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CONGESTION MANAGEMENT SAFETY PLAN (CMSP) | PHASE IV

Primary Screening Technical Memorandum

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DEPARTMENT OF TRANSPORTATION

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BACKGROUND

The Congestion Management Safety Plan (CMSP) is a funding program that seeks to implement lower-cost/high-benefit improvements to address congestion and safety problems on Minnesota Department of Transportation's (MnDOT) Metro District highway system. Identification of problem locations and selection of solutions is completed using a data driven process to maximize the return on investment in terms of benefits for highway users. Solutions are intended to address specific problems under existing conditions, and while they are not always intended to be 100 percent effective, they should make conditions noticeably better than they are today. Solutions are also typically lower-cost and smaller in scope that traditional highway investments, which is intended to allow them to be delivered more quickly and simply.

Several previous phases of CMSP have been undertaken over the past decade. The first phase, titled Congestion Management Planning Study, was completed in 2007 and identified 186 potential highway improvements on Metro District roadways. From these, 19 of the most promising solutions were recommended as demonstration projects, and 13 of these have been implemented since that time.

Phase 2 of the Congestion Management Safety Plan, undertaken in 2009-2010, addressed several policy considerations for adoption of the lower-cost/high-benefit investment approach for the region. Workshops were conducted to facilitate instruction and dialogue on flexible design and managed corridors, and to better define the range of solutions for the low-cost, high-benefit approach. In addition, the System Problem Statement was developed as part of this study to identify and characterize congestion and safety issues on the Metro highway system. The System Problem Statement utilized the annual Congestion Report produced by MnDOT's Regional Transportation Management Center (RTMC) to identify locations with recurring congestion on the freeway system. Each location was then characterized by a description of the problem's underlying causes such as entering traffic, lane drop, or weaving.

CMSP Phase 3 began with an extensive outreach effort in which the study team met with County and City representatives to confirm highway problem locations and gather feedback on the CMSP process. This phase then built on these results to screen the locations in the System Problem Statement and identify the most pressing issues. Lower-cost/high-benefit improvement concepts were developed for these locations in design charrettes, and their costs, benefits, and effectiveness were estimated. These factors were used to develop a return period, or anticipated length of time for the benefits to equal the cost, to prioritize the strongest solutions. From a list of 53 opportunities, several Phase 3 projects have also been constructed. In addition, 25 of these project opportunities are in the process of further design and study, and 11 are programmed for construction over the next four years.

Phase 4, the current phase of CMSP, repeats many of the key activities undertaken in Phases 2 and 3, by updating the System Problem Statement and developing a new list of opportunities that reflect changes to the Metro District highway system over recent years. Travel time reliability has also been added as an additional performance measure as part of the System Problem Statement. Reliability describes the variability in travel time experienced by highway users, due to factors such as weather, crashes, and changes in demand.

INTRODUCTION

The primary screening process was performed to identify the highest cost problem locations for prioritization of solution development. For primary screening, user costs for congestion, reliability, and safety were monetized for each problem location in the study area. The problem locations with the highest user costs for each roadway type were screened through this process to prioritize the locations for solution development in the eight-county Metro District. The magnitude of each problem and the road type of each location were major considerations for this process.

Problem locations in contiguous urbanized areas of Sherburne County and Wright County considered in the system problem statement were also monetized and compared to overall primary screening results. However, these locations will not be carried forward for solution development since they are outside of the MnDOT metro system. As noted, CMSP is a funding program within MnDOT's Metro District; since these trunk highways are within MnDOT's District 3 area they are ineligible for this funding. Use of these Problem Statement and Primary Screening findings to assist with District 3 planning processes is encouraged.

METHODS

The main objective of the primary screening process was to identify the highest priority problem locations for solution development. Considerations for this process include recent, current and upcoming projects, problem magnitude, and geographic distribution.

Screening Components and Monetization

In the problem statement process, 465 problem locations were identified among the eight-county Metro District. These are provided on the maps and lists in the CMSP System Problem Statement. Congestion, reliability, and safety are the three major components that contribute to the problem magnitude of each location. User costs for these three factors were assigned based on the influence area identified for the problem. Typically, the influence area is defined as the segment of highway extending upstream from the problem location to the extent of queue experiencing congestion. An example of an influence area is shown for the WB I-94 / I-694 lane drop at the Fish Lake interchange on the PM Peak Period Congestion map, shown in Figure 1 below.

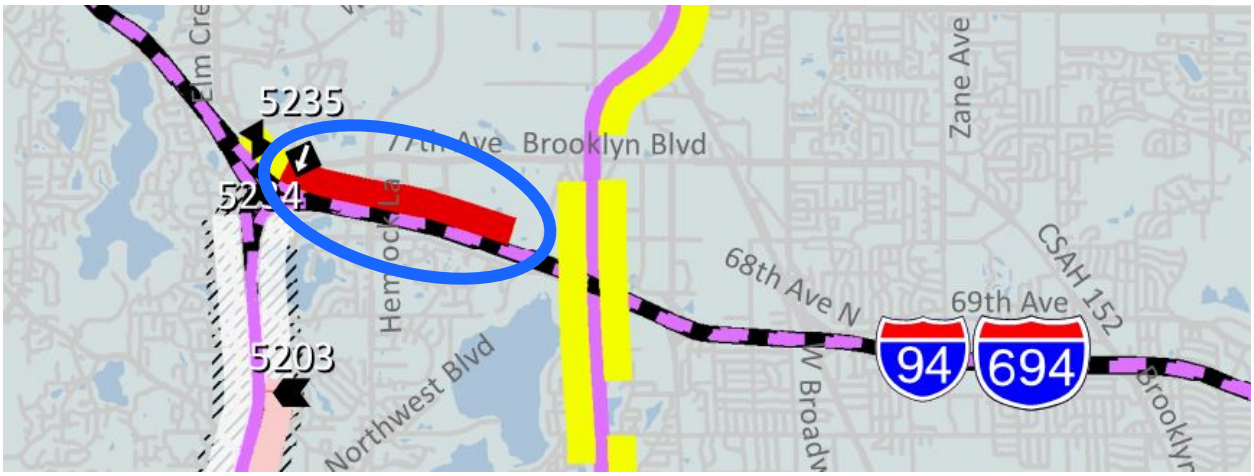


Figure 1: Influence Area Example

The problem influence area is illustrated in Figure 1 by the circled highway section that is shaded in red, which reflects vehicle delay and queue length due to the lane drop. These influence areas are critical in accounting for the full user delay and reliability costs associated with the problem location, as well as the influence of crashes which are frequently associated with congestion.

