Highway 169 North Analysis

Highway 169 Mobility Study

Version 2.0

Minnesota Department of Transportation

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September 2016

SRF No. 8989

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Introduction

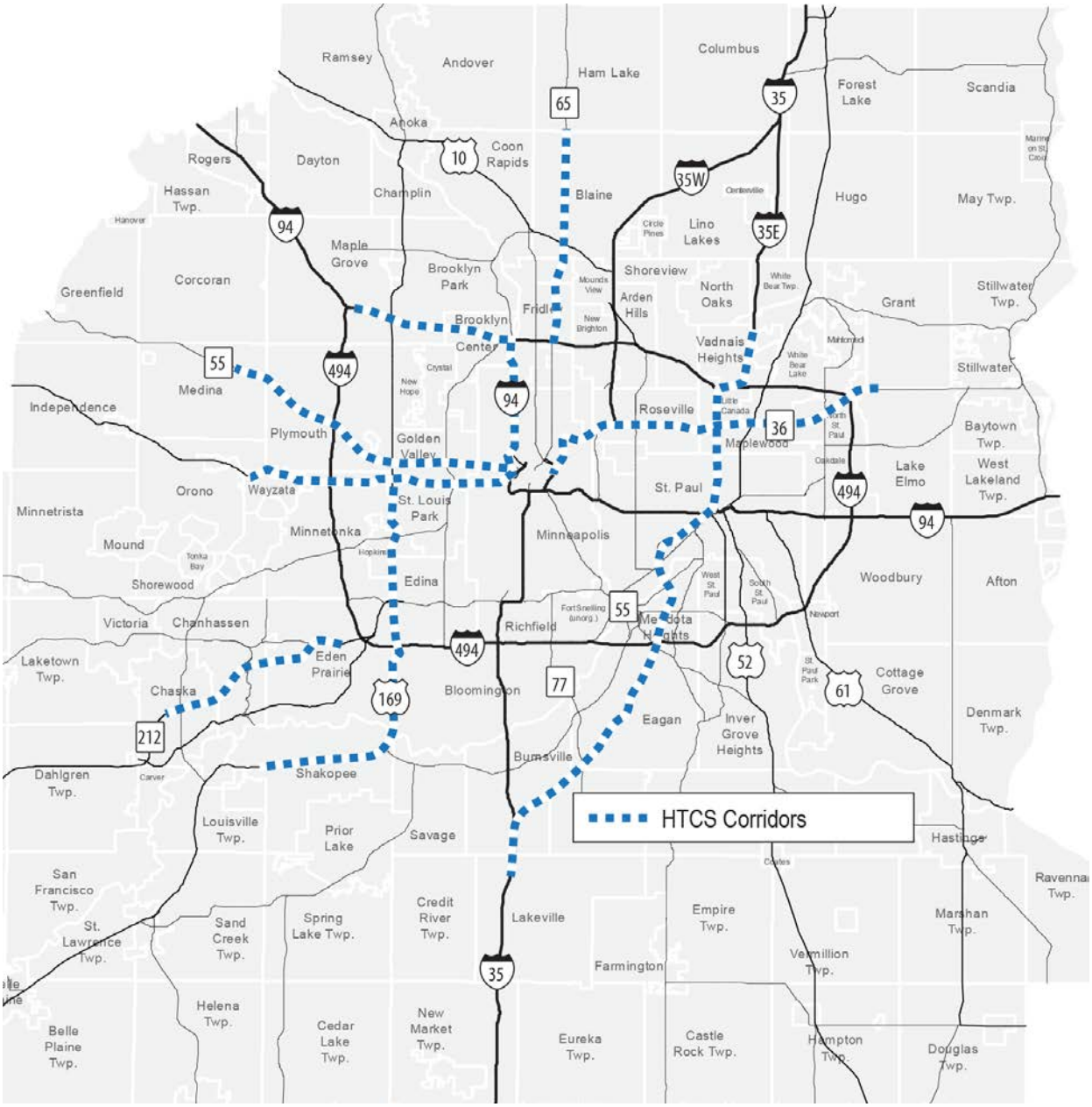
In 2014 the Metropolitan Council completed the Highway Transitway Corridor Study (HTCS), which examined the potential for all-day, frequent, station-to-station, Highway Bus Rapid Transit (BRT) along nine corridors in the region, shown in Figure 1 and listed below:

- I-94
- Highway 65
- I-35E North
- Highway 36
- I-35E South
- Highway 169 South
- Highway 212
- I-394
- Highway 55

The segment of Highway 169 between I-394 and Scott County Road 69 in Shakopee was studied in the HTCS; however, the northern segment of Highway 169 between I-394 and Highway 610 was not included in the study. The purpose of this analysis is to consider the potential for all-day, frequent, station-to-station, Highway BRT along Highway 169 from Marschall Road in Shakopee to Highway 610 in Brooklyn Park. This will be accomplished by performing the same analysis on Highway 169 that was completed for the corridors listed above.

An existing conditions analysis of the corridor was completed in two parts. Appendix A describes the northern segment of Highway 169 between I-394 in Golden Valley/Saint Louis Park and Highway 610 in Brooklyn Park. Appendix B describes the southern segment between I-394 and Marschall Road in Shakopee. The existing conditions reports include the study area population, employment and education centers, existing transit routes and transit advantage infrastructure, park-and-ride-lot descriptions and use in the corridor, and highway characteristics and congestion data.

Figure 1: Highway Transitway Corridor Study Corridors (2014)



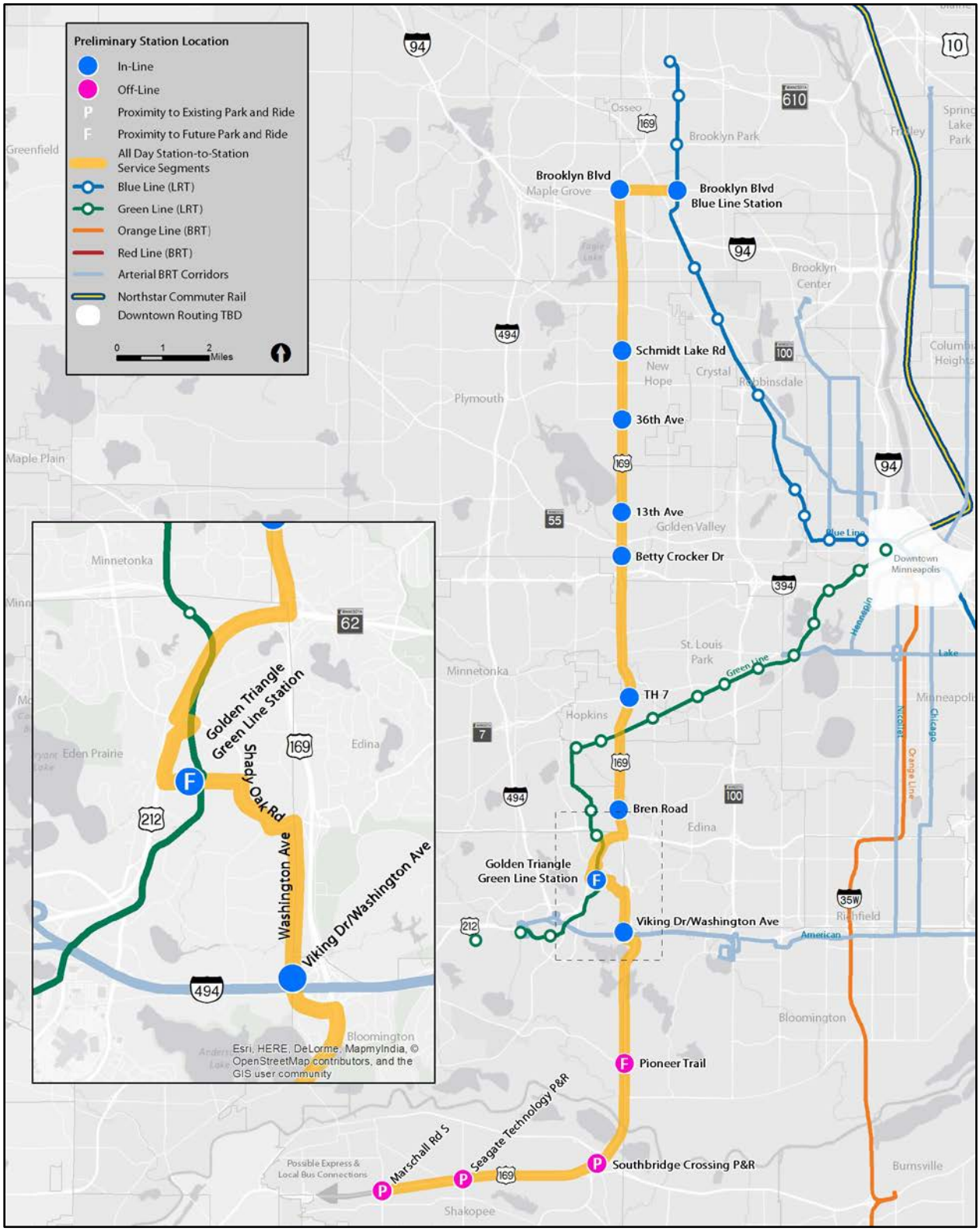
Concept Development

The concept development process for the Highway 169 corridor was consistent with the process for the original nine HTCS corridors. The purpose of concept development was to identify the costs and ridership of station-to-station BRT service. The methodology for estimating these costs and the ridership for the Highway 169 BRT service is briefly described in this section. For a more in-depth discussion of concept development please see the HTCS Final Report (under separate cover).

Selecting Stations for Analysis

Station locations were selected at a meeting of corridor cities and stakeholder agencies. On August 2, 2016, representatives from the Cities of Golden Valley, Osseo, Brooklyn Park, and Plymouth, Hennepin and Scott Counties, as well as MnDOT, Metro Transit, Metropolitan Council, SouthWest Transit, Minnesota Valley Transit Authority, and Shakopee Mdewakanton Sioux Community were presented with an overview of the Highway 169 Mobility Study, a summary of the metrics generated for each corridor studied in the HTCS, and a draft alignment and station locations. It was determined that alignment and station locations south of I-394 would remained unchanged from those used in the HTCS in order to maintain comparability. The group discussed the potential BRT routing and station locations north of I-394, and arrived on a BRT alternative for analysis, as shown in Figure 2. A summary of the meeting is available in Appendix C.

Figure 2: Highway 169 BRT Alternative



Capital Cost Estimates

Once the concept plan with alignment, station locations, and station types was defined for the corridor, capital costs were estimated. Capital cost estimates include the initial expenditure to build the system and typically include corridor construction, stations and technology systems, operations and maintenance facilities, vehicles, and right-of-way acquisition. Little additional right-of-way was required for stations. Concept plans assumed the service would run in mixed traffic, on bus only shoulders, or other existing transit advantage infrastructure, requiring little additional corridor infrastructure. However, some locations required improvements such as transit-only ramps to allow BRT vehicles to access station platforms, which contributed to construction costs.

"Soft costs" for items such as engineering, construction services, insurance, and owner's costs, as well as contingencies for uncertainty in both the estimating process and the limited scope of this study were also included in the cost estimates.

Operating Plan

The operating plan is focused on new Highway BRT station-to-station service along with some minor modifications to local and express routes to provide better connectivity to stations and eliminate redundancy. Span of service and frequency assumptions for Highway 169 BRT station-to-station service are consistent with the assumptions used in the HTCS, which in turn are generally consistent with the guidelines for Service Operations presented in the Regional Transitway Guidelines (February 2012, Metropolitan Council).

The analysis assumes that service would be operated seven days a week with a 16-hour span of service (for example 6 a.m. – 10 p.m.) on weekdays and Saturdays and 13 hours (for example 7 a.m. – 8 p.m.) on Sundays. It is assumed that service frequency would be every 15 minutes on weekdays and during the day on Saturdays, and every 30 minutes on Saturday evenings and Sundays. Existing express routes are generally assumed to remain in place in each corridor, which results in a combined frequency that exceeds the 10-minute peak period frequency guideline proposed in the Regional Transitways Guidelines. Highway BRT routes are assumed to stop at each proposed BRT station at all times throughout the day.

Both peak hour and off-peak period transit travel times for the corridor were estimated as follows:

- Station-to station travel times were based on assumed average peak and off-peak speed between each station (30 mph during peak periods; 45 mph during off-peak periods).
- BRT station-to-station service was assumed to use bus-only shoulder lanes during the peak periods.
- One minute of dwell time (i.e. the time spent loading and unloading passengers into and out of the transit vehicle) was assumed for each inline station stop.

- Five minutes of travel and dwell time was assumed for each offline station stop.
- Station-to-station travel times were compared to existing express route travel times to test for reasonableness.

Operating plans were developed for Highway 169 corridor using transit travel time estimates, service frequency assumptions, and typical layover time (i.e. a cushion of time at the end of a route that ensures on-time departure for the next trip and provides the driver a break between trips).

Operating and maintenance costs for each corridor were estimated using methodology defined for the HTCS, and the Robert Street, Nicollet-Central and Midtown Corridor Alternatives Analysis studies. Fiscal year (FY) 2011 Metro Transit cost data was used to develop unit costs and adjusted for inflation and to account for unique Highway BRT operations.

Ridership

Forecast Year 2030 ridership was estimated for the corridor using the Twin Cities Regional Travel Demand Model. Ridership forecasts were based on land use and development assumptions consistent with the Metropolitan Council's Regional Development Framework and local comprehensive plans as of January 2012. As part of the model validation process, the region was divided into study corridor or sub-corridor districts so mode choice and travel patterns could be analyzed.

The following set of ridership information was developed for the corridor:

- **Corridor Bus Route Ridership**: number of trips taken on local or express routes (but not BRT station-to-station route) in the study corridor; must use at least one non-downtown Highway BRT station and utilize a significant portion of the Highway BRT runningway.
- **Highway BRT Station-to-Station Ridership**: number of trips taken on the proposed Highway BRT all-day station-to-station route in the study corridor.
- **Transitway Total**: combined total of "corridor bus route ridership" and "highway BRT station-to-station" ridership.
- **Percent Transit Reliant Ridership**: percentage of "station-to-station" rides taken by persons from zero-car households.
- **New Transit Riders**: estimated number of new riders that would choose to use "highway BRT station-to-station" service rather than making a trip by automobile.
- **Current Year Ridership with Build Alternative**: estimated number of riders on "highway BRT station-to-station" service assuming all concept plan improvements were implemented in current year (2010 data).

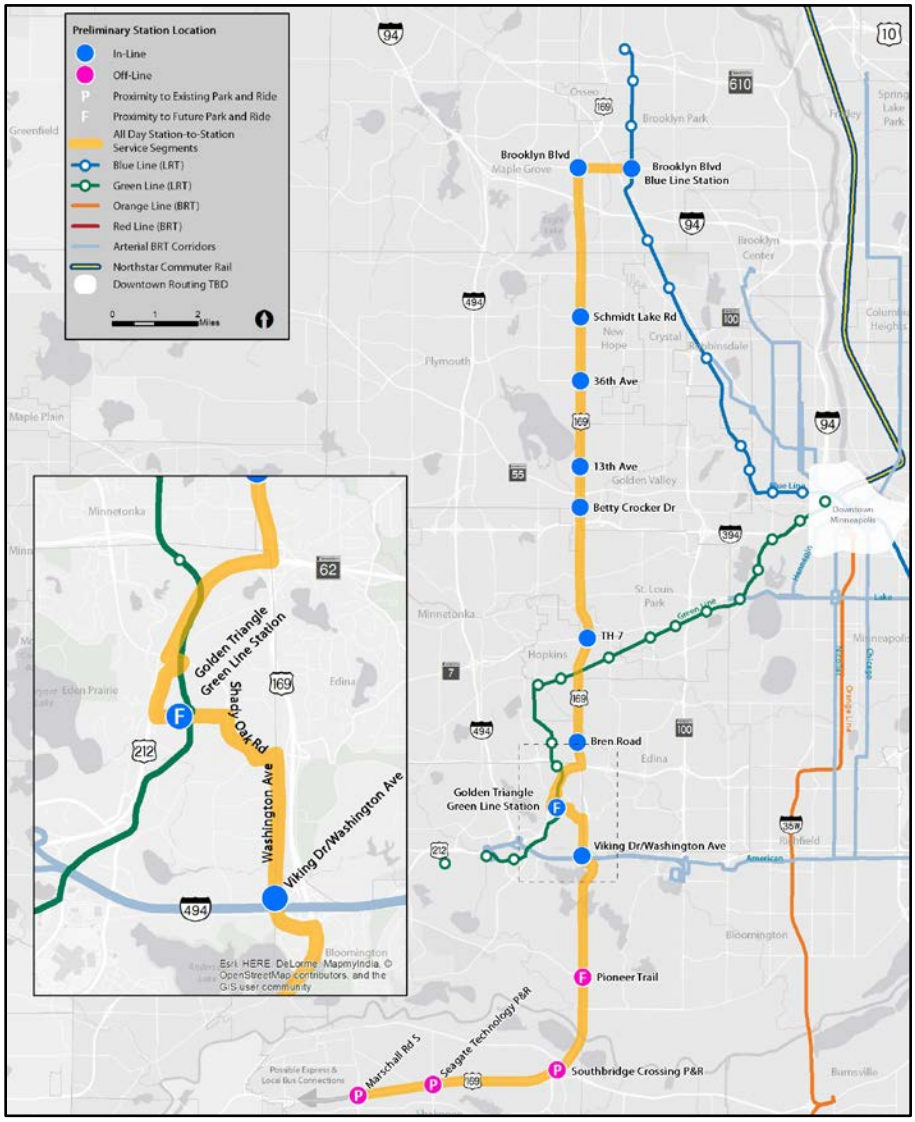
Ridership estimates for the HTCS were modeled as a system, meaning the model assumed all ten corridors (i.e. all ten Highway BRT lines together) as opposed to individual corridors. For the purposes of this analysis, Highway 169 was added to this model as a tenth corridor, so that all results can be compared to the corridor-by-corridor results in the HTCS.

Technical Results

Corridor Description

The Highway 169 corridor runs from Marschall Road in Shakopee to the Brooklyn Boulevard Station on the Blue Line LRT Extension. The corridor has 14 stations and is 31.0 miles long, as shown in Figure 3. The alternative would directly connect to the future American Boulevard Arterial BRT at Viking Drive, the METRO Green Line Extension at its Golden Triangle Station, and the METRO Blue Line Extension at its Brooklyn Boulevard Station. The concept includes the cost of a new park-and-ride at Pioneer Trail, and would serve existing Marschall Road, Seagate, and Southbridge park-and-rides.

Figure 3: Highway 169 BRT Alternative



Operating Characteristics

These service adjustments do not represent actual recommendations of the study and would need to be explored in greater detail if this alternative progresses to a more detailed level of analysis. Please see Appendix D for the service plan.

Table 1: Operating Characteristics

Peak-Period End-to-End Travel Time	86 minutes
Off-Peak End-to-End Travel Time	64 minutes
Required Fleet	14 peak vehicles, 3 spare vehicles
Background Local and Express Bus Service Adjustments	• Routes 17, 615, 667, 668: Extend to serve TH 7 Station • Routes 717, 791: Extend to serve 36th Ave. Station • Routes 756, 793: Extend to serve Schmidt Lake Rd. Station • Routes 670: Add stop at TH 7 Station • Route 795: Add stop at 13th Ave Station • Routes 690, 691: Shift service from I-494 to Highway 169; add stop at Golden Triangle Station • Routes 692, 699: Shift service from I-494 to Highway 169; add stop at Bren Rd. Station

Capital Costs

Capital costs are measured in year 2013 construction dollars. Please see Appendix E for the full capital cost estimate.

Table 2: Capital Costs

Cost Categories	Costs
Corridor Construction	$229,000
BRT Stations	$22,833,000
BRT Maintenance Facility	$5,100,000
Right of Way	$26,000
Vehicles	$10,404,000
Soft Costs	$8,554,000
25% Contingency	$11,787,000
Corridor Total Cost	**$58,933,000**

Operating and Maintenance Costs

Operating and maintenance costs are measured in year 2013 dollars. Please see Appendix F for the full operations and maintenance costs.

Table 3: Operating and Maintenance Costs

Item	Costs
Highway BRT Station-to-Station Service	$9,447,400
Background Bus Changes (net)	$106,100
Total Operating and Maintenance Cost Increase over No-Build	**$9,553,500**

Ridership

Table 4: Ridership Forecast

Existing Service (2010)	No Build (2030)	2030 Build Ridership		
Corridor Bus Routes	Corridor Bus Routes	Station-to-Station Service	Corridor Bus Routes[(1)]	Transitway Total
3,300	5,200	6,000	5,000	11,000

(1) Includes routes: 490, 680, 690, 692, 699, 742, and 793.

When estimating transitway ridership in the Twin Cities Region, two definitions for transitway are typically applied. The Federal Transit Administration's guidance (August 2013) on New Starts/Small Starts evaluation defines transitway ridership as a trip on any route that uses a portion of the guideway. The Metropolitan Council's Regional Transitway Guidelines states that BRT ridership includes both rides on station-to-station service and local or express service that utilize a defined transitway runningway for at least 50 percent of the route and use at least one non-downtown transitway station. The results of this ridership forecast reflect the Metropolitan Council's method of transitway ridership forecasting.

Table 5: Ridership Types

Descriptor	Data
Percent transit-reliant ridership (station-to-station service)	40%
Current-year ridership on station-to-station service with build alternative (2010)	4,100
New transit rides (2030)	2,200

The level of ridership activity at each proposed station location is shown in Table 6. Stations with less than 300 estimated riders per day were rated as 'Low' activity stations. Stations with 300 to 1,000 riders per day were rated as 'Medium' and stations with greater than 1,000 riders per day were rated as 'High' activity stations.

Table 6: Ridership by Station

Station Name	Station Activity
Brooklyn Boulevard Blue Line LRT Extension Station	High
Brooklyn Boulevard	Medium
Schmidt Lake Road	Medium
36th Avenue	Medium
13th Avenue	Medium
Betty Crocker Drive	Medium
TH 7	Medium
Bren Road	Medium
Golden Triangle	High
Viking Drive/ Washington Avenue	High
Pioneer Trail	Medium
Southbridge Crossing Park-and-Ride	Medium
Seagate Technology Park-and-Ride	Low
Marschall Road Transit Station	Medium

Low = fewer than 300 daily riders
Medium = 300 – 1,000 daily riders
High = more than 1,000 daily riders

Evaluation

Evaluation Criteria

The HTCS used five goals to evaluate the corridors studied:

1. Provide mobility benefits and respond to trip patterns/needs and deficiencies for markets identified in the purpose and need
2. Provide affordable, effective transportation improvements
3. Meet 2030 Transportation Policy Plan ridership goals
4. Seamlessly integrate with existing systems and provide valuable regional connections
5. Support area development plan, forecast growth assignment, redevelopment potential

To evaluate the nine corridors, technical evaluation measures were developed for each of the identified goals. The measures were scored on a three-point scale, with a maximum score of three points per evaluation measure.

Goal 1: Provide mobility benefits and respond to trip patterns/needs and deficiencies for markets identified in the purpose and need

Measure	Description
1. Transitway Total ridership	The sum of Station-to-Station Service ridership plus other Corridor Bus Route ridership (Year 2030)
2. Growth in guideway total ridership	The difference between Year 2030 Transitway Total ridership and Year 2030 No-Build ridership
3. Reverse-commute direction and off-peak hour ridership	The percentage of Station-to-Station Service reverse-commute riders (Year 2030) The percentage of Station-to-Station Service nonpeak hour riders (Year 2030)
4. Transit-reliant ridership	Percentage of Station-to-Station Service trips taken by persons from zero-car households
5. Minority residents in the service area	The percentage of minority residents within two miles of a Highway BRT station (2010 US Census)

Goal 2: Provide affordable, effective transportation improvements

Measure	Description
6. Cost effectiveness	The alternative's total annualized capital costs plus the alternative's annualized operating and maintenance costs divided by the total annual Station-to-Station service forecasted trips

Goal 3: Meet 2030 Transportation Policy Plan ridership goals

Measure	Description
7. Station-to-Station service ridership	The number of trips taken on a Highway BRT Station-to-Station Service route (Year 2030)
8. New transit riders	The estimated number of new riders that would choose to use the Highway BRT service instead of making the trip with an automobile (Year 2030)

Goal 4: Seamlessly integrate with existing systems and provide valuable regional connections

Measure	Description
9. Current year Station-to-Station Service ridership with the Build Alternative	The number of Station-to-Station Service trips taken on the Build Alternative if it was built in the current year
10. Connections to existing or planned high-frequency transitways	The number of times a Highway BRT corridor connects with an existing or planned high-frequency transitway

Goal 5: Support area development plan, forecast growth assignment, redevelopment potential

Measure	Description
11. Forecast growth in population	The forecasted percent change in population (2010– 2030) within two miles of a Highway BRT station location included for each corridor
12. Forecast growth in employment	The forecasted percent change in employment (2010 – 2030) within two miles of a Highway BRT station location included for each corridor

Table 7: Evaluation Data Summary

	Measure	I-94	HWY 65	I-35E North	HWY 36	I-35E South	HWY 169 S	HWY 212*	I-394	HWY 55	HWY 169 N*
GOAL 1	1. Transitway Total ridership (Year 2030)	13,700	1,200	3,400	11,400	5,700	12,000	3,800	14,400	8,300	11,000
	2. Growth in guideway total ridership (from 2030 No Build to 2030 Build)	4,400	600	3,100	9,300	4,200	8,600	1,400	7,900	4,900	5,800
	3. Off-peak hour ridership and reverse-commute direction (Year 2030)	35%	43%	12%	28%	37%	38%	45%	42%	45%	47%
	4. Transit-reliant ridership (Year 2030)	45%	26%	35%	35%	38%	33%	29%	37%	43%	40%
	5. Minority residents in the service area (US 2010 Census	52%	18%	46%	30%	21%	21%	17%	17%	32%	27%
GOAL 2	6. Cost effectiveness ($2013)	$5.12	$19.96	$6.81	$2.77	$8.50	$4.67	$18.36	$2.85	$7.13	$6.65
GOAL 3	7. Station-to-Station Service ridership (Year 2030)	5,400	800	2,500	9,300	4,000	7,800	600	6,600	4,300	6,000
	8. New transit riders (Year 2030)	1,400	700	500	1,300	1,200	2,000	300	1,600	1,300	2,200
GOAL 4	9. 2010 Trips with the Build Alternative	2,600	400	1,300	5,200	2,500	4,600	400	3,600	3,000	4,100
	10. Connections to existing or planned high-frequency transitways	1	1	0	2	3	2	1	0	3	3
GOAL 5	11. Forecast growth in population	3%	8%	6%	9%	6%	15%	25%	7%	13%	20%
	12. Forecast growth in employment	28%	14%	19%	13%	15%	19%	18%	8%	6%	24%

*Does not serve downtown Minneapolis directly

Evaluation Scoring Methodology

Reviewers Note: Consistent with the methodology in the HTCS, the thresholds described above were used to generate one score (ranging from 1 to 3) for each of the 12 criteria for each corridor. The five project goals were weighted equally in the overall score for each corridor. While the PMT has reviewed the technical results of the Highway 169 analysis, they have not yet reviewed the evaluation methods described below, which generated the corridor scores shown in Table 9.

