Implementation Plan

Highway 169 Mobility Study

Minnesota Department of Transportation

Prepared by:

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SRF No. 8989

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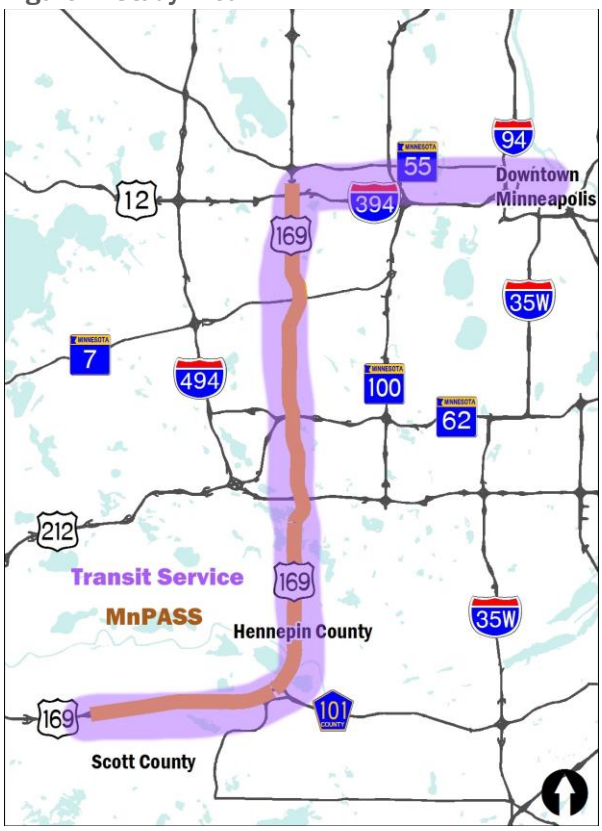
Introduction

Background and Study Area

Figure 1: Study Area



Highway 169 is a corridor that connects employees to jobs, and freight to destinations. This study examines ways to improve mobility through both highway and transit investments.

As a result of recommendations included in the Metropolitan Council's *Highway Transitway Corridor Study* (2014), Highway 169 is identified as a potential transitway in the Increased Revenue Scenario[1] of the Metropolitan Council's *2040 Transportation Policy Plan* (2015). Based on recommendations from the *MnPASS System Study Phase 2* (2010) and the *Metropolitan Highway System Investment Study* (2010), Highway 169 between Marschall Road and I-494 is also designated as a MnPASS corridor in the Increased Revenue Scenario.[1] As part of the MnPASS System Study Phase 3 (2017), Highway 169 was reaffirmed to be a valid corridor for investment. These four previous studies, as well as the *Scott County Transit Operations and Capital Plan* (2013) led to the unique scope of the Highway 169 Mobility Study, which considers Bus Rapid Transit (BRT), MnPASS, and highway spot mobility improvements in a single, coordinated effort.

As shown in Figure 1~~Figure 1~~, the study area for the BRT, MnPASS, and spot mobility improvements considered in the Highway 169 Mobility Study runs roughly 25 miles from Marschall Road in Shakopee in Scott County to Highway 55 in Golden Valley in Hennepin County, and then another seven miles to downtown Minneapolis. The BRT alternatives in the study considered the use of either I-394 or Highway 55 to travel from Highway 169 to downtown Minneapolis. In the study area, Highway 169 crosses a range of landscapes and land uses that include corporate campuses, industrial and warehouse facilities, retail centers, single-family residential neighborhoods, clusters of apartment buildings, and several prominent natural features. Users include both commuters and freight. In the study area, Highway 169 connects the cities of Shakopee and Savage in Scott County, and Bloomington, Eden Prairie, Edina, Hopkins, Minnetonka, St. Louis Park, Golden Valley, and Plymouth in Hennepin County. The corridor is populous and jobs-rich, with

[1] The Increased Revenue Scenario identifies a set of improvements to be pursued if/when additional funding is secured for transportation investments.

more than 215,000 residents and 187,000 employees at thousands of businesses in a range of industries within two miles of Highway 169. The study area also crosses the path of transitway investments including the planned METRO Green Line Extension and METRO Blue Line Extension light rail projects, the C Line arterial BRT project on Penn Avenue, the D Line arterial BRT project in Downtown Minneapolis, and the potential American Boulevard arterial BRT project.

Implementation plan

This implementation plan is the culmination of a two-year technical analysis of BRT, MnPASS, and highway spot mobility improvements in the Highway 169 corridor. The analysis was informed by community and employer engagement and guided by a project management team (PMT) as well as technical and policy advisory committees (TAC and PAC). The plan includes:

- A summary of the project's purpose and need statement and goals, the Study planning process, and reference to the technical body of work that informs the plan
- A vision for the corridor that includes implementation of BRT, MnPASS, and highway spot mobility improvements
- "Recommended Improvements" that define a set of BRT, MnPASS, and highway spot mobility improvements that offer high benefits for lower costs
- A chronology for coordinated highway and transit infrastructure and service investments that bring immediate benefits and value to communities while building toward the ultimate corridor vision

Project Purpose, Need, and Goals

The purpose of the BRT, MnPASS, and spot mobility improvement projects is to increase access to jobs and destinations, provide transportation choices, and improve safety and travel time for Highway 169 users. Currently, Highway 169 does not meet the needs of all existing and potential users—transit riders, carpoolers, individual drivers, and freight haulers. There are many different job types in the corridor, including office, industrial, medical, retail, and entertainment, which require a labor force with a wide variety of skills, education, and experience resulting in a diverse range of travel patterns and needs. Congestion along the corridor complicates commutes, makes travel times unreliable, and increases the likelihood of crashes.

This implementation plan is intended for use by a project champion to make the vision of improved mobility along Highway 169 a reality. Six project goals were developed after considering the purpose and need. Each goal has several measurable criteria that were used to evaluate alternatives.

1. Improve access to local and regional destinations, activity centers, and employment concentrations
2. Provide better mobility in the corridor and options to avoid congestion

3. Improve the attractiveness of transit to serve more people in the corridor
4. Provide a high long-term return on the transportation investment
5. Prioritize service to existing transit-supportive areas and to those committed to implementing development patterns that support transit service
6. Preserve and enhance the quality of the built and natural environments

Planning Process

After a high-level analysis of a "universe" of BRT and MnPASS alternatives, as documented in Tech Memo 4, three alternatives were analyzed in more detail for this study:

- Alternative 1: BRT from Marschall Road to downtown Minneapolis primarily along Highway 169 and I-394; MnPASS on Highway 169 between Marschall Road and Highway 55.
- Alternative 2: BRT from Marschall Road to downtown Minneapolis primarily along Highway 169 and Highway 55; MnPASS on Highway 169 between Marschall Road and Highway 55.
- Alternative 3: MnPASS on Highway 169 between Marschall Road and I-494.

Each alternative was evaluated using the criteria that correspond to the project goals in Tech Memo 10. Alternatives 1 and 2 met project goals, but with several distinct differences between the two alternatives. The alternative evaluation results were presented to the TAC and the PAC. The TAC came to consensus that Alternative 2 best met the project goals and recommended it for further development in the implementation plan for several reasons:

- The BRT in Alternative 2 serves a larger environmental justice population; it makes sense to serve the population most likely to use the service.
- The BRT investments are relatively similar, commute time is similar, and ridership is similar. The data does not point to a clear advantage for either alternative.
- Alternative 2 provides BRT service to a new market and an otherwise unmet need. It makes more sense to provide new point-to-point service on Highway 55.
- I-394 currently has frequent all-day bidirectional bus service.
- In addition to connecting to Green Line Extension light rail at the downtown Hopkins Station, the BRT in Alternative 2 connects to Blue Line Extension light rail and C Line Arterial BRT on Penn Avenue in Minneapolis.

Highway spot mobility improvements were investigated over the course of the study. Preliminary screening results were shared with the PMT, PAC and TAC. Full final evaluation results are included in Technical Memo 15.

Given the rationale for the TAC's recommendation, the project management team proceeded with preparation of this implementation plan for Alternative 2. Later, if project sponsors wish to pursue Alternative 1, a similar plan may be drafted for that alternative.

At their final meeting, the PAC passed a resolution in support of the Recommended Improvements and Interim Bus Service Option 2 with one abstention from the City of Bloomington. This resolution will allow the Metropolitan Council to designate Highway 169 and Highway 55 as a project with study recommendations under the increased revenue scenario.

The full body of technical information in support of this implementation plan is available in a series of technical memoranda:

- Tech Memo 1: Review of Past Studies
- Tech Memo 2: Existing Conditions and Market Analysis
- Tech Memo 3: Purpose and Need
- Tech Memo 4: Initial Alternatives Screening
- Tech Memo 5: Detailed Definition of Alternatives
- Tech Memo 6: BRT Operations and Maintenance Costs
- Tech Memo 7: Environmental Impact Scan
- Tech Memo 8: Capital Costs
- Tech Memo 9: Traffic Operations and Ridership
- Tech Memo 10: Evaluation Summary Report
- Tech Memo 11: Recommended Improvements Capital Costs and Concepts
- Tech Memo 12: Recommended Improvements Operations and Maintenance Cost and Interim Service Plan
- Tech Memo 13: Recommended Improvements Ridership Documentation
- Tech Memo 14: Recommended Improvements Pedestrian and Bicycle Facility Improvements\
- Tech Memo 15: Recommended Improvements Spot Mobility Improvements

Vision and Recommended Improvements

The vision for the Highway 169 corridor is similar to the purpose of the project: increasing access to jobs and destinations, providing transportation choices, and improving safety and travel time for Highway 169 users. The analysis of the three modal components of the Highway 169 Mobility Study—MnPASS, BRT, and highway spot mobility improvements—points to "recommended improvements", a set of MnPASS, BRT, and highway spot mobility improvements that could achieve the vision in an efficient and cost-effective manner. This plan defines the Recommended Improvements and then explores and explains pathways to funding and implementing it.

Recommended Improvements

MnPASS

The Recommended Improvements call for center-running MnPASS in both directions on Highway 169 from Marschall Road in Shakopee to Highway 55 in Golden Valley. MnPASS on Highway 169 would be part of the same system of MnPASS lanes that cross the corridor, existing on I-394 and planned on I-494 in Bloomington. However, direct connections between these MnPASS lanes that allow users to stay in MnPASS from one corridor to the next are not assumed as part of the MnPASS construction on Highway 169.[2]

From Marschall Road to south of the I-494 interchange MnPASS would be constructed in the median of Highway 169. The existing Bloomington Ferry Bridge over the Minnesota River would be used with expansions to several spans of the bridge to accommodate the lanes and recommended shoulder widths. In this and all segments, overpass bridges over Highway 169 would need to be expanded accordingly. From south of the I-494 interchange to north of the Highway 62 interchange, Highway 169 will be expanded to the inside for the MnPASS lanes. Adjustments to the ramp loops for the Highway 62 interchange would be needed.

[2] A lack of a direct connection means that MnPASS users wishing to travel from Highway 169 to I-394, for example, would need to exit the Highway 169 MnPASS lanes, use the general-purpose lanes to exit for I-394, then move through the general-purpose lanes on I-394 to enter the I-394 MnPASS lanes. Direct connections were omitted from the MnPASS recommended improvements definition because they require extensive interchange reconstruction and new right of way, and therefore have high capital costs.

From north of Highway 62 interchange to south of the bridge at 2nd Street, Highway 169 would be expanded to the outside for the MnPASS lanes and ramp connections and lane configuration would be adjusted accordingly. Replacement of the Nine Mile Creek Bridge was completed in fall 2017 and provides adequate width for future MnPASS lanes and bus-only shoulders.

The west side of the bridge over Excelsior Boulevard and the railroad tracks would be expanded to allow for northbound Highway 169 to accommodate a MnPASS lane while retaining two existing general purpose lanes and an auxiliary lane.

From south of the bridge at 2nd Street to south of the bridge at Minnetonka Boulevard), Highway 169 would be expanded to the inside and outside in various locations for the MnPASS lanes and ramp connections and lane configurations would be adjusted accordingly.

At Cedar Lake Road, the existing configuration includes button hook ramps south of Cedar Lake Road. With the expansion of Highway 169 for MnPASS, the existing button hooks ramps would no longer be viable and would be replaced with a service road connecting Cedar Lake Road to the Minnetonka Boulevard interchange.

Figure 2: MnPASS Segments

Highway 169 north of Cedar Lake Road includes the I-394 and Highway 55 interchanges. Most existing interchange infrastructure will be retained and expanded as required for the MnPASS lanes.

For additional detail on the MnPASS concepts, see Tech Memo 11: Recommended Improvement Capital Costs and Concepts.

Highway Spot Mobility Improvements

Spot mobility improvements are lower-cost/high-benefit highway concepts that seek to reduce existing congestion issues. These improvements are ideally able to be implemented more quickly and at lower cost than traditional capacity expansion projects. Successful improvements are expected to provide benefits for the existing facility and would also be compatible with the addition of MnPASS lanes to the facility.

Tech Memo 2: Existing Conditions and Market Analysis identified several priority congestion locations along Highway 169 in the study area. Each of these areas was reviewed and a series of spot mobility concepts were developed along the corridor, including multiple improvements for some locations. A screening process was applied based on traffic operations evaluation and cost estimates prepared for each improvement. The recommended improvements were those found to be most cost-effective at addressing existing and future congestion problems. The resulting concepts were also reviewed to ensure they fit within the overall Recommended Improvements for the Highway 169 corridor improvements outlined in this implementation plan. All concepts were developed as stand-alone spot mobility improvements that were later assessed for compatibility with MnPASS.

The cost-effectiveness evaluation results, which consider costs and congestion reduction for all proposed spot mobility improvements, are included on page four in Tech Memo 15: Spot Mobility Improvements Technical Memorandum. The concepts recommended reflect the improvements that meet the needs of both MnPASS and BRT improvements along the corridor and are the most cost-effective in reducing congestion. These improvements have not been reviewed by MnDOT's traffic engineering group, and additional microsimulation modeling is needed to fully investigate and refine these concepts.

Existing Physical Limitations

There are unique situations in two areas of the corridor where existing highway facilities present limitations to adding MnPASS lanes under their existing configuration. These are the Cedar Lake Road and Betty Crocker Drive interchange areas. Both interchanges are currently characterized by sub-standard ramp connections that have low design speeds because of the sharpness of the turn. Adding MnPASS in these locations requires widening the mainline of Highway 169 to the outside of its current footprint. As a result, these ramp connections would be further constrained to the point that it would not be possible to maintain them in their current configurations.

Both locations were also identified as priority congestion areas where spot mobility improvements were evaluated. Thus, there is an opportunity to improve operational conditions in these areas while modifying interchange access to facilitate the addition of MnPASS lanes to Highway 169.

Recommended Spot Mobility Improvements

The following sections describe the locations where spot mobility improvements are recommended as part of the Recommended Improvements for this implementation plan.