Geographic information system (GIS) mapping was used to combine the layers of data used in the primary screening analysis. The problem locations along with the congestion, reliability, and crash data were assigned to MnDOT's highway network using linear referencing. Then the influence areas of the problem locations were assigned to capture the extent of problem impacts. Using the influence areas, the congestion, reliability, and

safety data were extracted for use in the primary screening evaluation. The following sections provide additional detail on the monetization methods used for each of these performance measures.

Congestion

The congestion costs are the product of peak hour delay, peak hour traffic volume, and the value of time. Congestion data on the freeway system was obtained from the Regional Transportation Management Center, and congestion on non-freeway facilities was developed using GPS speed data obtained from INRIX representing year 2015 conditions. Free-flow speed was assumed as the 85th percentile of segment speed during the off-peak hours. Traffic volumes data were obtained from MnDOT published AADT and HCAADT, and peak hour volume percentages were developed based on real-world traffic patterns and existing traffic flow theories.

Traffic volumes and congestion levels were used to establish a relationship between AADT and peak hour demand. Using sample loop detector data from several problem locations with varying congestion levels, the speed, density, and flow measurements were used to estimate the percent of daily traffic in the peak period. The results of this curve-fitting exercise are illustrated in Figure 2, below.

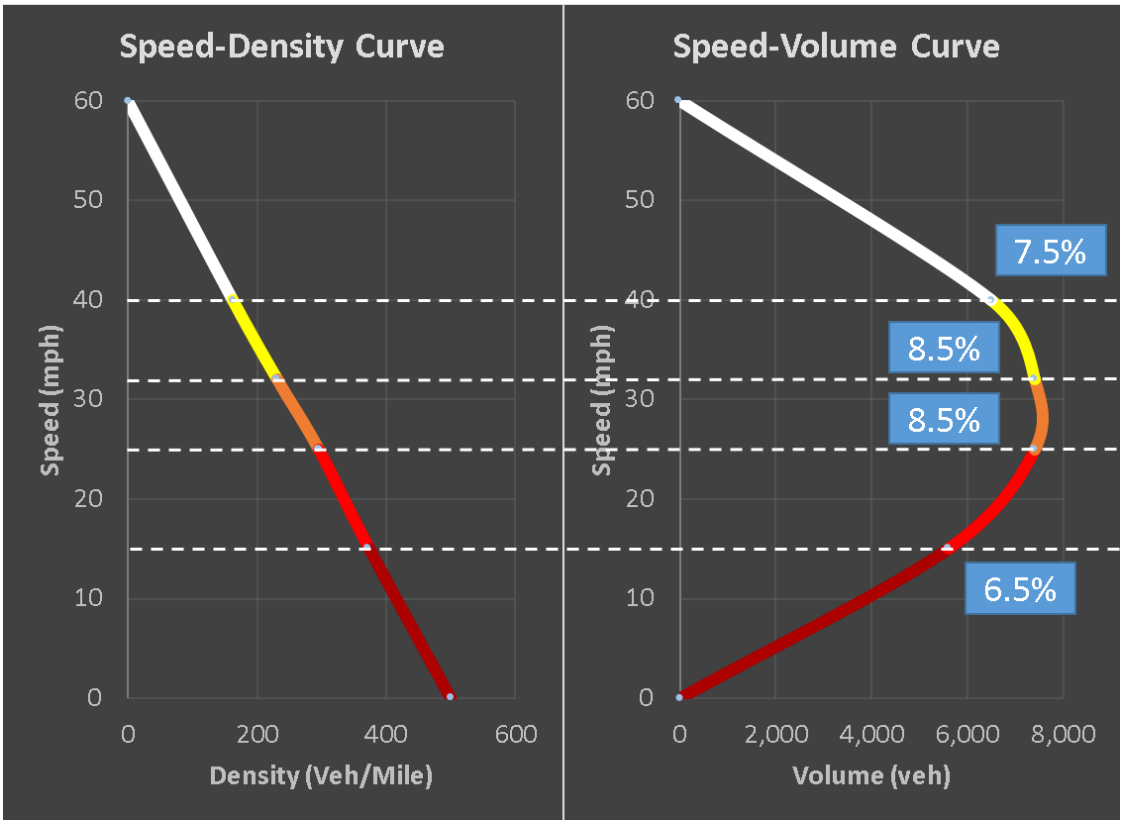


Figure 2: Traffic-Speed Relationships

The resulting peak hour percentages were used to calculate traffic volumes for use in the congestion and reliability monetization calculations. Values of time parameters were obtained from MnDOT Benefit-Cost Analysis Guidance for fiscal year 2016. See Figure 3, below, for an illustration of the congestion monetization process. The method for calculating annual delay cost is also depicted in the equation following the figure.

