SNELLING AVENUE RAPID BUS VISSIM EVALUATION

FINAL REPORT

July 2, 2013

Prepared for

Metro Transit

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REPORT CERTIFICATION

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

By: _____ Dated: 7/2/2013

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SNELLING AVENUE RAPID BUS
VISSIM EVALUATION

EXECUTIVE SUMMARY

Metro Transit has developed a concept for Arterial Bus Rapid Transit, or "rapid bus", to improve transit speed and attractiveness on its busiest urban corridors. Metro Transit is advancing Snelling Avenue/Ford Parkway as the first corridor for rapid bus implementation. This corridor extends roughly 10 miles from the Rosedale Transit Center to the 46th Street LRT Station just west of Trunk Highway 55 (Hiawatha Avenue) in Minneapolis. Metro Transit hopes to begin rapid bus service on this corridor in 2015.

Two components of the rapid bus concept are geometric modification of bus stations to include curb extensions, or bumpouts, to improve the efficiency of loading and unloading maneuvers, and the addition of Transit Signal Priority (TSP) to reduce the amount of transit delay due to red lights. The purpose of this project is to perform a detailed analysis of the potential benefits and costs of these improvements.

Input was sought from agency stakeholders including MnDOT Metro District, Ramsey County, Hennepin County, the City of Saint Paul and the City of Minneapolis. The study process was refined based on input from these stakeholders.

To estimate the potential benefit of TSP and evaluate the performance of the new station configurations, the corridor was modeled using VISSIM. The 34 signalized intersections along the route were included. Year 2012 traffic counts were assumed for the majority of the intersections. Older count data with higher traffic volumes was used for the segment of Snelling Avenue between County Road B and Selby Avenue due to low volumes caused by construction of the Green Line (Central Corridor) LRT at University Avenue during collection of count data in 2012. The cities of Minneapolis and St. Paul are both in the process of implementing new signal timing plans. The anticipated new timing plans were included in the model. ASC/3 software-in-the-loop technology was used to model signal operations, including TSP. The operations of the soon-to-be-completed Green Line were also included in the model.

The a.m. and p.m. peak hours of five scenarios were modeled. The scenarios included a baseline with no rapid bus service, three rapid bus service alternatives with varying station configurations, and a rapid bus alternative scenario with TSP. Significant findings from the analysis included the following:

- During the a.m. peak hour, proposed rapid bus operations with have very little, if any, discernible impact on traffic operations. In quantitative terms, average delay per vehicle for general traffic is expected to increase by less than 2 seconds near each of the proposed stations.
- During the p.m. peak hour, proposed rapid bus operations with have very little impact (less than 2 seconds of added delay per vehicle) at 15 of the 17 stations modeled.

- During the p.m. peak hour, the northbound University Avenue rapid bus station is likely to have an impact on traffic operations of approximately 5 seconds of added delay per vehicle. An analysis of an alternate location for the Northbound University Avenue station at Spruce Tree Avenue was completed. The new configuration of the station moved the stop out of the travel lane and into a right turn lane. The results showed that average delay could be improved by 2 to 5 seconds in the p.m. peak hour under this alternative.
- During the p.m. peak hour, the northbound Hague Avenue rapid bus station is likely to have an impact on traffic operations of approximately 7 seconds of additional delay per vehicle. The southbound Hague Avenue rapid bus station appears to have a slight impact to traffic operations of approximately 2 seconds per vehicle in the p.m. peak hour. An analysis of alternate locations for the Hague Avenue station pair with a northbound station at Selby and a southbound station at Dayton was completed. The results showed that moving the stations further north would result in slightly increased delay (around 2 seconds in the p.m. peak hour) for general traffic.
- VISSIM model analysis results indicate that TSP could reduce travel time for rapid buses by 3 to 5 minutes (10 to 14%). The analysis showed that rapid bus running time during peak periods is expected to vary between 35 and 40 minutes per one-way run without TSP.
- 98% percent of the potential benefit of TSP came from its use at seven project intersections. 13 project intersections in total saw a net benefit from TSP use, while the potential disbenefit outweighed the potential benefit at the remaining 20 project intersections where TSP use was analyzed.
- The intersections showing a potential net benefit due to TSP are as follows. The seven intersections showing greatest potential benefit are in **bold**.

    1. County Road B2 at Snelling Avenue at East Ramps
    2. **Snelling Avenue at Hoyt Avenue**
    3. Snelling Avenue at Midway Parkway
    4. **Snelling Avenue at Thomas Avenue**
    5. **Snelling Avenue at Spruce Tree Avenue**
    6. **Snelling Avenue at St. Anthony Avenue (I-94 North Ramps)**
    7. **Snelling Avenue at Concordia Avenue (I-94 South Ramps)**
    8. **Snelling Avenue at Marshall Avenue**
    9. **Snelling Avenue at Selby Avenue**
    10. Ford Parkway at Fairview Avenue
    11. Ford Parkway at Cretin Avenue
    12. 46th Street at 46th Avenue
    13. 46th Street at 42nd Avenue

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1.0 INTRODUCTION

Metro Transit has developed a concept for Arterial Bus Rapid Transit, or "rapid bus", to improve transit speed and attractiveness on its busiest urban corridors. To date, 12 corridors have been identified for potential future implementation of rapid bus. Based on the outcome of the 2012 *Arterial Transitway Corridors Study* (ATCS), Metro Transit is advancing Snelling Avenue/Ford Parkway as the first corridor for rapid bus implementation. Metro Transit hopes to begin rapid bus service on this corridor in 2015, shortly after the opening of the Green Line (Central Corridor LRT).

The Snelling Avenue rapid bus corridor extends roughly 10 miles from the Rosedale Transit Center south on Snelling Avenue, to Ford Parkway in St. Paul and across the Mississippi River and onto 46th Street, terminating in Minneapolis at the 46th Street LRT Station just west of Trunk Highway 55 (Hiawatha Avenue). The corridor passes through 34 signalized intersections, and crosses two light rail transit (LRT) lines, the Blue Line (Hiawatha) and Green Line (Central Corridor). Twenty rapid bus stations are planned for the corridor, spaced roughly every half mile. Figure 1 provides an overview of the corridor's route and station locations.

1.1 Project Purpose

Two components of the rapid bus concept are geometric modification of bus stations to include curb extensions, or bumpouts, to improve the efficiency of loading and unloading maneuvers, and the addition of Transit Signal Priority (TSP) to reduce the amount of transit delay due to red lights. These two components have the potential to greatly benefit transit operations, but may also adversely impact traffic flow, either on conflicting approaches in the case of TSP, or on the mainline in the case of curb extensions.

The ATCS included a high-level evaluation of the potential time savings benefit to transit of curb extensions and TSP on the Snelling/Ford corridor. The purpose of this project is to build upon the ATCS evaluation and perform a more detailed analysis of the potential benefits and costs of curb extensions and TSP along the corridor.

To properly estimate the potential benefit of TSP and evaluate the performance of the new station configurations, the corridor was modeled using the VISSIM software tool. VISSIM is a microscopic traffic simulation software program capable of modeling complex multimodal transportation networks. It is particularly useful in modeling and evaluating networks with complex transit operations and TSP.

The specific goals for this project are as follows:

1. Identify whether the proposed station locations and configurations are appropriate and can be operated without significant impact to traffic.
2. Evaluate the potential benefit of TSP and provide a ranking of which signalized intersections might benefit most from TSP.
3. Seek input from corridor stakeholders and document the process used to develop recommendations on goals one and two.


Figure 1.1
Snelling Avenue Rapid Bus Corridor
SNELLING AVENUE
ARTERIAL BRT/RAPID BUS CONCEPT
updated 10/8/2012
Rosedale
Roseville
County Road B
Roselawn
Larpenteur
Falcon Heights
Como
Como
St. Anthony Park
Hewitt
Hamline-Midway
Minnehaha
GREEN LINE
University
LONGFELLOW
Union Park
Hague
BLUE LINE
Grand
Macalester-Groveland
St. Clair
Randolph
46th Street Station
Minnehaha
45th/46th
Woodlawn
Finn
Kenneth
Fairview
Highland Park
Highland
0
0.5
1
Miles

1.2 Analysis Methodology

The following process was used to determine the traffic operations impact of the proposed station configurations and the potential benefit of TSP.

Baseline Scenario: First, a baseline model was constructed in VISSIM. This baseline model primarily represented existing (2012) conditions, with some revisions to account for planned geometric and signal timing improvements planned for implementation before the start of rapid bus service in 2015. Further discussion of the enhancements made is provided in Section 2 of this report. After the baseline model was developed using a set of default assumptions, the model was calibrated to replicate real world conditions as accurately as possible. This scenario is termed the *Baseline* in this report.

Rapid Bus Alpha Scenario: The next scenario modeled rapid bus service and stations without any other geometric, traffic volume, or signal timing modifications. Preliminary station configurations, representing the desired condition for transit operations, were assumed for the rapid bus stations under this scenario. For the purposes of this report, this scenario is labeled as *Rapid Bus Alpha*.

Rapid Bus Beta Scenario: Based on input provided by Metro Transit and stakeholders (see Section 1.3), modifications to the station configurations were made to improve areas where significant operational impacts were observed in the model. No other traffic volume, roadway geometry or signal timing modifications were made to this scenario in order to isolate the impact of the revised station geometry. This scenario is termed *Rapid Bus Beta*.

Rapid Bus Refined Scenario: Based on the results of the *Rapid Bus Beta* scenario, and taking into account constraints identified by Metro Transit outside the scope of this study, a final *Rapid Bus Refined* scenario was developed. This scenario incorporates some of the station locations from the *Rapid Bus Alpha* scenario and some of the station locations from the *Rapid Bus Beta* scenario.

Rapid Bus Refined with TSP Scenario: The final step in the analysis process was to incorporate Transit Signal Priority. TSP was added to the model through the use of Econolite ASC/3 software-in-the-loop signal controllers within the VISSIM model. The use of software-in-the-loop technology enables the signal timing in the model to be performed via the same signal controller software that would be used in the field.[1] For the final scenario, labeled as *Rapid Bus Refined with TSP*, the signal timing plans were modified to allow the rapid buses to call for transit signal priority. Traffic operations between this scenario and the *Rapid Bus Refined* scenario were compared in order to estimate the potential benefit of TSP. Detailed discussion on the signal timing modifications made to incorporate TSP and the measures of effectiveness (MOEs) used to assess potential TSP benefit are provided in Section 4 of this report.

[1] The City of Minneapolis uses Siemens/Eagle EPAC controllers to provide TSP. Operation is similar, but not identical to Econolite ASC/3 controllers.

In summary, the scenarios analyzed were as follows:

Table 1.1 –
Scenarios Modeled

No.	Scenario Name	Traffic Volumes	Roadway Geometry	Rapid Bus Service	Signal Timing
1.	Baseline	Year 2012	Year 2012 plus anticipated improvements	n/a	Year 2012 plus anticipated changes
2.	Rapid Bus Alpha		Year 2012 plus anticipated improvements and preliminary rapid bus station configurations	As programmed	
3.	Rapid Bus Beta		Year 2012 plus anticipated improvements and alternative rapid bus station configurations		
4.	Rapid Bus Refined		Year 2012 plus anticipated improvements and "refined" rapid bus station configurations		
5.	Rapid Bus Refined with TSP				Year 2012 plus anticipated changes and TSP

1.3 Stakeholder Involvement

Several project stakeholder agencies were invited to participate in this study. The agencies were invited to provide input throughout the project with the goal of creating a final product that would include issues known to the agencies and adequately address concerns about potential impacts of rapid bus operations and TSP. The agencies participating in the project were:

- MnDOT Metro District
- Ramsey County
- Hennepin County
- City of St. Paul
- City of Minneapolis

Three project stakeholder meetings were held to solicit stakeholder input. The first meeting, involving all project stakeholders, was held December 5, 2012. The purpose of this stakeholder kickoff meeting was to make the stakeholders aware of the project and to explore for any large issues that would need to be taken into account.

The stakeholders provided some guidance on the methodology of the analysis but no large issues were made apparent at this stakeholder meeting. A complete list of the input provided at the meeting is provided in the appendix.

The second stakeholder meeting, involving the City of Saint Paul, was held February 28, 2013. The one significant outcome of this meeting is that the traffic volumes used in each of the modeling scenarios were updated (increased) to better replicate the over-saturated conditions often observed in the field. Rather than using the turning movement count data collected in 2012 by SRF, the models were revised to include traffic count data for Snelling Avenue between Selby Avenue and Midway Parkway from the *Snelling Avenue Multi-Modal Transportation Plan*,

collected in 2004-2005, and volumes used by MnDOT to develop signal timing plans for Snelling Avenue between County Road B and Midway Parkway, collected in 2008. The *Snelling Avenue Multi-Modal Transportation Plan* was produced in 2012 for MnDOT and the City of Saint Paul.

The final stakeholder meeting involved all project stakeholders and was held June 17, 2013. The purpose of this meeting was to present the findings of the study to the project stakeholders and to respond to any questions. The one-hour presentation included a viewing of a five-minute VISSIM animation showing the proposed operation of the Rapid Bus in the p.m. peak hour. Approximately a half dozen stakeholder questions were addressed during the course of the presentation. Meeting minutes for this meeting, include a list of attendees, were prepared by Metro Transit and are available through the Snelling Rapid Bus project office.

1.4 TSP Background

Transit Signal Priority (TSP) is currently used by Metro Transit at 29 intersections in the Twin Cities. 27 of the intersections are along Central Avenue in northeast Minneapolis and adjacent suburbs. The remaining two intersections are near the Rosedale Transit Center in Roseville. Of these 29 intersections, 18 are operated by the City of Minneapolis, 10 are operated by the MnDOT, and one is operated by Ramsey County.

All Metro Transit buses (approximately 850) are equipped with the hardware necessary to facilitate TSP. The EMTRAC brand of TSP equipment was used to equip both the buses and intersections. EMTRAC uses GPS-based technology to perform TSP and also interfaces with the Trapeze Automated Vehicle Location (AVL) system on the buses to provide TSP calls on a conditional basis (when buses are behind schedule by a user-configurable amount of time).

Metro Transit's current TSP functionality was procured and made operational as part of the Urban Partnership Agreement (UPA) project two years ago. Metro Transit contributed funding totaling approximately $4 million to implement the system.

2.0 VISSIM MODEL DEVELOPMENT

All traffic models consist of the following basic components: roadway geometry, traffic volumes, and signal timing. This section of the report details the data incorporated into the VISSIM models for this project.

2.1 Roadway Geometry

To achieve a realistic and yet manageable model, the signalized intersections along the Snelling Avenue rapid bus corridor were included while the (typically lower-volume) unsignalized intersections were not included. The Snelling Avenue Rapid Bus corridor includes 34 signalized intersections:

Table 2.1 –
Snelling Avenue Corridor Signalized Intersections

No.	Signalized Intersection	Operating Agency
1	County Road B2 at Snelling Avenue West Ramps	Ramsey County
2	County Road B2 at Snelling Avenue East Ramps	Ramsey County
3	Snelling Avenue at County Road B	MnDOT Metro
4	Snelling Avenue at Har Mar Mall	MnDOT Metro
5	Snelling Avenue at Roselawn Avenue	MnDOT Metro
6	Snelling Avenue at Larpenteur Avenue	MnDOT Metro
7	Snelling Avenue at Hoyt Avenue	MnDOT Metro
8	Snelling Avenue at Midway Parkway	MnDOT Metro
9	Snelling Avenue at Hewitt Avenue	City of Saint Paul
10	Snelling Avenue at Minnehaha Avenue	City of Saint Paul
11	Snelling Avenue at Thomas Avenue	City of Saint Paul
12	Snelling Avenue at University Avenue	City of Saint Paul
13	Snelling Avenue at Spruce Tree Avenue	City of Saint Paul
14	Snelling Avenue at St Anthony Avenue (I-94 North Ramps)	City of Saint Paul
15	Snelling Avenue at Concordia Avenue (I-94 South Ramps)	City of Saint Paul
16	Snelling Avenue at Marshall Avenue	City of Saint Paul
17	Snelling Avenue at Selby Avenue	City of Saint Paul
18	Snelling Avenue at Summit Avenue	City of Saint Paul
19	Snelling Avenue at Grand Avenue	City of Saint Paul
20	Snelling Avenue at St. Clair Avenue	City of Saint Paul
21	Snelling Avenue at Jefferson Avenue	City of Saint Paul
22	Snelling Avenue at Randolph Avenue	City of Saint Paul
23	Snelling Avenue at Highland Parkway	City of Saint Paul
24	Snelling Avenue at Ford Parkway	City of Saint Paul
25	Ford Parkway at Fairview Avenue	City of Saint Paul
26	Ford Parkway at Kenneth Street	City of Saint Paul
27	Ford Parkway at Cleveland Avenue	City of Saint Paul
28	Ford Parkway at Finn Street	City of Saint Paul
29	Ford Parkway at Cretin Avenue	City of Saint Paul
30	46th Street at 46th Avenue	City of Minneapolis
31	46th Street at 42nd Avenue	City of Minneapolis
32	46th Street at Minnehaha Avenue	City of Minneapolis
33	TH 55 (Hiawatha Avenue) at 46th Street	City of Minneapolis
34	46th Street at 36th Avenue	City of Minneapolis

Existing roadway geometry, including number of lanes, turn lane storage lengths, speed limits, parking restrictions, etc. were collected by SRF in the fall of 2012 at these intersections for the

purpose of building the VISSIM model. As a part of the data collection, traffic patterns were observed to help calibrate the baseline scenario model.

Based on stakeholder input, several roadway improvement projects were identified as likely to occur within a short-term (one- to three-year) time frame. These improvements were incorporated into the model to represent expected conditions when rapid service begins:

- Reconstruction of Ford Parkway between Snelling Avenue and Howell Street
- Reconstruction of the 46th Street/Minnehaha Avenue intersection

2.2 Traffic Volumes

Two-hour a.m. and two-hour p.m. peak period turning movement counts were conducted by SRF on typical (non-holiday) weekdays at each of the signalized intersections along the corridor in 2012. Although rapid bus service is not anticipated to begin until 2015, the Snelling Avenue corridor extends through a fully developed portion of the Twin Cities metro area where volumes are not expected to change dramatically between 2012 and 2015. Background growth in traffic volumes between 2012 and 2015 was therefore not included in the model.

For the intersections between (and including) County Road B and Selby Avenue, stakeholders commented that the volumes collected by SRF in 2012 did not appear to be high enough to replicate the over-saturated conditions often observed in the field. As part of the calibration process, and based on stakeholder input, the turning movement counts used in the model for these 15 intersections were revised.

For the intersections from County Road B to Midway Parkway, turning movement count data provided by MnDOT, collected in 2008 for the purpose of developing signal timing plans, was used. For the intersections from Hewitt Avenue to Selby Avenue, count data from the *Snelling Avenue Multi-Modal Transportation Plan*, collected in 2004-2005, was used.

In order to isolate the impacts of rapid bus and transit signal priority, traffic volumes were held constant across of the four scenarios analyzed.

For the purpose of calculating person-delay in Section 4 of this report, average automobile occupancy was assumed at 1.28 persons per vehicle, based on the findings of the most recent Metropolitan Council Travel Behavior Inventory.[2]

2.3 Signal Timing

The *Baseline* model assumed a mixture of existing and anticipated near-term future signal timing plans. Existing signal timing was assumed at the intersections operated by Ramsey County and MnDOT Metro.

[2] Details are available at http://www.dot.state.mn.us/planning/program/benefitcost.html.

SRF has developed new timing plans for the City of Saint Paul intersections along the corridor as part of a project currently in progress with the City. These timing plans, anticipated to be implemented in mid-2013, were assumed in the *Baseline* model.

The City of Minneapolis is in the midst of a multi-year project to upgrade communication to each of its 800-plus traffic signals. As part of this process, the City is working to develop updated signal timing plans for each intersection. As of December 2012, timing plan development for the 46th Street intersections was partially complete. Cycle lengths had been chosen, but splits and offsets had not yet been determined.

For the *Baseline* model, a set of splits and offsets were developed based on the 2012 count data and proposed cycle lengths for the intersections along 46th Street at 46th Avenue, 42nd Avenue, and Minnehaha Avenue. The timing plans were developed with the goal of maximizing two-way progression along 46th Street.

For the Hiawatha Avenue/46th Street and 46th Street/36th Avenue intersections, the traffic signals were assumed to operate in actuated-uncoordinated, or "Free" mode. Max green times were assumed from existing signal timing data provided by the City.

Detailed discussion on how the *Baseline* model was altered to incorporated transit signal priority is provided in Section 4.2.

2.4 Rapid Bus Station Configuration and Operation

The station configurations for the *Rapid Bus Alpha* scenario were based on information provided by Metro Transit. The *Snelling Avenue Multi-Modal Transportation Plan* was used as an additional reference. This plan included high-level conceptual typical station platform designs for stations at Snelling/Como, Snelling/Hewitt, Snelling/Minnehaha, and Snelling/University.

The assumptions for rapid bus operation at each station provided by Metro Transit were based on preliminary site review and stakeholder input. The most important consideration, in terms of the potential impact to traffic operations, is the anticipated dwell time of the bus at each station.

Average dwell times by station were estimated based on ridership forecasts developed during the ATCS. Based on these forecasts and an average per-person boarding time factor, each directional station was placed in a short, medium, or long dwell time category, with dwell times of 7, 14 and 21 seconds, respectively.

A summary of the assumed preliminary station configuration data is provided in Tables 2.2a and 2.2b for the southbound and northbound directions, respectively.

Table 2.2a –
Northbound Rapid Bus Stations – Preliminary Configuration

No.	Rapid Bus Station	Stop Location	Platform Type	Station Length (ft.)	Dwell Time (sec.)
1	46th Street Station	n/a	n/a	n/a	21
2	Minnehaha	Nearside	Curbside	80	7
3	45th/46th	Nearside 46th	Curbside	80	7 (see note 3)
4	Woodlawn	Midblock	Bumpout	80	14
5	Finn	Farside	Bumpout	80	14
6	Kenneth	Nearside	Bumpout	80	7
7	Fairview	Farside	Bumpout	80	7
8	Highland	Farside	Bumpout	80	7
9	Randolph	Farside	Bumpout	80	7
10	St. Clair	Farside	Bumpout	80	14
11	Grand	Farside	Bumpout	80	7
12	Hague	Farside	Bumpout	80	7
13	University	Farside	Bumpout	80	21
14	Minnehaha	Farside	Bumpout	80	14
15	Hewitt	Farside	Bumpout	80	7
16	Como	Farside	Curbside	80	7
17	Larpenteur	Farside	Curbside	80	14
18	Roselawn	Farside	Curbside	80	7
19	County Road B / Har Mar	Midblock	Curbside	80	7
20	Rosedale Transit Center	n/a	n/a	n/a	21

Table 2.2b –
Southbound Rapid Bus Stations – Preliminary Configuration

No.	Rapid Bus Station	Stop Location	Platform Type	Station Length (ft.)	Dwell Time (sec.)
1	Rosedale Transit Center	n/a	n/a	n/a	21
2	County Road B / Har Mar	Farside Cty. Rd. B	Curbside	80	7
3	Roselawn	Farside	Curbside	80	7
4	Larpenteur	Farside	Curbside	80	14
5	Como	Farside	Curbside	80	7
6	Hewitt	Farside	Bumpout	80	7
7	Minnehaha	Farside	Bumpout	60	14
8	University	Farside	Curbside	80	21
9	Hague	Farside	Bumpout	80	7
10	Grand	Farside	Bumpout	80	7
11	St. Clair	Nearside	Bumpout	80	14
12	Randolph	Farside	Curbside	80	7
13	Highland	Farside	Bumpout	80	7
14	Fairview	Farside	Bumpout	80	7
15	Kenneth	Nearside	Curbside	60	7
16	Finn	Farside	Bumpout	80	14
17	Woodlawn	Nearside	Bumpout	80	14
18	45th/46th	Nearside 45th	Curbside	80	7
19	Minnehaha	Farside	Curbside	80	7
20	46th Street Station	n/a	n/a	n/a	21

[3] Dwell time was modeled as 20 seconds in VISSIM. This error was discovered after modeling had been completed and reported. Since no discernible traffic impact was observed at this station, the error was not corrected.

2.5 Rapid Bus Characteristics

Inputs needed to model the rapid buses included bus length, schedule, and anticipated ridership. Information on each of these inputs was provided by Metro Transit.

Rapid buses are assumed to be 40 feet in length. Rapid buses are proposed to operate on 10-minute headways, yielding a total of 6 rapid buses per hour in each direction. Assumed occupancy during the a.m. and p.m. peak hours ranges from 5 to 42, with higher volumes near the middle ("max load") point on the line, and lower volumes near the ends.

2.6 MOE Reporting

VISSIM is a microscopic traffic modeling tool. Like all microscopic modeling tools, a random number "seed" is used for each model run. This seed is used to determine when vehicles enter the network. The measures of effectiveness (MOEs) reported by the model, such as delay, travel time, etc. vary across successive runs. The amount of variability tends to increase as traffic becomes more congested and reaches saturation. To account for this variability, MOEs from multiple runs of each modeling scenario were completed. Average MOEs from across the multiple runs are reported. For the a.m. peak period, five model runs were completed for each scenario. For the p.m. peak period, it was found that significant variability still remained after averaging across five runs, and that 20 runs were needed to sufficiently control the variability.

2.7 Light Rail Transit Lines

The proposed Snelling Avenue rapid bus line crosses two LRT lines, one existing and one under construction. Two different methods were used to account for these two lines.

For the existing Blue Line (Hiawatha), the City of Minneapolis is currently wrapping up a project to install new advanced traffic signal controllers at the signalized intersections along Hiawatha Avenue. This project includes the intersection at 46th Street, where the Snelling Avenue rapid bus line crosses the LRT line. The new controllers, manufactured by Northwest Signal, are intended to improve the traffic operational performance at the intersections by responding more equitably to the preempt events caused by passing Blue Line trains. The controllers will track the amount of time each movement has been waiting at an intersection. After the preempt event is over, the controller will serve the movement that has been waiting the longest first, rather than a preset phase.

It is not currently possible to model the Northwest Signal controller in VISSIM. Based on a past history of poor traffic operations at the Hiawatha Avenue/46th Street intersection and on stakeholder comments received at the kickoff meeting, the decision was made to assume actuated-coordinated (Free) operation of the traffic signal, ignoring the impact of LRT vehicles at this intersection, and to assume that TSP for rapid buses would not be appropriate for this intersection. In short, this intersection would only be included in the model for the purpose of providing continuity along the corridor and estimating rapid bus running time.

Unlike the Blue Line, which preempts traffic signals in a manner similar to the operation of a freight train, the Green Line (Central Corridor) will instead request priority in a manner identical to the process proposed for rapid buses in this study. Using vehicle size, dwell time, and scheduling information from the *Snelling Avenue Multi-Modal Transportation Plan*, along with

the functionality available through the ASC/3 software-in-the-loop controller, the Green Line, anticipated to begin service in 2014, was included in the VISSIM models.

Based on the current TSP algorithm used in the ASC/3 controller, only one approach is allowed to request priority at a time. For the purpose of this study, no conditions or restrictions on priority requests were applied to either Snelling rapid buses or Green Line LRT vehicles. Calls received were processed first-come, first-served. In practice, the functionality built into the equipment used to place the TSP calls (i.e. EMTRAC, GTT, or others) may be used to give higher priority to the LRT calls than to the rapid bus calls.

3.0 EVALUATION OF RAPID BUS STATION TRAFFIC IMPACT

Twenty stations are proposed along the length of the Snelling Avenue rapid bus corridor, spaced at roughly one-half mile intervals. This section of the report takes a detailed look at the traffic operations near each of these stations with and without rapid bus in place to assess the impact of the preliminary station configurations.

To assess how traffic is operating in the vicinity of each station area, traffic operations for the a.m. and p.m. peak hours at each of the study intersections were analyzed in VISSIM. As noted previously, three scenarios were analyzed to better understand the impact of station location and configuration.

In general, where traffic operations in the *Rapid Bus Alpha* scenario declined noticeably from the *Baseline* scenario, a recommendation was made to adjust either the location or the configuration of the nearby station(s). Operations with the new station locations/configurations in place were analyzed in the *Rapid Bus Beta* scenario. A melded *Rapid Bus Refined* scenario was developed at the end of this process that included some station configurations from the *Alpha* scenario and some from the *Beta* scenario. This *Rapid Bus Refined* scenario is intended to represent Metro Transit's preferred station configuration, based not only on the results of the modeling from the *Alpha* and *Beta* scenarios, but also on project goals and other constraints. The results of this study will be used to inform stakeholder discussions about final station locations and configurations. Final location decisions will be made in cooperation with stakeholders based on this information and other factors. This *Rapid Bus Refined* scenario forms the baseline for analysis of TSP impact in the next section of this report.

3.1 Baseline vs. Alpha Analysis – Average Delay per Vehicle

Several measures of effectiveness (MOEs) were used to gauge the impact of the added Rapid Bus operations. The first MOE used was average delay per vehicle. This MOE was computed for each approach and each intersection in each of the three scenarios. Changes in average delay per vehicle less than around two seconds were observed to occur between successive runs of the same model, and were therefore considered insignificant.

Table 3.1 summarizes the change in intersection delay and arterial travel time between the *Baseline* and *Rapid Bus Alpha* Scenarios. As shown in the table, impact to traffic operations due to Rapid Bus, based on this MOE, is minimal during the a.m. peak hour, with no intersections experiencing an increase in average delay per vehicle of over two seconds. During the p.m. peak hour, seven intersections experience an increase in average delay per vehicle of between two and five seconds. The impact is concentrated on Snelling Avenue in the vicinity of the Interstate 94 interchange.

Table 3.1 –
Rapid Bus Impact on Average Delay per Vehicle

No.	Signalized Intersection	Average Delay Per Vehicle					
		AM Peak Hour			PM Peak Hour		
		Baseline	*Alpha*	Change	*Baseline*	*Alpha*	Change
1	County Road B2 at Snelling Avenue West Ramps	14.0	13.9	(0.1)	29.1	29.4	0.3
2	County Road B2 at Snelling Avenue East Ramps	5.1	5.2	0.1	11.6	11.9	0.3
3	Snelling Avenue at County Road B	33.7	33.9	0.2	71.4	73.9	2.5
4	Snelling Avenue at Har Mar Mall	11.5	11.6	0.1	14.3	14.4	0.1
5	Snelling Avenue at Roselawn Avenue	13.0	13.0	-	24.6	24.0	(0.6)
6	Snelling Avenue at Larpenteur Avenue	96.2	95.7	(0.5)	65.5	64.9	(0.6)
7	Snelling Avenue at Hoyt Avenue	6.2	6.2	-	9.3	8.9	(0.4)
8	Snelling Avenue at Midway Parkway	7.0	6.9	(0.1)	11.6	11.5	(0.1)
9	Snelling Avenue at Hewitt Avenue	11.7	11.9	0.2	17.1	16.9	(0.2)
10	Snelling Avenue at Minnehaha Avenue	13.1	13.3	0.2	23.5	23.4	(0.1)
11	Snelling Avenue at Thomas Avenue	12.4	12.7	0.3	27.5	26.8	(0.7)
12	Snelling Avenue at University Avenue	32.5	31.6	(0.9)	71.9	76.2	4.3
13	Snelling Avenue at Spruce Tree Avenue	6.2	6.1	(0.1)	29.6	34.1	4.5
14	Snelling Avenue at St Anthony Avenue (I-94 North Ramps)	20.9	20.8	(0.1)	43.6	44.2	0.6
15	Snelling Avenue at Concordia Avenue (I-94 South Ramps)	15.6	15.5	(0.1)	42.5	45.7	3.2
16	Snelling Avenue at Marshall Avenue	27.1	26.9	(0.2)	49.3	52.1	2.8
17	Snelling Avenue at Selby Avenue	42.4	41.5	(0.9)	36.9	40.1	3.2
18	Snelling Avenue at Summit Avenue	20.1	20.3	0.2	27.8	27.9	0.1
19	Snelling Avenue at Grand Avenue	23.5	23.8	0.3	27.5	27.8	0.3
20	Snelling Avenue at St. Clair Avenue	14.6	14.7	0.1	18.4	18.5	0.1
21	Snelling Avenue at Jefferson Avenue	11.2	11.3	0.1	14.6	14.4	(0.2)
22	Snelling Avenue at Randolph Avenue	26.9	26.9	-	25.2	25.3	0.1
23	Snelling Avenue at Highland Parkway	9.3	9.4	0.1	8.7	8.8	0.1
24	Snelling Avenue at Ford Parkway	7.6	7.6	-	9.4	9.6	0.2
25	Ford Parkway at Fairview Avenue	12.4	12.7	0.3	18.7	19.6	0.9
26	Ford Parkway at Kenneth Street	8.0	8.2	0.2	9.5	9.6	0.1
27	Ford Parkway at Cleveland Avenue	16.8	17.0	0.2	31.3	32.0	0.7
28	Ford Parkway at Finn Street	5.8	5.8	-	16.6	17.0	0.4
29	Ford Parkway at Cretin Avenue	7.5	7.6	0.1	11.5	11.7	0.2
30	46th Street at 46th Avenue	16.4	16.3	(0.1)	14.2	14.4	0.2
31	46th Street at 42nd Avenue	18.2	18.2	-	14.5	14.6	0.1
32	46th Street at Minnehaha Avenue	22.3	22.4	0.1	45.2	47.3	2.1
33	TH 55 (Hiawatha Avenue) at 46th Street	21.7	22.0	0.3	25.6	25.6	-
34	46th Street at 36th Avenue	4.9	5.0	0.1	3.5	3.8	0.3

3.2 Baseline vs. Alpha Analysis – Non-Rapid Bus Travel Time

The next MOE used to evaluate the impact of Rapid Bus operations was travel time. For the purpose of investigating the impact of Rapid Bus traffic on all other traffic, the travel time for *non*-Rapid Bus traffic was investigated. In order to account for station locations that could vary between scenarios, travel time measurements were recorded for each station from a location roughly two blocks before to two blocks after the *Alpha* scenario station location. These travel time segments were held constant between scenarios as station locations varied. Similar to the average delay analysis, changes in travel time of less than two seconds between runs were common. Therefore, increases in travel times over two seconds due to the addition of Rapid Bus service were considered significant.

Table 3.2 compares non-Rapid Bus arterial travel time between the *Baseline* and *Rapid Bus Alpha* Scenarios. Impact due to Rapid Bus operations, based on this MOE, is minimal during the a.m. peak hour, with no intersections experiencing an increase in average delay per vehicle of over two seconds, confirming the findings of the average delay MOE analysis. During the p.m. peak hour, two travel time segments experienced an increase in average delay per vehicle of at least two seconds. Again, the area of greatest relative impact is concentrated on Snelling Avenue in the vicinity of Interstate 94.

Table 3.2a –
Rapid Bus Impact on Non-Rapid Bus Arterial Travel Time - Northbound

No.	Northbound Station	Non-Rapid Bus Arterial Travel Time					
		AM Peak Hour			PM Peak Hour		
		Baseline	*Alpha*	Change	*Baseline*	*Alpha*	Change
1	46th Street Station	-	-	-	-	-	-
2	Minnehaha	31.9	32.1	0.2	31.6	32.1	0.5
3	45th/46th	42.0	42.0	-	30.5	31.1	0.6
4	Woodlawn	20.7	20.7	-	21.0	21.1	0.1
5	Finn	18.0	17.9	(0.1)	28.3	29.1	0.8
6	Kenneth	21.8	21.9	0.1	23.0	23.0	-
7	Fairview	34.2	34.9	0.7	37.3	38.1	0.8
8	Highland	18.1	18.1	-	17.6	17.6	-
9	Randolph	36.6	35.8	(0.8)	41.4	41.5	0.1
10	St. Clair	20.9	21.0	0.1	23.1	23.2	0.1
11	Grand	30.4	31.1	0.7	59.5	60.0	0.5
12	Hague	53.6	53.2	(0.4)	56.9	64.7	7.8
13	University	32.8	33.0	0.2	45.8	47.8	2.0
14	Minnehaha	23.4	23.7	0.3	29.9	30.6	0.7
15	Hewitt	30.2	30.2	-	31.0	31.1	0.1
16	Como (off arterial - not included in analysis)	-	-	-	-	-	-
17	Larpenteur	39.8	40.4	0.6	62.9	63.4	0.5
18	Roselawn	12.9	12.9	-	11.3	11.3	-
19	County Road B / Har Mar	10.6	10.6	-	10.8	10.8	-
20	Rosedale Transit Center	-	-	-	-	-	-

Table 3.2b –
Rapid Bus Impact on Non-Rapid Bus Arterial Travel Time - Southbound

No.	Southbound Station	Non-Rapid Bus Arterial Travel Time					
		AM Peak Hour			PM Peak Hour		
		Baseline	Alpha	Change	Baseline	Alpha	Change
1	Rosedale Transit Center	-	-	-	-	-	-
2	County Road B / Har Mar	14.9	15.0	0.1	17.9	17.8	(0.1)
3	Roselawn	10.5	10.6	0.1	15.6	15.1	(0.5)
4	Larpenteur	46.2	46.9	0.7	67.8	67.4	(0.4)
5	Como (off arterial - not included in analysis)	-	-	-	-	-	-
6	Hewitt	23.6	23.9	0.3	29.6	29.0	(0.6)
7	Minnehaha	24.1	24.3	0.2	31.9	31.4	(0.5)
8	University	38.7	38.5	(0.2)	68.7	70.3	1.6
9	Hague	12.7	12.8	0.1	12.8	13.0	0.2
10	Grand	35.4	35.2	(0.2)	29.8	30.3	0.5
11	St. Clair	23.0	23.0	-	31.0	31.3	0.3
12	Randolph	31.6	31.7	0.1	30.5	30.5	-
13	Highland	20.4	20.6	0.2	21.9	22.1	0.2
14	Fairview	33.7	35.1	1.4	37.4	38.6	1.2
15	Kenneth	23.1	23.4	0.3	25.8	26.2	0.4
16	Finn	15.5	15.5	-	20.1	20.7	0.6
17	Woodlawn	20.5	20.6	0.1	21.2	21.5	0.3
18	45th/46th	28.9	28.1	(0.8)	28.7	28.8	0.1
19	Minnehaha	49.0	48.6	(0.4)	51.6	51.4	(0.2)
20	46th Street Station	-	-	-	-	-	-

3.3 Conclusions from Baseline vs. Alpha Analysis

Based on the MOE tables above the following conclusions were drawn from the VISSIM analysis:

For the a.m. peak hour:

- Traffic volumes are relatively low. All intersections are under capacity.
- There is no practical difference in the results between the Baseline and Alpha scenarios, in terms of either Average Delay per Vehicle or Non-Rapid Bus Travel Times. **This means that the addition of Rapid Buses would be expected to have very little impact on traffic flow in the a.m. peak hour.**
- In quantitative terms, the maximum amount of added delay to other traffic due to Rapid Buses observed at any intersection in the model is less than two seconds per vehicle.