Southbound Highway 169 between 494 and the Bloomington Ferry Bridge

Improvements recommended in this segment are designed to improve lane continuity along southbound Highway 169 between I-494 and TH 101, which is compatible with MnPASS. This area currently has both two- and three-lane sections. The improvements would provide a continuous three-lane cross section, reducing the bottlenecks and lane changes required for general purpose traffic. The specific improvements include:

- Reconfiguring the I-494 westbound to Highway 169 southbound ramp to merge into mainline Highway 169 prior to the combined entrance from I-494 westbound and Marth Road
- Adding a third lane between the Anderson Lakes Parkway off ramp and on ramp
- Adding a third lane between the Anderson Lakes Parkway on ramp and the added lane near Pioneer Trail
- Adding a third lane between the lane drop near Old Shakopee Road and the on ramp from Old Shakopee Road
- Solution to reconfigure lane alignment at the Highway 169 southbound exit to Highway 101

Both directions of Highway 169 between Lincoln Drive and I-394

Improvements recommended in this area are designed to modify access to and from Highway 169 at Cedar Lake Road and Minnetonka Boulevard. This reduces the potential for congestion resulting from short weaving distances between the Cedar Lake Road and Minnetonka Boulevard interchanges and addresses the geometric constraints posed by widening Highway 169 to accommodate the widening of the highway for MnPASS lanes. The specific improvements include:

- Adding one-way frontage road connections between the north ramps at Minnetonka Boulevard and the existing frontage roads south of Cedar Lake Road
- Eliminating the south ramps at the Cedar Lake Road interchange
- Modifying the alignment of the north ramps at the Cedar Lake Road interchange

Both Directions of Highway 169 between I-394 and Highway 55

Improvements recommended in this area are designed to improve movements using on and off ramps between Highway 169 and I-394 and Highway 55. They also modify access to and from Betty Crocker Drive, which both reduce the potential for congestion resulting from short weaving distances between these interchanges and address the geometric constraints posed by widening Highway 169 to accommodate the widening of the highway for MnPASS lanes. The specific improvements include:

- Modifying the existing cloverleaf interchange at Highway 55 to a partial cloverleaf design with signalized traffic control

- Adding a frontage road connection on the east side of Highway 169 between Highway 55 and Betty Crocker Drive
- Adding a collector-distributor road along southbound Highway 169 to serve traffic movements entering and exiting at Highway 55 and I-394
- Maintaining south ramp access only between Highway 169 and Betty Crocker Road; these movements are critical for serving recommended Highway 169 BRT service

Bus Rapid Transit

Bus Rapid Transit Guideway

BRT would operate on Highway 169 for the portion of the corridor between Marschall Road in Shakopee and Betty Crocker Drive in Golden Valley. BRT would also operate on Betty Crocker Drive and General Mills Boulevard to reach Highway 55 and operate on Highway 55 to 7th Street near downtown Minneapolis. The buses would then use 7th and 10th Streets North, 2nd Avenue North, and 6th and 7th Streets South to serve downtown Minneapolis.

During peak periods or congested conditions, BRT would operate in the MnPASS lanes on Highway 169 between Canterbury Road and the Washington Street/Marth Road exit, and between Excelsior Boulevard and Betty Crocker Drive. On all other segments of Highway 169, BRT would use bus-only shoulders in congested conditions or general-purpose lanes when traffic is flowing freely. The use of bus-only shoulders allows transit to keep reliable service times.

It was assumed that buses would operate in general purpose lanes on Highway 55 and on all local streets. There is a short section of bus-only shoulder on Highway 55 between Highway 100 and Theodore Wirth Parkway; bus operators may use this facility at their discretion. See Figure 4 for a map of the optimized BRT alternative.

Bus Rapid Transit Stations

The optimized BRT would serve 15 stations, including five stations in downtown Minneapolis. Some stations are offline, and require the bus to leave the highway and make a few turns to access the station, and others are inline, which are adjacent to the highway on interchange ramps. Starting from the southern terminus, the stations are:

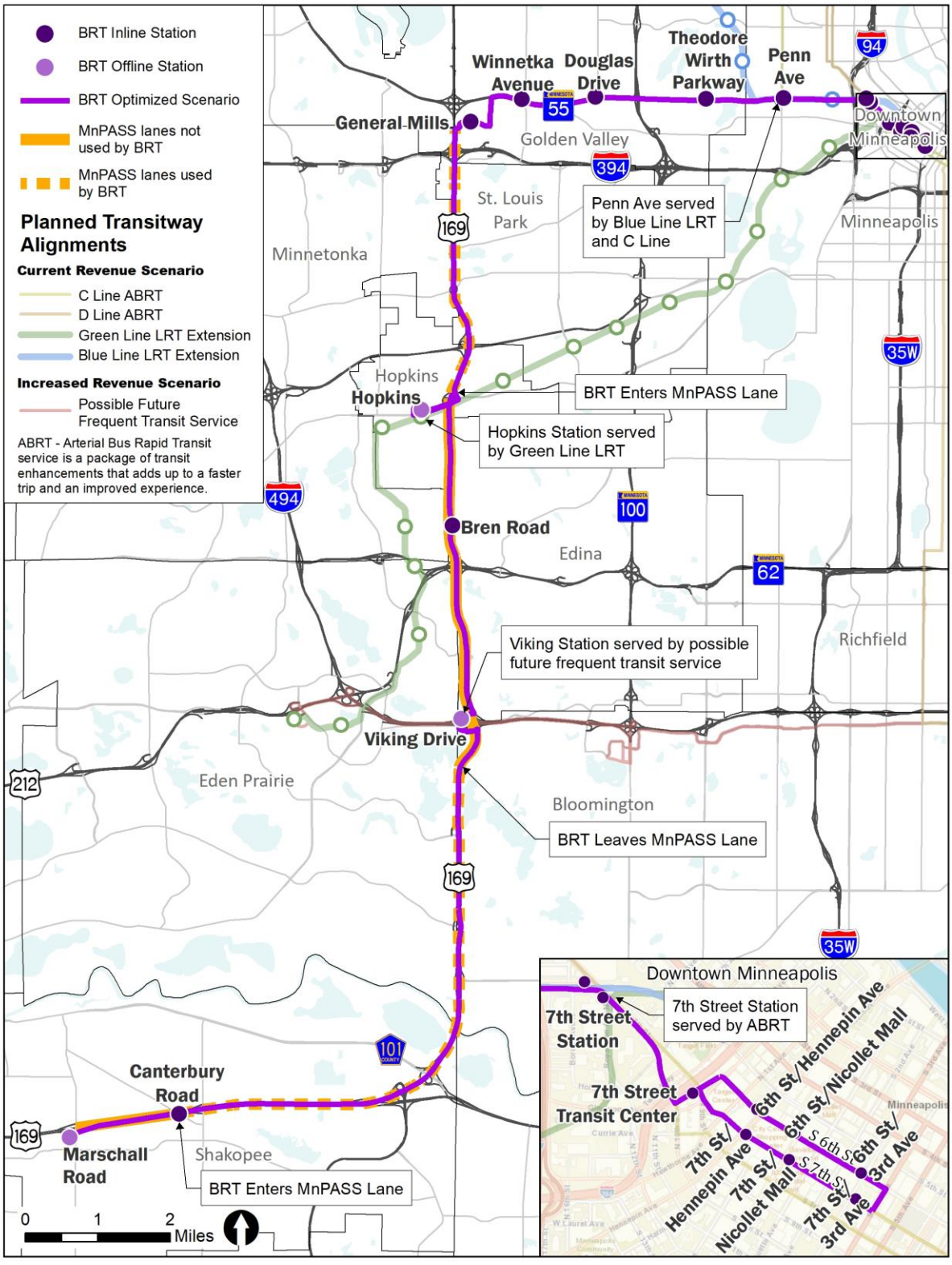
- Marschall Road Transit Station: This existing facility is proposed as an offline station at the southern terminus for BRT service. Northbound buses would use the existing slip ramp from the transit station to the Highway 169 off-ramp. Southbound service assumes a new slip ramp from Marshall Road into the transit station (to avoid the need to travel further south to 17th Avenue).
- Canterbury Road: BRT would stop in both directions along Highway 169 entrance ramps at Canterbury Road. This would be an inline station with platforms located on the far side of the intersection.
- Viking Drive/Washington Avenue: BRT would stop on West 78th Street, just east of Washington Avenue. Buses would access this offline station via existing Highway 169 on/off ramps. Southbound buses would use the existing Washington Avenue/Marth Road exit ramp. Northbound buses would return to Highway 169 via the existing Highway 169 frontage road to the Valley View Road interchange.

Figure 3. Station Types

- Bren Road: BRT would stop in both directions along Highway 169 entrance ramps at Bren Road. This inline station would have platforms located on the far sides of the intersection.
- Downtown Hopkins: BRT would stop at an offline station adjacent to the planned METRO Green Line Extension Downtown Hopkins Station. Buses would access this stop via Excelsior Boulevard. Buses would loop around 9th Avenue, 1st Street and 8th Avenue to access the platforms and return to Highway 169.
- General Mills: BRT would stop at an offline station on the north end of the General Mills parking lot, off Betty Crocker Drive.
- Winnetka Avenue: BRT would stop at an inline station west of Winnetka Avenue, near the existing pedestrian bridge.
- Douglas Drive: BRT would stop at an inline station, with far-side platforms assumed at this intersection.

  Theodore Wirth Parkway: BRT would stop at an inline station, with far-side platforms assumed at this intersection.

Figure 4. Recommended Improvements: BRT



- Penn Avenue: BRT would stop at an inline station, with a far-side platform assumed in the eastbound direction and a near-side platform assumed in the westbound direction. Stops are located for convenient transfers to and from the planned Blue Line Extension and C Line arterial BRT stations at Penn Avenue.
- 7th Street: BRT would stop at an inline station, with curbside platforms assumed along 7th Street, just north of 5th Avenue.
- 7th Street Transit Center: This downtown station assumes a northbound platform on Glenwood Avenue in the ground level of the A Ramp. The southbound platform is assumed at the intersection of Glenwood Avenue and 7th Street.
- Hennepin Avenue: This downtown station assumes a northbound stop at 6th Street and Hennepin Avenue. Because the BRT would be near its end and dropping off passengers only, no new station infrastructure is planned at this location. The southbound platform would be at 7th Street and Hennepin Avenue at the station to be built as part of the planned C Line arterial BRT project.
- Nicollet Mall: This downtown station assumes a northbound stop at 6th Street and Nicollet Mall. Because the BRT would be near its end and dropping off passengers only, no new station infrastructure is planned at this location. The southbound platform would be at 7th Street and Nicollet Mall at the station to be built as part of the planned C Line arterial BRT project.
- 3rd Avenue: This downtown station assumes a northbound stop at 6th Street and 3rd Avenue. Because the BRT will be near its end and dropping off passengers only, no new station infrastructure is planned at this location. The southbound platform will be at 7th Street and 3rd Avenue at the station to be built as part of the planned C Line arterial BRT project.

Bus Rapid Transit by the Numbers

Length: 28 miles

Stations: 15

Forecast 2040 Ridership: 5,600

Estimated Cost to Construct and Purchase Buses: $45.5 million*

Estimated Annual Cost to Operate: $13.6 million*

Service Frequency: every 15 minutes

End-to-End Travel Time: 75 minutes

**2018 dollars*

Ridership

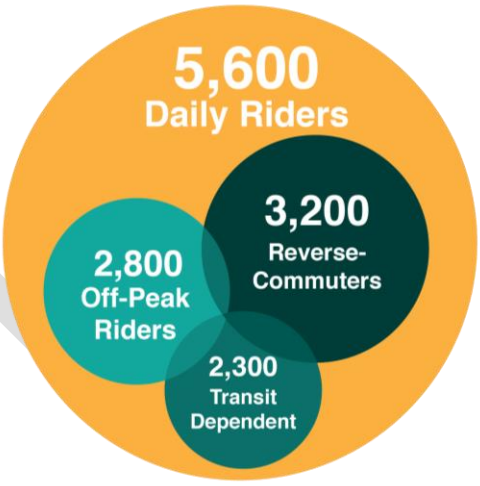
The 2040 ridership forecast assumes that all transitways included in the region's fiscally constrained plan (adopted in January 2015) are operational. This includes all existing transitways and the following planned transitways: Blue Line Extension (Bottineau) light rail, Green Line Extension (Southwest) light rail, C Line arterial BRT on Penn Avenue, and D Line arterial BRT on Chicago Avenue South and Emerson and Fremont Avenues North.

In addition to forecasting the ridership using the BRT service (station-to-station BRT ridership), the results estimate the breakdowns of specific BRT ridership characteristics and ridership on other complementary services, as shown in

Table 1~~Table 1~~.

Table 1: Optimized BRT Ridership

Measure	Ridership
Station-to-Station BRT	5,600
Transit-Dependent	2,300
Reverse Commute	3,200
Peak Period (Off-Peak Period)	2,800 (2,800)
Express Bus Sharing the BRT Guideway	1,600
Total Ridership Sharing the BRT Guideway	7,200
Express Bus Routes with Potential to Use the BRT Guideway	2,600
New System Transit Riders	1,900



See Tech Memo 13: Optimized BRT Ridership Forecast Results for more information.

Capital Costs

The capital cost of the optimized BRT alternative reflects the cost to construct the stations, expand the highway shoulders from 10 to 12 feet, provide traffic signals, and acquire vehicles, as well as "soft costs" for items such as engineering and construction services. Contingencies, allocated and unallocated, are applied to the capital cost to account for uncertainty in both the estimating process and the scope of the project. The capital cost of $45.5 million (2018 $) assumes construction of the line from Marschall Road Transit Station to 3rd Avenue in downtown Minneapolis. The cost of constructing stations on 7th Street in downtown Minneapolis is assumed to be covered by C Line and/or D Line arterial BRT projects. Capital Cost methodology and assumptions are discussed in detail in Tech Memo 11: Recommended Improvements Capital Costs.

Bus Rapid Transit Operating Plan

The BRT operating plan assumes one route pattern that makes all station stops. Proposed frequencies are 15 minutes all day and 30 minutes in the late evening and weekend early morning and evening periods, as shown in Table 2. A span of 18 hours is proposed seven days a week to accommodate employment in the Shakopee area with seven-day-a-week shift work. Proposed frequencies and span of service meets recommendations for highway BRT service in Met Council's Regional Transitway Guidelines.

Table 2: BRT Operating Plan

Service Day	Time Period	Time Span	Hours	Frequency
Weekdays	Early	5:00 – 6:00 a.m.	1.0 hour	15 min.
	AM Peak	6:00 – 9:00 a.m.	3.0 hours	15 min.
	Midday	9:00 a.m. – 3:00 p.m.	6.0 hours	15 min.
	PM Peak	3:00 – 6:30 p.m.	3.5 hours	15 min.
	Evening	6:30 – 8:30 p.m.	2.0 hours	15 min.
	Late Evening	8:30 – 11:00 p.m.	2.5 hours	30 min.
Weekends	Morning	5:00 – 8:30 a.m.	3.5 hours	30 min.
	Midday	8:30 a.m. – 6:30 p.m.	10.0 hours	15 min.
	Evening	6:30 – 11:00 p.m.	4.5 hours	30 min.

For more detail on the BRT Operating Plan see Tech Memo 12: Optimized BRT Service Plan, Operations and Maintenance Costs, and Interim Service Plan.

Supporting Transit Network

The background transit network assumes the following major transit improvements to be in place by 2040 as part of a "No-Build" condition:

- Green and Blue Line light rail extensions and Orange Line BRT on I-35W south of downtown
- Penn Avenue and Chicago/Emerson-Fremont arterial BRT
- Background bus network changes from Green and Blue Line light extension bus service plans

No changes to Highway 169 Corridor Express Bus service are proposed, with exception of express buses being able to use proposed MnPASS lanes for improved travel times and reliability compared to the "No-Build." Other proposed changes specific to routes that operate in the Highway 169 corridor are as follows:

- Minnesota Valley Transit Authority (MVTA) Route 495 – No changes are proposed to this route. Route 495 would have a connection to Highway 169 BRT service at the Marschall Road Transit Station, and provide connections to Amazon, Burnsville Transit Station (Orange Line BRT), and the Mall of America.
- MVTA Route 496 – This is a new route assumed for this study. This route would provide a direct connection between the industrial parks (including the Amazon distribution center) in Shakopee and the Marschall Road Transit Station. Proposed frequencies are 30 minutes in the peak periods and 60 minutes in the midday period, with service on weekdays only.
- MVTA Route 497 – This existing route is anchored at the Marschall Road Transit Station and provides circulator service in Shakopee to the Scott County Courthouse, Town Square Mall, and St Francis Regional Medical Center. No changes are proposed to this route's alignment. Service

frequencies, however, are assumed to be improved to 30 minutes in the peak periods, 60 minutes in the midday period, with weekend service at 60 minutes.

- MVTA Route 498 – This is a new route assumed for purposes of this study. This route would replace portions of service presently provided by Route 499, a Shakopee circulator connecting between large shopping centers, industrial job sites, and passing by Canterbury Park and Seagate Technology. Proposed frequencies are 30 minutes in the peak periods and 60 minutes in the midday period, weekdays only. Route 498 has connections to BRT service at the Marschall Road Transit Station and the Canterbury Road Station.