The results of all evaluation measures were comparatively scored on a three-point scale by alternative (i.e., a total maximum score of three points per evaluation measure). However, three separate methodologies were used to set scoring thresholds. The three methodologies are described below.

Threshold Methodology 1

The first methodology was used for results reported as a percentage. To set the threshold for these measures the range between the highest percentage and the lowest percentage was calculated. Then, the range was divided by three. The point thresholds were set by subtracting this value from the highest percentage value.

- Example: I-94 has transit reliant ridership of 45 percent, the highest of all eight corridors. Highway 65 has a transit reliant ridership of 26 percent, the lowest of all corridors.
  - (45 – 26)/3 = 6
    - 45-6 = 39
    - 39 – 6 = 33

Example Thresholds	Points
Between 39% and 45%	3
Between 33% and 39%	2
≤ 32%	1

Threshold Methodology 2

The second methodology was used for all non-percentage results (except for the Cost Effectiveness measure, as described in Threshold Methodology 3). For these results, the highest value was divided into thirds to determine the scoring thresholds.

- Example: For the Guideway Total Riders measure, the I-394 corridor is estimated to provide 14,400 trips, the largest amount of all eight corridors.
  - 14,400/3 = 4,800
    - 14,400 – 4,800 = 9,600
    - 9,600 – 4,800 = 4,800

Thresholds	Points
Between 9,600 and 14,400	3
Between 4,800 and 9,600	2
≤ 4,800	1

Threshold Methodology 3

The thresholds for the Cost Effectiveness measure were set based on the Small Starts thresholds set in the Federal Transit Administration's *New and Small Starts Evaluation and Rating Process* (August 2013) final policy guidance. The FTA's scoring process is based on a five-point scale, as shown in Table 8.

Table 8: FTA Small Starts Cost Effectiveness Breakpoints

Rating	Small Starts Breakpoints
High	<$1.00
Medium – High	Between $1.01 and $1.99
Medium	Between $2.00 and $3.99
Medium – Low	Between $4.00 and $5.00
Low	>$5.00

The Cost Effectiveness thresholds were adjusted to fit the project's three-point scoring system as well as to present meaningful differences between the results. Since the lower threshold for project is typically the "medium" rating, $4.00 was used from the Small Starts criteria as a break point and $8.00 for the next break point. The thresholds for this measure are shown below:

Thresholds	Points
Between $8.00 and $19.96	1
Between $4.00 and $8.00	2
≤ $4.00	3

Evaluation Scoring Results

Table 9: Evaluation Results

		I-94	HWY 65	I-35E North	HWY 36	I-35E South	HWY 169 S	HWY 212	I-394	HWY 55	HWY 169 N
Goal 1: Provide mobility benefits and respond to trip patterns/needs and deficiencies for markets identified in the purpose and need											
1	Guideway total ridership	●	○	○	●	◑	●	○	●	◑	●
2	Growth in guideway total ridership	◑	○	◑	●	◑	●	○	●	◑	◑
3	Off-peak hour ridership and reverse-commute direction	●	●	○	◑	●	●	●	●	●	●
4	Transit-reliant ridership	●	○	◑	◑	◑	◑	○	◑	●	●
5	Minority residents in the service area	●	○	●	◑	○	○	○	○	◑	○
Goal 2: Provide affordable, effective transportation improvements											
6	Cost effectiveness	◑	○	◑	●	◑	◑	○	●	◑	◑
Goal 3: Meet Transportation Policy Plan (TPP) ridership goals											
7	Station-to-station ridership	◑	○	○	●	◑	●	○	●	◑	◑
8	New transit riders	◑	○	○	◑	◑	●	○	●	◑	●
Goal 4: Seamlessly integrate with existing systems and provide valuable regional connections											
9	2010 Trips with the build alternative	◑	○	○	●	◑	●	○	●	◑	●
10	Connections to existing or planned high frequency transitways	○	○	○	◑	●	◑	○	○	●	●
Goal 5: Support area development plans, forecast growth assignment, redevelopment potential											
11	Forecast growth in population	○	○	○	○	○	◑	●	○	◑	●
12	Forecast growth in employment	●	○	◑	○	○	◑	◑	○	○	●
	TOTAL	●	○	○	●	◑	●	○	●	●	●

Based on the evaluation results, the ten HTCS corridors were placed into categories showing the potential feasibility of all-day, station-to-station BRT service, as shown in Table 10. The corridors identified in the "High" category represent those that had the highest technical score in the evaluation, strongly supporting the goals for the study. These corridors were: I-394, Highway 36, Highway 169 South, I-94, and Highway 55, and Highway 169.

Table 10: Potential for All-Day, Station-to-Station BRT Service

Potential Rating	Corridors
High	• Highway 36 • Highway 169 South • I-394 • I-94 • Highway 55 • Highway 169
Moderate	• I-35E South
Low	• Highway 65 • I-35W North • Highway 212

Appendix A

Existing Conditions: Highway 169 between I-394 and TH 610

Version 1.0

Minnesota Department of Transportation

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August 2016

SRF No. 8989

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Introduction

In 2014 the Metropolitan Council completed the Highway Transitway Corridor Study (HTCS), which examined the potential for all-day, frequent, station-to-station, Highway Bus Rapid Transit (BRT) along nine corridors in the region, shown in **Error! Reference source not found.** and listed below:

- I-94
- Highway 65
- I-35E North
- Highway 36
- I-35E South
- Highway 169 South
- Highway 212
- I-394
- Highway 55

The segment of Highway 169 between I-394 and Scott County Road 69 in Shakopee was studied in the HTCS; however, the northern segment of Highway 169 between I-394 and Highway 610 was not included in the study. The purpose of this analysis is to consider the potential for all-day, frequent, station-to-station, Highway BRT along Highway 169 from Marschall Road in Shakopee to Highway 610 in Brooklyn Park. This will be accomplished by performing the same analysis on Highway 169 that was completed for the corridors listed above.

Methodology and Existing Conditions

The existing conditions analysis includes: population estimates; identification of employment and education centers; existing transit routes and transit advantage infrastructure; park-and-ride-lot descriptions and use in the corridor; and highway characteristics and congestion data.

The existing conditions analysis presented in this technical memo is for the segment of Highway 169 between I-394 and Highway 610. For the segment of Highway 169 south of I-394, please see Appendix B: Existing Conditions and Market Analysis: Highway 169 between Highway 55 and Marschall Road.

Population Estimates

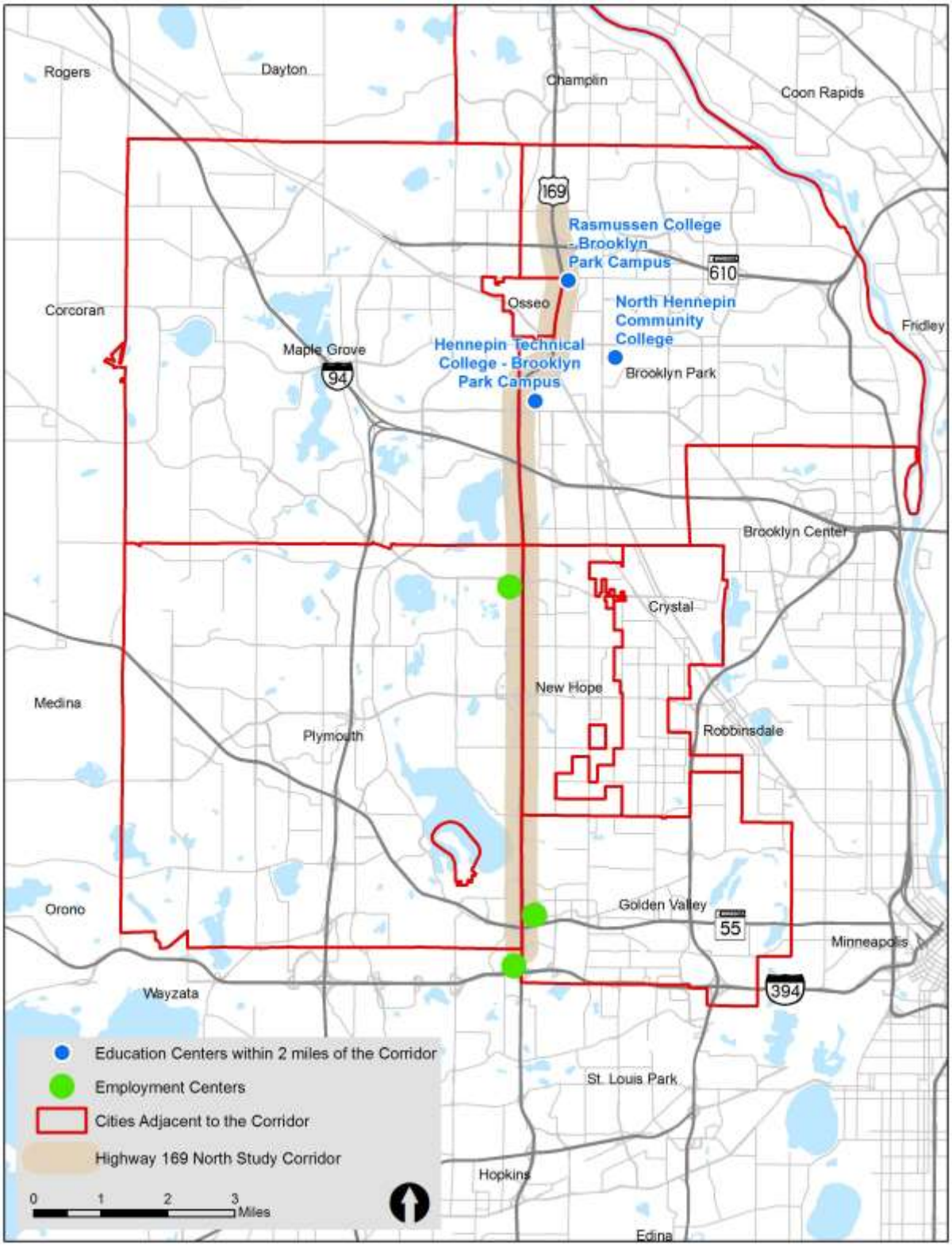
Methodology

Corridor population is defined as all persons living within two miles of all full-access local interchanges along Highway 169 between I-394 and Highway 610. Full-access local interchanges are those with roadways that intersect Highway 169 or I-394 and have entrance and exit ramps in all directions. The number of persons living within two miles of these interchanges was calculated at the US Census block level using 2010 US Decennial Census data.

Existing Conditions

The Highway 169 study area extends approximately 14.1 miles north from I-394 to 101st Avenue, which is located immediately north of the Highway 169/Highway 610 interchange. It directly serves the cities of Golden Valley, Maple Grove, Brooklyn Park, Plymouth, New Hope, Osseo, and Champlin. Approximately 139,000 persons and 57,000 households live within two miles of a full access interchange in the Highway 169 North Corridor. Figure 1 shows the 169 North Corridor and surrounding communities, employment centers, and education centers.

Figure 1: Highway 169 North Study Area, Education Centers, and Employment Centers



Employment Centers

Methodology

Corridor employment centers are defined as contiguous areas with 7,000 or more jobs and a job density of ten or more jobs per acre. The Metropolitan Council used a combination of 2010 Quarterly Census of Employment and Wages (QCEW) data and the Metropolitan Council's Generalized Land Use boundaries to identify corridor employment centers. The Council also classified each job center as a Metro Center, a Regional Center, or a Subregional Center. Metro Centers have the most jobs and highest job densities and Subregional centers have the fewest jobs.

Existing Conditions

There are three employment centers located within the Highway 169 North corridor, as shown in Table 1 and Figure 1. The Highway 55/Highway 169 sub-regional industrial center is the largest employment center; however, the I-394/Highway 169 sub-regional professional employment center has the highest density, or jobs per acre.

Table 1: Highway 169 Employment Center Characteristics

Employment Center	Class	Jobs (2010)	Net Density (Jobs per Acre)
I-394/Hwy 169	Sub-regional Professional	7,900	50
Hwy 55/Hwy 169	Sub-regional Industrial	12,400	25
Hwy 169/Bass Lake Rd	Sub-regional Diversified	9,900	16

Education Centers

Methodology

An education center is defined as any college or university with an enrollment of 500 students or more. Education centers within a two-mile buffer area of Highway 169 were identified.

Existing Conditions

There are three education centers within the Highway 169 Corridor, as shown in Figure 1. Table 2 includes the enrollment for these education centers, which include Hennepin Technical College in Brooklyn Park, North Hennepin Community College, and Rasmussen College. All three education centers are located in Brooklyn Park.

Table 2: Education Centers in the Highway 169 North Corridor

Education Center	Enrollment
Hennepin Technical College	9,500*
North Hennepin Community College	10,655
Rasmussen College-Brooklyn Park Campus	6,651*

NOTE: *Enrollment number represents students enrolled in the entire college/university. Enrollment at this institution is split between multiple campuses.

Existing Transit Routes and Infrastructure

Methodology

Existing transit routes that operate on or in proximity to Highway 169 were obtained from Metro Transit and Plymouth Metrolink along with proximate park-and-ride and park-and-pool facilities.

The park-and-ride usage data used in this report is taken from Metro Transit's *2012 Annual Regional Park-and-Ride System Report*. Park-and-ride usage is tracked through a collaborative effort between the state, county, and other regional agencies. Together these agencies counted and recorded license plate data for vehicles parked at every park-and-ride and park-and-pool serving the Twin Cities metropolitan area. Usage data was collected one time for each facility within the following dates:

- Tuesday, September 25–Thursday, September 27, 2012
- Tuesday, October 2–Thursday, October 4, 2012

Metro Transit then obtained user origin data from the Minnesota Driver and Vehicle Services (DVS) and the Wisconsin Department of Transportation databases to acquire vehicle registrants' street address, city/township and zip code. Upon completion of address acquisition, staff members geocoded the home origins of approximately 18,600 system users. Geocoding allows for a visual display of user origin distribution while protecting individual privacy throughout the system.

Existing Conditions

There are currently four bus routes that operate along Highway 169 from Highway 55 to 101st Avenue. Table 3 presents current characteristics of each route, including the transit providers, span of service, frequency of service, and number of AM and PM trips.

Table 3: Highway 169 Transit Service Performance Characteristics by Route

Route	Transit Provider	Span of Service	Frequency (minutes) (Peak/Mid/Evening)	Number of Trips
687	SouthWest Transit	6:33 am – 5:13 pm	50/0/0	AM: 2 PM: 1
742	Plymouth Metrolink	5:46 am – 7:00 pm	35/0/60	AM: 3 PM: 3
790	Plymouth Metrolink	5:43 am – 6:38 pm	15-30/0/15-45	AM: 8 PM:8
793	Plymouth Metrolink	6:29 am – 7:49 pm	30/0/35-60	AM: 2 PM:4

Existing transit routes, transit infrastructure, and transit advantages along the Highway 169 North Corridor are shown in Figure 2. There are currently bus-only shoulder lanes in both directions on Highway 169 from I-394 to I-694. Additionally, Highway 169 has two ramp meter bypasses for transit vehicles and high occupancy vehicles (HOVs), which are defined as vehicles with two or more passengers. The ramp meters are located at 36th Avenue and Highway 169 (southbound) and the I-394 westbound ramp to northbound Highway 169.

The residents along the Highway 169 North corridor primarily use three park-and-rides. These park-and-rides and the user home origins are shown in Figure 3, and include Nathan Lane (Highway 169), General Mills (I-394), and the Louisiana Avenue Transit Center (I-394). As shown in Table 4, the park-and-ride facility with the highest capacity and usage is the Louisiana Avenue Transit Center with 323 of 330 spaces in use (98 percent). The users of this park-and-ride reside throughout Plymouth, New Hope, and Golden Valley, as well as Saint Louis Park and Minnetonka. While smaller in size (123 spaces), the General Mills Boulevard Park and Ride is at 97 percent capacity, and the Nathan Lane Park and Ride facility is at approximately 73 percent capacity. The user home origins are concentrated in Plymouth and New Hope for the Nathan Lane (Cub Foods – Plymouth) Park and Ride. Users for the General Mills Boulevard Park and Ride are dispersed throughout the communities of Golden Valley, Plymouth, Saint Louis Park, and Minnetonka.

Table 4: Highway 169/I-394 Park-and-Ride Usage

Park-and-Ride Facility	Park-and-Ride Usage		
	Use	Capacity	% Used
Nathan Lane (Cub Foods – Plymouth)	87	120	73%
General Mills	119	123	97%
Louisiana Avenue Transit Center	323	330	98%

Source: Metropolitan Council, 2012

Figure 2: Transit Routes, Transit Advantages, and Park-and-Ride Facilities

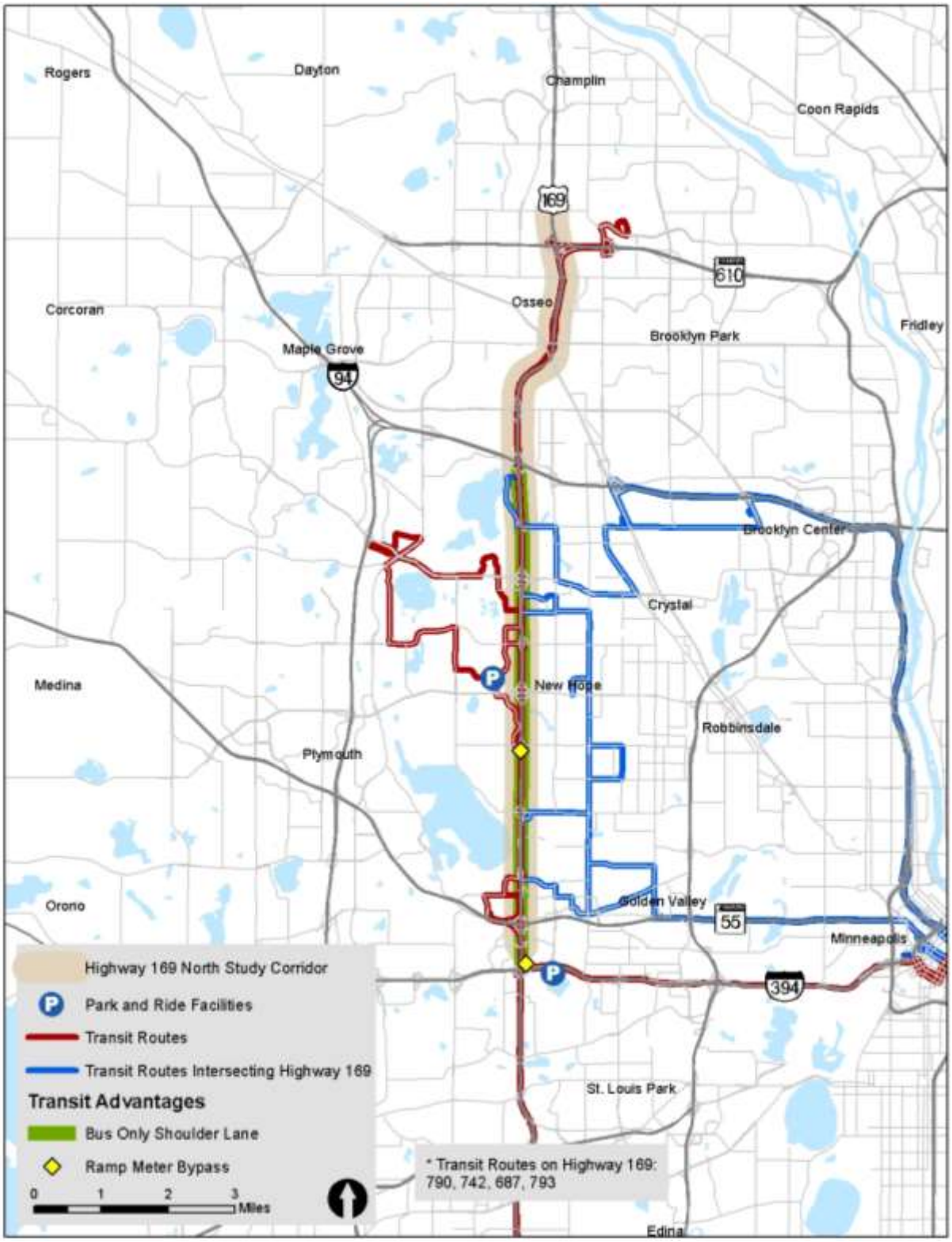
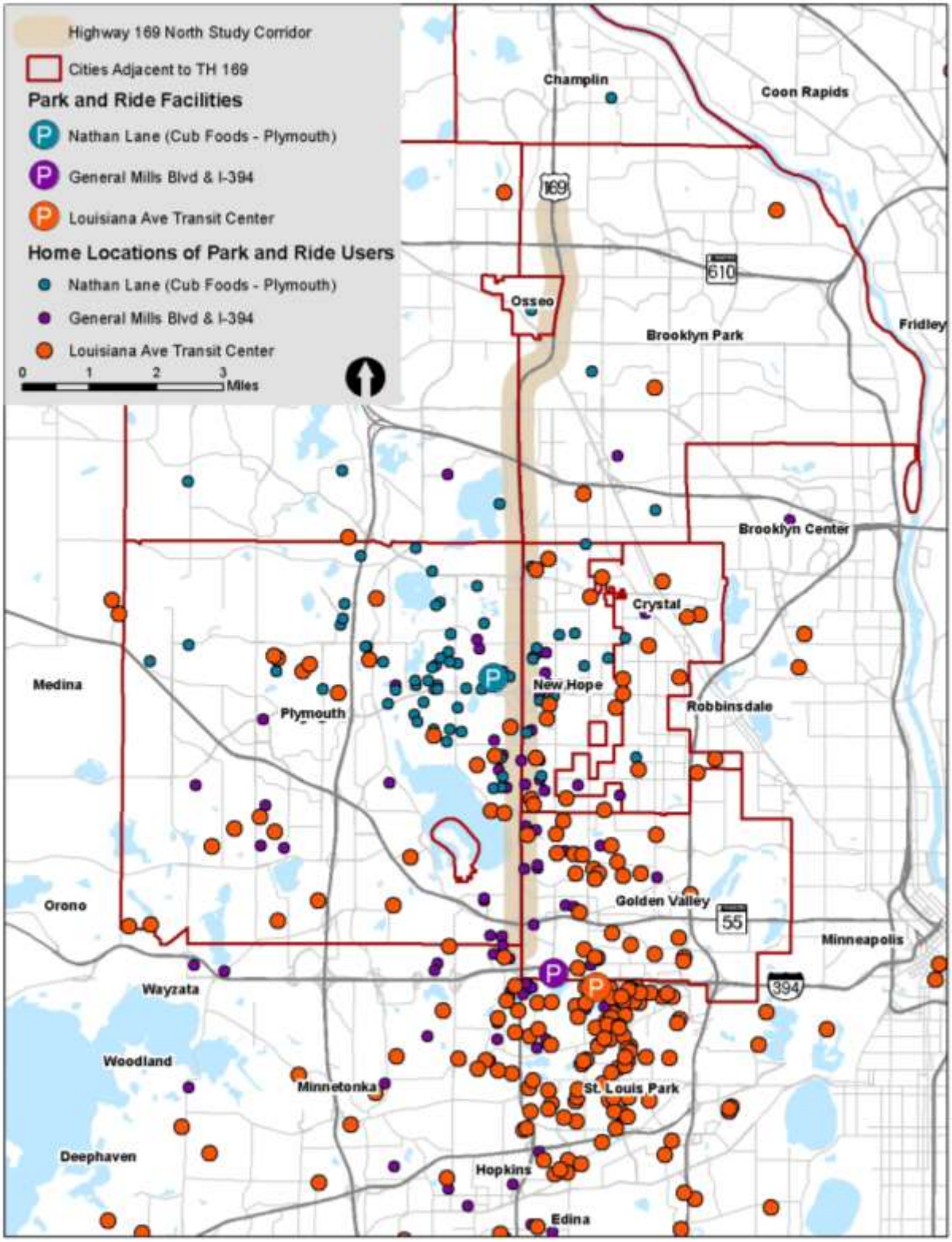


Figure 3: Home Locations of Highway 169 Park and Ride Users



Highway Characteristics and Congestion Data

Methodology

Roadway volume data was collected from MnDOT and reflects Average Daily Traffic (ADT) from 2010.

Congestion data for freeways in the Twin Cities metro area is collected by the Regional Transportation Management Center (RTMC) via detectors embedded in the roadway. The RTMC collects, evaluates, and archives detector data embedded in the mainline roadway which covers approximately 90 percent of the Twin Cities metro area freeway system. The data used in this report is from October 2012 and is representative of regular traffic patterns in the corridor. The speed data ranges from 5:00 AM to 8:00 PM, aggregated into 15 minute intervals.

Existing Conditions

Highway 169 is a four-lane divided arterial with a speed limit of 55 miles per hour through the cities of Golden Valley, Maple Grove, Brooklyn Park, Plymouth, New Hope, Osseo, and Champlin. The 2010 ADT for the Highway 169 North Corridor is displayed in Figure 4 and ranges from 70,000 to 88,000 ADT between I-394 and I-694. Volumes drop to a range of 43,000 to 55,500 ADT north of I-694.

Northbound and southbound congestion areas for the Highway 169 North corridor are shown in Figure 5 and Figure 6, respectively. In the northbound direction, moderate congestion occurs between Highway 55 and Plymouth Avenue from 3:30 PM to 5:30 PM. In the southbound direction, heavy congestion occurs between 36th Avenue and Highway 55 from 7:00 AM and 8:00 AM. There is also moderate congestion along the entire corridor from 6:30 AM to 9:00 AM.