For the p.m. peak hour:

- The segment of Snelling between (and including) University and Selby is at/over capacity. As previously discussed in section 2.6, this causes significant variation in the model from run to run. To help control for this variability, 20 model runs were averaged, as opposed to 5 runs for the a.m. peak hour. MOEs were averaged across all runs.
- **The average delay and travel time MOE results suggest that adding Rapid Buses will only result in a noticeable traffic flow impact at two station locations: Northbound at University and Northbound at Hague Avenue.** The impact at these two stations is approximately 5-12 seconds of increased delay per vehicle due to the Rapid Buses stopping in a travel lane.
- There also appears to be slight impact due to the Southbound station at Hague Avenue. Though the southbound results are not as conclusive as northbound, the impact at this station for southbound traffic is approximately 3-4 seconds per vehicle judging from the added delay at Marshall.
- At all other stations, the impact due to Rapid Buses is at or below two seconds per vehicle.

Based on these conclusions, SRF recommended that alternative station locations/configurations be examined for the Northbound University Avenue and Northbound Hague Avenue stations, and, if possible, the Southbound Hague Avenue station. To help improve traffic operations, SRF recommended that stations either be moved farther away from the congested segment of Snelling Avenue (away from Interstate 94), or out of the flow of traffic (convert from a bumpout station to a non-bumpout station).

In order to assess traffic impacts of multiple station location alternatives that meet project goals, Metro Transit directed SRF to investigate the effects of the following changes to these three stations:

- Northbound University Avenue: move the station from farside University Avenue to nearside Spruce Tree Avenue and eliminate bumpout. The station would be located in the right turn lane.
- Northbound Hague Avenue: move the station one block north from farside Hague Avenue to farside Selby.

- Southbound Hague Avenue: move the station two blocks north from farside Hague to nearside Dayton.

The remainder of Section 3 of this report looks at these three stations in detail to assess the station location and configuration options studied.

Section 5 of this report provides a station-by-station breakdown of station configuration assumptions and the resulting VISSIM MOEs for each scenario.

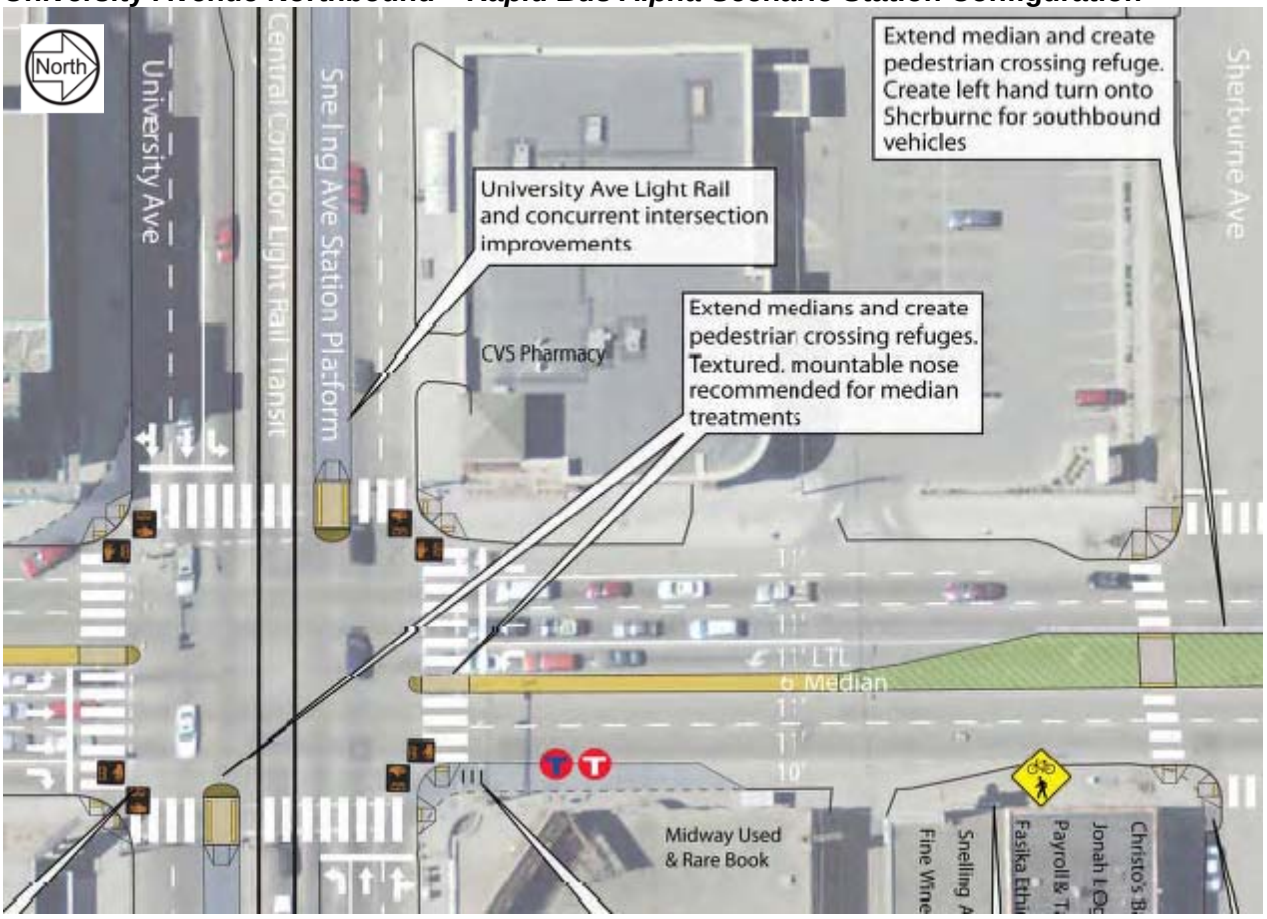
3.4 Alpha vs. Beta Analysis – University Avenue Station

As noted in the previous section of the report, based on a review of overall network traffic operations with and without Rapid Bus service, the University Avenue Northbound station was identified as one of three stations that had the potential for causing traffic flow disruption upon the introduction of Rapid Bus service. Table 3.3 provides details on the station configuration analyzed in the initial Rapid Bus VISSIM scenario, *Rapid Bus Alpha*, and also on the proposed changes to the station configuration to be analyzed in the *Rapid Bus Beta* scenario. Figures 3.1 and 3.2 below illustrate the proposed station configuration alternatives.

Table 3.3 –
Northbound University Avenue Station Alternatives Studied

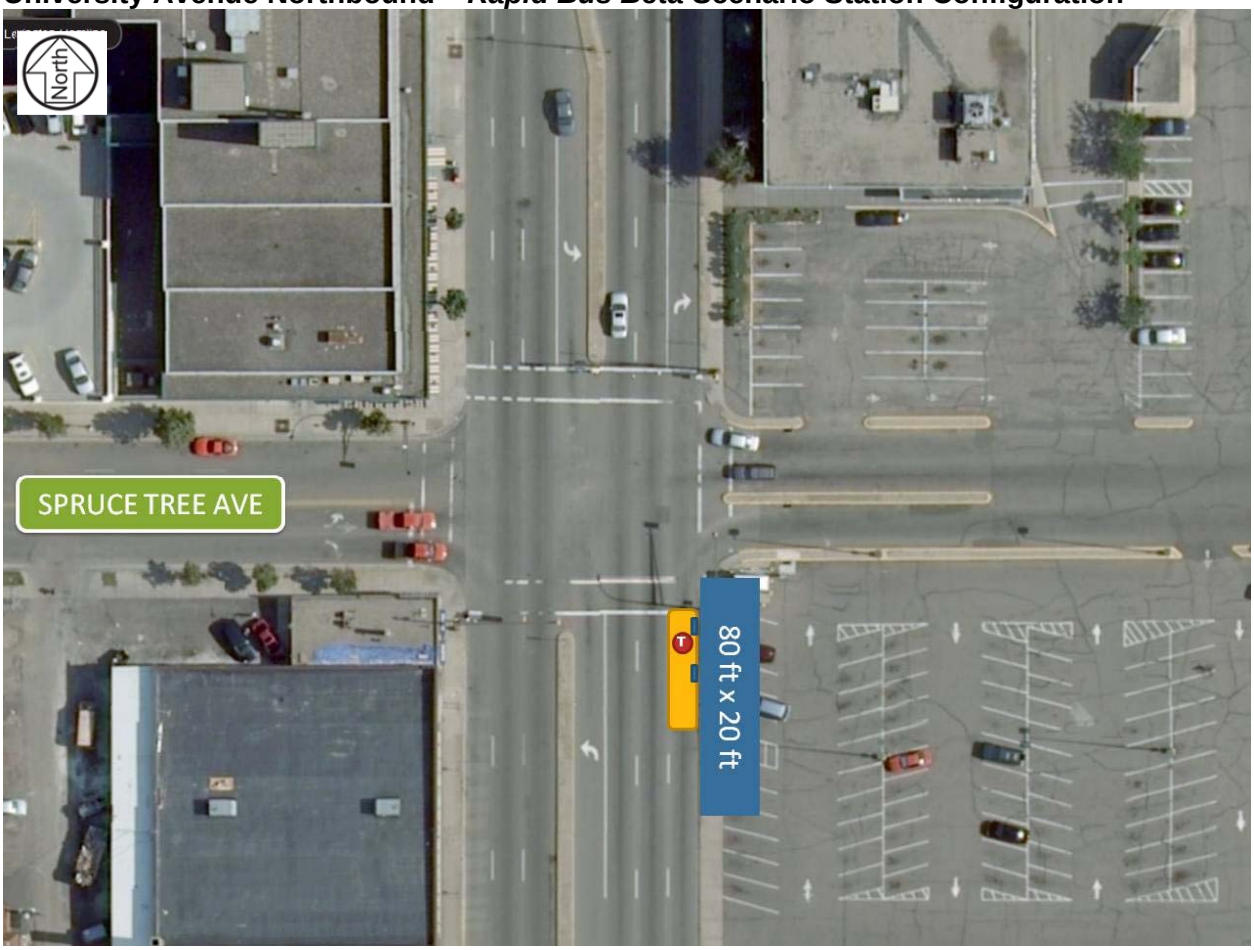
Scenario	Intersection	Location	Platform Type	Station Length (ft.)	Dwell Time (sec.)
Rapid Bus Alpha	University Avenue	Farside	Bumpout	80	21
Rapid Bus Beta	Spruce Tree Lane (one block south)	Nearside	Curbside	80	21

Figure 3.1 –
University Avenue Northbound – *Rapid Bus Alpha* Scenario Station Configuration



(Graphic from *Snelling Multi-Modal Transportation Plan*)

Figure 3.2 –
University Avenue Northbound – *Rapid Bus Beta* Scenario Station Configuration



VISSIM modeling of the *Beta* scenario with the revised station configuration was completed to assess the impact of the revised station location and configuration.

Tables 3.4 and 3.5 below illustrate the traffic impacts of the station configuration alternatives, compared to the Baseline scenario. Average delay per vehicle is summarized in Table 3.4, while non-Rapid Bus travel time is covered in Table 3.5.

From the results of the *Baseline* vs. *Alpha* analysis discussed earlier, no traffic impact due to Rapid Bus service is expected during the a.m. peak period. Detailed results available in the appendix confirm that the station locations and configurations studied in the *Beta* scenario do not impact this conclusion. Tables 3.4 and 3.5 focus on the traffic impacts during the p.m. peak hour.

Table 3.4 –
University Avenue Northbound Station Alternatives –
Rapid Bus Impact on Average Delay per Vehicle

Signalized Intersection	Approach	PM Peak Hour Average Delay Per Vehicle		
		Baseline	***Alpha***	***Beta***
University Avenue	Eastbound	112.0	121.9	110.3
	Westbound	82.4	82.4	86.0
	Northbound	28.8	30.7	28.8
	Southbound	73.6	78.2	80.5
	Total	**71.9**	**76.2**	**74.3**
Spruce Tree Avenue	Eastbound	26.9	25.1	26.8
	Westbound	77.0	70.6	71.7
	Northbound	35.5	48.4	35.4
	Southbound	14.6	14.4	14.7
	Total	**29.6**	**34.1**	**29.1**

Table 3.5 –
University Avenue Northbound Station Alternatives –
Rapid Bus Impact on Non-Rapid Bus Arterial Travel Time

Rapid Bus Station	Direction	PM Peak Hour Average Travel Times		
		Baseline	***Alpha***	***Beta***
University Avenue	Northbound	79.9	89.4	78.2
	Southbound	68.7	70.3	71.4

As shown in Tables 3.4 and 3.5, the *Beta* scenario of the Northbound University Rapid Bus station results in an improvement in traffic flow compared with the *Alpha* scenario for both the average delay and travel time MOEs. Specifically, average delay improves by 1.9 seconds at University Avenue and by 5.0 seconds at Spruce Tree Avenue. Travel time for the approximately four-block segment of Snelling Avenue in the vicinity of the station improves by 11.2 seconds in the northbound direction.

Compared with the *Baseline* scenario, the *Beta* scenario results in similar traffic flow. Average delay at both University and Spruce Tree is within two seconds of the Baseline scenario, while travel times are within three seconds of the Baseline scenario.

3.5 Alpha vs. Beta Analysis – Hague Avenue Station

The network-wide analysis section of the report identified the Hague Avenue station as the only other station with potential to noticeably impact traffic after the addition of Rapid Bus service. Based on the network-wide analysis, the recommended mitigation measure to improve traffic flow in the vicinity of the Hague Avenue station pair was to either move them south away from the congested portion of Snelling Avenue, or to reconfigure them as non-bumpout stations.

However, moving the stations farther south (to Laurel Avenue or beyond) would result in unacceptably wide station spacing to the north, toward the University Avenue station (0.8 mile or greater) and unacceptably narrow spacing to the south toward the Grand Avenue station (0.3 mile or less). Reconfiguring to non-bumpout stations would result in additional delay to transit, reducing the effectiveness of Rapid Bus and working against the project goal of providing faster Rapid Bus service.

Given the noticeable traffic impact of the Hague locations and constraints to the south, station locations to the north were examined in the interest of alternatives comparison.

Tables 3.6a and 3.6b provide details on the station configurations analyzed in the *Rapid Bus Alpha* and *Rapid Bus Beta* scenarios. Figures 3.3 and 3.4 below illustrate the configuration alternatives.

Table 3.6a –
Hague Avenue Northbound Station Alternatives Studied

Scenario	Intersection	Location	Platform Type	Station Length (ft.)	Dwell Time (sec.)
Rapid Bus Alpha	Hague Avenue	Farside	Bumpout	80	7
Rapid Bus Beta	Selby Avenue (one block north)	Farside	Bumpout	80	7

Table 3.6b –
Hague Avenue Southbound Station Alternatives Studied

Scenario	Intersection	Location	Platform Type	Station Length (ft.)	Dwell Time (sec.)
Rapid Bus Alpha	Hague Avenue	Farside	Bumpout	80	7
Rapid Bus Beta	Dayton Avenue (two blocks north)	Nearside	Bumpout	80	7

Figure 3.3 –
Hague Avenue – *Rapid Bus Alpha* Scenario Station Configurations

Figure 3.4 –
Hague Avenue Northbound – *Rapid Bus Beta* Scenario Station Configuration

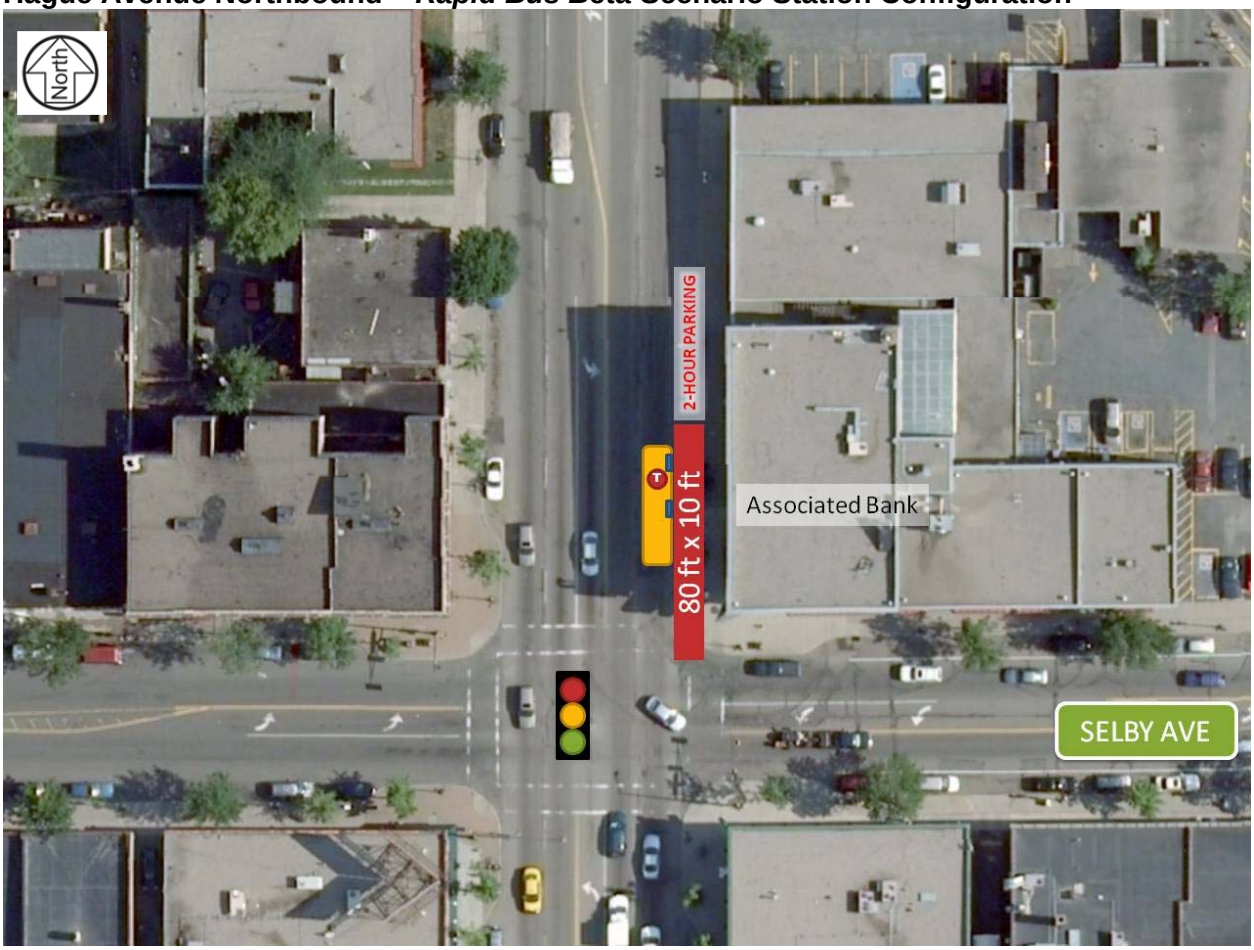


Figure 3.5 –
Hague Avenue Southbound – *Rapid Bus Beta* Scenario Station Configuration

Tables 3.7 and 3.8 below illustrate the traffic impacts of the station configuration alternatives, compared to the Baseline scenario. Average delay per vehicle is summarized in Table 3.7 and non-Rapid Bus travel time is covered in Table 3.8.

Table 3.7 –
Hague Avenue Station Alternatives –
Rapid Bus Impact on Average Delay per Vehicle

Signalized Intersection	Approach	PM Peak Hour Average Delay Per Vehicle		
		Baseline	***Alpha***	***Beta***
Marshall Avenue	Eastbound	41.2	43.0	41.4
	Westbound	38.2	38.3	38.3
	Northbound	44.8	46.0	44.4
	Southbound	57.3	62.1	60.8
	Total	**49.3**	**52.1**	**50.8**
Selby Avenue	Eastbound	34.0	34.4	34.0
	Westbound	31.5	32.2	31.4
	Northbound	58.7	68.3	76.2
	Southbound	26.7	27.5	28.3
	Total	**36.9**	**40.1**	**42.5**

Table 3.8 –
Hague Avenue Station Alternatives –
Rapid Bus Impact on Non-Rapid Bus Arterial Travel Time

Rapid Bus Station	Direction	PM Peak Hour Average Travel Times		
		Baseline	***Alpha***	***Beta***
Hague Avenue	Northbound	72.8	79.7	84.8
	Southbound	39.3	39.7	40.3

As shown in Table 3.4, the *Beta* scenario of the Northbound Hague Rapid Bus station (relocated to Selby) results in a slight decline in traffic efficiency at Marshall Avenue, with slight improvement at Selby, compared with the *Alpha* scenario. Specifically, average delay shrinks by 1.3 seconds at Marshall and grows by 2.4 seconds at Selby Avenue. This result is consistent with the relocation of the Hague Avenue stations away from Selby Avenue northward toward Marshall Avenue.

Table 3.5 shows that non-Rapid Bus arterial travel times increased in both the northbound and southbound directions for the roughly four-block segment of Snelling Avenue in the vicinity of the Hague Avenue station. Northbound travel time increased by 5.1 seconds while Southbound increased by 0.6 seconds.

The conclusion from these results is that the location of the Hague Avenue stations does have a slight impact of traffic efficiency. Shifting the northbound station one block north appears to have a bigger impact on traffic operations (around 5 seconds per vehicle of added delay, on average) than does shifting the southbound station two blocks north (2 seconds of added delay).

3.6 Rapid Bus Refined Scenario

Based on the results of the *Alpha* and *Beta* scenarios, and taking into account external constraints and project goals, Metro Transit established a "chosen" scenario to be used for the TSP analysis discussed in the next section of this report.

The *Rapid Bus Refined* scenario is Metro Transit's desired scenario to use for the purposes of testing the potential benefit of TSP. In particular, At University Avenue, Metro Transit chose to keep the *Alpha* northbound station location, rather than the Beta location that resulted in improved traffic flow metrics. Similarly, the *Rapid Bus Refined* scenario incorporates the Beta location for both the northbound and southbound Hague Avenue stations. In summary, the *Rapid Bus Refined* scenario should not be considered a "preferred" scenario from a purely traffic operations perspective, but rather a chosen baseline scenario for the purposes of assessing potential TSP benefit.

As decisions are made regarding the placement of the University and Hague Avenue stations, sections 3.2 and 3.3 of this report should be used as reference to understand the pros and cons of each from a traffic flow perspective.

4.0 ASSESSMENT OF POTENTIAL TSP BENEFIT

The second goal of this project was to determine the potential benefit of transit signal priority at the signalized intersections along the corridor. The determination of potential benefit was broken into a three-step process.

The first step was to analyze the *Baseline* scenario signal timing plans to determine where additional green time could be taken from conflicting phases during a TSP call to increase the amount of green time for the TSP phase. This process will be referred to as a "slack time analysis."

The next step was to develop a practice for the maximum amount of green time that could realistically be taken from conflicting phases, based on traffic operations and driver expectancy considerations, and apply this practice to develop the settings to input into the ASC/3 software-in-the-loop controller used in the VISSIM models.

The final step was to run the VISSIM model with the TSP-enabled timing plans in place. By analyzing the difference in MOEs between the *Rapid Bus Refined* and *Rapid Bus Refined with TSP* scenarios, conclusions were be drawn as to the potential benefit of TSP at each of the signalized intersections along the corridor. This section of the report details this process and resulting findings.

4.1 TSP Slack Time Analysis

The first step in determining where TSP may be of benefit along the Snelling Avenue rapid bus corridor is to look at where the TSP signal phase(s) would be able to take time from conflicting phase(s). For the Snelling Avenue rapid bus corridor, the TSP phases are generally the mainline through phases, while the conflicting phases are typically the mainline left turn phases as well as the cross street through and left turn phases. The amount of time available to reallocate from conflicting phases is equal to the difference between the actual green time, or split, and the minimum time for that phase. In simple terms, the minimum time for a phase is the greater of either the:

- **Minimum Green + Yellow + All Red** times, or the
- **Walk + Flashing Don't Walk + Yellow + All Red** times for that phase.

In general, the intersections with the most slack time on conflicting phases have the greatest potential for TSP benefit. However, a slack time analysis is only a preliminary gauge of the potential benefit of TSP. It does not take into account the level of traffic congestion that may be present at intersections. To fully gauge the potential benefit of TSP therefore, an understanding of both the availability of slack time and the availability to transfer green time from non-TSP phases to TSP phases is necessary.

The slack time analysis was completed for the a.m. and p.m. peak hours for the signalized intersections on the Snelling Avenue rapid bus corridor. Table 4.1, below, provides a summary of the slack time analysis. Details of the analysis are available in the appendix.

Table 4.1
Slack Time Analysis Summary

No.	Intersection	AM TSP Slack Time (1)	PM TSP Slack Time (1)	Overall TSP Potential (2)	Notes
1	Snelling Ave & B2 West Ramps	21%	61%	Med	
2	Snelling Ave & B2 East Ramps	48%	78%	High	
3	Snelling Ave & Cty Rd B	11%	19%	Med	
4	Snelling Ave & Har Mar	6%	14%	Med	
5	Snelling Ave & Roselawn	2%	0%	Low	
6	Snelling Ave & Larpenteur	18%	32%	Med	
7	Snelling Ave & Hoyt	6%	2%	Low	
8	Snelling Ave & Midway	6%	2%	Low	
9	Snelling Ave & Hewitt Ave	0%	0%	Low	
10	Snelling Ave & Minnehaha Ave	1%	30%	Med	
11	Snelling Ave & Thomas Ave	0%	14%	Low	
12	Snelling Ave & University Ave	8%	24%	Med	Consider CCLRT impacts (3)
13	Snelling Ave & Spruce Tree Ave	2%	33%	Med	
14	Snelling Ave & St Anthony Ave	72%	95%	High	benefit primarily for SB
15	Snelling Ave & Concordia Ave	25%	66%	Med	benefit primarily for NB
16	Snelling Ave & Marshall Ave	2%	3%	Low	
17	Snelling Ave & Selby Ave	72%	81%	High	benefit primarily for NB
18	Snelling Ave & Summit Ave	20%	41%	Med	
19	Snelling Ave & Grand Ave	15%	33%	Med	
20	Snelling Ave & St Clair Ave	25%	45%	Med	
21	Snelling Ave & Jefferson Ave	11%	4%	Low	
22	Snelling Ave & Randolph Ave	10%	34%	Med	
23	Snelling Ave & Highland Pkwy	0%	0%	Low	
24	Snelling Ave & Ford Pkwy	5%	5%	Low	
25	Ford Pkwy & Fairview Ave	38%	38%	Med	
26	Ford Pkwy & Kenneth Ave	23%	24%	Med	
27	Ford Pkwy & Cleveland Ave	12%	37%	Med	
28	Ford Pkwy & Finn Ave	6%	41%	Med	benefit primarily for EB
29	Ford Pkwy & Cretin Ave	14%	4%	Low	benefit primarily for WB
30	46th & 46th	22%	31%	Med	
31	46th & 42nd	30%	31%	Med	
32	46th & Minnehaha	67%	116%	High	
33	Hiawatha & 46th	134%	134%	High	Avoid TSP - LRT impacts (4)
34	46th & 36th	71%	71%	High	

Notes:
(1) The percentage reported for "TSP Slack Time" reflects the average amount of slack time available for use by the TSP phase(s) at an intersection.
(2) Overall TSP Potential categorizes intersections by the average amount of slack time available for TSP. The ranges (0-10%,10%-50%,>50%) are arbitrary.
(3) Central Corridor LRT will use TSP on University Avenue. See discussion in Section 2.5.
(4) Based on stakeholder input, TSP to be avoided at Hiawatha/46th due to existing traffic operational issues on Hiawatha Avenue related to LRT. See Section 2.5.

As shown in Table 4.1, the five intersections with the greatest TSP potential, based solely on available slack time, are:

- Snelling Avenue/St. Anthony Avenue;
- Snelling Avenue/Selby Avenue;
- County Road B2/Snelling Avenue East Ramps;
- 46th Street/Minnehaha Avenue, and;
- 46th Street/36th Avenue.

(The intersection of Hiawatha Avenue and 46th Street was removed from TSP consideration due to Hiawatha corridor LRT conflicts – see Section 2.4). 18 intersections have "medium" potential for TSP benefit based solely on the slack time analysis, while the remaining 10 intersections have "low" potential. The thresholds between the low, medium, and high rankings were based on average available slack time across the AM and PM peak periods, and are arbitrary (10% potential increase in TSP approach green time for the low-to-medium threshold and 50% potential increase in TSP approach green time for the medium-to-high threshold).

While some intersections have a higher potential for TSP benefit than others based solely on the slack time analysis, all of the intersections with the exception of two (Snelling Avenue at Hewitt Avenue and Snelling Avenue at Highland Avenue) have the potential for some TSP benefit, based on Table 4.1. The next two sections of the report cover the second part of the TSP analysis where the VISSIM model was used to assess the impact of traffic congestion on the potential benefit of TSP.

4.2 Development of Preliminary TSP Timing Settings

In order to model TSP in VISSIM (and operate TSP in real life), settings relating to the amount of time that a TSP approach is allowed to take from conflicting approaches during a TSP call must be determined and applied. Although it is actually possible to take up to 100% of the available slack time from a conflicting approach for a TSP event, in practice this can result in poor traffic operations on the conflicting approach.

Discussion on this topic at the stakeholder kickoff meeting resulted in the identification of conflicting interests. While Metro Transit's goal for this project was to identify the maximum potential benefit of TSP, MnDOT Metro requested that a realistic assumption be made on the amount of time TSP is allowed to take from conflicting phases.

To accommodate MnDOT's request, the practice for developing the TSP settings assumed as part of the analysis was as follows: the maximum reduction in green time for any one phase was equal to 25% of the green time split for that phase.

For example, at the intersection of Snelling Avenue and Selby Avenue, the current split for phase 4 EB/WB is 53 seconds in the p.m. peak. Per the Maximum Green Time Reduction practice applied, the largest reduction in green time for this phase during a TSP call would be 13 seconds (25% of 53 seconds). The slack time for this phase during the p.m. peak is 24 seconds. So while the maximum potential green time reduction for this phase is 24 seconds, the analysis completed for this project would assume that a TSP call would reduce the green time on this phase by up to

only 13 seconds. The actual amount of time that the split is reduced varies depending on the point during the cycle that a TSP call is received.

The basis for the assumed Maximum Green Time Reduction practice is the process used to develop the TSP settings for over 75 intersections in St. Cloud, Minnesota, where TSP has been in use successfully for over 10 years. This Green Time Reduction Practice is being used for the purpose of assessing potential TSP benefit only as part of this study. Because every system and every intersection is different, the actual maximum green time reduction thresholds to be used in the field should to be refined and fine-tuned intersection-by-intersection as part of TSP implementation to ensure that the optimal balance between transit benefit and non-transit impact is achieved.

Using the assumed Maximum Green Time Reduction practice, Maximum Green Reduction settings were developed for both the a.m. and p.m. peak hour timing plans for all phases at each of the study intersections. These settings were entered into the ASC/3 software-in-the-loop controllers and used for the *Rapid Bus Refined with TSP* scenario. The VISSIM model for this scenario was also updated to include TSP detection extending from the stop bar to a distance of approximately 15 to 20 seconds (600 to 800 feet) upstream of each signalized intersection. For stations located on the near side of signalized intersections (including St. Clair and Kenneth), the detection distance was reduced by the stations dwell time, plus two seconds of acceleration and two seconds of deceleration time.

The model also included the assumption that each rapid bus would place a call for priority at every intersection, consistent with the project goal to estimate to potential maximum benefit of TSP. In practice, conditions may be placed on when TSP calls are made (i.e. "Conditional" TSP), similar to how TSP operates on Central Avenue today. For example, calls may only be placed when a bus is more than five minutes behind schedule.

4.3 VISSIM Analysis of Potential TSP Benefit – Network Wide

The *Rapid Bus Refined* and *Rapid Bus Refined with TSP* were compared to determine the potential benefit of TSP.

A primary MOE to consider when evaluating the potential benefit of TSP is travel time savings for the rapid buses. In VISSIM, this MOE can be reported directly. Table 4.2 summarizes the potential benefit of TSP, in travel time terms as reported from VISSIM, for the Snelling Avenue rapid bus corridor. Travel times were measured from the time of departure at the first station to the time of arrival at the last station.

Table 4.2 –
Corridor Travel Time Reduction with TSP

Scenario Name	Average Travel Time (minutes:seconds)			
	AM Peak Hour		PM Peak Hour	
	Northbound	Southbound	Northbound	Southbound
Rapid Bus Refined	35:08	34:29	40:25	36:37
Rapid Bus Refined with TSP	31:20	30:41	34:35	32:59
Change	(3:48)	(3:48)	(5:50)	(3:38)
% Change	(11%)	(11%)	(14%)	(10%)

As shown in Table 4.2, the potential for reduction in travel times of between three and six minutes exists. In percentage terms, this equates to a reduction of between 10 and 14 percent.

The potential benefit is weighed against the costs. For TSP, such costs include the additional delay incurred by drivers on movements that conflict with the transit route. When additional time is given to the transit movement, the time is taken away from these conflicting movements.

One way to gauge the cost of TSP is to look at the amount of additional delay incurred, network-wide. Total network delay is the amount of delay, typically measured in hours, of all of the vehicles in the model for the entire hour being modeled. It is equivalent to the average delay per vehicle times the number of vehicles per hour, summed for each movement at all of the modeled intersections. This MOE is directly reported by VISSIM. Table 4.3 summarizes the change in total network delay between two TSP evaluation scenarios.

Table 4.3 –
Total Network Delay Increase with TSP

Scenario Name	Total Network Delay (hours)	
	AM Peak Hour	PM Peak Hour
Rapid Bus Refined	503	940
Rapid Bus Refined with TSP	528	1,065
Change	25	125
% Change	5%	13%

As shown in Table 4.3, implementation of TSP as assumed would result in a 5-13% increase in total network delay.

To directly compare the benefits of TSP with the costs, total network person-delay is a more appropriate MOE. Total network person-delay is similar to total network delay, but accounts for the occupancy of each vehicle, thereby accounting for the additional person throughput of transit vehicles. Although a person-delay MOE is available as a built-in MOE in VISSIM, it does not accurately reflect the true amount of person-delay for this project.

To compute person-delay, therefore, an indirect approach was used as follows. The Average delay per vehicle and number of vehicles per movement per hour outputs from VISSIM were multiplied to get total delay. The number of rapid buses per hour on each movement and the occupancy of each rapid bus were tallied manually and used as additional inputs. The total number of persons per movement output from VISSIM was added to the number of rapid buses times the assumed occupancy per bus to get total persons. The resulting total delay and total persons were multiplied together to get person-delay per movement. Total Network Person-Delay was calculated by summing across all movements and for all intersections. This calculation is summarized as follows:

$$TNPD = \sum_i ADPV_i * (NP_i + RBV_i * RBO_i)$$

Where:

- TNPD = Total Network Person-Delay
- $ADPV_i$ = Average Delay per Vehicle (on a given movement)

- NP_i = Number of Persons per hour (on that movement); non-Rapid Bus vehicles only
- RBV_i = Rapid Bus Volume per hour (on that movement)
- RBO_i = Assumed Rapid Bus Occupancy, per Metro Transit (on that movement)

Table 4.4 compares the results of the network-wide person-delay with and without TSP.

Table 4.4 –
TSP Impact on Network-Wide Person-Delay

Scenario Name	Total Network Person-Delay (person-hours)	
	AM Peak Hour	PM Peak Hour
Rapid Bus Refined	654	1,259
Rapid Bus Refined with TSP	680	1,397
Change	26	138
% Change	4%	11%

Table 4.4 shows that on a per-person basis, the use of TSP results in a smaller increase in delay. The reason for this difference is that the higher occupancy of the rapid buses on the TSP routes with reduced delay help to offset the increased delay on the other movements. The overall increase in person-delay in the a.m. peak hour is 4%, compared with a 5% increase in vehicle delay. In the p.m. peak hour the increase in person-delay is 11% vs. 13% for vehicle delay.

4.4 VISSIM Analysis of Potential TSP Benefit – By Intersection

To help better gauge the potential benefit of TSP, an intersection-by-intersection evaluation was completed. Person-delay was also the MOE used for this analysis. Table 4.5 shows the results of the analysis, providing a "TSP Benefit Score" for each intersection. This score is equal to the reduction of person-delay between the Rapid Bus Refined and Rapid Bus Refined with TSP scenarios, scaled to give the intersection with the greatest reduction in person-delay a score of 100, and a net reduction of 0 hours of person delay a score of 0. A negative TSP Benefit Score indicates an increase in person-delay with TSP.

To help assess where to invest limited financial resources available for implementing TSP, Intersections with a positive TSP Benefit score were also ranked in order of most to least potential for benefit due to TSP.