- MVTA Route 499 – This existing route's alignment is modified to provide more direct service between the Marschall Road Transit Station, the Canterbury Road Station and the existing Southbridge Crossings park-and-ride, which is served by three other MVTA routes (490, 491 and 492). Service frequencies are assumed to be improved to 30 minutes in the peak periods, 60 minutes in the midday period, with weekend service at 60 minutes. This route provides connections to several locations in Shakopee including St Francis Regional Medical Center, Workforce Center, Sam's Club, and Walmart.

- SouthWest Transit Route 632 – This is a new route proposed in the Green Line Extension bus service plans. This route would provide service between the Southwest Transit Station and the Eden Prairie Town Center, a large shopping mall and station along the Green Line. For this study, this route is assumed to be extended to the proposed Viking Drive/Washington Avenue BRT Station. No changes are assumed to existing route frequencies (30 minutes in the peak period and 60 minutes in the midday period, weekdays only).

- Plymouth Metrolink Route 774 –Plymouth Metrolink presently operates this express route from Station 73 in Plymouth to downtown Minneapolis and the University of Minesota via Zachary Lane, Hopkins Crossroad and I-394. Consideration should be given to modifying these alignments to follow Highways 55 and 169, Betty Crocker Drive and General Mills Blvd. This will provide additional access to the proposed BRT service and to General Mills creating connections to employers in Plymouth and to the University of Minnesota. No changes are proposed to service frequencies (eight eastbound morning trips, nine westbound evening trips, weekdays only). These potential changes are anticipated to have negligible impact on route service requirements and annual operating costs.

- Metro Transit Route 46 – This existing route presently has limited service (one a.m. and one p.m. trip) to Opportunity Partners, located along Smetana Drive. For this study, it is assumed that Route 42 service is expanded with all trips operating to this location, resulting in approximate 30-minute all-day frequencies (weekdays only). This route would connect to Highway 169 BRT service at the Bren Road Station.

- Metro Transit Route 542 – This existing route serves the American Boulevard corridor, including Best Buy Headquarters and the Mall of America. For this study, it is assumed this route is extended west to serve the Viking Drive/Washington Avenue BRT Station. Proposed

frequencies are 30 minutes in the peak periods and 60 minutes in the midday period, weekdays only.

Several new or altered transit routes that are part of the Green Line Extension bus service plan will also connect to Highway 169 BRT service with no alignment or frequency changes:

- Routes 630N and 630S – proposed circulator routes in the Green Line Extension bus service plans that serve the Golden Triangle with 15-minute service at peak periods and 30-minute service midday. Routes will have a connection to Highway 169 BRT service at Viking Drive/Washington Avenue.
- Route 615 – Green Line Extension service plans result in this route connecting to Highway 169 BRT service at Bren Road and at Downtown Hopkins. This route will connect to Excelsior & Grand, Ridgedale Shopping Center, and Knollwood Mall.
- Routes 605, 612, 614 and 664 – These routes from the Green Line Extension bus service plans will have transfer opportunities to Highway 169 BRT service at Downtown Hopkins. These routes provide connections to locations along Excelsior Boulevard, Vine Hill Road, and downtown Minneapolis.
- Route 645 – This route will have transfer opportunities to Highway 169 BRT service at the General Mills BRT Station. Previously express route 675, this route now offers limited stops between Park Place and Louisiana Transit Center near I-394.

Several other existing transit routes will have transfer opportunities to Highway 169 BRT service at stations along Highways 169 and 55. For more detail on the supporting bus network, including maps of proposed routes, see Tech Memo 12: Optimized BRT Service Plan, Operations and Maintenance Costs, and Interim Service Plan.

Operations and Maintenance Costs

Annual operations and maintenance costs reflect the cost of operating and maintaining the optimized BRT and all proposed supporting bus service, as shown in Table 3. Operations and maintenance costs for supporting bus service are expressed as additional costs over a No-Build scenario.

Table 3: BRT Operations and Maintenance Costs

Item	Annual Cost (2018$)
BRT Service (includes bus operations and maintenance)	$ 9,119,000
BRT Features (includes police and maintenance of station infrastructure)	$ 1,355,000
Supporting Bus Service	$ 3,135,000
Total	**$ 13,609,000**

Staging of Service and Improvements

The importance of staging improvements cannot be understated. The combination of both highway improvements and transit improvements in this implementation plan make it especially important to collaborate and precisely time funding opportunities.

This part of the Plan is broken in two sections, one section on transit service and funding opportunities, and one section on highway and transit infrastructure. Each covers phasing, cost, and funding opportunities.

Transit Service

To build a market for BRT service and to begin serving demand for trips in the corridor currently not served by existing service, such as suburb-to-suburb and reverse commute trips, two interim service bus routes are proposed. Because Green Line Extension and the bus service improvements planned to be implemented alongside it are important connections for the interim service, it is assumed that interim bus service would not be implemented until after Green Line Extension opens, currently anticipated in 2023. Furthermore, while the interim service is important to building the market, its usefulness depends on its connectivity to the broader transit network. To this end, it is recommended that interim service be implemented in conjunction with the supporting transit network below.

Interim Route Options

Interim route Option 1 assumes service from the Marschall Road Transit Station in Shakopee to the General Mills Station. Interim stops are proposed at Viking Drive/Washington Avenue and Downtown Hopkins. Option 2 assumes continuation of Option 1 service along Highway 55 from General Mills to downtown Minneapolis, stopping at all proposed stops along Highway 55 and in downtown Minneapolis. Interim route service is designed to run less frequently than the Recommended Improvements and does not include new stations, pre-pay boarding, or fare enforcement. Improvements to the pedestrian and bicycle networks can support the interim bus stops.

Figure 5. Interim Bus Service Option 1

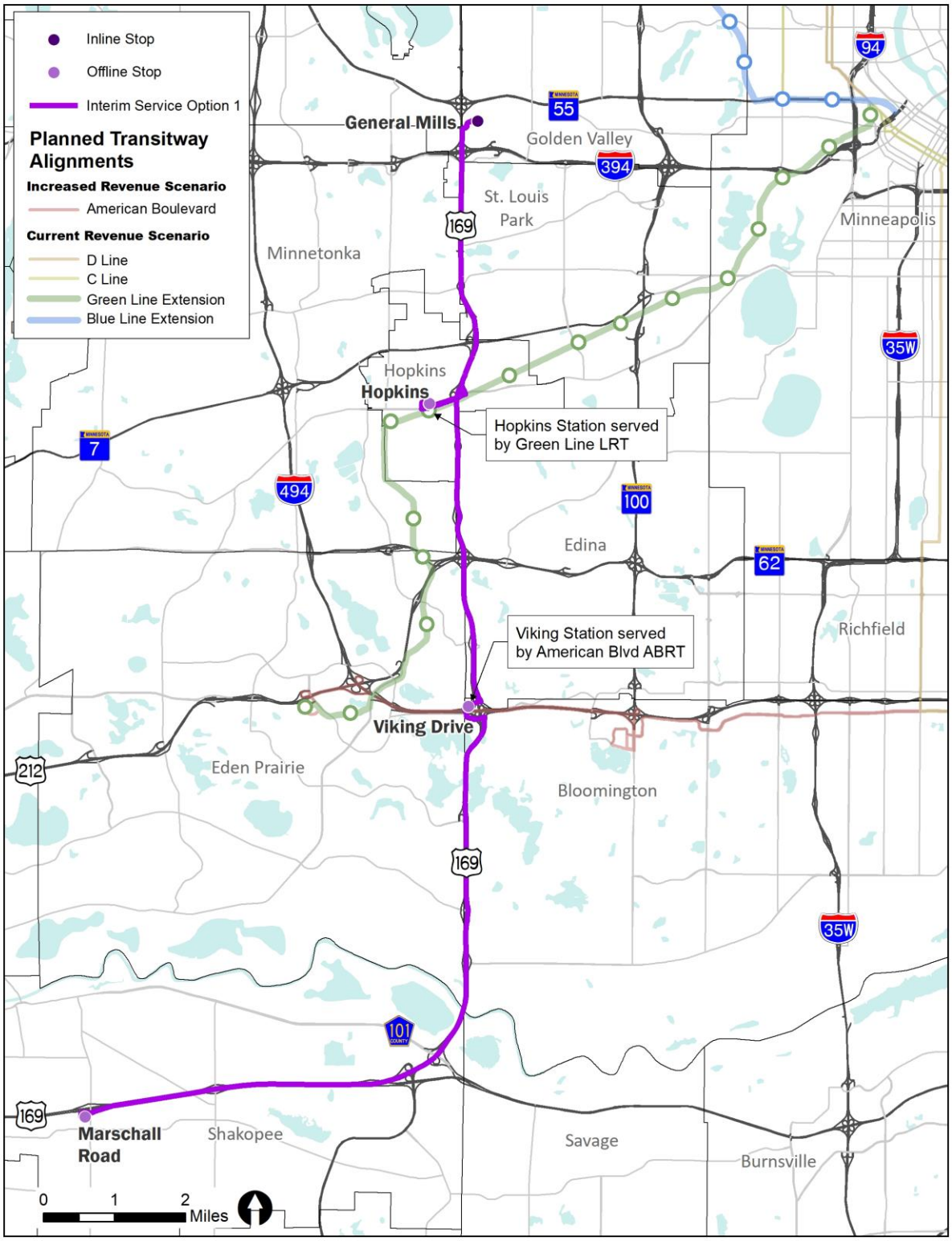
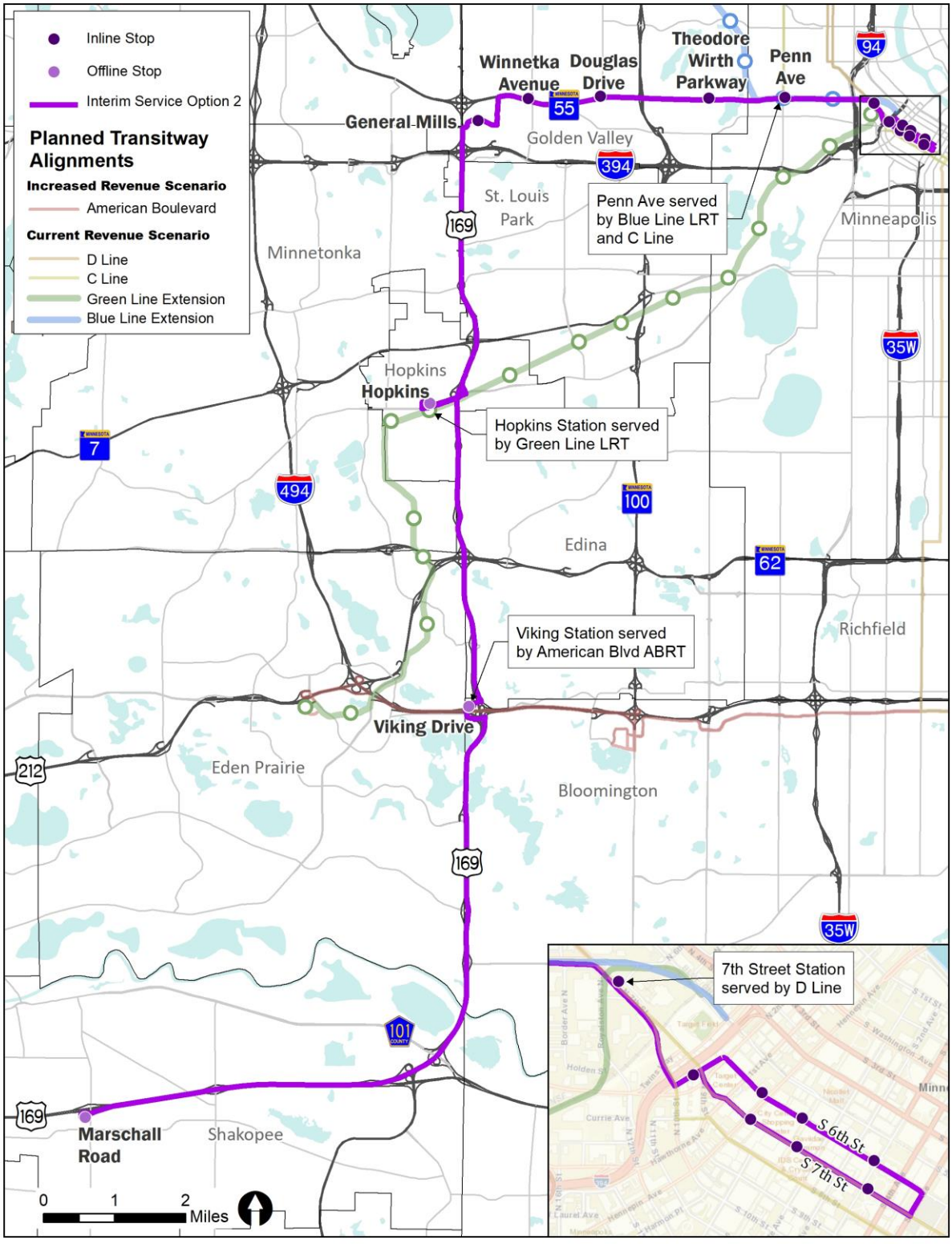


Figure 6. Interim Bus Service Option 2



Service Plan

The interim service operating plan assumes one route pattern that makes all station stops. Proposed weekday frequencies are 30 minutes during peak periods and hourly during other periods, as shown in Table 4. A span of 18 hours is proposed seven days a week to accommodate employment in the Shakopee area with seven-day-a-week shift work. However, initial service could be provided only during weekdays with weekend service added once benchmarks or other thresholds are met.

Table 4: Interim Service Operating Plan

Service Day	Time Period	Time Span	Hours	Frequency
Weekdays	Early	5:00 – 6:00 a.m.	1.0 hour	60 min.
	AM Peak	6:00 – 9:00 a.m.	3.0 hours	30 min.
	Midday	9:00 a.m. – 3:00 p.m.	6.0 hours	60 min.
	PM Peak	3:00 – 6:30 p.m.	3.5 hours	30 min.
	Evening	6:30 – 8:30 p.m.	2.0 hours	60 min.
	Late Evening	8:30 – 11:00 p.m.	2.5 hours	60 min.
Weekends	Morning	5:00 – 8:30 a.m.	3.5 hours	60 min.
	Midday	8:30 a.m. – 6:30 p.m.	10.0 hours	60 min.
	Evenings	6:30 – 11:00 p.m.	4.5 hours	60 min.

Supporting Transit Network

Connecting transit service would align with improvements described for BRT service in the Recommended Improvements Supporting Transit Network~~Supporting Transit Network~~ section. Interim service could be broken up into a phased-implementation approach with Option 1 service between the Marschall Road Transit Station and General Mills Station and Option 2 as full corridor service from Marschall Road Transit Station to downtown Minneapolis. Connecting bus service could be phased as warranted by demand, but its provision is essential to the success of the interim service.

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Potential bus service changes previously described in the Shakopee/Marschall Road area, the Viking Drive/Washington Avenue area and the General Mills area are also applicable for the interim service plan. As noted previously for the Recommended Improvements service plan, Plymouth Metrolink route 774 could also be modified to serve the General Mills stop with nominal impacts on service requirements or operating costs. Option 1 would be supported by existing route 645 that connects General Mills Station to Downtown Minneapolis.

Operations and Maintenance Costs

Annual operations and maintenance costs were estimated for the interim service and utilized methodologies outlined in Tech Memo 6: BRT Operations and Maintenance Costs.

Bus costs for background bus service changes are expressed as additional operations and maintenance costs over a No-Build scenario. Table 5 presents cost estimates for Option 1 and Option 2 interim service for either weekday-only service or 7-day service. Table 6 presents route-specific cost estimates for background bus service changes (cost increases from a No-Build scenario). These costs are reported by route, as they may not be implemented all at once. Costs do not include BRT station amenity costs, as the station amenities are assumed to be built later, along with the rest of the BRT investment.