Figure 4: Highway 169 North Traffic Volumes (2010 ADT)

Figure 5: Highway 169 North Congestion Areas (Northbound)

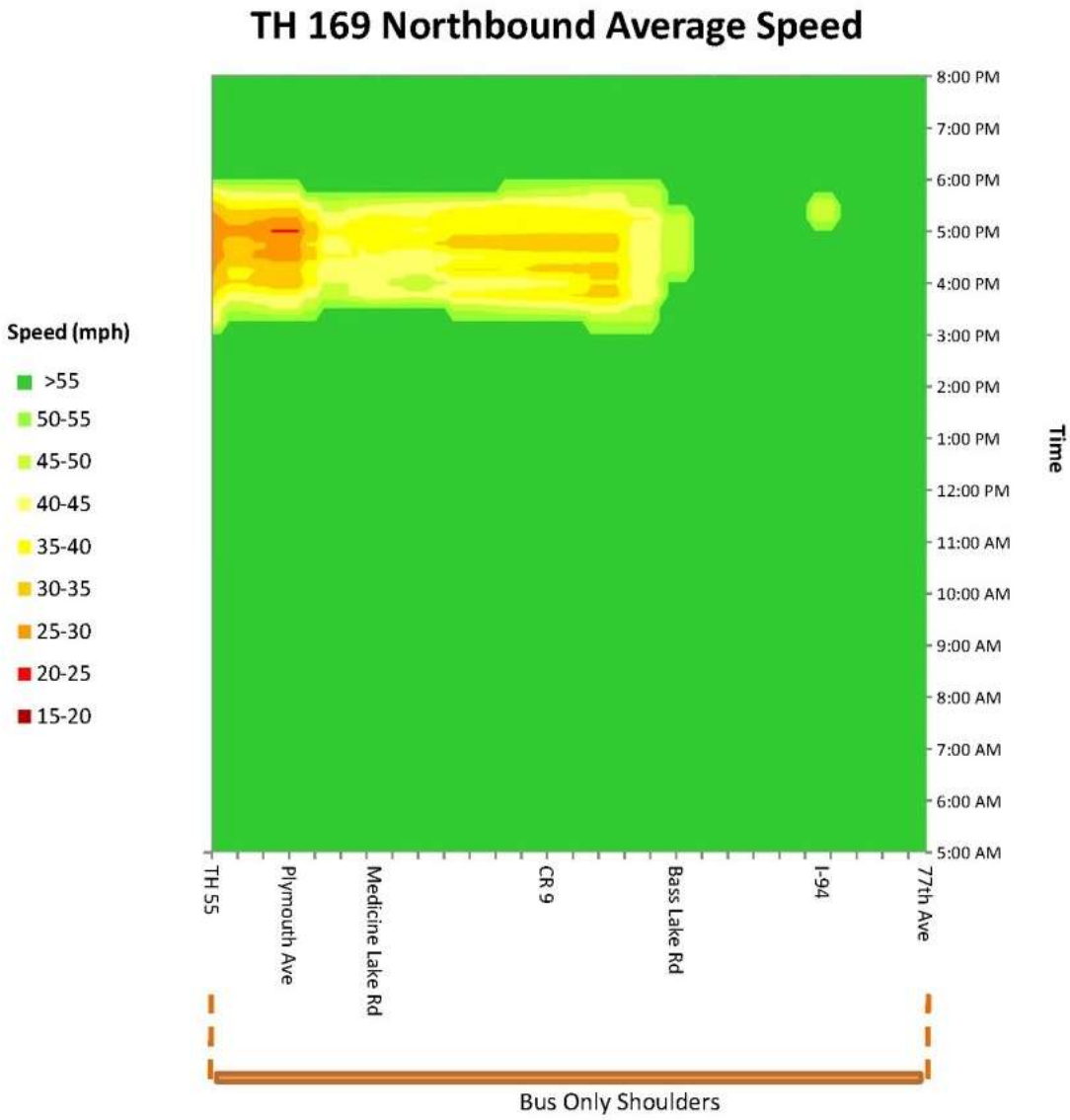
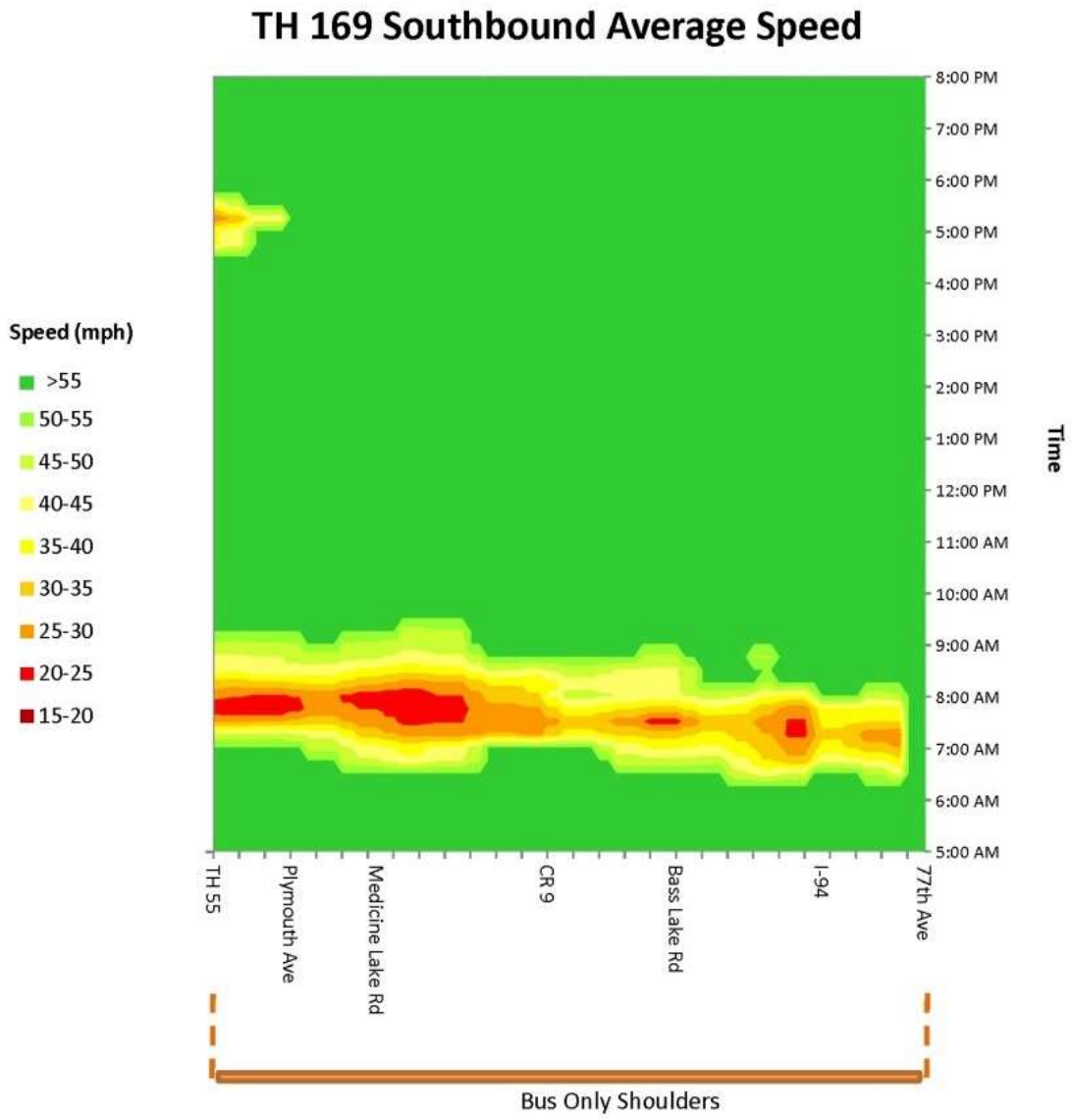


Figure 6: Highway 169 North Congestion Areas (Southbound)



Existing Conditions and Market Analysis

Highway 169 Mobility Study

Version 2.0

Minnesota Department of Transportation

SRF Consulting Group, Inc. | Engineers Planners Designers

April 2016

SRF No. 8989

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Introduction

Project Background

The purpose of the Highway 169 Mobility Study is to develop and evaluate potential options for improving transit and reducing congestion on Highway 169 between Shakopee and Golden Valley. The study will focus on a constrained set of alternatives that includes elements of highway bus rapid transit (BRT), MnPASS Express Lanes, and spot mobility improvements such as the addition of auxiliary lanes or interchange modifications. These improvements are intended to increase mobility, reliability, and safety through the study area. See Figure 1 for a map of the study area.

Within the broader study effort, the purpose of this existing conditions and market analysis is to gain an understanding of how Highway 169 is currently used and how well it functions for various users. The information documented in this memo will inform development of highway BRT and MnPASS Express Lane elements, as well as spot mobility improvements for analysis in this study.

The existing conditions and market analysis is divided into four parts: study area location and demographics, transit conditions, highway operations conditions, and a market analysis.

Study Area Location and Demographics

The Highway 169 Corridor Study Area is a 23-mile segment from Highway 41 in Shakopee to Highway 55 in Golden Valley. Located in the southwest quadrant of the Twin Cities region, in the study area Highway 169 passes through Plymouth, Golden Valley, St. Louis Park, Minnetonka, Hopkins, Edina, Eden Prairie, and Bloomington in Hennepin County, and Savage and Shakopee in Scott County. The study area is composed of areas within two miles of the corridor, and also includes part of the City of Prior Lake. The location and demographics sections describe the land uses in the corridor, other major transportation facilities, and demographics such as race, age, poverty status, education levels, median household income, and zero-vehicle households.

Transit Existing Conditions

Highway BRT is being considered on Highway 169. The transit section of this existing conditions memo describes transit service, performance, and facilities on Highway 169, as well as on I-394 and Highway 55, which are the two BRT route options under consideration from Highway 169 to downtown Minneapolis.

Highway Operations Conditions

MnPASS Express Lanes are also being considered on Highway 169, which if implemented could be directly or indirectly connected to the existing MnPASS lane on I-394 or to

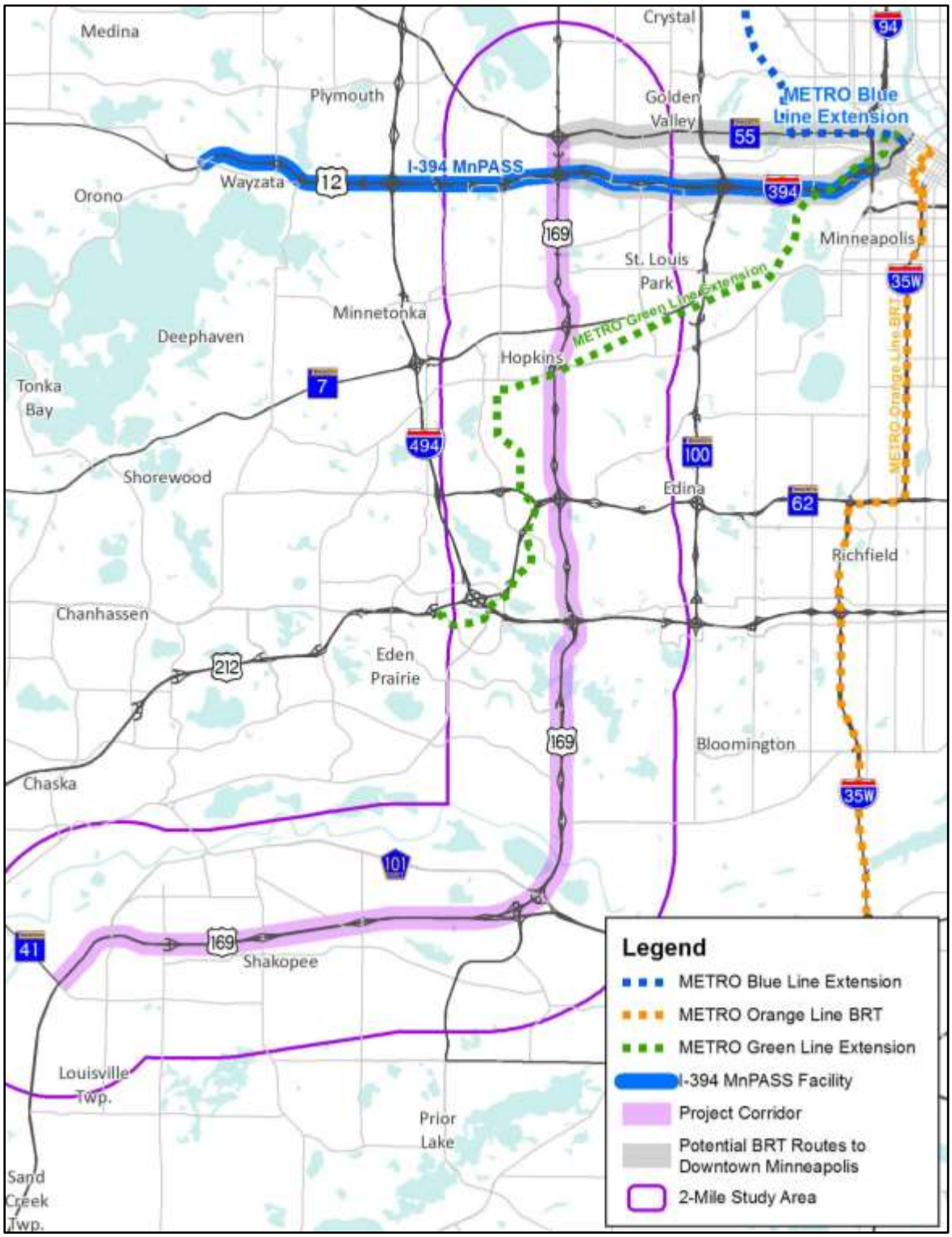
possible future MnPASS lanes on I-494 or Highway 62. However, this memo focuses solely on the existing highway conditions on Highway 169. Traffic characteristics, congestion levels and bottleneck locations, as well as travel time reliability and high crash locations are discussed in the highway operations existing conditions analysis.

Market Analysis

The market analysis uses origin-destination data to describe travel patterns on Highway 169 and includes an analysis of trip clusters, ramp-to-ramp movements, and use of alternate routes.

While this memo provides some general descriptions of the physical nature of the corridor, physical components and constraints in the corridor will be described and analyzed fully in a separate memo developed as part of the initial set of alternatives.

Figure 1: Highway 169 Mobility Study Area



Study Area Location and Demographics

Location

The Highway 169 Corridor Study Area runs from Highway 41 in Shakopee to Highway 55 in Golden Valley. This 23-mile stretch of Highway 169 is located in the southwest quadrant of the Twin Cities region and passes through Plymouth, Golden Valley, St. Louis Park, Minnetonka, Hopkins, Edina, Eden Prairie, and Bloomington in Hennepin County, and Savage and Shakopee in Scott County. The study area is composed of areas within two miles of the corridor, and also includes part of the City of Prior Lake. Highway 169 runs north-south in Hennepin County and connects with Highways 55, 7, 62, 212, and Interstates 394 and 494 in the study area. Highway 169 runs east-west in Scott County where it connects with Highways 13 and 41. Highway 169 crosses a range of landscapes and land uses that include employment-rich corporate campuses, industrial and warehouse facilities, retail centers, single-family residential neighborhoods, clusters of apartment buildings, and several prominent natural features. The highway crosses Bassett Creek, Minnehaha Creek, Nine Mile Creek, Anderson Lakes Parks Reserve, and the Minnesota River in the study area.

Please see Figure 1 for a map of the study area and Figure 2 for a map of land use in the corridor. Figure 3 shows the locations of major employers near Highway 169.

In the study area Highway 169 is mostly four lanes wide (two lanes in each direction), though there are multiple locations where the corridor is wider to accommodate auxiliary lanes near interchanges. The Bloomington Ferry Bridge, one of the main connections between Scott County and the rest of the metropolitan area, is six lanes wide. Space available for transportation infrastructure varies throughout the corridor. The areas that are most constrained have narrow shoulders (less than six feet wide) and retaining walls to allow for frontage roads and interchange ramps.

Corridor Cities

Plymouth

The City of Plymouth is located in the northwest corner of the study area; Highway 169 is the city's eastern border. Highway 55 is a major highway that runs diagonally through the city. There is a mix of land uses in the area around Highway 169 and Highway 55, including retail, services, office, and multifamily residential, as well as open space surrounding Basset Creek.

Golden Valley

Golden Valley is located in the northeastern corner of the study area. It is bound by Highway 169 to the west and mostly by I-394 to the south. Highway 55 runs east-west through the southern half of the city. The area along the corridor is dominated by industrial, office, single-family residential, and institutional uses. One of the largest employers in the region, General Mills global headquarters is located in the northeast quadrant of I-394 and Highway 169.

St. Louis Park

Highway 169 forms most of the western border of St. Louis Park. Typical land uses along Highway 169 are single- family residential, parks and recreational uses, as well as some institutional uses. Exceptions to this are several office towers in the northwest quadrant of I-394 and Highway 169, and Knollwood Mall, a regional shopping center in the northeast corner of Highway 169 and Highway 7. The Park Nicolet Methodist Hospital is also located near the corridor and draws thousands of employees and visitors each day. St. Louis Park will be served by the proposed Green Line Extension LRT line, with stations just south of Highway 7 at Beltline Boulevard, Wooddale Avenue, and Louisiana Avenue.

Minnetonka

The City of Minnetonka is located on the west side of Highway 169. Land use in the corridor is a mix of single-family and multifamily residential. I-394 runs along the northern part of the city and is surrounded by commercial and office uses. Opus Business Park northwest of the Highway 169 and Highway 62 interchange hosts the United Health Group corporate headquarters and a mix industrial, mixed use industrial, recreational, office, and residential uses. Opus Business Park will be served by a station on the proposed Green Line Extension LRT line; a second station in Minnetonka will be located near its border with Hopkins near Shady Oak Road and Excelsior Boulevard.

Hopkins

Highway 169 runs through the middle of the City of Hopkins and the entire city is located within two miles of the highway. Hopkins has a traditional downtown with an historic Main Street, a grid network of streets, and fairly dense single- and multi-family residential neighborhoods. There is a wide range of land uses present along the corridor including institutional, office, and industrial. Cargill is a major employer in the region and is located at the intersection of Highway 169 and Excelsior Boulevard. Hopkins will be served by the Green Line Extensions LRT line at Blake Road, 8th Avenue in downtown Hopkins, and at Shady Oak Road near its border with Minnetonka.

Edina

Highway 169 forms most of the western border of the City of Edina and Highway 62 runs east-west through the city and connects with Highway 169. North of Highway 62 there is a mix of land uses along the corridor including office, single-family residential, and multifamily residential. Nine Mile Creek runs under Highway 169 from Minnetonka to Edina. Adjacent is greenspace and wetland. Land uses south of Highway 62 along the corridor are dominated by residential neighborhoods and institutional and recreational uses.

Eden Prairie

The City of Eden Prairie is mostly bound by Highway 169 on its eastern edge.. I-494 and Highway 212 both intersect with Highway 169 near the Eden Prairie border. Highway 212 runs diagonally from Highway 169 until it intersects with Interstate 494 creating an area called the Golden Triangle. This area is a mix of industrial uses, office, and open space and is a regional jobs center because of its excellent freeway access. Emerson Electronics, and Supervalu have corporate offices in the Golden Triangle. The Golden Triangle, the United Health Group corporate campus at Highway 62 and Shady Oak Road, and SouthWest Station will all be served by the proposed Green Line Extension LRT line. South of I-494 and Golden Triangle land use in Eden Prairie is mostly single-family residential, park land, and water, with some small retail areas.

Bloomington

The City of Bloomington's western edge is mostly bound by Highway 169. Land use along the corridor is mostly single-family residential, with some green space and water bodies. Along I-494 to the north is a mix of greenspace and industrial and office uses, and industrial and multifamily uses line Old Shakopee Road near the corridor.

Savage

The City of Savage is located southeast of Highway 169 and connects to the corridor via Highway 13 which runs east and west. Land uses near the corridor in Savage include greenspace and industrial uses along the Minnesota River including machinery salvage and repair businesses, as well as single family residential, and undeveloped land.

Shakopee

The City of Shakopee is located on the far southern portion of the corridor. Highway 169 runs through the middle of the city from the Bloomington Ferry Bridge over the Minnesota River to Highway 41. Because the highway runs the length of the city, there is a wide range of land uses adjacent to the corridor including greenspace, single- and multi- family residential, retail, industrial, mixed-use industrial, undeveloped land, and some areas classified as farm land. Major employers include Amazon, Seagate Technologies, Shutterfly, Saint Francis Medical and Cancer Centers, and Saint Gertrude's Health Center. Other

seasonal regional draws include Valley Fair Amusement Park, Canterbury Park, and the Renaissance Festival.

Figure 2: Land Use in the Highway 169 Corridor

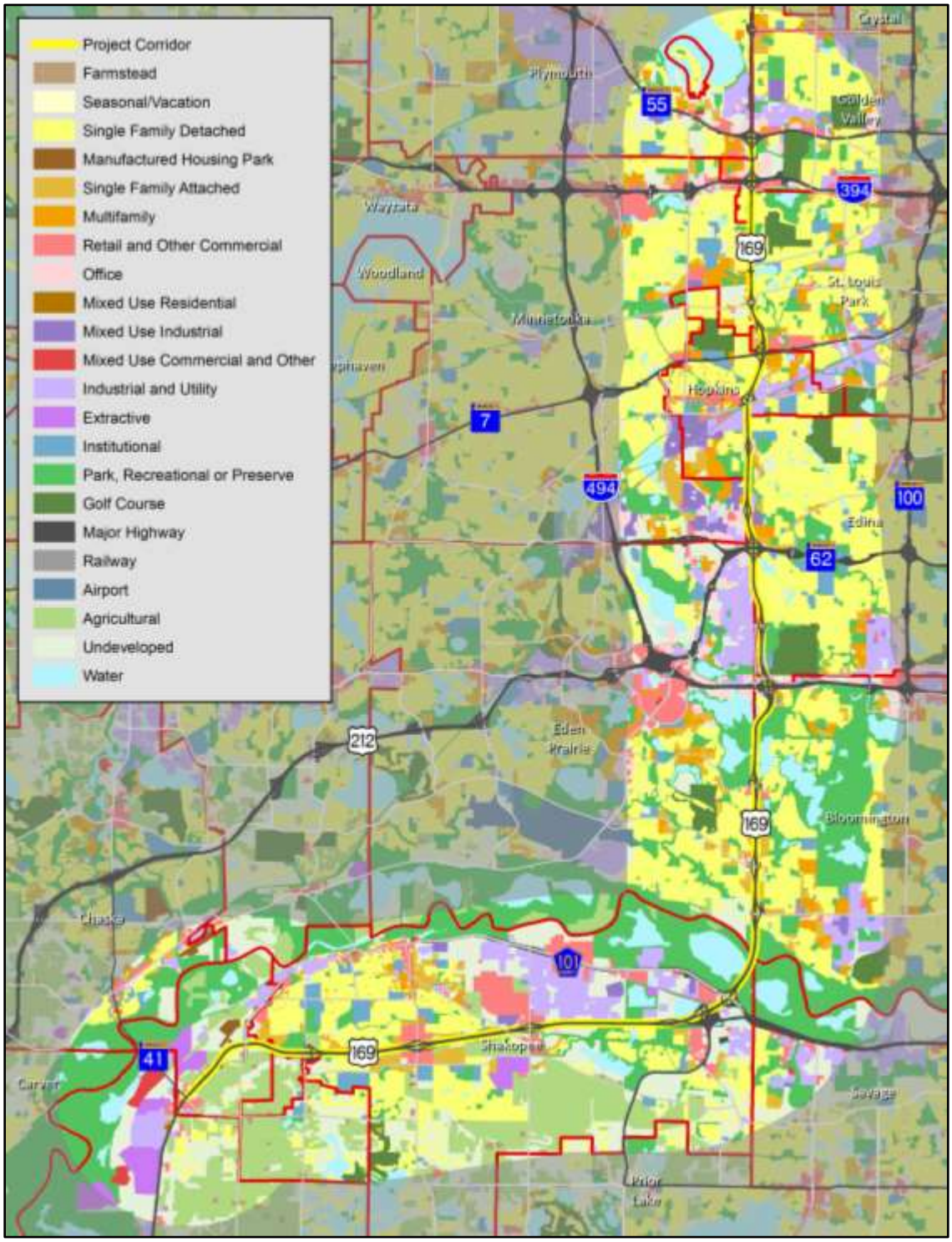
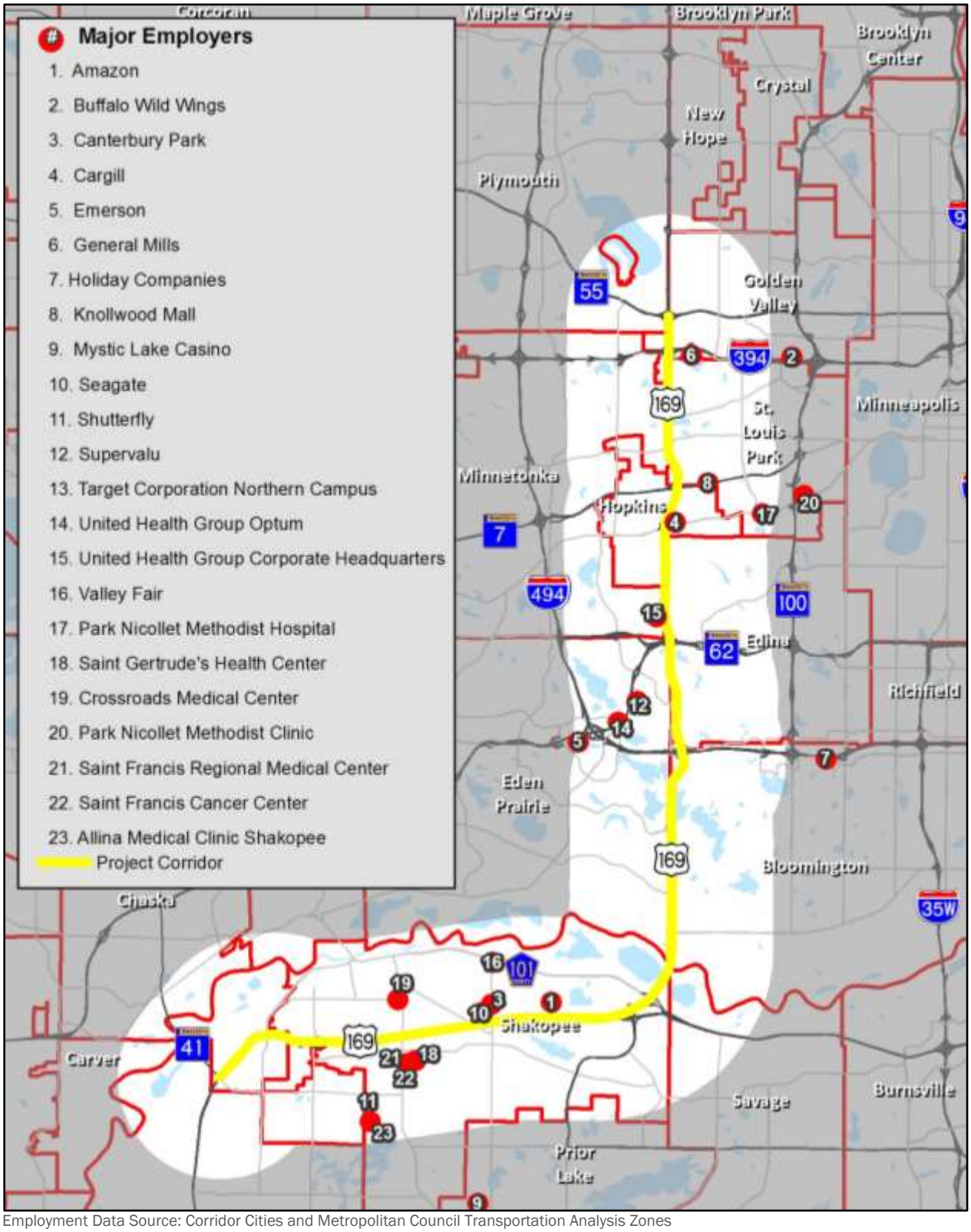


Figure 3: Major Employers in the Highway 169 Corridor



Employment Data Source: Corridor Cities and Metropolitan Council Transportation Analysis Zones

Demographics

A two-mile buffer around Highway 169 was drawn to summarize demographic trends in the populations living closest to the highway. The corridor is populous; more than 215,000 people live within two miles of the corridor in 10 cities. The municipalities range in size from Bloomington with approximately 85,000 residents, to just under 18,000 residents in Hopkins. Overall, the corridor population is fairly wealthy, well educated, and somewhat racially diverse.