Table 4.5 –
TSP Impact on Person-Delay By Intersection

No.	Signalized Intersection	Person-Delay (hours)						TSP Benefit Score	TSP Benefit Rank
		AM Peak Hour			PM Peak Hour				
		No TSP	*With TSP*	Change	*No TSP*	*With TSP*	Change		
1	County Road B2 at Snelling Avenue West Ramps	6.2	6.2	0.0	31.7	32.8	1.1	(4)	
2	County Road B2 at Snelling Avenue East Ramps	1.8	1.9	0.1	8.8	8.6	(0.2)	0	12
3	Snelling Avenue at County Road B	50.5	51.8	1.4	146.9	172.4	25.5	(108)	
4	Snelling Avenue at Har Mar Mall	13.5	13.8	0.4	21.3	22.2	0.8	(5)	
5	Snelling Avenue at Roselawn Avenue	14.8	15.3	0.4	33.2	37.7	4.5	(20)	
6	Snelling Avenue at Larpenteur Avenue	142.3	155.2	12.8	125.2	163.7	38.5	(205)	
7	Snelling Avenue at Hoyt Avenue	7.1	7.2	0.0	14.1	10.5	(3.6)	14	7
8	Snelling Avenue at Midway Parkway	7.8	7.7	(0.0)	16.3	15.8	(0.5)	2	9
9	Snelling Avenue at Hewitt Avenue	12.1	12.5	0.3	22.4	22.9	0.6	(4)	
10	Snelling Avenue at Minnehaha Avenue	13.6	14.4	0.8	33.1	35.1	2.0	(11)	
11	Snelling Avenue at Thomas Avenue	12.2	11.9	(0.3)	36.0	29.2	(6.7)	28	6
12	Snelling Avenue at University Avenue	44.3	49.9	5.6	138.0	214.0	76.0	(327)	
13	Snelling Avenue at Spruce Tree Avenue	6.4	5.7	(0.7)	47.5	23.2	(24.3)	100	1
14	Snelling Avenue at St Anthony Avenue (I-94 North Ramps)	33.0	32.5	(0.5)	78.8	71.9	(6.9)	30	5
15	Snelling Avenue at Concordia Avenue (I-94 South Ramps)	23.3	24.7	1.4	72.2	61.5	(10.7)	37	3
16	Snelling Avenue at Marshall Avenue	39.9	37.2	(2.7)	80.7	74.2	(6.5)	37	4
17	Snelling Avenue at Selby Avenue	58.5	52.5	(6.0)	58.1	49.2	(8.9)	60	2
18	Snelling Avenue at Summit Avenue	18.9	19.9	1.0	35.1	59.5	24.4	(101)	
19	Snelling Avenue at Grand Avenue	21.1	26.0	4.9	32.6	39.2	6.6	(46)	
20	Snelling Avenue at St. Clair Avenue	11.4	14.3	2.9	18.7	23.1	4.5	(30)	
21	Snelling Avenue at Jefferson Avenue	6.7	7.8	1.1	10.3	11.5	1.2	(10)	
22	Snelling Avenue at Randolph Avenue	23.5	26.8	3.3	25.2	27.4	2.1	(22)	
23	Snelling Avenue at Highland Parkway	5.2	5.9	0.7	5.7	6.0	0.3	(4)	
24	Snelling Avenue at Ford Parkway	4.5	4.8	0.3	6.9	7.2	0.3	(2)	
25	Ford Parkway at Fairview Avenue	8.0	8.0	0.1	16.9	16.7	(0.2)	0	11
26	Ford Parkway at Kenneth Street	2.9	3.0	0.1	5.6	5.7	0.1	(1)	
27	Ford Parkway at Cleveland Avenue	13.5	13.9	0.4	35.9	43.2	7.3	(31)	
28	Ford Parkway at Finn Street	3.0	2.9	(0.1)	14.4	14.6	0.2	(1)	
29	Ford Parkway at Cretin Avenue	3.7	3.6	(0.0)	8.9	8.9	(0.0)	0	13
30	46th Street at 46th Avenue	7.1	7.0	(0.1)	10.0	9.8	(0.1)	1	10
31	46th Street at 42nd Avenue	5.5	4.7	(0.7)	6.5	5.8	(0.7)	6	8
32	46th Street at Minnehaha Avenue	11.9	11.6	(0.3)	33.8	44.8	11.0	(43)	
33	TH 55 (Hiawatha Avenue) at 46th Street	18.6	18.6	(0.0)	27.8	27.8	(0.0)	-	
34	46th Street at 36th Avenue	0.9	1.0	0.0	0.8	0.9	0.1	(0)	

As shown in Table 4.5, 13 of the 34 project intersections were found to have positive TSP benefit scores. Of these 16 intersections, a large majority of the benefit of TSP is incurred at a handful of project intersections:

1. Snelling Avenue at Spruce Tree Avenue
2. Snelling Avenue at Selby Avenue
3. Snelling Avenue at Marshall Avenue
4. Snelling Avenue at Thomas Avenue
5. Snelling Avenue at Hoyt Avenue
6. Snelling Avenue at St. Anthony Avenue (I-94 North Ramps)
7. Snelling Avenue at Concordia Avenue (I-94 South Ramps)

In quantitative terms, these seven intersections accounted for 98% of all of the benefit yielded by TSP. Table 4.6 compares this list of high-benefit intersections to the initial results from the slack time analysis.

Table 4.6 –
High Potential Benefit TSP Intersections

Signalized Intersection	TSP Potential based on Slack Time Analysis
Snelling at Spruce Tree	Medium
Snelling at Selby	High
Snelling at Marshall	Low
Snelling at Thomas	Low
Snelling at Hoyt	Low
Snelling at St. Anthony (I-94 N. Ramps)	High
Snelling at Concordia (I-94 S. Ramps)	Medium

As shown in Table 4.6, the slack time analysis alone was not a dependable gauge of potential TSP benefit. While two intersections ranking "high" in the slack time analysis made the list of high potential benefit intersections based on the VISSIM analysis, three intersections ranking low also made the list. This result confirms that traffic conditions must be taken into account when forecasting were TSP may be of potential benefit; an analysis of signal time alone is not sufficient.

The most plausible explanation for this outcome is that although the amount of time shifted to the TSP route from the non-TSP phases was likely small for the intersections scoring "low" in the slack time analysis, the use of this extra time by rapid buses resulted in little to no adverse impact for other vehicles on conflicting approaches.

Two other findings are of note. The first is that the results confirm that TSP can be of significant benefit at intersections with very little slack time. Two of the intersections (Marshall Avenue and Hoyt Avenue) had average slack times of 0 to 5% but were able to provide potential benefit equivalent to intersections with slack times of close to 100%.

The second is that the two intersections with zero slack time (Snelling Avenue at Hewitt Avenue and Snelling Avenue at Highland Parkway) saw essentially no change in operations with versus without TSP. This result is a good check on the validity of the model results.

4.5 VISSIM Animation

To help visualize the impact of TSP on Rapid Bus operations, animations of the northbound and southbound p.m. peak hour Rapid Bus Refined with TSP scenarios were produced. The animations "follow" one Rapid Bus along its entire route during the p.m. peak hour. To aid in stakeholder review of the simulations, they were placed on SRF's You Tube channel at the following URLs:

- Northbound: http://youtu.be/od0fM3EExc8
- Southbound: http://youtu.be/H196iulyFFI

To help better understand where TSP provides benefit, a table showing when calls for TSP were made and whether the call resulted in early green, extended green, or no advantage was produced. The table was divided into two parts, one each for the northbound and southbound videos, as shown on the following two pages in Tables 4.7a and 4.7b.

One important item to note in Tables 4.7a and 4.7b is that while TSP is requested at each intersection, priority is not always granted. There are multiple possible reasons for this. For instance, a bus may arrive during green and priority may not be needed. Or, a priority call for a bus in the opposing direction may have just occurred and the signal controller is still in the process of returning to normal timing. Finally, at University Avenue, a priority event for the Green Line LRT may be in progress or may have only recently concluded.

Another important item to note from review of Tables 4.7a and 4.7b is that the reduction in travel time for Rapid Bus, as detailed in Table 4.2, is greater than the amount of additional green time gained by the Rapid Bus with TSP. The reason this is possible is that when a Rapid Bus calls for priority and receives even a short extension of green time, it avoids having to wait for the side streets and mainline lefts to be served, eliminating a significant amount of delay. In other words, a small amount of additional green time gained through the use of TSP can translate to a large reduction in travel time.

Table 4.7a –
Video Interpretation Log - Rapid Bus with TSP - Northbound PM

No.	Signalized Intersection	Time of TSP Request	Response	Advantage Gained
1	46th Street at 36th Avenue	0:03	No Priority	-
2	TH 55 (Hiawatha Avenue) at 46th Street	-	n/a - no TSP	-
3	46th Street at Minnehaha Avenue	0:32	Early Green	0:04
4	46th Street at 42nd Avenue	0:57	Extended Green	0:01
5	46th Street at 46th Avenue	1:12	Early Green	0:22
6	Ford Parkway at Cretin Avenue	2:20	No Priority - Arrived on Green	-
7	Ford Parkway at Finn Street	2:30	No Priority - Arrived on Green	-
8	Ford Parkway at Cleveland Avenue	2:51	Early Green	0:09
9	Ford Parkway at Kenneth Street	3:19	No Priority - Arrived on Green	-
10	Ford Parkway at Fairview Avenue	3:49	No Priority - Arrived on Green	-
11	Snelling Avenue at Ford Parkway	4:27	No Priority	-
12	Snelling Avenue at Highland Parkway	4:41	Early Green	0:11
13	Snelling Avenue at Randolph Avenue	5:17	Early Green	0:15
14	Snelling Avenue at Jefferson Avenue	5:49	Early Green	0:03
15	Snelling Avenue at St. Clair Avenue	6:05	Opposing Bus - Arrived on Green	-
16	Snelling Avenue at Grand Avenue	6:43	Early Green	0:01
17	Snelling Avenue at Summit Avenue	7:04	Early Green	0:08
18	Snelling Avenue at Selby Avenue	7:33	Early Green	0:11
19	Snelling Avenue at Marshall Avenue	8:22	Early Green	0:06
20	Snelling Ave. at Concordia Ave. (I-94 S. Ramps)	8:50	Early Green	0:07
21	Snelling Ave. at St Anthony Ave. (I-94 N. Ramps)	9:12	Early Green	0:11
22	Snelling Avenue at Spruce Tree Avenue	9:24	No Priority - Arrived on Green	-
23	Snelling Avenue at University Avenue	9:41	No Priority - Arrived on Green	-
24	Snelling Avenue at Thomas Avenue	10:09	No Priority - Arrived on Green	-
25	Snelling Avenue at Minnehaha Avenue	10:27	Early + Extended Green	0:03
26	Snelling Avenue at Hewitt Avenue	11:06	Extended Green	0:06
27	Snelling Avenue at Midway Parkway	12:27	No Priority - Arrived on Green	-
28	Snelling Avenue at Hoyt Avenue	12:58	No Priority - Arrived on Green	-
29	Snelling Avenue at Larpenteur Avenue	13:13	Early Green	0:06
30	Snelling Avenue at Roselawn Avenue	14:32	No Priority - Arrived on Green	-
31	Snelling Avenue at Har Mar Mall	15:01	No Priority - Arrived on Green	-
32	Snelling Avenue at County Road B	15:23	Early Green	0:10
33	County Road B2 at Snelling Avenue East Ramps	16:12	Early Green	0:06
34	County Road B2 at Snelling Avenue West Ramps	16:29	Early Green	0:08
	Total			**2:28**

Table 4.7b –
Video Interpretation Log - Rapid Bus with TSP - Southbound PM

No.	Signalized Intersection	Time of TSP Request	Response	Advantage Gained
1	County Road B2 at Snelling Avenue West Ramps	0:04	Early Green	0:04
2	County Road B2 at Snelling Avenue East Ramps	-	n/a	-
3	Snelling Avenue at County Road B	0:51	No Priority - Arrived on Green	-
4	Snelling Avenue at Har Mar Mall	1:20	No Priority - Arrived on Green	-
5	Snelling Avenue at Roselawn Avenue	1:35	No Priority - Arrived on Green	-
6	Snelling Avenue at Larpenteur Avenue	2:09	Extended Green	0:04
7	Snelling Avenue at Hoyt Avenue	2:36	No Priority - Arrived on Green	-
8	Snelling Avenue at Midway Parkway	2:56	No Priority - Arrived on Green	-
9	Snelling Avenue at Hewitt Avenue	4:07	No Priority - Arrived on Green	-
10	Snelling Avenue at Minnehaha Avenue	4:30	No Priority - Arrived on Green	-
11	Snelling Avenue at Thomas Avenue	5:03	Extended Green	0:09
12	Snelling Avenue at University Avenue	5:44	No Priority - Arrived on Green	-
13	Snelling Avenue at Spruce Tree Avenue	6:21	No Priority - Arrived on Green	-
14	Snelling Ave. at St Anthony Ave. (I-94 N. Ramps)	6:52	Early Green	0:13
15	Snelling Ave. at Concordia Ave. (I-94 S. Ramps)	7:37	No Priority - Arrived on Green	-
16	Snelling Avenue at Marshall Avenue	8:08	Extended Green	0:01
17	Snelling Avenue at Selby Avenue	8:29	Early Green	0:07
18	Snelling Avenue at Summit Avenue	9:04	Early Green	0:08
19	Snelling Avenue at Grand Avenue	9:17	Early Green	0:13
20	Snelling Avenue at St. Clair Avenue	9:58	Extended Green	0:14
21	Snelling Avenue at Jefferson Avenue	10:41	No Priority - Arrived on Green	-
22	Snelling Avenue at Randolph Avenue	10:54	Early Green	0:01
23	Snelling Avenue at Highland Parkway	11:34	Early Green	0:14
24	Snelling Avenue at Ford Parkway	11:58	Extended Green	0:08
25	Ford Parkway at Fairview Avenue	12:29	No Priority - Arrived on Green	-
26	Ford Parkway at Kenneth Street	13:08	Extended Green	0:25
27	Ford Parkway at Cleveland Avenue	13:25	No Priority - Arrived on Green	-
28	Ford Parkway at Finn Street	13:33	No Priority - Arrived on Green	-
29	Ford Parkway at Cretin Avenue	13:53	Early Green	0:06
30	46th Street at 46th Avenue	15:03	Early Green	0:18
31	46th Street at 42nd Avenue	15:36	No Priority - Arrived on Green	-
32	46th Street at Minnehaha Avenue	15:46	Early Green	0:10
33	TH 55 (Hiawatha Avenue) at 46th Street	-	n/a - no TSP	-
34	46th Street at 36th Avenue	16:33	No Priority - Arrived on Green	-
	Total			**2:35**

5.0 STATION-BY-STATION SUMMARIES

This section of the report provides a detailed quantitative look at the modeling results at each of the 17 rapid bus stations analyzed in VISSIM. Each of the summaries provides information on the station configuration and a.m. and p.m. peak hour MOEs for each scenario. Station configuration information includes the station location relative to the nearest intersection, type of platform, and assumed dwell time. MOEs include northbound and southbound travel time from approximately two blocks before to two blocks after the station, average delay per vehicle at nearby intersection(s), corresponding Level of Service, and total person-delay. Total person-delay is reported only for the *Rapid Bus Refined* and *Rapid Bus Refined with TSP* scenarios.

The purpose of these summaries is to provide a quick reference when making design decisions related to the location and configuration of each of the stations.

Table 5.1 –
Rapid Bus MOE Summary - County Road B / Har Mar Station

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound	Station Location	n/a	midblock			
	Platform Type		curbside			
	Dwell Time (sec.)		7			
Southbound	Station Location		farside County Road B			
	Platform Type		curbside			
	Dwell Time (sec.)		7			
AM Peak Hour						
Northbound Travel Time (sec.)		10.6	10.6	10.6	10.7	10.5
Southbound Travel Time (sec.)		14.9	15.0	15.0	15.0	14.7
Snelling Avenue / County Rd. B.	Avg. Delay per Veh. (sec.)	33.7	33.9	33.9	33.9	34.9
	Level of Service	C	C	C	C	C
	Total Person-Delay (hr.)				50.5	51.8
PM Peak Hour						
Northbound Travel Time (sec.)		10.8	10.8	10.7	10.7	10.8
Southbound Travel Time (sec.)		17.9	17.8	18.0	17.7	17.4
Snelling Avenue / County Rd. B.	Avg. Delay per Veh. (sec.)	71.4	73.9	73.9	73.5	87.5
	Level of Service	E	E	E	E	F
	Total Person-Delay (hr.)				146.9	172.4

Table 5.2 –
Rapid Bus MOE Summary - Roselawn Station

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound	Station Location	n/a	farside			
	Platform Type		curbside			
	Dwell Time (sec.)		7			
Southbound	Station Location		farside			
	Platform Type		curbside			
	Dwell Time (sec.)		7			
AM Peak Hour						
Northbound Travel Time (sec.)		12.9	12.9	12.9	13.0	12.8
Southbound Travel Time (sec.)		10.5	10.6	10.6	10.7	10.7
Snelling Avenue / Roselawn Avenue	Avg. Delay per Veh. (sec.)	13.0	13.0	13.0	13.1	13.6
	Level of Service	B	B	B	B	B
	Total Person-Delay (hr.)				14.8	15.3
PM Peak Hour						
Northbound Travel Time (sec.)		11.3	11.3	11.4	11.4	11.7
Southbound Travel Time (sec.)		15.6	15.1	15.2	15.4	16.4
Snelling Avenue / Roselawn Avenue	Avg. Delay per Veh. (sec.)	24.6	24.0	23.9	23.5	26.8
	Level of Service	C	C	C	C	C
	Total Person-Delay (hr.)				33.2	37.7

Table 5.3 –
Rapid Bus MOE Summary - Larpenteur Station

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound	Station Location	n/a	farside			
	Platform Type		curbside			
	Dwell Time (sec.)		14			
Southbound	Station Location		farside			
	Platform Type		curbside			
	Dwell Time (sec.)		14			
AM Peak Hour						
Northbound Travel Time (sec.)		39.8	40.4	39.3	39.7	39.6
Southbound Travel Time (sec.)		46.2	46.9	46.6	46.7	45.2
Snelling Avenue / Larpenteur Avenue	Avg. Delay per Veh. (sec.)	96.2	95.7	95.8	95.6	105.5
	Level of Service	F	F	F	F	F
	Total Person-Delay (hr.)				142.3	155.2
PM Peak Hour						
Northbound Travel Time (sec.)		62.9	63.4	63.2	63.1	55.4
Southbound Travel Time (sec.)		67.8	67.4	67.5	67.8	65.8
Snelling Avenue / Larpenteur Avenue	Avg. Delay per Veh. (sec.)	65.5	64.9	65.9	66.2	88.3
	Level of Service	E	E	E	E	F
	Total Person-Delay (hr.)				125.2	163.7

Table 5.4 –
Rapid Bus MOE Summary - Hewitt Station

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound	Station Location	n/a	farside			
	Platform Type		bumpout			
	Dwell Time (sec.)		7			
Southbound	Station Location		farside			
	Platform Type		bumpout			
	Dwell Time (sec.)		7			
AM Peak Hour						
Northbound Travel Time (sec.)		30.2	30.2	30.5	30.1	30.6
Southbound Travel Time (sec.)		23.6	23.9	23.7	23.6	23.8
Snelling Avenue / Hewitt Avenue	Avg. Delay per Veh. (sec.)	11.7	11.9	11.9	11.6	12.0
	Level of Service	B	B	B	B	B
	Total Person-Delay (hr.)				12.1	12.5
PM Peak Hour						
Northbound Travel Time (sec.)		31.0	31.1	31.3	31.1	31.4
Southbound Travel Time (sec.)		29.6	29.0	29.2	29.0	28.3
Snelling Avenue / Hewitt Avenue	Avg. Delay per Veh. (sec.)	17.1	16.9	17.1	16.8	17.2
	Level of Service	B	B	B	B	B
	Total Person-Delay (hr.)				22.4	22.9

Table 5.5 –
Rapid Bus MOE Summary - Minnehaha Station (St. Paul)

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound	Station Location	n/a	farside			
	Platform Type		bumpout			
	Dwell Time (sec.)		14			
Southbound	Station Location		farside			
	Platform Type		bumpout			
	Dwell Time (sec.)		14			
AM Peak Hour						
Northbound Travel Time (sec.)		23.4	23.7	23.4	23.6	23.6
Southbound Travel Time (sec.)		24.1	24.3	24.2	24.0	24.3
Snelling Avenue / Minnehaha Avenue	Avg. Delay per Veh. (sec.)	13.1	13.3	13.1	13.1	13.9
	Level of Service	B	B	B	B	B
	Total Person-Delay (hr.)				13.6	14.4
PM Peak Hour						
Northbound Travel Time (sec.)		29.9	30.6	31.3	30.7	31.2
Southbound Travel Time (sec.)		31.9	31.4	31.9	32.7	30.9
Snelling Avenue / Minnehaha Avenue	Avg. Delay per Veh. (sec.)	23.5	23.4	24.3	24.0	25.6
	Level of Service	C	C	C	C	C
	Total Person-Delay (hr.)				33.1	35.1

Table 5.6 –
Rapid Bus MOE Summary - University Station

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound	Station Location	n/a	farside	nearside	farside	
	Platform Type		bumpout	curbside	bumpout	
	Dwell Time (sec.)		21			
Southbound	Station Location		farside			
	Platform Type		curbside			
	Dwell Time (sec.)		21			
AM Peak Hour						
Northbound Travel Time (sec.)		43.3	43.5	43.5	43.5	39.7
Southbound Travel Time (sec.)		38.7	38.5	38.4	38.8	35.8
Snelling Avenue / University Avenue	Avg. Delay per Veh. (sec.)	32.5	31.6	31.8	31.9	36.0
	Level of Service	C	C	C	C	D
	Total Person-Delay (hr.)				44	50
Snelling Avenue / Spruce Tree Avenue	Avg. Delay per Veh. (sec.)	6.2	6.1	6.4	6.0	5.4
	Level of Service	A	A	A	A	A
	Total Person-Delay (hr.)				6.4	5.7
PM Peak Hour						
Northbound Travel Time (sec.)		79.9	89.4	78.2	89.5	53.6
Southbound Travel Time (sec.)		68.7	70.3	71.4	71.1	53.8
Snelling Avenue / University Avenue	Avg. Delay per Veh. (sec.)	71.9	76.2	74.3	75.1	122.5
	Level of Service	E	E	E	E	F
	Total Person-Delay (hr.)				138	214
Snelling Avenue / Spruce Tree Avenue	Avg. Delay per Veh. (sec.)	29.6	34.1	29.1	35.1	17.3
	Level of Service	C	C	C	D	B
	Total Person-Delay (hr.)				47.5	23.2

Table 5.7 –
Rapid Bus MOE Summary - Hague Station

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound	Station Location	n/a	farside Hague	farside Selby		
	Platform Type		bumpout			
	Dwell Time (sec.)		7			
Southbound	Station Location		farside Hague	nearside Dayton		
	Platform Type		bumpout			
	Dwell Time (sec.)		7			
AM Peak Hour						
Northbound Travel Time (sec.)		65.4	65.0	71.8	76.3	59.8
Southbound Travel Time (sec.)		41.9	42.1	41.9	42.2	41.3
Snelling Avenue / Selby Avenue	Avg. Delay per Veh. (sec.)	42.4	41.5	46.1	50.5	47.0
	Level of Service	D	D	D	D	D
	Total Person-Delay (hr.)				58.5	52.5
PM Peak Hour						
Northbound Travel Time (sec.)		72.8	79.7	84.8	84.3	66.7
Southbound Travel Time (sec.)		39.3	39.7	40.3	40.0	40.8
Snelling Avenue / Selby Avenue	Avg. Delay per Veh. (sec.)	36.9	40.1	42.5	43.0	36.4
	Level of Service	D	D	D	D	D
	Total Person-Delay (hr.)				58.1	49.2

Table 5.8 –
Rapid Bus MOE Summary - Grand Station

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound	Station Location	n/a	farside			
	Platform Type		bumpout			
	Dwell Time (sec.)		7			
Southbound	Station Location		farside			
	Platform Type		bumpout			
	Dwell Time (sec.)		7			
AM Peak Hour						
Northbound Travel Time (sec.)		30.4	31.1	31.2	31.0	29.9
Southbound Travel Time (sec.)		35.4	35.2	35.3	35.5	31.8
Snelling Avenue / Grand Avenue	Avg. Delay per Veh. (sec.)	23.5	23.8	23.5	23.8	30.1
	Level of Service	C	C	C	C	C
	Total Person-Delay (hr.)				21.1	26.0
PM Peak Hour						
Northbound Travel Time (sec.)		59.5	60.0	60.1	59.6	56.7
Southbound Travel Time (sec.)		29.8	30.3	30.3	30.3	33.8
Snelling Avenue / Grand Avenue	Avg. Delay per Veh. (sec.)	27.5	27.8	27.7	27.8	33.5
	Level of Service	C	C	C	C	C
	Total Person-Delay (hr.)				32.6	39.2

Table 5.9 –
Rapid Bus MOE Summary - St. Clair Station

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound	Station Location	n/a	farside			
	Platform Type		bumpout			
	Dwell Time (sec.)		14			
Southbound	Station Location		nearside			
	Platform Type		bumpout			
	Dwell Time (sec.)		14			
AM Peak Hour						
Northbound Travel Time (sec.)		20.9	21.0	21.0	21.2	20.6
Southbound Travel Time (sec.)		23.0	23.0	22.9	22.9	22.9
Snelling Avenue / St. Clair Avenue	Avg. Delay per Veh. (sec.)	14.6	14.7	14.7	14.8	18.8
	Level of Service	B	B	B	B	B
	Total Person-Delay (hr.)				11.4	14.3
PM Peak Hour						
Northbound Travel Time (sec.)		23.1	23.2	23.3	23.3	22.8
Southbound Travel Time (sec.)		31.0	31.3	31.7	31.7	29.0
Snelling Avenue / St. Clair Avenue	Avg. Delay per Veh. (sec.)	18.4	18.5	18.7	18.7	23.6
	Level of Service	B	B	B	B	C
	Total Person-Delay (hr.)				18.7	23.1

Table 5.10 –
Rapid Bus MOE Summary - Randolph Station

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound	Station Location	n/a	farside			
	Platform Type		bumpout			
	Dwell Time (sec.)		7			
Southbound	Station Location		farside			
	Platform Type		curbside			
	Dwell Time (sec.)		7			
AM Peak Hour						
Northbound Travel Time (sec.)		36.6	35.8	37.2	37.3	34.3
Southbound Travel Time (sec.)		31.6	31.7	32.1	32.1	31.0
Snelling Avenue / Randolph Avenue	Avg. Delay per Veh. (sec.)	26.9	26.9	27.1	27.1	31.4
	Level of Service	C	C	C	C	C
	Total Person-Delay (hr.)				23.5	26.8
PM Peak Hour						
Northbound Travel Time (sec.)		41.4	41.5	41.2	41.6	39.4
Southbound Travel Time (sec.)		30.5	30.5	30.3	30.6	30.5
Snelling Avenue / Randolph Avenue	Avg. Delay per Veh. (sec.)	25.2	25.3	25.2	25.3	27.5
	Level of Service	C	C	C	C	C
	Total Person-Delay (hr.)				25.2	27.4

Table 5.11 –
Rapid Bus MOE Summary - Highland Station

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound	Station Location	n/a	farside			
	Platform Type		bumpout			
	Dwell Time (sec.)		7			
Southbound	Station Location		farside			
	Platform Type		bumpout			
	Dwell Time (sec.)		7			
AM Peak Hour						
Northbound Travel Time (sec.)		18.1	18.1	18.0	18.1	18.3
Southbound Travel Time (sec.)		20.4	20.6	20.5	20.5	21.2
Snelling Avenue / Highland Parkway	Avg. Delay per Veh. (sec.)	9.3	9.4	9.3	9.3	10.5
	Level of Service	A	A	A	A	B
	Total Person-Delay (hr.)				5.2	5.9
PM Peak Hour						
Northbound Travel Time (sec.)		17.6	17.6	17.6	17.6	17.7
Southbound Travel Time (sec.)		21.9	22.1	22.1	21.9	21.5
Snelling Avenue / Highland Parkway	Avg. Delay per Veh. (sec.)	8.7	8.8	8.8	8.7	9.2
	Level of Service	A	A	A	A	A
	Total Person-Delay (hr.)				5.7	6.0

Table 5.12 –
Rapid Bus MOE Summary - Fairview Station

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound (Eastbound)	Station Location	n/a	farside			
	Platform Type		bumpout			
	Dwell Time (sec.)		7			
Southbound (Westbound)	Station Location		farside			
	Platform Type		bumpout			
	Dwell Time (sec.)		7			
AM Peak Hour						
Northbound Travel Time (sec.)		34.2	34.9	34.6	34.0	34.2
Southbound Travel Time (sec.)		33.7	35.1	34.5	34.6	33.9
Ford Parkway / Fairview Avenue	Avg. Delay per Veh. (sec.)	12.4	12.7	12.5	12.6	12.7
	Level of Service	B	B	B	B	B
	Total Person-Delay (hr.)				8.0	8.0
PM Peak Hour						
Northbound Travel Time (sec.)		37.3	38.1	38.5	38.7	37.2
Southbound Travel Time (sec.)		37.4	38.6	38.7	38.7	37.4
Ford Parkway / Fairview Avenue	Avg. Delay per Veh. (sec.)	18.7	19.6	19.5	19.6	19.4
	Level of Service	B	B	B	B	B
	Total Person-Delay (hr.)				16.9	16.7

Table 5.13 –
Rapid Bus MOE Summary - Kenneth Station

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound (Eastbound)	Station Location	n/a	nearside			
	Platform Type		bumpout			
	Dwell Time (sec.)		7			
Southbound (Westbound)	Station Location		nearside			
	Platform Type		curbside			
	Dwell Time (sec.)		7			
AM Peak Hour						
Northbound Travel Time (sec.)		21.8	21.9	21.8	21.9	21.9
Southbound Travel Time (sec.)		23.1	23.4	23.2	22.9	23.3
Ford Parkway / Kenneth Street	Avg. Delay per Veh. (sec.)	8.0	8.2	8.1	8.1	8.4
	Level of Service	A	A	A	A	A
	Total Person-Delay (hr.)				2.9	3.0
PM Peak Hour						
Northbound Travel Time (sec.)		23.0	23.0	23.0	23.1	23.0
Southbound Travel Time (sec.)		25.8	26.2	26.1	26.2	25.5
Ford Parkway / Kenneth Street	Avg. Delay per Veh. (sec.)	9.5	9.6	9.6	9.7	9.9
	Level of Service	A	A	A	A	A
	Total Person-Delay (hr.)				5.6	5.7

Table 5.14 –
Rapid Bus MOE Summary - Finn Station

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound (Eastbound)	Station Location	n/a	farside			
	Platform Type		bumpout			
	Dwell Time (sec.)		14			
Southbound (Westbound)	Station Location		farside			
	Platform Type		bumpout			
	Dwell Time (sec.)		14			
AM Peak Hour						
Northbound Travel Time (sec.)		18.0	17.9	18.1	18.1	17.9
Southbound Travel Time (sec.)		15.5	15.5	15.6	15.7	15.6
Ford Parkway / Finn Street	Avg. Delay per Veh. (sec.)	5.8	5.8	5.9	6.0	5.8
	Level of Service	A	A	A	A	A
	Total Person-Delay (hr.)				3.0	2.9
PM Peak Hour						
Northbound Travel Time (sec.)		28.3	29.1	29.1	29.1	28.0
Southbound Travel Time (sec.)		20.1	20.7	20.4	20.5	20.2
Ford Parkway / Finn Street	Avg. Delay per Veh. (sec.)	16.6	17.0	17.0	16.8	17.2
	Level of Service	B	B	B	B	B
	Total Person-Delay (hr.)				14.4	14.6

Table 5.15 –
Rapid Bus MOE Summary - Woodlawn Station

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound (Eastbound)	Station Location	n/a	midblock			
	Platform Type		bumpout			
	Dwell Time (sec.)		14			
Southbound (Westbound)	Station Location		nearside			
	Platform Type		bumpout			
	Dwell Time (sec.)		14			
AM Peak Hour						
Northbound Travel Time (sec.)		20.7	20.7	20.7	20.7	20.7
Southbound Travel Time (sec.)		20.5	20.6	20.6	20.6	20.6
PM Peak Hour						
Northbound Travel Time (sec.)		21.0	21.1	21.1	21.1	21.1
Southbound Travel Time (sec.)		21.2	21.5	21.5	21.5	21.5

Table 5.16 –
Rapid Bus MOE Summary - 45th/46th Station

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound (Eastbound)	Station Location	n/a	nearside 46th			
	Platform Type		curbside			
	Dwell Time (sec.)		7			
Southbound (Westbound)	Station Location		nearside 45th			
	Platform Type		curbside			
	Dwell Time (sec.)		7			
AM Peak Hour						
Northbound Travel Time (sec.)		42.0	42.0	41.9	41.3	38.5
Southbound Travel Time (sec.)		28.9	28.1	28.2	28.4	28.1
46th Street / 46th Avenue	Avg. Delay per Veh. (sec.)	16.4	16.3	16.3	16.2	16.1
	Level of Service	B	B	B	B	B
	Total Person-Delay (hr.)				7.1	7.0
PM Peak Hour						
Northbound Travel Time (sec.)		30.5	31.1	31.2	30.8	30.5
Southbound Travel Time (sec.)		28.7	28.8	28.7	28.7	28.8
46th Street / 46th Avenue	Avg. Delay per Veh. (sec.)	14.2	14.4	14.5	14.4	14.2
	Level of Service	B	B	B	B	B
	Total Person-Delay (hr.)				10.0	9.8

Table 5.17 –
Rapid Bus MOE Summary - Minnehaha Station (Minneapolis)

Assumption / Measure of Effectiveness		Scenario				
		Baseline	***Rapid Bus Alpha***	***Rapid Bus Beta***	***Rapid Bus Refined***	***Rapid Bus Refined w/ TSP***
Station Configuration						
Northbound (Eastbound)	Station Location	n/a	nearside			
	Platform Type		curbside			
	Dwell Time (sec.)		7			
Southbound (Westbound)	Station Location		farside			
	Platform Type		curbside			
	Dwell Time (sec.)		7			
AM Peak Hour						
Northbound Travel Time (sec.)		31.9	32.1	32.1	31.3	30.3
Southbound Travel Time (sec.)		49.0	48.6	48.6	48.6	45.1
46th Street / Minnehaha Avenue	Avg. Delay per Veh. (sec.)	22.3	22.4	22.4	22.2	21.8
	Level of Service	C	C	C	C	C
	Total Person-Delay (hr.)				11.9	11.6
PM Peak Hour						
Northbound Travel Time (sec.)		31.6	32.1	31.9	31.8	30.4
Southbound Travel Time (sec.)		51.6	51.4	51.4	51.6	47.6
46th Street / Minnehaha Avenue	Avg. Delay per Veh. (sec.)	45.2	47.3	43.6	46.5	63.0
	Level of Service	D	D	D	D	E
	Total Person-Delay (hr.)				33.8	44.8

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Major conclusions drawn by SRF analysis described above include:

- During the a.m. peak hour, proposed rapid bus operations with have very little, if any, discernible impact on traffic operations. In quantitative terms, average delay per vehicle for general traffic is expected to increase by less than 2 seconds near each of the proposed stations.
- During the p.m. peak hour, proposed rapid bus operations with have very little impact (less than 2 seconds of added delay per vehicle) at 15 of the 17 stations modeled.
- During the p.m. peak hour, the northbound University Avenue rapid bus station, as initially proposed in the *Alpha* scenario, is likely to have an impact on traffic operations of approximately 5 seconds of added delay per vehicle.
- An analysis of an alternate location for the Northbound University Avenue station was completed. The analysis looked at an alternative location/configuration at Spruce Tree Avenue, as suggested by Metro Transit. The new configuration of the station moved the stop out of the travel lane and into a right turn lane. The results showed that average delay could be improved by 2 to 5 seconds in the p.m. peak hour under this alternative.
- During the p.m. peak hour, the northbound Hague Avenue rapid bus station, as initially proposed in the *Alpha* scenario, is likely to have an impact on traffic operations of approximately 7 seconds of additional delay per vehicle.
- The southbound Hague Avenue rapid bus station appears to have a slight impact to traffic operations of approximately 2 seconds per vehicle in the p.m. peak hour.
- An analysis of alternate locations for the Northbound and Southbound Hague Avenue stations were completed, examining a northbound station at Selby and a southbound station at Dayton. The results showed that moving the stations further north would result in slightly increased delay (around 2 seconds in the p.m. peak hour) for general traffic.
- A basic TSP slack time analysis that considered only signal timing and not traffic volumes found that transit operations at all but two of the project intersections could potentially benefit from the use of TSP.
- A more detailed VISSIM model analysis results indicate that TSP could reduce travel time for rapid buses by 3 to 5 minutes (10 to 14%). The analysis showed that rapid bus running time during peak periods is expected to vary between 35 and 40 minutes per one-way run without TSP.
- 98% percent of the potential benefit of TSP came from its use at seven project intersections. 13 project intersections in total saw a net benefit from TSP use, while the potential disbenefit outweighed the potential benefit at the remaining 20 project intersections where TSP use was analyzed.

6.2 Recommendations

Based on the conclusions above, SRF offers the following recommendations:

- Consider traffic impacts as the northbound University Avenue station location is finalized. The northbound nearside Spruce Tree Avenue with curbside (non-bumpout) configuration would slightly reduce impacts to general traffic.
- Consider traffic impacts as the Hague/Selby/Dayton station location is finalized. Locating both Hague Avenue stations as proposed in the baseline scenario (at Hague Avenue and not one or two blocks north at Selby or Dayton Avenues) would reduce impacts to general traffic.
- Consider analysis of additional transit priority measures, such as a queue jump signal, at the northbound University Avenue station to further improve rapid bus operations in this congested area.
- Explore an additional scenario with no TSP or a less aggressive Maximum Green Time Reduction practice at intersections where the potential disbenefit due to TSP outweighed the potential benefit to gauge the amount of rapid bus travel time savings under a more realistic set of assumptions. The intersections showing a potential net benefit due to TSP are as follows (listed geographically from north to south):

    1. County Road B2 at Snelling Avenue at East Ramps
    2. Snelling Avenue at Hoyt Avenue
    3. Snelling Avenue at Midway Parkway
    4. Snelling Avenue at Thomas Avenue
    5. Snelling Avenue at Spruce Tree Avenue
    6. Snelling Avenue at St. Anthony Avenue (I-94 North Ramps)
    7. Snelling Avenue at Concordia Avenue (I-94 South Ramps)
    8. Snelling Avenue at Marshall Avenue
    9. Snelling Avenue at Selby Avenue
    10. Ford Parkway at Fairview Avenue
    11. Ford Parkway at Cretin Avenue
    12. 46th Street at 46th Avenue
    13. 46th Street at 42nd Avenue

- Concurrent with the development/implementation of Rapid Bus service, prioritize implementation of TSP at the 7 project intersections showing the most potential benefit (listed from most potential benefit to least potential benefit):

    1. Snelling Avenue at Spruce Tree Avenue
    2. Snelling Avenue at Selby Avenue
    3. Snelling Avenue at Marshall Avenue
    4. Snelling Avenue at Thomas Avenue
    5. Snelling Avenue at Hoyt Avenue
    6. Snelling Avenue at St. Anthony Avenue (I-94 North Ramps)
    7. Snelling Avenue at Concordia Avenue (I-94 South Ramps)

- As funding sources allow, consider implementing TSP at the remaining 6 intersections showing the potential for net benefit due to TSP (listed from most potential benefit to least potential benefit):

    1. 46th Street at 42nd Avenue
    2. Snelling Avenue at Midway Parkway
    3. 46th Street at 46th Avenue
    4. Ford Parkway at Fairview Avenue
    5. County Road B2 at Snelling Avenue at East Ramps
    6. Ford Parkway at Cretin Avenue

- As development of other Arterial BRT corridors proceeds, repeat the VISSIM analysis process used in this study to assess the potential traffic impacts of the proposed stations and potential benefit of the use of TSP.
- In addition to the use of TSP, consider the addition of vehicle and pedestrian detection to improve traffic flow along the Snelling Avenue Rapid Bus corridor. The addition of vehicle and pedestrian detection helps to improve traffic flow by minimizing the amount of green time given to phases with light traffic or pedestrian demand. Extra detection added as part of the Central Avenue TSP project, in combination with implementation of optimized signal timing plans, resulted in a significant improvement in bus travel times on that corridor.