Table 5: Interim Service Operations and Maintenance Cost Estimates (2018$)

Cost Item	Weekday Only Service	7-Day Service
Interim Service Option 1	$1,687,724	$2,188,962
Interim Service Option 2	$2,641,081	$3,346,438

Table 6: Operations and Maintenance Costs for Supporting Bus Service (2018$)

Operator	Route	Annual Cost
MVTA	496	$354,936
MVTA	497	$323,516
MVTA	498	$543,139
MVTA	499	$255,022
Plymouth Metrolink	774	$554,241
SouthWest Transit	632	$279,843
Metro Transit	542	$337,236
Total		**$2,647,933**

Capital Costs

Capital costs for interim bus service are shown below in Table 7~~Table 7~~. Option 1 interim service from the Marschall Road Transit Station to General Mills requires 3 peak and 4 fleet buses for 7-day service. Option 2 interim service from Marschall Road to downtown Minneapolis requires 6 peak and 8 fleet buses for 7-day service. The following improvements were included in the cost estimate for each bus stop location: preparation of the site with grading; demolition/removals; sidewalk improvements for compliance with the Americans with Disabilities Act (ADA); curb and gutter improvements; a concrete pad for the shelter; and shelters with light and heat and standard station signage.

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Table 7: Interim Service Capital Costs (2018$)

Cost Item	Capital Cost of Interim Service
Interim Service Option 1	$4,440,000

Interim Service Option 2	$8,800,000

Interim Service Performance

Performance benchmarks applied to the interim service could be used to determine appropriate timeframes for upgrading:

- the level of service (more midday or peak period trips),
- the span of service (weekday-only to 7-day service),
- expansion of the alignment (Option 1 to General Mills vs. Option 2 to downtown Minneapolis),
- eventual inclusion of BRT features (including the addition of stops at Canterbury Road and Bren Road).

However, performance benchmarks do not commit the region to mandatory upgrades of service, only the consideration of improvements, and would be dependent on available funding. These service benchmarks could be used as one of several evaluation measures for interim service to see if it is ready for improvements.

Based on regional transit guidelines, suburban local service should reach 15 passengers per in-service hour (PPISH) and if service reaches the downtown urban core, that number goes up to 20 PPISH. It is anticipated that it will take a time to build ridership for this new regional route. This route will need to capture approximately 600 (Option 1) to 1,000 (Option 2) weekday passenger trips per day to reach a 15 PPISH threshold. The Downtown Hopkins stop is anticipated to be important to this route's success because the proposed Highway 169 service provides a means to distribute Green Line trips north to General Mills, and south to Shakopee. Regional transit guidelines suggest that BRT achieve a minimum of 25 PPISH, so an interim service option, such as Option 1 or 2, would have to demonstrate productivity close to this to be considered for an upgrade to BRT service and infrastructure. MnPASS lanes and/or upgraded bus-on-shoulder lanes should also be in place prior to upgrading to BRT service.

Finally, a key objective of this route is capturing reverse commute trips. Passenger surveys and trip load analysis should be used to determine trip purposes, distribution of demand by geography and time of day, and general passenger use on the interim route. Survey information can be used to determine appropriate adjustments to the interim route's span of service, days of operation and passenger travel patterns.

Transit Planning Next Steps

The next step to support the project is to determine a locally preferred alternative (LPA.) Though the recommendation from the PAC places the project firmly in the Increased Revenue Scenario, official actions would need to be taken by counties and cities to formally designate the LPA. This can happen before or after interim route service begins, depending on when funding is made

available for the work. This would likely include sharing the Recommended Improvements broadly with the public along the route to increase awareness and gather feedback.

Next, the project is carried forward for preliminary design and environmental clearance, and eventual full funding, final design and construction. Preliminary design and environmental clearance occur coincidentally and typically take approximately two years; timelines for completion of final design, funding, and construction are more uncertain because they depend on funding availability. In advance of and during planning for BRT, communities along the corridor can promote and prepare for the BRT project by placing transit-supportive land use and zoning in prospective station areas and creating connections to station locations by improving bicycle and pedestrian infrastructure, as discussed in Technical Memo 14. Funding Opportunities

Funding opportunities for transit service are necessary to meet the vision both to create interim service to build a market and to implement BRT described in the Recommended Improvements. Because these funding opportunities come with many rules and require time and effort to acquire, it is important to plan ahead for applications and funding. This project will need to be documented in the Metropolitan Council's Transportation Policy Plan.

Funding sources can be used for capital costs, while others can be used for operating expenses, and likewise some may be used for interim service while others can be used for BRT. A full table of the source, description, and allowed uses of funds can be found in Table 8~~Table 7~~.

Federal Transit Administration Capital Investment Grant Program, Small Starts

The Federal Transit Administration (FTA) Capital Investment Grant (CIG) Program is a grant program that provides funding for transit investments. It is comprised of specific programs, including Small Starts. Small Starts is a discretionary and competitive federal grant program appropriate for total project costs below $300M, and funding sought from the program below $100M. Once entry into Project Development has been granted, Small Starts grant funds can be used for environmental review, project engineering and design, and construction. Projects are justified based on mobility, environmental benefits, congestion relief, economic development, land use, and cost effectiveness per trip. The award also depends on a commitment of local funds and evidence of stable financial sources for future operation, and position in the national list of projects. Getting into the national queue can be difficult and requires precise timing to pair with other funding sources.

State of Minnesota

State funding covers nearly half of transit system operating costs in Minnesota. The two main sources are the Public Transit Assistance from the General Fund and the Metro Area Transit Account.

General Fund (Public Transit Assistance)

The Minnesota State Legislature has set aside funds from the general fund for transit in the past, both for Greater Minnesota Transit and for Twin Cities Metro Area Transit. In 2016 and 2017 respectively, the Public Transit Assistance from the general funds has been $80 million and $101 million.[3] This assistance can be used by transit agencies for both capital and operating costs but is typically used for operating expenses. Most general fund dollars for the metro area are used to fund the Metro Mobility paratransit service and projections for this service indicate that all general fund dollars (based on current levels) will be used for this federal- and state-mandated service in the near future.

Motor Vehicle Sales Tax (Metro Area Transit Account)

A Motor Vehicle Sales Tax (MVST) also funds the Metro Area Transit Account. This value fluctuates year-to-year based on the sales and value of sales of motor vehicles in the state. In 2016 and 2017, these values were between $330 and $370 million dollars each year. The Minnesota Constitution requires that at least 40 percent of MVST revenues be spent on transit in the state of Minnesota and state law has established an ongoing practice of allocating 36 percent of statewide revenues to the Metro Area Transit Account. This funding generally supports the operation of the current metro area transit system and has historically not provided enough funding for transit service expansion.

General Obligation Bonds

General Obligation Bonds (GO Bonds) have been used to fund transit capital at the state level in Minnesota as recently as 2017. Municipalities can also leverage GO bonds to fund capital projects but are limited by the risk to their credit rating.

Regional Solicitation for Federal Funds

Metropolitan Council receives some federal funds, most notably Surface Transportation Block Grants (STBG) and Congestion Mitigation and Air Quality (CMAQ) grants, to disperse among the region. The Transportation Advisory Board accepts applications and recommends projects for funding to the Metropolitan Council every two years.

Surface Transportation Block Grants

The Surface Transportation Block Grant program is a federally funded program, administered locally by MnDOT and the Metropolitan Council, that largely replaces the previous Surface Transportation Program (STP) funding. STBG funds may be used to help design, implement, and oversee public-private partnerships. This could be particularly useful for closing gaps between transit

[3] 2016 Transit Report: A Guide to Minnesota's Public Transit Systems Page 7
http://www.dot.state.mn.us/govrel/reports/2017/transit.pdf

stations and large employers and improving nearby pedestrian and bicycle facilities that show readiness for transit service.

Congestion Mitigation and Air Quality

Congestion Management and Air Quality Improvement Program (CMAQ) funds can be used to reduce congestion on highways and improve air quality. Project examples include vehicle-to-infrastructure communications equipment and metered entrances. Funding is administered by the Metropolitan Council's Transportation Advisory Board. CMAQ has also been used to fund new rail transit service, system expansion, new vehicles, and reduced fare programs. CMAQ can be used for both roadway and transit improvements.

Minnesota Regional Railroad Authorities

Regional Railroad Authorities (RRAs) are created as political subdivisions and local government units in Minnesota to be a steward of rail projects and rail right of way land.[4] RRAs that have imposed the metropolitan transportation sales and use tax (including both Hennepin County RRA and Scott County RRA) are limited to contributing no more than ten percent of capital costs for rail projects, and may not fund operations and maintenance costs for rail projects.[5] However, there are no statutory rules that limit spending on project enhancements or supportive infrastructure for a light rail project, which could be interpreted to include connecting BRT service. Though not the express purpose of RRAs, there is no specific language prohibiting RRAs from supporting BRT transit projects with either capital or operations and maintenance dollars.

Hennepin County Regional Railroad Authority

Hennepin County Regional Railroad Authority (HCRRA) was established to plan, design and implement light rail transit in Hennepin County. They have also found reuses for abandoned railroad right of way, most notably for the Midtown Greenway in Minneapolis. Although HCRRA's presence in BRT corridor work is limited to date, other RRAs have participated in the planning and development of bus transit.

Scott County Regional Railroad Authority

Scott County Regional Railroad Authority (SCRRA) consists of the five County Commissioners and has not passed a budget between 2012 and 2017. The financial reports indicate there is just under $100,000 balance for SCRRA and no levies to increase that amount of funding have been passed between 2012 and 2017. Although SCRRA's has not been involved in BRT corridors in the past,

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[4] Regional Railroad Authorities Act Purpose, Minnesota State Statute 398A.02 2017
https://www.revisor.mn.gov/statutes/?id=398A.02

[5] Regional Railroad Authorities Transit Funding, Minnesota State Statute 398A.10 2017
https://www.revisor.mn.gov/statutes/?id=398A.10

there is nothing prohibiting them from participating in the future, either by levying a tax, selling assets, or applying for grant funding.

County Sales and Use Tax

The County Sales and Use Tax, originally passed by the Minnesota State Legislature in 2008, allows counties to impose a transportation sales tax as high as one-half percent (0.5%) and an excise tax of $20 per motor vehicle purchased in the county. These funds can be used for transportation generally, including transit capital or operating costs.

Hennepin County

In 2017, Hennepin County decided to impose the full extent of the tax, which may bring in as much as $125 million annually. This amount is expected to be sufficient to cover costs of projects outlined in the Hennepin County Sales and Use Transportation Tax Implementation Plan through 2036, including operations of the existing Blue and Green Line LRTs and Northstar Commuter Rail. Transit projects in the plan include Bottineau (Blue Line Extension), Northstar, Orange Line, Riverview, and Southwest (Green Line Extension.) Hennepin County staff do not anticipate that the Hennepin County Board will add other projects to their Implementation Plan in the near term.

Scott County

As outlined in the Transportation Tax Implementation Plan passed in May of 2015, Scott County expects to generate about $6 million annually using the full extent of the tax. $1 million is expected to be used annually for capital and/or operating transit countywide. It is expected that the remaining funding will be used on highway infrastructure, including a potential future project on Highway 169 Bloomington Ferry Bridge Crossing.

Funding for capital and operation will not be possible with one funding source or the support of only one county alone—collaboration is the key to finding enough funding to bring the project to fruition.

Table 8: Transit Funding Sources

Name	Jurisdiction	Source	Description	Allowed use of Funds
Capital Investment Grants Program	Federal	FTA	Nationally competitive grant funding for projects in the cost range of Highway 169 BRT, requires a local match (Federal Guideway, Small Starts & New Starts)	Capital, BRT
General Fund (Public Transit Assistance)	State	State of MN	The Minnesota State Legislature has, in the past, dedicated general funds to transit, and has been and likely will continue to be used to fund Metro Mobility service.	Capital & Operations, Interim Service, BRT
Motor Vehicle Sales Tax (Metro Area Transit Account)	State	Motor Vehicle Sales Tax	This funding generally supports the operation of the current metro area transit system and has historically not provided enough funding for transit service expansion.	Capital & Operations, Interim Service
Regional Solicitation	Metro	Federal Funding, allocated by Metropolitan Council Transportation Advisory Board	CMAQ funds can be used to support transit service, including new rail transit service, system expansion, new vehicles, reduced fare programs, and roadway infrastructure. STBG funds can be used for pedestrian and bicycle access to stations.	Capital & Operations, Interim Service
County Sales and Use Tax	County	County	Counties can levy up to a .5% sales tax for transportation, Hennepin County dollars are planned for through 2036	Capital & Operations
Regional Railroad Authority Support	County	Hennepin County Regional Railroad Authority and Scott County Regional Railroad Authority	HCRRA has been known to allow land lease agreements and fund transit projects (i.e. SWLRT) and other RRAs have funded transit project studies (Washington County RRA, Red Rock)	Capital & Operations
General Obligation Bonds	Municipal, County, or State	Municipal, County, or State	Public entities in Minnesota have the power to leverage bonds to generate funding to support projects.	Capital
Municipal Tax Increment Financing Districts (TIF)[6]	Municipal	Future Taxes	A form of value capture, TIF districts in Minnesota must be approved by the State Legislature. Usually used for housing and redevelopment projects, this could also be used to fund transit or public infrastructure with an amendment to State law.	Capital, Public Infrastructure

[6] http://www.house.leg.state.mn.us/hrd/issinfo/tif/mech.aspx

Highway and Transit Infrastructure

It is understood that the full vision cannot be completed as a single project. Due to planned updates to infrastructure, funding timelines, and political realities, it will take many years and separate stages for the vision to be realized. The purpose of identifying the vision was to ensure that as improvements are made throughout the corridor, they support and build toward the vision while providing benefits to corridor users with each new improvement. Specific details of the chronological order of these improvements are described in the following section.

The improvements included in the vision were identified through several steps in the study evaluation process. First, the corridor was screened to determine which segments of the corridor could operate as a MnPASS corridor. After establishing the need for a MnPASS lanes in Tech Memo 2: Existing Conditions and Market Analysis, spot mobility improvements to address localized existing congestion were developed and evaluated with traffic modeling. This was completed assuming the existence of a MnPASS lane to ensure that the improvements would still provide user benefits in the presence of additional capacity. The strongest-performing and most cost-effective spot improvement concepts were included in the vision.

These improvements were evaluated using several screening and analysis tools. These tools included traffic lane assignment analysis, CAD layout development, and public input. The results of the analyses indicated these are beneficial improvements that can cost-effectively deliver the goals and objectives.

Data Sources

The specific data sources used in the development of the implementation plan to aid in the coordination of programmed, planned, or scheduled improvements included the following:

- MnDOT 2018-21 State Transportation Investment Program (STIP) – approved November 2017
- MnDOT 10-year Capital Highway Investment Program (CHIP) – draft approved June 2017
- MnDOT Metro District Bridge Replacement and Improvement Management (BRIM) – last revised in 2014 with updates in 2017

Unknown Influences

As noted, the Implementation Plan was developed based on operational need and future pavement and bridge preservation needs identified by MnDOT. Nonetheless, other factors could influence and modify the Implementation Plan moving forward, such as:

- I-35W Minnesota River Bridge reconstruction (and management of traffic)
- Other MnPASS corridors (e.g., I-494) and system implementation
- Other local projects (e.g., Canterbury redevelopment, TH 13, and TH 41 improvements)
- Orange Line completion
- Flooding and bridge closures
- STIP/CHIP updates and bridge maintenance needs
- Funding sources/opportunities

These factors could affect the Implementation Plan by driving the need for localized improvements to address changes in traffic and congestion. They may also present opportunities for funding partnerships to accelerate various elements in the Implementation Plan. Conversely, funding limitations or resource allocations to other corridors could delay elements of the Plan. The list of factors is provided to notify decision-makers of the potential issues and it is recommended they remain up to date on the status of these factors and aware as new factors arise.