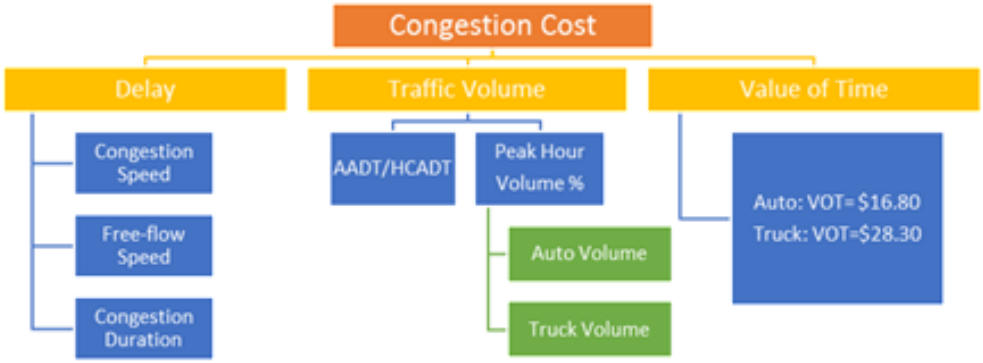


Figure 3: Flow Chart - Congestion Monetization

$$Annual\ Delay\ Cost = \left(\frac{1}{S_{cong}} - \frac{1}{FFS}\right) * dist_{IA} * vol_{hour} * dur_{cong} * 260\frac{weekdays}{year} * VOT$$

Where:

$S_{cong} = congested\ vehicle\ speed\ (miles\ per\ hour)$

$FFS = free - flow\ speed\ (miles\ per\ hour)$

$dist_{IA} = length\ of\ influence\ area\ (miles)$

$vol_{hour} = hourly\ traffic\ volume\ (vehicles\ per\ hour)$

$dur_{cong} = duration\ of\ congestion\ (hours)$

$VOT = value\ of\ time$

An example for calculating congestion cost using the data sources and procedures outlined above is summarized in Figure 4 on the following page. The following delay computation is for westbound passenger vehicles during the pm peak period at the intersection of TH 55 and Vicksburg Lane. Note that the total delay cost used in Primary Screening consisted of delay during the am and pm peak periods, and both directions along the trunk highway. Also, delay was monetized separately for passenger and commercial vehicles based on truck percentage.

Figure 4: Congestion Cost Calculation Example

$$Annual\ Delay\ Cost\ (pm\ peak\ in\ WB\ direction)$$
$$= \left(\frac{1}{24mph} - \frac{1}{47mph}\right) /(veh * hr) * 0.6mi * 1445veh * 1.1hr * 260\frac{weekdays}{year}$$
$$* \$16.80/hr = \mathbf{\$85,000}$$

Reliability

The reliability cost measures the user costs associated with travel time variability. The cost is the product of travel time standard deviation, traffic volume, reliability ratio[1] (RR), and value of time (see Figure 5). The reliability measure is the standard deviation of travel time index, which is the ratio of observed travel time and free-flow travel time. The RR is the ratio between the value of travel time reliability and the value of time. The traffic volume and value of time were obtained from similar sources used in the congestion monetization computations.

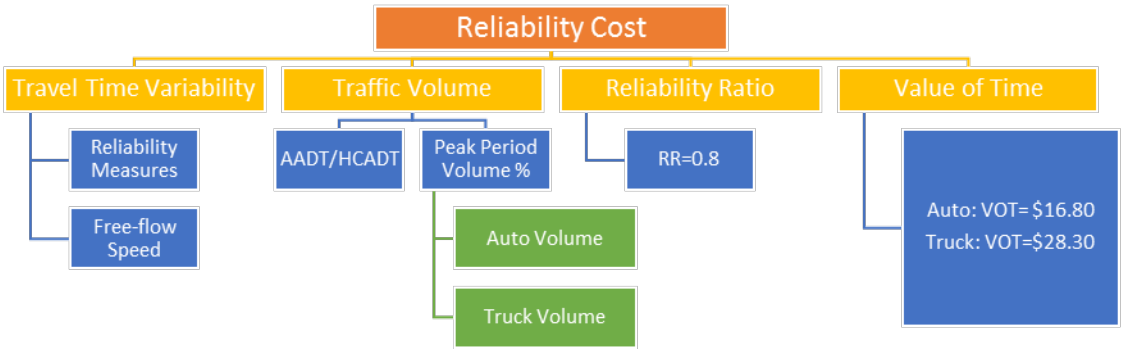


Figure 5: Flow Chart - Reliability Monetization

[1] The CMSP study referenced SHRP2 Projects L07 and C11 for guidance on identifying a reliability ratio. Research teams from both SHRP2 projects performed comprehensive literature reviews on past studies and surveys. Ultimately, both studies elected to use a value 0.8, which fell on the lower end of the ranges identified during the review processes. Based on information provided in the SHRP2 Projects, a reliability ratio of 0.8 was used in the CMSP study.

The reliability methods are further illustrated in the example below. The travel time standard deviation is derived from twenty annual travel time index measures, which consist of five percentile increments between the 2.5th percentile and the 97.5th percentile. The traffic volume used in the reliability cost computation consisted of the five-hour peak period volume to be consistent with the period included in the standard deviation measure. Values for other parameters were taken from the congestion cost calculation, above, for use in the following reliability cost example.