7.0 APPENDIX

A. Meeting Minutes – December 5, 2012 Stakeholder Kickoff Meeting
B. Detailed Slack Time Analysis Results
C. Detailed VISSIM Modeling Output
D. VISSIM Station Placement Aerial Images – *Rapid Bus Refined* Scenarios

APPENDIX A

MEETING MINUTES
DECEMBER 5, 2012 STAKEHOLDER KICKOFF MEETING

Meeting Minutes

Snelling Avenue Arterial BRT – VISSIM Modeling / TSP Evaluation
Stakeholder Project Kickoff Meeting
Wednesday, December 5, 2012 – 9:00-11:00 a.m.
Metro Transit - FT Heywood Building

Attendees:
Metro Transit: Katie Roth, Charles Carlson, Kyle Burrows
MnDOT: Mark Lindeberg, Carl Jensen, Gayle Gedstad, Kevin Sommers, Kevin Schwartz
Ramsey County: Beth Engum, Erin Laberee
City of Saint Paul: Eriks Ludins, Pete Gallagher, Paul St. Martin
SRF Consulting Group: Nick Erpelding, Scott Poska

The following meeting minutes represent SRF Consulting Group's interpretation of the meeting, with review and input from Metro Transit:

Discussion Items:

1. Project Overview
   - Katie Roth presented an overview of the Snelling Avenue arterial BRT/rapid bus concept. The presentation is attached.
2. Project Goals
   - Nick Erpelding discussed the purpose and findings of SRF's previous TSP/rapid bus Studies.
   - Nick went over the three main project goals 1) identify station locations and configurations, 2) evaluate the benefits of TSP, and 3) document the process used to develop recommendations on goals 1 and 2.
   - Kevin Schwartz asked if the cost of upgrading the signal controllers to ASC/3s was part of the project. Nick explained that equipment costs were outside the scope of this study.
   - Pete Gallagher asked about new detection for the TSP scenario. Nick explained that this rapid bus study will not assume any new detection at any intersections.
   - Gayle Gedstad stated that Snelling Avenue is a designated truck route.
   - Paul St. Martin asked if existing local buses on Snelling were going to utilize the new rapid bus stops. Katie Roth responded that it is likely they would but detailed bus operations will be explored further during the design phase.
3. VISSIM Modeling Parameters
   - SRF will develop 4 model scenarios: Existing Conditions, No-Build, Revised No-Build, and Build. The initial "No-Build" VISSIM model with initial assumptions

from Metro Transit on location and type of station (in travel lane/"bumpout" or not in travel lane). One of the goals for the mid-project progress meeting will be to identify where bumpout stations may present operational challenges and what alternatives may be available. SRF will incorporate these and other comments into the revised "No-Build" VISSIM models.

- VISSIM MOEs will include intersection delay, LOS, queues, and rapid bus travel times.
- Kevin Sommers would like the model to have four 15-minute input intervals to account for the peak hour factor.
- Kevin Schwartz thought the following MnDOT operated intersections had the most pedestrian activity: Snelling/Larpenteur, Snelling/Co B, and Snelling/Co C.

4. <u>TSP Benefit Calculation Process</u>
   - Nick discussed the TSP calculation methodology including slack time analysis, split reductions, and delayed calls for near side stations.
   - Kevin Schwartz asked if Econolite controllers had better TSP logic compared to Siemens/Eagle controllers based on SRF's previous TSP evaluation work. Nick replied that Econolite has the preferred TSP operation logic (until forthcoming firmware updates from Siemens are proven). All signals (except signals within Minneapolis) are likely to use ASC/3 controllers to implement TSP. For these reasons, modeling of TSP with the ASC/3 in VISSIM (as opposed to the default generic VISSIM controller) is proposed.
   - Kevin Schwartz asked if the TSP will be changed from unconditional to conditional. Katie Roth stated that Metro Transit will work with the appropriate agencies to determine appropriate conditions for use of TSP in the future, but this study is focused on determining the maximum benefit of TSP so will assume unconditional TSP.
   - Kevin Schwartz said the SBL movement at Snelling/Har Mar is given extra time during the Christmas peak period so TSP may not be beneficial at this intersection during that time of the year.
   - Pete Gallagher said that the City operates a special timing plan along Snelling during the State Fair.
   - Kevin Schwartz requested that the TSP calculation results and TSP timings be shared prior to use in the VISSIM model. Nick Erpelding agreed to share the results prior to final VISSIM runs, and noted that actual TSP timings to be used in the field will be reviewed by all appropriate stakeholders prior to turn-on.

Next Meeting:
The next meeting will be a mid-project progress meeting, tentatively planned for early February 2013.

SCP, NJE

Attachments

1. Stakeholder Meeting #1 Sign-In sheet
2. Stakeholder Meeting #1 Agenda
3. Snelling Avenue Arterial BRT/Rapid Bus Concept Map
4. VISSIM modeling parameters
5. TSP benefit calculation process
6. Metro Transit Snelling Rapid Bus Presentation

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SRF Consulting Group, Inc. | Engineers Planners Designers

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Meeting Sign-In

Snelling Avenue Arterial BRT -- VISSIM Modeling / TSP Evaluation
Stakeholder Project Kickoff Meeting
Wednesday, December 5, 2012 – 9:00-11:00 a.m.
Metro Transit - FT Heywood Building

	Name	Agency
1.	Nick Erpelding	SRF Consulting
2.	Eriks Ludins	St. Paul Public Works
3.	Mark Lindberg	MnDOT
4.	Carl Jensen	MnDOT
5.	Charles Carlson	Metro Transit
6.	Kyle Burrows	Metro Transit
7.	Katie Roth	Metro Transit
8.	Pete Gallagher	City of St. Paul
9.	Beth Engum	Ramsey Co
10.	Erin Laberee	Ramsey Co
11.	Kevin Schwartz	MnDOT
12.	Paul St. Martin	St. Paul
13.	Kevin Somers	MnDOT
14.	Gayle Gedstad	MnDOT
15.	Scott Peske	SRF
16.		
17.		
18.		
19.		
20.		
21.		
22.		

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Meeting Agenda

Snelling Avenue Arterial BRT -- VISSIM Modeling / TSP Evaluation
Stakeholder Project Kickoff Meeting
Wednesday, December 5, 2012 – 9:00-11:00 a.m.
Metro Transit - FT Heywood Building

Attendees Invited:
Metro Transit: Katie Roth, Charles Carlson, Claudius Toussaint, Kyle Burrows
MnDOT: Mark Lindeberg, Brian Isaacson, Carl Jensen, Gayle Gedstad, Kevin Sommers, Kevin Schwartz
Ramsey County: Joe Lux, Beth Engum, Erin Laberee
Hennepin County: Tom Johnson
City of Saint Paul: Eriks Ludins, Brian Vitek, Pete Gallagher
City of Minneapolis: Nick Van Gunst
SRF Consulting Group: Nick Erpelding, Scott Poska

Discussion Items:

1. Introductions
2. Project goals
3. VISSIM modeling parameters
4. TSP benefit calculation process
5. Other stakeholder input
6. Project schedule / Next Meeting Date

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SNELLING AVENUE
ARTERIAL BRT/RAPID BUS CONCEPT
updated 10/8/2012
Rosedale
Roseville
County Road B
Roselawn
Larpenteur
Falcon Heights
Como
Como
St. Anthony Park
Hewitt
Hamline-Midway
Minnehaha
GREEN LINE
University
LONGFELLOW
BLUE LINE
Union Park
Hague
Grand
Macalester-Groveland
St. Clair
Randolph
46th Street Station
Minnehaha
45th/46th
Woodlawn
Finn
Kenneth
Fairview
Highland Park
Highland
0
0.5
1
Miles

Snelling Avenue BRT
VISSIM Modeling Assumptions

Scenario	Existing	No-Build (Draft)	No-Build (Final)	Build
Description		w/Rapid Bus	w/Rapid Bus	w/Rapid Bus and TSP
Scenario Number	1-2	3-4	5-6	7-8
Design year	2013	2013	2013	2013
Roadway Geometry				
Existing roadway geometry, with (1), (2) and (3)	■	■	■	■
Basic geometry (four approaches per intersection)	■	■	■	■
Signal Timing				
Existing Minneapolis Signal Timing, plus (4)	■	■	■	■
Proposed St Paul SPART Signal Timing (SRF, 2013), plus (1)	■	■	■	■
Existing Ramsey County Signal Timing	■	■	■	■
Existing MnDOT Signal Timing	■	■	■	■
Existing/standard detection	■	■	■	■
Traffic Volumes				
Pedestrians at heavy volume intersections - 2012 counts	■	■	■	■
-up to 8 intersections, list TBD	■	■	■	■
Vehicles - 2012 counts	■	■	■	■
Heavy Vehicles (Trucks and buses) - 2012 counts	■	■	■	■
Vehicle speeds per posted speed limits	■	■	■	■
Origin/Destination - typical CUBE matrix estimation	■	■	■	■
Transit Operations				
Existing Hiawatha LRT Operations				
Proposed CC LRT Operations	■	■	■	■
-headways	■	■	■	■
-dwell times	■	■	■	■
-LRT vehicle size	■	■	■	■
Proposed Snelling Rapid Bus		■	■	■
-actual route origin/destination		■	■	■
-headways		■	■	■
-occupancy		■	■	■
-station-specific dwell times		■	■	■
Currently proposed Rapid Bus station configurations		■		
-primarily bumput-style; bus stops in travel lane		■		
Revised Rapid Bus station configurations			■	■
-eliminate bumput in congested areas			■	■
Proposed TSP signal timing				■
MOEs / Reporting				
MOEs - average of 5 runs (min.)	■	■	■	■
-Network + intersection delay / LOS	■	■	■	■
-v/c ratio	■	■	■	■
-maximum queues	■	■	■	■
-Rapid Bus corridor travel time		■	■	■
Animations (1 per scenario)	■	■	■	■

Notes:

(1) Snelling/University: Central Corridor LRT roadway geometry (KHA) and signal timings (AECOM)
(2) Ford Parkway: reconstruction between Snelling and Howell
(3) 46th/Minnehaha: intersection reconstruction
(4) 46th/Hiawatha-signal retiming

1. **Slack Time Analysis**
   Basic assessment of potential benefit of TSP
   Greater slack time on non-TSP phases = more potential TSP benefit
   Does not take traffic volumes into account
   Goal: Eliminate infeasible intersections

2. **Develop Preliminary TSP Timing Settings**
   Assume unconditional TSP (each bus makes call)
   Assume max split reduction range: 0 to 25%
   Vary max split reduction based on traffic v/c ratio
   Incorporate delay in call at near side stations
   Goal: Develop basic TSP settings for inputting into VISSIM.

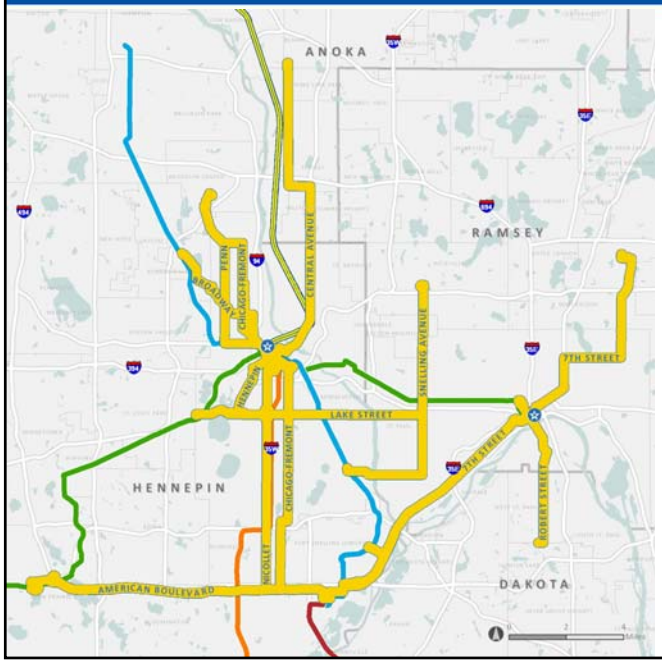
3. **Analyze VISSIM MOEs**
   Compare No-Build and Build MOEs
   Use Rapid Bus travel time MOE and occupancy projections to gauge benefit (person-hours)
   Use network delay to gauge cost (person-hours)
   Goal 1: Gauge potential network-wide TSP benefit
   Goal 2: Rank intersections in terms of potential benefit of TSP

Snelling Avenue Arterial BRT TSP Stakeholder Meeting

December 5, 2012

1

12 corridors studied



- Arterial Transitway Corridors Study completed April 2012
- Snelling Avenue emerged as top priority

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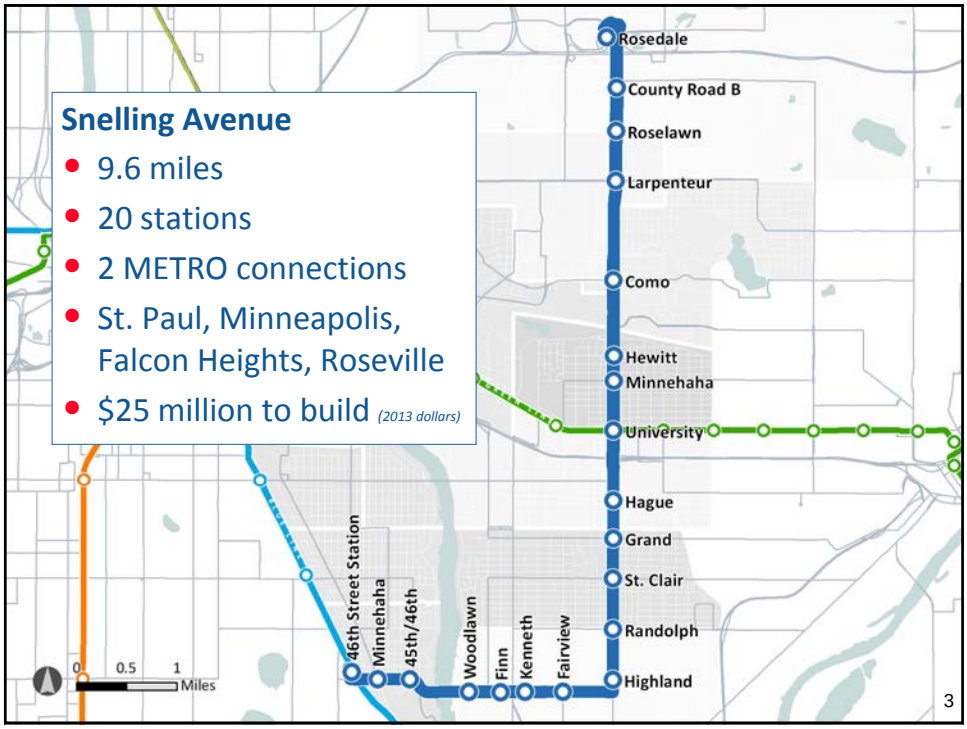
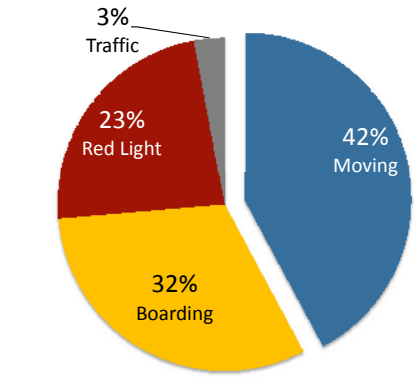
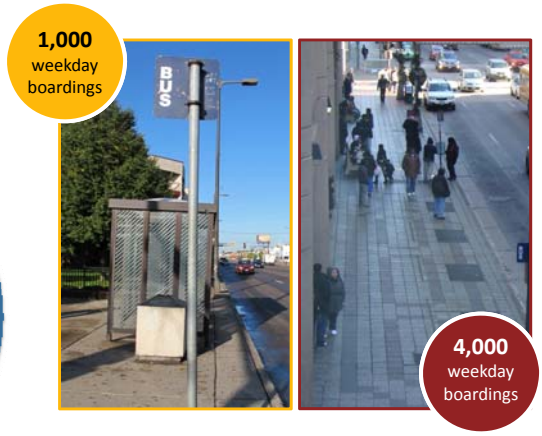


Key transit challenges

- **Slow transit speeds** caused by significant **boarding** and **signal delay**



- **Lack of attractive, easily identified facilities**



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Based on Route 18 NB observation, American Blvd to 5th/Nicollet

4

Transit moves people in these corridors

Southbound Snelling Avenue at Minnehaha Avenue

However, traditional roadway space allocation leads to slower transit speeds.

Narrow sidewalk with no space for transit shelter or customer information

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The rapid bus solution

Faster Service with Less Waiting

- *Limited stop service*
- *Improved service frequency*
- *Off-board fare payment*
- *All-door boarding*
- Curb extensions/raised curbs
- Far side station platforms
- Signal timing and priority
- Increased snow removal

Improved Experience for More Customers

- Real-time "next bus" signage
- Security cameras
- Heated shelters
- Trash receptacles
- Station lighting
- Bike racks
- Wayfinding signage
- Common look/identity

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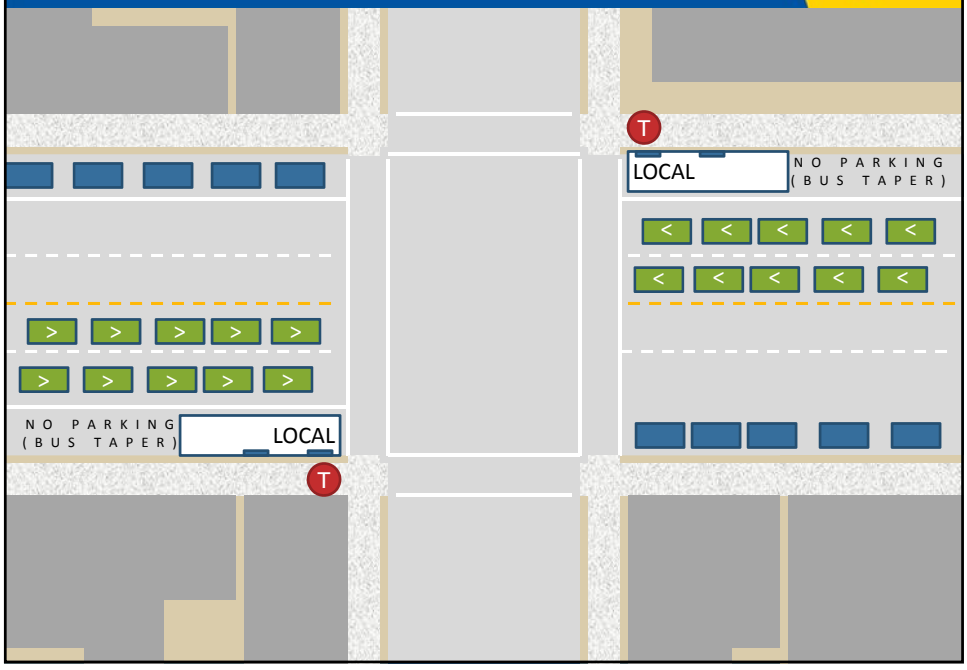
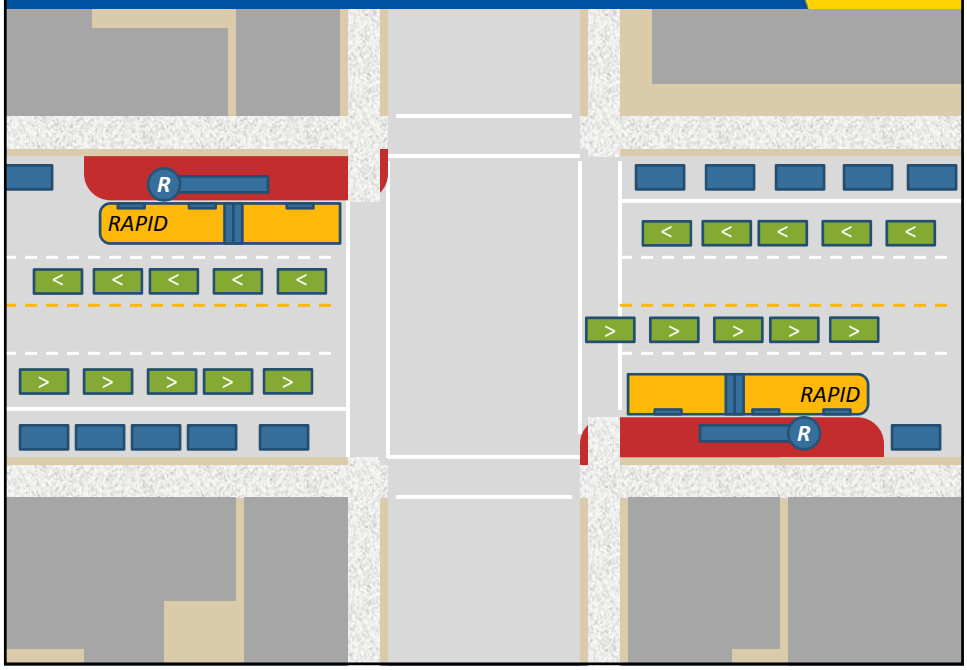
Adaptable Stations, Consistent Identity

CONCEPTUAL DESIGNS

Typical Existing Condition

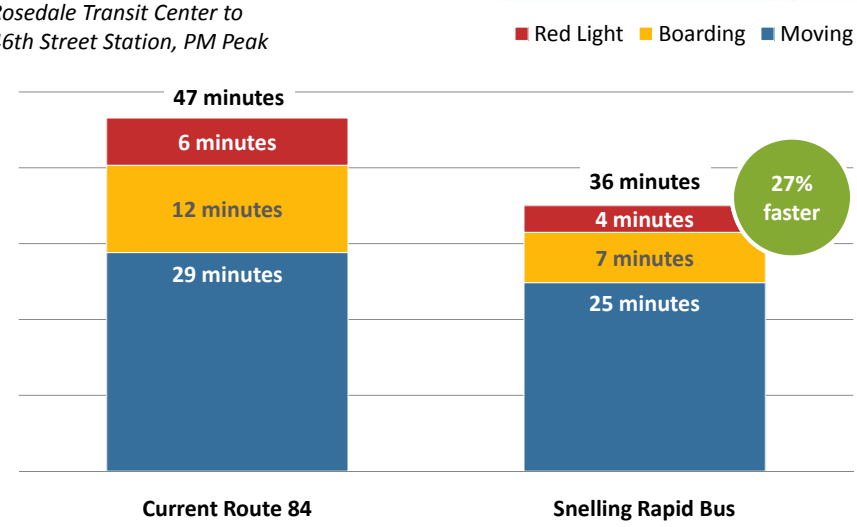


Station Platform Concept



Service Improvement on Snelling Avenue

Rosedale Transit Center to 46th Street Station, PM Peak



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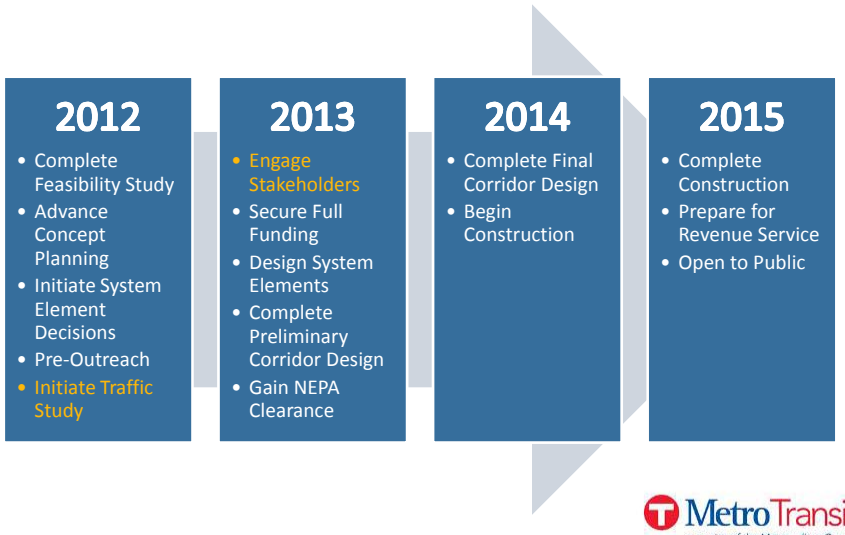
Snelling Avenue Corridor Timeline



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APPENDIX B

DETAILED SLACK TIME ANALYSIS RESULTS

TSP Slack Time Analysis - Intersection Data

#	INTID	Comm ID	Agency	Intersection	Control	Controller	AM TSP Slack Time (1)	PM TSP Slack Time (1)	Overall TSP Potential (2)	Notes
1	336	2.01	Ramsey Co.	Snelling Ave & B2 West Ramps	Act-Coord	ASC/8000	21%	61%	Med	
2	388	2.02	Ramsey Co.	Snelling Ave & B2 East Ramps	Act-Coord	ASC/2	48%	78%	High	
3	19	209.06	MnDOT	Snelling Ave & Cty Rd B	Act-Coord	ASC/2	11%	19%	Med	
4	18	209.05	MnDOT	Snelling Ave & Har Mar	Act-Coord	ASC/2	6%	14%	Med	
5	17	209.04	MnDOT	Snelling Ave & Roselawn	Act-Coord	ASC/2	2%	0%	Low	
6	16	209.03	MnDOT	Snelling Ave & Larpenteur	Act-Coord	ASC/2	18%	32%	Med	
7	15	209.02	MnDOT	Snelling Ave & Hoyt	Act-Coord	ASC/2	6%	2%	Low	
8	914	209.01	MnDOT	Snelling Ave & Midway	Act-Coord	ASC/2	6%	2%	Low	
9	269	1.01	St. Paul	Snelling Ave & Hewitt Ave	Act-Coord	T-170	0%	0%	Low	
10	157	1.02	St. Paul	Snelling Ave & Minnehaha Ave	Act-Coord	T-170	1%	30%	Med	
11	165	1.03	St. Paul	Snelling Ave & Thomas Ave	Act-Coord	T-170	0%	14%	Low	
12	166	1.04	St. Paul	Snelling Ave & University Ave	Act-Coord	ASC/3	8%	24%	Med	Consider CCLRT impacts (3)
13	404	1.05	St. Paul	Snelling Ave & Spruce Tree Ave	Act-Coord	T-170	2%	33%	Med	
14	162	1.06	St. Paul	Snelling Ave & St Anthony Ave	Act-Coord	T-170	72%	95%	High	benefit primarily for SB
15	260	1.07	St. Paul	Snelling Ave & Concordia Ave	Act-Coord	T-170	25%	66%	Med	benefit primarily for NB
16	155	1.08	St. Paul	Snelling Ave & Marshall Ave	Act-Coord	T-170	2%	3%	Low	
17	161	1.09	St. Paul	Snelling Ave & Selby Ave	Act-Coord	T-170	72%	81%	High	benefit primarily for NB
18	164	1.10	St. Paul	Snelling Ave & Summit Ave	Pretimed	T-170	20%	41%	Med	
19	150	1.11	St. Paul	Snelling Ave & Grand Ave	Act-Coord	T-170	15%	33%	Med	
20	163	1.12	St. Paul	Snelling Ave & St Clair Ave	Pretimed	T-170	25%	45%	Med	
21	154	1.13	St. Paul	Snelling Ave & Jefferson Ave	Pretimed	T-170	11%	4%	Low	
22	160	1.14	St. Paul	Snelling Ave & Randolph Ave	Act-Coord	T-170	10%	34%	Med	
23	151	1.15	St. Paul	Snelling Ave & Highland Pkwy	Act-Coord	T-170	0%	0%	Low	
24	284	1.16	St. Paul	Snelling Ave & Ford Pkwy	Act-Coord	T-170	5%	5%	Low	
25	49	1.22	St. Paul	Ford Pkwy & Fairview Ave	Act-Free	T-170	38%	38%	Med	
26	61	1.21	St. Paul	Ford Pkwy & Kenneth Ave	Act-Coord	T-170	23%	24%	Med	
27	14	1.20	St. Paul	Ford Pkwy & Cleveland Ave	Act-Coord	T-170	12%	37%	Med	
28	359	1.19	St. Paul	Ford Pkwy & Finn Ave	Act-Coord	T-170	6%	41%	Med	benefit primarily for EB
29	292	1.18	St. Paul	Ford Pkwy & Cretin Ave	Act-Coord	T-170	14%	4%	Low	benefit primarily for WB

#	INTID	Comm ID	Agency	Intersection	Control	Controller	AM TSP Slack Time (1)	PM TSP Slack Time (1)	Overall TSP Potential (2)	Notes
30	835	3.01	Minneapolis	46th & 46th	Act-Coord	EPAC	22%	31%	Med	
31	783	3.02	Minneapolis	46th & 42nd	Pretimed	EPAC	30%	31%	Med	
32	54	3.03	Minneapolis	46th & Minnehaha	Pretimed	EPAC	67%	116%	High	
33	23	3.04	Minneapolis	Hiawatha & 46th	Act-Free	NW	134%	134%	High	Avoid TSP - LRT impacts (4)
34	179	3.05	Minneapolis	46th & 36th	Act-Free	EPAC	71%	71%	High	

Notes:

(1) The percentage reported for "TSP Slack Time" reflects the average amount of slack time available for use by the TSP phase(s) at an intersection.

(2) Overall TSP Potential categorizes intersections by the average amount of slack time available for TSP. The ranges (0-10%,10%-50%,>50%) are arbitrary.

(3) Central Corridor LRT will use TSP on University Avenue. Special attention to be given to Snelling Avenue TSP impacts. See discussion in Section 2.4.

(4) Based on stakeholder input TSP to be avoided at Hiawatha/46th due to existing traffic operational issues on Hiawatha Avenue related to LRT. See Section 2.4.

Intersection	IntID	Phase	Movement	Phasing	Min Green	Walk	Ped Clear (FDW)	Yellow	Red Clear (All Red)	Ped Actuated?	Min Split Incl. peds?	TSP phase?	Default Min Split	Veh Min Split	Ped Min Split	Min Split	AM Pattern #	AM Cycle	AM Split	AM Slack Time	AM TSP Time	AM TSP Time (% of ex. Split)	PM Pattern #	PM Cycle	PM Split	PM Slack Time	PM TSP Time	PM TSP Time (% of ex. Split)
Snelling Ave & B2 West Ramps	1	1	EBL	Prot	7			3	1				15	12	-	15	233	100	26	11	-	-	433	100	31	16	-	-
	1	2	WB	Mainline	15	7	13	4	1	Yes	Yes		20	21	26	26	233	100	26	0	-	-	433	100	38	12	-	-
	1	3											-	-	-	-	233	100		-	-	-	433	100		-	-	-
	1	4	NB	X-Street	10	7	15	3	1.7	Yes	Yes	Yes	18	16	28	28	233	100	28	0	9	32%	433	100	31	3	26	84%
	1	5	WBL	Prot	7			3	1			Yes	15	12	-	15	233	100	22	7	2	9%	433	100	32	17	12	38%
	1	6	EB	Mainline	15	7	15	4	1	Yes	Yes		20	21	28	28	233	100	30	2	-	-	433	100	37	9	-	-
	1	7	NBL	P/P	7			3	1				13	12	-	13	233	100	12	0	-	-	433	100	16	3	-	-
	1	8	SB	X-Street	10			3.5	1.4				18	16	-	18	233	100	16	0	-	-	433	100	15	0	-	-
Snelling Ave & B2 East Ramps	2	1	EBL	P/P	5			3	1				13	10	-	13	233	100	28	15	-	-	433	100	38	25	-	-
	2	2	WB	Mainline	15			3.5	1.1				20	21	-	21	233	100	21	0	-	-	433	100	25	4	-	-
	2	3											-	-	-	-	233	100		-	-	-	433	100		-	-	-
	2	4											-	-	-	-	233	100		-	-	-	433	100		-	-	-
	2	5											-	-	-	-	233	100		-	-	-	433	100		-	-	-
	2	6	EB	Mainline	15			3.5	1.1				20	21	-	21	233	100	49	28	-	-	433	100	63	42	-	-
	2	7											-	-	-	-	233	100		-	-	-	433	100		-	-	-
	2	8	SB	X-Street	7	8	25	3	1.6	Yes	Yes	Yes	18	13	39	39	233	100	31	0	15	48%	433	100	37	0	29	78%
Snelling Ave & Cty Rd B	3	1	SBL	Prot	7			3	2				15	13	-	15	5	180	21	6	-	-	6	180	29	14	-	-
	3	2	NB	Mainline	15	7	23	4.5	1.5	Yes	Yes	Yes	20	22	37	37	5	180	120	83	11	9%	6	180	100	63	20	20%
	3	3	WBL	P/P	5			3	2				13	11	-	13	5	180	18	5	-	-	6	180	19	6	-	-
	3	4	EB	X-Street	10	7	30	4	3	Yes	Yes		18	18	45	45	5	180	21	0	-	-	6	180	32	0	-	-
	3	5	NBL	Prot	7			3	2				15	13	-	15	5	180	25	10	-	-	6	180	27	12	-	-
	3	6	SB	Mainline	15	7	23	5	1.5	Yes	Yes	Yes	20	22	37	37	5	180	116	79	15	13%	6	180	102	65	18	18%
	3	7	EBL	P/P	5			3	2				13	11	-	13	5	180	18	5	-	-	6	180	19	6	-	-
	3	8	WB	X-Street	10	7	30	4	3	Yes	Yes		18	18	45	45	5	180	21	0	-	-	6	180	32	0	-	-
Snelling Ave & Har Mar	4	1	SBL	Prot	7			3	2				15	13	-	15	5	180	21	6	-	-	6	180	34	19	-	-
	4	2	NB	Mainline	20	7	13	4.5	1.5	Yes	Yes	Yes	20	27	27	27	5	180	127	100	6	5%	6	180	97	70	19	20%
	4	3	WB	X-Street	8	7	24	3.5	2	Yes	Yes		18	14	37	37	5	180	16	0	-	-	6	180	24	0	-	-
	4	4	EB	X-Street	11	7	22	3.5	2	Yes	Yes		18	17	35	35	5	180	16	0	-	-	6	180	25	0	-	-
	4	5	NBL	Prot	7			3	2				15	13	-	15	5	180	25	10	-	-	6	180	24	9	-	-
	4	6	SB	Mainline	20	7	18	4.5	1.5	Yes	Yes	Yes	20	27	32	32	5	180	123	91	10	8%	6	180	107	75	9	8%
	4	7											-	-	-	-	5	180		-	-	-	6	180		-	-	-
	4	8											-	-	-	-	5	180		-	-	-	6	180		-	-	-

Intersection	IntID	Phase	Movement	Phasing	Min Green	Walk	Ped Clear (FDW)	Yellow	Red Clear (All Red)	Ped Actuated?	Min Split Incl. peds?	TSP phase?	Default Min Split	Veh Min Split	Ped Min Split	Min Split	AM Pattern #	AM Cycle	AM Split	AM Slack Time	AM TSP Time	AM TSP Time (% of ex. Split)	PM Pattern #	PM Cycle	PM Split	PM Slack Time	PM TSP Time	PM TSP Time (% of ex. Split)
Snelling Ave & Roselawn	5	1	SBL	Prot	7			3	2				15	13	-	15	5	180	15	0	-	-	6	180	15	0	-	-
	5	2	NB	Mainline	20	7	11	4.5	1.5	Yes	Yes	Yes	20	27	25	27	5	180	137	110	0	0%	6	180	128	101	0	0%
	5	3											-	-	-	-	5	180		-	-	-	6	180		-	-	-
	5	4	EB	X-Street	10	7	23	3.5	2	Yes	Yes		18	16	36	36	5	180	28	0	-	-	6	180	37	1	-	-
	5	5	NBL	Prot	7			3	2				15	13	-	15	5	180	19	4	-	-	6	180	15	0	-	-
	5	6	SB	Mainline	20	7	11	4.5	1.5	Yes	Yes	Yes	20	27	25	27	5	180	133	106	4	3%	6	180	128	101	0	0%
	5	7											-	-	-	-	5	180		-	-	-	6	180		-	-	-
	5	8	WB	X-Street	10	7	27	3.5	2	Yes	Yes		18	16	40	40	5	180	28	0	-	-	6	180	37	0	-	-
Snelling Ave & Larpenteur	6	1	SBL	Prot	7			3	2				15	13	-	15	5	180	18	3	-	-	6	180	22	7	-	-
	6	2	NB	Mainline	20	7	20	4.5	1.5	Yes	Yes	Yes	20	27	34	34	5	180	106	72	12	11%	6	180	92	58	22	24%
	6	3	WBL	P/P	5			3	2				13	11	-	13	5	180	28	15	-	-	6	180	19	6	-	-
	6	4	EB	X-Street	10	16	15	4	2	Yes	Yes		18	17	38	38	5	180	28	0	-	-	6	180	47	9	-	-
	6	5	NBL	Prot	7			3	2				15	13	-	15	5	180	30	15	-	-	6	180	33	18	-	-
	6	6	SB	Mainline	20	7	20	4.5	1.5	Yes	Yes	Yes	20	27	34	34	5	180	94	60	24	26%	6	180	81	47	33	41%
	6	7	EBL	P/P	5			3	2				13	11	-	13	5	180	13	0	-	-	6	180	32	19	-	-
	6	8	WB	X-Street	10	14	13	4	2	Yes	Yes		18	17	34	34	5	180	43	9	-	-	6	180	34	0	-	-
Snelling Ave & Hoyt	7	1	SBL	P/P	5			3	2				13	11	-	13	5	180	21	8	-	-	6	180	16	3	-	-
	7	2	NB	Mainline	15	7	10	4.5	2	Yes	Yes	Yes	20	22	24	24	5	180	128	104	8	6%	6	180	141	117	3	2%
	7	3											-	-	-	-	5	180		-	-	-	6	180		-	-	-
	7	4	EBWB	X-Street	10	10	20	3.5	2	Yes	Yes		18	16	36	36	5	180	31	0	-	-	6	180	23	0	-	-
	7	5	NBL	P/P	5			3	2				13	11	-	13	5	180	21	8	-	-	6	180	16	3	-	-
	7	6	SB	Mainline	15	15	10	4.5	2	Yes	Yes	Yes	20	22	32	32	5	180	128	96	8	6%	6	180	141	109	3	2%
	7	7											-	-	-	-	5	180		-	-	-	6	180		-	-	-
	7	8											-	-	-	-	5	180		-	-	-	6	180		-	-	-
Snelling Ave & Midway	8	1	SBL	P/P	5			3	2				13	11	-	13	5	180	21	8	-	-	6	180	16	3	-	-
	8	2	NB	Mainline	15	10	17	4	2	Yes	Yes	Yes	20	22	34	34	5	180	126	92	8	6%	6	180	141	107	3	2%
	8	3											-	-	-	-	5	180		-	-	-	6	180		-	-	-
	8	4	WB	X-Street	10	10	17	3.5	2	Yes	Yes		18	16	33	33	5	180	33	0	-	-	6	180	23	0	-	-
	8	5	NBL	P/P	5			3	2				13	11	-	13	5	180	21	8	-	-	6	180	16	3	-	-
	8	6	SB	Mainline	15	10	17	4	2	Yes	Yes	Yes	20	22	34	34	5	180	126	92	8	6%	6	180	141	107	3	2%
	8	7											-	-	-	-	5	180		-	-	-	6	180		-	-	-
	8	8	EB	X-Street	10	10	17	3.5	2	Yes	Yes		18	16	33	33	5	180	33	0	-	-	6	180	23	0	-	-

