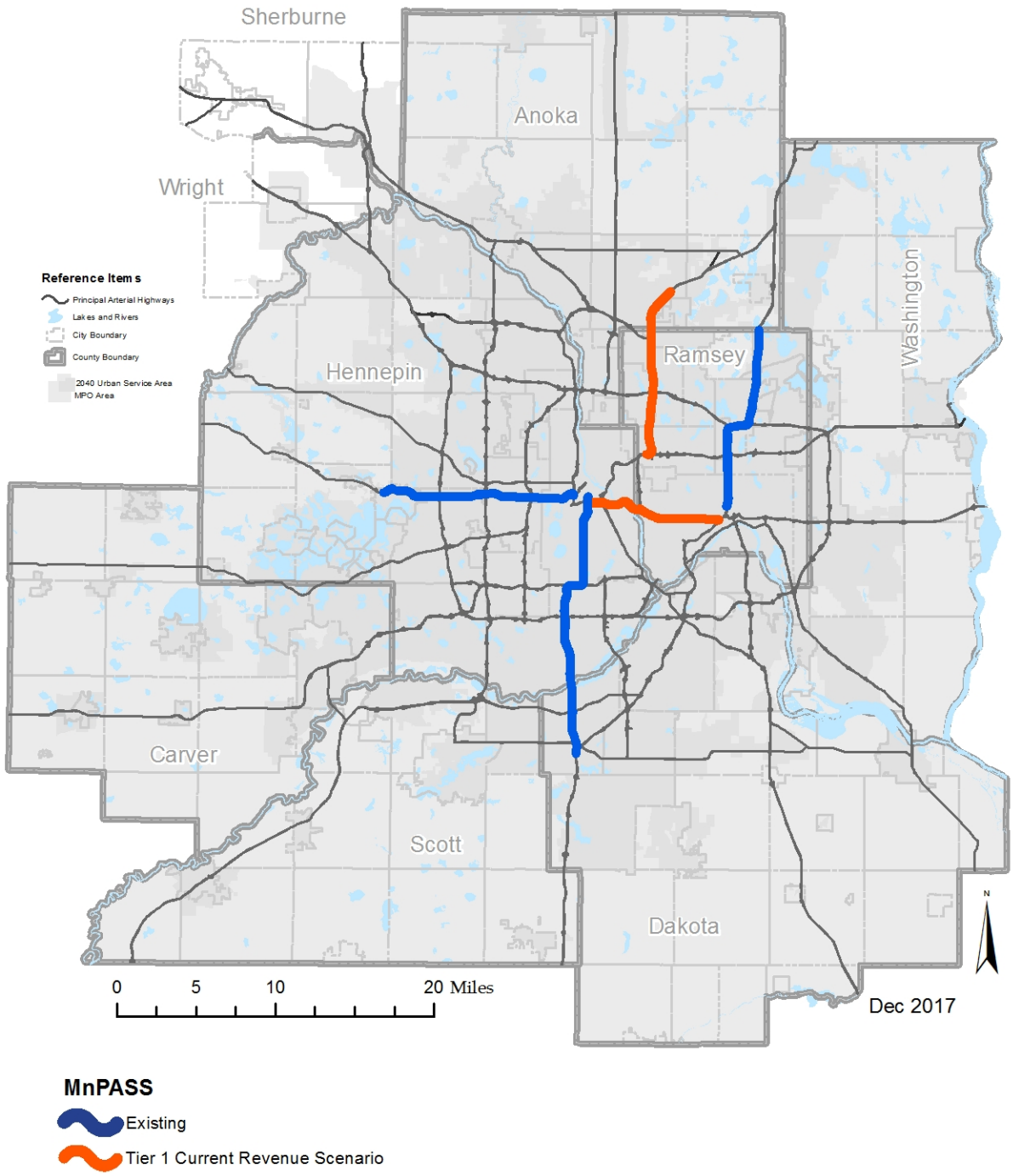


Table 5-10: **MnPASS CORRIDOR - PRIORITY TIERS**

EXISTING SYSTEM/UNDER CONSTRUCTION Can someone format this table? Communications?

ROUTE	From	TO	Description	Status
I-394	I-494	I-94 near downtown Minneapolis	MNPASS lanes	Complete
I-35W	I-35W/E south split	46th St.	MNPASS lanes	Complete
I-35E	I-94	Ramsey County J	MnPASS lanes	Complete
I-35W	Downtown Minneapolis (26th St)	46th St.	Complete Southbound MnPASS lane in conjunction with construction of I-35W/Lake St. Transit Station	Under construction; project opening 2021

TIER I PRIORITY

Route	From	To	Description	Status
I-35W	MN 36	Lexington Ave.	Construct MnPASS lanes	Contract letting 2018
I-94	Downtown Minneapolis	Downtown St. Paul	Design under study between MN 55 and MN 61	$100M allocated

~~Priced managed lanes provide a reliable, congestion-free travel option during rush hours for people who ride transit or in carpools, and other motorists who are willing to pay. In the Twin~~

Cities, we call this system is called MnPASS. Single-occupant vehicles and small trucks can buy their way into the managed lanes during rush hour times as long as the target travel conditions are maintained in the lane. Any vehicle can use the MnPASS lanes during non-rush hour times. A system of MnPASS lanes can improve highway efficiency and effectiveness by moving more people through congested highway corridors during rush hour periods. The MnPASS system offers commuters and small trucks a choice for improved travel time. The choice and reliability offered by MnPASS also supports transit riders and other kinds of ridesharing, especially commuters using longer-distance express bus service and park-and-ride facilities. New or extended MnPASS lanes also improve the flow of traffic in adjacent general purpose lanes.

The *Metropolitan Highway System Investment Study* (MHSIS) andThe *MnPASS 2 3* studies were completed just prior to adoption of the *2030*drafting of this 2040 *Transportation Policy Plan* in November 2010July 2017. The *2030 Transportation Policy Plan* documented the tiered priority for MnPASS investments. The MnPASS System Vision shown on Figure 56 and Table 5-3 is based on the 2010 MnPASS 22016/17 MnPASS 3 Study, although the t. The tiers have been adjusted since 2010 to reflect the present status of MnPASS project implementation and the funding available under the Current Revenue Scenario.

The MnPASS System Vision shown in Figure 5-6 is estimated to cost $1.8 to $2.4 billion (2014 dollars) which is beyond the funding available in the Current Revenue Scenario. To promote cost-effectiveness and allow for building more of the MnPASS system, this estimate assumes most MnPASS projects will be built in conjunction with major pavement and bridge reconstruction or rehabilitation projects, and with little or no new right-of-way. In some cases, MnPASS projects may require use of flexible design principles to maximize the use of available pavement and right-of-way.

The RTMC also manages the operation of the MnPASS system of priced managed lanes. The MnPASS system first opened in May 2005 on Interstate 394, where it replaced high-occupancy-vehicle-only (HOV) lanes. The MnPASS system expanded to the I-35W corridor south of downtown Minneapolis in September 2009, replacing the region's remaining HOV lanes. Another MnPASS lane is under construction on Interstate 35E north of downtown St. Paul. That project is scheduled for completion in 2015. MnPASS lanes provide a reliable, congestion-free travel option during rush hour times for people who ride transit or in carpools, motorcyclists, and single-occupant vehicles and small delivery trucks willing to pay. Single-occupant vehicles and small trucks can buy their way into the managed lanes during rush hour times as long as the target travel conditions are maintained in the MnPASS lane. Any vehicle can use a MnPASS lane for free during non-rush hour times. MnDOT's RTMC maintains speeds in the 28 miles of MnPASS lanes by charging a fee for single-occupant vehicles and small trucks. The fee varies in real time according to the number of vehicles and their speeds in the MnPASS lane as measured using pavement-scanning cameras and loop detectors. The price rises between a minimum of $0.25 to a maximum of $8.00 as more vehicles use the lane. See the MnPASS website for more information.

MnPASS Investments with Current Revenues

Three MnPASS corridors, I-394, I-35W south of downtown Minneapolis, and I-35E north of downtown Saint Paul, are operating or under construction. Between 2015 2018and 2024, MnDOT will extend an existing MnPASS lane and complete two new MnPASS lanes. These projects are shown as Tier 1 MnPASS investments in Table 5-3, and the summarized costs are shown in Table 5-7. Because of increasing highway operations and rebuilding needs, limited available revenues, and rising cost of construction, MnDOT does not anticipate being able to construct additional MnPASS lanes after 2024 2023 under the Current Revenue Scenario.

The four projects scheduled for construction prior to 2024 are:

1. **I-35W south of downtown Minneapolis:** MnDOT will complete the southbound I-35W MnPASS south of downtown Minneapolis to 46th Street in conjunction with major pavement and bridge reconstruction projects.
2. **I-35W north of Minneapolis:** MnDOT intends to align preservation efforts with MnPASS implementation on I-35W north of Minneapolis. A corridor study for I-35W North MnPASS completed in 2013 recommended pursuing significant capital cost savings by integrating MnPASS lane construction with major bridge and pavement asset management projects in the corridor. The study recommended constructing the I-35W North MnPASS lanes in phases, starting with the lanes between State Highway 36 in Roseville and U.S. Highway 10 in Arden Hills and Blaine. This first phase is included in the Current Revenue Scenario.
3. **I-94 between downtown Minneapolis and Saint Paul:** MnDOT is working to complete a corridor study for the I-94 MnPASS lane between Minneapolis and Saint Paul and has indicated the project should be included in the Current Revenue Scenario. If the I-94 MnPASS Study shows the project cannot be implemented before 2024, MnDOT will work to restore transit advantages between downtown Minneapolis and downtown Saint Paul until MnPASS is constructed in the corridor. The bus-only shoulder lanes between State Highway 280 and downtown Minneapolis were removed as an emergency traffic relief measure in 2007 following collapse of the I-35W bridge.
4. **I-35E north of Saint Paul:** MnDOT is currently in the environmental/pre-design process for extending MnPASS lanes on I-35E north between Little Canada Road and Ramsey County Road J.