Phasing Plan

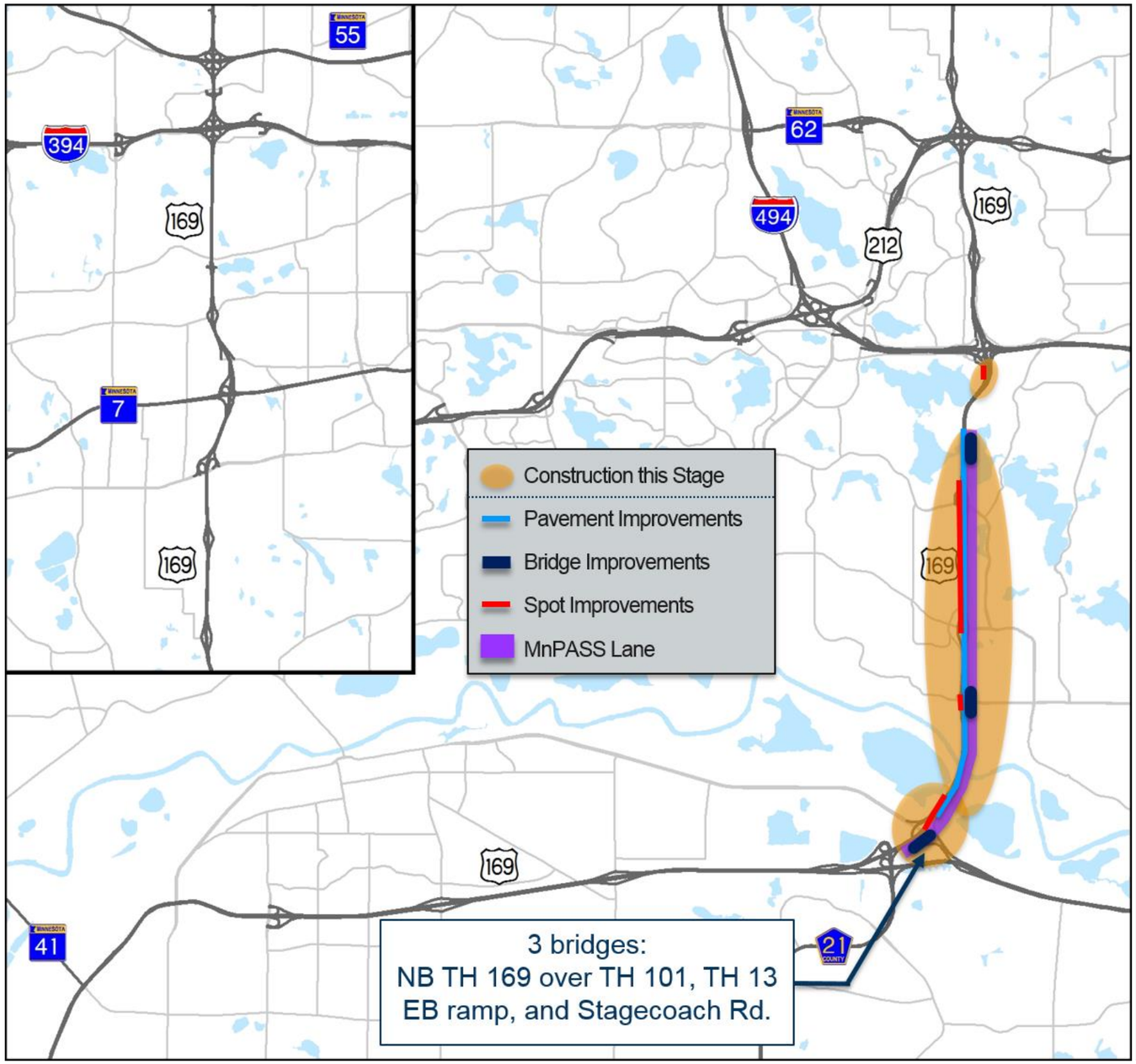
The Implementation Plan defines eight stages that contain elements that could realistically be constructed in a one- to three-year period. The Plan was developed to capitalize on bridge and pavement preservation needs that have been identified by MnDOT. The bridge preservation needs were laid out in three timeframes: 2022 to 2027, 2028 to 2037, and 2038 to 2043, which were taken into consideration when developing the Plan. The southern end of the corridor has some form of pavement preservation needs identified within the timeframes covered by the data sources.

The following section documents the stages of the Implementation Plan. While the implementation stages have been separated into explicit systematic groups, it may be determined to lump several stages together for the final project design and development, or split stages apart based on available funding or changing preservation needs. While the Plan is intended to be chronological, stages may be reordered based on shifting preservation needs or funding availability. Any stages with prerequisite projects are identified.

Each stage identifies construction to be completed in that stage, shown in orange color by highlighting the section of roadway, or emphasizing the improvement area with an orange bubble. MnPASS lane improvements from the vision are illustrated in purple, and spot improvements are displayed in red.

The stages break their activities into three categories:

- Preservation only, independent of the vision – These improvements have been identified for preservation purposes within the corridors study limits. However, these improvements lack synergy with identified vision improvements either due to proximity, or timing.
- Preservation activities that have synergy with the vision – These improvements can either be leveraged for potential cost savings if vision improvements are included in construction activities, or the preservation activity needs to be completed or modified to facilitate implementation of a vision improvement
- Mobility Improvements – These improvements are not identified in any preservation or maintenance program but were developed to meet study goals.



Stage A

Preservation only, independent of vision

- N/A

Preservation activities that have synergy with vision

- NB TH 169 over South Anderson Lakes ~~reoverlay~~ widening
- NB TH 169 over Old Shakopee ~~reoverlay~~ widening
- NB TH 169 over TH 101 ~~reoverlay~~ widening
- NB TH 169 over EB TH 13 ramp ~~reoverlay~~ widening
- NB TH 169 over Stagecoach ~~reoverlay~~ widening
- Pavement rehab from Minnesota River Bridge to Anderson Lakes Parkway

Mobility Improvements

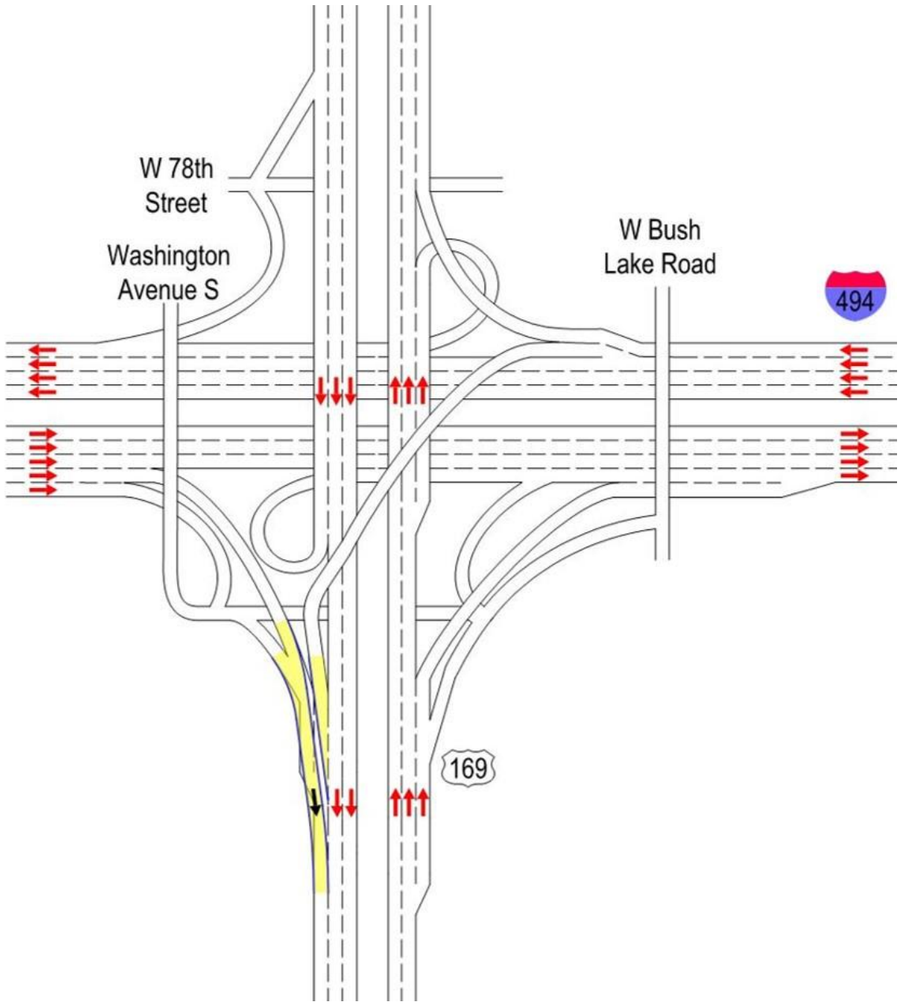
- NB TH 169 – initial NB TH 169 MnPASS lane
- SB TH 169 – restripe TH 101 exits as center decision lane instead of right lane add and 2-2 split
- SB TH 169 – connect Pioneer on-ramp auxiliary lane to downstream 3-lane section
- SB TH 169 – merge WB I-494 into 2 lanes and then add separated CD road from EB I-494 into 3rd lane

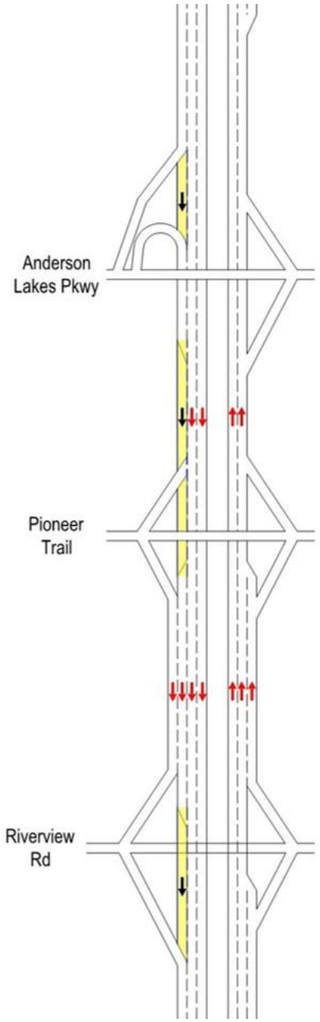
This stage would coordinate pavement preservation activities on TH 169 with the construction of a northbound MnPASS lane between CSAH 21 and South Anderson Lake. Additionally, all three spot improvements identified on southbound TH 169 should be coordinated with the pavement preservation activities to help minimize impacts to traffic. The cross section of the MnPASS improvement would not be to full standards, but the bridge widening conducted as part of this improvement would be compatible with future full build MnPASS cross sections when the southbound MnPASS lane is installed as part of future investment. Note that the Minnesota River Bridge would only be restriped, not widened, to accommodate the addition of the MnPASS lane. The smaller cross section allows for minimal drainage mitigation and would be a lower cost staged implementation for the MnPASS corridor.

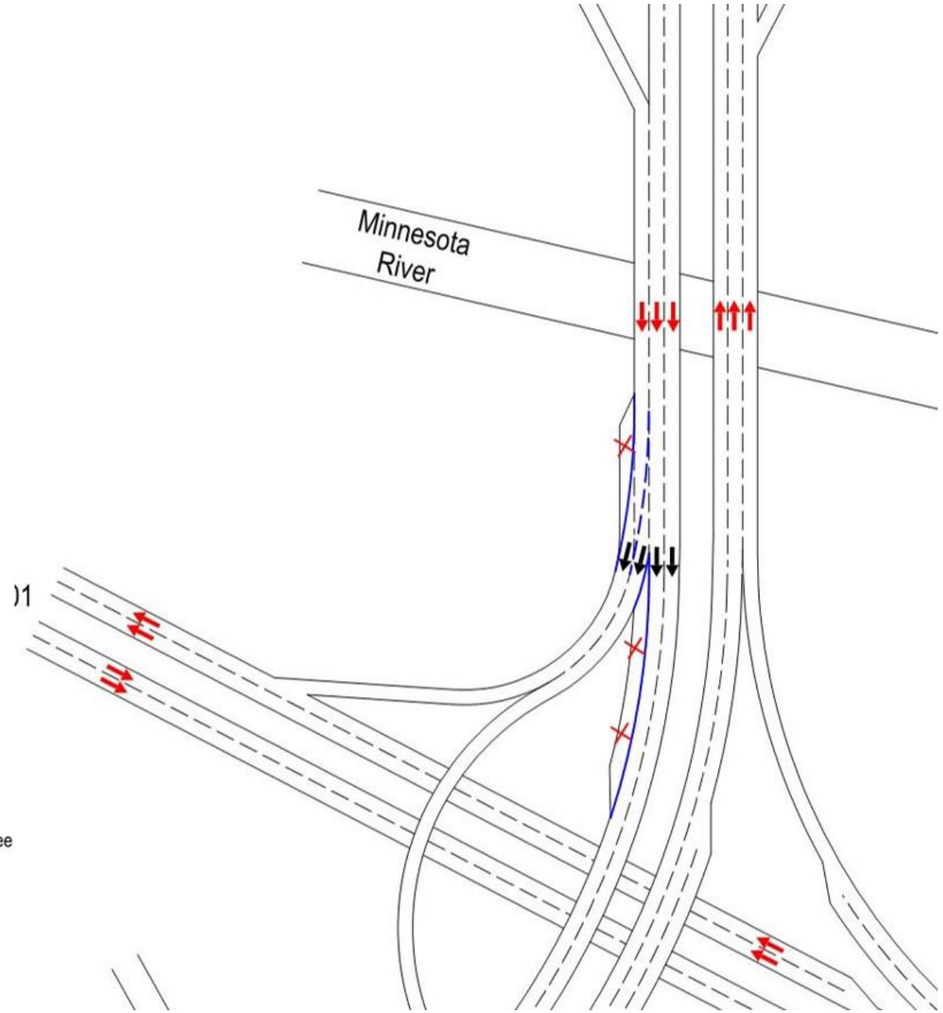
The spot improvements included in this stage are expected to correct lane volume balance issues, provide lane continuity for mainline southbound TH 169, and be compatible with future MnPASS construction.

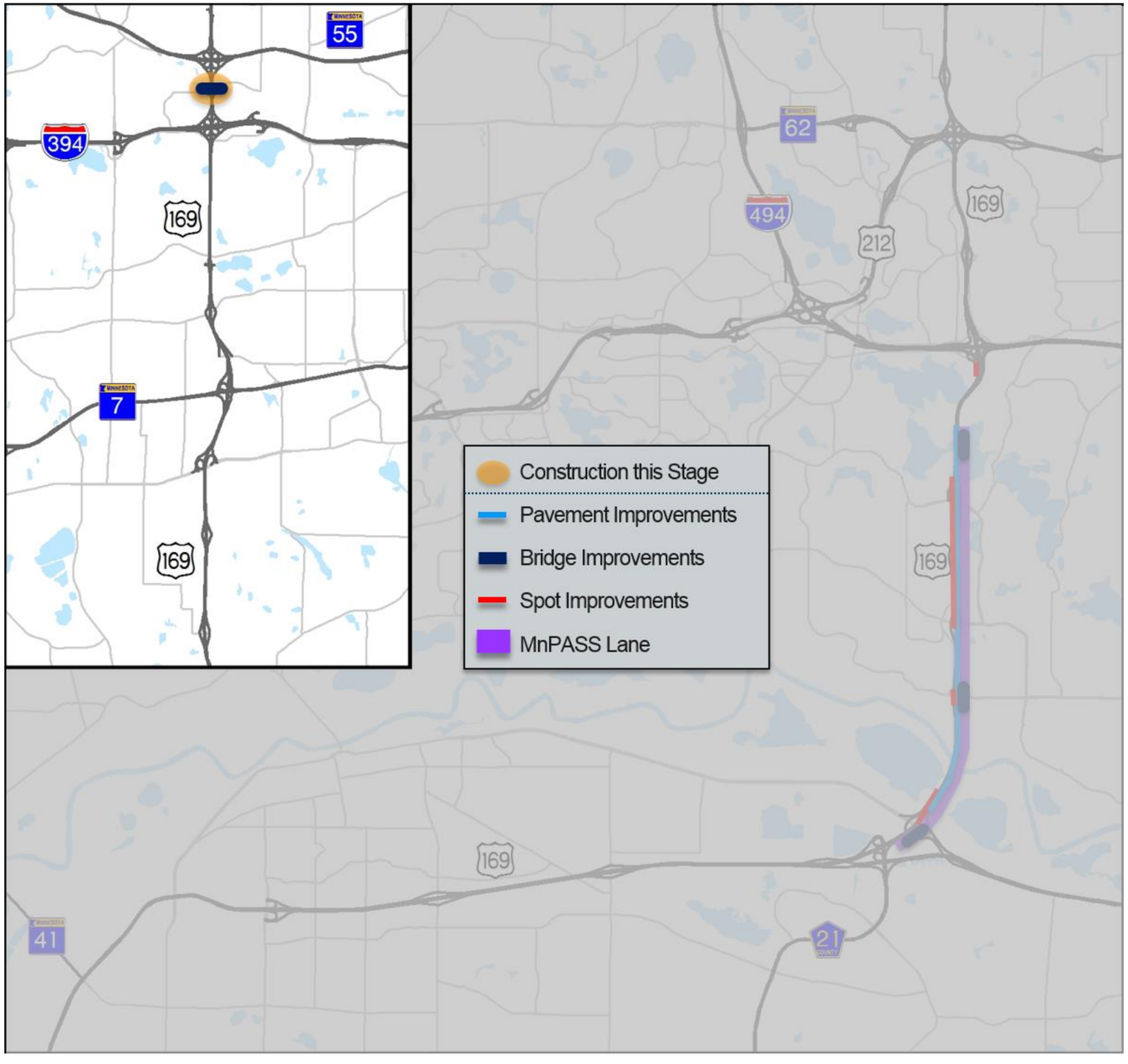
Interim bus service and BRT would benefit from northbound MnPASS between CSAH 21 and South Anderson Lake. Full shoulders would allow buses to pass traffic traveling below 35mph and bus service would benefit from time savings from spot improvements.