Percentile	TTI
2.5%	1.0
7.5%	1.0
12.5%	1.0
17.5%	1.0
22.5%	1.1
27.5%	1.1
32.5%	1.2
37.5%	1.4
42.5%	1.6
47.5%	1.9
52.5%	2.1
57.5%	2.3
62.5%	2.5
67.5%	2.6
72.5%	2.7
77.5%	2.8
82.5%	2.9
87.5%	3.0
92.5%	3.2
97.5%	3.6

$$Annual\ reliablity\ cost = \sigma * FFTT * dist_{IA} * RR * vol_{peak} * VOT$$

Where:

$\sigma = travel\ time\ index\ standard\ deviation$

$FFTT = free - flow\ travel\ time\ (hours) = \frac{1}{FFS} * dist_{IA}$

$vol_{peak} = 5 - hour\ peak\ period\ traffic\ volume$

$$Annual\ reliablity\ cost\ (example: one\ direction, one\ peak\ period) = \frac{0.87}{veh} * \frac{1}{47mph} * 0.6mi * 0.8 * 5270veh * \frac{\$16.80}{hr} * 260\frac{weekdays}{year} = \mathbf{\$55,000}$$

Safety

The safety cost is calculated by multiplying the annual number of crashes and crash cost values by severity for each problem location (see Figure 6 on the following page). Thee-year (July, 2012 to June, 2015) crash data was obtained from MnDOT Office of Traffic, Safety, and Technology, and the crash values were from MnDOT Benefit-Cost Analysis Guidance. For this analysis, the cost of fatal crashes was calculated as two times the cost of a crash at injury severity A. This method is frequently used in system level evaluations so that results are not skewed unreasonably by isolated fatal crashes.

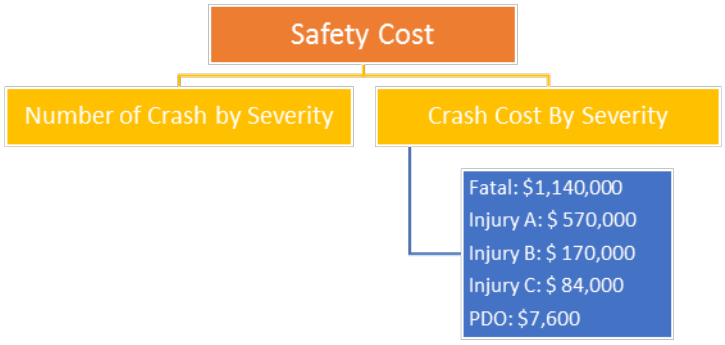


Figure 6: Flow Chart - Crash Monetization

Screening Procedure

The policy supporting CMSP envisions lower-cost/high-benefit solutions that are diversified across the system. The CMSP 4 study implemented this vision by developing spot mobility improvements across the various roadway types that make up the Metropolitan trunk highway system. The screening method to identify the priority problem locations used roadway type as one of the screening factors to ensure that solutions would be developed throughout the system. As a result, the study didn't necessarily recommended solutions for all the largest problems system-wide, but rather prioritized the largest problems located on each roadway type across the system. The screening process is described in more detail below.

Six steps were involved in the primary screening process:

1. Identifying the recent, current, and upcoming projects among the recognized problem locations.
2. Screening scenario one: Problem Magnitude Ranking and Even Road Type Distribution
   - This scenario ranked locations by problem magnitude within each road type category and assigned equal number of problem locations for each road type.
3. Screening scenario two: Problem Magnitude Ranking and Problem Distribution by Road Type
   - This scenario ranked locations by problem magnitude within each road type category and assigned problem locations proportional to roadway problem distribution by facility type in the System Problem Statement.
4. Combining results from scenario one and scenario two, and prioritizing locations common among both scenarios.
5. Identifying CMSP 3 opportunities and corridor studies that are completed or underway.
6. Soliciting feedback from agencies and stakeholders and finalizing the location list based on comments and local knowledge of problem locations.

Summary of Screening Results

The System Problem Statement inventory was screened to 68 priority problem locations for development of lower-cost/high-benefit solutions at design charrettes (see Table 1 on the following page). Furthermore, 36

problem locations located in the study area of previous and ongoing studies[2] also passed the screening process, resulting in a total of 104 opportunities to be included (or carried) forward into the *Transportation Policy Plan* (TPP) opportunity list.

County	2 Lane Rural	2 Lane Urban	4+ Lane Urban	4+ Lane Expressway	4 Lane Freeway	6+ Lane Freeway	Total
Anoka			3	5	1		9
Carver	6						6
Chisago	6						6
Dakota	1	1			1		3
Hennepin	1		6	4	6	7	24
Ramsey		2	6	1	2		11
Scott	1			4			5
Washington	3			1			4
Total	**18**	**3**	**15**	**15**	**10**	**7**	**68**

Table 1: Problem Locations for Design Charrette by County and Road Type

In addition to the problem locations within MnDOT's eight-county Metro District, the primary screening evaluation was also applied to problem locations identified in the contiguous urbanized areas of Sherburne and Wright Counties. Of the 13 problem locations within these areas, three were found to have scores that would result in inclusion to the priority problem location list. These findings could potentially be used to assist in MnDOT's District 3 planning and programming process. The three problem locations are listed in Table 2, below.

Location	Problem Description
TH 169 and Main Street NW	Intersection capacity
TH 169 and School Street / Elk Hills Drive	Intersection capacity
TH 169 and Jackson Avenue / 193rd Avenue	Intersection capacity

Table 2: Priority Problem Locations in Sherburne and Wright Counties

[2] Studies include CMSP Phase 3, I-494/TH 62 Congestion Relief Study, Highway 169 Mobility Study, TH 10 Planning & Access Study, and Rethinking I-94 Study.