Table 1 shows a range of demographic indicators by municipality. Note that the values in the table reflect the populations in the study area, not the municipality as a whole, with the exception of Hopkins, which is entirely within the study area. The Scott County cities in the study area, Prior Lake, Savage and Shakopee, have high percentages of young people under age 18 in the study area. Hopkins stands out in the corridor with the most racial diversity and limited English proficiency among its population, and also has the highest percentage of zero-vehicle households.

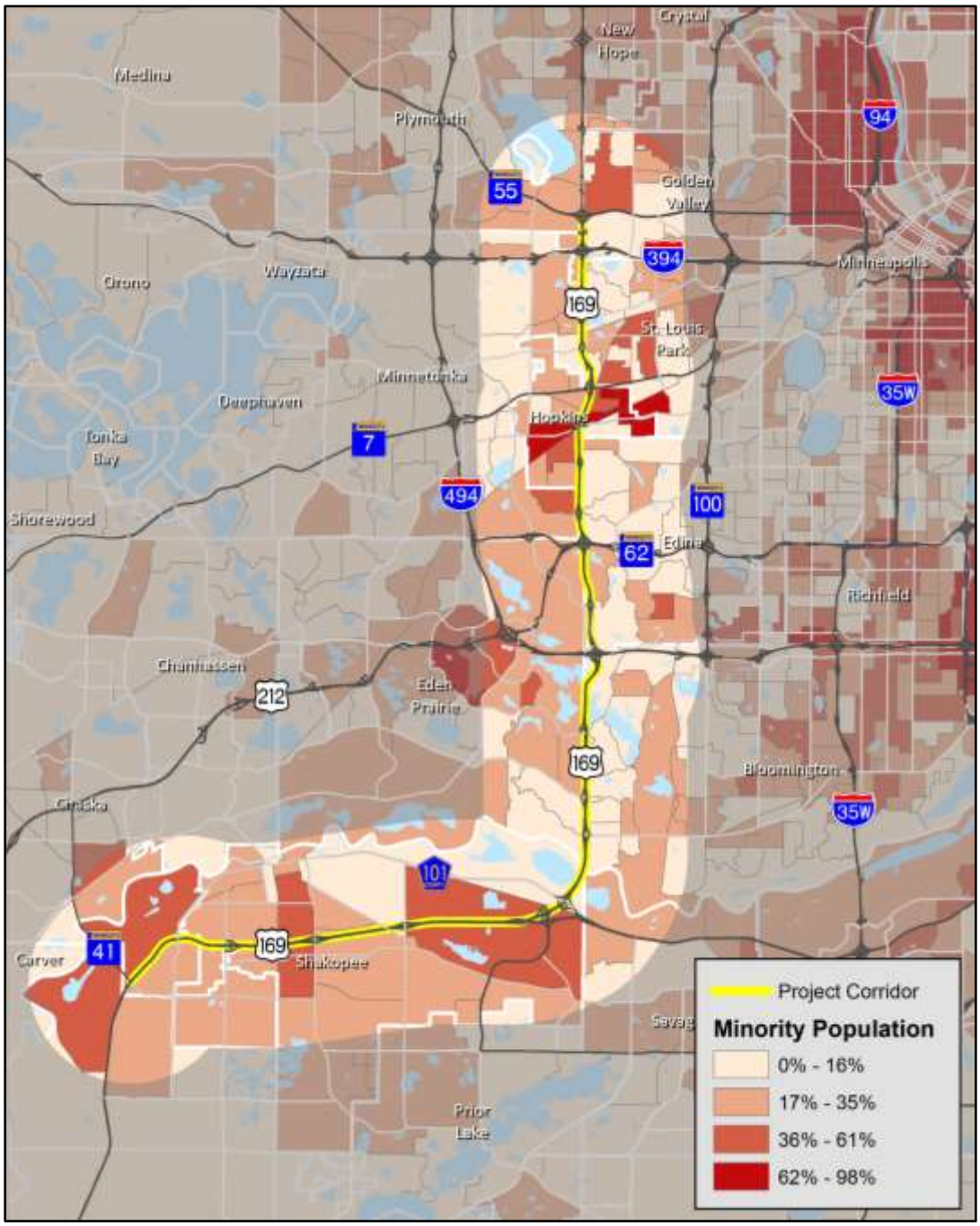
See Table 1 and Figure 4 through Figure 9 for details and maps.

Table 1: Study Area Demographic Indicators

City	Population in the Study Area	Percent Minority	Percent Foreign Born	Percent Limited English Proficiency	Percent Zero-Vehicle Households	Percent Under Age 18	Percent in Poverty	Percent without High School Education	Average of Median Household Income
Bloomington	20,652	15.4%	7.9%	3.5%	3.4%	17.8%	4.4%	3.8%	$88,477
Eden Prairie	27,488	27.4%	18.5%	6.5%	4.9%	25.6%	5.7%	4.3%	$94,338
Edina	22,478	12.6%	9.5%	1.8%	3.0%	25.1%	4.3%	1.3%	$118,572
Golden Valley	12,307	20.4%	8.3%	3.6%	5.7%	20.7%	9.0%	4.8%	$78,736
Hopkins	17,909	42.2%	21.9%	10.3%	14.5%	23.8%	16.1%	8.8%	$54,582
Minnetonka	25,423	17.9%	10.9%	4.4%	4.5%	17.5%	5.6%	2.9%	$80,231
Plymouth	9,794	16.9%	10.9%	5.2%	5.4%	19.8%	12.1%	4.2%	$75,935
Prior Lake	7,598	15.3%	4.8%	2.4%	5.1%	31.7%	4.3%	2.3%	$110,903
Savage	5,486	18.8%	10.5%	6.8%	0.5%	34.6%	1.8%	3.5%	$121,267
Shakopee	37,381	29.4%	16.0%	8.0%	4.1%	29.6%	7.3%	7.6%	$72,360
St. Louis Park	29,578	22.2%	9.9%	3.8%	8.0%	19.3%	9.4%	5.4%	$66,256
Corridor	216,094	22.9	12.1	5.3%	5.7%	23.4%	7.4%	4.7%	83,015
Seven-County Metro Area	2,920,637	24.8%	11.0%	6.3%	8.2%	24.1%	11.1%	7.0%	$68,183

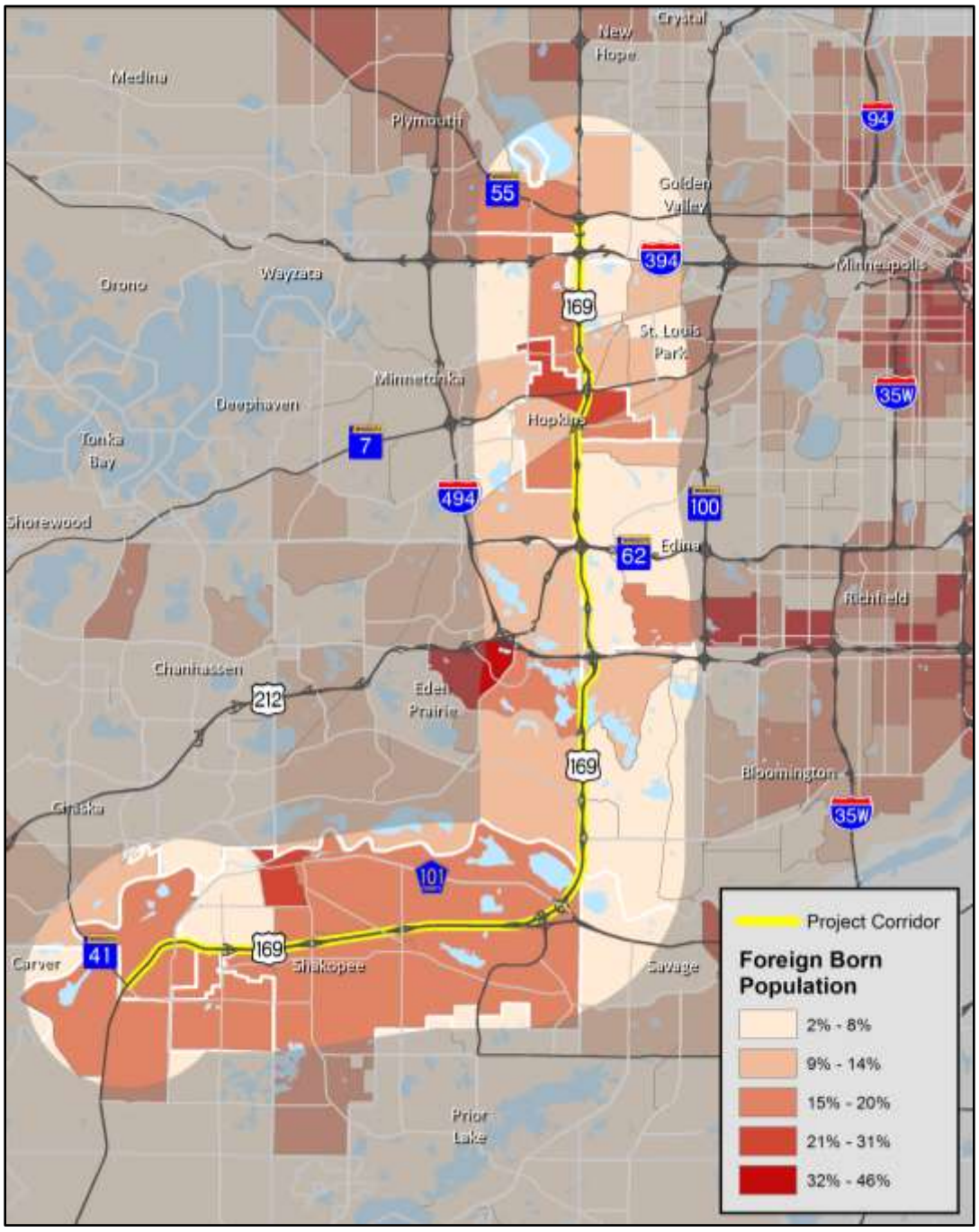
Source: American Community Survey 2009-2014

Figure 4: Minority Populations in the Highway 169 Corridor



In the northern part of the corridor, including Hopkins and St. Louis Park, there is a higher concentration of African-American populations. Asian populations are more prevalent in the southern part of the corridor in Shakopee, Savage, and Eden Prairie. Hispanic populations are fairly evenly distributed in the corridor with a few areas of high concentration in Hopkins. American Indian populations make up a small percentage of the corridor population and are fairly evenly distributed throughout the corridor.

Figure 5: Foreign-Born Populations in the Highway 169 Corridor



Each city located along the corridor has foreign-born populations, however, they tend to be concentrated in certain census tracts within each city. As a whole, the City of Hopkins has the largest foreign born population (21.9 percent) and people with Limited English Proficiency (10.3 percent) in the study area, followed by the City of Shakopee (16.0 percent and 8.0 percent respectively). Languages spoken at home vary by each city: Spanish is prevalent throughout the corridor as are other Indo-European languages. Asian and Pacific

Island speaking populations are clustered on the south end of the corridor in Bloomington and Shakopee and on the north end in St. Louis Park, Golden Valley, and Plymouth.

Figure 6: Languages Spoken in the Highway 169 Corridor

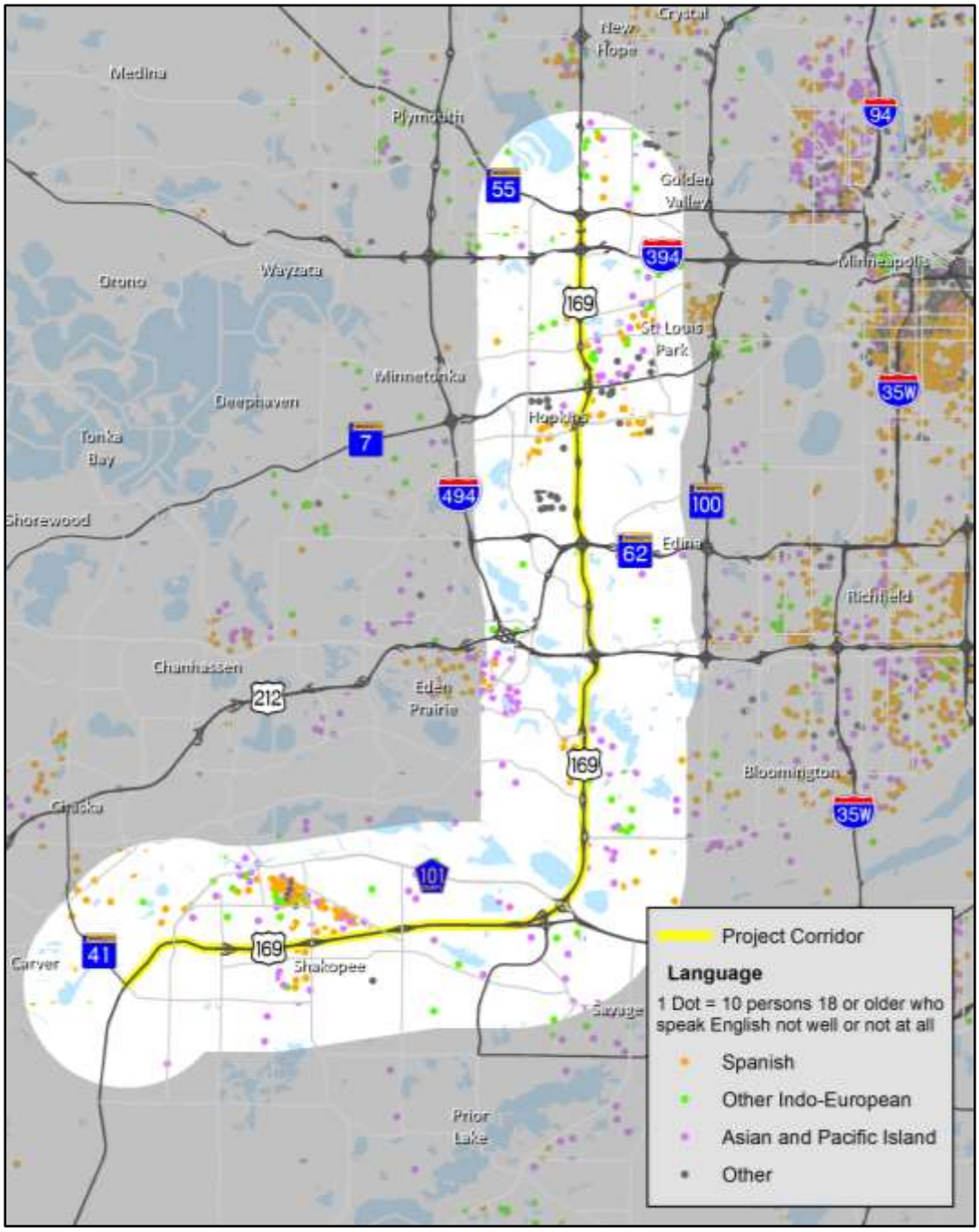
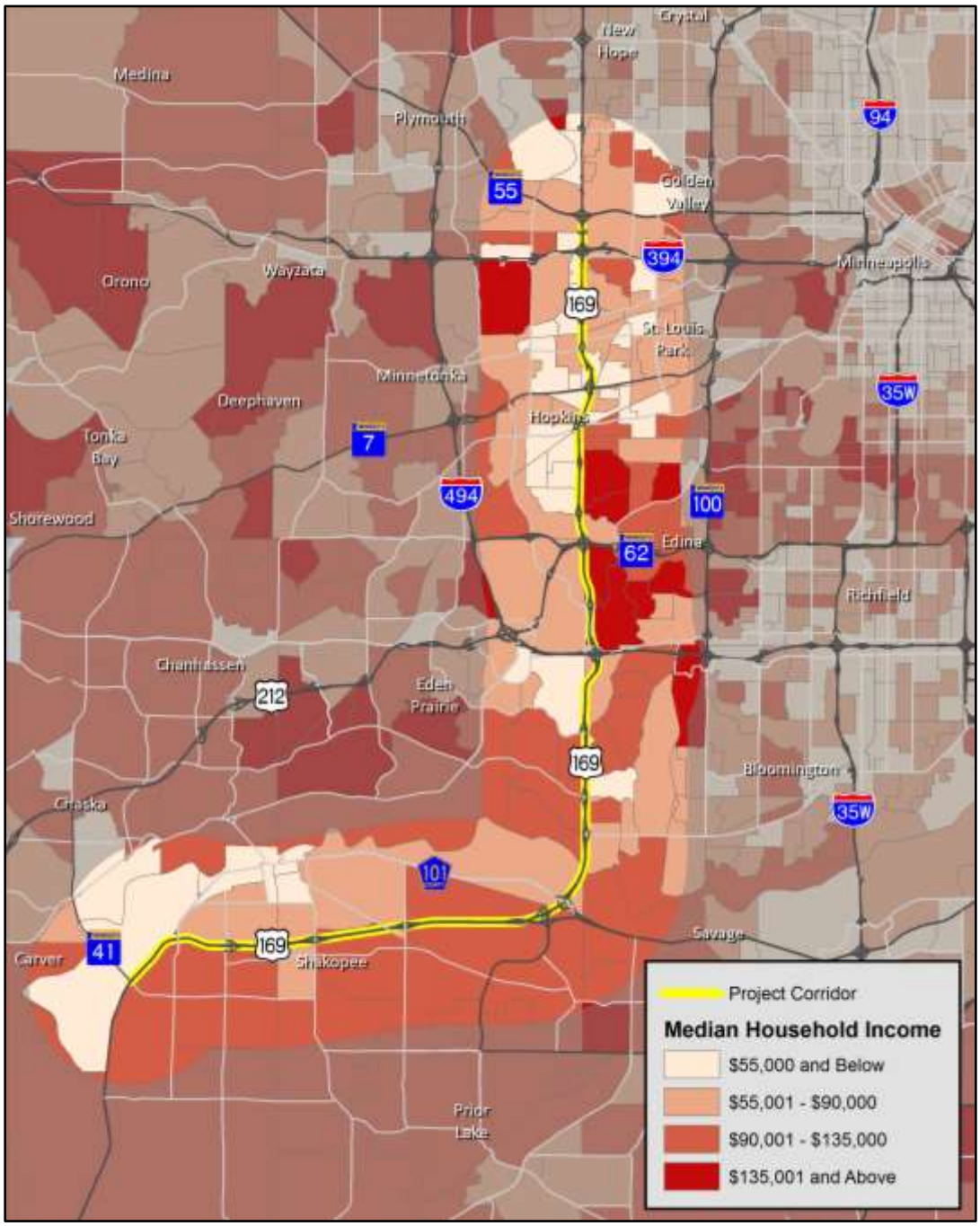
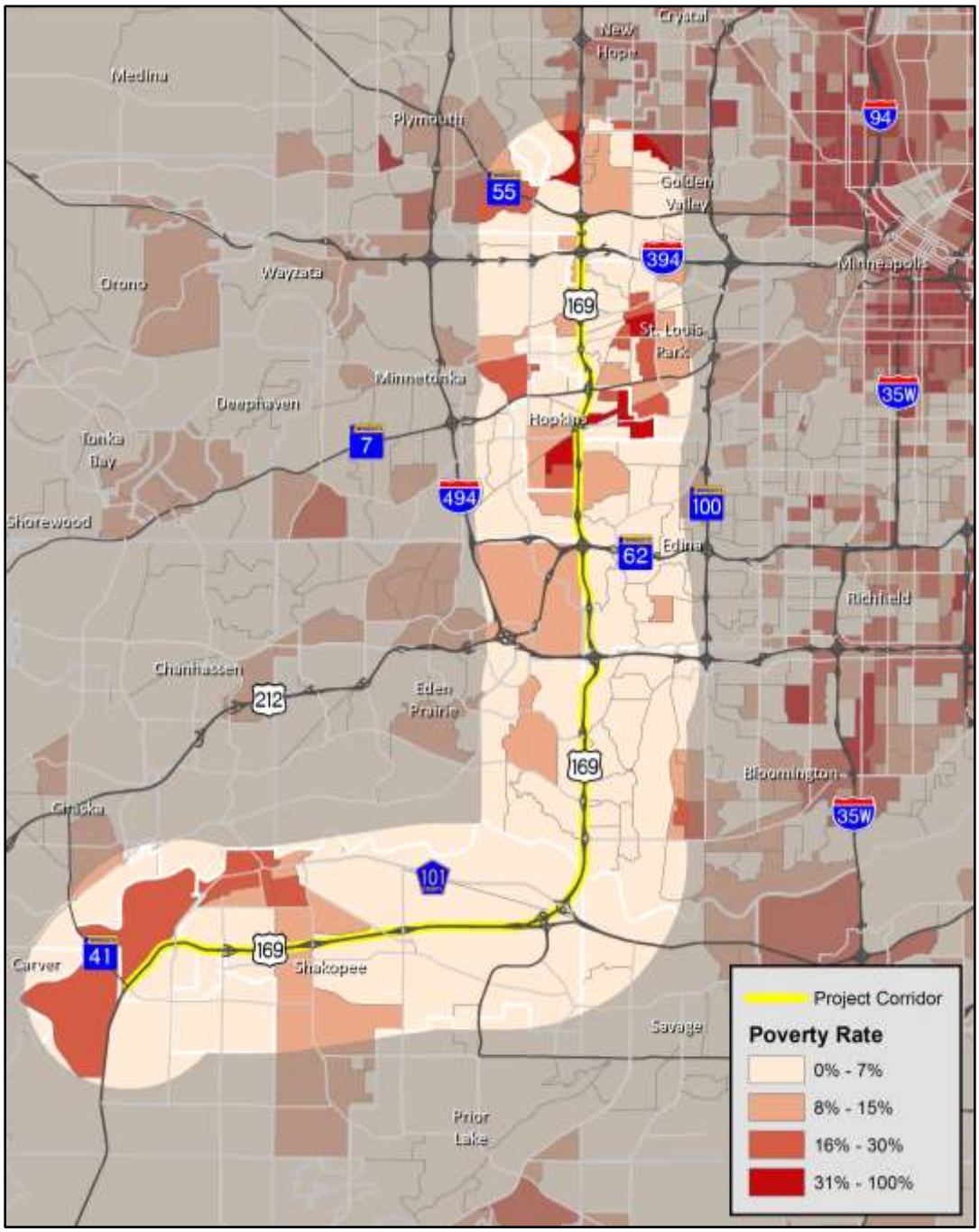


Figure 7: Median Household Incomes in the Highway 169 Corridor



The corridor is economically diverse. Median household income by block group in the Corridor ranges from over $135,000 to below $30,000. The City of Savage and City of Edina have some of the highest median incomes where Hopkins, Plymouth, and St. Louis Park have some of the lowest median incomes. This coincides with the poverty rate where the City of Hopkins is the highest at 16.1 percent followed by the City of Plymouth at 12.1 percent. The City of Savage has the lowest poverty rate at less than two percent.

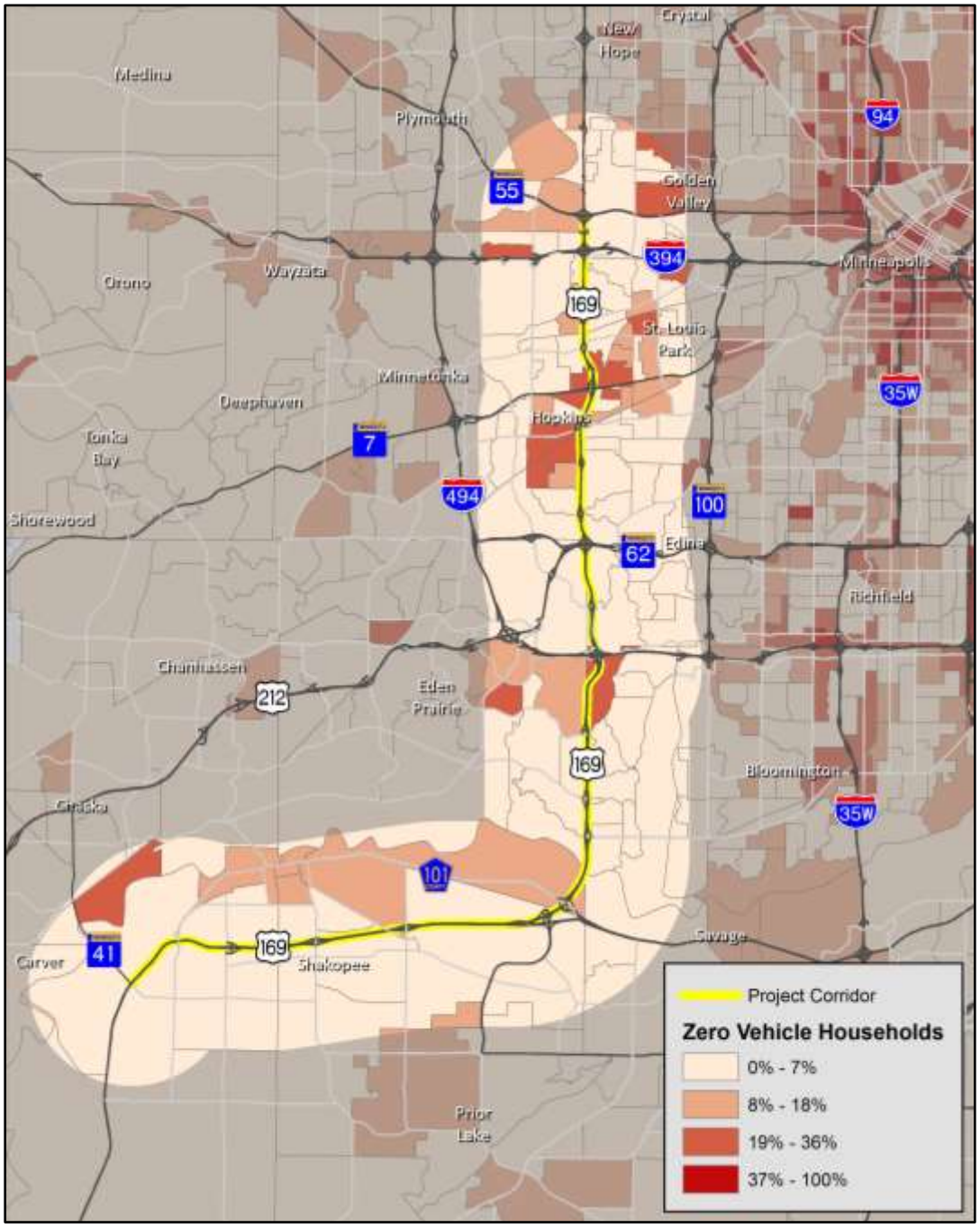
Figure 8: Poverty Rates in the Highway 169 Corridor



Most households in the corridor have at least one vehicle per household. In the corridor 5.7 percent of households do not have access to a vehicle (zero-vehicle households). Hopkins has the highest percentage of zero-vehicle households at 14.5 percent, whereas less than one percent of Savage's households have no cars. Zero-vehicle households are concentrated in areas of poverty and correlate to areas with more transit options. Block groups with higher than the corridor average for zero-vehicle households are found in St. Louis Park, Hopkins, Golden Valley, Bloomington, and Eden Prairie. However, among the corridor cities only

Hopkins has a higher percentage of zero vehicle households than the regional average of 8.2 percent.