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Snelling Ave & Hewitt Ave	9	1	SBL	P/P	7			3	1				13	12	-	13	AM	80	12	0	-	-	PM	90	13	0	-	-
	9	2	NB	Mainline	15	7	8	4	1		Yes	Yes	20	21	21	21	AM	80	33	12	0	0%	PM	90	42	21	0	0%
	9	3											-	-	-	-	AM	80		-	-	-	PM	90		-	-	-
	9	4	EBWB	X-Street	10	7	22	4	1		Yes		18	16	35	35	AM	80	35	0	-	-	PM	90	35	0	-	-
	9	5	NBL	P/P	7			3	1				13	12	-	13	AM	80	12	0	-	-	PM	90	12	0	-	-
	9	6	SB	Mainline	15	7	8	4	1		Yes	Yes	20	21	21	21	AM	80	33	12	0	0%	PM	90	43	22	0	0%
	9	7											-	-	-	-	AM	80		-	-	-	PM	90		-	-	-
	9	8											-	-	-	-	AM	80		-	-	-	PM	90		-	-	-
Snelling Ave & Minnehaha Ave	10	1	SBL	P/P	7			3	1				13	12	-	13	AM	80	14	1	-	-	PM	90	13	0	-	-
	10	2	NB	Mainline	15	7	9	4	1		Yes	Yes	20	21	22	22	AM	80	36	14	1	3%	PM	90	36	14	11	31%
	10	3											-	-	-	-	AM	80		-	-	-	PM	90		-	-	-
	10	4	EBWB	X-Street	10	7	17	4	1		Yes		18	16	30	30	AM	80	30	0	-	-	PM	90	41	11	-	-
	10	5	NBL	P/P	7			3	1				13	12	-	13	AM	80	12	0	-	-	PM	90	12	0	-	-
	10	6	SB	Mainline	15	7	10	4	1		Yes	Yes	20	21	23	23	AM	80	38	15	0	0%	PM	90	37	14	11	30%
	10	7											-	-	-	-	AM	80		-	-	-	PM	90		-	-	-
	10	8											-	-	-	-	AM	80		-	-	-	PM	90		-	-	-
Snelling Ave & Thomas Ave	11	1	SBL	P/P	7			3	1				13	12	-	13	AM	80	12	0	-	-	PM	90	14	1	-	-
	11	2	NB	Mainline	15	7	7	4	1		Yes	Yes	20	21	20	21	AM	80	36	15	0	0%	PM	90	39	18	6	15%
	11	3											-	-	-	-	AM	80		-	-	-	PM	90		-	-	-
	11	4	EBWB	X-Street	12	7	19	4	1		Yes		18	18	32	32	AM	80	32	0	-	-	PM	90	37	5	-	-
	11	5	NBL	P/P	7			3	1				13	12	-	13	AM	80	13	0	-	-	PM	90	12	0	-	-
	11	6	SB	Mainline	15	7	8	4	1		Yes	Yes	20	21	21	21	AM	80	35	14	0	0%	PM	90	41	20	5	12%
	11	7											-	-	-	-	AM	80		-	-	-	PM	90		-	-	-
	11	8											-	-	-	-	AM	80		-	-	-	PM	90		-	-	-
Snelling Ave & University Ave	12	1	SBL	P/P	7			4	1				13	13	-	13	AM	105	14	1	-	-	PM	130	19	6	-	-
	12	2	NB	Mainline	17	7	6	4	1		Yes	Yes	20	23	19	23	AM	105	51	28	1	2%	PM	130	55	32	16	29%
	12	3	EBL	Prot	7			4	1				15	13	-	15	AM	105	13	0	-	-	PM	130	29	14	-	-
	12	4	WB	X-Street	20	7	20	4	1		Yes		18	26	33	33	AM	105	27	0	-	-	PM	130	27	0	-	-
	12	5	NBL	P/P	7			4	1				13	13	-	13	AM	105	19	6	-	-	PM	130	14	1	-	-
	12	6	SB	Mainline	17	7	6	4	1		Yes	Yes	20	23	19	23	AM	105	46	23	6	13%	PM	130	60	37	11	18%
	12	7	WBL	Prot	7			4	1				15	13	-	15	AM	105	17	2	-	-	PM	130	25	10	-	-
	12	8	EB	X-Street	20	7	19	4	1		Yes		18	26	32	32	AM	105	23	0	-	-	PM	130	31	0	-	-

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Snelling Ave & Spruce Tree Ave	13	1	SBL	P/P	7			4	1				13	13	-	13	AM	105	13	0	-	-	PM	130	15	2	-	-
	13	2	NB	Mainline	7	7	10	4	1		Yes	Yes	20	13	23	23	AM	105	60	37	0	0%	PM	130	64	41	21	33%
	13	3											-	-	-	-	AM	105		-	-	-	PM	130		-	-	-
	13	4	EBWB	X-Street	7	7	19	4	1		Yes		18	13	32	32	AM	105	32	0	-	-	PM	130	51	19	-	-
	13	5	NBL	P/P	7			4	1				13	13	-	13	AM	105	15	2	-	-	PM	130	15	2	-	-
	13	6	SB	Mainline	7	7	10	4	1		Yes	Yes	20	13	23	23	AM	105	58	35	2	3%	PM	130	64	41	21	33%
	13	7											-	-	-	-	AM	105		-	-	-	PM	130		-	-	-
	13	8											-	-	-	-	AM	105		-	-	-	PM	130		-	-	-
Snelling Ave & St Anthony Ave	14	1	NBL	P/P	7			3.5	2				13	13	-	13	AM	105	39	26	-	-	PM	130	50	37	-	-
	14	2	SB	Mainline	11	7	6	3.5	2		Yes	Yes	20	17	19	20	AM	105	30	10	38	127%	PM	130	35	15	58	166%
	14	3											-	-	-	-	AM	105		-	-	-	PM	130		-	-	-
	14	4	WB	X-Street	15	7	10	4	2		Yes		18	22	24	24	AM	105	36	12	-	-	PM	130	45	21	-	-
	14	5											-	-	-	-	AM	105		-	-	-	PM	130		-	-	-
	14	6	NB	Mainline	11	7	8	3.5	2		Yes	Yes	20	17	21	21	AM	105	69	48	12	17%	PM	130	85	64	21	25%
	14	7											-	-	-	-	AM	105		-	-	-	PM	130		-	-	-
	14	8											-	-	-	-	AM	105		-	-	-	PM	130		-	-	-
Snelling Ave & Concordia Ave	15	1	SBL	P/P	7			3.5	1				13	12	-	13	AM	105	20	7	-	-	PM	130	28	15	-	-
	15	2	NB	Mainline	11	7	8	3.5	2		Yes	Yes	20	17	21	21	AM	105	49	28	17	35%	PM	130	47	26	44	94%
	15	3											-	-	-	-	AM	105		-	-	-	PM	130		-	-	-
	15	4	EB	X-Street	15	7	14	3.5	1		Yes		18	20	26	26	AM	105	36	10	-	-	PM	130	55	29	-	-
	15	5											-	-	-	-	AM	105		-	-	-	PM	130		-	-	-
	15	6	SB	Mainline	11	7	8	3.5	2		Yes	Yes	20	17	21	21	AM	105	69	48	10	14%	PM	130	75	54	29	39%
	15	7											-	-	-	-	AM	105		-	-	-	PM	130		-	-	-
	15	8											-	-	-	-	AM	105		-	-	-	PM	130		-	-	-
Snelling Ave & Marshall Ave	16	1	SBL	P/P	7			3	1				13	12	-	13	AM	105	12	0	-	-	PM	130	12	0	-	-
	16	2	NB	Mainline	12	7	16	4	1		Yes	Yes	20	18	29	29	AM	105	44	15	1	2%	PM	130	68	39	2	3%
	16	3	EBL	P/P	7			3	1				13	12	-	13	AM	105	15	2	-	-	PM	130	16	3	-	-
	16	4	WB	X-Street	10	7	21	4	1		Yes		18	16	34	34	AM	105	34	0	-	-	PM	130	34	0	-	-
	16	5	NBL	P/P	7			3	1				13	12	-	13	AM	105	13	0	-	-	PM	130	12	0	-	-
	16	6	SB	Mainline	12	7	16	4	1		Yes	Yes	20	18	29	29	AM	105	43	14	1	2%	PM	130	68	39	2	3%
	16	7	WBL	P/P	7			3	1				13	12	-	13	AM	105	13	0	-	-	PM	130	14	1	-	-
	16	8	EB	X-Street	10	7	22	4	1		Yes		18	16	35	35	AM	105	36	1	-	-	PM	130	36	1	-	-

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Snelling Ave & Selby Ave	17	1	SBL	P/P	7			4	1				13	13	-	13	AM	105	20	7	-	-	PM	130	39	26	-	-
	17	2	NB	Mainline	15	7	10	4	1		Yes	Yes	20	21	23	23	AM	105	32	9	31	97%	PM	130	38	15	50	132%
	17	3											-	-	-	-	AM	105		-	-	-	PM	130		-	-	-
	17	4	EBWB	X-Street	12	7	16	4	1		Yes		18	18	29	29	AM	105	53	24	-	-	PM	130	53	24	-	-
	17	5											-	-	-	-	AM	105		-	-	-	PM	130		-	-	-
	17	6	SB	Mainline	15	7	13	4	1		Yes	Yes	20	21	26	26	AM	105	52	26	24	46%	PM	130	77	51	24	31%
	17	7											-	-	-	-	AM	105		-	-	-	PM	130		-	-	-
	17	8											-	-	-	-	AM	105		-	-	-	PM	130		-	-	-
Snelling Ave & Summit Ave	18	1											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
	18	2	NBSB	Mainline	10	7	10	4.5	1.5		Yes	Yes	20	17	24	24	AM	105	65	41	13	20%	PM	110	59	35	24	41%
	18	3											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
	18	4	EBWB	X-Street	10	7	14	4	1		Yes		18	16	27	27	AM	105	40	13	-	-	PM	110	51	24	-	-
	18	5											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
	18	6											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
	18	7											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
	18	8											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
Snelling Ave & Grand Ave	19	1	NBL	P/P	7			3	1				13	12	-	13	AM	105	13	0	-	-	PM	110	13	0	-	-
	19	2	SB	Mainline	10	7	12	3.5	1.5		Yes	Yes	20	16	25	25	AM	105	44	19	6	14%	PM	110	43	18	12	28%
	19	3	EBL	P/P	7			3	1				13	12	-	13	AM	105	13	0	-	-	PM	110	13	0	-	-
	19	4	WB	X-Street	12	7	16	3.5	1.5		Yes		18	18	29	29	AM	105	35	6	-	-	PM	110	41	12	-	-
	19	5	SBL	P/P	7			3	1				13	12	-	13	AM	105	14	1	-	-	PM	110	16	3	-	-
	19	6	NB	Mainline	10	7	12	3.5	1.5		Yes	Yes	20	16	25	25	AM	105	43	18	7	16%	PM	110	40	15	15	38%
	19	7	WBL	P/P	7			3	1				13	12	-	13	AM	105	13	0	-	-	PM	110	15	2	-	-
	19	8	EB	X-Street	12	7	16	3.5	1.5		Yes		18	18	29	29	AM	105	35	6	-	-	PM	110	39	10	-	-
Snelling Ave & St Clair Ave	20	1											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
	20	2	NBSB	Mainline	10	7	10	4	1		Yes	Yes	20	16	23	23	AM	105	60	37	15	25%	PM	110	55	32	25	45%
	20	3											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
	20	4	EBWB	X-Street	10	7	17	4	1		Yes		18	16	30	30	AM	105	45	15	-	-	PM	110	55	25	-	-
	20	5											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
	20	6											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
	20	7											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
	20	8											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-

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Snelling Ave & Jefferson Ave	21	1											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
	21	2	NBSB	Mainline	12	7	5	4	1		Yes	Yes	20	18	18	20	AM	105	70	50	8	11%	PM	110	80	60	3	4%
	21	3											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
	21	4	EBWB	X-Street	10	7	14	4	1		Yes		18	16	27	27	AM	105	35	8	-	-	PM	110	30	3	-	-
	21	5											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
	21	6											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
	21	7											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
	21	8											-	-	-	-	AM	105		-	-	-	PM	110		-	-	-
Snelling Ave & Randolph Ave	22	1	SBL	P/P	7			3.5	1				13	12	-	13	AM	105	14	1	-	-	PM	110	16	3	-	-
	22	2	NB	Mainline	10	7	11	4	1		Yes	Yes	20	16	24	24	AM	105	43	19	5	12%	PM	110	38	14	15	39%
	22	3	EBL	P/P	7			3.5	1				13	12	-	13	AM	105	13	0	-	-	PM	110	14	1	-	-
	22	4	WB	X-Street	10	7	18	4	1		Yes		18	16	31	31	AM	105	35	4	-	-	PM	110	42	11	-	-
	22	5	NBL	P/P	7			3.5	1				13	12	-	13	AM	105	13	0	-	-	PM	110	12	0	-	-
	22	6	SB	Mainline	10	7	11	4	1		Yes	Yes	20	16	24	24	AM	105	44	20	4	9%	PM	110	42	18	12	29%
	22	7	WBL	P/P	7			3.5	1				13	12	-	13	AM	105	13	0	-	-	PM	110	14	1	-	-
	22	8	EB	X-Street	10	7	18	4	1		Yes		18	16	31	31	AM	105	35	4	-	-	PM	110	42	11	-	-
Snelling Ave & Highland Pkwy	23	1											-	-	-	-	AM	60		-	-	-	PM	60		-	-	-
	23	2	NBSB	Mainline	10			4	1			Yes	20	16	-	20	AM	60	31	11	0	0%	PM	60	31	11	0	0%
	23	3											-	-	-	-	AM	60		-	-	-	PM	60		-	-	-
	23	4	EBWB	X-Street	10	7	16	4	1		Yes		18	16	29	29	AM	60	29	0	-	-	PM	60	29	0	-	-
	23	5											-	-	-	-	AM	60		-	-	-	PM	60		-	-	-
	23	6											-	-	-	-	AM	60		-	-	-	PM	60		-	-	-
	23	7											-	-	-	-	AM	60		-	-	-	PM	60		-	-	-
	23	8											-	-	-	-	AM	60		-	-	-	PM	60		-	-	-
Snelling Ave & Ford Pkwy	24	1											-	-	-	-	AM	60		-	-	-	PM	60		-	-	-
	24	2	NBSB	Mainline	10	7	14	4	1		Yes	Yes	20	16	27	27	AM	60	30	3	0	0%	PM	60	30	3	0	0%
	24	3											-	-	-	-	AM	60		-	-	-	PM	60		-	-	-
	24	4	EBWB	X-Street	10	7	17	4	1		Yes	Yes	18	16	30	30	AM	60	30	0	3	10%	PM	60	30	0	3	10%
	24	5											-	-	-	-	AM	60		-	-	-	PM	60		-	-	-
	24	6											-	-	-	-	AM	60		-	-	-	PM	60		-	-	-
	24	7											-	-	-	-	AM	60		-	-	-	PM	60		-	-	-
	24	8											-	-	-	-	AM	60		-	-	-	PM	60		-	-	-

Intersection	IntID	Phase	Movement	Phasing	Min Green	Walk	Ped Clear (FDW)	Yellow	Red Clear (All Red)	Ped Actuated?	Min Split Incl. peds?	TSP phase?	Default Min Split	Veh Min Split	Ped Min Split	Min Split	AM Pattern #	AM Cycle	AM Split	AM Slack Time	AM TSP Time	AM TSP Time (% of ex. Split)	PM Pattern #	PM Cycle	PM Split	PM Slack Time	PM TSP Time	PM TSP Time (% of ex. Split)
Ford Pkwy & Fairview Ave	25	1											-	-	-	-	Free	Free		-	-	-	Free	Free		-	-	-
	25	2	EBWB	Mainline	12	7	17	4	1.5		Yes	Yes	20	18	30	30	Free	Free	45	15	17	38%	Free	Free	45	15	17	38%
	25	3											-	-	-	-	Free	Free		-	-	-	Free	Free		-	-	-
	25	4	NBSB	X-Street	14	7	15	4	1.5		Yes		18	20	28	28	Free	Free	45	17	-	-	Free	Free	45	17	-	-
	25	5											-	-	-	-	Free	Free		-	-	-	Free	Free		-	-	-
	25	6											-	-	-	-	Free	Free		-	-	-	Free	Free		-	-	-
	25	7											-	-	-	-	Free	Free		-	-	-	Free	Free		-	-	-
	25	8											-	-	-	-	Free	Free		-	-	-	Free	Free		-	-	-
Ford Pkwy & Kenneth Ave	26	1											-	-	-	-	AM	80		-	-	-	PM	110		-	-	-
	26	2	EBWB	Mainline	15	7	7	4	1		Yes	Yes	20	21	20	21	AM	80	39	18	9	23%	PM	110	63	42	15	24%
	26	3											-	-	-	-	AM	80		-	-	-	PM	110		-	-	-
	26	4	NBSB	X-Street	7	7	20	3.5	1		Yes		18	12	32	32	AM	80	41	9	-	-	PM	110	47	15	-	-
	26	5											-	-	-	-	AM	80		-	-	-	PM	110		-	-	-
	26	6											-	-	-	-	AM	80		-	-	-	PM	110		-	-	-
	26	7											-	-	-	-	AM	80		-	-	-	PM	110		-	-	-
	26	8											-	-	-	-	AM	80		-	-	-	PM	110		-	-	-
Ford Pkwy & Cleveland Ave	27	1	EBL	P/P	7			3	1				13	12	-	13	AM	80	-	-	-	-	PM	110	13	0	-	-
	27	2	WB	Mainline	10	7	15	3.5	1		Yes	Yes	20	15	27	27	AM	80	34	7	4	12%	PM	110	40	13	15	38%
	27	3	SBL	P/P	7			3	1				13	12	-	13	AM	80	12	0	-	-	PM	110	12	0	-	-
	27	4	NB	X-Street	10	7	17	3.5	1		Yes		18	15	29	29	AM	80	34	5	-	-	PM	110	45	16	-	-
	27	5	WBL	P/P	7			3	1				13	12	-	13	AM	80	-	-	-	-	PM	110	12	0	-	-
	27	6	EB	Mainline	10	7	20	3.5	1		Yes	Yes	20	15	32	32	AM	80	34	2	4	12%	PM	110	41	9	15	37%
	27	7	NBL	P/P	7			3	1				13	12	-	13	AM	80	15	2	-	-	PM	110	19	6	-	-
	27	8	SB	X-Street	10	7	17	3.5	1		Yes		18	15	29	29	AM	80	31	2	-	-	PM	110	38	9	-	-
Ford Pkwy & Finn Ave	28	1	WBL	P/P	7			3	1				13	12	-	13	AM	80	14	1	-	-	PM	110	23	10	-	-
	28	2	EB	Mainline	16	7	15	3.5	1		Yes	Yes	20	21	27	27	AM	80	34	7	3	9%	PM	110	42	15	25	60%
	28	3											-	-	-	-	AM	80		-	-	-	PM	110		-	-	-
	28	4	NBSB	X-Street	8	7	17	4	1		Yes		18	14	30	30	AM	80	32	2	-	-	PM	110	45	15	-	-
	28	5											-	-	-	-	AM	80		-	-	-	PM	110		-	-	-
	28	6	WB	Mainline	16	7	9	3.5	1		Yes	Yes	20	21	21	21	AM	80	48	27	2	4%	PM	110	65	44	15	23%
	28	7											-	-	-	-	AM	80		-	-	-	PM	110		-	-	-
	28	8											-	-	-	-	AM	80		-	-	-	PM	110		-	-	-

Intersection	IntID	Phase	Movement	Phasing	Min Green	Walk	Ped Clear (FDW)	Yellow	Red Clear (All Red)	Ped Actuated?	Min Split Incl. peds?	TSP phase?	Default Min Split	Veh Min Split	Ped Min Split	Min Split	AM Pattern #	AM Cycle	AM Split	AM Slack Time	AM TSP Time	AM TSP Time (% of ex. Split)	PM Pattern #	PM Cycle	PM Split	PM Slack Time	PM TSP Time	PM TSP Time (% of ex. Split)
Ford Pkwy & Cretin Ave	29	1	EBL	P/P	8			3	1				13	13	-	13	AM	80	15	2	-	-	PM	110	16	3	-	-
	29	2	WB	Mainline	10	7	9	4	1		Yes	Yes	20	16	22	22	AM	80	32	10	6	19%	PM	110	64	42	4	6%
	29	3											-	-	-	-	AM	80		-	-	-	PM	110		-	-	-
	29	4	NBSB	X-Street	10	7	17	3.5	1		Yes		18	15	29	29	AM	80	33	4	-	-	PM	110	30	1	-	-
	29	5											-	-	-	-	AM	80		-	-	-	PM	110		-	-	-
	29	6	EB	Mainline	10	7	7	4	1		Yes	Yes	20	16	20	20	AM	80	47	27	4	9%	PM	110	80	60	1	1%
	29	7											-	-	-	-	AM	80		-	-	-	PM	110		-	-	-
	29	8											-	-	-	-	AM	80		-	-	-	PM	110		-	-	-
46th & 46th	30	1	WBL	P/P	7			3.5	2.2				13	14	-	14	*	110	24	10	-	-	*	120	29	15	-	-
	30	2	EB	Mainline	15	8	9	3.5	3.2		Yes	Yes	20	23	25	25	*	110	37	12	13	35%	*	120	41	16	21	51%
	30	3	SWB	X-Street	10			3.5	2.2				18	17	-	18	*	110	18	0	-	-	*	120	16	0	-	-
	30	4	SB	X-Street	10	9	12	3.5	2.6		Yes		18	17	28	28	*	110	31	3	-	-	*	120	34	6	-	-
	30	5	EBL	P/P	7			3.5	2.2				13	14	-	14	*	110	15	1	-	-	*	120	13	0	-	-
	30	6	WB	Mainline	15	8	9	3.5	3.2		Yes	Yes	20	23	25	25	*	110	46	21	4	9%	*	120	57	32	6	11%
	30	7											-	-	-	-	*	110		-	-	-	*	120		-	-	-
	30	8	NB	X-Street	10			3.5	2.6				18	17	-	18	*	110	31	13	-	-	*	120	34	16	-	-
46th & 42nd	31	1											-	-	-	-	*	110		-	-	-	*	120		-	-	-
	31	2	EBWB	Mainline	15	7	11	3.6	0		Yes	Yes	20	20	23	23	*	110	67	44	20	30%	*	120	74	51	23	31%
	31	3											-	-	-	-	*	110		-	-	-	*	120		-	-	-
	31	4	NBSB	X-Street	10	7	11	3.6	0		Yes		18	15	23	23	*	110	43	20	-	-	*	120	46	23	-	-
	31	5											-	-	-	-	*	110		-	-	-	*	120		-	-	-
	31	6											-	-	-	-	*	110		-	-	-	*	120		-	-	-
	31	7											-	-	-	-	*	110		-	-	-	*	120		-	-	-
	31	8											-	-	-	-	*	110		-	-	-	*	120		-	-	-
46th & Minnehaha	32	1											-	-	-	-	*	110		-	-	-	*	120		-	-	-
	32	2	NBSB	X-Street	10	7	12	3.2	1.6		Yes		18	16	25	25	*	110	59	34	-	-	*	120	76	51	-	-
	32	3											-	-	-	-	*	110		-	-	-	*	120		-	-	-
	32	4	EBWB	Mainline	15	7	11	3.2	1.6		Yes	Yes	20	21	24	24	*	110	51	27	34	67%	*	120	44	20	51	116%
	32	5											-	-	-	-	*	110		-	-	-	*	120		-	-	-
	32	6											-	-	-	-	*	110		-	-	-	*	120		-	-	-
	32	7											-	-	-	-	*	110		-	-	-	*	120		-	-	-
	32	8											-	-	-	-	*	110		-	-	-	*	120		-	-	-

TSP Slack Time Analysis - Timing Data

Intersection	IntID	Phase	Movement	Phasing	Min Green	Walk	Ped Clear (FDW)	Yellow	Red Clear (All Red)	Ped Actuated?	Min Split Incl. peds?	TSP phase?	Default Min Split	Veh Min Split	Ped Min Split	Min Split	AM Pattern #	AM Cycle	AM Split	AM Slack Time	AM TSP Time	AM TSP Time (% of ex. Split)	PM Pattern #	PM Cycle	PM Split	PM Slack Time	PM TSP Time	PM TSP Time (% of ex. Split)
Hiawatha & 46th	33	1	SBL	Prot	5			3.9	2.3				15	12	-	15	Free	Free	40	25	-	-	Free	Free	40	25	-	-
	33	2	NB	Mainline	10	12	13	3.9	2.3	Yes	Yes		20	17	32	32	Free	Free	90	58	-	-	Free	Free	90	58	-	-
	33	3	EBL	P/P	5			3.5	3.4				13	13	-	13	Free	Free	30	17	-	-	Free	Free	30	17	-	-
	33	4	WB	X-Street	8	7	17	3.5	4.1	Yes	Yes	Yes	18	17	33	33	Free	Free	70	37	90	129%	Free	Free	70	37	90	129%
	33	5	NBL	Prot	5			3.9	2.3				15	12	-	15	Free	Free	30	15	-	-	Free	Free	30	15	-	-
	33	6	SB	Mainline	10	12	13	3.9	2.3	Yes	Yes		20	17	32	32	Free	Free	90	58	-	-	Free	Free	90	58	-	-
	33	7	WBL	Prot	5			3.5	4.1				15	14	-	15	Free	Free	40	25	-	-	Free	Free	40	25	-	-
	33	8	EB	X-Street	8	7	23	3.5	3.4	Yes	Yes	Yes	18	16	38	38	Free	Free	70	32	98	140%	Free	Free	70	32	98	140%
46th & 36th	34	1	WBL	P/P	0			3.5	1.6				13	6	-	13	Free	Free	-	-	-	-	Free	Free	-	-	-	-
	34	2	EB	Mainline	15	11	8	3.5	1.6		Yes		20	21	25	25	Free	Free	90	65	-	-	Free	Free	90	65	-	-
	34	3											-	-	-	-	Free	Free		-	-	-	Free	Free		-	-	-
	34	4	SB	X-Street	10	12	11	3.5	2		Yes	Yes	18	16	29	29	Free	Free	60	31	65	108%	Free	Free	60	31	65	108%
	34	5	EBL	P/P	0			3.5	1.6				13	6	-	13	Free	Free	-	-	-	-	Free	Free	-	-	-	-
	34	6	WB	Mainline	15	11	8	3.5	1.6		Yes	Yes	20	21	25	25	Free	Free	90	65	31	34%	Free	Free	90	65	31	34%
	34	7											-	-	-	-	Free	Free		-	-	-	Free	Free		-	-	-
	34	8	NB	X-Street	10	12	11	3.5	2		Yes		18	16	29	29	Free	Free	60	31	-	-	Free	Free	60	31	-	-

Note:

* New timing plans are being developed for 46th Street in Minneapolis. As of December, 2012, cycle lengths have been developed, but splits and offsets are yet to be determined. For this analysis, for the intersections of Minnehaha, 42nd, and 46th, new timing plans were assumed based on the proposed cycle lengths.

APPENDIX C

DETAILED VISSIM MODELING OUTPUT

Baseline Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Arterial MOEs (A.M. Peak Hour 7:30 - 8:30)

Consulting Group, Inc

Co B2 at Snelling W Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	11	7	87	30.0	C	27.9	C	14.0	B
	Thru	23	7	86	34.0	C				
	Right	6	0	0	1.5	A				
Southbound	Left	20	9	90	37.3	D	23.4	C		
	Thru	33	9	89	38.0	D				
	Right	37	0	0	2.6	A				
Eastbound	Left	22	4	56	36.8	D	11.3	B		
	Thru	101	2	51	6.9	A				
	Right	14	0	0	3.3	A				
Westbound	Left	120	32	232	43.9	D	12.3	B		
	Thru	447	8	128	5.8	A				
	Right	78	0	0	1.2	A				

Co B2 at Snelling E Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	50	10	114	31.8	C	14.7	B	5.1	A
	Right	150	0	45	9.0	A				
Eastbound	Left	13	0	34	3.5	A	1.5	A		
	Thru	115	0	34	1.3	A				
Westbound	Thru	492	2	95	2.4	A	2.3	A		
	Right	30	0	0	1.4	A				

Snelling at Co B

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	134	74	301	87.0	F	15.1	B	33.7	C
	Thru	883	11	211	5.5	A				
	Right	83	0	0	1.6	A				
Southbound	Left	154	85	693	87.2	F	28.4	C		
	Thru	1,542	143	762	24.7	C				
	Right	333	61	711	18.6	B				
Eastbound	Left	103	54	310	77.9	E	74.8	E		
	Thru	237	83	333	85.4	F				
	Right	46	2	91	12.5	B				
Westbound	Left	137	56	280	67.4	E	61.7	E		
	Thru	270	83	312	81.3	F				
	Right	129	6	145	14.6	B				

Snelling at HarMar

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	56	30	170	85.2	F	12.6	B	11.5	B
	Thru	956	16	246	9.0	A				
	Right	57	0	0	1.7	A				
Southbound	Left	58	25	170	68.4	E	4.5	A		
	Thru	1,600	6	131	2.3	A				
	Right	69	0	46	2.3	A				
Eastbound	Left	63	37	143	82.9	F	45.2	D		
	Thru	31	37	143	83.5	F				
	Right	114	40	146	14.1	B				
Westbound	Left	39	26	130	88.4	F	41.8	D		
	Thru	18	26	130	85.9	F				
	Right	78	7	116	8.2	A				

* Results shown are the average of 5 model runs.
** Results shown are from all vehicles except transit vehicles.

Baseline Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Arterial MOEs (A.M. Peak Hour 7:30 - 8:30)

Consulting Group, Inc

Snelling at Roselawn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	10	4	57	74.6	E	5.6	A	13.0	B
	Thru	943	9	280	4.9	A				
	Right	10	0	31	2.6	A				
Southbound	Left	32	24	111	117.5	F	4.7	A		
	Thru	1,673	5	113	2.5	A				
	Right	47	0	27	2.6	A				
Eastbound	Left	24	50	219	123.8	F	59.9	E		
	Thru	42	47	211	112.1	F				
	Right	76	3	67	10.8	B				
Westbound	Left	47	113	513	104.1	F	70.0	E		
	Thru	114	113	514	105.5	F				
	Right	103	4	90	15.0	B				

Snelling at Larpenteur

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	182	90	398	75.5	E	27.2	C	96.2	F
	Thru	790	42	382	17.2	B				
	Right	40	1	73	4.5	A				
Southbound	Left	48	38	159	127.4	F	27.5	C		
	Thru	1,625	140	1,143	25.6	C				
	Right	121	3	83	13.1	B				
Eastbound	Left	83	39	184	78.0	E	69.0	E		
	Thru	192	52	228	66.6	E				
	Right	21	64	242	55.2	E				
Westbound	Left	222	1,321	1,701	286.0	F	292.8	F		
	Thru	711	1,362	1,702	293.8	F				
	Right	90	1,371	1,705	301.8	F				

Snelling at Hoyt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	0	31	19.1	B	5.3	A	6.2	A
	Thru	923	10	259	5.1	A				
	Right	30	0	0	2.7	A				
Southbound	Left	16	0	14	6.5	A	2.0	A		
	Thru	1,839	2	107	2.0	A				
	Right	14	0	0	3.1	A				
Eastbound	Left	10	4	45	73.1	E	59.5	E		
	Thru	7	4	67	88.5	F				
	Right	8	3	93	17.1	B				
Westbound	Left	73	39	212	87.2	F	52.1	D		
	Thru	9	10	140	75.3	E				
	Right	77	11	157	16.2	B				

Snelling at Midway

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	44	1	57	19.3	B	6.1	A	7.0	A
	Thru	942	12	266	5.6	A				
	Right	21	0	51	3.4	A				
Southbound	Left	43	0	14	7.3	A	4.2	A		
	Thru	1,824	5	246	4.1	A				
	Right	52	8	282	4.9	A				
Eastbound	Left	0	-	-	-	A	68.6	E		
	Thru	13	6	71	80.9	F				
	Right	3	0	37	13.5	B				
Westbound	Left	45	35	175	78.6	E	62.4	E		
	Thru	26	35	172	84.5	F				
	Right	23	1	58	6.6	A				

* Results shown are the average of 5 model runs.
** Results shown are from all vehicles except transit vehicles.