FINAL PROBLEM LOCATIONS

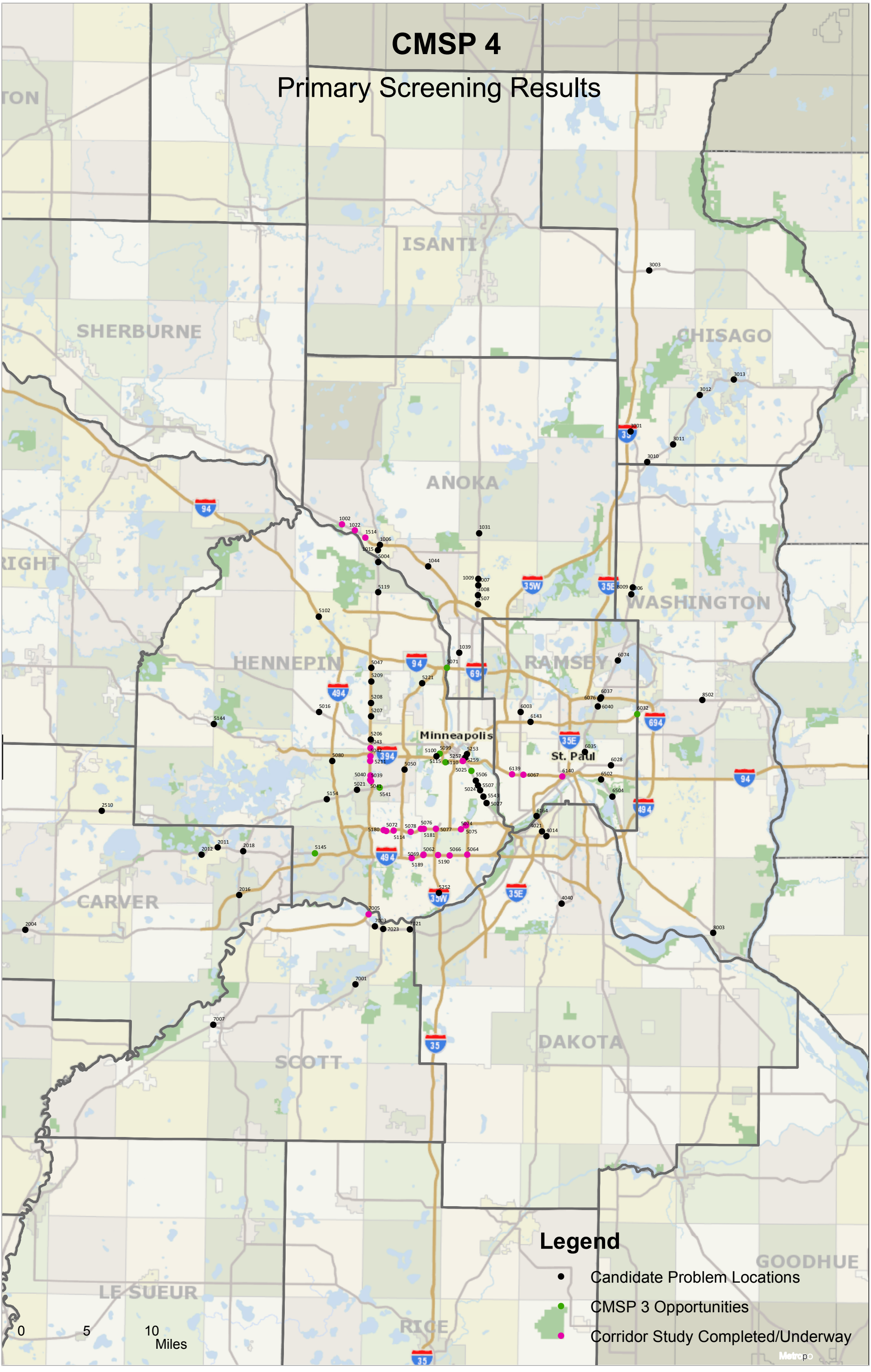
The preliminary review results are shown on the CMSP 4 Primary Screening Results Map on the next page. As part of this review the following lists have also been prepared. These items are included in the appendices on the next several pages.

Appendices

- System Problem Statement Map
- List A: Draft Primary Screening Problem Locations
- List B: CMSP 3 Opportunities and Corridor Study Completed/Underway Locations