Table 5-3: MnPASS System Investment Priorities for Current Revenue Scenario

Tier	Route	From (or at)	To	Description	Estimated Cost* (year of expenditure dollars)
1	I-35W	46th Street	Downtown Minneapolis	Complete southbound MnPASS lane in conjunction with pavement reconstruction and I-35W/Lake Street transit station	
1	I-35E	Little Canada Road	Ramsey County J	Construct MnPASS lanes	$16M
1	I-35W	MN 36/280 Ramsey County J	US 10Lexington Avenue	Construct MnPASS lanes	Approx. $100M
1	I-94	Downtown Minneapolis	Downtown Saint Paul	Construct MnPASS lanes including direct connections to and from both downtowns	Approx. $100M

MnDOT will continue to develop all tiers of the MnPASS system in close coordination with all related public and private transit service and support facility planners and providers, including cities, counties, Metro Transit, Suburban Transit Providers, Metro Mobility, and Transit Link.

Although Tier 2 and 3 MnPASS lanes are not funded under the Current Revenue Scenario, there are many ongoing studies of MnPASS in the Tier 2 and 3 corridors. MnDOT has started to develop a study to add an eastbound MnPASS lane on State Highway 36 between I-35W and I-35E. MnDOT is also participating in the Gateway Corridor Transitway study for I-94 east of downtown Saint Paul. The I-94 east corridor is in the MnPASS system vision but implementation of both the I-94 MnPASS lane and the Gateway Corridor BRT will require resolving right-of-way issues through further study, including the Gateway Transitway Draft Environmental Impact Statement. MnDOT and Dakota County completed a managed lane study in 2014 for State Highway 77 south of I-494. The study recommended adding a MnPASS lane to northbound State Highway 77 between 138th Street in Apple Valley and Old Shakopee Road in Bloomington, The study acknowledged that the benefits of a MnPASS lane on State Highway 77 cannot be fully achieved without improvements to ease congestion for westbound I-494 between State Highway 77 and I-35W.

~~For corridors where MnPASS lanes are planned, other corridor investments will be designed so as not to preclude a future MnPASS investment. Recent examples include the eastbound auxiliary lane on Interstate 494 in Edina, Bloomington, and Richfield, the northbound auxiliary lane on Interstate 35W between the 4th Avenue interchange and Johnson Street, planned general purpose lane additions on Interstate 94 between Lexington Avenue and Rice Street, and planned general purpose and auxiliary lanes on Interstate 494 between Interstate 394 and Interstates 94/694.~~

~~MnDOT and the Council will also continue to work together to further refine the MnPASS system vision. In the process to update the *2040 Transportation Policy Plan*, a number of MnPASS-related questions have been raised that deserve further study and discussion, including the relationship between new or extended MnPASS lanes and transit service and support facilities [*insert link to Chapter 11 Work Program MnPASS System Plan Update*].~~

Regional Mobility: Strategic Capacity Enhancements

In some cases, traffic management technologies, spot improvements, or MnPASS lanes do not fully resolve the specific highway issues needed to improve travel conditions for people and freight. The region has designated these other improvements that might be needed as strategic capacity enhancements. These types of improvements are described below and those to be implemented with current revenue investments are identified. The region has established a number of criteria or conditions that these improvements must meet to be consistent with the adopted highway investment philosophy. Specific strategic capacity enhancements projects must place priority on existing problems~~,~~; maximize use of existing pavement and right-of-way~~,~~; be developed and built using the lower-cost/high-return-on-investment approach~~,~~; and be prioritized for funding based on their ability to advance the *Thrive MSP 2040* outcomes and Transportation Policy Plan goals and objectives. In addition, general purpose lane capacity enhancements should be considered only if MnPASS has been evaluated and found not to be feasible. For highway corridors with transit advantages or where MnPASS lanes are planned, strategic capacity enhancements cannot eliminate existing transit advantages and will not preclude future implementation of MnPASS lanes. Where appropriate, these investments should build toward future transit advantages or MnPASS implementation.

Examples of strategic capacity enhancements on freeways include:

- Freeway system-to-system interchange improvements
- New service interchanges (see Appendix F)
- New or expanded ramp movements on existing service interchanges (see Appendix F)
- Other service interchange improvements
- Auxiliary lanes over one mile (less than one mile would be considered in CMSP)
- Bus only shoulders
- Truck climbing lanes
- High-performing CMSP projects that are too large to fit into the CMSP mold due to project cost, project elements, or length

- New general purpose lanes
- Improvements to general purpose lanes adjacent to a MnPASS lane that are needed to reduce operational issues on the MnPASS lane

Examples of strategic capacity enhancements on non-freeway principal arterials include:

- New service interchanges or freeway conversions (see discussion of Principal Arterial Intersection Conversion Study in the Increased Revenue Scenario)
- Access management improvements and/or frontage roads
- New general purpose lanes

A regional prioritization process of freeway system-to-system interchanges will begin in 2018 (see Work Program[*insert link*]). Freeway system-to-system interchanges that connect two freeways are critical to the functioning of the region's principal arterial system. Over the past several years the level of congestion and the amount of crashes have increased significantly at these interchanges. The level of problems and high cost of solutions overshadow most other mobility and crash areas in the region; therefore, a prioritization effort is needed to make the best use of potential future mobility funds. These types of investments fit best within the strategic capacity category. Major investments have recently been made at system interchanges such US 169/I-494 and I-35E/I-694 interchanges to help alleviate the mobility and safety deficiencies.

For proposals for new service interchange or new ramps for service interchanges, the evaluation process and criteria for initial approval are identified in Appendix F [*insert link*]. The main purpose of the interchange approval process is to identify safe and cost-effective projects that can be supported by the Council and MnDOT for local and regional funding. Completion of this assessment and explicit support from MnDOT will continue to be necessary as a qualifying requirement to pursue funding through the Regional Solicitation process for non-freeway state trunk highway improvements.

~~While past practice emphasized highway capacity expansion as a common response to growing traffic congestion, this plan advances the direction from the *2030 Transportation Policy Plan* adopted in November 2010 by continuing to acknowledge that limited funding is available to operate, maintain, rebuild, and enhance all of the transportation system, including highways, and emphasizing that any capacity enhancements must be carefully developed, considered, and prioritized for funding. However, in some cases, strategic capacity enhancements other than traffic management technologies, spot mobility improvements, new or extended MnPASS lanes, or capacity improvements to other modes may be needed on the highway system to improve travel conditions for people and freight. Strategic capacity enhancements must be affordable, place priority on existing problems, be developed and built using the lower-cost/high-return-on-investment approach, and be prioritized for funding based on their ability to advance the *Thrive MSP 2040* outcomes and Transportation Policy Plan goals and objectives. In addition general-purpose-lane capacity enhancements should be considered only if the~~

~~project maximizes use of existing pavement and right-of-way; and MnPASS has been evaluated and found not to be feasible.~~

~~On freeways, strategic capacity enhancements may include bus-only shoulder lanes, truck climbing lanes, unpriced dynamic shoulder lanes, auxiliary lanes, improvements to existing interchanges to alleviate bottlenecks like freeway-to-freeway system interchanges (such as I-35W/494 in Bloomington or I-94/494/694 in Oakdale/Woodbury), frontage roads or improvements to the local arterial system that allow traffic to use an off freeway route,. This plan supports consideration of permanent general-purpose lanes on freeways for the purpose of correcting lane continuity in areas with high levels of existing congestion; this plan does not support adding permanent general-purpose capacity elsewhere on the freeway system. For highway corridors with transit advantages or where MnPASS lanes are planned, strategic capacity enhancements will not eliminate existing transit advantages, will not preclude future implementation of MnPASS lanes and will lead toward future transit advantages or MnPASS investment.~~

~~This plan also supports cost-effective strategic capacity enhancements on non-freeway principal arterial highways. Special emphasis should be placed on improvements that integrate preservation, safety, multimodal enhancements and modernization, including:~~

- ~~Truck climbing lanes~~
- ~~Lane continuity within the urban service area~~
- ~~Traffic management technology implementation such as fiber optic cable to allow traffic signal interconnection and coordination~~
- ~~Transit advantages~~
- ~~Increasing roadway and intersection capacity by building alternative intersection designs, replacing an intersection with an interchange, or reducing the number of access points to the road through frontage roads or improvements to the local arterial system~~

~~Many local agencies and other transportation stakeholders have expressed a desire, conducted studies and pursued state and federal funding to convert some non-freeway principal arterial intersections to interchanges to increase safety and mobility. Freeways with grade-separated interchanges carry traffic faster and, in most cases, are safer than non freeway principal arterials with at-grade intersections and traffic signals.~~

~~Many regional partners are continuing to implement non-freeway principal arterial improvements identified a decade ago in the interregional corridor studies, such as the efforts of Dakota County along U.S. Highway 52, most recently at County Road 86, or the efforts of MnDOT and Scott County to implement several intersection conversions along U.S. Highway 169 in Scott County, such as County Road 69, with the intent of improving safety and capacity in these corridors. The Shakopee Mdewakanton Sioux tribe is also working with MnDOT and Scott County and fully funding strategic capacity enhancements to U.S. Highway 169 to support the tribe's economic development. However, the IRC studies preceded the region's attempts to identify lower cost /high-return- on-investment improvements so few of the improvements~~

~~identified through these studies have been included in the Current or Increased Revenue Scenarios of this plan. Future work in these corridors will need to reassess the approach and design to assure that projects are affordable, focused on existing problems, and provide a high-return-on-investment.~~

~~As a work program item for the next update of the *2040 Transportation Policy Plan*, the Council and MnDOT will work with regional highway partners to analyze key intersections on the non-freeway principal arterial system within the urban service area to identify and prioritize specific intersection conversion projects [*insert link to Chapter 11 Work Program Principal Arterial Intersection Conversion Study*]. Although several highway corridors such as State Highway 36, U.S. Highway 10, U.S. Highway 169 and U.S. Highway 212 have recently been studied , the improvements being identified through these efforts are not included in the Current or Increased Revenue Scenarios, and should be prioritized for future funding through the Intersection Conversion Study.~~

A-minor arterials are also important in carrying regional and sub-~~-~~regional trips in a safe and efficient manner, and play a critical role in supplementing the capacity and network of the principal arterial system. They support access to regional job concentrations, educational institutions, and industrial and manufacturing centers for motorists and people riding transit, biking, and walking. This P~~p~~lan supports cost-effective strategic capacity enhancements to A-minor arterials such as building new A-minor arterials where needed within the urban service area to provide critical regional, multimodal highway connectivity. A-minor arterial enhancements can also often be identified through city or county comprehensive plan updates, which are reviewed for consistency with regional plans and policies by the Council.