Stage A Vision Improvements









Stage B

Preservation only, independent of vision

- N/A

Preservation activities that have synergy with vision

- Betty Crocker bridge reconstruct over TH 169

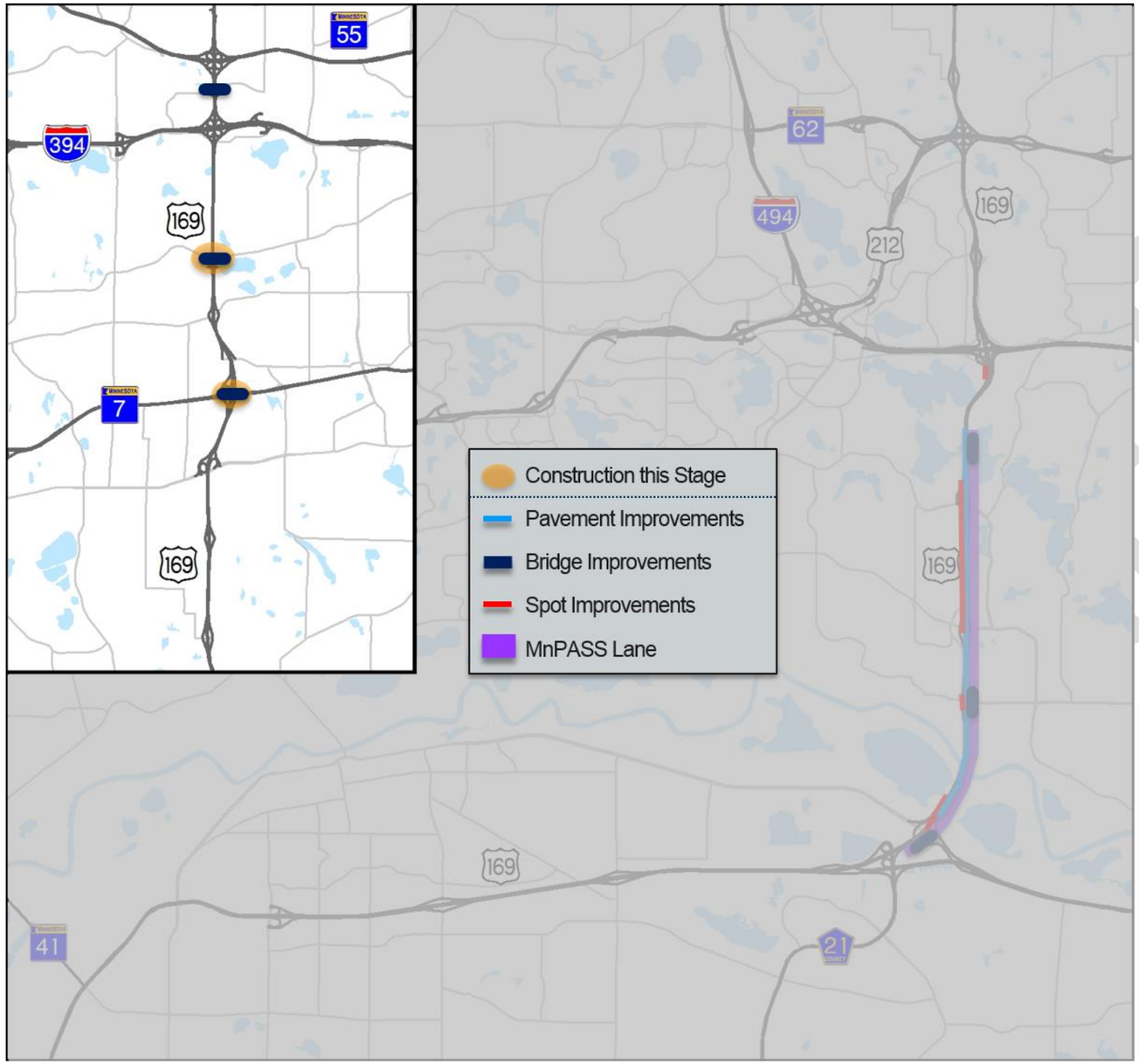
Mobility Improvements

- N/A

This stage coordinates expected upcoming bridge replacement of Betty Crocker Drive with interchange reconfiguration improvements that would be required to facilitate MnPASS (bridge clearance and right-of-way) and BRT operations (access). As shown, this stage only includes the bridge replacement. The bridge would allow for future construction of MnPASS, BRT and necessary local improvements. This stage can be completed independently from other stages. It should also be noted that the full construction of the improvement, or portions of the improvement, could occur in this stage if funding were to become available. If the full improvement was constructed in this stage it would reduce the overall cost of the future full vision MnPASS construction. The total cost of this standalone spot improvement (with the bridge) is estimated to be $74M.

Time-efficient transit service to General Mills is dependent on a reliable route from Highway 169 to General Mills. Without an exit at Betty Crocker Drive, interim bus routing would involve many new turns and intersections to reach General Mills. Although reconstruction of the bridge may happen before interim service or BRT service begins, careful attention must be paid to the width of the bridge, opportunities to exit the highway, and more specifically for transit vehicles to leave the future MnPASS lane. Creating a standard width sidewalk for pedestrian access across Betty Crocker on the bridge would help link nearby housing developments and large employers in Shelard Park to the proposed BRT station at General Mills.

Stage B Vision Improvements



Stage C

Preservation only, independent of vision

- TH 7 reoverlay over TH 169

Preservation activities that have synergy with vision

- Cedar Lake Rd bridge reconstruct over TH 169

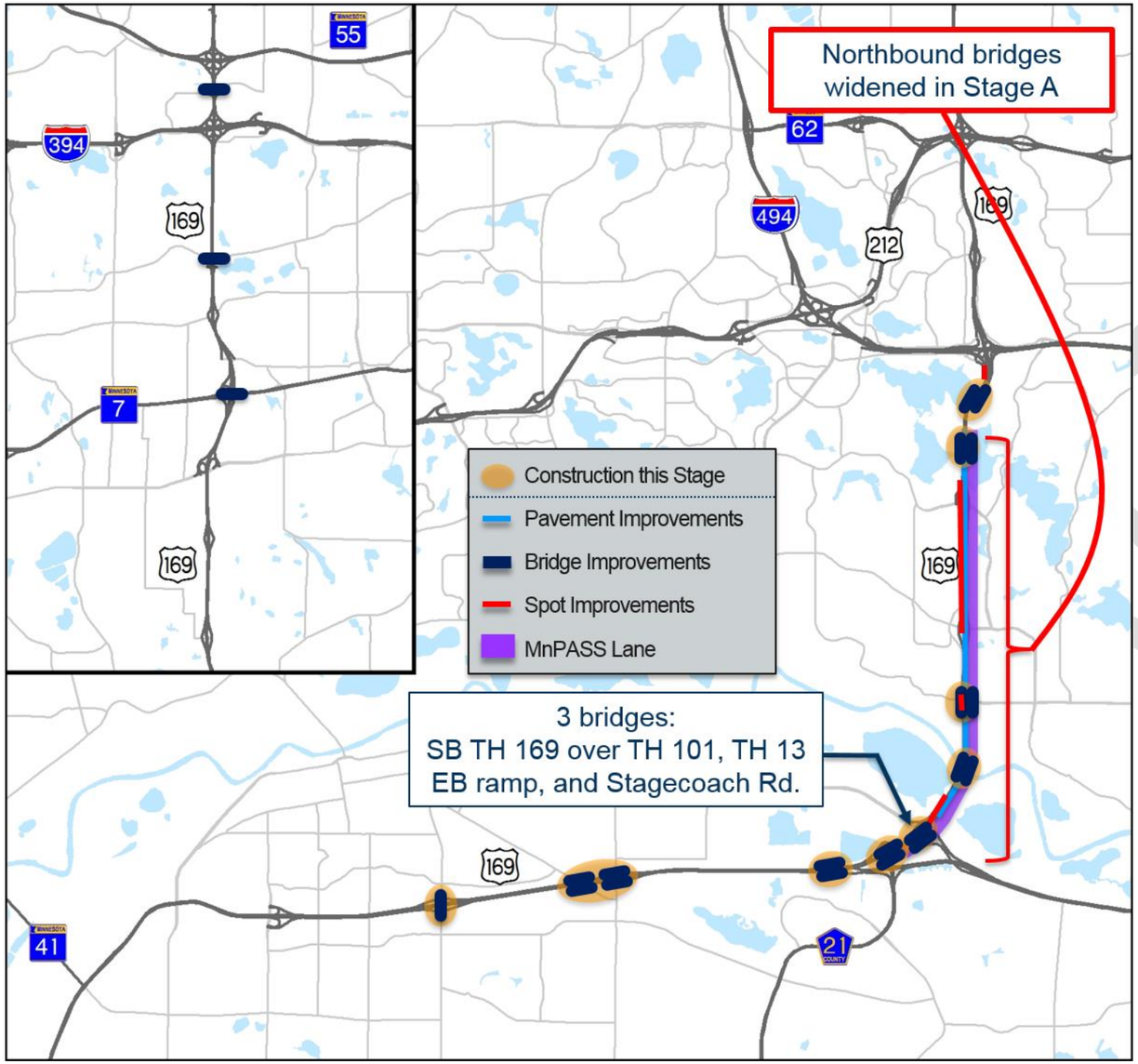
Mobility Improvements

- N/A

This stage coordinates expected upcoming bridge replacement of Cedar Lake Road with interchange reconfiguration improvements that would be required to facilitate MnPASS (bridge clearance and right-of-way) and BRT operations (station location and freeway access). As shown, this stage only includes the bridge replacement. The bridge would allow for future construction of MnPASS, BRT, and necessary local improvements. This stage can be completed independently from other stages. It should also be noted that the full construction of the improvement could occur in this stage if funding were to become available. If the full improvement was constructed in this stage it would reduce the overall cost of the future full vision MnPASS construction. The total cost of this standalone spot improvement (with the bridge) is estimated to be $15M.

Interim bus service nor BRT service would not be changed by this improvement as there is no station at Cedar Lake Road.

Stage C Vision Improvements



Stage D

Preservation only, independent of vision

- NB TH 169 over Minnesota River reoverlay
- SB TH 169 over Minnesota River reoverlay
- Marschall Rd reoverlay over TH 169

Preservation activities that have synergy with vision

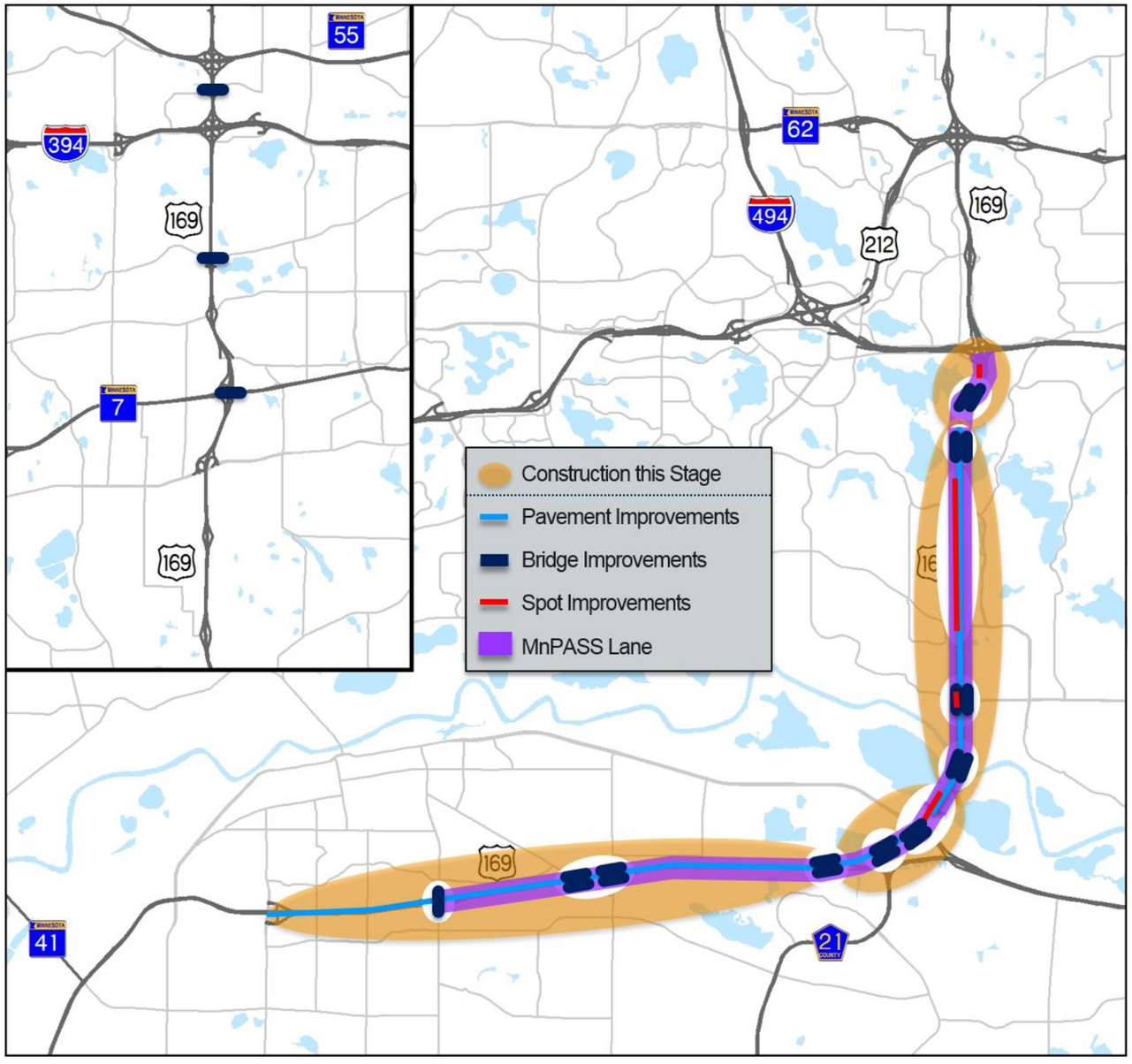
- NB TH 169 over Eagle Creek Blvd ~~reoverlay~~ widening
- SB TH 169 over Eagle Creek Blvd ~~reoverlay~~ widening
- NB TH 169 over Canterbury Rd ~~reoverlay~~ widening
- SB TH 169 over Canterbury Rd ~~reoverlay~~ widening
- NB TH 169 over WB TH 13 ramp reoverlay widening
- SB TH 169 over WB TH 13 ramp ~~reoverlay~~ widening
- NB TH 169 over CSAH 21 ~~reoverlay~~ widening
- SB TH 169 over CSAH 21 ~~reoverlay~~ widening
- SB TH 169 over Stagecoach ~~reoverlay~~ widening
- SB TH 169 over EB TH 13 ramp ~~reoverlay~~ widening
- SB TH 169 over TH 101 ~~reoverlay~~ widening
- SB TH 169 over Old Shakopee ~~reoverlay~~ widening
- SB TH 169 over South Anderson Lakes ~~reoverlay~~ widening
- NB TH 169 over North Anderson Lakes ~~reoverlay~~ widening
- SB TH 169 over North Anderson Lakes ~~reoverlay~~ widening

Mobility Improvements

- N/A

Stage D focuses on coordinating upcoming bridge preservation needs with bridge widening activities that would be required to install MnPASS from Marschall Road to I-494. Bridges included as part of Stage A will not need additional work if completed with installation of northbound MnPASS. Also, the Minnesota River Bridge would remain in the striping configuration identified in Stage A without undergoing structure widening.