Figure 9: Zero-Vehicle Households in the Highway 169 Corridor



Existing Conditions

Transit

Transit Infrastructure

Existing transit infrastructure along the Highway 169, I-394, and Highway 55 corridors is shown in Figure 10. This infrastructure includes facilities which provide a travel time advantage to transit vehicles, as well as park-and-ride surface parking lots and ramps. Each of these infrastructure components in the study area is described in additional detail below.

Transit Advantages

There are multiple types of transit advantages throughout the Highway 169 study area, as well as on Highway 55 and I-394 between Highway 169 and downtown Minneapolis. This infrastructure includes the MnPASS Express Lanes on I-394, bus-only shoulder lanes, and ramp meter bypasses.

MnPASS

The I-394 MnPASS lane extends from I-494 to downtown Minneapolis and has two distinct segments. The segment between Highway 169 and Highway 100 is an at-grade center lane in each direction intended for use by transit vehicles, high-occupancy vehicles (HOVs) with two or more passengers, and single-occupancy vehicles choosing to pay the posted fee via an electronic fee system. East of Highway 100 to downtown Minneapolis, the MnPASS facility transitions to two reversible lanes that are separated by jersey barriers and grade differences from the general purpose lanes. There is currently no connection from Highway 169 directly into the I-394 MnPASS lane.

Ramp Meter Bypasses

Throughout the corridors, there are 12 ramp meter bypasses where HOVs and transit vehicles can bypass other vehicles waiting at ramp meters to efficiently enter the highway. Ramp meter bypasses are operational at the following locations:

Entering Northbound Highway 169	Entering Eastbound I-394	Entering Westbound I-394	Entering Eastbound I-494	Entering Westbound I-494
Bren Road Excelsior Boulevard Eastbound Highway 62/Highway 212 Westbound I-394	Northbound Highway 169 General Mills Boulevard Louisiana Avenue	Louisiana Avenue	Northbound Highway 169 Southbound Highway 169	Northbound Highway 169 Southbound Highway 169

Figure 10: Existing Transit Infrastructure

Bus-Only Shoulders

As shown in Figure 10 Bus-only shoulders are located on both sides of Highway 169 throughout most of the corridor, with the exception of four segments: Londonderry Road/Bren Road to 5th Street/Lincoln Drive, I-494 to Anderson Lakes Parkway, the Minnesota River to Highway 101, and southwest of Old Brick Yard Road (County Highway 69) in Shakopee. A bus-only shoulder is also located on eastbound I-394 between Xenia Avenue and Highway 100 where the standard MnPASS lane terminates and the reversible MnPASS lane begins.

Park-and-Rides

The park-and-ride usage and home location data used in this report is from Metro Transit's *2015 Annual Regional Park-and-Ride System Report*. Park-and-ride usage is tracked through a collaborative effort between the state, county, and other regional agencies. Together these agencies counted and recorded license plate data for vehicles parked at every park-and-ride and park-and-pool serving the Twin Cities metropolitan area. Usage data was collected one time for each facility within the following dates:

- Tuesday, September 29–Thursday, October 1, 2014
- Tuesday, October 6–Thursday, October 8, 2014

Metro Transit then obtained user origin data from the Minnesota Driver and Vehicle Services (DVS) and the Wisconsin Department of Transportation databases to acquire vehicle registrants' street address, city/township, and zip code. Upon completion of address acquisition, Metro Transit staff geocoded the home origins of approximately 16,100 system users. Geocoding allows for a visual display of user origin distribution while protecting individual privacy throughout the system.

There are eight park-and-ride facilities adjacent to Highway 169. Additionally, there are three facilities on I-394 between Highway 169 and downtown Minneapolis and two facilities on Highway 55 between the same endpoints. An inventory of these 11 park-and-ride facilities including the number of parking spaces (capacity), usage, and adjacent highway, is listed in Table 2. Also included is an inventory of park-and-rides that, while not located on the Highway 169 corridor, are served by routes that travel on Highway 169.

Table 2: Highway 169, Highway 55, and I-394 Park-and-Ride 2015 Usage

Park-and-Ride Facility	Park-and-Ride Usage		
	Usage	Capacity	% Used
Highway 169			
Marschall Road	50	442	11%
Seagate Technology	4	82	5%
Southbridge Crossing	206	513	40%
Eagle Creek Transit Center	72	563	13%
Preserve Village Mall	17	50	34%
Hopkins Transit Center	37	52	71%
Cub Foods – Plymouth (Nathan Lane)	31	120	26%
Westwood Lutheran Church	9	40	23%
I-394			
General Mills	105	123	85%
Louisiana Avenue Transit Center	328	330	99%
Park Place	35	55	64%
Highway 55			
Highway 100 and Duluth Street	70	50	140%
Station 73 (Highway 55 and County Road 73)	150	288	52%
Other Park-and-Rides with Routes that Travel on Highway 169			
Highway 7 and Texas Avenue	4	10	40%
Excelsior City Hall	11	20	55%
Highway 7 and Vine Hill Road	3	27	11%
Minnetonka Boulevard and Steele Street	6	25	24%
Minnetonka Boulevard and Baker Road	13	16	81%

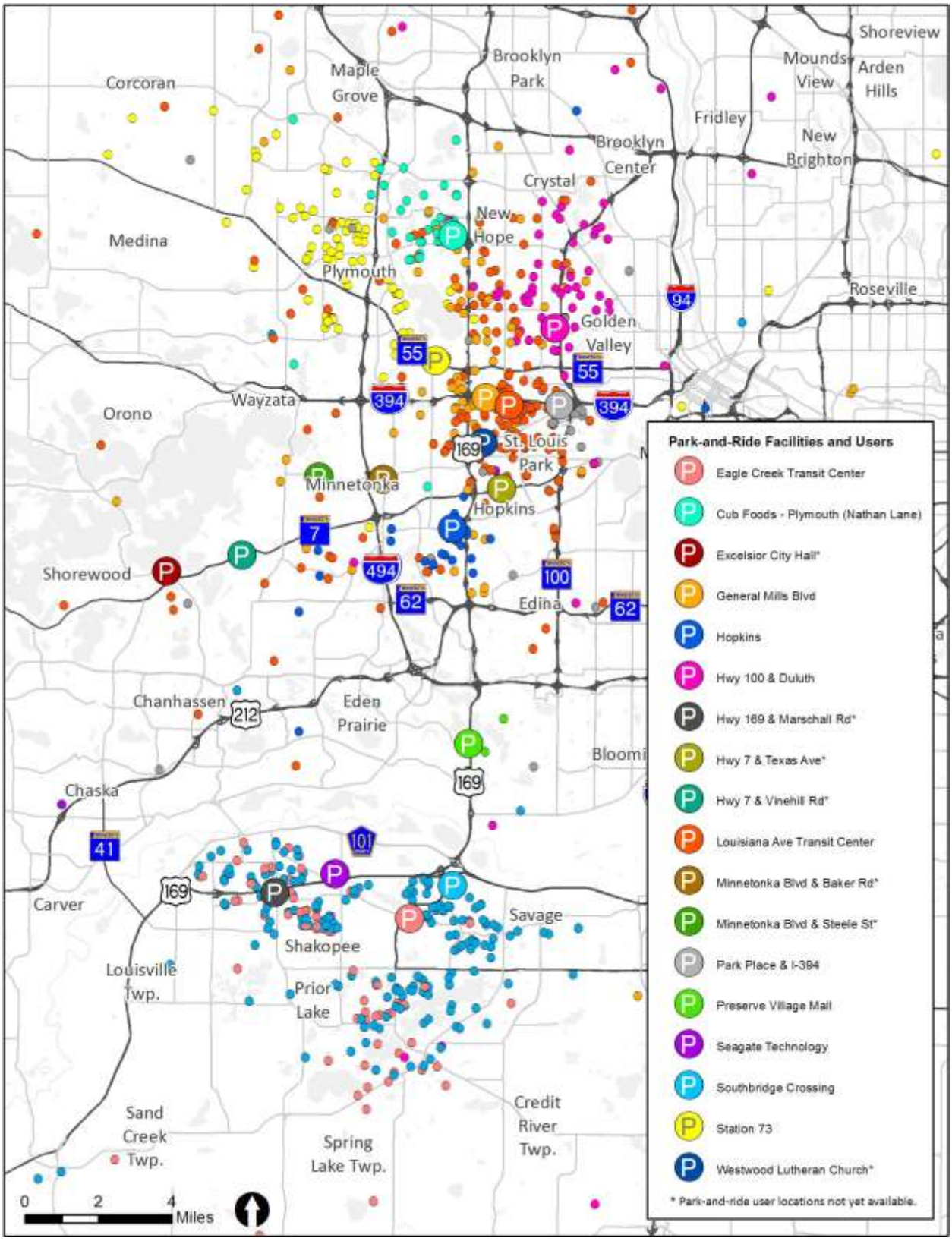
Source: Metropolitan Council 2015 Annual Regional Park-and-Ride System Report

The Southbridge Crossing facility and the Eagle Creek Transit Center on Highway 169 in Shakopee have the largest capacity of all of the facilities along the corridors with 513 and 563 parking spaces, respectively. The Louisiana Avenue Transit Center on I-394 in Saint Louis Park has the largest draw of users and operates at 99 percent of capacity.

The park-and-ride facility at Highway 100 and Duluth Street on Highway 55 in Golden Valley is one of the smallest park and rides but has the greatest utilization rate of all facilities on the corridors. Users regularly fill and exceed the capacity of this lot, which was at 140 percent capacity in 2015. This can occur if users park on a street near a facility with no other apparent nearby destinations, use an overflow lot, use a shared parking lot where available park-and-ride spaces are not clearly marked, or use any other non-traditional parking arrangement.

Figure 11 shows the home locations for the park-and-ride users in the service area. This map demonstrates that the park-and-ride users are dispersed throughout the adjacent and nearby communities of the park-and-ride facility, including Plymouth, Golden Valley, Saint Louis Park, Shakopee, Savage, and Prior Lake. Few users travel distances over ten miles to reach a park-and-ride in the study area.

Figure 11: Park-and-Ride User Home Locations



Transit-Supportive Development Patterns

There are some conditions in the corridor cities that make it difficult to provide all-day regular-route transit service:

- Development patterns are lower density and destinations are spread out, so bus stops are less likely to be convenient for pedestrians to access many destinations.
- Even in concentrated areas there are few safe and efficient pedestrian connections between potential station locations and nearby destinations; these connections are typically addressed through local infrastructure investments.
- Development patterns in some parts of the corridor are homogenous, generating more homogeneous types of trips and concentrating demand at key destinations and at specific times.
- Street networks are often circuitous and disconnected making transit routing inefficient, reducing the area and destinations served by a single transit stop, and compromising the potential to serve additional destinations through connecting bus service.
- Parking is usually free and abundant, which reduces the attractiveness of transit.

As shown in the following section, transit service in the corridor is generally express bus service used by riders who park in the corridor and ride to their destination in downtown Minneapolis. While transit-friendly development patterns and bicycle and pedestrian connections support express bus service, they are essential to attracting riders to all-day regular-route and station-to-station service.

The range of potential development changes and actions that can be taken in tandem with transit investments has the potential to improve non-automobile access to jobs and destinations for both residents and employees in the corridor. Planning, infrastructure investments, and new development patterns can make transit service viable in communities with many of the barriers listed above. This will require a coordinated effort by the cities, counties, MnDOT, and transit providers beyond just the scope of this study and subsequent project recommendations.

Transit Providers and Service

Four transit providers operate fixed-route bus service through the Highway 169 corridor, as well as on I-394 and Highway 55 between Highway 169 and downtown Minneapolis. Existing bus service is express service that operates mainly between suburban park-and-ride locations and downtown Minneapolis with few local stops. Bus routes in the corridor generally route from suburban locations to downtown Minneapolis in the morning peak period, and from downtown Minneapolis to the suburbs in the evening peak period. As shown in Table 3, there are few reverse commute trips, there is very little mid-day service, and there is no service on nights or weekends on the transit routes operating in the corridors.

Additional information about the transit providers – Metro Transit, SouthWest Transit, Plymouth Metrolink, and Minnesota Valley Transit Authority - is included below. A summary of the existing transit service and providers on Highway 169, Highway 55, and I-394 is included in Table 3. Transit routes by provider are displayed in Figure 12. Figure 12 also includes bus routes that cross Highway 169 or operate immediately adjacent to the Highway, which are further described in Table 4.

Mystic Lake Casino and Land to Air Express also operate shuttle service in the study area, as described below.

Metropolitan Council/Metro Transit

Metro Transit serves as a transportation resource for the Twin Cities, offering an integrated network of buses, light rail, and commuter trains as well as resources for those who carpool, vanpool, walk or bike. Metro Transit is an operating division of the Metropolitan Council. The Metropolitan Council also provides fixed-route and dial-a-ride transit services with private contractors. Together, they provide fixed route transit service in the study area on 18 express and suburban local bus routes.

SouthWest Transit

SouthWest Transit is the transit agency serving the communities of Carver, Chaska, Chanhassen, and Eden Prairie. SouthWest Transit provides express bus service connecting these communities with downtown Minneapolis, and provides service connecting suburban communities. SouthWest Transit operates five express and suburban local routes in the project study area.

Plymouth Metrolink

Plymouth Metrolink is the public transit agency for the City of Plymouth. Plymouth Metrolink provides express bus service connecting Plymouth to downtown Minneapolis, including reverse-commute service. In the project study area, Plymouth Metrolink operates five express and local bus routes.

MVTA

The Minnesota Valley Transit Authority (MVTA) is the public transportation agency for seven suburban communities located approximately 15 miles south of Minneapolis and St. Paul: Savage, Prior Lake, and Shakopee in Scott County and Apple Valley, Burnsville, Eagan, and Rosemount in Dakota County. In the study area, MVTA operates three bus routes, including suburban circulator service and express service.

Table 3: Regular Route Transit Service Characteristics

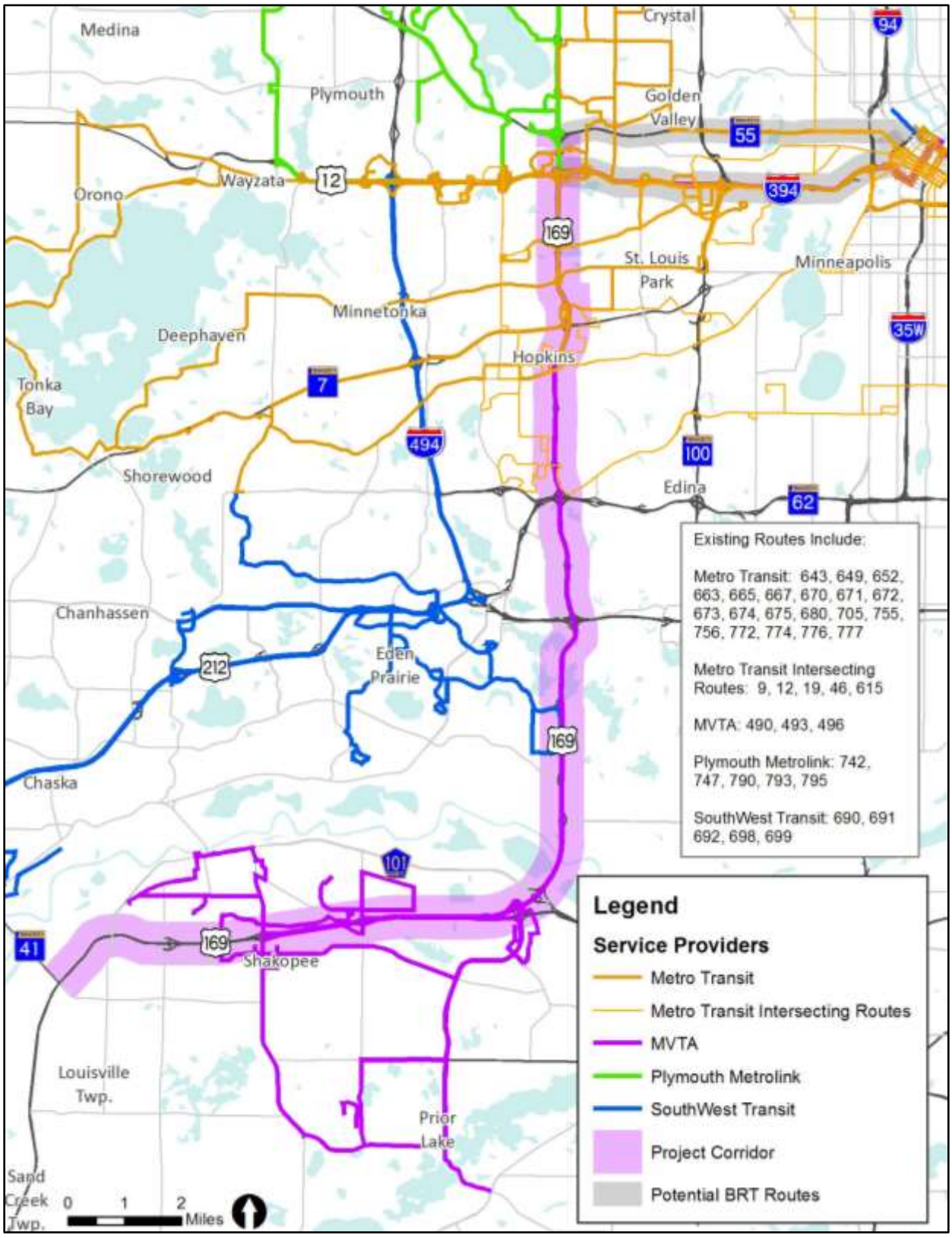
Route	Provider	Span of Service	Frequency (minutes) (Peak/Mid/Eve)	Number of Trips	Study Area Corridors Used
490	MVTA	5:37AM – 7:21PM	10-20 / 0 / 0	AM: 10 PM: 11	Highway 169 I-394
493	MVTA	5:41 AM - 6:38 PM	25-50 / 0 / 0	AM: 4 PM: 4	Highway 169 I-394
496	MVTA	5:40 AM - 6:42 PM	60 / 60 / 60	AM: 13 PM: 12	Highway 169
643	Metro Transit	6:02 AM - 6:37 PM	30 / 0 / 0	AM: 5 PM: 5	I-394
649	Metro Transit	6:13 AM - 6:44 PM	30 / 0 / 0	AM: 9 PM: 10	I-394
652	Metro Transit	6:53AM – 6:25PM	10-60 / 0 / 0	AM: 4 PM: 5	I-394
663	Metro Transit	6:17AM – 6:46PM	15-30 / 0 / 0	AM: 8 PM: 8	I-394
667	Metro Transit	5:29AM – 6:49PM	10-60 / 0 / 0	AM: 12 PM: 9	Highway 169 I-394
670	Metro Transit	6:12AM – 6:16PM	30 / 0 / 0	AM: 3 PM: 3	Highway 169 I-394
671	Metro Transit	6:19AM – 6:08PM	25-35 / 0 / 0	AM: 3 PM: 3	Highway 169 I-394
672	Metro Transit	6:06AM – 6:42PM	15-60 / 0 / 0	AM: 9 PM: 10	I-394
673	Metro Transit	5:53AM – 6:53PM	10-30 / 0 / 0	AM: 16 PM: 12	I-394
674	Metro Transit	6:15AM – 6:15PM	25-35 / 0 / 0	AM: 3 PM: 3	I-394
675	Metro Transit	4:57AM – 10:59PM	30-60 / 30-60 / 60	AM: 30 PM: 34	I-394
690	Southwest Transit	6:04AM – 7:27PM	5-15 / 0 / 0	AM: 24 PM: 22	I-394
691	Southwest Transit	5:15AM – 6:16AM	0 / 0 / 0	AM: 1 PM: 0	I-394

Route	Provider	Span of Service	Frequency (minutes) (Peak/Mid/Eve)	Number of Trips	Study Area Corridors Used
692	Southwest Transit	6:30AM – 6:07PM	15-25 / 0 / 0	AM: 4 PM: 5	I-394
698	Southwest Transit	5:36AM – 10:39PM	30-60 / 60 / 30-60	AM: 13 PM: 20	I-394
699	Southwest Transit	5:55AM – 6:41PM	10-20 / 0 / 0	AM: 11 PM: 11	I-394
705	Metro Transit	5:10 AM - 9:19 PM	60 / 60 / 60	AM: 14 PM: 17	Highway 169 I-394
742	Plymouth Metrolink	5:46AM – 7:00PM	45-60 / 0 / 0	AM: 3 PM: 4	Highway 169 I-394
747	Plymouth Metrolink	5:11AM – 6:10PM	25-30 / 0 / 0	AM: 8 PM: 9	I-394
755	Metro Transit	5:05 AM - 6:58 PM	30 / 0 / 0	AM: 12 PM: 13	Highway 169 Highway 55
756	Metro Transit	6:37AM – 5:49PM	25-35 / 0 / 0	AM: 3 PM: 3	Highway 169 I-394
772	Metro Transit	5:57AM – 6:31PM	20-30 / 0 / 0	AM: 6 PM: 5	I-394
774	Metro Transit	6:09PM -7:41PM	60 / 0 / 0	AM: 0 PM: 2	I-394
776	Metro Transit	5:25AM –6:58PM	15-30 / 0 / 0	AM: 7 PM: 7	I-394
777	Metro Transit	5:43AM – 6:48PM	25-30 / 0 / 0	AM:5 PM:5	I-394
790	Plymouth Metrolink	5:43AM – 6:38PM	15-20 / 0 / 0	AM: 8 PM: 8	Highway 169 I-394
793	Plymouth Metrolink	6:29AM – 7:49PM	30-60 / 0 / 0	AM: 2 PM: 4	Highway 169 I-394
795	Plymouth Metrolink	12:11 PM- 2:58PM	0 / 120 / 0	AM: 0 PM: 2	I-394

Table 4: Transit Routes that Cross Highway 169 or Operate Adjacent to the Corridor

Route	Provider	Span of Service	Frequency (minutes) (Peak/Mid/Eve)	Number of Trips	General Route in the Corridor
9	Metro Transit	5:15AM – 1:40AM	15-20 / 30 / 30	45 in each direction	Cedar Lake Road; terminates at CR 73
12	Metro Transit	5:01AM – 12:37AM	15-20 / 30 / 30	24 in each direction	Excelsior Blvd, Hopkins Main Street; terminates at Opportunity Partners
19	Metro Transit	2:30AM – 1:00AM	8-15 / 15 / 15-20	105 in each direction	Highway 55 in Minneapolis
46	Metro Transit	5:10AM – 10:48PM	15-30 / 30 / 30-60	41 in each direction	Lincoln Drive, Smetana Road; terminates at Opportunity Partners
615	Metro Transit	6:51AM – 7:43PM	60 / 60 / 60	12 in each direction	2nd St NE, Hopkins Main Street; terminates at Ridgedale

Figure 12: Existing Public Transit Routes by Provider



Mystic Lake Casino

Mystic Lake Casino offers free shuttle service to adults ages 18 and older with a valid driver's license or state identification card. The Casino operates 12 shuttle routes from various locations throughout the Twin Cities, as well as from St. Cloud, Rochester, New Ulm and their surrounding areas, as described in Table 5. All routes terminate at Mystic Lake Casino Hotel in Prior Lake.

Table 5: Mystic Lake Casino Shuttle Routes

Shuttle Route	Locations Served	Frequency and Span of Service
1	Brooklyn Center, Robbinsdale, New Hope, Golden Valley, St. Louis Park, Richfield, Bloomington	One round trip daily
2	Shoreview, Roseville, Falcon Heights, Minneapolis	Two round trips daily: morning and evening
3	Brooklyn Park, Brooklyn Center, Minneapolis, Hopkins	Two round trips daily: morning and evening
4	St. Paul, South St. Paul, West St. Paul, Eagan, Burnsville, Apple Valley	Two round trips daily: morning and evening
5	Anoka, Blaine, Spring Lake Park, Fridley, Columbia Heights, Minneapolis	Two round trips daily: morning and evening
6	Maplewood, Little Canada, St. Paul	Two round trips daily: morning and evening
7	Minneapolis, Bloomington	Two round trips daily: morning and evening
8A	New Ulm, Nicollet, North Mankato, St. Peter, Le Sueur, Belle Plaine	One round trip daily
8C	Rochester, Zumbrota, Faribault, Montgomery, New Prague	One round trip daily
8D	Cold Spring, Waite Park, St. Cloud, Monticello, Buffalo, Rockford, Plymouth	One round trip daily
8E	St. Cloud, Monticello, Buffalo, Rockford, Plymouth	One round trip daily
9	Waseca, Owatonna, Faribault, Northfield, New Prague	One round trip daily

Land to Air Express

Land to Air Express offers shuttle service between Mankato and St. Peter and the Minneapolis-St. Paul Airport and downtown Minneapolis. Land to Air operates six route trips on weekdays and three roundtrips on weekends.

Highway Operations

Physical Characteristics

Physical characteristics of Highway 169 were reviewed to identify potential obstacles to implement changes to the corridor and guide the screening of alternatives considered. The Highway 169 corridor varies in its design, width, and configuration throughout the study area. The text that follows is a brief summary of the physical characteristics for the corridor.

Highway 169

The Highway 169 corridor is generally four lanes wide (two in each direction); however, there are multiple locations where the corridor varies from this typical cross section. Extra lanes (referred to as auxiliary lanes) exist near interchanges, shoulder widths vary between four and twelve feet, and shoulders transition from an urban to a rural cross section without curb and gutter south of Bren Road. Furthermore, a six lane bridge crossing the Minnesota River is one of the main connections between Scott County and the rest of the metro area. Interchange spacing in most of the Highway 169 corridor is not consistent with MnDOT freeway spacing guidelines. Within the I-494/I-694 beltway, interchange spacing is recommended to be greater than one mile; outside the beltway spacing is recommended at two miles or more. Between Highway 62 and Highway 55 interchange spacing on Highway 169 ranges from quarter of a mile to one mile, much closer together than the guidelines recommend.

Between Marschall Road and Bren Road, Highway 169 is divided primarily by a grassy median with cable barriers. Between Highway 62/Highway 212 and Highway 7 and between Minnetonka Boulevard and Highway 55, Highway 169 has a concrete median barrier.

Geometric and right-of-way (ROW) constraints vary throughout the corridor. The areas that are most constrained have narrow shoulders (under six feet) and retaining walls to allow for frontage roads and interchange ramps.

Traffic Characteristics

The Highway 169 corridor carries commuter-oriented traffic from southwestern Twin Cities suburban communities to major employment centers in and near downtown Minneapolis, commercial and industrial areas along Highway 169; and jobs at Eden Prairie Center. This results in greater volumes of traffic in the northbound direction during the a.m. peak period and in the southbound direction during the p.m. peak period. Reverse commuters travel in the opposite direction to employment centers in Scott County. In addition, as one of the major north-south connectors across the Minnesota River in the region, Highway 169 connects Scott County to region-wide destinations via major highways including I-494, Highway 62, Highway 7, I-394 and Highway 55.

Highway 169 is also the primary route from much of the metro area to recreational attractions in Scott County including Mystic Lake Casino, Valley Fair, the Renaissance Festival, and Canterbury Park. This results in distinct weekend and seasonal travel patterns.