Baseline Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Arterial MOEs (A.M. Peak Hour 7:30 - 8:30)

Consulting Group, Inc

Snelling at Hewitt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	15	0	24	13.5	B	12.7	B	11.7	B
	Thru	1,073	35	**438**	12.7	B				
	Right	21	43	**460**	10.8	B				
Southbound	Left	76	2	80	13.6	B	9.2	A		
	Thru	1,371	29	**569**	9.1	A				
	Right	29	0	50	5.0	A				
Eastbound	Left	49	13	134	30.5	C	25.7	C		
	Thru	11	14	135	34.2	C				
	Right	30	17	153	14.7	B				
Westbound	Left	58	11	110	31.8	C	30.2	C		
	Thru	5	11	108	33.6	C				
	Right	7	17	123	15.6	B				

Snelling at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	18	0	44	19.5	B	8.5	A	13.1	B
	Thru	1,001	19	**385**	8.3	A				
	Right	12	19	**372**	6.7	A				
Southbound	Left	35	1	50	14.9	B	12.6	B		
	Thru	1,300	36	**660**	12.4	B				
	Right	124	35	**648**	13.5	B				
Eastbound	Left	55	23	159	36.0	**D**	33.2	C		
	Thru	58	23	159	31.5	C				
	Right	22	23	157	30.6	C				
Westbound	Left	35	22	183	32.5	C	31.2	C		
	Thru	69	22	184	31.2	C				
	Right	53	22	184	30.2	C				

Snelling at Thomas

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	22	1	47	12.0	B	9.7	A	12.4	B
	Thru	951	25	**331**	9.7	A				
	Right	23	26	**338**	7.6	A				
Southbound	Left	33	1	37	14.8	B	12.6	B		
	Thru	1,256	31	**603**	12.8	B				
	Right	68	0	43	9.3	A				
Eastbound	Left	31	11	136	33.0	C	28.9	C		
	Thru	22	11	137	32.0	C				
	Right	16	16	153	16.8	B				
Westbound	Left	25	15	157	32.7	C	23.5	C		
	Thru	45	15	159	27.9	C				
	Right	49	21	172	14.6	B				

Snelling at University

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	162	30	292	29.4	C	16.6	B	32.5	C
	Thru	876	54	**312**	15.9	B				
	Right	126	55	**317**	4.8	A				
Southbound	Left	154	15	185	29.7	C	28.2	C		
	Thru	1,005	89	**635**	29.4	C				
	Right	144	3	104	18.6	B				
Eastbound	Left	50	15	126	46.9	**D**	36.4	**D**		
	Thru	227	55	287	37.8	**D**				
	Right	136	57	290	30.4	C				
Westbound	Left	153	170	**509**	148.1	**F**	61.5	**E**		
	Thru	551	99	**379**	40.6	**D**				
	Right	74	102	**385**	38.5	**D**				

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Snelling at Spruce Tree

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	66	1	63	11.0	B	6.2	A	6.2	A
	Thru	1,112	13	226	6.2	A				
	Right	54	16	242	2.1	A				
Southbound	Left	18	0	39	17.0	B	3.0	A		
	Thru	1,228	9	213	2.9	A				
	Right	51	13	234	2.3	A				
Eastbound	Left	19	6	70	46.7	D	17.1	B		
	Thru	0	6	71	73.1	E				
	Right	61	2	94	7.4	A				
Westbound	Left	46	13	115	44.5	D	36.5	D		
	Thru	22	9	110	49.0	D				
	Right	36	10	113	18.4	B				

Snelling at St Anthony

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	883	39	318	13.2	B	11.0	B	20.9	C
	Thru	827	39	319	8.6	A				
Southbound	Thru	936	95	514	38.3	D	30.0	C		
	Right	403	52	454	10.7	B				
Westbound	Left	214	65	345	32.3	C	25.1	C		
	Thru	526	65	342	34.6	C				
	Right	392	27	282	8.5	A				

Snelling at Concordia

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	1,380	47	364	19.1	B	17.5	B	15.6	B
	Right	414	8	277	12.2	B				
Southbound	Left	493	13	328	9.9	A	7.3	A		
	Thru	642	13	327	5.3	A				
Eastbound	Left	327	55	247	39.1	D	22.3	C		
	Thru	164	55	247	36.6	D				
	Right	413	0	0	3.4	A				

Snelling at Marshall

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	67	8	151	36.4	D	29.2	C	27.1	C
	Thru	1,487	176	654	29.4	C				
	Right	50	1	72	12.5	B				
Southbound	Left	25	3	62	29.8	C	20.8	C		
	Thru	794	63	303	23.3	C				
	Right	227	12	199	11.2	B				
Eastbound	Left	271	63	362	39.1	D	31.4	C		
	Thru	210	24	164	25.9	C				
	Right	58	27	192	14.7	B				
Westbound	Left	47	5	107	19.9	B	29.6	C		
	Thru	329	42	225	31.7	C				
	Right	47	42	233	24.8	C				

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Snelling at Selby

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	12	2	47	53.8	D	54.9	D	42.4	D
	Thru	1,079	244	733	55.0	D				
	Right	21	246	722	48.3	D				
Southbound	Left	230	101	417	68.4	E	27.9	C		
	Thru	645	33	233	14.2	B				
	Right	28	35	237	11.8	B				
Eastbound	Left	68	79	341	148.3	F	70.3	E		
	Thru	149	39	335	38.5	D				
	Right	13	37	327	23.4	C				
Westbound	Left	31	3	45	31.8	C	31.7	C		
	Thru	175	126	523	37.4	D				
	Right	452	129	528	29.4	C				

Snelling at Summit

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	41	1	44	9.6	A	5.3	A	20.1	C
	Thru	924	15	153	5.1	A				
	Right	32	15	152	5.9	A				
Southbound	Left	40	13	114	27.9	C	21.9	C		
	Thru	551	47	288	21.4	C				
	Right	101	48	287	21.8	C				
Eastbound	Left	49	14	195	54.8	D	30.8	C		
	Thru	178	28	262	25.1	C				
	Right	13	38	286	19.5	B				
Westbound	Left	64	7	218	39.2	D	39.4	D		
	Thru	357	138	598	41.3	D				
	Right	146	152	616	35.1	D				

Snelling at Grand

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	44	2	65	13.0	B	13.7	B	23.5	C
	Thru	771	33	253	13.8	B				
	Right	55	34	263	13.3	B				
Southbound	Left	98	13	124	28.8	C	18.2	B		
	Thru	423	31	204	17.2	B				
	Right	102	35	219	12.0	B				
Eastbound	Left	46	6	80	26.4	C	26.8	C		
	Thru	184	34	282	27.6	C				
	Right	23	36	299	21.0	C				
Westbound	Left	82	12	280	39.3	D	43.4	D		
	Thru	299	154	607	46.4	D				
	Right	176	158	623	40.1	D				

Snelling at St Clair

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	39	1	37	11.3	B	6.4	A	14.6	B
	Thru	651	11	116	6.3	A				
	Right	44	0	49	3.7	A				
Southbound	Left	46	2	71	13.7	B	7.9	A		
	Thru	450	9	163	7.4	A				
	Right	30	12	178	6.0	A				
Eastbound	Left	47	34	281	33.6	C	25.0	C		
	Thru	217	34	278	25.3	C				
	Right	39	42	297	12.9	B				
Westbound	Left	68	62	462	36.9	D	27.5	C		
	Thru	256	62	465	29.9	C				
	Right	179	73	485	20.4	C				

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Snelling at Jefferson

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	17	250	18.0	B	10.7	B	11.2	B
	Thru	651	17	251	10.7	B				
	Right	24	21	263	9.2	A				
Southbound	Left	16	5	81	5.4	A	3.5	A		
	Thru	546	5	82	3.5	A				
	Right	4	8	98	3.3	A				
Eastbound	Left	19	13	117	32.5	C	28.2	C		
	Thru	59	13	114	28.6	C				
	Right	7	21	137	13.6	B				
Westbound	Left	62	29	218	31.1	C	29.2	C		
	Thru	66	30	222	34.1	C				
	Right	54	37	234	21.1	C				

Snelling at Randolph

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	65	5	88	17.4	B	22.0	C	26.9	C
	Thru	491	39	207	23.5	C				
	Right	33	1	67	9.3	A				
Southbound	Left	98	5	125	16.5	B	16.7	B		
	Thru	353	22	255	18.9	B				
	Right	155	7	184	11.7	B				
Eastbound	Left	101	33	**417**	44.3	**D**	36.0	**D**		
	Thru	364	98	**517**	35.9	**D**				
	Right	44	1	66	18.2	B				
Westbound	Left	60	8	90	36.1	**D**	35.0	C		
	Thru	407	117	**584**	37.8	**D**				
	Right	88	9	**401**	21.3	C				

Snelling at Highland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	3	5	107	8.6	A	3.6	A	9.3	A
	Thru	494	6	110	3.7	A				
	Right	153	8	121	3.4	A				
Southbound	Left	20	7	194	11.4	B	6.3	A		
	Thru	426	7	197	6.1	A				
	Right	12	8	205	5.3	A				
Eastbound	Left	37	16	147	22.6	C	21.9	C		
	Thru	93	16	146	23.1	C				
	Right	9	0	35	6.7	A				
Westbound	Left	124	19	114	30.6	C	22.9	C		
	Thru	61	8	114	21.6	C				
	Right	61	12	127	8.7	A				

Snelling at Ford

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	75	7	108	12.1	B	5.8	A	7.6	A
	Thru	443	8	109	4.7	A				
	Right	5	11	127	2.7	A				
Southbound	Left	2	2	83	8.9	A	2.7	A		
	Thru	391	2	77	2.6	A				
	Right	171	1	81	2.9	A				
Eastbound	Left	206	21	174	24.6	C	20.1	C		
	Thru	3	21	174	22.1	C				
	Right	76	3	104	7.9	A				
Westbound	Left	8	1	43	23.0	C	18.4	B		
	Thru	5	1	46	15.9	B				
	Right	2	0	61	7.1	A				

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Ford at Fairview

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	42	3	65	22.0	C	11.5	B	12.4	B
	Thru	436	20	254	10.7	B				
	Right	49	20	271	9.1	A				
Southbound	Left	22	1	42	19.9	B	10.9	B		
	Thru	429	20	257	10.8	B				
	Right	66	23	273	8.9	A				
Eastbound	Left	89	8	100	21.6	C	15.4	B		
	Thru	216	13	183	13.8	B				
	Right	29	1	89	8.5	A				
Westbound	Left	28	2	66	15.8	B	13.1	B		
	Thru	216	12	171	12.9	B				
	Right	7	0	47	5.7	A				

Ford at Kenneth

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	38	16	160	35.5	D	27.7	C	8.0	A
	Thru	27	16	157	31.5	C				
	Right	32	13	155	15.1	B				
Southbound	Left	11	11	120	33.5	C	22.6	C		
	Thru	44	11	120	30.2	C				
	Right	38	7	114	10.8	B				
Eastbound	Left	30	0	30	4.1	A	2.0	A		
	Thru	294	2	81	1.9	A				
	Right	20	2	92	1.2	A				
Westbound	Left	15	0	19	4.4	A	4.2	A		
	Thru	301	3	79	4.2	A				
	Right	8	3	82	1.8	A				

Ford at Cleveland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	296	24	266	17.1	B	17.2	B	16.8	B
	Thru	389	42	345	17.1	B				
	Right	56	39	347	19.1	B				
Southbound	Left	28	2	61	15.6	B	19.8	B		
	Thru	274	29	295	19.5	B				
	Right	86	27	292	22.0	C				
Eastbound	Left	91	9	110	20.9	C	14.4	B		
	Thru	260	18	144	12.4	B				
	Right	124	16	144	13.9	B				
Westbound	Left	50	7	98	28.7	C	16.0	B		
	Thru	290	17	128	14.4	B				
	Right	36	14	128	12.1	B				

Ford at Finn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	48	10	98	33.1	C	20.3	C	5.8	A
	Thru	1	6	89	41.0	D				
	Right	42	6	101	5.1	A				
Southbound	Left	31	7	99	32.3	C	21.9	C		
	Thru	1	7	91	17.0	B				
	Right	29	4	95	10.7	B				
Eastbound	Left	20	0	39	8.1	A	5.0	A		
	Thru	403	6	113	4.9	A				
	Right	20	4	121	3.7	A				
Westbound	Left	125	1	70	5.0	A	2.9	A		
	Thru	489	2	97	2.5	A				
	Right	59	2	101	2.2	A				

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Ford at Cretin

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	117	23	148	32.4	C	22.3	C	7.5	A
	Right	65	1	75	3.9	A				
Eastbound	Left	112	2	80	7.9	A	4.9	A		
	Thru	323	3	115	3.8	A				
Westbound	Thru	382	7	121	4.6	A	4.8	A		
	Right	182	6	127	5.3	A				

46th at 46th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	28	18	170	55.1	E	13.2	B	16.4	B
	Thru	33	18	162	49.2	D				
	Right	217	0	4	2.4	A				
Southbound	Left	50	11	135	39.3	D	45.9	D		
	Thru	16	15	157	52.8	D				
	Right	42	17	150	51.0	D				
Eastbound	Left	25	2	85	16.0	B	20.7	C		
	Thru	171	15	142	22.5	C				
	Right	34	20	159	15.2	B				
Westbound	Left	142	5	127	9.6	A	9.0	A		
	Thru	221	7	118	8.8	A				
	Right	81	3	90	8.7	A				

46th at 42nd

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	1	41	24.7	C	17.4	B	18.2	B
	Thru	5	1	48	21.5	C				
	Right	4	1	48	3.7	A				
Southbound	Left	28	6	88	21.3	C	11.3	B		
	Thru	4	5	87	26.2	C				
	Right	84	5	90	7.3	A				
Eastbound	Left	49	7	105	27.2	C	23.4	C		
	Thru	192	17	131	22.9	C				
	Right	14	21	143	17.8	B				
Westbound	Left	4	1	39	21.4	C	16.5	B		
	Thru	272	18	175	16.8	B				
	Right	14	21	183	9.2	A				

46th at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	22	31	252	26.3	C	22.4	C	22.3	C
	Thru	274	32	260	22.5	C				
	Right	13	29	260	13.9	B				
Southbound	Left	38	23	258	29.7	C	18.2	B		
	Thru	166	23	255	21.0	C				
	Right	109	20	245	9.9	A				
Eastbound	Left	127	14	163	23.0	C	17.9	B		
	Thru	208	14	164	15.4	B				
	Right	25	18	177	13.6	B				
Westbound	Left	74	15	122	36.7	D	30.1	C		
	Thru	181	33	194	32.8	C				
	Right	114	34	197	21.6	C				

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46th at Hiawatha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	26	6	79	38.5	D	20.9	C	21.7	C
	Thru	883	66	360	24.2	C				
	Right	183	0	0	2.3	A				
Southbound	Left	94	20	147	36.7	D	19.3	B		
	Thru	530	27	204	16.7	B				
	Right	14	0	0	1.0	A				
Eastbound	Left	63	6	87	21.5	C	27.3	C		
	Thru	82	18	110	28.8	C				
	Right	44	18	109	32.8	C				
Westbound	Left	165	32	216	34.9	C	25.9	C		
	Thru	73	9	115	22.3	C				
	Right	71	2	88	8.6	A				

46th at 36th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	0	31	7.8	A	6.2	A	4.9	A
	Thru	0	-	-	-	A				
	Right	5	0	33	4.5	A				
Southbound	Left	43	2	68	7.7	A	6.7	A		
	Thru	0	-	-	-	A				
	Right	15	2	74	4.0	A				
Eastbound	Left	15	0	38	5.1	A	5.2	A		
	Thru	142	2	96	5.4	A				
	Right	8	4	112	2.3	A				
Westbound	Left	1	2	67	6.3	A	3.4	A		
	Thru	86	1	57	3.6	A				
	Right	25	0	52	2.5	A				

* Results shown are the average of 5 model runs.
** Results shown are from all vehicles except transit vehicles.

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SRF Consulting Group, Inc

Co B2 at Snelling W Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	75	36	213	33.4	C	23.3	C	29.1	C
	Thru	153	37	213	36.1	D				
	Right	141	0	0	3.9	A				
Southbound	Left	6	27	182	44.8	D	21.8	C		
	Thru	106	27	191	44.8	D				
	Right	148	1	58	4.4	A				
Eastbound	Left	404	112	553	45.2	D	30.0	C		
	Thru	747	56	374	24.0	C				
	Right	77	0	0	9.4	A				
Westbound	Left	353	103	453	46.3	D	32.6	C		
	Thru	439	34	193	23.0	C				
	Right	24	0	0	6.2	A				

Co B2 at Snelling E Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	21	43	545	43.3	D	25.6	C	11.6	B
	Right	498	25	475	24.9	C				
Eastbound	Left	248	4	177	8.8	A	5.7	A		
	Thru	646	6	214	4.5	A				
Westbound	Thru	318	6	122	6.5	A	6.0	A		
	Right	38	0	0	2.6	A				

Snelling at Co B

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	154	70	331	72.5	E	13.4	B	71.4	E
	Thru	1,559	34	302	9.0	A				
	Right	211	0	0	3.1	A				
Southbound	Left	426	215	663	97.6	F	43.6	D		
	Thru	1,246	215	665	31.6	C				
	Right	294	103	630	16.3	B				
Eastbound	Left	179	952	1,512	317.2	F	287.8	F		
	Thru	504	988	1,516	292.6	F				
	Right	152	772	1,478	237.6	F				
Westbound	Left	167	81	346	79.2	E	51.2	D		
	Thru	260	70	367	70.2	E				
	Right	300	30	276	19.1	B				

Snelling at HarMar

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	51	22	157	72.5	E	6.5	A	14.3	B
	Thru	1,610	16	124	5.0	A				
	Right	267	0	0	3.3	A				
Southbound	Left	125	47	290	61.4	E	11.0	B		
	Thru	1,340	27	267	6.8	A				
	Right	98	1	67	3.4	A				
Eastbound	Left	116	56	195	79.1	E	58.0	E		
	Thru	49	56	196	82.3	F				
	Right	79	60	199	12.1	B				
Westbound	Left	100	55	219	79.8	E	41.5	D		
	Thru	57	55	218	77.3	E				
	Right	198	47	240	11.7	B				

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Consulting Group, Inc

Snelling at Roselawn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	15	12	74	125.6	F	4.5	A	24.6	C
	Thru	1,835	11	141	3.5	A				
	Right	27	0	16	3.4	A				
Southbound	Left	96	192	562	234.3	F	24.6	C		
	Thru	1,311	45	421	10.7	B				
	Right	102	1	57	6.3	A				
Eastbound	Left	51	236	710	133.4	F	109.0	F		
	Thru	193	230	710	123.7	F				
	Right	70	5	140	50.8	D				
Westbound	Left	21	98	412	136.0	F	95.6	F		
	Thru	93	94	399	118.7	F				
	Right	45	2	78	28.5	C				

Snelling at Larpenteur

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	221	122	468	95.2	F	53.4	D	65.5	E
	Thru	1,699	419	1,343	50.6	D				
	Right	185	5	129	29.9	C				
Southbound	Left	175	391	1,270	218.9	F	71.2	E		
	Thru	1,052	311	1,270	53.6	D				
	Right	174	6	130	28.0	C				
Eastbound	Left	27	8	74	75.7	E	92.2	F		
	Thru	699	318	866	92.2	F				
	Right	196	342	893	94.6	F				
Westbound	Left	153	73	313	79.3	E	54.8	D		
	Thru	352	87	392	49.7	D				
	Right	151	101	416	41.9	D				

Snelling at Hoyt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	7	0	13	16.8	B	10.1	B	9.3	A
	Thru	2,067	47	706	10.2	B				
	Right	124	0	7	6.6	A				
Southbound	Left	45	2	75	30.1	C	3.4	A		
	Thru	1,345	4	106	2.5	A				
	Right	9	0	0	2.6	A				
Eastbound	Left	23	11	86	83.2	F	79.5	E		
	Thru	6	3	58	79.0	E				
	Right	1	1	68	13.6	B				
Westbound	Left	41	21	130	86.0	F	63.6	E		
	Thru	10	7	85	80.3	F				
	Right	29	8	102	26.6	C				

Snelling at Midway

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	53	1	66	16.2	B	11.9	B	11.6	B
	Thru	2,102	80	804	11.9	B				
	Right	66	0	55	10.2	B				
Southbound	Left	76	1	72	17.8	B	5.3	A		
	Thru	1,266	9	218	4.5	A				
	Right	49	13	252	5.4	A				
Eastbound	Left	46	24	133	87.1	F	58.8	E		
	Thru	30	14	96	80.7	F				
	Right	39	2	66	8.5	A				
Westbound	Left	19	17	112	87.4	F	41.7	D		
	Thru	15	17	110	80.0	F				
	Right	51	2	66	13.0	B				

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Consulting Group, Inc

Snelling at Hewitt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	24	1	42	19.8	B	16.4	B	17.1	B
	Thru	1,575	80	**733**	16.3	B				
	Right	19	89	**759**	16.1	B				
Southbound	Left	71	4	93	24.2	C	15.5	B		
	Thru	1,350	64	**614**	15.5	B				
	Right	102	1	72	8.3	A				
Eastbound	Left	91	29	201	38.3	**D**	32.1	C		
	Thru	11	30	205	36.5	**D**				
	Right	74	38	219	23.7	C				
Westbound	Left	30	14	147	34.5	C	24.2	C		
	Thru	20	14	148	32.8	C				
	Right	80	20	163	18.2	B				

Snelling at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	39	2	66	26.2	C	20.3	C	23.5	C
	Thru	1,402	100	**847**	20.1	C				
	Right	50	101	**849**	21.8	C				
Southbound	Left	103	8	126	30.0	C	22.2	C		
	Thru	1,247	89	**692**	21.5	C				
	Right	106	87	**689**	22.7	C				
Eastbound	Left	134	56	**347**	43.2	**D**	36.7	**D**		
	Thru	175	56	**343**	33.6	C				
	Right	75	56	**343**	32.4	C				
Westbound	Left	50	31	220	37.8	**D**	29.0	C		
	Thru	131	30	220	27.5	C				
	Right	79	31	219	26.1	C				

Snelling at Thomas

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	44	2	78	23.7	C	23.6	C	27.5	C
	Thru	1,356	123	**914**	23.6	C				
	Right	72	125	**927**	24.0	C				
Southbound	Left	61	4	91	34.1	C	30.2	C		
	Thru	1,272	137	**766**	30.4	C				
	Right	31	0	48	18.2	B				
Eastbound	Left	110	52	**325**	35.6	**D**	33.9	C		
	Thru	85	52	**324**	35.5	**D**				
	Right	79	63	**342**	29.7	C				
Westbound	Left	40	22	199	34.7	C	28.2	C		
	Thru	55	22	202	29.9	C				
	Right	44	28	213	20.3	C				

Snelling at University

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	111	73	**329**	62.0	**E**	28.8	C	71.9	**E**
	Thru	1,069	140	**331**	28.0	C				
	Right	179	142	**335**	13.2	B				
Southbound	Left	196	73	**540**	84.7	**F**	73.6	**E**		
	Thru	1,110	**367**	**1,229**	73.0	**E**				
	Right	60	1	69	49.9	**D**				
Eastbound	Left	187	64	**340**	65.7	**E**	112.0	**F**		
	Thru	810	**443**	**1,230**	117.6	**F**				
	Right	172	**447**	**1,234**	135.8	**F**				
Westbound	Left	167	117	**439**	103.8	**F**	82.4	**F**		
	Thru	519	222	**746**	76.3	**E**				
	Right	213	226	**749**	80.5	**F**				

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Consulting Group, Inc

Snelling at Spruce Tree

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	61	4	83	33.6	C	35.5	D	29.6	C
	Thru	1,230	147	**811**	37.7	D				
	Right	147	160	**830**	17.8	B				
Southbound	Left	69	8	125	33.0	C	14.6	B		
	Thru	1,359	51	**348**	13.7	B				
	Right	14	63	**366**	12.9	B				
Eastbound	Left	35	27	191	69.9	E	26.9	C		
	Thru	65	28	195	45.6	D				
	Right	177	9	122	11.7	B				
Westbound	Left	141	46	292	59.9	E	77.0	E		
	Thru	53	95	**491**	88.9	F				
	Right	96	99	**496**	95.4	F				

Snelling at St Anthony

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	365	38	**329**	19.7	B	14.0	B	43.6	D
	Thru	993	38	**329**	11.9	B				
Southbound	Thru	1,331	**353**	**1,004**	77.9	E	63.2	E		
	Right	358	**304**	**948**	8.4	A				
Westbound	Left	367	171	**850**	68.0	E	49.3	D		
	Thru	436	170	**837**	63.4	E				
	Right	447	126	**783**	20.1	C				

Snelling at Concordia

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	1,043	129	**686**	51.1	D	47.1	D	42.5	D
	Right	237	63	**603**	29.5	C				
Southbound	Left	500	49	**342**	9.3	A	16.2	B		
	Thru	1,207	49	**343**	19.0	B				
Eastbound	Left	337	88	**537**	64.8	E	72.9	E		
	Thru	331	88	**548**	80.6	F				
	Right	610	**346**	**1,197**	73.2	E				

Snelling at Marshall

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	49	6	89	52.9	D	44.8	D	49.3	D
	Thru	1,020	184	**632**	45.8	D				
	Right	81	2	89	27.7	C				
Southbound	Left	47	3	74	56.6	E	57.3	E		
	Thru	1,542	**577**	**1,063**	59.0	E				
	Right	222	95	**523**	45.6	D				
Eastbound	Left	216	64	**349**	46.8	D	41.2	D		
	Thru	350	61	287	39.3	D				
	Right	85	73	**313**	34.6	C				
Westbound	Left	73	13	119	31.8	C	38.2	D		
	Thru	245	42	191	41.2	D				
	Right	43	43	200	32.5	C				

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Snelling at Selby

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	25	16	122	122.5	F	58.7	E	36.9	D
	Thru	871	201	682	57.0	E				
	Right	54	211	698	56.6	E				
Southbound	Left	388	226	688	79.1	E	26.7	C		
	Thru	1,118	35	613	11.5	B				
	Right	185	37	618	9.1	A				
Eastbound	Left	53	12	151	51.4	D	34.0	C		
	Thru	285	64	408	31.9	C				
	Right	38	67	416	25.4	C				
Westbound	Left	43	8	89	44.3	D	31.5	C		
	Thru	204	76	474	34.0	C				
	Right	210	80	482	26.5	C				

Snelling at Summit

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	32	3	57	33.6	C	20.3	C	27.8	C
	Thru	724	52	296	19.4	B				
	Right	70	52	294	23.6	C				
Southbound	Left	93	22	253	34.9	C	27.8	C		
	Thru	986	101	648	27.2	C				
	Right	128	101	651	27.2	C				
Eastbound	Left	75	37	408	64.3	E	33.7	C		
	Thru	419	79	501	28.6	C				
	Right	18	89	518	26.3	C				
Westbound	Left	60	8	219	42.1	D	32.7	C		
	Thru	424	124	596	32.8	C				
	Right	166	137	615	29.0	C				

Snelling at Grand

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	71	7	130	28.5	C	30.9	C	27.5	C
	Thru	597	79	434	31.6	C				
	Right	138	82	443	29.3	C				
Southbound	Left	186	24	222	26.6	C	14.3	B		
	Thru	748	32	478	11.9	B				
	Right	130	33	495	10.9	B				
Eastbound	Left	76	13	242	40.7	D	35.5	D		
	Thru	423	118	596	35.3	D				
	Right	64	127	613	30.8	C				
Westbound	Left	95	19	329	45.3	D	38.9	D		
	Thru	346	129	594	39.4	D				
	Right	149	138	610	33.8	C				

Snelling at St Clair

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	55	11	103	43.5	D	10.8	B	18.4	B
	Thru	566	14	99	8.5	A				
	Right	87	1	56	4.9	A				
Southbound	Left	104	15	162	31.1	C	17.7	B		
	Thru	671	37	257	16.1	B				
	Right	118	44	271	14.6	B				
Eastbound	Left	75	48	380	35.0	D	25.1	C		
	Thru	310	47	382	24.1	C				
	Right	42	57	404	15.6	B				
Westbound	Left	77	58	456	34.1	C	24.3	C		
	Thru	316	56	451	25.3	C				
	Right	151	66	469	17.4	B				

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Snelling at Jefferson

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	7	24	**318**	16.0	B	12.7	B	14.6	B
	Thru	673	24	**318**	12.7	B				
	Right	44	28	**332**	12.2	B				
Southbound	Left	38	20	187	15.9	B	9.0	A		
	Thru	754	20	187	8.7	A				
	Right	1	24	197	14.8	B				
Eastbound	Left	11	20	156	39.2	**D**	35.4	**D**		
	Thru	82	20	153	36.1	**D**				
	Right	8	29	177	23.7	C				
Westbound	Left	40	34	226	42.1	**D**	37.1	**D**		
	Thru	85	34	227	39.3	**D**				
	Right	37	42	242	26.4	C				

Snelling at Randolph

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	53	5	89	23.2	C	25.7	C	25.2	C
	Thru	498	48	288	28.6	C				
	Right	105	5	180	13.1	B				
Southbound	Left	147	13	180	21.2	C	17.2	B		
	Thru	545	31	265	17.9	B				
	Right	117	3	137	9.3	A				
Eastbound	Left	123	33	**495**	39.1	**D**	33.7	C		
	Thru	422	108	**601**	33.5	C				
	Right	41	1	60	19.3	B				
Westbound	Left	88	11	126	28.9	C	27.2	C		
	Thru	346	77	**545**	30.1	C				
	Right	103	8	**310**	16.1	B				

Snelling at Highland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	8	5	101	8.1	A	3.2	A	8.7	A
	Thru	608	5	102	3.2	A				
	Right	100	7	116	3.0	A				
Southbound	Left	33	12	251	14.2	B	8.0	A		
	Thru	603	12	253	7.7	A				
	Right	36	14	262	7.4	A				
Eastbound	Left	23	11	109	21.2	C	19.0	B		
	Thru	75	11	111	21.4	C				
	Right	18	1	41	6.3	A				
Westbound	Left	110	17	137	29.4	C	24.5	C		
	Thru	68	8	108	21.4	C				
	Right	21	10	120	8.9	A				

Snelling at Ford

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	124	13	147	16.7	B	8.0	A	9.4	A
	Thru	448	13	146	5.6	A				
	Right	5	18	163	4.0	A				
Southbound	Left	13	5	113	7.3	A	4.3	A		
	Thru	461	5	112	4.1	A				
	Right	254	3	131	4.6	A				
Eastbound	Left	266	23	170	24.6	C	19.9	B		
	Thru	8	23	167	26.7	C				
	Right	144	6	136	10.8	B				
Westbound	Left	8	1	42	21.4	C	17.7	B		
	Thru	5	1	38	18.6	B				
	Right	3	0	57	6.3	A				

* Results shown are the average of 20 model runs.
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Consulting Group, Inc

Ford at Fairview

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	73	13	132	40.4	D	16.1	B	18.7	B
	Thru	498	30	358	12.8	B				
	Right	25	31	371	10.8	B				
Southbound	Left	26	1	47	21.6	C	15.6	B		
	Thru	464	41	464	15.8	B				
	Right	181	47	482	14.2	B				
Eastbound	Left	144	41	225	54.2	D	26.3	C		
	Thru	367	29	351	18.0	B				
	Right	69	2	94	11.6	B				
Westbound	Left	18	1	57	22.9	C	16.8	B		
	Thru	350	29	274	16.8	B				
	Right	16	0	58	9.0	A				

Ford at Kenneth

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	55	30	228	51.6	D	42.8	D	9.5	A
	Thru	21	30	227	48.7	D				
	Right	37	24	224	26.5	C				
Southbound	Left	29	18	150	46.1	D	34.4	C		
	Thru	26	18	154	46.3	D				
	Right	43	15	151	19.7	B				
Eastbound	Left	46	1	52	7.5	A	2.8	A		
	Thru	506	4	97	2.5	A				
	Right	48	5	107	1.3	A				
Westbound	Left	14	0	29	9.2	A	5.8	A		
	Thru	568	7	141	5.8	A				
	Right	21	7	142	4.3	A				

Ford at Cleveland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	247	45	301	33.0	C	29.3	C	31.3	C
	Thru	352	63	390	27.0	C				
	Right	38	61	387	27.2	C				
Southbound	Left	79	10	240	35.8	D	42.0	D		
	Thru	404	138	757	41.5	D				
	Right	170	138	758	46.0	D				
Eastbound	Left	159	29	316	33.3	C	28.0	C		
	Thru	489	73	410	22.8	C				
	Right	270	74	411	34.2	C				
Westbound	Left	84	14	137	33.2	C	27.4	C		
	Thru	498	55	301	26.4	C				
	Right	82	55	302	27.3	C				

Ford at Finn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	200	61	280	50.0	D	31.3	C	16.6	B
	Thru	10	60	287	32.1	C				
	Right	176	63	286	10.0	A				
Southbound	Left	114	38	250	41.1	D	35.5	D		
	Thru	16	38	254	35.7	D				
	Right	66	38	255	25.7	C				
Eastbound	Left	52	3	142	17.5	B	14.2	B		
	Thru	638	32	306	14.2	B				
	Right	44	33	315	10.6	B				
Westbound	Left	195	10	154	13.6	B	8.2	A		
	Thru	660	14	170	6.9	A				
	Right	52	14	175	5.3	A				

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Consulting Group, Inc

Ford at Cretin

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	172	49	254	47.0	D	30.7	C	11.5	B
	Right	111	3	65	5.6	A				
Eastbound	Left	111	4	111	12.8	B	6.3	A		
	Thru	562	7	150	5.0	A				
Westbound	Thru	785	25	248	8.8	A	9.5	A		
	Right	145	25	249	13.3	B				

46th at 46th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	16	148	53.6	D	11.5	B	14.2	B
	Thru	38	16	143	52.5	D				
	Right	252	0	7	2.9	A				
Southbound	Left	81	21	168	42.6	D	47.3	D		
	Thru	31	12	108	52.9	D				
	Right	10	10	108	68.9	E				
Eastbound	Left	26	1	47	10.0	B	11.4	B		
	Thru	341	14	135	11.0	B				
	Right	51	20	153	14.6	B				
Westbound	Left	299	17	242	16.3	B	12.0	B		
	Thru	476	12	192	9.7	A				
	Right	119	5	150	10.0	B				

46th at 42nd

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	2	38	29.6	C	19.7	B	14.5	B
	Thru	6	1	39	21.6	C				
	Right	4	1	42	3.8	A				
Southbound	Left	37	9	126	26.7	C	17.4	B		
	Thru	5	9	125	27.6	C				
	Right	58	7	127	10.5	B				
Eastbound	Left	85	13	141	30.1	C	21.9	C		
	Thru	377	27	200	20.1	C				
	Right	5	32	215	17.6	B				
Westbound	Left	3	0	18	9.7	A	6.8	A		
	Thru	461	9	180	6.9	A				
	Right	34	11	191	5.8	A				

46th at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	42	63	**414**	43.2	D	33.4	C	45.2	D
	Thru	272	62	**413**	34.5	C				
	Right	66	60	**411**	22.6	C				
Southbound	Left	122	**338**	**1,131**	97.2	F	84.3	F		
	Thru	313	**330**	**1,122**	83.7	F				
	Right	121	**322**	**1,116**	72.9	E				
Eastbound	Left	174	24	203	28.1	C	19.5	B		
	Thru	278	18	208	14.4	B				
	Right	15	22	223	15.0	B				
Westbound	Left	82	17	168	40.2	D	35.1	D		
	Thru	354	55	**301**	35.3	D				
	Right	91	56	**304**	30.0	C				

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Consulting Group, Inc

46th at Hiawatha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	84	20	142	42.0	**D**	23.5	C	25.6	C
	Thru	806	71	**362**	27.9	C				
	Right	243	0	2	2.7	A				
Southbound	Left	145	33	197	40.2	**D**	25.6	C		
	Thru	858	64	**353**	24.2	C				
	Right	40	0	0	2.2	A				
Eastbound	Left	52	7	91	25.8	C	31.4	C		
	Thru	79	17	105	34.5	C				
	Right	22	17	104	33.6	C				
Westbound	Left	201	52	**357**	43.3	**D**	28.6	C		
	Thru	148	20	248	26.8	C				
	Right	167	6	195	12.5	B				

46th at 36th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	1	0	29	9.6	A	10.0	A	3.5	A
	Thru	2	0	26	10.4	B				
	Right	0	-	-	-	A				
Southbound	Left	38	1	55	6.1	A	5.9	A		
	Thru	1	1	60	6.9	A				
	Right	5	1	63	4.0	A				
Eastbound	Left	5	0	20	4.8	A	4.4	A		
	Thru	115	1	66	4.4	A				
	Right	1	2	88	1.8	A				
Westbound	Left	0	-	-	-	A	2.7	A		
	Thru	241	3	142	2.8	A				
	Right	30	0	56	2.0	A				

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Co B2 at Snelling W Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	11	8	93	29.9	C	27.0	C	13.9	B
	Thru	21	8	91	32.9	C				
	Right	6	0	0	1.6	A				
Southbound	Left	20	8	79	37.3	D	22.3	C		
	Thru	33	8	79	34.9	C				
	Right	37	0	0	2.6	A				
Eastbound	Left	22	4	56	36.8	D	11.5	B		
	Thru	101	2	51	7.1	A				
	Right	14	0	0	3.6	A				
Westbound	Left	118	34	244	43.4	D	12.4	B		
	Thru	446	8	141	6.2	A				
	Right	78	0	0	1.3	A				

Co B2 at Snelling E Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	50	10	113	31.9	C	15.0	B	5.2	A
	Right	148	0	39	9.3	A				
Eastbound	Left	13	0	34	3.8	A	1.5	A		
	Thru	114	0	29	1.3	A				
Westbound	Thru	492	2	87	2.4	A	2.3	A		
	Right	30	0	0	1.4	A				

Snelling at Co B

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	134	76	316	88.0	F	15.3	B	33.9	C
	Thru	882	11	188	5.4	A				
	Right	83	0	0	1.9	A				
Southbound	Left	153	85	680	87.7	F	28.9	C		
	Thru	1,538	145	769	25.2	C				
	Right	332	70	738	19.0	B				
Eastbound	Left	103	55	326	79.0	E	75.2	E		
	Thru	237	82	315	85.6	F				
	Right	46	2	91	13.3	B				
Westbound	Left	137	57	278	67.8	E	61.2	E		
	Thru	271	82	315	81.1	F				
	Right	129	5	129	12.5	B				

Snelling at HarMar

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	55	28	163	81.3	F	12.5	B	11.6	B
	Thru	954	17	238	9.2	A				
	Right	57	0	0	1.7	A				
Southbound	Left	58	25	169	68.7	E	4.6	A		
	Thru	1,596	6	129	2.3	A				
	Right	69	0	43	2.3	A				
Eastbound	Left	64	37	153	82.1	F	44.9	D		
	Thru	31	37	152	80.4	F				
	Right	114	40	156	14.7	B				
Westbound	Left	39	26	130	88.4	F	41.7	D		
	Thru	18	26	130	85.9	F				
	Right	78	7	116	8.1	A				

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Snelling at Roselawn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	10	4	60	73.0	E	5.5	A	13.0	B
	Thru	940	9	243	4.8	A				
	Right	10	0	31	2.7	A				
Southbound	Left	33	24	112	114.7	F	4.5	A		
	Thru	1,672	5	115	2.4	A				
	Right	47	0	24	2.4	A				
Eastbound	Left	24	50	214	122.6	F	61.1	E		
	Thru	42	47	207	112.1	F				
	Right	76	4	82	13.4	B				
Westbound	Left	47	112	513	104.1	F	70.2	E		
	Thru	113	112	514	105.4	F				
	Right	103	4	90	15.6	B				

Snelling at Larpenteur

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	181	90	401	75.6	E	27.7	C	95.7	F
	Thru	787	45	411	17.9	B				
	Right	40	1	68	4.6	A				
Southbound	Left	48	40	367	127.6	F	28.5	C		
	Thru	1,625	155	1,279	26.7	C				
	Right	122	3	93	14.3	B				
Eastbound	Left	84	39	186	76.2	E	68.5	E		
	Thru	192	52	224	66.6	E				
	Right	21	64	242	55.4	E				
Westbound	Left	221	1,120	1,701	283.5	F	289.0	F		
	Thru	710	1,329	1,702	290.3	F				
	Right	89	1,340	1,702	292.0	F				

Snelling at Hoyt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	0	33	17.4	B	5.3	A	6.2	A
	Thru	920	11	253	5.1	A				
	Right	30	0	0	3.1	A				
Southbound	Left	16	0	13	7.0	A	2.1	A		
	Thru	1,837	2	118	2.0	A				
	Right	14	0	0	2.3	A				
Eastbound	Left	10	4	45	73.1	E	59.6	E		
	Thru	7	4	67	88.5	F				
	Right	8	3	93	17.4	B				
Westbound	Left	73	39	212	87.2	F	52.2	D		
	Thru	9	10	140	75.3	E				
	Right	77	11	157	16.5	B				

Snelling at Midway

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	44	1	62	20.9	C	6.1	A	6.9	A
	Thru	940	12	275	5.5	A				
	Right	21	0	51	3.1	A				
Southbound	Left	43	0	29	8.3	A	4.0	A		
	Thru	1,823	4	131	3.9	A				
	Right	52	7	163	4.5	A				
Eastbound	Left	0	-	-	-	A	67.5	E		
	Thru	13	6	71	80.9	F				
	Right	3	0	37	7.5	A				
Westbound	Left	45	35	175	78.6	E	62.5	E		
	Thru	26	35	172	84.5	F				
	Right	23	1	58	6.8	A				

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Snelling at Hewitt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	0	29	14.0	B	12.8	B	11.9	B
	Thru	1,073	35	**430**	12.8	B				
	Right	21	43	**451**	10.2	B				
Southbound	Left	77	2	78	13.6	B	9.5	A		
	Thru	1,370	30	**490**	9.4	A				
	Right	29	0	48	4.7	A				
Eastbound	Left	49	14	134	30.5	C	25.9	C		
	Thru	11	14	135	34.2	C				
	Right	30	17	153	15.2	B				
Westbound	Left	58	11	110	31.9	C	30.4	C		
	Thru	5	11	108	33.6	C				
	Right	7	17	123	16.7	B				

Snelling at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	18	1	51	20.8	C	8.9	A	13.3	B
	Thru	997	19	**408**	8.7	A				
	Right	12	20	**401**	6.4	A				
Southbound	Left	35	0	46	13.9	B	12.7	B		
	Thru	1,298	35	**620**	12.6	B				
	Right	124	35	**621**	13.9	B				
Eastbound	Left	55	23	159	36.0	**D**	33.1	C		
	Thru	58	23	159	31.5	C				
	Right	22	23	156	30.1	C				
Westbound	Left	35	22	183	32.5	C	31.1	C		
	Thru	69	22	184	31.0	C				
	Right	53	22	184	30.3	C				

Snelling at Thomas

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	22	1	47	12.2	B	10.1	B	12.7	B
	Thru	946	26	**360**	10.1	B				
	Right	23	27	**374**	7.9	A				
Southbound	Left	33	1	42	14.6	B	12.8	B		
	Thru	1,257	33	**595**	12.9	B				
	Right	67	0	41	8.7	A				
Eastbound	Left	31	11	136	33.0	C	28.6	C		
	Thru	22	11	137	31.3	C				
	Right	16	16	153	16.5	B				
Westbound	Left	25	15	160	32.7	C	23.2	C		
	Thru	45	15	161	27.7	C				
	Right	49	20	175	14.0	B				

Snelling at University

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	162	29	**301**	28.8	C	16.6	B	31.6	C
	Thru	871	54	**304**	16.1	B				
	Right	126	55	**308**	4.6	A				
Southbound	Left	154	15	168	30.6	C	27.8	C		
	Thru	1,005	87	**608**	28.9	C				
	Right	144	3	92	17.9	B				
Eastbound	Left	50	15	126	46.8	**D**	36.4	**D**		
	Thru	227	55	287	37.8	**D**				
	Right	136	57	290	30.4	C				
Westbound	Left	153	143	**444**	128.0	**F**	57.9	**E**		
	Thru	551	100	**398**	41.3	**D**				
	Right	74	103	**400**	36.3	**D**				

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SRF Consulting Group, Inc

Snelling at Spruce Tree

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	66	1	56	10.9	B	6.2	A	6.1	A
	Thru	1,106	14	234	6.1	A				
	Right	54	17	248	2.7	A				
Southbound	Left	18	0	28	13.9	B	3.0	A		
	Thru	1,228	9	233	2.9	A				
	Right	51	13	254	2.5	A				
Eastbound	Left	19	6	70	47.9	D	17.2	B		
	Thru	0	6	72	73.1	E				
	Right	61	2	95	7.1	A				
Westbound	Left	46	13	115	44.5	D	35.5	D		
	Thru	22	8	112	47.4	D				
	Right	36	9	112	16.8	B				

Snelling at St Anthony

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	877	39	320	13.4	B	11.1	B	20.8	C
	Thru	823	39	319	8.7	A				
Southbound	Thru	936	95	510	37.9	D	29.6	C		
	Right	404	52	452	10.5	B				
Westbound	Left	214	64	281	31.9	C	25.0	C		
	Thru	526	64	280	34.5	C				
	Right	392	26	221	8.5	A				

Snelling at Concordia

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	1,370	46	356	19.0	B	17.2	B	15.5	B
	Right	413	7	274	11.3	B				
Southbound	Left	494	12	322	10.2	B	7.4	A		
	Thru	641	12	323	5.2	A				
Eastbound	Left	327	55	247	39.0	D	22.3	C		
	Thru	164	55	247	36.6	D				
	Right	413	0	0	3.4	A				

Snelling at Marshall

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	67	7	96	34.5	C	28.1	C	26.9	C
	Thru	1,471	169	635	28.4	C				
	Right	50	1	75	12.5	B				
Southbound	Left	26	3	64	29.1	C	21.4	C		
	Thru	793	65	290	23.9	C				
	Right	228	12	216	11.8	B				
Eastbound	Left	272	65	374	40.2	D	31.8	C		
	Thru	210	24	169	25.7	C				
	Right	58	28	197	14.6	B				
Westbound	Left	47	5	107	19.9	B	29.6	C		
	Thru	329	42	225	31.7	C				
	Right	47	42	233	24.6	C				

* Results shown are the average of 5 model runs.