Interim bus service and BRT would be largely unaffected by these changes.



Stage E

Preservation only, independent of vision

- N/A

Preservation activities that have synergy with vision

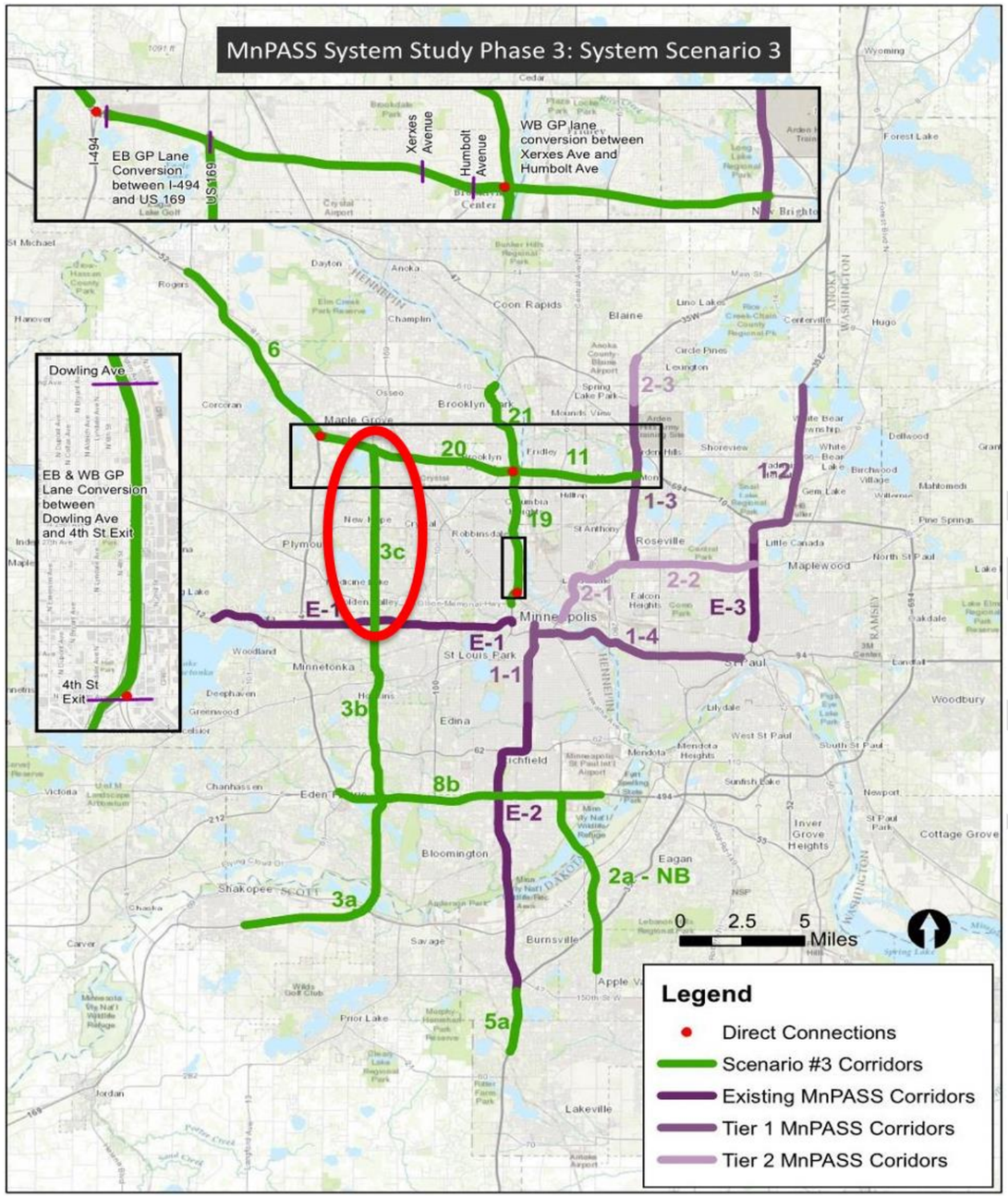
- TH 169 CPR from CSAH 15 to Minnesota River bridge

Mobility Improvements

- Complete TH 169 MnPASS from Marschall Rd to I-494

This stage focuses on completion of full build MnPASS on TH 169 between Marschall Road and I-494. Activities included in Stage A and Stage D are prerequisite to the construction of MnPASS in Stage E. Depending on funding availability Stages D and E could be closely coordinated or combined to further reduce traffic impacts. This improvement should be coordinated with scheduled roadway concrete preservation activities between CSAH 15 and the Minnesota River Bridge.

Interim bus service or BRT may begin using MnPASS south of I-494 after the completion of this stage.



Stage F

Preservation only, independent of vision

- N/A

Preservation activities that have synergy with vision

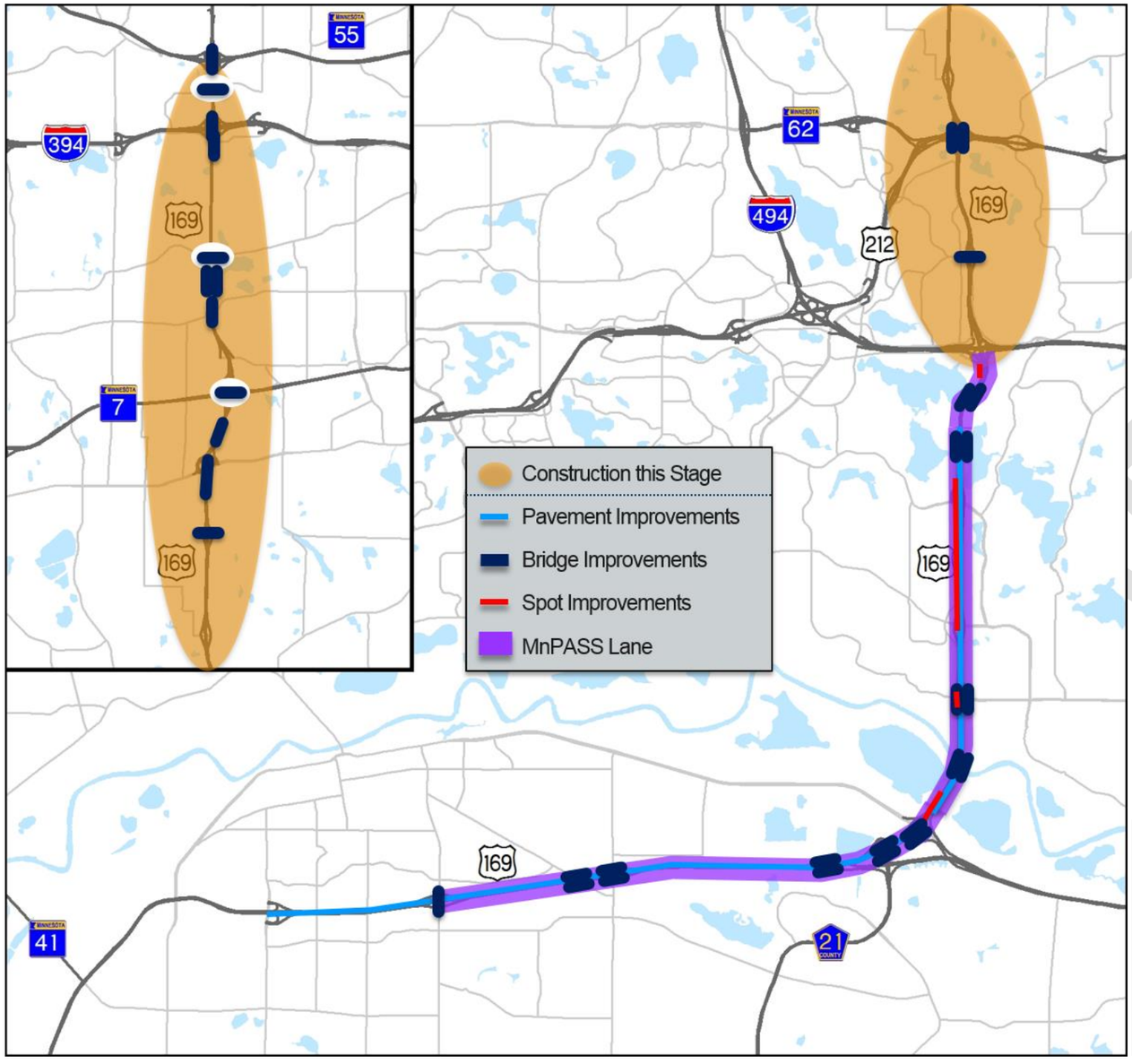
- N/A

Mobility Improvements

- TH 169 improvements (MnPASS) north of TH 55

The section of TH 169 north of TH 55 was external to this study's study area. However, it is expected that the installation of a MnPASS lane on TH 169 between I-494 and TH 55, particularly northbound, would have adverse operational impacts due to the existing state of congestion on TH 169 between TH 55 and I-694. For this reason, it is being recommended that this segment be improved before (MnPASS, spot improvements, or both) any MnPASS lanes be installed between I-494 and TH 55.

There would be no changes to interim bus service or BRT in this stage as the improvement is outside of the study area.



Stage G

Preservation only, independent of vision

- Interlachen Rd over TH 169 redeck
- Valley View Rd over TH 169 redeck

Preservation activities that have synergy with vision

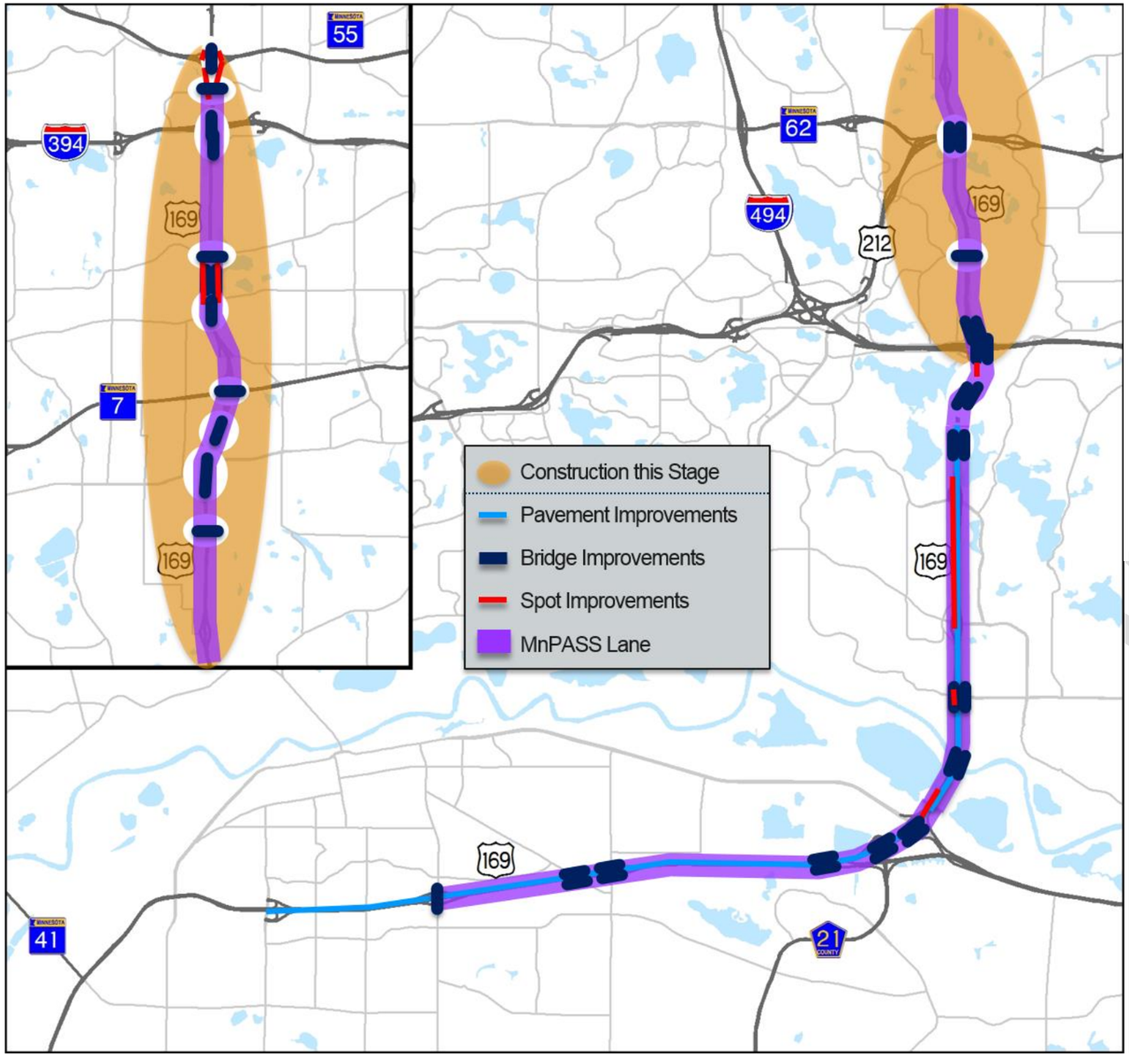
- NB TH 169 over TH 62 ~~overlay~~ widening
- SB TH 169 over TH 62 ~~overlay~~ widening
- TH 169 over Excelsior Blvd and 3rd St ~~reoverlay~~ widening
- TH 169 over 2nd St ~~reoverlay~~ widening
- TH 169 over Minnetonka Blvd replacement + widening
- NB TH 169 over BNSF replacement + widening
- SB TH 169 over BNSF replacement + widening
- TH 169 over Wayzata Blvd ~~reoverlay~~ widening
- TH 169 over I-394 ~~reoverlay~~ widening
- TH 169 over TH 55 replacement + widening

Mobility Improvements

- N/A

Stage G focuses on coordinating upcoming bridge preservation needs with bridge widening activities that would be required to install MnPASS from I-494 to TH 55. It is expected that these activities could run concurrent with any study or construction on the segment of TH 169 between TH 55 and I-694.

Transit service during Stage G would be largely unchanged. Transit providers should pay attention to work done near Minnetonka Boulevard, as nearby communities have expressed interest in the possibility of a station at this location.