This section describes several indicators of travel patterns on Highway 169:

- Directional split: the percentage of total traffic traveling in a given direction at a given time
- Peak-hour percent of daily traffic: a measure of traffic volume during peak periods in relation to volumes during the rest of the day
- Volumes approaching capacity: the volume to capacity ratio indicates locations where the highway is nearly full, and may not be able to accommodate additional peak period demand without creating delay for users
- Duration of peak period congestion: the duration of peak period congestion allows for comparison between minor, moderate, and severe congestion in various locations during the peak periods
- Time of peak hour traffic flow/onset of congestion: peak hour traffic flow provides an indication of when congestion begins and, in turn, when MnPASS operations would be warranted and most valuable
- Freight traffic: the percentage of overall traffic comprised of heavy commercial vehicles

Directional Split

A highway's directional split describes the percentage of total traffic traveling in a given direction. In a mature corridor surrounded by diverse and established land uses and relatively dense development patterns, highways tend to be used nearly evenly in both directions throughout the day, referred to as a 50/50 directional split. This describes Highway 169 between Highways 55 and 62. South of Highway 62, Highway 169 is has a predominate direction of travel: northbound in the morning peak period and southbound in the evening peak period. Table 6 and Table 7 show that north of Highway 62, directional splits on Highway 169 hover around 50 percent in each direction during both the a.m. and p.m. peak periods, while directional splits south of Highway 62 are more disparate, with a greater percentage of traffic traveling northbound in the morning and southbound in the evening peak period.

Table 6: Traffic Characteristics – A.M. Peak Directional Split

	CSAH 69 to Canterbury Road	Canterbury Road to Highway 101	Highway 101 to Old Shakopee Road	Old Shakopee Road to I-494
NB Highway 169	66	69	64	59
SB Highway 169	34	31	36	41
	I-494 to Highway 62	Highway 62 to Excelsior Boulevard	Excelsior Boulevard to I-394	I-394 to Highway 55

NB Highway 169	60	50	48	55
SB Highway 169	40	50	52	45

Table 7: Traffic Characteristics – P.M. Peak Directional Split

	CSAH 69 to Canterbury Road	Canterbury Road to Highway 101	Highway 101 to Old Shakopee Road	Old Shakopee Road to I-494
NB Highway 169	33	38	36	36
SB Highway 169	67	62	64	64
	I-494 to Highway 62	Highway 62 to Excelsior Boulevard	Excelsior Boulevard to I-394	I-394 to Highway 55
NB Highway 169	39	47	44	54
SB Highway 169	61	53	56	46

Peak-Hour Percent of Daily Traffic

Like the directional split indicator, peak-hour percent of daily traffic provides information about the character of a corridor. In a mature corridor that is fully developed with a diversity of land uses, like Highway 169 between Highways 62 and 55, highways are busy in both directions all day. Traffic during the peak periods may be heaviest, but is not that much heavier than during non-peak times. Peak-hour percentage of daily traffic tends to be higher in developing corridors that have less diversity of land use, like Highway 169 south of Highway 62, because these corridors tend to have more residential land use that generates commuter trips during the peak periods.

In less developed corridors the highway itself is less constrained and has less congestion, which allows people to drive during the peak periods. In mature, congested corridors, drivers often start their trips early or leave later in the morning or evening in order to avoid the worst congestion. This spreads out the peak period and makes it more likely that the hour of the day that sees the most traffic won't be much greater than other times.

For the analysis of the percent of daily traffic that occurs during peak hours, Highway 169 was divided into two segments.

- South of Highway 62: This segment functions as a commuter corridor and peak-hour percent of daily traffic ranges from nine to 11 percent in the peak direction (northbound in the a.m.) and five to seven percent in the non-peak direction (southbound in the a.m.).

- Between Highways 62 and 55: This segment of Highway 169 has high use throughout the day, and ranges from seven to nine percent in both directions in both the a.m. and p.m. peak hours.

A summary of peak hour traffic, expressed as a percentage of daily traffic is shown in Table 8. The first value in each cell represents the percentage of a.m. peak traffic, and the value in parenthesis (#) represents the p.m. peak percentage.

Table 8: Traffic Characteristics – Peak Hour Percentage of Daily Traffic – A.M./(P.M.) Peaks

	CSAH 69 to Canterbury Road	Canterbury Road to Highway 101	Highway 101 to Old Shakopee Road	Old Shakopee Road to I-494
NB Highway 169	11 (5)	10 (5)	10 (6)	8 (6)
SB Highway 169	6 (10)	5 (9)	5 (10)	5 (9)
	I-494 to Highway 62	Highway 62 to Excelsior Boulevard	Excelsior Boulevard to I-394	I-394 to Highway 55
NB Highway 169	10 (6)	9 (7)	8 (7)	7 (7)
SB Highway 169	7 (9)	8 (8)	8 (7)	6 (6)

Volumes Approaching Capacity

Volume refers to the number of vehicles using a roadway; capacity refers to how many vehicles a roadway can hold in a given location. The volume to capacity ratio indicates locations where the highway is nearly full, and may not be able to accommodate additional peak period demand without creating delay for users.

The capacity of a freeway is 2,000 vehicles per lane per hour. Traffic volumes approach and exceed this threshold in several locations on Highway 169 during both the morning and evening peak periods. As shown in Table 9, a.m. peak period traffic volumes are more than 80 percent of capacity at the following locations:

- Northbound Highway 169 between Canterbury Road and Old Shakopee Road
- Northbound Highway 169 between Pioneer Trail and I-494
- Northbound Highway 169 between Bren Road and Lincoln Drive
- Northbound Highway 169 between Highway 7 and W. 36th Street
- Northbound Highway 169 between Cedar Lake Road and 16th Street
- Northbound Highway 169 between I-394 and Betty Crocker Drive
- Southbound Highway 169 between I-394 and Cedar Lake Road

In the a.m. peak period, volumes exceed capacity on:

- Southbound Highway 169 between Lincoln Drive and Bren Road

Table 9: Traffic Characteristics – A.M. Peak Volumes Approaching Capacity (Volume/Capacity)

	CSAH 69 to Canterbury Road	Canterbury Road to Highway 101	Highway 101 to Old Shakopee Road	Old Shakopee Road to I-494
NB Highway 169	.67	.86	.82	.99
SB Highway 169	.30	.45	.47	.61
	I-494 to Highway 62	Highway 62 to Excelsior Boulevard	Excelsior Boulevard to I-394	I-394 to Highway 55
NB Highway 169	.70	.92	.95	.82
SB Highway 169	.59	1.03	.92	.59

These locations correspond to congestion produced at bottlenecks observed on MnDOT's 2014 *Congestion Maps*.

In the p.m. peak period, volumes are over 80 percent of capacity on:

- Northbound Highway 169 between Bren Road and Lincoln Drive
- Southbound Highway 169 between Lincoln Drive and Highway 62
- Southbound Highway 169 between Pioneer Trail and CSAH 101
- Southbound Highway 169 between CSAH 101 and Canterbury Road

In the p.m. peak period, volumes exceed capacity on:

- Southbound Highway 169 between I-394 and Cedar Lake Road
- Southbound Highway 169 between Anderson Lakes Pkwy and Pioneer Trail

Table 10: Traffic Characteristics – P.M. Peak Volumes Approaching Capacity (Volume/Capacity)

	CSAH 69 to Canterbury Road	Canterbury Road to Highway 101	Highway 101 to Old Shakopee Road	Old Shakopee Road to I-494
NB Highway 169	.27	.44	.47	.65
SB Highway 169	.61	.83	.86	1.09
	I-494 to Highway 62	Highway 62 to Excelsior Boulevard	Excelsior Boulevard to I-394	I-394 to Highway 55
NB Highway 169	.53	.86	.75	.69
SB Highway 169	.72	.89	1.00	.61

These locations correspond to congestion produced at bottlenecks observed on MnDOT's year *2014 Congestion Maps*.

Duration of Peak Period Congestion

When congestion occurs, fewer cars can get through and drivers experience delay. Congestion is something to be avoided, as it results in lost productivity and increased costs to drivers in time lost, fuel consumed, and stress. Measuring the duration of peak period congestion allows for comparison between minor, moderate, and severe congestion in various locations during the peak periods.

The duration of peak period traffic congestion varies throughout the corridor. In the a.m. peak period, northbound congestion is observed between Highway 101 and I-394 for one to three hours. In the southbound direction, congestion extends from north of Highway 55 to Excelsior Boulevard and lasts for one to two hours.

Traffic congestion in the p.m. peak hour is much greater. On northbound Highway 169, congestion extends from Cedar Lake Road to Highway 55 for more than three hours, and from Highway 62 to Cedar Lake Road for one to two hours. Southbound Highway 169 congestion also occurs for two to three hours between I-494 and south of Old Shakopee Road. Southbound Highway 169 is also congested between Highway 55 and I-394 for one to two hours during the p.m. peak.

Table 11: Traffic Characteristics – Duration of Congested Conditions During A.M. Peak

	CSAH 69 to Canterbury Road	Canterbury Road to Highway 101	Highway 101 to Old Shakopee Road	Old Shakopee Road to I-494
NB Highway 169	-	-	2-3 hours	1-2 hours
SB Highway 169	-	-	-	-
	I-494 to Highway 62	Highway 62 to Excelsior Boulevard	Excelsior Boulevard to I-394	I-394 to Highway 55
NB Highway 169	< 1 hour	< 1 hour	1-2 hours	-
SB Highway 169	-	-	1-2 hours	1-2 hours

Table 12: Traffic Characteristics – Duration of Congested Conditions During P.M. Peak

	CSAH 69 to Canterbury Road	Canterbury Road to Highway 101	Highway 101 to Old Shakopee Road	Old Shakopee Road to I-494
NB Highway 169	-	-	-	-
SB Highway 169	-	-	< 1 hour	2-3 hours
	I-494 to Highway 62	Highway 62 to Excelsior Boulevard	Excelsior Boulevard to I-394	I-394 to Highway 55
NB Highway 169	< 1 hour	1-2 hours	> 3 hours	> 3 hours

	CSAH 69 to Canterbury Road	Canterbury Road to Highway 101	Highway 101 to Old Shakopee Road	Old Shakopee Road to I-494
SB Highway 169	-	-	1-2 hours	1-2 hours

Time of Peak Hour Traffic Flow/Onset of Congestion

The time of the peak hour traffic flow provides an indication of when congestion begins and, in turn, when MnPASS operations would be warranted and most valuable. For example, if there is no congestion in the general purpose lanes, there is no reason to operate the MnPASS lane as a managed lane. As congestion begins in the general purpose lanes, the MnPASS lane provides a transit advantage and travel time reliability to users.

Due to the length of the corridor, the time of the highest hour of volumes in each peak (peak hour traffic flow) varies by location.

The a.m. peak hour starts between 6:15 a.m. and 7:15 a.m. on Highway 169. Earlier peak hours (6:15/6:30 a.m.) were observed in both northbound and southbound directions near I-394 and south of Old Shakopee Road, with later peaks (7:00/7:15 a.m.) happening between I-494 and I-394. The beginning of the peak hour across the study area network was observed to be 7:00 a.m., on average, based on detector-recorded traffic volumes.

During the p.m. peak period, a similar trend exists on the corridor, but the variance of the start of the peak hour is much greater. Near the center of the study area near Bren Road, the peak hour is observed to start at 4:00 p.m., while the north and south ends of the study corridors experience peak traffic between 2:15 p.m. and 3:15 p.m.

The p.m. peak hour has greater variability throughout the study area. This variation was attributed to a greater variety of trip purposes, volumes approaching capacity, and longer duration of peak traffic demand in the afternoon.

Table 13: Traffic Characteristics – A.M. Peak Hour Start Time

	CSAH 69 to Canterbury Road	Canterbury Road to Highway 101	Highway 101 to Old Shakopee Road	Old Shakopee Road to I-494
NB Highway 169	6:15	6:15	6:15	6:15
SB Highway 169	6:30	6:30	6:45	7:00
	I-494 to Highway 62	Highway 62 to Excelsior Boulevard	Excelsior Boulevard to I-394	I-394 to Highway 55
NB Highway 169	6:45	6:45	6:45	7:15
SB Highway 169	7:15	7:15	6:45	6:15

Table 14: Traffic Characteristics – P.M. Peak Hour Start Time

	CSAH 69 to Canterbury Road	Canterbury Road to Highway 101	Highway 101 to Old Shakopee Road	Old Shakopee Road to I-494
NB Highway 169	4:15	4:15	4:15	4:00
SB Highway 169	3:00	3:00	3:00	3:00
	I-494 to Highway 62	Highway 62 to Excelsior Boulevard	Excelsior Boulevard to I-394	I-394 to Highway 55
NB Highway 169	3:45	3:45	3:00	2:15
SB Highway 169	3:30	3:45	3:45	3:00

Freight Traffic

To better understand use of Highway 169 by freight carriers, heavy commercial traffic counts were reviewed for the study area. Heavy commercial traffic volumes are from the most recent available data on the MnDOT Traffic Mapping Analysis Tool (Draft 2014). These volumes are summarized in Table 15.

Available data suggests commercial vehicles comprise a significant percentage of traffic on Highway 169, particularly on the segment south of the Minnesota River. Average weekday commercial vehicle volumes along the Highway 169 corridor range from 3,000 to 6,000, while the daily percentage of traffic ranges from 4.5 to 9.7 percent. Between I-494 and Highway 55 the percentage of commercial vehicles ranges from 4.5 to 5.3 percent, while volumes between range from 6.2 to 9.7 percent from I-494 to Marschall Road.

Table 15: Share of Heavy Commercial Volumes on Highway 169

Roadway	Percent Passenger Car Share (volume)	Percent Heavy Commercial Vehicle Share (volume)
CSAH 69 to Canterbury Road	90.3%-92.6% (31,000-46,000)	7.4%–9.7% (3,000-3,400)
Canterbury Road to Highway 101	93.4% (68,000)	6.6% (4,500)
Highway 101 to Old Shakopee Road	93.8% (103,000)	6.2% (6,400)
Old Shakopee Road to I-494	93.4%-93.8% (90,000-97,000)	6.2%-6.6% (5,900-6,000)
I-494 to Highway 62	94.7%-94.8% (64,000-66,000)	5.2%-5.3% (3,300-3,500)
Highway 62 to Excelsior Boulevard	94.9%-95.1% (94,000-98,000)	4.9%-5.1% (4,800)
Excelsior Boulevard to I-394	94.9%-95.0% (97,000-106,000)	5.0%-5.1% (4,900-5,300)

I-394 to Highway 55	94.5%-95.0% (94,000-107,000)	4.5%-5.0% (4,200-5,300)

Congestion Levels and Bottleneck Locations

This analysis provides a detailed look at specific locations in the corridor that might be candidates for spot improvements. Bottlenecks are places where design, volume, or capacity issues cause congestion. Six causes of congestion were identified along the study corridor:

- Entering traffic
- Ramp-to-ramp weaving
- Substandard geometry
- Exit ramp capacity
- Lane drops
- Mainline weaving

These causes of congestion can lead to bottlenecks. Table 16 through

Table 19 list the locations, types, description, severity, and extent of the bottlenecks. Bottleneck locations were identified using a lane assignment technique that helps identify places where lane volume will overwhelm capacity, or capacity is reduced because of weaving movements.

Table 16: Northbound Highway 169 Bottleneck Locations – A.M. Peak

Location	Type/Cause	Description	Severity (Duration)	Extent
Highway 101 to Old Shakopee Road	Mainline Weaving	Entering volume from Highway 101 conflicts with volume exiting to Old Shakopee Road overloading right through lane	2-3 hrs	1.5 mi
Old Shakopee Road to Pioneer Trail	Ramp-to-Ramp Weave	Entering volume from Old Shakopee Road conflicts with volume exiting to Pioneer Trail overloading right through lane	1-2 hrs	0.75 mi
Anderson Lakes Pkwy	Entering Traffic	Entering volume from Anderson Lakes Pkwy conflicts with an overloaded right through lane as vehicles align themselves for the I-494 interchange	< 1 hr	1.75 mi
Lincoln Drive to I-394	Ramp-to-Ramp Weave	Several closely spaced interchanges with high entering and exiting volumes overload the right through lane at weave locations	< 1 hr	4 mi

Table 17: Southbound Highway 169 Bottleneck Locations – A.M. Peak

Location	Type/Cause	Description	Severity (Duration)	Extent
Plymouth Avenue to 16th Street	Ramp-to-Ramp Weave	Entering and exiting volume from I-394 overloads right through lane for both on ramps and for the I-394 eastbound (EB) off ramp	1-2 hrs	2 mi
Minnetonka Boulevard to Cedar Lake Road	Ramp-to-Ramp Weave	Entering volume from Cedar Lake Road conflicts with an overloaded right through lane as traffic is skewed into the right lane because of closely spaced interchanges	< 1 hr	1.5 mi
Cedar Lake Road to Excelsior Boulevard	Ramp-to-Ramp Weave	Over capacity at Highway 7 and the weave between Highway 7 and Excelsior Boulevard causes a higher percent of right lane volume to left lane volume.	< 1 hr	1.5 mi

Table 18: Northbound Highway 169 Bottleneck Locations – P.M. Peak

Location	Type/Cause	Description	Severity (Duration)	Extent
Highway 62 to Bren Road	Entering Volume	Entering volume from Bren Road overloads the right through lane which spills back and effects entering and exiting traffic from Highway 62	1-2 hrs	1mi
Bren Road to Highway 7	Ramp-to-Ramp Weave	High entering volume at Excelsior Boulevard and exiting volume at Highway 7 overloads the right through lane	1-2 hrs	1.5 mi
Highway 7 to Cedar Lake Road	Ramp-to-Ramp Weave	Several closely spaced interchanges with entering and exiting volumes overload the right through lane at weave locations	2-3 hrs	1.5 mi
Cedar Lake Road to Betty Crocker Drive	Entering Volume	High entering volume from I-394 eastbound (EB) and westbound (WB) overload the right through lane	> 3 hrs	1.5 mi
Betty Crocker Drive to Bass Lake Road	Ramp-to-Ramp Weave	Closely-spaced interchange ramps overload the right through lane at weave locations between I-394 and Bass Lake Road	> 3 hrs	6 mi

Table 19: Southbound Highway 169 Bottleneck Locations – P.M. Peak

Location	Type/Cause	Description	Severity (Duration)	Extent
Plymouth Avenue to Minnetonka Boulevard	Ramp-to-Ramp Weave	Right lane is overloaded from entering traffic from Cedar Lake Road and exiting traffic to Minnetonka Boulevard	1-2 hrs	3 mi
I-494 to Anderson Lakes Pkwy	Entering Volume	Entering volume from EB and WB I-494 causes an overloaded right lane approaching the lane drop at Anderson Lakes Pkwy	2-3 hrs	0.5 mi
Anderson Lakes Pkwy to Old Shakopee Road	Over Capacity	2-lane section of roadway at Old Shakopee Road, Pioneer Trail, and Anderson Lakes Pkwy are all over capacity	2-3 hrs	4 mi
Old Shakopee Road to Highway 101	Lane Drop	Exiting volume to Highway 101 and Highway 13 overload the right lane because both exit lanes develop from the right lane.	1-2 hrs	0.5 mi

Travel Time Reliability

Travel time reliability measures the variability in travel time along a segment or corridor. Traffic measures often focus on average congestion, but ignore variability. Travel time reliability is important because the more travel times vary on a given route, the earlier travelers must leave to ensure on-time arrival. A congested but consistent commute is easier to plan for than a less congested but very unreliable commute.

This analysis of Highway 169 focuses on the reliability of a.m. and p.m. peak period travel times. Table 20 and Table 21 below summarize travel time reliability indices for eight segments (four in each direction) along Highway 169 from Highway 55 to CSAH 69. Table 20 includes reliability indices from the a.m. peak period from 6:00 to 9:00 and Table 21 covers the p.m. peak period from 3:00-6:00. Both tables are limited to Tuesday through Thursday to represent typical traffic condition during weekdays (Monday and Friday normally have different traffic patterns). The indices include:

- Planning Time Index (PTI): The PTI compares the 95 percent travel time to the free flow travel time. The 95 percent travel time can be thought of as ones worst commute during a month of commuting (five days per week).
- Average total peak period delay: The total delay of all vehicles during an average peak period, accounting for the severity of delay as well as the number of vehicles experiencing the delay.
- Reliability rating: The percentage of trips which are shorter than 1.25 times the free flow travel time in all conditions, in weather conditions, and in crash conditions.

Travel time and volume data consisted primarily of MnDOT loop detector data with supplemental data from the National Performance Management Research Data Set

(NPMRDS). Crash data came from the Minnesota Crash Mapping Analysis Tool (MnCMAT) and weather data from the National Oceanic and Atmospheric Administration (NOAA). The data was aggregated into 1- minute time intervals and analyzed using tools developed through the Strategic Highway Research Program 2 (SHRP 2).

Table 20: Highway 169 Travel Time Reliability during the a.m. Peak Period (06:00 – 09:00)

SB

PTI	Delay (hr)	RR	Weather RR	Crash RR	Segment	PTI	Delay (hr)	RR	Weather RR	Crash RR
1.72	69	89%	78%	50%	55	1.64	56	89%	72%	38%
1.48	26	91%	78%	47%	Excelsior	*1.80*	*71*	*88%*	*68%*	*14%*
1.05	3	99%	93%	N/A	494	*2.05*	*199*	*54%*	*37%*	*13%*
1.22	16	95%	78%	47%	Old Shakopee	*2.94*	*291*	*53%*	*36%*	*13%*
					CH 69					

NB

Table 21: Highway 169 Travel Time Reliability during the P.M. Peak Period (3:00 – 6:00)

SB

PTI	Delay (hr)	RR	Weather RR	Crash RR	Segment	PTI	Delay (hr)	RR	Weather RR	Crash RR
1.33	44	92%	77%	33%	55	*3.42*	*446*	*41%*	*19%*	*16%*
2.30	*78*	*89%*	*75%*	*67%*	Excelsior	*2.20*	*136*	*76%*	*51%*	*8%*
2.06	*162*	*66%*	*51%*	*50%*	494	1.00	2	100%	99%	N/A
1.40	60	91%	81%	70%	Old Shakopee	1.30	39	95%	87%	50%
					CH 69					

NB

Notes:
Date reflects Tuesday – Thursday conditions for a.m. and p.m. peak periods

Planning Time Index (PTI) = $\frac{TT_{95\%}}{TT_{FreeFlow}}$

Reliability Rating (RR) = $\frac{Trips_{TT<1.25*FFTT}}{Trips_{total}}$

Delay is the total delay (for all vehicles) during an average peak period in hours
N/A = Insufficient Data to generate reliability measures

The least reliable segments are italicized in Table 20 and Table 21. They include northbound Highway 169 between County Highway 69 and Excelsior Boulevard in the a.m. peak period; and in the p.m. peak period southbound between Excelsior Boulevard and Old Shakopee Road and northbound between I-494 and Highway 55. These segments all experience large amounts of delay and have reliability ratios below 70 percent. Crashes and weather conditions lead to reliability ratios generally under 50 percent for these segments.

The Minnesota River crossing is a bottleneck for a.m. peak period traffic heading northbound and for p.m. peak period traffic heading southbound. In addition, commuters experience heavy congestion approaching Anderson Lakes Pkwy from the south during the a.m. peak and approaching I-394 and Highway 55 from the south in the p.m. peak.

High Crash Areas

Crashes hurt people, cost money, and can disrupt highway operations, causing congestion. MnDOT strives to increase safety and reduce the number of crashes on the highway system. Crash patterns provide valuable insight into potential locations and types of projects that could improve traffic flow and safety.

A safety analysis was performed on the Highway 169 corridor within the study area. The Highway 169 corridor study area includes 24 interchanges, 11 of which are ranked in the top 200 statewide interchanges by crash cost in the *2013 MnDOT Interchange Crash Toolkit*. Two of these interchanges were in the top 50 highest crash cost interchanges.

The probability of crashes increases when congestion is present, driver confusion exists, and/or driver expectancy is not met. Two individual safety assessments of the corridors were completed using standard MnDOT reporting processes and covering crash data from the calendar years 2010 to 2014; the Mainline Assessment assesses crash density (crashes per mile per year) and crash rates, and the Interchange Assessment assess crash costs and crash rates.

Highway 169 Mainline Assessment

To evaluate the Highway 169 crash data and road characteristics, crashes were categorized into interchange or mainline segment clusters. Interchange clusters included all crash data in the interchange influence area including the freeway mainline, the ramps, and the ramp intersections. Segment clusters included mainline crash data between interchanges and for interchange clusters, where only the mainline crash data was included. The mainline assessment included calculating crash density and crash rates.

To avoid skewed crash rates due to analyzing short segments, crash data was aggregated into eight crash data segments along Highway 169. Table 22 provides a summary of the crash data characteristics within each of the crash data segments.

Results of the mainline assessment indicate that four of the Highway 169 segments have a crash rate greater than the average crash rate for segments with similar characteristics and two of the segments have a crash rate greater than the critical crash rate (see Table 22, italicized). It should be noted that a higher than average crash rate does not necessarily indicate a

significant crash problem. Therefore, the crash rates were compared to the critical crash rates to determine the statistical significance of the above average crash rates. If the calculated crash rate is below the critical crash rate, crashes that occurred are typically due to the random nature of crashes and are not necessarily the result of a geometric design issue. However, a crash rate that is greater than the critical crash rate indicates that there may be a geometric design or other issues and warrants further review or mitigation.

Table 22: Highway 169 Crash Data (2010 – 2014)

Segment #	Segment Extent	Length	Free-way Type	Total Crashes	AADT	Crash Density (Crashes/ Mi per Yr)	Crash Rate (Crashes per million VMT)	Crash Rate vs Average / Critical Crash Rate
1	*I-394 through Highway 55*	*1.2*	*4-Lane Urban*	*296*	*87,000*	*49.3*	*1.55*	*> Critical*
2	Excelsior Boulevard to I-394	3.4	4-Lane Urban	383	78,000	22.5	0.79	> Average < Critical
3	Highway 62 to Excelsior Boulevard	2.5	4-Lane Urban	308	69,000	24.6	.98	> Average < Critical
4	*I-494 to Highway 62*	*2.4*	*4-Lane Urban*	*293*	*66,000*	*24.4*	*1.01*	*> Critical*
5	Old Shakopee Road to I-494	3.6	4-Lane Urban	401	84,000	22.3	0.73	< Average
6	Highway 101 to Old Shakopee Road	1.4	6-Lane Urban	170	89,000	24.3	0.75	< Average
7	Canterbury Road to Highway 101	3.3	4-Lane Suburban	251	66,000	15.2	0.63	< Average
8	CSAH 69 to Canterbury Road	4.4	4-Lane Suburban	191	38,000	8.7	0.63	< Average

(1) Source: MnDOT Metro Traffic MnCMAT

(2) AADT represents weighted average along segment

Interchange Assessment

The interchange assessment reviewed corridor mainline crashes within the 24 interchange influence areas in the study area and included the freeway mainline, the ramps, and the ramp intersections. The analyses used the standardized assessment zones within the *2013 Transportation Information Systems database Critical Intersections/Interchanges crash spreadsheet*.