MnDOT will only have revenue to complete a limited number of strategic capacity enhancements as illustrated in Figure 5-12 and listed in Table 5-9 and Appendices B and C. Programmed projects include a northbound truck climbing lane on I-35W at the Minnesota River, a regionally significant Dakota County two to four-lane expansion on CSAH 26 (an A-minor arterial), a new interchange at MN 212 and Carver County 140 in Chaska, and 15 interchanges or lane expansions selected through the Regional Solicitation. Because of increasing operations and rebuilding needs, limited available revenues, and rising cost of construction, MnDOT does not anticipate being able to make additional strategic capacity investments after 2024. Special funding programs such as the state's ~~Corridor Investment Management Strategy (CIMS) and~~ Corridors of Commerce program may also fund future strategic capacity enhancements~~, and funding provided by the Shakopee Mdewakanton Sioux for U.S. Highway 169~~.

Figure 5-12: Highway Strategic Capacity Enhancements 2015~~-18~~-2021

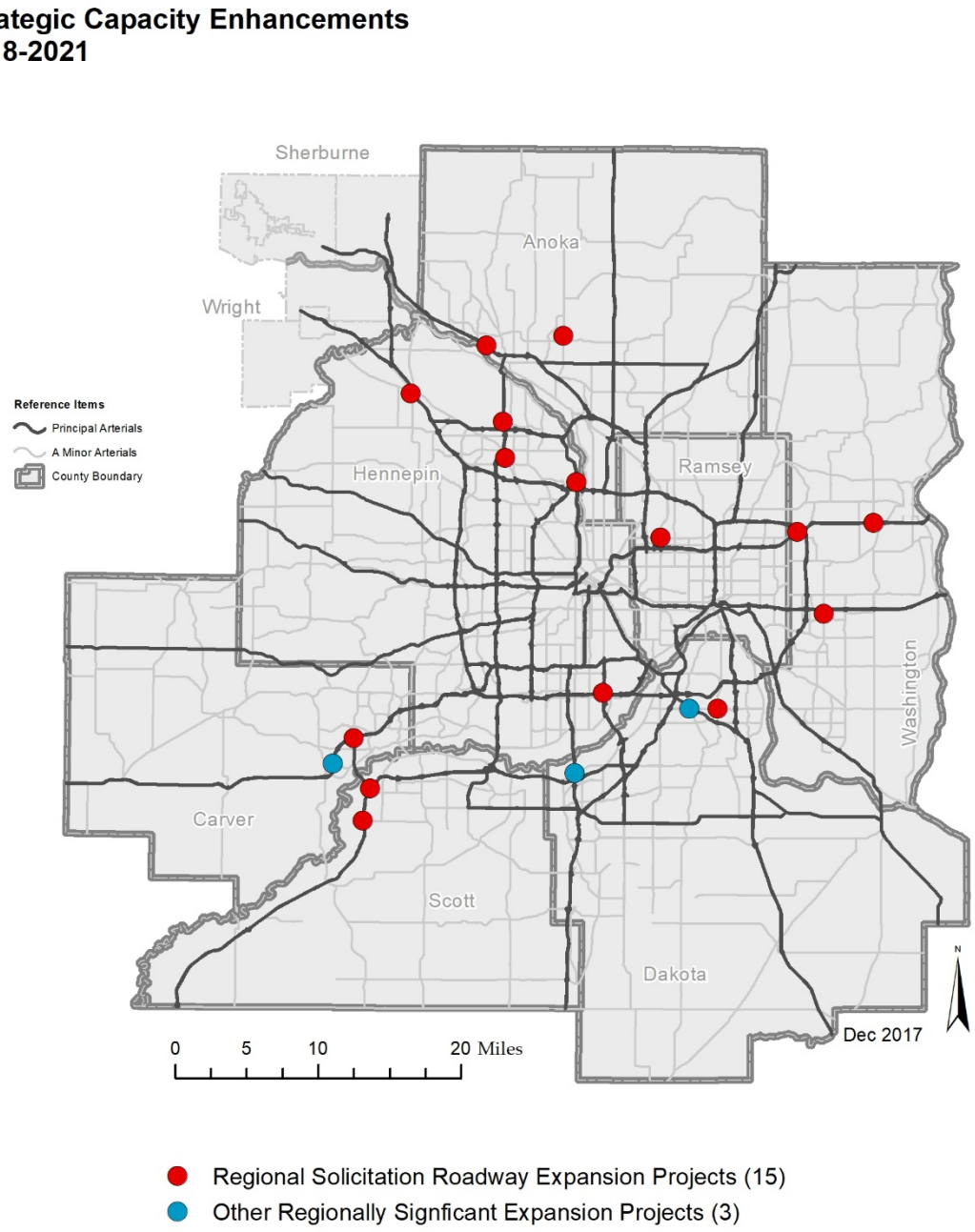


Table 5-9: Highway Strategic Capacity Enhancements 2015 18-2021 Update table

Route	From (or at)	To	Description	Estimated Cost (year of expenditure dollars)
TH 610	I-94	Hennepin County 81	Complete the four-lane freeway and connection with I-94	$131M (an additional $50M for right-of-way in Program Support)
I-694	Lexington Avenue	Rice Street	Construct one additional lane in each direction	$42 M ($32 M strategic capacity, $30 M preservation)
I-94	MN 241 in St. Michael	MN 101 in Rogers	Extend westbound ramp, add westbound lane through MN 101 interchange, and add eastbound lane between the interchanges	$46M
I-94	East 7th Street exit in Saint Paul	Mounds Boulevard in Saint Paul	Eastbound auxiliary lane, emergency pull-off areas, noise wall, and related roadside infrastructure	$3 M
US 10	Armstrong Boulevard in Ramsey		New interchange and rail grade separation	$34.4M total (MnDOT - $10M)
TH 169	Scott County 18/Canterbury Road	Scott County 21	Construct additional southbound lane in Shakopee	$1.5M total (MnDOT – Future operations, maintenance, and rebuilding only)

Regional Mobility Improvements: Freeway Interchanges

Highway access to jobs, education, and industry is critical to the livability and prosperity of the region. But additional freeway access must be provided in a way that preserves or enhances the safety and capacity of the system. As mentioned in the previous section, proposals for new or modified interchanges on the principal arterial system must be reviewed by MnDOT and the Council and meet the criteria in Appendix F [*insert link*]. Further review is required by the Federal Highway Administration (FHWA) for interchange proposals on the Interstate system. In addition to solving highway capacity or safety deficiencies, new interchanges should be consistent with regional development plans and regionally approved local comprehensive plans (Wright and Sherburne County and Houlton, Wisconsin local comprehensive plans do not need to be regionally approved). New interchanges should also support development that enhances the region's economic competitiveness. See *Thrive MSP 2040* and "Land Use and Local Planning" [*insert links*] for more discussion of land use planning for housing, jobs, education, and industry within the seven-county region.

Between 2015 and 2024, MnDOT will contribute to the regional highway access investments projects listed in Table 5-5 in Appendices B and C [*insert links*]. These projects are funded through the state's regular construction and Transportation Economic Development (TED) programs. Because of increasing highway operations, maintenance, and rebuilding needs, limited available revenues, and rising cost of construction, MnDOT does not anticipate being able to contribute to regional highway access investments after 2024.

Table 5-5: Freeway Interchange Investments 2015-2018

Route	From (or at)	To	Description	Estimated Cost (reported in year of expenditure dollars)	Investment Scenario
I-94	5th/7th Street in Minneapolis		Reconstructed interchange to close 5th Street ramp and replace it with one at 7th Street	$9.7M total (MnDOT - $6.79M)	Current Revenue Scenario; 2015-2018
US 212	Shady Oak Road in Eden Prairie		Reconstructed interchange	$7M	Current Revenue Scenario; 2015-2018
TH 100	36th Street in St. Louis Park	Barry Street	Reconstruct mainline including interchanges at CR 5, MN 7, and 36th Street	Cost in asset management	Current Revenue Scenario; 2015-2018

Multimodal: Freight

The MN Highway Freight Program is responsible for allocating the approximately $20M per year that the State of Minnesota receives from the federal funding sources. These are new funds that became available with the signing of the FAST Act with funds being allocated starting in 2016. MnDOT recently completed a solicitation for 2019-2022. The MN Highway Freight Program Solicitation utilized a number of criteria to measure proposals against highway system investment prioritization factors described in this Plan. These included crash rate reduction, sustained crash location, presence in a safety plan, Heavy Commercial Annual Average Daily Traffic, cost-effectiveness, truck travel time reliability, removing a barrier or avoiding future load restrictions on oversize/overweight routes, upgrading of a roadway to 10-ton standards and daily truck load equivalents entering and exiting a facility or facilities.

In this funding cycle, over $79 M in funding was awarded to projects within the region, which was 80% of the statewide total. Based purely on the highest performing projects submitted, 96% of the funds would have been allocated to the region. MnDOT implemented a policy that mandated a minimum of 20% of total funds must be awarded to either the metro area or Greater Minnesota in order to ensure geographic balance of projects throughout the state. This indicates that there are many worthwhile projects in the metro area that could positively affect freight movements. Freight projects selected in the metro area are displayed in Figure 5-13 and Table 5-10 and were selected out of one of three primary application categories: Freight Safety, Freight Congestion/Freight Efficiency Improvement, and First-Last Mile Connections. Being located on one of the Truck Highway Corridors was a qualifying requirement to pursue the funds. More discussion about this Council led study is in the Freight chapter.