CMSP 4

Primary Screening Results



List A: Draft Primary Screening Problem Candidates

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Location Number	Congestion Cost	Reliability Cost	Crash Cost	Total Cost	Road Type	County	Problem Type	HWY	Descriptions
Anoka County									
1008	$ 1,524,900	$ 661,700	$ 1,429,500	$ 3,616,100	4+ Lane Expressway	Anoka	Intersection	TH65	TH 65 & 99TH AVE
1044	$ 1,247,700	$ 848,900	$ 1,327,300	$ 3,423,900	4 Lane Freeway	Anoka	Lane Drop	US10	Hanson Blvd
1007	$ 1,058,400	$ 465,400	$ 1,473,500	$ 2,997,300	4+ Lane Expressway	Anoka	Intersection	TH65	TH 65 & 105TH AVE
1507	$ 1,266,200	$ 423,700	$ 856,700	$ 2,546,600	4+ Lane Expressway	Anoka	Intersection	TH65	TH 65 & 93RD LN
1015	$ 1,530,200	$ 430,600	$ 397,300	$ 2,358,100	4+ Lane Urban	Anoka	Intersection	TH169	FERRY ST N & FERRY ST S & MAIN ST W
1031	$ 299,500	$ 319,500	$ 761,200	$ 1,380,200	4+ Lane Expressway	Anoka	Intersection	TH65	TH 65 & BUNKER LAKE BLVD
1009	$ 495,100	$ 252,400	$ 327,700	$ 1,075,200	4+ Lane Expressway	Anoka	Intersection	TH65	TH 65 & 109TH AVE
1039	$ 251,500	$ 150,500	$ 315,700	$ 717,700	4+ Lane Urban	Anoka	Intersection	MN47	Mississippi St
1006	$ 492,800	$ 129,700	$ 665,300	$ 1,287,800	4+ Lane Urban	Anoka	Intersection	TH169	FERRY ST N & HIGHWAY 10
Carver County									
2018	$ 561,000	$ 173,300	$ 625,900	$ 1,360,200	2 Lane Rural	Carver	Intersection	MN41	TH 5
2011	$ 183,700	$ 232,000	$ 314,100	$ 729,800	2 Lane Rural	Carver	Intersection	MN5	CSAH 13
2016	$ 95,200	$ 36,300	$ 27,900	$ 159,400	2 Lane Rural	Carver	Intersection	TH41	CHESTNUT ST N & HIGHWAY 212
2012	$ 13,600	$ 91,900	$ 71,200	$ 176,700	2 Lane Rural	Carver	Intersection	MN5	Victoria Dr
2510	$ -	$ 5,200	$ 61,100	$ 66,300	2 Lane Rural	Carver	Intersection	TH7	HIGHWAY 7 & COUNTY ROAD 10
2004	$ 22,700	$ 22,700	$ 48,300	$ 93,700	2 Lane Rural	Carver	Intersection	MN5	TH 212
Chisago County									
3012	$ 31,100	$ 55,600	$ 246,300	$ 333,000	2 Lane Rural	Chisago	Intersection	TH8	Lofton Ave/Old Towne Rd
3010	$ 11,200	$ 37,800	$ 383,600	$ 432,600	2 Lane Rural	Chisago	Intersection	TH8	Greenway Ave
3001	$ 7,000	$ 38,600	$ 89,700	$ 135,300	2 Lane Rural	Chisago	Intersection	US61	Wyoming Trl
3011	$ 9,300	$ 30,800	$ 348,100	$ 388,200	2 Lane Rural	Chisago	Intersection	TH8	Green Lake Trl
3013	$ 16,600	$ 20,400	$ 132,900	$ 169,900	2 Lane Rural	Chisago	Intersection	TH8	Akerson St
3003	$ 3,300	$ 23,200	$ 17,700	$ 44,200	2 Lane Rural	Chisago	Intersection	MN95	Forest Blvd
Dakota County									
4021	$ 1,030,700	$ 1,342,600	$ 360,100	$ 2,733,400	4 Lane Freeway	Dakota	Lane Drop	I35E	At MN 110
4014	$ 370,300	$ 149,700	$ 349,100	$ 869,100	2 Lane Urban	Dakota	Intersection	MN149	MN 110
4040	$ 42,400	$ 30,600	$ 101,700	$ 174,700	2 Lane Rural	Dakota	Intersection	MN149	Robert Trl
Hennepin County									
5080	$ 5,340,400	$ 3,225,700	$ 602,100	$ 9,168,200	6+ Lane Freeway	Hennepin	Exit Capacity	I494	I-394 EB exit
5206	$ 4,342,100	$ 1,869,900	$ 1,496,300	$ 7,708,300	4 Lane Freeway	Hennepin	Entering Traffic	US169	TH 55
5257	$ 4,789,500	$ 544,800	$ 1,921,600	$ 7,255,900	6+ Lane Freeway	Hennepin	Ramp to Ramp Weaving	I35W	Hiawatha to University
5102	$ 3,164,400	$ 2,045,900	$ 1,505,100	$ 6,715,400	6+ Lane Freeway	Hennepin	Entering Traffic	I94	Maple Grove Pkwy
5253	$ 2,309,100	$ 1,272,100	$ 2,528,900	$ 6,110,100	6+ Lane Freeway	Hennepin	Exit Capacity	I35W	I-94 CD Road
5050	$ 2,106,800	$ 1,987,700	$ 1,242,700	$ 5,337,200	6+ Lane Freeway	Hennepin	Entering Traffic	TH100	Cedar Lake Rd
5252	$ 1,299,100	$ 867,400	$ 2,857,100	$ 5,023,600	6+ Lane Freeway	Hennepin	Entering Traffic	I35W	W Old Shakopee Rd
5209	$ 2,751,400	$ 1,230,400	$ 572,400	$ 4,554,200	4 Lane Freeway	Hennepin	Ramp to Ramp Weaving	US169	CSAH 10 EB
5100	$ 1,984,100	$ 933,200	$ 1,382,900	$ 4,300,200	6+ Lane Freeway	Hennepin	Entering Traffic	I394	I-94 & Dunwoody entrances