Stage H

Preservation only, independent of vision

- N/A

Preservation activities that have synergy with vision

- NB TH 169 over I-494 ~~reoverlay~~ widening
- SB TH 169 over I-494 ~~reoverlay~~ widening
- NB TH 169 over 78th St ~~reoverlay~~ widening
- SB TH 169 over 78th St ~~reoverlay~~ widening

Mobility Improvements

- MnPASS on TH 169 from I-494 to TH 55
- Interchange reconfiguration at Betty Crocker and TH 55
- Cedar Lake Rd interchange reconfiguration

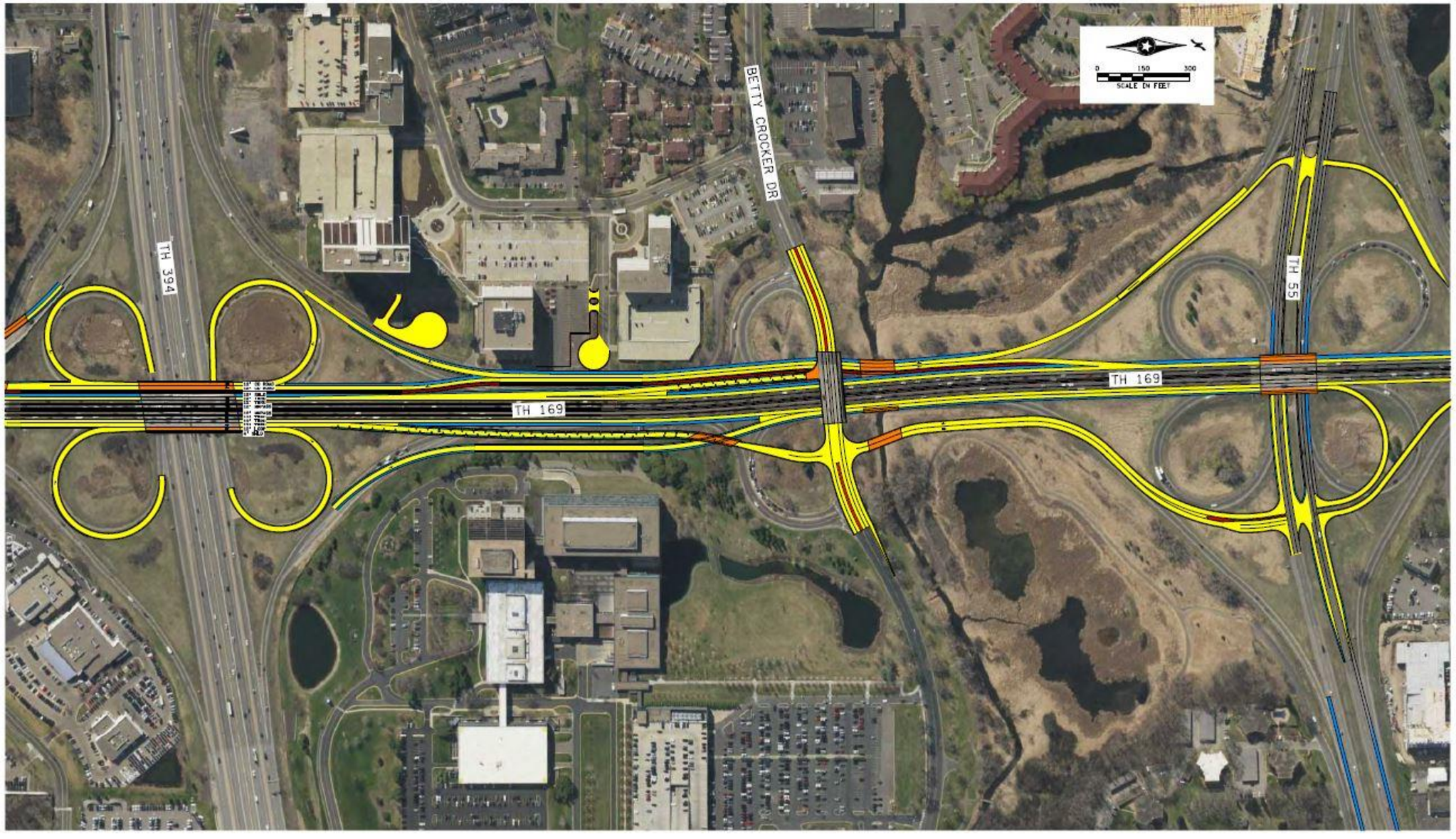
This stage focuses on completion of full build MnPASS on TH 169 between I-494 and TH 55. Activities included in Stage F and Stage G are prerequisite to the construction of MnPASS in Stage H. Completion of this stage would coincide with the completion of the Recommended Improvements /Vision as determined by the TH 169 Mobility Study.

After the completion of this stage, transit service would be able to use the MnPASS lane in all sections as described in the Recommended Improvements. Full redevelopment of Highway 169 exits to Betty Crocker would provide significant time savings for BRT using MnPASS. Buses would need to leave the MnPASS lane and cross two lanes to exit the highway.

There were multiple improvements developed for the Betty Crocker interchange area. Due to the geometric and traffic-related complexities in the area, and the high magnitude in project delivery cost, it was assumed that more detailed analysis and engineering would be completed later to identify a preferred improvements. Thus, the implementation plan referenced the improvements with the largest footprint for cost allocation purposes, and not necessarily the most cost-effective improvements from the spot mobility technical analysis.

Stage H Vision Improvements : Cedar Lake Road

Stage H Vision Improvements: Betty Crocker Drive



Cost Summary

Costs for the project are broken into three groups:

- Programed Investment from the Statewide Transportation Improvement Program (STIP)
- Preservation Needs outlined in the Capital Highway Improvement Program or Bridge Replacement and Improvement Management
- And the remainder of the cost required to complete the work for that stage.

Most of the funding needed to reach the $315 million un-programmed total (assuming synergy) is found in Stage H to create the northern section of MnPASS. Stage F does not have any cost because it is outside of the project area and the scope of this study.

Table 9: Cost Estimates for Recommended Improvements Highway and Transit Infrastructure

Category	Cost
MnPASS Investments	$335M
Preservation Investments	$85M
2018-2021 Program	$0
Corridor Investments – Subtotal	$420M
Cost Synergy	-$20M
Corridor Investments – Total	$400M

Funding amounts shown in millions (M)

Figure 6. Annual Expenditure by Phase

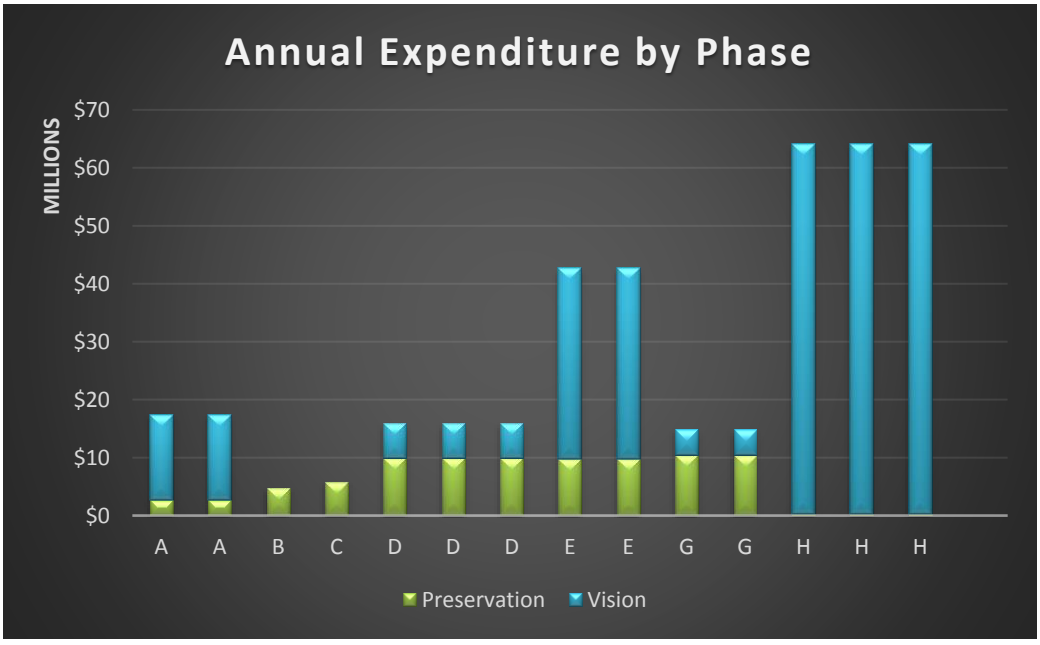


Table 10: Estimated Cost by Stage (with Cost Synergy)

Stage	A	B	C	D	E	F	G	H	Total
Cost	$35M	$5M	$5M	$50M	$85M	TBD	$30M	$190M	**$400M**

Note - Costs rounded to nearest $5M.

Funding Opportunities

Identifying and securing funding opportunities for the infrastructure described in the implementation is essential to meet the corridor vision. Funding opportunities take concerted effort and precise timing to combine and use appropriately. Many funding sources require waiting periods for a combination of review and allowing other projects to be funded first. These projects will need to be documented in several transportation planning and programming documents to receive funding, most importantly for infrastructure projects in the STIP.

A complete list of funding sources and uses can be found in Table 11~~Table 10~~.

MnDOT Funding Sources

State Road Construction Program

MnDOT receives state transportation funding through fuel taxes, motor vehicle sales taxes and vehicle registration fees that are constitutionally dedicated to funding state highway projects, as well as federal highway formula funding. These funds are used to construct bridge and pavement preservation projects, as well as mobility projects in the metro area. This is the primary source of funding for MnPASS projects and spot mobility improvements.

Bridge preservation is programed funded by MnDOT as a part of the State Road Construction Program. Each year, MnDOT's Bridge Office creates a list of bridges that need repair most urgently within the BRIM. The BRIM is used to create the STIP, a federally mandated four-year document which prioritizes projects and gives high-level cost estimates.

MnDOT publishes the useful life of pavement in a similar manner to bridges. This funding is leveraged within the phases so that improvements are underway at the same time as other work in the immediate area.

Corridors of Commerce

Corridors of Commerce is a program that is funded by the Minnesota State Legislature. The program aims to provide additional highway capacity on segments where there are currently bottlenecks in the system and improve the movement of freight and reduce barriers to commerce.

Transportation Economic Development Program

The Transportation Economic Development Program (TED) program, administered by MnDOT, provides competitive grants historically every other year to support construction projects on state highways that provide measurable economic benefits including job creation and retention. Generally, applicants for this funding include municipalities and counties. Award values range from year to year depending upon availability of funds.

Team Transit Funding

Team Transit invests in highway improvements that support and encourage transit use on congested highways. They are most known for preserving bus shoulders across the metro area that allow buses to pass slow traffic. This is an appropriate funding source for areas of roadway expansion to create bus shoulders in the few areas of the corridor that do not already have them.

Minnesota's Highway Freight Program

Minnesota's Highway Freight Program (MHFP) is funded by Federal dollars from Fixing America's Surface Transportation (FAST) Act and awarded by MnDOT. Projects have been selected for all of the program funding available through 2022. Future funding will be determined by Congress. The solicitation process and schedule will depend on funding from Congress and MnDOT staff discretion as there is no currently defined process and no scheduled next solicitation. Because funding is allocated in advance, it is key to ramp up for next round if it is reauthorized. This may be a good source for spot mobility, or MnPASS implementation along the corridor.

Infrastructure For Rebuilding America

As a nationally competitive program, applying to receive Infrastructure for Rebuilding America (INFRA) funds is a large undertaking. Building from the bones of the federal FASTLANE (Fostering Advancements in Shipping and Transportation for the Long-Term Achievement of National Efficiencies) program, this funding source is for reconstruction, rehabilitation, acquisition of property, environmental mitigation, construction contingencies, equipment acquisition, and operational improvements directly related to highway system performance. If implementation of the vision involves a high amount of innovation and support from other funding sources, it may be worth pursuing INFRA.

Highway Safety Improvement Program

The Highway Safety Improvement Program (HSIP) is a Federal DOT program allocated through MnDOT. The program goal is to reduce traffic fatalities and serious injuries on public roads. The program includes funding to identify, implement, and evaluate cost effective construction safety projects. Past funded projects include striping, dynamic signage, lighting, shoulder paving and rumble strips. Solicitations have occurred every other year in the past. In the 2017 solicitation,

projects were required to be stand-alone and listed in the MnDOT District Safety Plan to be considered,[7] so this funding source may not be applicable to Highway 169.

Transportation Investment Generating Economic Recovery

The Transportation Investment Generating Economic Recovery (TIGER) program is a federally competitive program. Scott County won $17,700,000 in 2016 for freight mobility improvements in the form of a grade-separated interchange at the junction of Highway 169 and Trunk Highway 41.[8] TIGER funds are best used on large projects as the effort for applications is arduous.

Regional Solicitation for FAST funds

Metropolitan Council receives some federal funds, most notably Surface Transportation Block Grants (STBG) and Congestion Mitigation and Air Quality (CMAQ) grants, to disperse among the region. The Transportation Advisory Board accepts applications and recommends projects for funding to the Metropolitan Council every two years.

Surface Transportation Block Grants

The Surface Transportation Block Grant program is a federally funded program, administered locally by MnDOT and the Metropolitan Council, that largely replaces the previous Surface Transportation Program (STP) funding. STBG funds may be used to help design, implement, and oversee public-private partnerships. This could be particularly useful for closing gaps between transit stations and large employers and improving nearby pedestrian and bicycle facilities that show readiness for transit service.

Congestion Mitigation and Air Quality

Congestion Management and Air Quality Improvement Program (CMAQ) funds can be used to reduce congestion on highways and improve air quality. Project examples include vehicle-to-infrastructure communications equipment and metered entrances. Funding is administered by the Metropolitan Council's Transportation Advisory Board. CMAQ has also been used to fund new rail transit service, system expansion, new vehicles, and reduced fare programs. CMAQ can be used for both roadway and transit improvements.

[7] https://www.dot.state.mn.us/trafficeng/safety/hsip/districtfall17announcement.pdf

[8] Document Page 29, US 169 Freight Mobility Project
https://www.transportation.gov/sites/dot.gov/files/docs/TIGER%20Fact%20Sheets%20-%207-28.pdf

Table 11: Grant Opportunities for Infrastructure

Name	Jurisdiction	Source	Description	Allowed use of Funds
FAST/ MHFP	Federal/State	DOT/MnDOT	MnDOT created the Minnesota Highway Freight Program to select projects to receive FAST dollars.[9]	Must be for a project included in the state's freight plan that contributes to the efficient movement of freight. Must be on designated highway freight systems[10] (includes Highway 169 between Marschall Road and Highway 13[11])
INFRA	Federal	DOT	INFRA builds upon the FASTLANE program, but puts a heavier focus on economic vitality goals and leveraging other sources of funding.[12]	Reconstruction, rehabilitation, acquisition of property, environmental mitigation, construction contingencies, equipment acquisition, and operational improvements directly related to highway system performance[13]
HSIP	Federal/State	DOT/MnDOT	The Highway Safety Improvement Program is used to fund items in localities and within MnDOT Districts in greater Minnesota.	The program includes funding to identify, implement, and evaluate cost effective construction safety projects
TIGER	Federal	DOT	TIGER funds can be used on a wide variety of transportation projects	Road, transit, port, or rail projects that provide desirable long-term outcomes
Corridors of Commerce[14]	State	MnDOT	Projects consistent with the statewide modal plan that can begin in a four-year period and improve freight movement can apply for this funding source.	Provide additional highway capacity on segments where there are currently bottlenecks in the system Improve the movement of freight and reduce barriers to commerce
Transportation Economic Development Program (TED)	State	MnDOT	TED provides competitive grants for construction on state highways that provide economic benefits.	Transportation improvements that contribute to job creation, retention, or measurable economic benefit[15]
Strategic Capacity – MnPASS	State	MnDOT	As part of a program to make best use of our existing highway system, funds managed lanes including high occupancy toll lanes.	MnPASS construction
Team Transit[16]	State	MnDOT	Funds infrastructure supportive of transit, well-known for bus on shoulder program	Transit advantages, infrastructure supportive of transit
Bridge and Pavement Preservation	State	MnDOT	Supporting existing infrastructure through regular testing and assessment	Bridge decking and reconstruction, pavement preservation
Regional Solicitation	Federal/ Regional	Federal flexible funds	Federal Surface Transportation Block Grant funds available for a wide range of transportation projects. Administered by Metropolitan Council via Regional Solicitation process.	Construction, reconstruction, rehabilitation, resurfacing, restoration, preservation, or operational improvements for highways; bicycle pedestrian facilities; transit capital costs
	Federal/ Regional	Federal flexible funds	Federal funds available for a wide range of transportation projects. Administered by Metropolitan Council via Regional Solicitation process (CMAQ)	Transportation project or program that is likely to contribute to the attainment or maintenance of a national ambient air quality standard, with a high level of effectiveness in reducing air pollution

[9] http://www.dot.state.mn.us/ofrw/mhfp/index.html
[10] https://www.fhwa.dot.gov/fastact/factsheets/nhfpfs.cfm
[11] https://www.arcgis.com/home/webmap/viewer.html?webmap=3991d2164dc941d49f85768b6d05ad70
[12] https://www.transportation.gov/sites/dot.gov/files/docs/policy-initiatives/buildamerica/283276/fy17-18-infra-vs-fastlane-fact-sheet.pdf
[13] https://www.transportation.gov/buildamerica/infragrants
[14] http://www.dot.state.mn.us/corridorsofcommerce/
[15] http://www.dot.state.mn.us/funding/ted/
[16] https://www.dot.state.mn.us/metro/teamtransit/