Figure 5-13

Minnesota Highway Freight Program Projects 2018-2022

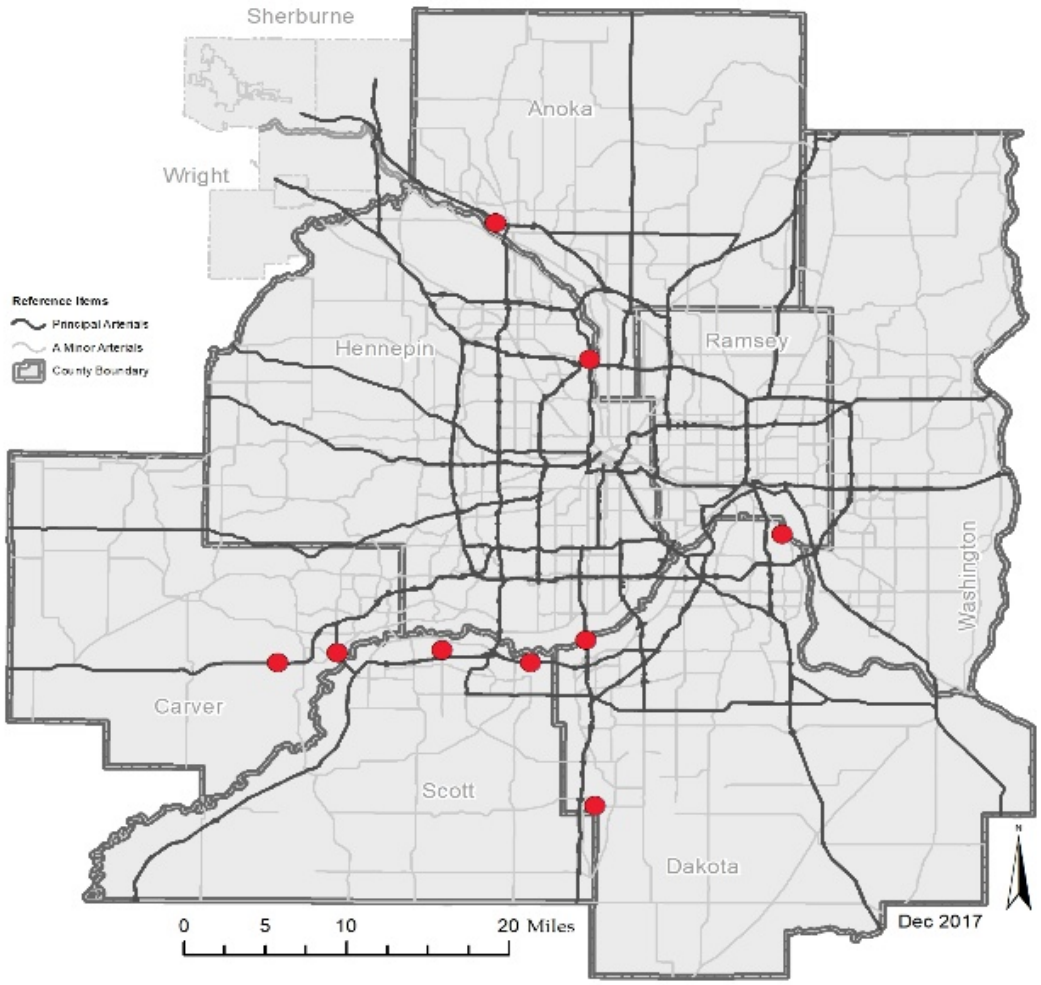


Table 5-10-Insert project list

Multimodal: Bicycle and Pedestrian Infrastructure

The region is also committed to providing facilities for all people to safely bike or walk, including people with disabilities. MnDOT is anticipated to invest $~~300~~ 125 million between 2015-2040, or about ~~3~~1% of the Current Revenue Scenario (see Table 5-~~7~~6) in bicycle and accessible pedestrian infrastructure associated with its roads. Although specific projects are not identified, these bicycle and accessible pedestrian highway investments will often be made in conjunction with pavement and bridge projects, or at high priority locations as part of larger mobility projects. These funds will be supplemented by other investments in bicycle and accessible pedestrian infrastructure funded through the Regional Solicitation and by local partners. Some of these Regional Solicitation projects are stand-alone multiuse trail, on-street bicycle lanes, sidewalks, or Safe Routes to School infrastructure grants. However, about two to 4% of the total budget for funded roadway projects goes toward bicycle and pedestrian project elements. Multimodal roadway projects are prioritized in the Regional Solicitation scoring and in fact, nearly all of the roadway projects funded include either a trail, sidewalk, or improved intersection crossing elements for other modes.

Examples of bicycle and accessible pedestrian investments include trails and sidewalks on highway bridges or parallel to the roadway travel lanes, accessible pedestrian signals at signalized intersections, and sidewalk curb ramps that meet or exceed Americans with Disabilities Act (ADA) standards. Federal regulations require the evaluation of need for these kinds of facilities as part of federal aid highway projects and construction. Beyond ADA compliance on the projects themselves, agencies with 50 employees or greater also should be working toward completing their Americans with Disabilities Act (ADA) Transition Plan for the public right-of-way. In the near future, this step will be required for all types of projects to be included in the TIP.

Increased Revenue Scenario Investments

The investments identified in the Current Revenue Scenario are able to be funded and are the region's highest highway investment priorities, but do not represent the highway investments needed to help achieve the outcomes, goals, and objectives in *Thrive MSP 2040* and this Transportation Policy Plan. The Increased Revenue Scenario identifies a higher level of spending for highway investments that will come closer to advancing the outcomes, goals, and objectives of *Thrive MSP 2040*, this Transportation Policy Plan, and the *Minnesota State Highway Investment Plan* ~~*2014-2033*~~*2018-2037*.

Building on work completed in 2012 for the Governor's Transportation Finance Advisory Committee (TFAC) and supplemented with additional information from MnDOT, this plan calls for significant additional state highway investments for the ~~2015 to~~ 2040 timeframe, summarized by investment category in Table 5-7. The Increased Revenue Scenario for the metropolitan area's state highway system totals $8 billion to $10 billion (constant dollars)~~, which does not include funding needed for additional, high priority transit, local transportation,~~

~~aviation, or non-highway freight transportation improvements~~. The total includes the anticipated public costs – operations, maintenance, and capital – only for the state highway system in the metropolitan area.

While the intent in developing this Increased Revenue Scenario was to identify a practical scenario for the 2015 to 2040 timeframe, an additional $8 billion to 10 billion of increased revenue for highways is a very aggressive scenario. For example, when policymakers were discussing different options for raising revenue for the needs identified through the TFAC process, the $4 billion to $6.5 billion in needs identified for the metropolitan area's state highway system required the equivalent of more than a 40-cent rise in the gas tax over a 20-year period. The TFAC analysis did not include the additional state highway funding needs for system operations and maintenance, ~~now~~ included in this *2040 Transportation Policy Plan*.

Table 5-~~7~~ 10 shows how the $8 billion to $10 billion in increased revenues might be allocated among the 10 investment categories. An important message in this table is the level of funding increase needed compared to the Current Revenue Scenario investment categories. Based on the best information available, funding for state highway should increase as noted:

1. Operations and maintenance should increase on the order of 50% (+$1 billion)
2. Funds to rebuild and replace highway assets should increase about 35% (+$2 to $ 2.5 billion)
3. Highway safety should increase 75% (+$0.4 billion)
4. Regional mobility investments should increase in the range of $4 to $5 billion, a very significant increase over the spending in the Current Revenue Scenario.
5. Multimodal: Bicycle and pedestrian investments should increase 100% (+$0.3 billion)

Table 5-10: 2015-2040 Increased Revenue Scenario-Update table

	2015-2040 (reported in year of expenditure dollars)		
Investment Category	Current Revenue Scenario	Increased Revenue Scenario	
Operation and Maintenance	$2.9	$	%
Preservation of Highway Assets	$9.7	$	%
Safety	$0.2	$	%
Regional Mobility	$1.8	$	%
Multimodal	$0.1	$	%
Total*	$14.7	$	%

If a level less than the $8 billion to $10 billion is provided to the region, then the new revenues funds should be focused first on three primary areas before being used to better meet the identified needs in all investment areas:

1. Regional Mobility: Idenfied in MnSHIP as the largest unfunded investment need at over $4 billion. In addition, funds allocated to mobility out in the Current Reveneue Scenario will be reduced in 2024. New revenues should focus on the mobility priorities identified in this chapter.
2. Safety: Identified in the TPP as one of the region's highest priorities. MnSHIP identifies an unfunded safety need of approximately $400M between 2018 and 2040.
3. Multimodal: Advance planned ADA improvements (e.g., sidewalks, curb ramps, and intersection crossing improvements) to an early year so that MnDOT can be fully ADA-compliant earlier than 2037 as detailed in MnSHIP. This type of investment ties directly back to the Equity and Livability Outcomes in Thrive MSP2040 and the Safety and Security, as well as the Healthy Environment TPP Goals.

Given that the vast majority of the existing funding is going to operations and preservation activities in the Current Revenue Scenario and there will be acceptable performance, new revenues coming to the region should be allocated to other needs before going back to these core functions. All new capital investments will also need to include an additional 16% for program delivery costs and may require increased operations funds.

The text that follows identifies potential investments between 2015 and 2040 under an Increased Revenue Scenario for each of the ~~10~~ five highway investment categories defined in the Current Revenue Scenario discussion. The lists of projects under the Increased Revenue Scenario are illustrative and may not identify the region's highest priorities for investment. As discussed throughout the Current Revenue Scenario, the Metropolitan Council, MnDOT, and other regional highway partners will continue to develop state highway projects and identify priorities as part of the on-going transportation planning process. See Chapter 11 Work Program for discussion of select activities to be completed prior to the next update of the Transportation Policy Plan or the Unified Planning Work Program for discussion of all annual transportation planning activities performed by the Metropolitan Council [*insert links*]. This plan concludes by identifying additional highway investments that are beyond the Increased Revenue Scenario and time period of this plan that may be needed as the region continues to grow and develop.