Table 23 identifies the 11 interchanges in the study area listed in the *2013 MnDOT Interchange Crash Toolkit*, which lists the top 200 highest-crash interchanges by crash cost. The collective crash costs for the 11 interchanges amount to an average of $18.56 million dollars per year from 2009-2013. Four interchanges within the study corridor have a crash rate greater than the critical crash rate (see Table 23, italicized). These interchanges listed in order of greatest crash cost were; I-494, CSAH 101, Canterbury Road, and CSAH 17.

Table 23: Highway 169 Corridor Interchanges Included in MnDOT Top 200 Interchanges Report for 2013

	Interchange Description	Approach Volume	Overall Rank	Crash Cost	K	A	B	C	PD	TOT	CR	FAR
494	HIGHWAY 169 /BLOOMINGTON	180,975	32	$2,481,400	0	0	21	82	325	428	***1.30***	0.00
394	HIGHWAY 169	205,310	50	$1,896,360	0	0	17	60	257	334	0.89	0.00
169	HIGHWAY 101 (SHAKOPEE)	82,811	58	$1,775,640	3	0	8	40	143	194	***1.28***	***1.98***
169	HIGHWAY 7/HOPKINS	117,288	93	$1,484,200	1	1	14	34	105	155	0.72	0.93
169	HIGHWAY 212 & HIGHWAY 62	152,119	119	$1,262,480	0	1	8	42	146	197	0.71	0.36
169	CSAH 21 (SHAKOPEE)	68,457	141	$1,125,760	1	1	8	24	102	136	1.09	***1.60***
169	CSAH 83 CANTERBURY BOULEVARD	75,344	144	$1,119,120	0	0	10	38	124	172	***1.25***	0.00
169	CSAH 3 EXCELSIOR BOULEVARD/HOPKINS	104,953	153	$1,061,200	1	1	7	24	80	113	0.59	1.04
169	HIGHWAY 55/GOLDEN VALLEY-PLYMOUTH	121,337	159	$1,038,400	0	1	8	31	115	155	0.70	0.45
169	CSAH 17 MARSCHALL ROAD/SHAKOPEE	63,172	176	$954,040	0	0	6	39	88	133	***1.15***	0.00
169	OLD SHAKOPEE ROAD/CSAH 1	88,620	199	$850,240	1	0	2	26	98	127	0.78	0.62

K: Fatal Crash; A: Incapacitation Injury Crash; B: Non-Incapacitation Injury Crash; C: Possible or Unknown Injury Crash; PD: Property Damage Only Crash;

TOT: Total Crashes within Intersection; CR: Intersection Crash Rate; FAR: Fatal and Severe Crash Rate; Crash period consists of 1,826 days (2009-2013)

Crash Cost based on FY 2014 MnDOT Crash Values with a value of 2 x A for Fatal Crashes

Market Analysis

The INRIX origin-destination data provides information on travel behavior and travel patterns that are difficult to observe from a single or even multiple locations. The data provides general characteristics about trips using the corridor, variations on travel patterns within the corridor, and patterns of trips that start or end near Highway 169. The data gives some indication of how effective certain kinds of improvements or solutions may be and where they could be located to optimally serve trips in the corridor.

Methodology

Data Sources

INRIX is a software/data company that provides historical and real-time traffic information, traffic forecasts, travel times and traffic counts. The origin-destination (O-D) data provided by INRIX indicate real-world traffic patterns along the Highway 169.

The time range of INRIX data used in this study is from February 2015 to April 2015. The data include individual trip information such as providers, types of vehicle, trip origins, trip destinations, etc. In addition, the detailed trip path was provided in the format of XY coordinates and time. The time intervals were usually from 5 seconds to 3 minutes, giving detailed accounts of trip destinations and travel times.

Using the INRIX data, several analyses were conducted to better understand the travel patterns of the corridor, major origins and destinations, and station area activities. This could facilitate modeling, validation and design of the proposed Highway 169 alternative improvements under consideration.

Travel Pattern Investigation

The availability of traveler origin and destination data presents an opportunity to answer detailed questions about current travel patterns around the Highway 169 study area. Analysis of the data provides several types of information with application to the study:

- Travel patterns trips on a given segment, such as the Bloomington Ferry Bridge, and their origins and destinations in both directions and during peak and off-peak periods. This information contributes to determination of appropriate managed lane or transitway termini and validation of the traffic model's prediction of zonal activity.
- The number of drivers that are avoiding congestion on Highway 169 by using other roads and highways, and which roads and highways these travelers use, which allows for an estimate of potential trips attracted to Highway 169 if capacity was expanded.

- On- and off-ramp travel patterns along Highway 169 in each direction during the morning and afternoon peak periods. This information helps to identify segments of Highway 169 with predominately longer trip lengths that may be appropriate for managed lanes, or locations with large proportion of short trips traveling only a few interchanges before exiting.
- Locations where traveler destinations are clustered in the corridor and how many trips are going to various locations. This information aids in refining proposed transitway station locations and targeting project outreach.
- Incoming and outgoing trips within a given distance of possible transitway station locations, which help to determine the relationship between travel patterns and proposed transitway station locations and refine station locations as appropriate.
- Travel patterns along potential transit stations for Green Line and American Boulevard Arterial BRT service that shows the relationship between travel patterns and proposed transitways connecting to potential Highway 169 transit service.

Each of these data analyses is detailed in the following sections.

Travel Patterns using Bloomington Ferry Bridge

Figure 13Figure 14 show the travel pattern across the Bloomington Ferry Bridge for both directions in the a.m. peak period. Of the trips using northbound Highway 169 at the bridge during the a.m. peak hour, 39 percent are from the Highway 169 mainline and 53 percent are merging trips from CSAH 21 and Highway 101 in the south, 6 percent are from Highway 101 to the north, and 2 percent are from other locations. North of the river, 32 percent of trips are taking I-494 east and west to reach their final destinations while the majority (46 percent) stay on Highway 169 north of Highway 62. 18 percent of the trips end at other local destinations along the corridor (referred to in the figures as the percent "remaining").

Figure 13: A.M. Peak Hour Northbound Travel Pattern

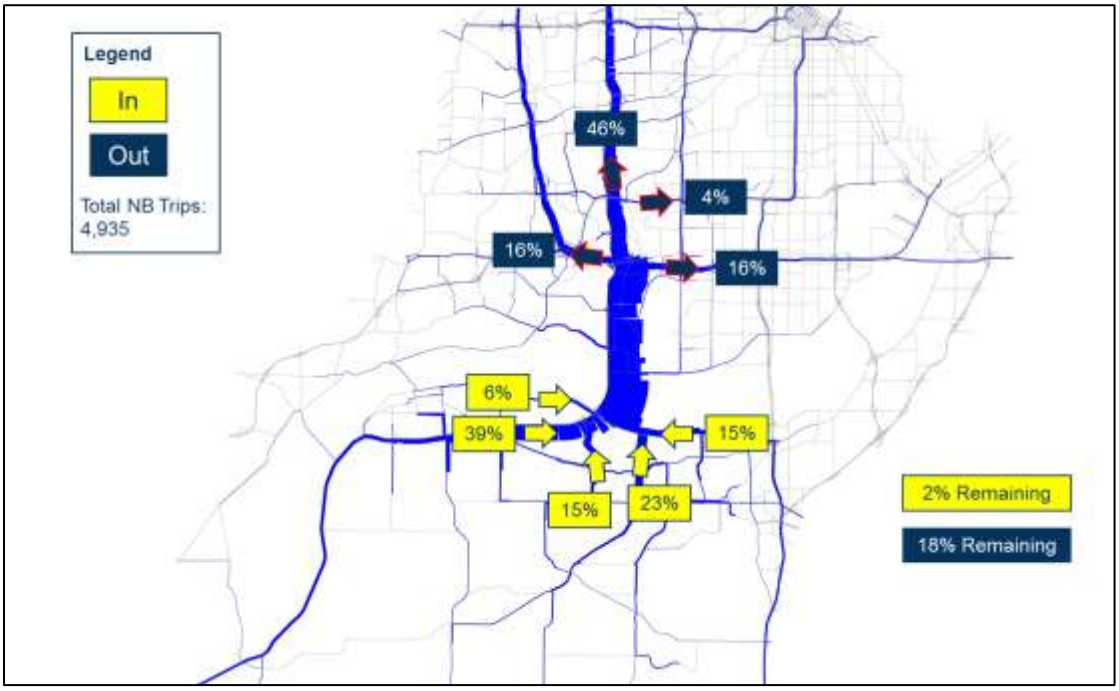
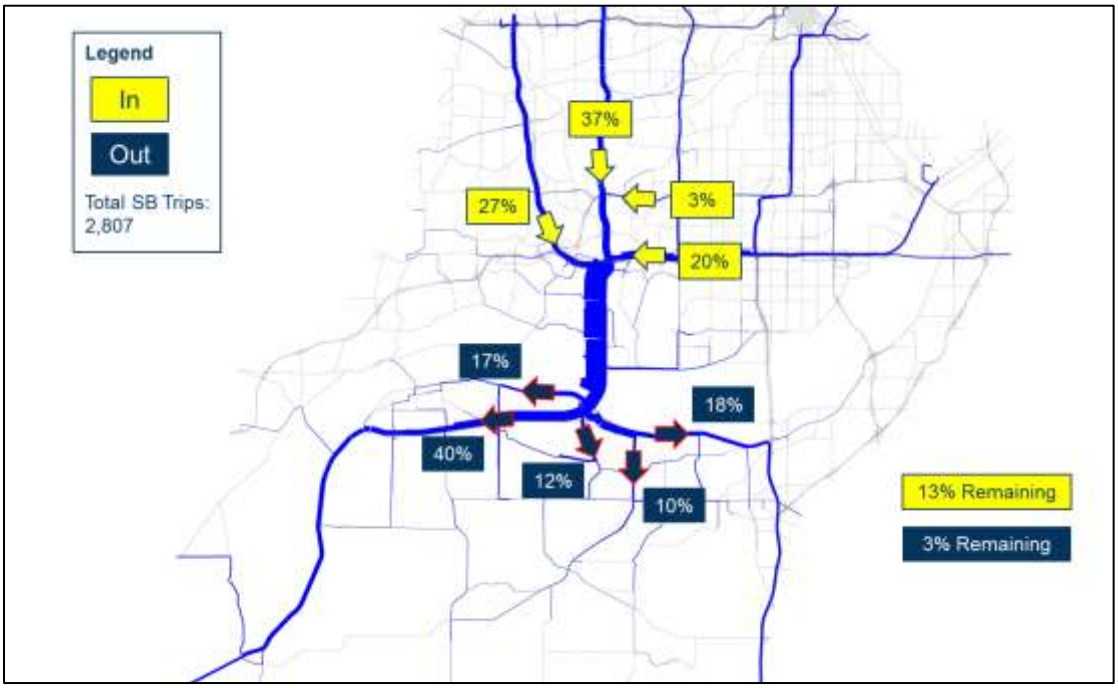


Figure 14: A.M. Peak Hour Southbound Travel Pattern



During the p.m. peak period, southbound traffic mirrors the northbound a.m. peak traffic with 36 percent of trips from the Highway 169 mainline and 38 percent from I-494. A larger percentage (24 percent) of locally originating trips was also observed (referred to in the

figures as the percent "remaining"). Once they pass the bridge, 38 percent of trips stay on Highway 169 and 54 percent take Highway 13 and CSAH 21, as displayed in Figure 15 and Figure 16.

Figure 15: P.M. Peak Hour Northbound Travel Pattern

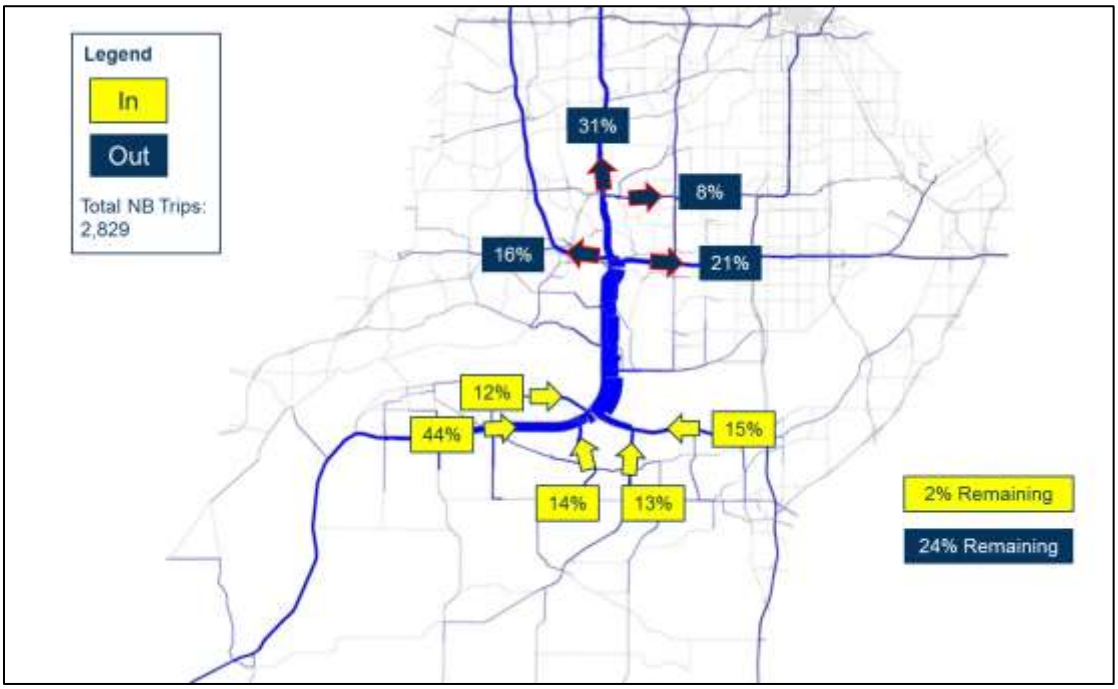
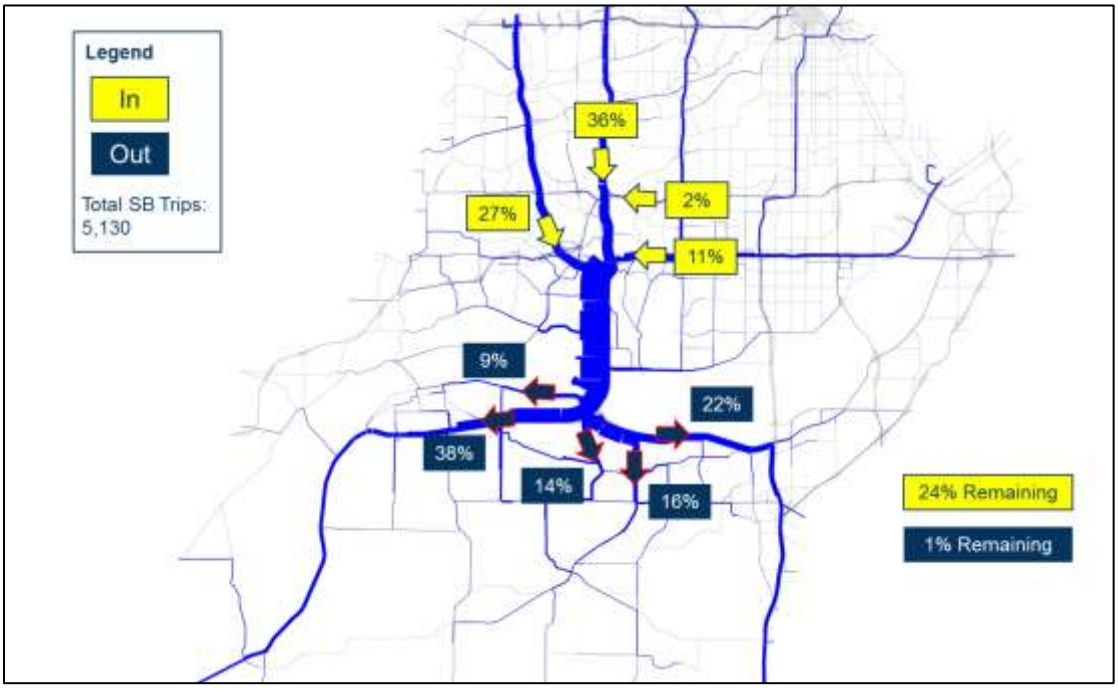


Figure 16: P.M. Peak Hour Southbound Travel Pattern

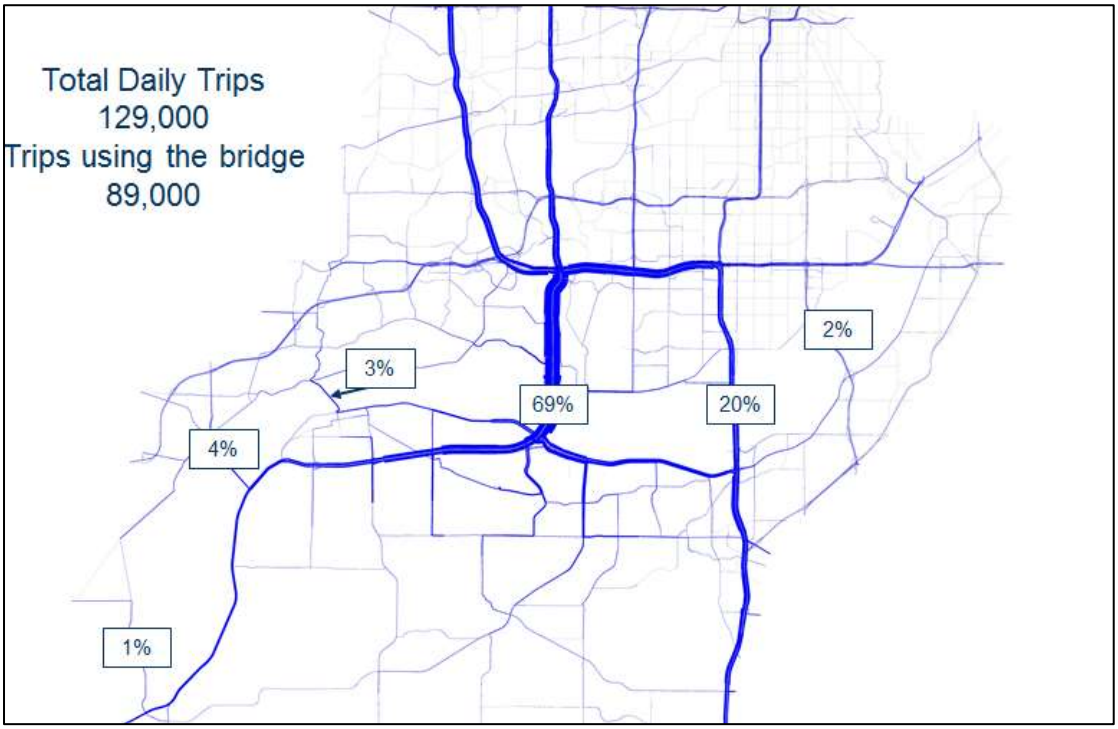


Travel patterns in the off-peak directions (southbound in a.m. and northbound in p.m.) are similar to their peak direction counterparts with traffic more evenly dispersed among major entrances and exits. The influence of CSAH 21 and Highway 101 is diminished for the reverse commute travel patterns, illustrating a stronger draw to employment centers along Highway 169 in Shakopee rather than residential areas around Prior Lake.

Highway 169 River Bridge Diversion

In addition to traveling on the Highway 169 Bloomington Ferry Bridge, there are other alternatives that could serve same trip origins and destinations. Figure 17 shows that while the majority of trips (69 percent) use the Bloomington Ferry Bridge, a significant percentage (20 percent) take I-35W. A small number of trips use other bridge facilities to cross the Minnesota River. The amount of diverted traffic is important because it represents the number of potential trips that could be attracted to Highway 169 if improvements were to reduce congestion. The analysis shows that 129,000 vehicles use the bridge each day, a maximum of an additional 40,000 trips might choose to if the Highway were improved.

Figure 17: Alternative Routes to Highway 169 Bloomington Ferry Bridge



On-ramp and Off-ramp Travel Pattern along Highway 169

A ramp-to-ramp analysis was conducted to better understand the movements between important entrances and exits along Highway 169. Trips are tracked based on where they get on the freeway and where they get off using the routing information from INRIX Origin-Destination data. Key observations include:

In the a.m. peak:

- 30 percent of the ramp-to-ramp trips travel along the segment of Highway 169 south of I-494 (including I-494 ramps); 34 percent travel the segment north of Highway 62.
- Heavy and balanced ramp to ramp movements are observed between I-494 and Highway 101, meaning that a near equal number of vehicles are coming to and from I-494 and Highway 101.
- Heavy ramp-to-ramp movements are observed from/to I-394 and Highway 101 with trips from I-394 almost double the opposite movement
- 15 percent of Highway 169 freeway traffic uses ramps next to each other

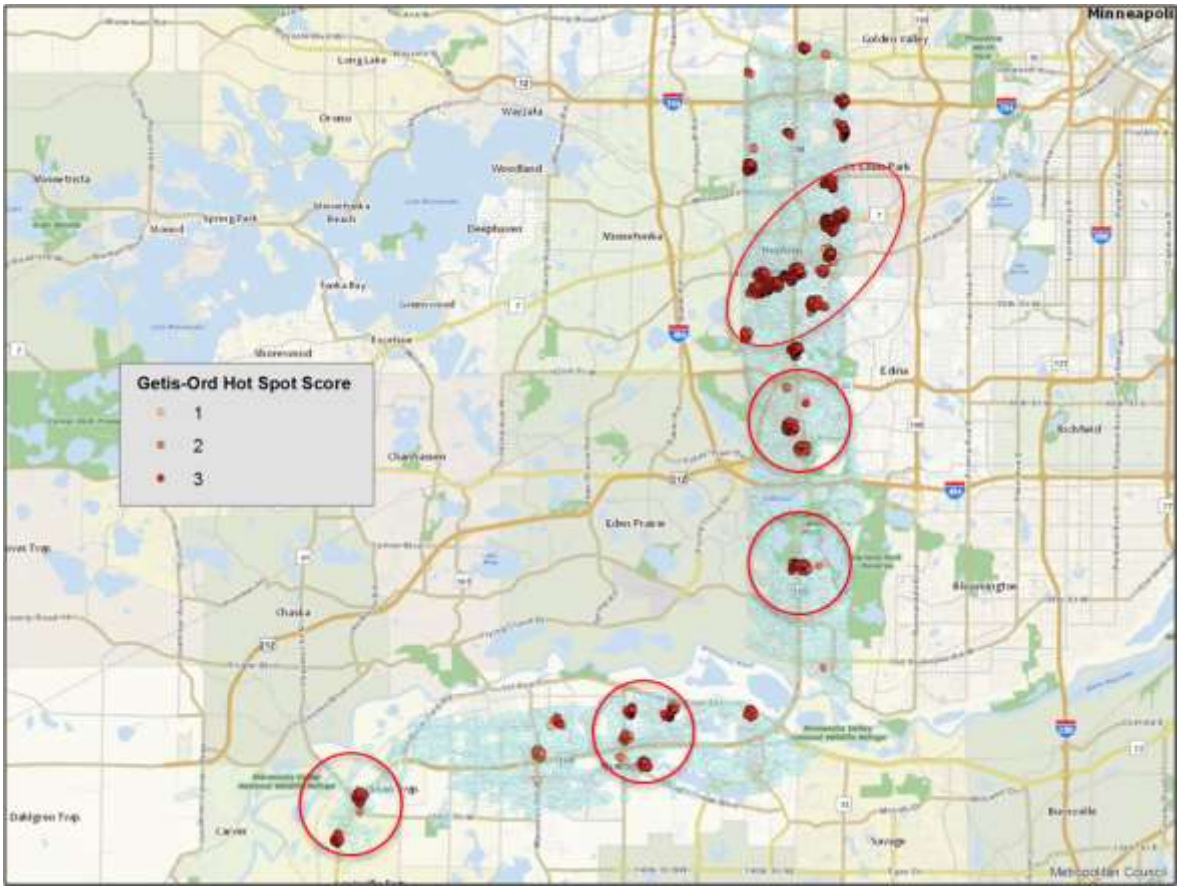
In the p.m. peak:

- 35 percent of the ramp-to-ramp trips travel along the segment of Highway 169 south of I-494 (including I-494 ramps) and 32 percent travel the segment north of Highway 62.
- Heavy ramp-to-ramp movements are observed from/to I-494 and Highway 101 with trips from I-494 almost double the opposite movement
- Heavy ramp-to-ramp movements are observed from/to I-394 and Highway 55 with trips from I-394 almost double the opposite movement
- 17 percent of Highway 169 freeway traffic uses ramps next to each other
- Very strong ramp movements are observed between Canterbury Road and CSAH 21 and from Bren Road to Highway 62 (both are adjacent interchanges)

Corridor Trip Cluster Analysis

A cluster analysis was conducted in ArcGIS based on the INRIX O-D data to identify key destination locations within a half mile of Highway 169. The top five locations identified include: Highway 41 intersection area, Canterbury Road interchange area, Anderson Lake Pkwy interchange area, Valley View Road area, Excelsior Boulevard and Highway 7 area. See Figure 18 where darker colors represent denser concentration of trips.

Figure 18: Corridor Trip Clusters



Transitway Station Area Trip Travel Pattern

Trips starting or ending near proposed highway BRT stations (as proposed in the Metropolitan Council's 2014 *Highway Transitway Corridor Study*) were isolated to understand travel patterns to, from, and within station areas. A half-mile radius buffer was defined for station locations in this analysis. Bren Road along with Excelsior Road and Marschall Road station areas attract the most trips while Marystown Road and Old Shakopee Road each account for less than 1 percent of total trips.

Table 24: Transitway Station Area Trip Travel Pattern

Transit Station Location	# of Trips	% of Total Trips	# of Trips Over Bridge	% of Station Trips Over Bridge
Cedar Lake Rd	5,850	3.6%	30	0.5%
Minnetonka Blvd	5,200	3.2%	143	2.8%
MN7	14,300	8.9%	198	1.4%
Excelsior Blvd	22,300	13.9%	1,093	4.9%
Interlachen Rd	8,350	5.2%	441	5.3%
Bren Rd	34,650	21.5%	706	2.0%

Transit Station Location	# of Trips	% of Total Trips	# of Trips Over Bridge	% of Station Trips Over Bridge
Valley View Rd	13,500	8.4%	856	6.3%
Anderson Lakes Pkwy	9,400	5.8%	1,108	11.8%
Pioneer Trail	4,900	3.0%	613	12.5%
Old Shakopee Rd	1,500	0.9%	212	14.1%
MN 21 (Southbridge Crossing Park & Ride)	9,650	6.0%	3,369	34.9%
Canterbury Rd	8,900	5.5%	2,756	31.0%
Marschall Rd	21,000	13.1%	4,460	21.2%
Marystown Rd	1,400	0.9%	226	16.1%
Total Trips	**160,900**	**100%**	**16,211**	**10.1%**

Green Line and American Boulevard Arterial BRT Trip Travel Patterns

Two major transitway services are identified that might closely interact with Highway 169 corridors: the Green Line Light Rail Transit (LRT) and American Boulevard Arterial BRT. Trips starting or ending near these transitway stations were identified to analyze their travel patterns. Table 25 shows the modest percentage of total trips to each station area that use the Highway 169 Bloomington Ferry Bridge. Green Line stations west of Highway 169 are identified to have the strongest interaction with Highway 169 corridor.