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Consulting Group, Inc

Snelling at Selby

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	12	2	40	49.9	D	52.6	D	41.5	D
	Thru	1,071	228	743	52.7	D				
	Right	21	234	745	49.4	D				
Southbound	Left	230	100	408	67.6	E	27.7	C		
	Thru	644	33	232	14.2	B				
	Right	28	35	232	10.5	B				
Eastbound	Left	68	78	350	149.7	F	69.5	E		
	Thru	148	31	334	37.1	D				
	Right	13	30	327	19.2	B				
Westbound	Left	31	3	45	32.6	C	31.9	C		
	Thru	174	127	523	37.7	D				
	Right	452	130	529	29.6	C				

Snelling at Summit

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	41	1	46	10.7	B	5.4	A	20.3	C
	Thru	915	15	161	5.1	A				
	Right	32	15	160	5.8	A				
Southbound	Left	40	13	124	28.8	C	22.3	C		
	Thru	548	49	319	21.8	C				
	Right	100	49	316	21.9	C				
Eastbound	Left	49	14	195	54.9	D	30.9	C		
	Thru	178	28	262	25.1	C				
	Right	13	38	286	19.6	B				
Westbound	Left	64	8	219	39.2	D	39.5	D		
	Thru	357	138	599	41.3	D				
	Right	146	152	618	35.1	D				

Snelling at Grand

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	44	2	51	12.5	B	14.2	B	23.8	C
	Thru	763	34	244	14.4	B				
	Right	55	36	254	13.2	B				
Southbound	Left	99	14	126	29.3	C	18.2	B		
	Thru	422	30	184	17.1	B				
	Right	102	34	199	11.8	B				
Eastbound	Left	46	6	83	26.7	C	26.8	C		
	Thru	184	34	282	27.6	C				
	Right	23	36	299	21.0	C				
Westbound	Left	82	12	286	39.2	D	43.4	D		
	Thru	299	154	607	46.5	D				
	Right	176	157	623	40.2	D				

Snelling at St Clair

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	40	1	37	12.2	B	6.6	A	14.7	B
	Thru	646	12	126	6.4	A				
	Right	44	0	52	3.7	A				
Southbound	Left	46	2	78	13.5	B	7.9	A		
	Thru	450	12	159	7.4	A				
	Right	30	17	172	7.4	A				
Eastbound	Left	47	34	281	33.7	C	25.0	C		
	Thru	217	34	278	25.3	C				
	Right	39	43	297	13.0	B				
Westbound	Left	68	62	431	37.5	D	27.5	C		
	Thru	256	62	435	29.9	C				
	Right	179	73	455	20.1	C				

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Snelling at Jefferson

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	17	254	18.0	B	10.7	B	11.3	B
	Thru	647	17	251	10.7	B				
	Right	24	21	262	9.5	A				
Southbound	Left	16	5	79	7.4	A	3.6	A		
	Thru	544	5	80	3.5	A				
	Right	4	8	94	3.2	A				
Eastbound	Left	19	13	117	32.5	C	28.2	C		
	Thru	59	13	114	28.6	C				
	Right	7	21	137	14.0	B				
Westbound	Left	62	29	218	31.1	C	29.2	C		
	Thru	66	30	222	34.1	C				
	Right	54	37	234	21.1	C				

Snelling at Randolph

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	65	5	86	18.4	B	21.4	C	26.9	C
	Thru	486	38	213	22.6	C				
	Right	33	1	55	9.2	A				
Southbound	Left	98	6	140	17.5	B	17.0	B		
	Thru	352	23	240	19.0	B				
	Right	155	7	187	12.2	B				
Eastbound	Left	101	32	**373**	44.6	**D**	36.1	**D**		
	Thru	364	97	**515**	35.9	**D**				
	Right	44	1	68	18.2	B				
Westbound	Left	60	8	90	36.1	**D**	35.0	**D**		
	Thru	407	117	**584**	37.8	**D**				
	Right	88	9	**402**	21.4	C				

Snelling at Highland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	3	5	93	3.8	A	3.6	A	9.4	A
	Thru	488	5	97	3.6	A				
	Right	154	7	109	3.3	A				
Southbound	Left	20	7	198	11.4	B	6.5	A		
	Thru	426	7	200	6.3	A				
	Right	12	8	209	5.5	A				
Eastbound	Left	37	15	147	22.5	C	21.9	C		
	Thru	93	15	146	23.1	C				
	Right	9	0	35	7.1	A				
Westbound	Left	124	19	114	30.6	C	22.8	C		
	Thru	61	8	114	21.4	C				
	Right	61	12	127	8.6	A				

Snelling at Ford

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	76	7	101	11.9	B	5.7	A	7.6	A
	Thru	441	7	100	4.7	A				
	Right	5	11	119	4.1	A				
Southbound	Left	2	2	57	5.9	A	2.7	A		
	Thru	390	2	64	2.4	A				
	Right	171	2	94	3.1	A				
Eastbound	Left	203	23	183	24.7	C	20.2	C		
	Thru	3	22	187	28.1	C				
	Right	76	3	106	8.0	A				
Westbound	Left	8	1	43	23.2	C	18.4	B		
	Thru	5	1	46	15.9	B				
	Right	2	0	61	6.2	A				

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Ford at Fairview

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	40	2	64	20.3	C	11.1	B	12.7	B
	Thru	436	19	249	10.4	B				
	Right	45	19	262	9.1	A				
Southbound	Left	22	1	48	20.3	C	11.0	B		
	Thru	429	20	268	10.8	B				
	Right	66	24	282	9.3	A				
Eastbound	Left	89	10	115	26.1	C	16.9	B		
	Thru	216	14	164	14.2	B				
	Right	27	1	68	7.8	A				
Westbound	Left	28	2	74	16.6	B	14.0	B		
	Thru	216	14	178	13.9	B				
	Right	7	0	56	6.3	A				

Ford at Kenneth

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	38	17	160	36.0	D	27.9	C	8.2	A
	Thru	27	16	157	31.5	C				
	Right	32	13	155	15.1	B				
Southbound	Left	11	11	120	33.4	C	22.6	C		
	Thru	44	11	120	30.2	C				
	Right	38	7	114	10.9	B				
Eastbound	Left	30	0	33	4.2	A	2.1	A		
	Thru	291	3	101	1.9	A				
	Right	20	3	110	2.1	A				
Westbound	Left	15	0	28	5.3	A	4.6	A		
	Thru	300	4	99	4.6	A				
	Right	8	4	102	3.1	A				

Ford at Cleveland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	296	24	266	17.2	B	17.2	B	17.0	B
	Thru	389	42	345	17.0	B				
	Right	56	39	347	19.1	B				
Southbound	Left	28	2	61	15.5	B	19.8	B		
	Thru	274	29	295	19.5	B				
	Right	86	27	292	22.0	C				
Eastbound	Left	91	9	96	19.8	B	14.3	B		
	Thru	258	19	137	12.3	B				
	Right	123	17	136	14.3	B				
Westbound	Left	50	7	89	28.8	C	16.9	B		
	Thru	288	18	139	15.3	B				
	Right	37	15	135	13.1	B				

Ford at Finn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	48	10	100	34.1	C	20.7	C	5.8	A
	Thru	1	6	90	41.0	D				
	Right	42	6	103	5.1	A				
Southbound	Left	31	7	100	33.2	C	22.5	C		
	Thru	1	7	92	17.0	B				
	Right	29	4	95	11.2	B				
Eastbound	Left	20	0	36	8.3	A	4.8	A		
	Thru	400	6	123	4.8	A				
	Right	20	4	131	3.1	A				
Westbound	Left	125	1	61	5.0	A	2.9	A		
	Thru	487	2	80	2.5	A				
	Right	59	2	83	2.2	A				

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Ford at Cretin

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	117	23	148	32.4	C	22.3	C	7.6	A
	Right	65	1	78	4.0	A				
Eastbound	Left	112	2	83	7.8	A	4.8	A		
	Thru	321	3	109	3.8	A				
Westbound	Thru	380	7	136	4.6	A	4.9	A		
	Right	182	6	152	5.6	A				

46th at 46th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	28	18	170	55.1	E	13.2	B	16.3	B
	Thru	33	18	162	49.2	D				
	Right	217	0	7	2.4	A				
Southbound	Left	50	11	135	39.3	D	45.9	D		
	Thru	16	15	157	52.8	D				
	Right	42	17	150	51.0	D				
Eastbound	Left	25	2	79	16.4	B	21.0	C		
	Thru	169	18	162	22.5	C				
	Right	34	23	184	17.2	B				
Westbound	Left	142	5	125	9.6	A	8.6	A		
	Thru	219	6	118	8.1	A				
	Right	82	3	109	8.1	A				

46th at 42nd

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	1	41	24.8	C	17.5	B	18.2	B
	Thru	5	1	48	21.5	C				
	Right	4	1	48	3.8	A				
Southbound	Left	28	6	88	21.4	C	11.3	B		
	Thru	4	5	87	26.2	C				
	Right	84	5	90	7.3	A				
Eastbound	Left	49	7	104	26.4	C	23.5	C		
	Thru	191	18	149	23.2	C				
	Right	14	22	163	17.6	B				
Westbound	Left	4	0	39	20.9	C	16.4	B		
	Thru	270	18	162	16.7	B				
	Right	13	21	171	10.2	B				

46th at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	22	31	252	26.3	C	22.4	C	22.4	C
	Thru	274	32	260	22.5	C				
	Right	13	29	260	13.9	B				
Southbound	Left	38	23	258	29.8	C	18.2	B		
	Thru	166	23	255	20.9	C				
	Right	109	19	245	10.1	B				
Eastbound	Left	127	15	166	23.6	C	18.3	B		
	Thru	206	16	186	15.5	B				
	Right	25	20	198	14.0	B				
Westbound	Left	74	15	123	36.5	D	29.9	C		
	Thru	179	34	197	32.4	C				
	Right	114	35	201	21.7	C				

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46th at Hiawatha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	26	5	76	36.3	D	21.4	C	22.0	C
	Thru	885	68	329	24.9	C				
	Right	183	0	0	2.3	A				
Southbound	Left	95	20	164	36.6	D	19.5	B		
	Thru	530	28	213	17.0	B				
	Right	14	0	0	0.8	A				
Eastbound	Left	63	6	103	22.1	C	27.1	C		
	Thru	80	20	116	29.3	C				
	Right	44	19	117	30.0	C				
Westbound	Left	162	34	234	35.9	D	26.2	C		
	Thru	71	9	110	21.7	C				
	Right	71	2	86	8.5	A				

46th at 36th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	0	30	8.1	A	6.4	A	5.0	A
	Thru	0	-	-	-	A				
	Right	5	0	33	4.5	A				
Southbound	Left	41	2	77	7.9	A	6.9	A		
	Thru	0	-	-	-	A				
	Right	15	2	81	4.2	A				
Eastbound	Left	15	0	38	6.2	A	5.6	A		
	Thru	142	2	96	5.8	A				
	Right	8	4	112	2.4	A				
Westbound	Left	1	2	89	1.4	A	3.1	A		
	Thru	86	1	89	3.3	A				
	Right	24	0	68	2.5	A				

* Results shown are the average of 5 model runs.
** Results shown are from all vehicles except transit vehicles.

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SRF Consulting Group, Inc

Co B2 at Snelling W Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	75	36	217	33.0	C	22.8	C	29.4	C
	Thru	152	36	218	35.3	D				
	Right	142	0	0	4.0	A				
Southbound	Left	6	27	202	43.2	D	21.9	C		
	Thru	106	27	211	45.0	D				
	Right	148	1	79	4.5	A				
Eastbound	Left	403	114	585	45.5	D	30.5	C		
	Thru	746	57	333	24.5	C				
	Right	77	0	0	9.7	A				
Westbound	Left	351	107	460	47.1	D	33.2	C		
	Thru	440	35	192	23.6	C				
	Right	24	0	0	6.2	A				

Co B2 at Snelling E Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	21	47	587	42.6	D	26.5	C	11.9	B
	Right	497	29	524	25.8	C				
Eastbound	Left	247	5	180	8.8	A	5.8	A		
	Thru	647	6	202	4.6	A				
Westbound	Thru	318	7	123	6.6	A	6.2	A		
	Right	38	0	0	3.0	A				

Snelling at Co B

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	154	69	319	71.6	E	13.6	B	73.9	E
	Thru	1,558	36	291	9.3	A				
	Right	212	0	0	3.3	A				
Southbound	Left	426	213	667	96.8	F	43.4	D		
	Thru	1,244	213	668	31.5	C				
	Right	294	93	632	15.9	B				
Eastbound	Left	178	1,022	1,577	331.7	F	304.6	F		
	Thru	502	1,060	1,580	310.4	F				
	Right	152	901	1,591	254.0	F				
Westbound	Left	167	81	364	78.3	E	51.9	D		
	Thru	260	71	368	70.7	E				
	Right	300	36	324	20.8	C				

Snelling at HarMar

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	51	22	155	72.6	E	6.5	A	14.4	B
	Thru	1,609	17	133	5.0	A				
	Right	267	0	0	3.2	A				
Southbound	Left	125	47	293	61.4	E	11.0	B		
	Thru	1,337	27	304	6.9	A				
	Right	98	1	65	3.2	A				
Eastbound	Left	116	56	191	79.6	E	58.1	E		
	Thru	49	57	192	82.6	F				
	Right	80	60	195	12.0	B				
Westbound	Left	100	56	221	80.1	F	41.6	D		
	Thru	57	55	219	77.6	E				
	Right	198	47	244	11.7	B				

* Results shown are the average of 20 model runs.
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Snelling at Roselawn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	15	11	71	125.5	F	4.6	A	24.0	C
	Thru	1,831	11	141	3.6	A				
	Right	27	0	17	3.6	A				
Southbound	Left	96	189	**578**	236.2	F	23.7	C		
	Thru	1,306	38	**403**	9.5	A				
	Right	101	0	54	5.4	A				
Eastbound	Left	51	226	**698**	128.8	F	104.5	F		
	Thru	193	219	**697**	118.6	F				
	Right	70	9	137	47.9	D				
Westbound	Left	22	98	**415**	137.5	F	97.2	F		
	Thru	93	94	**402**	120.4	F				
	Right	45	3	75	29.9	C				

Snelling at Larpenteur

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	221	120	**446**	93.5	F	53.3	D	64.9	E
	Thru	1,695	**413**	**1,342**	50.6	D				
	Right	185	5	128	29.7	C				
Southbound	Left	175	**385**	**1,251**	219.0	F	70.7	E		
	Thru	1,047	**307**	**1,247**	52.9	D				
	Right	173	7	146	28.5	C				
Eastbound	Left	27	8	68	73.7	E	89.4	F		
	Thru	700	**305**	**856**	89.0	F				
	Right	197	**330**	**886**	92.6	F				
Westbound	Left	153	73	**309**	79.4	E	54.9	D		
	Thru	352	87	**391**	49.9	D				
	Right	151	101	**415**	41.9	D				

Snelling at Hoyt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	7	0	8	15.7	B	9.4	A	8.9	A
	Thru	2,063	43	**716**	9.5	A				
	Right	124	0	7	6.3	A				
Southbound	Left	45	2	85	31.6	C	3.4	A		
	Thru	1,342	4	107	2.5	A				
	Right	9	0	0	2.1	A				
Eastbound	Left	23	11	86	83.1	F	79.1	E		
	Thru	6	3	56	77.5	E				
	Right	1	1	68	12.2	B				
Westbound	Left	41	20	127	85.8	F	63.2	E		
	Thru	10	7	85	80.3	F				
	Right	29	7	102	26.0	C				

Snelling at Midway

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	53	1	61	16.0	B	11.8	B	11.5	B
	Thru	2,097	77	**819**	11.8	B				
	Right	66	1	54	10.7	B				
Southbound	Left	75	1	68	17.5	B	5.1	A		
	Thru	1,261	9	217	4.4	A				
	Right	49	13	249	5.2	A				
Eastbound	Left	46	24	133	87.2	F	59.2	E		
	Thru	30	14	96	81.0	F				
	Right	39	2	66	9.2	A				
Westbound	Left	19	17	112	87.4	F	41.6	D		
	Thru	15	17	110	80.0	E				
	Right	51	2	65	12.9	B				

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Snelling at Hewitt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	24	1	43	19.6	B	16.4	B	16.9	B
	Thru	1,572	80	**744**	16.3	B				
	Right	19	89	**770**	16.2	B				
Southbound	Left	72	4	92	23.9	C	15.0	B		
	Thru	1,350	61	**571**	15.1	B				
	Right	102	1	73	8.1	A				
Eastbound	Left	91	29	202	38.0	**D**	31.9	C		
	Thru	11	29	206	36.6	**D**				
	Right	74	38	220	23.6	C				
Westbound	Left	30	14	143	34.4	C	24.4	C		
	Thru	20	14	144	32.9	C				
	Right	80	20	159	18.5	B				

Snelling at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	39	2	66	27.0	C	21.0	C	23.4	C
	Thru	1,400	103	**858**	20.8	C				
	Right	50	104	**860**	23.5	C				
Southbound	Left	103	8	122	30.5	C	21.3	C		
	Thru	1,245	80	**684**	20.4	C				
	Right	106	80	**685**	22.2	C				
Eastbound	Left	134	56	**349**	43.1	**D**	36.5	**D**		
	Thru	175	56	**345**	33.3	C				
	Right	75	56	**345**	31.9	C				
Westbound	Left	49	31	220	36.7	**D**	29.0	C		
	Thru	131	30	220	27.8	C				
	Right	79	30	220	26.3	C				

Snelling at Thomas

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	45	3	73	24.9	C	23.3	C	26.8	C
	Thru	1,352	119	**883**	23.3	C				
	Right	71	121	**887**	23.2	C				
Southbound	Left	61	4	92	33.0	C	29.1	C		
	Thru	1,273	126	**739**	29.2	C				
	Right	32	0	53	17.4	B				
Eastbound	Left	110	51	**326**	35.1	**D**	33.4	C		
	Thru	85	51	**325**	34.7	C				
	Right	79	62	**345**	29.5	C				
Westbound	Left	40	21	196	33.6	C	27.6	C		
	Thru	55	21	198	29.5	C				
	Right	44	28	211	19.9	B				

Snelling at University

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	110	78	**334**	65.0	**E**	30.7	C	76.2	**E**
	Thru	1,063	143	**342**	30.0	C				
	Right	178	145	**346**	13.6	B				
Southbound	Left	196	72	**663**	89.4	**F**	78.2	**E**		
	Thru	1,114	**401**	**1,270**	77.6	**E**				
	Right	60	1	66	52.7	**D**				
Eastbound	Left	187	65	**388**	69.0	**E**	121.9	**F**		
	Thru	810	**499**	**1,280**	128.2	**F**				
	Right	172	**505**	**1,290**	149.8	**F**				
Westbound	Left	166	109	**462**	96.7	**F**	82.4	**F**		
	Thru	517	225	**752**	77.0	**E**				
	Right	213	229	**757**	84.3	**F**				

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Snelling at Spruce Tree

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	61	4	82	41.7	D	48.4	D	34.1	C
	Thru	1,221	210	857	51.1	D				
	Right	145	225	876	27.8	C				
Southbound	Left	70	8	136	32.3	C	14.4	B		
	Thru	1,363	52	353	13.5	B				
	Right	14	62	373	14.2	B				
Eastbound	Left	35	25	155	66.5	E	25.1	C		
	Thru	64	25	156	41.9	D				
	Right	177	9	132	10.8	B				
Westbound	Left	141	40	249	54.6	D	70.6	E		
	Thru	54	82	433	83.5	F				
	Right	97	86	436	86.8	F				

Snelling at St Anthony

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	362	39	321	19.8	B	14.7	B	44.2	D
	Thru	981	39	321	12.8	B				
Southbound	Thru	1,337	346	996	75.8	E	61.5	E		
	Right	359	297	941	8.1	A				
Westbound	Left	363	185	924	73.2	E	52.4	D		
	Thru	432	182	917	67.0	E				
	Right	444	138	861	21.3	C				

Snelling at Concordia

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	1,034	145	694	54.3	D	50.0	D	45.7	D
	Right	237	78	604	31.1	C				
Southbound	Left	500	52	340	8.9	A	17.3	B		
	Thru	1,209	52	339	20.8	C				
Eastbound	Left	330	91	650	67.5	E	80.1	F		
	Thru	323	91	665	87.6	F				
	Right	593	421	1,282	83.1	F				

Snelling at Marshall

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	49	6	91	53.6	D	46.0	D	52.1	D
	Thru	1,018	190	635	47.0	D				
	Right	81	2	102	28.3	C				
Southbound	Left	47	3	69	62.8	E	62.1	E		
	Thru	1,530	650	1,062	63.7	E				
	Right	222	97	573	50.6	D				
Eastbound	Left	215	73	380	51.6	D	43.0	D		
	Thru	350	61	303	39.7	D				
	Right	85	73	327	34.9	C				
Westbound	Left	73	13	119	31.9	C	38.3	D		
	Thru	245	42	193	41.2	D				
	Right	43	43	201	32.6	C				

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Snelling at Selby

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	25	15	126	120.5	F	68.3	E	40.1	D
	Thru	870	249	**796**	66.8	E				
	Right	54	262	**819**	67.9	E				
Southbound	Left	387	232	**692**	81.7	F	27.5	C		
	Thru	1,106	35	**633**	11.7	B				
	Right	184	37	**635**	9.0	A				
Eastbound	Left	53	12	148	53.5	D	34.4	C		
	Thru	285	64	**409**	32.0	C				
	Right	38	67	**417**	25.5	C				
Westbound	Left	43	8	89	44.7	D	32.2	C		
	Thru	204	78	**471**	34.7	C				
	Right	210	82	**479**	27.2	C				

Snelling at Summit

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	33	3	55	32.5	C	20.5	C	27.9	C
	Thru	721	54	287	19.7	B				
	Right	70	54	287	23.0	C				
Southbound	Left	92	22	180	35.1	D	27.8	C		
	Thru	974	100	**662**	27.2	C				
	Right	127	100	**662**	27.3	C				
Eastbound	Left	75	36	**407**	65.0	E	33.7	C		
	Thru	419	75	**496**	28.4	C				
	Right	18	86	**515**	26.0	C				
Westbound	Left	60	8	211	42.6	D	32.8	C		
	Thru	424	125	**598**	32.9	C				
	Right	166	137	**616**	29.1	C				

Snelling at Grand

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	71	7	133	28.4	C	31.1	C	27.8	C
	Thru	596	80	**439**	31.8	C				
	Right	138	83	**448**	29.7	C				
Southbound	Left	186	24	230	27.0	C	14.8	B		
	Thru	737	33	**474**	12.4	B				
	Right	129	34	**491**	11.1	B				
Eastbound	Left	76	13	225	40.6	D	35.5	D		
	Thru	423	118	**597**	35.3	D				
	Right	64	126	**614**	30.8	C				
Westbound	Left	95	19	**336**	45.4	D	38.9	D		
	Thru	346	129	**593**	39.4	D				
	Right	149	139	**610**	33.8	C				

Snelling at St Clair

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	56	12	112	44.0	D	10.8	B	18.5	B
	Thru	565	14	104	8.5	A				
	Right	87	1	54	4.8	A				
Southbound	Left	103	15	183	31.2	C	17.9	B		
	Thru	664	40	264	16.3	B				
	Right	117	48	278	15.7	B				
Eastbound	Left	75	47	**371**	34.7	C	24.9	C		
	Thru	310	46	**372**	23.8	C				
	Right	42	55	**394**	15.4	B				
Westbound	Left	77	57	**456**	34.0	C	24.2	C		
	Thru	316	56	**450**	25.1	C				
	Right	151	66	**469**	17.4	B				

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Snelling at Jefferson

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	7	24	**310**	15.7	B	12.5	B	14.4	B
	Thru	670	24	**311**	12.5	B				
	Right	44	27	**323**	12.1	B				
Southbound	Left	38	20	188	15.2	B	8.9	A		
	Thru	747	20	188	8.5	A				
	Right	1	23	201	16.7	B				
Eastbound	Left	11	20	156	39.2	**D**	35.5	**D**		
	Thru	82	20	153	36.1	**D**				
	Right	8	29	177	23.6	C				
Westbound	Left	40	34	226	42.1	**D**	37.1	**D**		
	Thru	85	34	227	39.3	**D**				
	Right	37	42	242	26.3	C				

Snelling at Randolph

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	53	5	91	23.7	C	25.8	C	25.3	C
	Thru	495	50	292	28.6	C				
	Right	106	5	169	13.6	B				
Southbound	Left	146	13	174	21.8	C	17.3	B		
	Thru	539	30	267	17.8	B				
	Right	116	3	123	9.4	A				
Eastbound	Left	123	33	**493**	38.7	**D**	33.6	C		
	Thru	422	107	**601**	33.5	C				
	Right	41	1	62	19.2	B				
Westbound	Left	88	11	122	29.0	C	27.3	C		
	Thru	346	77	**547**	30.2	C				
	Right	103	8	**313**	16.4	B				

Snelling at Highland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	8	5	105	8.6	A	3.2	A	8.8	A
	Thru	606	5	106	3.2	A				
	Right	101	7	118	3.2	A				
Southbound	Left	33	12	255	15.8	B	8.3	A		
	Thru	597	12	255	7.9	A				
	Right	36	14	264	7.2	A				
Eastbound	Left	23	11	109	21.2	C	18.9	B		
	Thru	75	10	111	21.3	C				
	Right	18	1	40	5.9	A				
Westbound	Left	110	17	135	29.4	C	24.5	C		
	Thru	68	8	108	21.4	C				
	Right	21	10	120	9.0	A				

Snelling at Ford

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	124	13	156	17.3	B	8.2	A	9.6	A
	Thru	446	13	156	5.7	A				
	Right	5	18	170	3.5	A				
Southbound	Left	13	5	132	8.8	A	4.4	A		
	Thru	458	5	134	4.2	A				
	Right	251	3	138	4.6	A				
Eastbound	Left	266	25	185	24.7	C	20.2	C		
	Thru	8	25	181	25.9	C				
	Right	144	7	148	11.6	B				
Westbound	Left	8	1	41	19.6	B	16.9	B		
	Thru	5	1	37	19.2	B				
	Right	3	0	58	6.0	A				

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Ford at Fairview

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	71	13	141	42.3	D	16.7	B	19.6	B
	Thru	497	32	347	13.3	B				
	Right	25	34	362	11.6	B				
Southbound	Left	26	1	50	23.1	C	16.6	B		
	Thru	464	46	468	16.7	B				
	Right	181	52	483	15.5	B				
Eastbound	Left	143	44	297	56.3	E	27.2	C		
	Thru	367	32	416	18.6	B				
	Right	66	2	86	12.1	B				
Westbound	Left	15	1	42	22.3	C	17.5	B		
	Thru	351	31	276	17.8	B				
	Right	16	0	53	8.5	A				

Ford at Kenneth

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	55	30	226	51.3	D	42.6	D	9.6	A
	Thru	21	29	225	48.2	D				
	Right	37	24	223	26.7	C				
Southbound	Left	29	18	150	45.6	D	34.3	C		
	Thru	26	18	154	46.4	D				
	Right	43	15	151	19.6	B				
Eastbound	Left	47	1	51	7.9	A	3.0	A		
	Thru	505	6	122	2.6	A				
	Right	49	7	134	2.6	A				
Westbound	Left	14	0	30	9.2	A	6.1	A		
	Thru	568	8	153	6.0	A				
	Right	21	9	157	4.8	A				

Ford at Cleveland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	247	45	310	33.2	C	29.4	C	32.0	C
	Thru	352	63	390	26.9	C				
	Right	38	61	387	28.2	C				
Southbound	Left	79	10	240	36.0	D	42.1	D		
	Thru	403	139	760	41.6	D				
	Right	170	138	759	46.0	D				
Eastbound	Left	160	33	333	36.6	D	29.6	C		
	Thru	487	79	439	23.8	C				
	Right	268	80	439	36.0	D				
Westbound	Left	84	14	139	33.7	C	27.8	C		
	Thru	497	56	311	26.7	C				
	Right	82	56	312	28.5	C				

Ford at Finn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	200	59	285	48.3	D	30.6	C	17.0	B
	Thru	10	58	294	31.4	C				
	Right	176	61	291	10.4	B				
Southbound	Left	114	39	244	41.2	D	35.8	D		
	Thru	16	39	248	36.5	D				
	Right	67	39	250	26.4	C				
Eastbound	Left	52	4	128	18.5	B	14.8	B		
	Thru	636	34	311	14.8	B				
	Right	44	34	320	11.0	B				
Westbound	Left	196	11	160	14.2	B	8.8	A		
	Thru	660	15	179	7.4	A				
	Right	52	16	186	5.8	A				

* Results shown are the average of 20 model runs.
** Results shown are from all vehicles except transit vehicles.

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SRF Consulting Group, Inc

Ford at Cretin

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	172	49	255	47.0	D	30.8	C	11.7	B
	Right	111	3	70	5.7	A				
Eastbound	Left	111	4	121	13.1	B	6.3	A		
	Thru	560	7	145	5.0	A				
Westbound	Thru	783	27	264	8.9	A	9.8	A		
	Right	146	27	266	14.3	B				

46th at 46th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	16	148	53.5	D	11.4	B	14.4	B
	Thru	38	16	143	52.5	D				
	Right	252	0	12	2.8	A				
Southbound	Left	81	21	168	42.3	D	47.2	D		
	Thru	31	12	110	53.1	D				
	Right	10	10	110	68.9	E				
Eastbound	Left	26	1	47	9.9	A	12.5	B		
	Thru	340	20	161	11.7	B				
	Right	51	27	178	19.3	B				
Westbound	Left	299	17	252	16.3	B	11.9	B		
	Thru	473	12	217	9.6	A				
	Right	119	5	161	9.7	A				

46th at 42nd

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	2	38	29.5	C	19.7	B	14.6	B
	Thru	6	1	39	21.6	C				
	Right	4	1	42	3.8	A				
Southbound	Left	37	9	126	26.6	C	17.4	B		
	Thru	5	9	125	27.6	C				
	Right	58	7	127	10.6	B				
Eastbound	Left	85	13	151	30.6	C	22.2	C		
	Thru	375	28	198	20.4	C				
	Right	5	33	212	18.4	B				
Westbound	Left	3	0	18	10.4	B	6.7	A		
	Thru	458	9	172	6.8	A				
	Right	34	11	182	5.8	A				

46th at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	42	65	**423**	44.2	D	33.8	C	47.3	D
	Thru	272	63	**418**	35.0	C				
	Right	66	61	**416**	22.4	C				
Southbound	Left	122	**374**	**1,132**	103.7	F	91.1	F		
	Thru	314	**363**	**1,122**	90.0	F				
	Right	121	**364**	**1,125**	81.4	F				
Eastbound	Left	173	23	199	27.3	C	19.5	B		
	Thru	277	20	206	14.9	B				
	Right	15	25	220	15.8	B				
Westbound	Left	82	18	179	40.9	D	35.0	C		
	Thru	351	55	**307**	35.0	D				
	Right	91	56	**311**	29.6	C				

* Results shown are the average of 20 model runs.