Operate and Maintain Highway Assets

The MnDOT Highway Systems Operation Plan 2012-2015 (HSOP) identifies a shortfall in current state highway operations and maintenance spending. The HSOP showed that both traditional and risk-based cost estimates of current operations and maintenance needs exceed the budget anticipated. The Increased Revenue Scenario includes an additional $~~1~~ 0.9 billion in MnDOT

operations and maintenance spending (see Table 5-~~7~~10), which would account for both unmet needs on the existing highway system and additional needs created under this scenario due to improvements like new or additional traffic management technologies, MnPASS, and strategic capacity enhancements.

~~Program Support~~

~~Resources are also needed to support the delivery of quality highway projects. Under the Increased Revenue Scenario, approximately $0.7 billion would be allocated to the metropolitan area for meeting additional project delivery priorities (see Table 5-7). This does not include internal MnDOT resources necessary for program delivery.~~

~~Rebuild and Replace~~Preservation of Existing Highway Assets

Based on work done for the Transportation Finance Advisory Committee, an Increased Revenue Scenario would yield approximately $2 to 2.5 billion for additional pavement, bridge, and roadside infrastructure investments in the metropolitan area (see Table 5-~~7~~10). This level of new investment would help maintain conditions for both principal arterials and state-owned A-minor arterials which are not part of the National Highway System, like MN 47/University Avenue, MN 65/Central Avenue, MN 51/Snelling Avenue, MN 13 and MN 5. Many of these state roads are considered some of the most important routes in a particular municipality and often serve as important transit routes~~, including the proposed arterial bus rapid transit network~~.

~~Highway~~ Safety ~~Improvements~~

Under the Increased Revenue Scenario, it is estimated that approximately $300 million (about 3% of the Increased Revenue Scenario) would be allocated to the greater Twin Cities region for meeting specific highway safety priorities. See Table 5-~~7~~10.

Regional Mobility Improvements

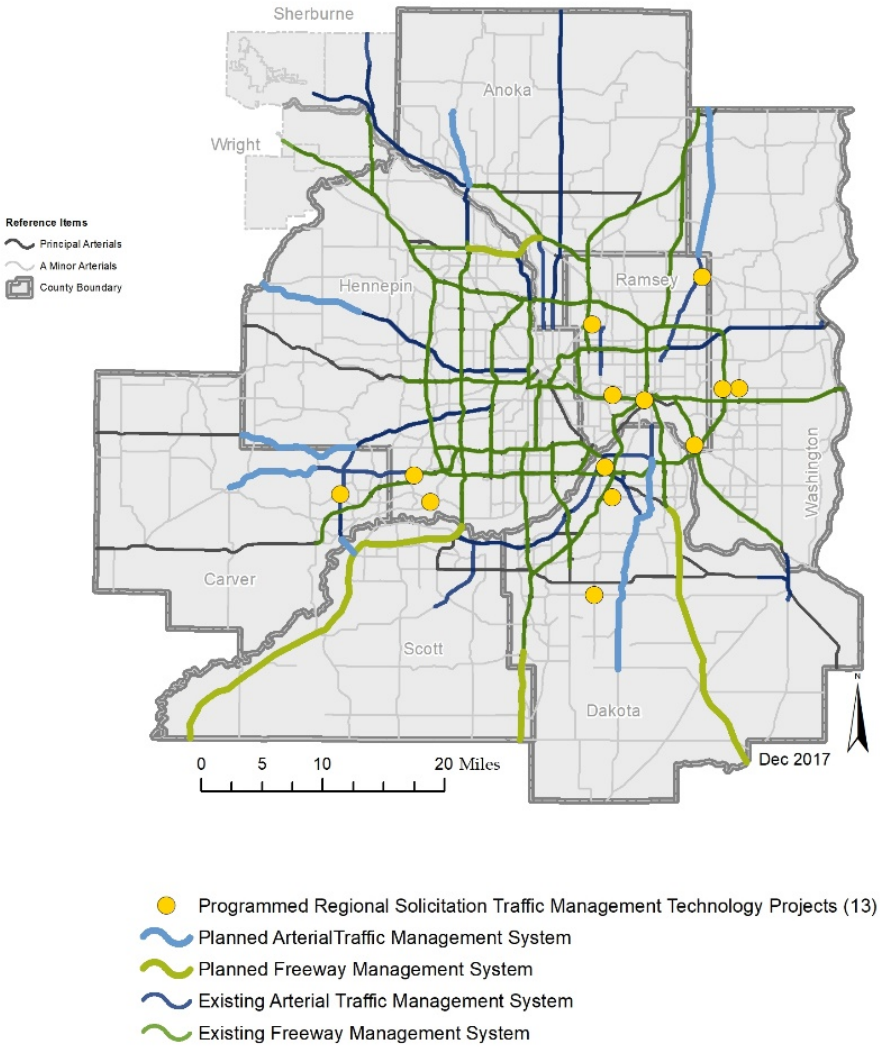
~~Regional mobility improvements consist of several types of the 10 investment categories including: (6) traffic management technologies, (7) spot mobility improvements, (8) the MnPASS system, (9) highway strategic capacity enhancements, and (10) highway access to jobs, education, and industry~~. Potential regional mobility improvements are expected to increase by $4 to $5 billion, but the breakdown by each of these six categories has not yet been determined, as indicated in Table 5-~~7~~10.

Regional Mobility Improvements: Traffic Management Technologies

The need for traffic management technology and spot mobility improvements on the principal and A-minor arterials greatly exceed the level of investment anticipated under the Current Revenue Scenario. A portion of the $4 billion to $5 billion in additional regional mobility funding would be allocated to meeting additional active traffic management and intelligent transportation system priorities. Some of these priorities are illustrated in Figure~~s~~ 5-14 ~~Traffic Management Technology~~.

Figure 5-14: Increased Revenue Traffic Management Technologies

Traffic Management Technology Projects
Increased Revenue Scenario



Regional Mobility Improvements: Spot Mobility

The Current Revenue Scenario includes all projects analyzed in CMSP 4 with a return-on-investment of 12 years or less. As the CMSP study effort is updated in future years, it is anticiapated that additional projects will be generated to add to the Increased Revenue Scenario.

Regional Mobility Improvements: MnPASS Investments

The Increased Revenue Scenario includes funding for the Tier 2 and Tier 3 MnPASS projects, listed in Table 5-6, and would result in completing the MnPASS system vision. Tier 2 and Tier 3 projects were identified based on the highest performing corridors in the MnPASS 3 Study, which was completed in 2017. ~~Consistent with the findings from the MnPASS 2 Study completed by MnDOT in 2010 and the Metropolitan Council's Metropolitan Highway System Investment Study,~~ Tier 2 MnPASS projects should be completed before Tier 3 MnPASS projects unless subsequent corridor studies provide a basis for reprioritizing, partial funding is awarded through a competitive solicitation, other local funds are contributed to the project, or it can be added at the same time as a major preservation project. ~~While a portion of the I-35W North MnPASS would be completed under the Current Revenue Scenario, consistent with recommendations from the I-35W North corridor study, the Tier 2 projects shown below would be completed under an Increased Revenue Scenario. Refer to the Current Revenue Scenario and Figure E-5 for more discussion of MnPASS [*insert links*].~~

The MnPASS System Vision shown in Figure 14 and Table 11 is estimated to cost $1.8 to $2.4 billion dollars, which is beyond the funding available in the Current Revenue Scenario, given the lack of current funds and to promote cost-effectiveness, this estimate assumes most MnPASS projects will be built in conjunction with major pavement and bridge reconstruction or rehabilitation projects, and with little or no new right-of-way. In some cases, MnPASS projects may require use of flexible design principles to maximize the use of available pavement and right-of-way.

While the four Tier 2 corridors are not funded in the Current Revenue Scenario, in depth studies are either underway or will be carried out soon in anticipation of opportunities that may allow construction. There are four Tier 2 priority corridors.