5207	$ 1,752,700	$ 1,099,300	$ 652,900	$ 3,504,900	4 Lane Freeway	Hennepin	Ramp to Ramp Weaving	US169	36th Ave
5047	$ 1,788,200	$ 560,400	$ 390,300	$ 2,738,900	4 Lane Freeway	Hennepin	Entering Traffic	US169	I-94
5208	$ 1,541,900	$ 851,700	$ 280,300	$ 2,673,900	4 Lane Freeway	Hennepin	Ramp to Ramp Weaving	US169	CSAH 9
5221	$ 785,300	$ 697,900	$ 1,058,500	$ 2,541,700	4 Lane Freeway	Hennepin	Entering Traffic	TH100	Brooklyn Blvd
5119	$ 1,030,200	$ 389,100	$ 773,200	$ 2,192,500	4+ Lane Expressway	Hennepin	Intersection	TH169	TH 169 & 109TH AVE N
5024	$ 1,222,300	$ 247,200	$ 528,000	$ 1,997,500	4+ Lane Urban	Hennepin	Intersection	TH55	38TH ST E & HIAWATHA AVE
5154	$ 546,700	$ 361,900	$ 540,500	$ 1,449,100	4+ Lane Expressway	Hennepin	Intersection	TH7	TH 7 & WILLISTON RD
5027	$ 825,400	$ 226,200	$ 307,700	$ 1,359,300	4+ Lane Urban	Hennepin	Intersection	TH55	46TH ST E & HIAWATHA AVE
5016	$ 615,800	$ 256,600	$ 349,900	$ 1,222,300	4+ Lane Expressway	Hennepin	Intersection	TH55	TH 55 & VICKSBURG LN
5506	$ 401,100	$ 97,100	$ 686,400	$ 1,184,600	4+ Lane Urban	Hennepin	Intersection	TH55	32ND ST E & HIAWATHA AVE
5507	$ 410,800	$ 86,000	$ 363,700	$ 860,500	4+ Lane Urban	Hennepin	Intersection	TH55	35TH ST E & HIAWATHA AVE
5021	$ 373,400	$ 210,500	$ 240,500	$ 824,400	4+ Lane Expressway	Hennepin	Intersection	TH7	HIGHWAY 7 & HOPKINS XRD
5004	$ 409,200	$ 206,100	$ 168,500	$ 783,800	4+ Lane Urban	Hennepin	Intersection	TH169	JEFFERSON HWY N & WEST RIVER RD N
5543	$ 403,400	$ 84,800	$ 275,500	$ 763,700	4+ Lane Urban	Hennepin	Intersection	TH55	42ND ST E & HIAWATHA AVE
5144	$ 262,300	$ 184,700	$ 152,500	$ 599,500	2 Lane Rural	Hennepin	Intersection	TH12	BAKER PARK RD & HIGHWAY 12 & WAYZATA BLVD W
Ramsey County									
6164	$ 933,000	$ 1,313,600	$ 458,300	$ 2,704,900	4 Lane Freeway	Ramsey	Entering Traffic	I35E	Shepard Rd
6143	$ 1,176,700	$ 580,500	$ 905,700	$ 2,662,900	4 Lane Freeway	Ramsey	Entering Traffic	TH36	Snelling Ave
6040	$ 356,100	$ 168,600	$ 634,400	$ 1,159,100	4+ Lane Urban	Ramsey	Intersection	US61	Beam Ave
6003	$ 528,600	$ 229,400	$ 379,500	$ 1,137,500	4+ Lane Expressway	Ramsey	Intersection	MN51	Co Rd C
6502	$ 398,700	$ 129,200	$ 502,400	$ 1,030,300	4+ Lane Urban	Ramsey	Intersection	TH61	TH 61 & WARNER RD
6076	$ 443,400	$ 144,000	$ 432,000	$ 1,019,400	4+ Lane Urban	Ramsey	Intersection	US61	I-694
6074	$ 144,800	$ 332,700	$ 293,200	$ 770,700	4+ Lane Urban	Ramsey	Intersection	US61	CSAH 96
6037	$ 201,700	$ 68,100	$ 477,100	$ 746,900	4+ Lane Urban	Ramsey	Intersection	US61	I-694 WB Ramps
6504	$ 57,600	$ 47,300	$ 530,400	$ 635,300	4+ Lane Urban	Ramsey	Intersection	TH61	HIGHWAY 61 & LOWER AFTON RD
6028	$ 168,200	$ 66,000	$ 309,500	$ 543,700	2 Lane Urban	Ramsey	Intersection	MN5	White Bear Ave
6035	$ 178,500	$ 50,900	$ 104,100	$ 333,500	2 Lane Urban	Ramsey	Intersection	US61	Maryland Ave
Scott County									
7003	$ 896,600	$ 916,000	$ 61,100	$ 1,873,700	4+ Lane Expressway	Scott	Ramp to Ramp Weaving	MN13	US 169 to MN 13
7021	$ 624,300	$ 374,400	$ 193,200	$ 1,191,900	4+ Lane Expressway	Scott	Intersection	TH13	TH 13 & LYNN AVE
7023	$ 515,600	$ 238,700	$ 557,600	$ 1,311,900	4+ Lane Expressway	Scott	Entering Traffic	MN13	MN 13 NB
7007	$ 451,900	$ 363,000	$ 198,300	$ 1,013,200	4+ Lane Expressway	Scott	Intersection	TH169	TH 169 & TH 282
7001	$ 69,600	$ 49,900	$ 178,100	$ 297,600	2 Lane Rural	Scott	Intersection	MN13	160th St SE
Washington County									
8502	$ 6,800	$ 22,700	$ 736,900	$ 766,400	4+ Lane Expressway	Washington	Intersection	TH36	TH 36 & LAKE ELMO AVE N
8003	$ 193,700	$ 122,600	$ 150,800	$ 467,100	2 Lane Rural	Washington	Intersection	TH61	HIGHWAY 61 & MANNING AVE S
8006	$ 62,900	$ 34,200	$ 164,100	$ 261,200	2 Lane Rural	Washington	Intersection	US61	140th ST N
8009	$ 23,300	$ 12,600	$ 76,300	$ 112,200	2 Lane Rural	Washington	Intersection	US61	Frenchman Rd