Table 25: Green Line and American Boulevard ABRT Trip Travel Patterns

Transitway	Total Trips starting or ending within 0.5 miles of transitway stations	Percentage of total trips that travel across the Highway 169 bridge
Green Line West of Highway 169	126,900	4.1%
Green Line East of Highway 169	103,200	1.4%
American Boulevard ABRT	127,200	2.5%

Highway 169 Mobility Study
North BRT Analysis
Meeting Record

August 2, 2016 1:30 – 3:00 p.m.

SRF Consulting, Plymouth, MN

Attendees

Cindy Sherman, City of Brooklyn Park
Chloe McGuire Brigl, City of Golden Valley
Emily Goellner, City of Golden Valley
Jeff Oliver, City of Golden Valley
Nancy Abts, City of Osseo
Barbara Thomson, City of Plymouth
Joe Gladke, Hennepin County
Craig Lamothe, Metro Transit
Cole Hiniker, Metropolitan Council
Jen Lehmann, MVTA
Brad Larson, MnDOT
Angie Stenson, Scott County
Josh Johnson, Shakopee Mdewakanton Sioux Community
Dave Jacobson, SouthWest Transit
Mona Elabbady, SRF
Paul Morris, SRF
Jake Knight, SRF

Summary of discussion outcomes

- Limited value duplicating service north of the Blue Line Extension (BLE) Brooklyn Blvd Station
- Terminus for Highway 169 North BRT should be at the BLE Brooklyn Blvd Station, providing connecting transit service
- Propose a BRT station on Brooklyn Blvd, farside of Northland Dr N, to serve Hennepin Technical College; the City of Brooklyn Park has already installed concrete pads at this location in anticipation of future bus service
- Eliminate proposed stations at Bass Lake Rd and Rockford Rd: interchange loops add travel time; no connecting Metro Transit service west of Highway 169; excessive walk distances
- Proposed BRT stations at Schmidt Lake Rd and 36th Ave should move forward: with diamond interchanges, they are simpler operationally and minimize travel time; they serve large employers and transit-dependent populations
- Proposed BRT station at 13th Ave should remain: simple from an operational standpoint, and serves an affordable community that would benefit from service

- Proposed BRT station Betty Crocker Dr should remain: major center of employment, to expand in the future; operationally challenging but critical to ridership

Stations moving forward as part of the alternative

- Brooklyn Blvd @ BLE Station
- Brooklyn Blvd @ Northland Dr
- Hwy 169 @ Schmidt Lake Rd
- Hwy 169 @ 36th Ave
- Hwy 169@ 13th Ave
- Hwy 169 @ Betty Crocker Dr
- Previously determined stations on the southern half

Discussion notes

I. Projected ridership methodology

Josh Johnson: How might we best reflect major event/activity centers such as Mystic Lake and Canterbury Park on the weekends?

> *Cole Hiniker*: When annualized for transitways, a factor is applied to capture evening and weekend and event characteristics such as a stadium. This should be further explored as part of the ridership analysis since the 169 corridor has many events on evenings and weekends.

Dave Jacobson: What goes into the model?

> *Paul Morris*: Based on the regional model; current and projected population, employment, land use, mode choice, travel behavior, etc.

II. Terminus discussion

Josh Johnson: Brooklyn Park, Brooklyn Center, Minneapolis, and St. Paul are home to a significant number of Mystic Lake employees. They do outreach in these communities seeking to fill positions at or under the roughly $20/hour mark.

Joe Gladke: Balancing transit travel time and access is important. There seem to be a lot of stops – is this turning into a regular fixed route?

Cole Hiniker: Clarified that this is a BRT/MnPass project; at this point, we are not considering any additional modes (and their associated service frequencies).

Josh Johnson: Question about the full corridor travel time from Target complex to Marshall Rd; worried about the number of stops.

Dave Jacobson: Agree with Josh - needs to be a balance between the number of stops and run time in order to maximize ridership.

Craig Lamothe:

- Questioning the value of assuming ¼-mile walk radius – appropriate in this context? A pedestrian attempting to cross Bass Lake or Rockford roads might be required to wait several minutes. How does that influence the time or perceived time required to access the station?
- Very few will travel the length of the corridor
- Important to consider connecting bus service

Dave Jacobson: Given the service assumptions, have you considered the number of passengers needed to achieve a reasonable level of performance? Will the subsidy be outrageous?

> *Mona Elabbady*: That has not been explored to date. Once an alignment, terminus, and station locations are selected, we can run the ridership model to get a sense of what the potential ridership may be.

Cindy Sherman:

- Connections to Starlight Transit Center, given its role as a transit hub, is important
- Are the connecting service plan assumptions of the Blue Line Extension (BLE) being included in this analysis?

> *Mona Elabbady*: Yes, connecting service will be an important aspect and we will use the connecting service plan assumed as part of the BLE project.

Joe Gladke: At this stage, are we considering bus layover capacity constraints at stations with a lot of connecting service, e.g. BLE stations?

> *Mona Elabbady*: Not at this stage in the process – we need to know that it will work and that there are feasible options, but not necessarily how exactly it will work. If this alternative is deemed appropriate to move forward, these items will be looked at in greater detail.

Craig Lamothe: Utilizing the interchanges to provide access to offline station will require a lot of time.

Cindy Sherman: In the future, the area surrounding the Target Campus will feature a grid street system, be more dense and urban. But tying into the existing job density at 93rd is attractive, too.

Josh Johnson:

- Why do we want to serve the Target campus all day if they primarily have first shift employees? Is it a waste of service going all the way to Target?
- At Mystic Lake, with first, second, and third shifts, we can get people to work, but have a hard time providing service when they need to go home.

Jen Lehman: There in not a one size fits all BRT – we learned this with the METRO Red Line. Why are we restricting ourselves to one? Does this corridor need this level of service over that span?

> *Cole Hiniker*: Project leaders have reiterated that this is a study of BRT and MnPASS alternatives. Moreover, the regional guidelines now state that in order to be considered a BRT, it must have the level of service like an LRT. In this policy framework, BRT is this level of service.

Paul Morris: For the purposes of this study, at this point in the process, we are seeking an apples-to-apples comparison with what was completed as part of the Highway Transitway Corridor Study. If this alternative is deemed acceptable there will be in-depth technical analysis.

Cindy Sherman: 93rd would be a good terminus, with its employment density and residential mix.

Group conclusions:

- Limited value duplicating service north of the BLE Brooklyn Blvd Station
- Terminus should be at the BLE Brooklyn Blvd Station
- There should be an additional BRT station on Brooklyn Blvd, farside of Northland Dr N, in order to serve Hennepin Technical College

III. Stops in/near Plymouth and New Hope

Craig Lamothe:

- Bass Lake Rd and Rockford Rd stations should be avoided; travel time penalty from interchanges and offline stops is detrimental
- Metro Transit bus service will not be able to connect to areas west of 169 – that's Plymouth Transit's service area

Barbara Thomson: Near the proposed Schmidt Lake Rd station, St. Jude Medical Center to build another 175,000 square feet of office space on site in the future.

Cole Hiniker: Would Plymouth Transit consider a north-south route running parallel and to the west of Highway 169 in order to serve some of the destinations and connections at Bass Lake Rd and Rockford Rd?

> *Dave Jacobson*: Maybe, but not likely; Plymouth Transit is focused on east-west routes.

Group conclusions:

- Schmidt Lake Rd and 36th Avenue are preferred BRT station locations; Bass Lake Rd and Rockford Rd should not be included

IV. Stops in/near Golden Valley and Plymouth

Jeff Oliver: General Mills plans to construct an additional two towers for office space on its existing (southern) site, sometime in the future. The 13th Ave Station is a good potential site – within the city's most affordable neighborhood.

Jeff Oliver: General Mills (used to?) run shuttle service between its north and south campuses.

Group conclusions:

- The proposed stations at 13th Ave and Betty Crocker Dr should remain as part of the alternative

Appendix D – Operating Characteristics
HWY 169 N

Station to Station Service

	Marschall Rd.	Seagate Technology Park & Ride	Southbridge Crossing P&R	Pioneer Tr.	Viking Dr./ Washington Ave.	Golden Triangle Station	Bren Rd. W.	TH 7	Betty Crocker Dr.	13th Ave.	36th Ave.	Schmidt Lake Rd.	Brooklyn Blvd./Northland Dr.	Brooklyn Blvd. Blue Line Extension Station
Station Type	offline	offline	offline	offline	inline	inline	inline	inline	inline	inline	inline	inline	inline	inline
Incremental Distance (Miles)	-	1.7	3.0	3.7	3.3	1.6	2.6	2.5	3.1	1.0	2.0	1.6	3.8	0.5
Cumulative Distance (Miles)	-	1.7	4.7	8.4	11.7	13.3	15.9	18.4	21.5	22.5	24.5	26.1	29.9	30.4
Peak Period Times (Minutes)														
Incremental Run Time	-	8	11	12	8	4	6	6	7	3	5	4	9	2
Cumulative Run Time	-	8	19	31	39	43	49	55	62	65	70	74	83	85
Midday Period Times (Minutes)														
Incremental Run Time	-	7	9	10	5	3	4	4	5	2	4	3	6	2
Cumulative Run Time	-	7	16	26	31	34	38	42	47	49	53	56	62	64

Existing Corridor Services

Route	Frequency (PK–MD–EVE)			Origin	Marschall Rd.	Seagate Technology P&R	Southbridge Crossing P&R	Pioneer Tr.	Viking Dr./Washington Ave.	Golden Triangle	Bren Rd. W.	TH 7	Betty Crocker Dr.	13th Ave.	36th Ave.	Schmidt Lake Rd.	Brooklyn Blvd./Northland Dr.	Brooklyn Blvd. Blue Line Extension Station	Destination	Service Type
12	15-20	30	30	Minnetonka							●								Minneapolis	Local
497	60	60	60	Shakopee	●														Shakopee	Local
499	60	60	60	Shakopee	●	●	●												Shakopee	Local
705	60	60	60	Brooklyn Park										●				●	St. Louis Park	Local
723	30	30	60	Brooklyn Park														●	Brooklyn Center	Local
724	30	30	30	Brooklyn Park														●	Minneapolis	Local
146	15-30	0	0	Bloomington							●								Minneapolis	Limited
721	30	30	60	Brooklyn Park													●		Minneapolis	Limited
755	30	0	0	New Hope										●					Minneapolis	Limited
490	10-20	1 trip	1 trip	Prior Lake			●	○	○		○	○							Minneapolis	Express
491	30	1 trip	1 trip	Shakopee			●												Minneapolis	Express
492	60	0	0	Shakopee			●												Minneapolis	Express
493	15-25	1 trip	1 trip	Shakopee	●														Minneapolis	Express
589	30	0	0	Bloomington				●											Minneapolis	Express
670	30	0	0	Excelsior								○	○	○	○	○			Minneapolis	Express
675	15-30	30-60	60	Mound									●						Minneapolis	Express
687	1 trip	0	0	Chaska								○	○	○					Brooklyn Park	Express
742	60	0	0	Plymouth										●	○	●			Minneapolis	Express
756	30	0	0	New Hope										●					Minneapolis	Express
764	30	0	0	Brooklyn Park														●	Minneapolis	Express
790	15-30	0	0	Plymouth									○	○	●				Minneapolis	Express
793	30	0	0	Plymouth											●				Minneapolis	Express
795	0	120	0	Minneapolis											●				Plymouth	Express

● Station Served ○ Station Passed but Not Served

Proposed Corridor Services

Route	Frequency (PK–MD–EVE)			Origin	Marschall Rd.	Seagate Technology P&R	Southbridge Crossing P&R	Pioneer Tr.	Viking Dr./Washington Ave.	Golden Triangle	Bren Rd. W.	TH 7	Betty Crocker Dr.	13th Ave.	36th Ave.	Schmidt Lake Rd.	Brooklyn Blvd./Northland Dr.	Brooklyn Blvd. Blue Line Extension Station	Destination	Service Type	Change Notes
12	15-20	30	30	Minnetonka							●								Minneapolis	Local	
17	10-20	30	30	St. Louis Park								●							Minneapolis	Local	1
495	60	60	60	Shakopee	●														Bloomington	Local	14
497	60	60	60	Shakopee	●														Shakopee	Local	
499	60	60	60	Shakopee	●	●	●												Shakopee	Local	
615	60	60	1 trip	Minnetonka								●							St. Louis Park	Local	1
705	30	30	30	Brooklyn Park										●				●	St. Louis Park	Local	8
712	30	30	30	Plymouth											●				Robbinsdale	Local	9
717	60	60	60	Plymouth															Brooklyn Center	Local	3
720	30	30	30	Maple Grove													●	●	Brooklyn Park	Local	10
723	30	30	30	Brooklyn Park														●	Brooklyn Center	Local	8
724	15	15	15	Brooklyn Park														●	Minneapolis	Local	8
745	30	60	60	Plymouth												●			Crystal	Local	11
746	30	60	60	Plymouth											●				Robbinsdale	Local	12
791	30	0	2 trips	Plymouth											●				Plymouth	Local	3
146	15-30	0	0	Bloomington							●								Minneapolis	Limited	
721	30	30	60	Brooklyn Park													●		Minneapolis	Limited	
755	30	0	0	New Hope										●					Minneapolis	Limited	
490	10-20	1 trip	1 trip	Prior Lake			●	○	○		○	○							Minneapolis	Express	
491	30	1 trip	1 trip	Shakopee			●												Minneapolis	Express	
492	60	0	0	Shakopee			●												Minneapolis	Express	
493	15-25	1 trip	1 trip	Shakopee	●														Minneapolis	Express	
589	30	0	0	Bloomington				●											Minneapolis	Express	
667	30-60	0	0	Minnetonka								●							Minneapolis	Express	1
668	30	0	0	Hopkins								●							Minneapolis	Express	1
670	30	0	0	Excelsior								●							Minneapolis	Express	4
675	15-30	30-60	60	Mound									●						Minneapolis	Express	
690	5-15	0	0	Eden Prairie						●	○	○							Minneapolis	Express	6
691	1 trip	0	0	Chaska						●	○	○							Minneapolis	Express	6
692	15-25	0	0	Chanhassen						○	●	○							Minneapolis	Express	7
699	10-20	0	0	Chaska						○	●	○							Minneapolis	Express	7
742	60	0	0	Plymouth										●	○	●			Minneapolis	Express	
756	30	0	0	New Hope										●		●			Minneapolis	Express	2
790	15-30	0	0	Plymouth									○	○	●				Minneapolis	Express	
793	30	0	0	Plymouth											●	●			Minneapolis	Express	2
795	0	120	0	Minneapolis										●	●				Plymouth	Express	5
AMER. ABRT	15	15	15	Eden Prairie					●										Bloomington	ABRT	15
GLE	10	10	15	Eden Prairie						●									Minneapolis	LRT	16
BLE	10	10	15	Minneapolis														●	Brooklyn Park	LRT	17

● Station Served ○ Station Passed but Not Served

Proposed Connecting Service Change Notes:

1. Routes 17, 615, 667, 668: Extend to serve TH 7 Station
2. Route 756, 793: Extend to serve Schmidt Lake Rd. Station
3. Routes 717, 791: Extend to serve 36th Ave. Station
4. Route 670: Add stop at TH 7 Station
5. Route 795: Add connections at 13th Ave. and 36th Ave. Stations
6. Routes 690, 691: Shift existing non-stop service off of I-494 to US 169, stop at Golden Triangle Station en route to Minneapolis
7. Routes 692, 699: Shift existing non-stop service off of I-494 to US 169, stop at Bren Station en route to Minneapolis
8. Routes 705, 723, 724: Increased frequency, proposed as part of expanded bus operations for Blue Line Extension
9. Route 712: New route proposed as part of expanded bus operations for Blue Line Extension
10. Route 720: New weekday only local crosstown route, proposed as part of expanded bus operations for Blue Line Extension
11. Route 745: New route proposed as part of expanded bus operations for Blue Line Extension
12. Route 746: New route proposed as part of expanded bus operations for Blue Line Extension
13. Route 764: Removed per bus operations plan for Blue Line Extension
14. Route 495: New local route beginning August 20, 2016 (MVTA)
15. American Blvd Arterial ABRT
16. Green Line Extension LRT
17. Blue Line Extension LRT

Proposed Connecting Local Service

Station	Route	Frequency Peak	Frequency Mid-day	Comments
Marschall Road	495	60	60	New local route, effective Aug. 20, 2016
	497	60	60	
	499	60	60	
Seagate Technology Park & Ride	499	60	60	
Southbridge Crossing Pard & Ride	499	60	60	
Viking Drive/Washington Avenue	American Blvd. ABRT	15	15	Included in the 2040 TPP Increased Revenue Scenario
Golden Triangle	GLE	10	10	Green Line Extension LRT
Bren Road	12	15-20	30	
	146	15-30	0	
TH 7	17	10-20	30	Extended to serve TH 7 Station
	615	60	60	Extended to serve TH 7 Station
13th Avenue	705	30	30	Increased frequency
	755	30	0	
36th Avenue	712	30	30	New local route
	746	30	60	New local route
	791	30	0	Extend to serve 36th Avenue Station
Schmidt Lake Road	745	30	60	New local route
Brooklyn Boulevard/Northland Drive	720	30	30	New weekday only local route
	721	30	30	
Brooklyn Boulevard Station of the Blue Line Extension	BLE	10	10	Blue Line Extension LRT
	705	30	30	Increased frequency
	720	30	30	New weekday only local route
	723	30	30	Increased frequency
	724	15	15	Increased frequency

APPENDIX E

169 Corridor (Marschall Rd to Blue Line)

		Inline	Online	Offline
Length (mi)	31			
No. of Stations	14	20	0	4

Item No.	Item Description	Quantity	Unit	Unit Cost	Cost	Allocated	Final Cost
Corridor Improvement					**$191,000**	**$38,000**	**$229,000**
1	Slip Ramp	400	LF	$200.00	$80,000	$16,000	$96,000
2	Earthwork(Import/Excavation & Embankment)	7400	CY	$15.00	$111,000	$22,000	$133,000
3	Retaining Wall	0	SF	$150.00	$0	$0	$0
BRT Station					**$19,028,000**	**$3,805,000**	**$22,833,000**
4	Station (Shelter and Amenities)	24	EA	$350,000.00	$8,400,000	$1,680,000	$10,080,000
5	Inline Station Platform	20	EA	$24,000.00	$480,000	$96,000	$576,000
6	Offline Station Platform	4	EA	$34,000.00	$136,000	$27,000	$163,000
7	Nearside Roadway Improvements	8	EA	$240,000.00	$1,920,000	$384,000	$2,304,000
8	Farside Roadway Improvements	12	EA	$92,000.00	$1,104,000	$221,000	$1,325,000
9	Additional Earthwork/Retaining Walls (Major)	4	EA	$390,000.00	$1,560,000	$312,000	$1,872,000
10	Additional Earthwork/Retaining Walls (Minor)	1	EA	$100,000.00	$100,000	$20,000	$120,000
11	Utilities and Drainage Improvements (Major)	0	EA	$20,000.00	$0	$0	$0
12	Utilities and Drainage Improvements (Minor)	4	EA	$4,000.00	$16,000	$3,000	$19,000
13	Pedestrian Improvements (Major)	2	EA	$36,000.00	$72,000	$14,000	$86,000
14	Pedestrian Improvements (Minor)	4	EA	$10,000.00	$40,000	$8,000	$48,000
15	Traffic Control (Inline/Online)	20	EA	$30,000.00	$600,000	$120,000	$720,000
16	Traffic Control (Offline)	4	EA	$10,000.00	$40,000	$8,000	$48,000
17	Platform Systems Allowance	24	EA	$190,000.00	$4,560,000	$912,000	$5,472,000
BRT Maintenance Facility					**$4,250,000**	**$850,000**	**$5,100,000**
18	BRT Maintenance Facility	17	EA	$250,000.00	$4,250,000	$850,000	$5,100,000
Total Construction Costs					$23,469,000	$4,693,000	$28,162,000
Right of Way					**$22,000**	**$4,000**	**$26,000**
19	Commercial	0.1	ACRE	$220,000.00	$22,000	$4,000	$26,000
20	Residential		ACRE	$0.00	$0	$0	$0
Vehicles					**$8,670,000**	**$1,734,000**	**$10,404,000**
21	Low Floor 40-foot Buses	17	EA	$502,000.00	$8,534,000	$1,707,000	$10,241,000
22	Low Floor 60-foot Buses		EA	$854,000.00	$0	$0	$0
23	Hybrid buses		EA	$1,107,000.00	$0	$0	$0
24	On-Board Go To Validator (per bus door)	34	EA	$4,000.00	$136,000	$27,000	$163,000
Soft Costs							**$8,554,000**
25	Preliminary Engineering						$939,000
26	Final Design						$1,495,000
27	Project Management for Design and Construction						$643,000
28	Construction Administration and Management						$1,878,000
29	Insurance						$939,000
30	Legal; Permits; Review Fees by Other Agencies						$236,000
31	Surveys, Testing, Investigation, Inspection						$645,000
32	Agency Force Account Work						$1,497,000
33	Public Art						$282,000
25% Contingency							**$11,787,000**
169-Long Route Total Cost							**$58,933,000**

Station Location	Inline Station (Nearside)	Inline Station (Farside)	Offline Station	Add. Earthwork/Ret. Walls (Major)	Add. Earthwork/Ret. Walls (Minor)	Right of Way (AC)	Util & Drainage (Minor)	Ped. Improv. (Major)	Ped. Improv. (Minor)
Blue Line Station		2							
Brooklyn Blvd	2							1	
Schmidt Lake Rd	1	1							1
36th Ave	1	1							
13th Ave		2		1		0.1			1
Betty Crocker Drive		2			1				1
TH 7	2			1				1	
Bren Rd W	2			2			2		
70th Ave		2							
Viking Dr/Washington Ave		2					2		1
Pioneer Trail			1						
Stagecoach Rd			1						
Canterbury Rd			1						
Marschall Rd			1						
TOTAL	**8**	**12**	**4**	**4**	**1**	**0.1**	**4**	**2**	**4**

Annual Operations & Maintenance Cost Estimates ($2013)

Transit Service	Cost Drivers	Unit Cost ($2012)	HWY 169 N ($2013)
Highway BRT Service	Peak Buses	$36,330	14
	Ann. Rev. Bus-Hr.	$75.25	58,570
	Ann. Rev. Bus-Mi. (40')	$3.05	1,289,100
	Directional Stops	$18,250	24
	On-line Stops with Elevators	$20,000	0
	O&M Cost Estimate		$9,447,400
Background Bus Changes	Change in Peak Buses	$36,330	1
	Change in Ann. Rev. Bus-Hr.	$75.25	1,862
	Change in Ann. Rev. Bus-Mi. (40')	$3.05	-23,639
	Change in O&M Cost *(from Existing)*		$106,100
TOTAL CORRIDOR O&M COST ESTIMATE			**$9,553,500**

CPI -2013 (1-year) inflation rate: 1.74%

Notes

1. In-line stations counted as two (one for each direction).
2. No exclusive lane miles or TSP costs are included.
3. All cost estimates assume 40' buses.
4. HTCS service plans assume 16 hour span of service Mon-Sat, 13-hours on Sun.
5. HCTS service plans assume 15-min. all-day service on weekdays and Saturdays, 30-min. on Sat. nights and Sundays.
6. Costs for background bus changes are general.
7. Unit costs consistent with those used in recent Metropolitan Council corridor studies (Robert St., Nicollet-Central, Midtown).
8. Costs were converted from 2012 to 2013 dollars using the CPI-2013 1-year inflation rate of 1.74%

Operating Statistics

Corridor	From	To	Time Period	Travel Time	Distance (miles)	Day	Headway AM	Headway Mid	Headway PM	Headway Eve	Headway Late	Vehicles Peak	Vehicles Total	Daily Rev.-Miles	Daily Rev-Hrs	Annual Rev.-Miles	Annual Rev.-Hrs	Buses AM	Buses Mid	Buses PM	Buses Eve	Buses Late	One-way daily bus trips AM	One-way daily bus trips Mid	One-way daily bus trips PM	One-way daily bus trips Eve	One-way daily bus trips Late	One-way daily bus trips Total	AM PEAK Layover	AM PEAK Cycle	MIDDAY Layover	MIDDAY Cycle	PM PEAK Layover	PM PEAK Cycle	EARLY EVE Layover	EARLY EVE Cycle	LATE EVE Layover	LATE EVE Cycle
HWY 169 N	Marschall Rd.	Brooklyn	Peak	86	31.00	M-F	15	15	15	15	n/a	14.0	17.0	3,968	184	1,011,800	46,920	14.0	10.0	14.0	10.0	0.0	24	52	24	28	0	128	38.00	210.00	22.00	150.00	38.00	210.00	22.00	150.00	n/a	n/a
Shakopee to		Blvd. Station	Midday	64	31.00	Sat	15	15	15	30	n/a			3,534	144	183,800	7,500	10.0	10.0	10.0	5.5	0.0	24	52	24	14	0	114	22.00	150.00	22.00	150.00	22.00	150.00	37.00	165.00	n/a	n/a
Brooklyn Park						Sun	n/a	30	30	30	n/a			1,612	72	93,500	4,150	0.0	5.5	5.5	5.5	0.0	0	26	12	14	0	52	37.00	165.00	37.00	165.00	37.00	165.00	37.00	165.00	n/a	n/a
												14	**17**			**1,289,100**	**58,570**																					

Background Bus Service Changes (Order-of-Magnitude Estimates)

Corridor	Background Bus Change	Pk Buses	Daily Hrs	Daily Mi's.	Ann. Hrs.	Ann. Miles	Comments
HWY 169 N	Routes 17, 615,667,668: Extend to TH 7 Station	0	0	0	0	0	Assume cost neutral
Shakopee to	Routes 717: Extend to serve 36th Ave. Station	1	3.5	48	884	12,240	Add 13 minutes, 3 miles to cycle; 16 daily cycles
Brooklyn Park	Routes 791: Extend to serve 36th Ave. Station	0	0	0	0	0	Assume cost neutral.
	Route 756: Extend to serve Schmidt Lake Rd. Station	0	0	4.2	0	1,071	Add 0.7 miles per trip,
	Route 793: Extend to serve Schmidt Lake Rd. Station	0	0	0	0	0	Assume cost neutral
	Route 670: Add stop at TH 7 Station	0	0	0	0	0	Assume cost neutral
	Route 795: Add stop at 13th Ave. Station	0	0	0	0	0	Assume cost neutral
	Routes 690, 691, 692, 699: Shift service from I-494 to US 169	0	0	-172.5	0	-43,988	2.3 miles shorter, 75 daily trips
	Routes 690, 691: Add stop at Golden Triangle Station	0	4	27.6	978	7,038	Add 5 minues. 0.6 miles for 46 daily trips
	Routes 692, 699: add stop at Bren Rd. Station	0	0	0	0	0	Assume cost neutral
		1	7	-93	1,862	-23,639	

Note - changes in peak buses, annual revenue bus-hours and bus-miles of service estimated, based on estimated changes in daily trips, average route distance and average scheduled travel time.