Figure 5-14

MnPASS Projects: Increased Revenue Scenario

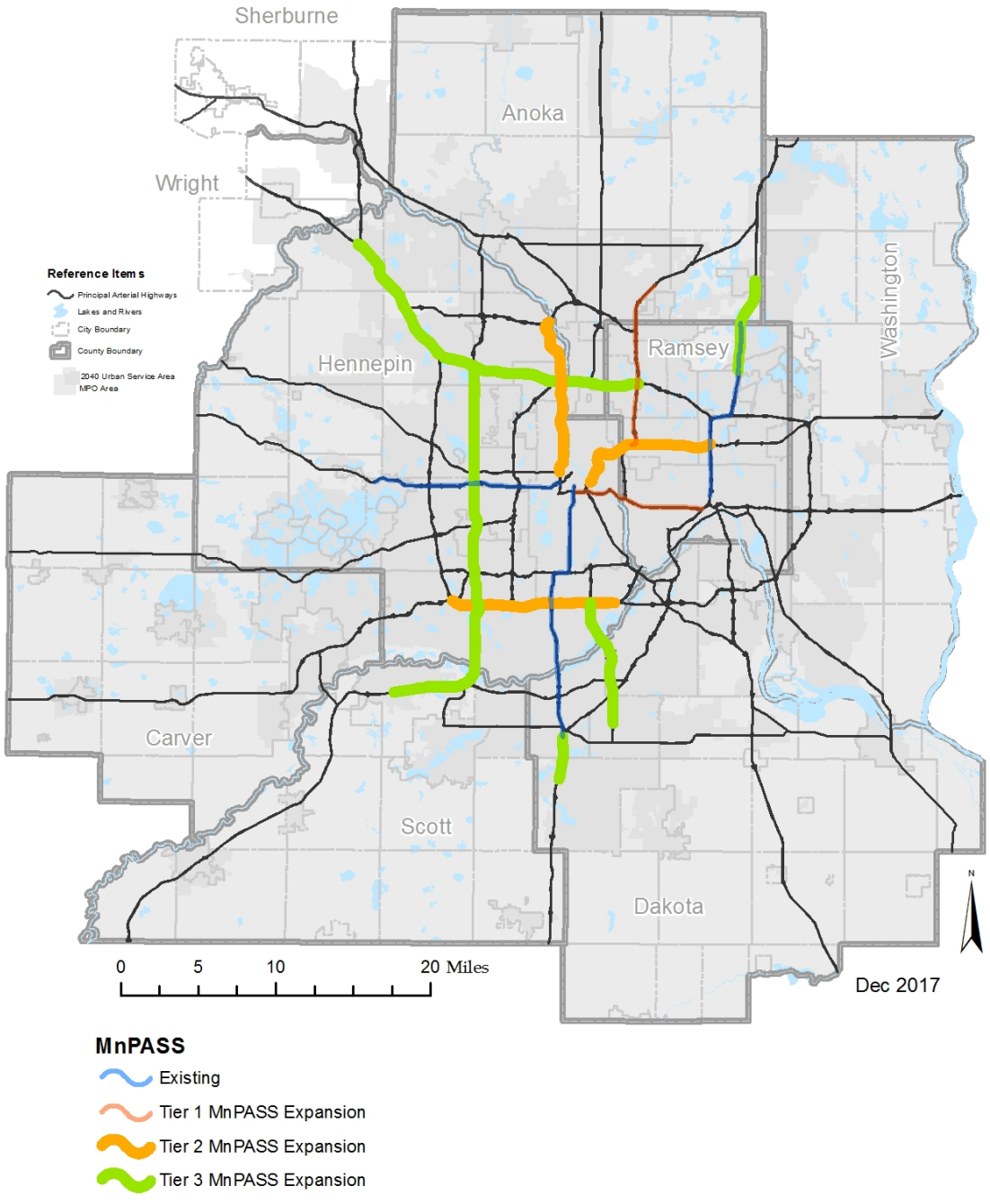


Table 5-~~6~~12: MnPASS System Investment Priorities Under Increased Revenue Scenario

TIER 2 PRIORITY Format table

Route	From	To	Description	Status
TH 36	I-35W	I-35E	Construct East-bound MnPASS lane	Corridor study completed in 2018
I-35W	TH 36	Mississippi River	Construct MnPASS lanes	Corridor study starting in 2018
I-494	West Bush Lake Rd	TH 5	Construct MnPASS lanes	Corridor study completed in 2017
TH 252	I-94	TH 610	Construct MnPASS lanes in conjunction with conversion freeway. TH252 construction also assumes I-94 MnPASS (described below)	Corridor study completed in 2018
I-94	I-694	4th ST.	Construct MnPASS lanes. Between Dowling Ave. and 4th St. convert general purpose lanes to MnPASS lanes	

TIER 3 PRIORITY

Route	From	To	Description	Status
TH 77	138th ST	I-494	Northbound lane only	Study has been completed
TH 169	Scott Co Rd 17	I-494		Corridor study completed in 2017
TH 169	I-494	I-394		Corridor study completed in 2017
TH 169	I-394	I-694		
I-35E Northbound I-35E Southbound CR 96 to Anoka Co 14	Ramsey Co Rd J	Anoka Co 14		
I-35	Dakota Co Rd 50	Crystal Lake Rd	Extension of Existing MnPASS Lanes	
I-94	I-494/I-694	TH 101		
I-94	I-494/I-694	TH 252		
I-694	TH 47	TH 610		

MnPASS 3 Study Process

The purpose of MnPASS system Study Phase 3 was to assist in updating the MnPASS Vision in the TPP and prioritize MnPASS corridors. Since the MnPASS system 2 Study, many changes have occurred to the MnPASS corridors as well as to other regional highway corridors. The MnPASS 3 Study was needed to revisit the MnPASS corridor priorities and to determine if conditions on other highway corridors justified the potential of adding a MnPASS lane(s).

The following steps were followed in MnPASS 3:

1. A list of corridors was identified for possible MnPASS additions.
2. Criteria was selected to portray key characteristics of each corridor and their suitability for MnPASS implementation.
3. Using the results of the screening criteria, the 2040 base model travel forecasts, and qualitative factors such as parallel corridors, redundancy, regional balance, and other factors, a group of corridors for the initial system scenario were selected. Corridors were selected for two system scenarios.
4. An iterative process was used to review the two initial system scenarios for evaluation.
5. The study evaluated the system scenarios, or combinations of corridors, to test each corridor and each scenario's performance.
6. Finally, an optimal system scenario with corridor evaluation results was identified for potential inclusion in the TPP update.

The following criteria were used to determine the regional highway corridors that were suitable for MnPASS lane additions:

- Severity of Congestion. Congestion was measured as the miles – hours of congestion below 45 miles per hour.
- Proximity to employment centers. Scores were developed for each corridor based on the number and size of employment centers within one mile of the corridor.
- Connection to other MnPASS corridors and major destinations. A corridor was rated "high" if it connected to at least one of the following major destinations: downtown Minneapolis, downtown St. Paul, the University of Minnesota, MSP Airport and the Mall of America.
- Express Commuter Bus Demand. Express bus route boardings were totaled for each corridor.
- Constructability/Affordability. Cost ranges were developed for each corridor given the length and physical characteristics as well as existing budget.
- Each corridor received a score for each of the five criteria. Three scoring options were considered:
    - Congestion and costs were each weighted "3". The other criteria weighted 2.
    - All criteria were weighted evenly
    - Congestion weighted 3, cost 2 and others 1.

These scores determined if the corridor would be considered for the next phase of the analysis. Corridors with at least one "high" in at least one weighted option were included in at least one system scenario. Corridors that scored "low" in one or more weighted options were not included in a scenario.

System Evaluation

The system performance of each MnPASS scenario was compared to the 2040 base scenario. The evaluation considered the following five criteria:

1. Vehicle Miles Traveled (VMT) is computed as a combination of the number of vehicles in the system and the distance traveled. VMT is expected to increase due to increasing demand in the MnPASS lances and improved accessibility.
2. Vehicle Hours Traveled (VHT) is the product of linking volume and travel time. VHT is expected to decrease due to travel time savings in the MnPASS lane.
3. Overall System Speed is computed on the ratio of VMT and VHT. The overall speed is expected to increase since MnPASS lanes provided free-flow options to certain travel groups.
4. Congested lane miles are the total lane miles that have volume to capacity ratios higher than certain thresholds during peak hours. For MnPASS system scenarios, congested lane miles are expected to decrease.
5. Mode Shift measures the shift of trips among modes. For MnPASS scenarios, 500 trips are expected to decrease and HOV and transit trips are expected to increase.

Corridor Evaluation

The individual Corridor Evaluations within the system scenarios use four measures:

1. Change in person throughput
2. Total person hours saved
3. Percent travel time saved
4. Cost

The MnPASS 3 study utilized a number of criteria to measure proposals against highway system investment prioritization factors described in this plan. These criteria included proximity to employment centers, severity of congestion, connections to other MnPASS corridors or major destinations, express commuter bus demand and a ratio of 2040 mobility benefits to estimate construction costs.

Figure ~~3~~15 shows the increase in trips with a congestion-free option under the MnPASS Vision. Table ~~3~~14 shows the number of trips with a congestion-free option and the percent of congested freeway lane miles covered by MnPASS under the various tiers of MnPASS corridors. Under the MnPASS vision, more than 700,000 peak period trips would have congestion-free options, with many others offered a partially congestion-free trip. Nearly 60% of the congested lane miles system-wide would have a congestion-free MnPASS option.

Figure 15-add MnPASS figure

Table 14 Trips and Congested Lane Miles with Congestion-Free Options Format table

	INCREASE IN PEAK PERIOD TRIPS WITH CONGESTION-FREE OPTIONS FOR ENTIRE TRIP	**PERCENT OF CONGESTED FREE- LANE MILES COVERED BY MnPASS**

No MnPASS	N/A	0%
Existing MnPASS	101,000	11%
Existing and Tier 1 MnPASS	209,000	25%
Existing, Tier 1 and Tiers 2 MnPASS	260,000	29%
Existing, Tier 1, Tier 2, and Tier 3 MnPASS	708,000	58%

Tier	Route	From (or at)	To	Estimated Cost for MnPASS
2	I-35W	Downtown Minneapolis	MN 36/280	$160-180M
2	TH 36	I-35W	I-35E	$35-60M
2	I-35W	US 10	95th Avenue in Blaine	To be developed
3	TH 36	I-35W	I-35E	To be developed
3	TH 36	I-35E	I-694	To be developed
3	TH 77	138th Street in Apple Valley	Old Shakopee Road in Bloomington	$41M
3	US 169	Scott County 17 in Shakopee	I-494	$80-$115M
3	I-35E	Ramsey County J	Anoka County 14	To be developed
3	I-35	Crystal Lake Road/Southcross Drive in Lakeville	Dakota County 70	To be developed
3	I-94	MN 101 in Rogers	I-494/694	$70 to $95M
3	I-94	Downtown Saint Paul	I-694/494 in Woodbury	To be developed
3	I-494	I-94/694	I-394	To be developed
3	I-494	I-394	US 212	$70 to $150M
3	I-494	US 212	MN 5/MSP Airport	$150 to $185M
3	I-694	I-35W	I-35E	To be developed

Regional Mobility Improvements: Strategic Capacity Enhancements

One ~~of the~~ types of strategic capacity enhancements, new interchanges or overpasses at existing at-grade intersections with traffic signals on multilane highways, was prioritized as part of the Principal Arterial Intersection Conversion Study (completed in early 2017). Jointly led by the Metropolitan Council and MnDOT, the study initially considered about 300 miles of non-

freeway principal arterials with at-grade intersections, considering which intersections might limit the roadway's ability to best serve long-term safety and mobility. A similar prioritization effort has not yet occurred for new interchanges on the existing freeway system since there are so places in the Metro where a new freeway interchange is warranted. Furthermore, a future study of freeway system-to-system interchanges is planned for 2018. Regional transportation partners have identified many ~~potential strategic capacity enhancements~~system-to-system interchanges, including improvements to the I-35W/494 interchange in Bloomington and to the I-94/494/694 interchange in Oakdale/Woodbury beyond what is already programmed.