List B: CMSP 3 Opportunities and Corridor Study Completed/Underway Locations

DRAFT

Location Number	Congestion Cost	Reliability Cost	Crash Cost	Total Cost	Road Type	County	Problem Type	HWY	Descriptions
Anoka County									
1022	$ 1,304,400	$ 695,600	$ 1,265,700	$ 3,265,700	4+ Lane Expressway	Anoka	Intersection	TH10	TH 10 & SUNFISH LAKE BLVD
1514	$ 948,300	$ 410,200	$ 653,700	$ 2,012,200	4+ Lane Expressway	Anoka	Intersection	TH10	TH 10 & THURSTON AVE
1002	$ 475,000	$ 405,500	$ 560,000	$ 1,440,500	4+ Lane Expressway	Anoka	Intersection	TH10	TH 10 & RAMSEY BLVD
Hennepin County									
5025	$ 788,300	$ 212,200	$ 350,900	$ 1,351,400	4+ Lane Urban	Hennepin	Intersection	MN55	26th St
5115	$ 11,688,300	$ 4,101,700	$ 4,994,700	$ 20,784,700	6+ Lane Freeway	Hennepin	Mainline Weaving	I94	Hennepin/Lyndale to I-35W SB
5181	$ 8,678,100	$ 5,433,500	$ 4,147,300	$ 18,258,900	4 Lane Freeway	Hennepin	Entering Traffic	TH62	Xerxes Ave entrance
5043	$ 5,648,200	$ 7,252,300	$ 1,645,900	$ 14,546,400	4 Lane Freeway	Hennepin	Ramp to Ramp Weaving	US169	I-394 to TH 55
5189	$ 5,454,900	$ 4,451,100	$ 2,029,600	$ 11,935,600	6+ Lane Freeway	Hennepin	Lane Drop	I494	France Ave
5099	$ 3,778,700	$ 2,494,400	$ 5,616,100	$ 11,889,200	6+ Lane Freeway	Hennepin	Exit Capacity	I394	I-94 EB exit
5259	$ 5,324,300	$ 2,722,900	$ 2,920,700	$ 10,967,900	6+ Lane Freeway	Hennepin	Exit Capacity	I94	I-35W SB exit
5062	$ 4,581,600	$ 1,600,600	$ 1,926,500	$ 8,108,700	6+ Lane Freeway	Hennepin	Entering Traffic	I494	France Ave
5071	$ 3,178,900	$ 1,430,000	$ 1,712,500	$ 6,321,400	6+ Lane Freeway	Hennepin	Exit Capacity	I694	I-94 EB exit
5069	$ 1,203,100	$ 1,259,200	$ 3,264,400	$ 5,726,700	6+ Lane Freeway	Hennepin	Ramp to Ramp Weaving	I494	Penn Ave to France Ave
5190	$ 2,266,100	$ 1,548,800	$ 1,872,500	$ 5,687,400	6+ Lane Freeway	Hennepin	Ramp to Ramp Weaving	I494	I-35W NB to Lyndale Ave
5075	$ 1,772,200	$ 1,743,400	$ 1,680,000	$ 5,195,600	4 Lane Freeway	Hennepin	Entering Traffic	TH62	TH 77 NB
5064	$ 2,287,400	$ 1,001,000	$ 1,756,700	$ 5,045,100	6+ Lane Freeway	Hennepin	Exit Capacity	I494	TH 77 entrance
5066	$ 2,655,400	$ 1,069,100	$ 1,147,500	$ 4,872,000	6+ Lane Freeway	Hennepin	Entering Traffic	I494	Portland Ave to Nicollet Ave
5110	$ 1,899,100	$ 844,000	$ 1,688,500	$ 4,431,600	6+ Lane Freeway	Hennepin	Entering Traffic	I94	CD Road entrance
5039	$ 2,732,000	$ 1,036,100	$ 557,200	$ 4,325,300	4 Lane Freeway	Hennepin	Ramp to Ramp Weaving	US169	36th St to Minnetonka Blvd
5114	$ 2,302,500	$ 890,300	$ 511,500	$ 3,704,300	4 Lane Freeway	Hennepin	Substandard Geometry or Other	TH62	uphill grade
5076	$ 1,311,000	$ 1,247,700	$ 1,012,300	$ 3,571,000	4 Lane Freeway	Hennepin	Entering Traffic	TH62	Xerxes Ave
5072	$ 1,367,100	$ 1,415,800	$ 621,900	$ 3,404,800	4 Lane Freeway	Hennepin	Lane Drop	TH62	Gleason Rd
5074	$ 2,129,700	$ 632,600	$ 636,000	$ 3,398,300	4 Lane Freeway	Hennepin	Entering Traffic	TH62	I-35W to TH 77
5042	$ 1,495,900	$ 1,183,400	$ 674,800	$ 3,354,100	4 Lane Freeway	Hennepin	Entering Traffic	US169	I-394 EB entrance
5078	$ 592,700	$ 789,800	$ 1,627,200	$ 3,009,700	4 Lane Freeway	Hennepin	Entering Traffic	TH62	Valley View Rd
5041	$ 1,062,900	$ 1,115,100	$ 652,000	$ 2,830,000	4 Lane Freeway	Hennepin	Entering Traffic	US169	Minnetonka Blvd
5040	$ 1,873,300	$ 590,600	$ 303,300	$ 2,767,200	4 Lane Freeway	Hennepin	Entering Traffic	US169	Minnetonka Blvd
5180	$ 1,020,200	$ 1,112,900	$ 599,100	$ 2,732,200	4 Lane Freeway	Hennepin	Ramp to Ramp Weaving	TH62	TH 169 to TH 100
5077	$ 776,300	$ 895,000	$ 598,100	$ 2,269,400	4+ Lane Urban	Hennepin	Entering Traffic	TH62	Lyndale Ave
5145	$ 709,600	$ 418,600	$ 1,039,500	$ 2,167,700	4+ Lane Expressway	Hennepin	Intersection	MN5	CSAH 4
5541	$ 161,500	$ 65,100	$ 1,155,700	$ 1,382,300	4+ Lane Expressway	Hennepin	Intersection	TH7	TH 7 & BLAKE RD
Ramsey County									
6140	$ 4,956,100	$ 2,976,300	$ 4,842,400	$ 12,774,800	6+ Lane Freeway	Ramsey	Exit Capacity	I94	I-94/I-35E
6067	$ 1,628,000	$ 1,848,700	$ 1,989,300	$ 5,466,000	6+ Lane Freeway	Ramsey	Lane Drop	I94	Snelling Ave
6139	$ 1,991,600	$ 1,041,200	$ 1,434,800	$ 4,467,600	6+ Lane Freeway	Ramsey	Lane Drop	I94	Snelling Ave
6032	$ 1,063,900	$ 459,500	$ 823,200	$ 2,346,600	2 Lane Urban	Ramsey	Intersection	TH36	TH 36 & TH 120 (CENTURY AVE)
Scott County									
7005	$ 3,459,500	$ 2,766,100	$ 1,183,500	$ 7,409,100	4 Lane Freeway	Scott	Entering Traffic	US169	From MN 13