The Principal Arterial Intersection Conversion process first screened 370 intersections down to 91 intersections for detailed analysis and prioritization. It then prioritized intersections as Low-, Medium-, or High-Priority locations for grade-separation projects or other improvements.

The Principal Arterial Intersection Conversion study utilized a number of criteria to measure proposals against highway system investment prioritization factors described in this plan. These included the critical crash rate index, observed safety deficiencies or concerns, crash frequency, crash severity, need for new infrastructure, Heavy Commercial Average Annual Daily Traffic, connection to a principal or A-minor arterial, supportive of the Regional Bicycle Transportation Network, volume-capacity ratios, and supportive of transit, local planning and existing land use.

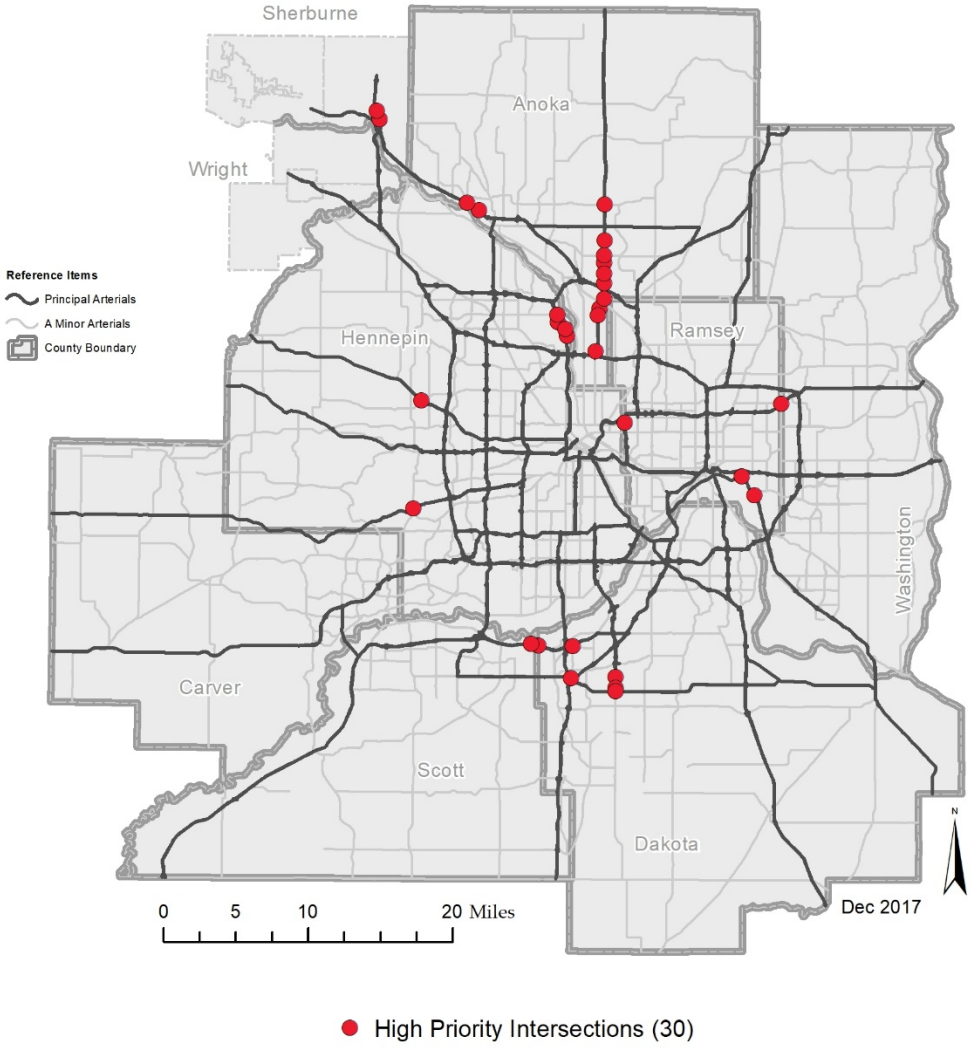
Eighty-six intersections are described below because five of the intersections studied in detail were funded with federal funds in the 2016 Regional Solicitation. The results of the study provide high-level guidance for the "right-sizing" of potential projects as follows:

- **31 High-Priority Intersections** – The High-Priority intersections shown in Figure X often exhibit needs that can justify high-capacity at-grade improvements or grade separations. These intersections (and the corridors they serve) are among the region's candidate locations for strategic capacity expansion under the Increased Revenue Scenario. They should be studied individually or by corridor in more detail to determine right-sized and compatible investments.
- **26 Medium-Priority Intersections** – The Medium-Priority intersections generally do not need grade-separation projects based on current demand. However, additional studies at these locations could show needs for high-capacity at-grade improvements or limited/emerging needs for grade-separation elements (for example, a bridge which may serve only one movement).
- **29 Low-Priority Intersections** – These locations generally do not need major changes or projects based on current demand and any problems can most likely be addressed with at-grade projects under the Spot Mobility project type.

The region and state are using these rankings to help allocate competitive funding through the Regional Solicitation and MnDOT's TED program.

Several interchange projects have also successfully completed the interchange approval process and are listed in Appendix F. These projects are primarily led by local partners and the projects will be amended into the Plan once they are fully funded. Completing this initial interchange approval does not imply that the project is one of the region's highest priorities. The Principal Arterial Intersection Conversion Study prioritized new interchange projects on the non-freeway system.

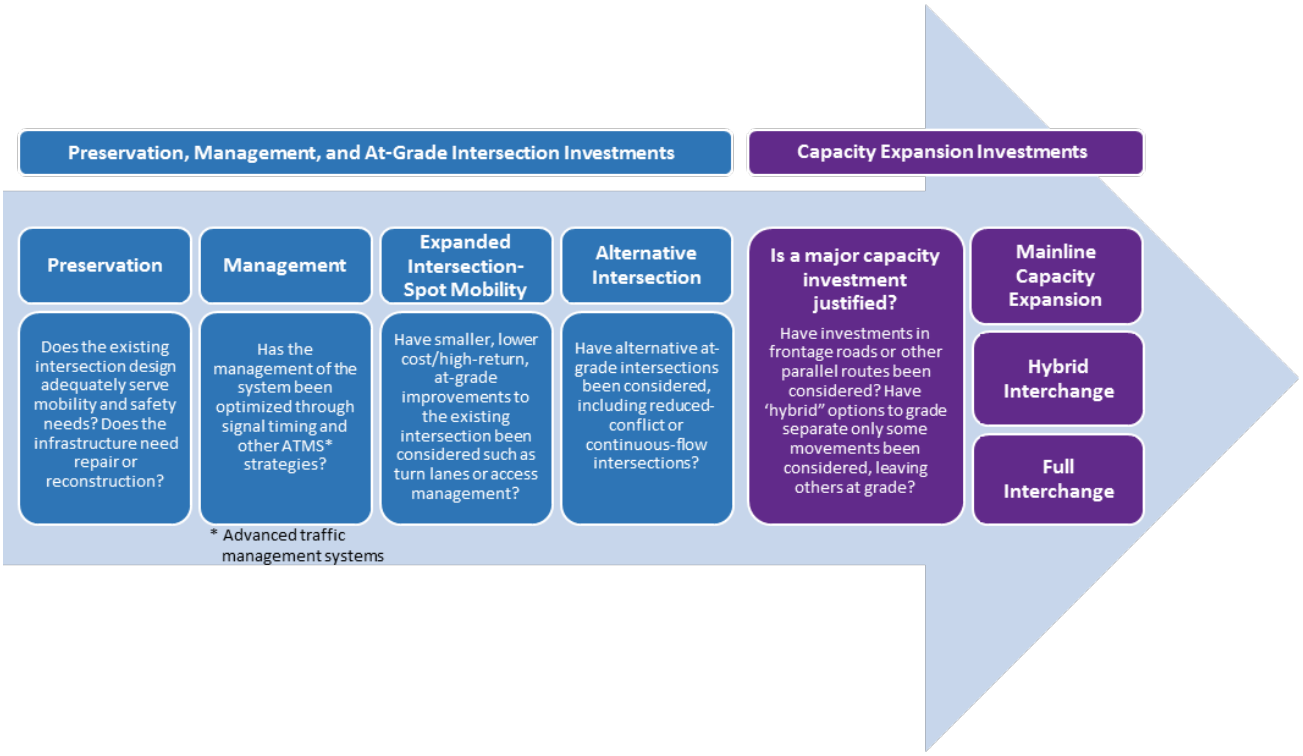
Principal Arterial Intersection Conversion Study High Priority Locations



High Priority Intersections (30)

Consistent with the TPP, the 2017 intersection study also encourages planning to ensure the "right-sizing" of project investments, recommending that intersection improvements consider a progression of investment decisions along with technical data and context at the intersection and throughout the corridor (see Figure Y). This progression should shift from at-grade lower-cost designs to designs that propose to substantially increase capacity, where supported.

Figure Y: Progression of Intersection Investments



On some corridors, there are general purpose lane expansion needs. MnPASS is not a viable alternative in some corridors because of a lack of transit in the corridor limits the benefits of a MnPASS lane or the existing facility is not a freeway, so a MnPASS lane is not possible. Also, ~~I~~in many rural parts of the metro region, trucks are a significant percentage of total traffic flow, carrying agricultural products and natural resources from Greater Minnesota into the metropolitan area on roads where the number of automobiles does not justify MnPASS improvements. Improvements to highways in these outer portions of the metro area which would primarily benefit freight and residents of Greater Minnesota should be considered for funding from sources that would otherwise be designated for use outside the Twin Cities metro area, such as the Greater Minnesota portion of the Corridors of Commerce program funded by the legislature in recent years. This P~~p~~lan does not currently include those funds in the "anticipated revenue~~-~~" for the metro region, so if MnDOT determines these funds should be spent on a project located within the metro region that benefits Greater Minnesota, both the

project and this additional funding would need to be amended into this TPP in order to maintain the plan's fiscal balance between expenditures and revenues.

Include GP lane projects in MnPASS corridors to help MnPASS lanes operate better?

~~Although Appendix F has been part of the region's long range plan for decades, after adoption of the *2030 Transportation Policy Plan* in 2010, MnDOT and the Council implemented a more formal interchange review process. Conversion of the intersection at U.S. Highway 169 at 101st Avenue in Brooklyn Park to an interchange has been found consistent with the qualifying criteria in Appendix F, although funding has not been identified. As part of the work program following adoption of the *2040 Transportation Policy Plan*, MnDOT and the Council will undertake a Principal Arterial Intersection Conversion Study to identify and prioritize key at-grade intersections that should be improved to strategically enhance the capacity of the principal and A-minor arterial system.~~

~~***Highway Access Investments with Increased Revenues***~~

~~Regional transportation partners have identified many potential regional highway access investments, either new interchanges or modifications to existing interchanges on controlled access freeways. Some of these efforts are high priorities and are not included in the Current Revenue Scenario due to anticipated funding limits. Other proposals have been brought forward by local partners to support the economic development they hope to achieve in their communities.~~

~~The new or modified interchanges listed below have been found consistent with the qualifying criteria found in Appendix F of the Transportation Policy Plan, although funding has not yet been identified. This list is not intended to be exhaustive nor does it indicate the region's priorities for investment.~~

~~1. U.S. Highway 52 at Dakota County 42 (Rosemount)~~
~~1. I-494 at Bush Lake Road (Bloomington)~~
~~2. I-94/MN 610 at Hennepin County 610/Maple Grove Parkway (Maple Grove)~~
~~3. I-494 at Argenta Trail (Mendota Heights, Sunfish Lake, Inver Grove Heights, Eagan)~~
~~4. I-94 at Brockton Avenue (Dayton, Rogers)~~
~~5. U.S. Highway 212 at Carver County 140 (Chaska)~~

~~Two other interchanges, I-94 at Wright County 22 (Saint Michael) and the modification and collector distributor road at I-94 at Wright County 19 (Albertville), are not subject to approval via Appendix F since they are beyond the seven county region. However, they are noted under this Increased Revenue Scenario since Interstate Access requests for those locations have been approved by FHWA.~~

Multimodal: Bicycle and Pedestrian Improvements

Under the Increased Revenue Scenario, it is estimated that approximately $300 million (about 3% of the Increased Revenue Scenario) would be allocated to the greater Twin Cities region for meeting additional highway bicycle and accessible pedestrian priorities. See Table 5-10.

~~Highway Investment Summary~~

~~The projects identified in the Current Revenue Scenario are illustrated in Figure E-8 and listed in Appendices B, C, and E [*insert links*]. These investments are for the region's state highway system only, which are Interstates, U.S., and state trunk highways owned and operated by MnDOT.~~

~~Several counties and cities also own a small part of the principal arterial system, and own and operate a majority of the A-minor arterial system. Highway investments made by the counties and cities on their systems are not shown in this section since they are identified through the local comprehensive and capital improvement planning processes, and are largely funded by state and local taxes as shown in Chapter 4 Regional Transportation Finance [*insert link*]. All of the major state and local highway projects identified to date in the metropolitan planning area – consisting of the seven-county region plus the contiguous, urbanized areas of Wright and Sherburne counties, and Houlton, Wisconsin -- are listed in Appendices B, C, and E [*insert links*].~~

~~Projects in the first four years of the plan are identified with some certainty and MnDOT is actively developing them. Projects identified in years 2019-2024 are likely to advance, but continue to need significant development and may substantively change as they are developed. Specific projects have not been identified beyond 2024. Over the timeframe of this plan, MnDOT anticipates investing $11 billion (year-of-expenditure dollars) in the metropolitan area's state highway system.~~

~~MnDOT is largely able to meet its highway asset rebuilding and replacement needs, but has high priority, unmet needs for all other investment categories, including operations and maintenance, specific highway safety improvements, and regional mobility. Operations and maintenance, program support, and reconstruction and replacement activities are estimated to make up between 76% to 94% of the Current Revenue Scenario. Safety, bicycle, and pedestrian investments are estimated to make up 5% to 7% of the Current Revenue Scenario.~~

~~Between 2015 and 2024 in the Current Revenue Scenario, MnDOT will also invest approximately $721 million (6% of the Current Revenue Scenario) in regional mobility improvements. These include traffic management technology, spot mobility improvement, the MnPASS system, highway strategic capacity enhancements, and regional highway access investments, known as "regional mobility improvements."~~

~~MnDOT will continue to improve and expand traffic management technologies throughout the metropolitan area and deliver spot mobility improvements identified through its Congestion Management and Safety Plan. It will also continue to expand the MnPASS system of priced managed lanes. And in response to special funding like the state's Corridor Investment Management Strategy (CIMS), Transportation Economic Development (TED), and Corridors of Commerce programs, MnDOT will complete or contribute to several strategic capacity enhancements and regional highway access projects. However, it should be noted that these special funding programs should not be seen as dedicated funding sources that will be perpetuated in the future, so no funding amounts beyond those already awarded or appropriated are included in the revenue assumptions for the Current Revenue scenario.~~

~~As shown in Table 5-7, these projects make up over 30% of the regional mobility funding available to the metropolitan area separate from Regional Solicitation funding. Because of operation, maintenance, and rebuilding needs in 2025 through 2040, limited available revenues, state trunk highway bond repayment responsibilities, and the rising cost of construction, MnDOT does not anticipate making regional mobility improvement investments in the region after 2024. Performance outcomes based on these investments are summarized in "System Performance Measurement and Monitoring" [*insert link*].~~

~~If new revenues become available, MnDOT would continue to invest in operations and maintenance in the metropolitan area. This would include addressing a backlog of priority projects as well as operating and maintaining new highway facilities, such as new or improved traffic management technologies and an expanded MnPASS system. MnDOT would also develop and deliver additional safety, bicycle, accessible pedestrian, and regional mobility improvements, such as the MnPASS, strategic capacity, and regional highway access projects discussed. These projects would help the region work toward the outcomes identified in *Thrive MSP 2040* and the goals and objectives identified in this plan. As shown in Table 5-7, the investments under the Increased Revenue Scenario are estimated to cost $8 billion to 10 billion (constant dollars).~~

Additional Highway Needs beyond Increased Revenue Scenario

There are now, and will continue to be, highway needs in the region that are not addressed under either revenue scenario in this plan. While the region does not support attempts at building general-purpose highway capacity to eliminate congestion, there are other needs that should be recognized. Regional transportation partners have identified many other potential, long-term highway improvement projects, often through the local comprehensive planning and capital improvement planning processes.

When conducting studies of these potential improvements, regional transportation partners must use the population, household, and employment forecasts and corresponding urban and rural land use plans adopted by the Metropolitan Council and local communities, so all potential projects can be comparably prioritized for investment. To increase the likelihood of being able to fund these projects, studies should work to develop innovative and affordable projects that address reasonably anticipated needs based on these forecasts and plans.

~~*New River Crossings*~~

~~Regional transportation partners should continue to work together on two potentially critical future river bridges identified in previous Transportation Policy Plans. MnDOT should continue to work with Carver and Scott counties to monitor the changing needs for, and identify affordable improvements to, the State Highway 41 bridge and its approaches over the Minnesota River. Hennepin and Anoka counties should also continue to work together, and with MnDOT, to monitor the need for and affordable approaches to a new A-minor arterial bridge over the Mississippi River potentially connecting the cities of Dayton and Ramsey. The project partners should work together to preserve right-of-way for bridge improvements if development pressures become imminent.~~

New principal or A-minor arterials to support expanding urban development

The need for new principal or A-minor arterials to serve growth is well documented in future suburban edge and emerging suburban edge areas where land ~~uses~~uses, and the arterial grid are not densely developed. As discussed in Appendix D, principal arterials are the most efficient and safe way to accommodate longer and faster regional vehicle trips. The following future principal arterial needs have been identified:

1. **Anoka County** has identified Anoka County 22/Viking Boulevard from Sherburne to Chisago counties as the preferred location for its potential future east-west principal arterial.
2. **Dakota/Scott counties** have identified Scott County 17/State Highway 13 from U.S. Highway 169 to State Highway 19 as the route for its potential future north-south principal arterial, and additional north-south and ~~a future~~ east-west principal arterials are currently being studied by local partners. ~~along Dakota County 70/Scott County 8 from I-35 to U.S. Highway 169.~~ Get info from Dakota and Scott Counties.
3. **Washington County** has identified Washington County 15/Manning Avenue as the route for its potential future north-south principal arterial.

Since principal arterials should end with a connection to another principal arterial, actual endpoints can be finalized in the future. Most of these proposed future principal arterials and their supporting A-minor arterial network will be considered further in future updates of the Transportation Policy Plan when new regional forecasts based on the 2020 census have been developed. Most of these routes are not warranted within the current planning timeframe as

the urban service area, consistent with the ~~*2030*~~ *2040 Transportation Policy Plan*, is not forecast to expand to require them. However, Scott County 17 and Scott County 42 lie within the urban service area identified by *Thrive MSP 2040*.

~~As a work program item for the future update of the *2040 Transportation Policy Plan*, the Council, MnDOT, and the counties will work together to assess the need and regional priority for additional principal arterials in the part of the region beyond the urban service area and identify practical approaches for providing, operating, and maintaining them if justified [*insert link to "Work Program"*].~~