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46th at Hiawatha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	84	20	140	42.9	**D**	23.6	C	25.6	C
	Thru	808	71	**365**	27.9	C				
	Right	243	0	2	2.7	A				
Southbound	Left	145	34	207	40.9	**D**	25.7	C		
	Thru	858	64	**369**	24.3	C				
	Right	40	0	0	2.2	A				
Eastbound	Left	52	7	88	25.5	C	30.9	C		
	Thru	77	18	115	33.1	C				
	Right	22	18	115	36.2	**D**				
Westbound	Left	202	52	**377**	43.3	**D**	28.1	C		
	Thru	146	20	240	25.6	C				
	Right	168	6	198	12.0	B				

46th at 36th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	1	0	29	9.1	A	10.2	B	3.8	A
	Thru	2	0	27	11.2	B				
	Right	0	-	-	-	A				
Southbound	Left	36	1	58	6.2	A	6.0	A		
	Thru	1	1	61	7.8	A				
	Right	5	1	65	4.0	A				
Eastbound	Left	5	0	21	5.1	A	4.6	A		
	Thru	115	1	71	4.6	A				
	Right	1	2	96	1.8	A				
Westbound	Left	0	-	-	-	A	3.1	A		
	Thru	241	3	159	3.2	A				
	Right	28	0	56	2.0	A				

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Co B2 at Snelling W Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	11	8	93	29.9	C	27.0	C	13.9	B
	Thru	21	8	91	32.9	C				
	Right	6	0	0	1.6	A				
Southbound	Left	20	8	79	37.3	D	22.3	C		
	Thru	33	8	79	34.9	C				
	Right	37	0	0	2.7	A				
Eastbound	Left	22	4	56	36.8	D	11.5	B		
	Thru	101	2	50	7.2	A				
	Right	14	0	0	3.7	A				
Westbound	Left	118	34	235	43.3	D	12.5	B		
	Thru	446	9	137	6.3	A				
	Right	78	0	0	1.3	A				

Co B2 at Snelling E Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	50	11	128	33.4	C	15.5	B	5.2	A
	Right	148	0	60	9.5	A				
Eastbound	Left	13	0	34	3.7	A	1.5	A		
	Thru	114	0	29	1.3	A				
Westbound	Thru	492	2	74	2.3	A	2.2	A		
	Right	30	0	0	1.4	A				

Snelling at Co B

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	134	73	306	85.6	F	15.0	B	33.9	C
	Thru	882	11	237	5.5	A				
	Right	83	0	0	1.9	A				
Southbound	Left	153	89	668	87.5	F	29.0	C		
	Thru	1,541	148	783	25.3	C				
	Right	334	61	730	19.0	B				
Eastbound	Left	103	57	332	81.0	F	75.5	E		
	Thru	237	84	354	85.2	F				
	Right	46	2	96	13.2	B				
Westbound	Left	137	56	277	67.1	E	61.3	E		
	Thru	270	82	312	81.5	F				
	Right	129	5	140	12.6	B				

Snelling at HarMar

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	56	29	161	83.1	F	12.6	B	11.6	B
	Thru	954	16	253	9.1	A				
	Right	57	0	0	1.6	A				
Southbound	Left	58	25	164	69.5	E	4.7	A		
	Thru	1,600	6	133	2.4	A				
	Right	69	0	50	2.5	A				
Eastbound	Left	64	37	157	79.2	E	44.2	D		
	Thru	30	37	158	85.0	F				
	Right	114	40	161	13.7	B				
Westbound	Left	39	26	130	88.4	F	41.7	D		
	Thru	18	26	130	85.9	F				
	Right	78	7	116	8.1	A				

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Snelling at Roselawn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	10	4	63	71.8	E	5.5	A	13.0	B
	Thru	941	9	263	4.8	A				
	Right	10	0	31	2.5	A				
Southbound	Left	32	24	112	115.4	F	4.6	A		
	Thru	1,675	6	145	2.6	A				
	Right	47	0	27	2.4	A				
Eastbound	Left	24	51	222	126.4	F	61.2	E		
	Thru	42	48	214	112.4	F				
	Right	76	3	85	12.5	B				
Westbound	Left	47	112	513	104.1	F	70.2	E		
	Thru	113	112	514	105.4	F				
	Right	103	4	90	15.5	B				

Snelling at Larpenteur

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	181	90	399	76.1	E	26.9	C	95.8	F
	Thru	788	41	354	16.7	B				
	Right	40	1	62	4.4	A				
Southbound	Left	48	38	161	128.2	F	28.0	C		
	Thru	1,626	147	1,156	26.2	C				
	Right	121	3	94	13.6	B				
Eastbound	Left	83	38	183	75.3	E	68.4	E		
	Thru	192	52	224	66.8	E				
	Right	21	64	242	55.8	E				
Westbound	Left	222	1,103	1,701	286.2	F	290.8	F		
	Thru	711	1,335	1,701	291.7	F				
	Right	89	1,348	1,702	295.6	F				

Snelling at Hoyt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	15	0	36	20.7	C	5.5	A	6.3	A
	Thru	923	11	256	5.3	A				
	Right	30	0	0	2.6	A				
Southbound	Left	16	0	13	7.0	A	2.2	A		
	Thru	1,836	2	117	2.1	A				
	Right	14	0	0	3.6	A				
Eastbound	Left	10	4	45	73.1	E	59.5	E		
	Thru	7	4	67	88.5	F				
	Right	8	3	93	17.3	B				
Westbound	Left	73	39	212	87.2	F	52.1	D		
	Thru	9	10	140	75.3	E				
	Right	77	11	157	16.3	B				

Snelling at Midway

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	44	1	62	21.4	C	6.1	A	6.9	A
	Thru	941	12	241	5.5	A				
	Right	21	0	42	2.7	A				
Southbound	Left	43	0	18	7.9	A	4.0	A		
	Thru	1,826	4	175	3.9	A				
	Right	52	7	211	5.2	A				
Eastbound	Left	0	-	-	-	A	67.5	E		
	Thru	13	6	71	80.9	F				
	Right	3	0	37	7.5	A				
Westbound	Left	45	35	175	78.6	E	62.5	E		
	Thru	26	35	172	84.5	F				
	Right	23	1	58	6.9	A				

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Snelling at Hewitt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	0	30	13.5	B	13.1	B	11.9	B
	Thru	1,072	36	**427**	13.1	B				
	Right	21	43	**449**	10.2	B				
Southbound	Left	76	2	79	14.3	B	9.3	A		
	Thru	1,369	29	**495**	9.1	A				
	Right	28	0	57	4.6	A				
Eastbound	Left	49	13	134	30.5	C	25.9	C		
	Thru	11	13	135	34.2	C				
	Right	30	17	153	15.4	B				
Westbound	Left	58	11	110	31.9	C	30.3	C		
	Thru	5	11	108	33.6	C				
	Right	7	17	123	15.9	B				

Snelling at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	18	0	42	20.6	C	8.5	A	13.1	B
	Thru	998	18	**397**	8.3	A				
	Right	12	18	**384**	7.0	A				
Southbound	Left	35	1	64	16.7	B	12.6	B		
	Thru	1,297	33	**590**	12.4	B				
	Right	124	34	**593**	13.5	B				
Eastbound	Left	55	23	159	36.0	**D**	33.2	C		
	Thru	58	23	159	31.5	C				
	Right	22	23	156	30.6	C				
Westbound	Left	35	22	183	32.4	C	31.1	C		
	Thru	69	22	184	31.0	C				
	Right	53	22	184	30.3	C				

Snelling at Thomas

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	22	1	56	12.5	B	10.2	B	12.7	B
	Thru	947	28	**387**	10.2	B				
	Right	23	29	**389**	9.3	A				
Southbound	Left	33	0	43	15.4	B	12.8	B		
	Thru	1,253	33	**548**	13.0	B				
	Right	68	0	39	8.6	A				
Eastbound	Left	31	11	136	33.0	C	28.6	C		
	Thru	22	11	137	31.3	C				
	Right	16	16	153	16.7	B				
Westbound	Left	25	15	160	32.7	C	23.2	C		
	Thru	45	15	161	27.7	C				
	Right	49	20	175	14.1	B				

Snelling at University

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	162	28	274	30.4	C	16.8	B	31.8	C
	Thru	871	56	**309**	16.0	B				
	Right	126	56	**312**	4.5	A				
Southbound	Left	156	16	180	31.5	C	27.9	C		
	Thru	1,001	88	**619**	28.7	C				
	Right	144	3	79	18.5	B				
Eastbound	Left	50	15	126	46.8	**D**	36.4	**D**		
	Thru	227	55	287	37.8	**D**				
	Right	136	57	290	30.0	C				
Westbound	Left	152	152	**473**	133.0	**F**	58.3	**E**		
	Thru	551	98	**392**	40.8	**D**				
	Right	74	102	**397**	34.9	C				

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Snelling at Spruce Tree

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	66	1	56	10.2	B	6.5	A	6.4	A
	Thru	1,107	17	229	6.3	A				
	Right	54	21	241	5.0	A				
Southbound	Left	18	0	21	12.6	B	3.1	A		
	Thru	1,225	10	247	3.0	A				
	Right	51	13	266	2.5	A				
Eastbound	Left	19	6	70	49.8	D	18.1	B		
	Thru	0	7	72	73.1	E				
	Right	61	2	90	7.7	A				
Westbound	Left	46	13	115	45.0	D	36.6	D		
	Thru	22	9	110	49.0	D				
	Right	36	10	113	18.1	B				

Snelling at St Anthony

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	876	39	312	13.3	B	11.1	B	21.1	C
	Thru	824	39	312	8.7	A				
Southbound	Thru	934	98	552	39.0	D	30.4	C		
	Right	404	54	492	10.4	B				
Westbound	Left	214	65	349	32.1	C	25.1	C		
	Thru	526	65	345	34.6	C				
	Right	392	27	285	8.5	A				

Snelling at Concordia

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	1,370	46	325	19.2	B	17.4	B	15.6	B
	Right	414	7	239	11.6	B				
Southbound	Left	492	12	328	9.8	A	7.2	A		
	Thru	640	12	329	5.2	A				
Eastbound	Left	327	55	247	39.1	D	22.3	C		
	Thru	164	55	247	36.7	D				
	Right	413	0	0	3.4	A				

Snelling at Marshall

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	67	7	78	35.1	D	29.4	C	27.6	C
	Thru	1,474	178	649	29.6	C				
	Right	50	1	69	13.7	B				
Southbound	Left	26	3	56	29.1	C	21.6	C		
	Thru	793	66	292	24.3	C				
	Right	227	12	191	11.4	B				
Eastbound	Left	271	70	390	42.1	D	32.8	C		
	Thru	210	24	169	25.7	C				
	Right	58	27	197	14.4	B				
Westbound	Left	47	5	107	19.9	B	29.5	C		
	Thru	329	42	225	31.7	C				
	Right	47	42	233	24.2	C				

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Snelling at Selby

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	12	2	52	67.1	E	64.2	E	46.1	D
	Thru	1,074	295	1,019	64.3	E				
	Right	21	297	1,008	56.4	E				
Southbound	Left	230	99	438	66.3	E	27.4	C		
	Thru	645	34	311	14.2	B				
	Right	28	36	306	11.5	B				
Eastbound	Left	68	82	355	153.6	F	71.8	E		
	Thru	149	28	320	38.4	D				
	Right	13	28	315	26.0	C				
Westbound	Left	31	3	45	32.3	C	32.3	C		
	Thru	174	128	523	38.3	D				
	Right	452	131	529	30.0	C				

Snelling at Summit

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	41	1	42	10.4	B	5.3	A	20.3	C
	Thru	916	15	158	5.0	A				
	Right	32	15	157	7.2	A				
Southbound	Left	40	14	137	30.7	C	22.3	C		
	Thru	549	48	270	21.8	C				
	Right	101	48	271	22.1	C				
Eastbound	Left	49	14	195	54.8	D	30.8	C		
	Thru	178	28	262	25.1	C				
	Right	13	38	286	19.7	B				
Westbound	Left	64	7	211	39.2	D	39.5	D		
	Thru	357	138	598	41.4	D				
	Right	146	152	616	35.2	D				

Snelling at Grand

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	44	1	47	12.3	B	14.3	B	23.5	C
	Thru	763	35	278	14.5	B				
	Right	55	36	288	14.0	B				
Southbound	Left	98	13	127	29.2	C	18.4	B		
	Thru	421	33	206	17.2	B				
	Right	102	36	223	12.6	B				
Eastbound	Left	46	6	83	26.3	C	26.8	C		
	Thru	184	34	282	27.7	C				
	Right	23	36	299	21.3	C				
Westbound	Left	82	12	231	38.3	D	42.0	D		
	Thru	298	147	601	45.4	D				
	Right	176	153	617	38.1	D				

Snelling at St Clair

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	39	1	49	12.2	B	6.5	A	14.7	B
	Thru	645	12	120	6.4	A				
	Right	43	0	54	3.7	A				
Southbound	Left	46	2	65	13.8	B	7.7	A		
	Thru	449	11	159	7.2	A				
	Right	30	15	175	6.7	A				
Eastbound	Left	47	34	276	33.2	C	24.9	C		
	Thru	217	34	272	25.3	C				
	Right	39	42	292	13.0	B				
Westbound	Left	68	62	430	37.4	D	27.7	C		
	Thru	256	63	434	30.1	C				
	Right	179	74	454	20.5	C				

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Snelling at Jefferson

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	17	244	17.8	B	10.6	B	11.2	B
	Thru	646	17	245	10.6	B				
	Right	24	21	255	9.0	A				
Southbound	Left	16	6	100	6.3	A	3.5	A		
	Thru	545	6	101	3.4	A				
	Right	4	9	122	4.8	A				
Eastbound	Left	19	13	117	32.5	C	28.2	C		
	Thru	59	13	114	28.6	C				
	Right	7	21	137	13.6	B				
Westbound	Left	62	29	218	31.1	C	29.2	C		
	Thru	66	30	222	34.1	C				
	Right	54	37	234	21.0	C				

Snelling at Randolph

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	64	5	79	16.8	B	22.4	C	27.1	C
	Thru	486	40	217	24.0	C				
	Right	33	1	65	8.8	A				
Southbound	Left	98	5	133	16.6	B	16.9	B		
	Thru	352	24	262	19.3	B				
	Right	155	7	193	11.9	B				
Eastbound	Left	101	33	**417**	44.1	**D**	35.9	**D**		
	Thru	364	98	**517**	35.9	**D**				
	Right	44	1	68	18.0	B				
Westbound	Left	60	8	90	35.8	**D**	35.1	**D**		
	Thru	407	117	**584**	37.9	**D**				
	Right	88	9	**401**	21.5	C				

Snelling at Highland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	3	5	100	5.5	A	3.5	A	9.3	A
	Thru	490	5	104	3.6	A				
	Right	153	8	116	3.4	A				
Southbound	Left	20	7	176	11.8	B	6.4	A		
	Thru	426	6	176	6.1	A				
	Right	12	8	185	5.3	A				
Eastbound	Left	37	15	147	22.1	C	21.7	C		
	Thru	93	15	146	23.0	C				
	Right	9	0	35	6.5	A				
Westbound	Left	124	19	115	30.4	C	22.9	C		
	Thru	61	8	114	21.6	C				
	Right	61	12	127	8.8	A				

Snelling at Ford

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	76	7	105	11.3	B	5.7	A	7.5	A
	Thru	441	7	105	4.8	A				
	Right	5	11	127	3.2	A				
Southbound	Left	2	2	75	10.1	B	2.7	A		
	Thru	390	2	77	2.6	A				
	Right	171	1	90	2.9	A				
Eastbound	Left	203	22	172	24.3	C	20.0	C		
	Thru	3	22	171	26.9	C				
	Right	76	3	118	8.4	A				
Westbound	Left	8	1	43	24.0	C	18.8	B		
	Thru	5	1	46	15.9	B				
	Right	2	0	61	5.9	A				

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Ford at Fairview

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	40	3	74	22.1	C	11.7	B	12.5	B
	Thru	437	21	249	11.0	B				
	Right	45	21	262	9.8	A				
Southbound	Left	22	1	47	18.5	B	10.7	B		
	Thru	428	19	244	10.6	B				
	Right	65	22	260	8.8	A				
Eastbound	Left	89	8	107	22.5	C	15.7	B		
	Thru	217	14	201	13.7	B				
	Right	27	1	79	8.6	A				
Westbound	Left	28	2	64	18.0	B	13.8	B		
	Thru	218	13	171	13.5	B				
	Right	7	0	48	6.4	A				

Ford at Kenneth

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	38	16	160	35.5	D	27.7	C	8.1	A
	Thru	27	16	157	31.5	C				
	Right	32	13	155	15.1	B				
Southbound	Left	11	11	120	33.5	C	22.5	C		
	Thru	44	11	120	30.0	C				
	Right	38	7	114	10.8	B				
Eastbound	Left	30	0	38	4.3	A	2.1	A		
	Thru	291	3	99	1.9	A				
	Right	20	3	108	2.1	A				
Westbound	Left	15	0	27	5.9	A	4.5	A		
	Thru	299	4	113	4.5	A				
	Right	7	4	116	3.5	A				

Ford at Cleveland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	296	24	266	17.1	B	17.2	B	17.1	B
	Thru	389	42	345	17.1	B				
	Right	56	39	347	19.1	B				
Southbound	Left	28	2	61	15.5	B	19.8	B		
	Thru	274	29	295	19.5	B				
	Right	86	27	292	22.0	C				
Eastbound	Left	91	10	108	21.8	C	14.8	B		
	Thru	257	19	162	12.3	B				
	Right	123	18	162	14.9	B				
Westbound	Left	50	6	95	28.2	C	16.8	B		
	Thru	289	18	162	15.4	B				
	Right	37	17	160	13.1	B				

Ford at Finn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	48	10	100	34.2	C	20.8	C	5.9	A
	Thru	1	6	89	41.0	D				
	Right	42	6	103	5.1	A				
Southbound	Left	31	7	99	32.8	C	22.4	C		
	Thru	1	7	91	17.0	B				
	Right	29	4	95	11.3	B				
Eastbound	Left	20	1	38	9.5	A	5.1	A		
	Thru	400	6	113	4.9	A				
	Right	20	4	122	3.6	A				
Westbound	Left	125	1	63	5.1	A	3.0	A		
	Thru	488	2	75	2.5	A				
	Right	59	2	79	2.2	A				

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Ford at Cretin

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	117	23	148	32.4	C	22.3	C	7.5	A
	Right	65	1	75	4.1	A				
Eastbound	Left	112	2	70	7.8	A	4.8	A		
	Thru	320	3	97	3.7	A				
Westbound	Thru	380	7	117	4.6	A	4.9	A		
	Right	182	6	126	5.5	A				

46th at 46th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	28	18	170	55.1	E	13.2	B	16.3	B
	Thru	33	18	162	49.2	D				
	Right	217	0	4	2.4	A				
Southbound	Left	50	11	135	39.3	D	45.9	D		
	Thru	16	15	157	52.8	D				
	Right	42	17	150	51.0	D				
Eastbound	Left	25	2	79	16.5	B	21.1	C		
	Thru	169	17	171	22.4	C				
	Right	34	22	194	18.2	B				
Westbound	Left	143	5	126	9.4	A	8.5	A		
	Thru	219	7	101	8.1	A				
	Right	82	3	76	7.9	A				

46th at 42nd

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	1	41	24.8	C	17.5	B	18.2	B
	Thru	5	1	48	21.5	C				
	Right	4	1	48	3.7	A				
Southbound	Left	28	6	88	21.4	C	11.3	B		
	Thru	4	5	87	26.2	C				
	Right	84	5	90	7.2	A				
Eastbound	Left	49	7	112	27.1	C	23.9	C		
	Thru	190	18	160	23.6	C				
	Right	14	22	173	16.9	B				
Westbound	Left	4	0	38	20.5	C	16.1	B		
	Thru	271	17	157	16.3	B				
	Right	14	21	168	9.3	A				

46th at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	22	32	252	26.4	C	22.4	C	22.4	C
	Thru	274	32	260	22.5	C				
	Right	13	29	260	13.9	B				
Southbound	Left	38	24	258	30.1	C	18.3	B		
	Thru	166	23	255	21.0	C				
	Right	109	20	245	10.1	B				
Eastbound	Left	126	14	170	23.4	C	18.2	B		
	Thru	206	16	161	15.4	B				
	Right	25	21	173	14.7	B				
Westbound	Left	74	15	120	36.6	D	30.0	C		
	Thru	179	34	202	32.4	C				
	Right	114	35	206	21.9	C				

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46th at Hiawatha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	26	6	87	41.7	**D**	21.1	C	21.7	C
	Thru	884	66	**336**	24.4	C				
	Right	183	0	0	2.3	A				
Southbound	Left	94	19	167	35.8	**D**	18.8	B		
	Thru	531	27	198	16.3	B				
	Right	14	0	0	1.3	A				
Eastbound	Left	63	7	95	23.2	C	28.5	C		
	Thru	80	20	111	29.9	C				
	Right	44	20	110	33.4	C				
Westbound	Left	163	33	246	34.9	C	25.9	C		
	Thru	72	9	146	23.3	C				
	Right	71	1	68	7.9	A				

46th at 36th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	0	30	8.1	A	6.3	A	5.1	A
	Thru	0	-	-	-	A				
	Right	5	0	33	4.5	A				
Southbound	Left	41	2	77	7.9	A	6.9	A		
	Thru	0	-	-	-	A				
	Right	15	2	81	4.1	A				
Eastbound	Left	15	0	38	5.8	A	5.6	A		
	Thru	142	2	96	5.8	A				
	Right	8	4	112	2.3	A				
Westbound	Left	1	2	107	0.6	A	3.4	A		
	Thru	86	1	93	3.8	A				
	Right	24	0	51	2.1	A				

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Co B2 at Snelling W Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	74	36	218	34.2	C	22.9	C	29.5	C
	Thru	152	36	218	35.1	D				
	Right	142	0	0	4.1	A				
Southbound	Left	6	27	199	43.6	D	21.7	C		
	Thru	105	27	209	44.9	D				
	Right	148	1	76	4.5	A				
Eastbound	Left	405	112	558	45.4	D	30.3	C		
	Thru	746	56	363	24.2	C				
	Right	77	0	0	10.0	B				
Westbound	Left	351	112	468	48.7	D	33.8	C		
	Thru	438	34	198	23.4	C				
	Right	24	0	0	6.2	A				

Co B2 at Snelling E Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	21	47	583	42.1	D	26.4	C	11.9	B
	Right	496	29	517	25.7	C				
Eastbound	Left	248	5	197	9.0	A	5.8	A		
	Thru	647	6	215	4.6	A				
Westbound	Thru	318	7	126	6.5	A	6.1	A		
	Right	38	0	0	2.6	A				

Snelling at Co B

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	153	69	323	71.9	E	13.3	B	73.9	E
	Thru	1,558	35	264	8.9	A				
	Right	212	0	0	3.3	A				
Southbound	Left	426	213	667	96.0	F	43.5	D		
	Thru	1,245	212	673	31.9	C				
	Right	295	89	624	16.7	B				
Eastbound	Left	178	1,049	1,579	335.4	F	306.4	F		
	Thru	500	1,065	1,585	310.7	F				
	Right	151	844	1,575	258.0	F				
Westbound	Left	169	84	366	80.8	F	50.9	D		
	Thru	259	68	322	69.1	E				
	Right	300	30	279	18.5	B				

Snelling at HarMar

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	51	22	159	72.4	E	6.5	A	14.4	B
	Thru	1,609	17	133	4.9	A				
	Right	267	0	0	3.3	A				
Southbound	Left	127	47	287	61.3	E	11.2	B		
	Thru	1,339	26	298	7.0	A				
	Right	98	1	63	3.6	A				
Eastbound	Left	116	57	193	79.6	E	58.3	E		
	Thru	50	57	194	83.2	F				
	Right	79	60	197	11.3	B				
Westbound	Left	100	56	221	81.0	F	41.9	D		
	Thru	58	56	219	77.0	E				
	Right	196	49	245	11.6	B				

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Snelling at Roselawn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	15	12	70	124.6	F	4.6	A	23.9	C
	Thru	1,832	11	136	3.6	A				
	Right	27	0	16	3.5	A				
Southbound	Left	96	184	553	222.9	F	23.6	C		
	Thru	1,311	47	402	10.4	B				
	Right	101	0	52	5.3	A				
Eastbound	Left	51	223	694	128.3	F	102.8	F		
	Thru	193	216	692	116.9	F				
	Right	70	4	100	45.4	D				
Westbound	Left	21	99	419	139.1	F	98.2	F		
	Thru	94	95	404	121.1	F				
	Right	45	3	79	31.0	C				

Snelling at Larpenteur

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	222	124	497	96.6	F	54.6	D	65.9	E
	Thru	1,696	426	1,325	51.6	D				
	Right	185	6	133	31.4	C				
Southbound	Left	175	380	1,280	217.9	F	70.0	E		
	Thru	1,053	300	1,280	52.4	D				
	Right	173	27	226	27.9	C				
Eastbound	Left	27	8	73	77.3	E	93.0	F		
	Thru	700	319	883	92.6	F				
	Right	197	344	912	96.6	F				
Westbound	Left	153	73	308	79.8	E	55.1	E		
	Thru	352	87	390	50.0	D				
	Right	151	101	414	42.0	D				

Snelling at Hoyt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	7	0	8	18.7	B	11.8	B	10.3	B
	Thru	2,058	71	706	12.0	B				
	Right	124	0	2	7.8	A				
Southbound	Left	45	2	70	30.6	C	3.4	A		
	Thru	1,347	4	104	2.5	A				
	Right	9	0	0	2.4	A				
Eastbound	Left	23	11	87	82.4	F	78.1	E		
	Thru	6	3	58	76.1	E				
	Right	1	1	68	12.1	B				
Westbound	Left	41	21	128	85.6	F	63.6	E		
	Thru	10	7	85	78.1	E				
	Right	29	8	103	27.7	C				

Snelling at Midway

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	53	1	58	16.9	B	11.8	B	11.5	B
	Thru	2,090	79	846	11.7	B				
	Right	67	0	51	9.9	A				
Southbound	Left	75	1	79	18.3	B	5.2	A		
	Thru	1,266	9	205	4.4	A				
	Right	49	14	240	5.3	A				
Eastbound	Left	46	24	131	87.9	F	59.1	E		
	Thru	30	14	96	80.7	F				
	Right	39	2	66	9.0	A				
Westbound	Left	19	17	113	87.8	F	41.9	D		
	Thru	15	17	110	79.8	E				
	Right	51	2	66	13.5	B				

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SRF Consulting Group, Inc

Snelling at Hewitt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	23	0	36	19.1	B	16.7	B	17.1	B
	Thru	1,570	84	**746**	16.6	B				
	Right	19	93	**762**	16.4	B				
Southbound	Left	72	4	90	25.2	C	15.2	B		
	Thru	1,350	61	**585**	15.2	B				
	Right	102	1	78	8.1	A				
Eastbound	Left	91	29	203	38.1	**D**	32.0	C		
	Thru	11	30	207	36.9	**D**				
	Right	73	38	222	23.7	C				
Westbound	Left	30	14	148	34.4	C	24.4	C		
	Thru	20	15	149	33.3	C				
	Right	80	20	164	18.4	B				

Snelling at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	39	2	71	28.5	C	22.6	C	24.3	C
	Thru	1,398	113	**868**	22.4	C				
	Right	50	113	**868**	24.3	C				
Southbound	Left	103	8	139	31.3	C	21.8	C		
	Thru	1,248	83	**706**	20.9	C				
	Right	106	84	**711**	23.5	C				
Eastbound	Left	134	56	**350**	43.3	**D**	36.7	**D**		
	Thru	176	56	**346**	33.5	C				
	Right	76	56	**346**	32.6	C				
Westbound	Left	50	30	222	36.6	**D**	29.0	C		
	Thru	131	30	222	27.7	C				
	Right	79	30	222	26.2	C				

Snelling at Thomas

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	45	2	66	23.3	C	23.7	C	28.3	C
	Thru	1,346	124	**890**	23.7	C				
	Right	72	126	**895**	23.2	C				
Southbound	Left	61	4	94	37.8	**D**	32.2	C		
	Thru	1,275	148	**817**	32.2	C				
	Right	32	0	50	18.5	B				
Eastbound	Left	110	51	**322**	35.4	**D**	33.8	C		
	Thru	86	51	**322**	34.7	C				
	Right	79	62	**340**	30.5	C				
Westbound	Left	40	21	197	34.5	C	27.9	C		
	Thru	55	21	200	29.5	C				
	Right	44	28	212	20.0	B				

Snelling at University

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	110	75	**338**	65.6	**E**	28.8	C	74.3	**E**
	Thru	1,061	135	**339**	27.6	C				
	Right	178	137	**343**	13.0	B				
Southbound	Left	196	77	**706**	88.3	**F**	80.5	**F**		
	Thru	1,114	**423**	**1,234**	80.4	**F**				
	Right	61	1	70	56.6	**E**				
Eastbound	Left	187	64	**367**	64.7	**E**	110.3	**F**		
	Thru	811	**437**	**1,228**	116.3	**F**				
	Right	173	**439**	**1,227**	131.7	**F**				
Westbound	Left	166	121	**482**	107.5	**F**	86.0	**F**		
	Thru	520	235	**802**	79.0	**E**				
	Right	213	240	**805**	86.3	**F**				

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Snelling at Spruce Tree

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	61	4	90	33.4	C	35.4	D	29.1	C
	Thru	1,219	146	802	36.7	D				
	Right	146	158	822	25.2	C				
Southbound	Left	71	9	146	34.4	C	14.7	B		
	Thru	1,364	53	346	13.7	B				
	Right	14	62	365	12.7	B				
Eastbound	Left	35	27	179	69.8	E	26.8	C		
	Thru	64	27	178	45.6	D				
	Right	177	9	144	11.5	B				
Westbound	Left	140	43	262	58.1	E	71.7	E		
	Thru	54	83	431	81.3	F				
	Right	97	90	443	86.1	F				

Snelling at St Anthony

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	362	37	320	19.5	B	13.8	B	44.5	D
	Thru	981	37	321	11.7	B				
Southbound	Thru	1,330	346	1,000	76.0	E	61.6	E		
	Right	358	298	944	8.1	A				
Westbound	Left	362	194	941	76.9	E	54.3	D		
	Thru	430	193	933	69.5	E				
	Right	443	146	874	21.2	C				

Snelling at Concordia

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	1,034	127	663	50.4	D	46.7	D	44.1	D
	Right	235	62	574	30.0	C				
Southbound	Left	501	53	329	9.1	A	17.2	B		
	Thru	1,197	53	329	20.6	C				
Eastbound	Left	331	94	568	67.0	E	77.8	E		
	Thru	328	95	585	85.7	F				
	Right	598	393	1,277	79.5	E				

Snelling at Marshall

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	48	6	92	50.6	D	44.4	D	50.8	D
	Thru	1,014	181	637	45.5	D				
	Right	80	2	92	26.9	C				
Southbound	Left	47	3	63	60.6	E	60.8	E		
	Thru	1,518	633	1,068	62.7	E				
	Right	221	34	520	48.4	D				
Eastbound	Left	214	64	346	47.2	D	41.4	D		
	Thru	351	61	286	39.4	D				
	Right	86	73	312	34.6	C				
Westbound	Left	73	13	119	32.0	C	38.3	D		
	Thru	245	42	193	41.3	D				
	Right	43	43	201	32.1	C				

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Snelling at Selby

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	26	18	165	136.4	F	76.2	E	42.5	D
	Thru	866	278	868	74.5	E				
	Right	54	290	882	75.0	E				
Southbound	Left	385	232	685	81.3	F	28.3	C		
	Thru	1,099	42	648	12.6	B				
	Right	183	44	654	10.8	B				
Eastbound	Left	53	11	137	51.5	D	34.0	C		
	Thru	284	64	405	32.0	C				
	Right	38	67	413	25.3	C				
Westbound	Left	43	8	88	44.0	D	31.4	C		
	Thru	205	75	473	34.1	C				
	Right	209	79	481	26.3	C				

Snelling at Summit

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	33	3	56	33.0	C	20.9	C	28.1	C
	Thru	720	55	302	20.0	B				
	Right	70	55	301	24.3	C				
Southbound	Left	92	22	197	35.3	D	28.1	C		
	Thru	975	101	653	27.5	C				
	Right	125	102	655	27.5	C				
Eastbound	Left	75	37	419	64.5	E	33.8	C		
	Thru	418	75	503	28.6	C				
	Right	18	85	520	26.1	C				
Westbound	Left	60	8	212	41.9	D	32.6	C		
	Thru	423	124	597	32.7	C				
	Right	166	137	615	29.1	C				

Snelling at Grand

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	71	8	141	29.4	C	31.0	C	27.7	C
	Thru	596	79	414	31.6	C				
	Right	137	82	423	29.3	C				
Southbound	Left	185	26	242	28.0	C	15.0	B		
	Thru	738	34	470	12.4	B				
	Right	130	35	485	11.3	B				
Eastbound	Left	76	13	252	40.5	D	35.5	D		
	Thru	422	118	596	35.3	D				
	Right	65	127	613	30.9	C				
Westbound	Left	95	20	357	45.2	D	38.5	D		
	Thru	346	127	593	39.0	D				
	Right	148	137	609	33.1	C				

Snelling at St Clair

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	55	12	107	46.6	D	11.1	B	18.7	B
	Thru	565	15	107	8.6	A				
	Right	85	1	54	4.5	A				
Southbound	Left	104	16	215	33.1	C	18.7	B		
	Thru	666	43	289	16.8	B				
	Right	116	50	300	16.9	B				
Eastbound	Left	75	47	386	34.7	C	25.1	C		
	Thru	310	47	388	24.0	C				
	Right	43	56	408	15.5	B				
Westbound	Left	76	54	450	33.2	C	23.7	C		
	Thru	317	54	448	24.7	C				
	Right	151	63	466	16.9	B				

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Snelling at Jefferson

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	7	23	**306**	14.6	B	12.5	B	14.4	B
	Thru	669	23	**309**	12.5	B				
	Right	45	27	**321**	12.0	B				
Southbound	Left	37	19	181	14.4	B	8.8	A		
	Thru	747	19	181	8.5	A				
	Right	1	23	191	8.0	A				
Eastbound	Left	11	20	152	39.3	**D**	35.5	**D**		
	Thru	83	20	151	36.1	**D**				
	Right	8	29	174	23.7	C				
Westbound	Left	40	34	225	41.8	**D**	37.1	**D**		
	Thru	86	34	226	39.3	**D**				
	Right	36	42	242	26.6	C				

Snelling at Randolph

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	53	6	103	24.3	C	25.5	C	25.2	C
	Thru	495	49	282	28.2	C				
	Right	106	5	169	13.6	B				
Southbound	Left	147	13	168	21.5	C	17.1	B		
	Thru	538	30	265	17.6	B				
	Right	115	3	136	9.1	A				
Eastbound	Left	124	33	**502**	38.9	**D**	33.7	C		
	Thru	422	108	**604**	33.7	C				
	Right	40	1	59	19.0	B				
Westbound	Left	88	11	121	29.0	C	27.3	C		
	Thru	347	77	**557**	30.1	C				
	Right	102	7	**304**	16.4	B				

Snelling at Highland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	8	5	96	9.7	A	3.2	A	8.8	A
	Thru	605	5	95	3.1	A				
	Right	101	7	108	3.1	A				
Southbound	Left	33	12	264	15.1	B	8.2	A		
	Thru	596	12	265	7.9	A				
	Right	37	14	276	7.4	A				
Eastbound	Left	23	11	110	21.3	C	19.0	B		
	Thru	74	10	112	21.3	C				
	Right	18	1	41	6.1	A				
Westbound	Left	111	17	136	29.6	C	24.7	C		
	Thru	68	8	107	21.6	C				
	Right	21	10	119	8.8	A				

Snelling at Ford

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	124	13	140	17.3	B	8.1	A	9.7	A
	Thru	446	13	139	5.6	A				
	Right	5	18	158	4.4	A				
Southbound	Left	13	5	119	7.6	A	4.3	A		
	Thru	456	5	117	4.0	A				
	Right	251	4	139	4.7	A				
Eastbound	Left	266	25	198	25.6	C	20.8	C		
	Thru	8	25	197	27.3	C				
	Right	143	7	160	11.4	B				
Westbound	Left	8	1	41	21.5	C	17.9	B		
	Thru	5	1	37	19.3	B				
	Right	3	0	56	6.0	A				

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Ford at Fairview

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	71	13	134	42.3	D	16.5	B	19.5	B
	Thru	497	31	367	13.0	B				
	Right	26	33	387	11.6	B				
Southbound	Left	26	1	44	22.1	C	16.3	B		
	Thru	463	44	465	16.5	B				
	Right	182	50	480	14.8	B				
Eastbound	Left	144	44	244	56.3	E	27.5	C		
	Thru	366	32	374	18.9	B				
	Right	66	2	88	11.8	B				
Westbound	Left	15	1	43	23.5	C	17.6	B		
	Thru	350	31	263	17.7	B				
	Right	16	0	60	8.8	A				

Ford at Kenneth

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	55	30	229	51.8	D	42.8	D	9.6	A
	Thru	22	29	228	47.8	D				
	Right	37	24	226	26.8	C				
Southbound	Left	29	18	147	45.8	D	34.3	C		
	Thru	25	18	149	46.5	D				
	Right	44	15	148	19.5	B				
Eastbound	Left	46	1	52	8.1	A	3.0	A		
	Thru	504	6	127	2.5	A				
	Right	49	7	138	2.6	A				
Westbound	Left	14	0	30	9.8	A	6.0	A		
	Thru	568	8	158	5.9	A				
	Right	21	8	164	4.8	A				

Ford at Cleveland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	247	46	311	33.5	C	29.5	C	32.0	C
	Thru	352	63	392	26.9	C				
	Right	37	60	390	27.3	C				
Southbound	Left	79	10	241	35.9	D	42.3	D		
	Thru	404	140	772	41.9	D				
	Right	170	140	772	46.4	D				
Eastbound	Left	159	32	343	35.5	D	29.4	C		
	Thru	487	79	466	23.6	C				
	Right	268	79	467	36.1	D				
Westbound	Left	84	15	133	34.5	C	28.0	C		
	Thru	496	56	315	26.7	C				
	Right	83	56	316	28.9	C				

Ford at Finn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	200	61	297	49.8	D	31.3	C	17.0	B
	Thru	10	60	301	30.8	C				
	Right	176	63	303	10.3	B				
Southbound	Left	115	39	244	41.7	D	36.1	D		
	Thru	16	39	249	36.7	D				
	Right	66	39	250	26.1	C				
Eastbound	Left	53	4	132	17.7	B	14.7	B		
	Thru	636	33	317	14.7	B				
	Right	44	34	324	11.3	B				
Westbound	Left	194	12	169	14.7	B	8.7	A		
	Thru	661	14	176	7.2	A				
	Right	52	15	180	6.0	A				

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Ford at Cretin

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	172	49	261	47.1	D	30.9	C	11.9	B
	Right	111	3	65	5.7	A				
Eastbound	Left	111	4	116	13.6	B	6.5	A		
	Thru	559	7	150	5.1	A				
Westbound	Thru	783	28	249	9.0	A	10.0	A		
	Right	145	28	251	15.4	B				

46th at 46th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	16	145	53.4	D	11.4	B	14.5	B
	Thru	38	16	140	52.5	D				
	Right	252	0	6	2.8	A				
Southbound	Left	81	21	169	42.5	D	47.4	D		
	Thru	31	12	110	52.7	D				
	Right	10	10	110	70.4	E				
Eastbound	Left	26	1	41	10.4	B	12.5	B		
	Thru	339	20	164	11.8	B				
	Right	51	27	181	18.7	B				
Westbound	Left	300	17	242	16.7	B	12.0	B		
	Thru	474	12	201	9.6	A				
	Right	119	5	145	9.8	A				

46th at 42nd

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	2	39	29.0	C	19.3	B	14.5	B
	Thru	6	1	39	20.7	C				
	Right	4	1	43	3.9	A				
Southbound	Left	37	9	127	26.6	C	17.4	B		
	Thru	5	8	126	27.0	C				
	Right	58	7	127	10.6	B				
Eastbound	Left	85	13	148	30.1	C	21.9	C		
	Thru	374	28	202	20.1	C				
	Right	5	33	215	17.7	B				
Westbound	Left	3	0	16	9.6	A	6.8	A		
	Thru	460	9	174	6.9	A				
	Right	34	12	184	5.9	A				

46th at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	42	60	**406**	39.8	D	32.2	C	43.6	**D**
	Thru	272	59	**403**	33.5	C				
	Right	66	57	**403**	21.8	C				
Southbound	Left	121	**315**	**1,091**	92.0	F	79.7	**E**		
	Thru	313	**305**	**1,082**	78.8	E				
	Right	122	**304**	**1,081**	69.7	E				
Eastbound	Left	173	23	198	27.6	C	19.5	B		
	Thru	277	19	197	14.7	B				
	Right	15	24	208	14.1	B				
Westbound	Left	81	17	168	39.8	D	34.9	C		
	Thru	353	56	**313**	35.0	D				
	Right	91	57	**315**	29.7	C				

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46th at Hiawatha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	85	21	142	43.1	**D**	23.6	C	25.6	C
	Thru	804	70	**354**	27.8	C				
	Right	243	0	2	2.7	A				
Southbound	Left	145	34	205	40.4	**D**	25.7	C		
	Thru	856	64	**348**	24.3	C				
	Right	40	0	0	2.3	A				
Eastbound	Left	52	6	81	25.1	C	31.4	C		
	Thru	77	18	118	34.3	C				
	Right	22	18	120	36.1	**D**				
Westbound	Left	202	52	**373**	43.5	**D**	28.1	C		
	Thru	147	20	260	25.3	C				
	Right	169	6	169	12.0	B				

46th at 36th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	1	0	28	9.2	A	10.3	B	3.7	A
	Thru	2	0	25	11.4	B				
	Right	0	-	-	-	A				
Southbound	Left	36	1	59	6.2	A	6.0	A		
	Thru	1	1	62	8.0	A				
	Right	5	1	66	4.0	A				
Eastbound	Left	5	0	21	5.1	A	4.5	A		
	Thru	115	1	68	4.5	A				
	Right	1	2	96	2.0	A				
Westbound	Left	0	-	-	-	A	3.0	A		
	Thru	242	3	145	3.1	A				
	Right	28	0	54	2.0	A				

* Results shown are the average of 20 model runs.
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Co B2 at Snelling W Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	11	8	93	29.9	C	27.0	C	13.9	B
	Thru	21	8	91	32.9	C				
	Right	6	0	0	1.6	A				
Southbound	Left	20	8	79	37.3	D	22.2	C		
	Thru	33	8	79	34.9	C				
	Right	37	0	0	2.5	A				
Eastbound	Left	22	4	56	36.8	D	11.4	B		
	Thru	101	2	51	7.0	A				
	Right	14	0	0	3.6	A				
Westbound	Left	118	33	222	42.6	D	12.5	B		
	Thru	446	9	140	6.4	A				
	Right	78	0	0	1.3	A				

Co B2 at Snelling E Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	50	10	126	31.9	C	14.8	B	5.1	A
	Right	148	0	57	9.1	A				
Eastbound	Left	13	0	34	4.1	A	1.6	A		
	Thru	114	0	30	1.3	A				
Westbound	Thru	492	2	75	2.3	A	2.3	A		
	Right	30	0	0	1.4	A				

Snelling at Co B

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	134	74	304	86.9	F	15.2	B	33.9	C
	Thru	881	11	230	5.5	A				
	Right	83	0	0	2.1	A				
Southbound	Left	153	90	684	87.7	F	28.8	C		
	Thru	1,539	144	772	25.2	C				
	Right	333	62	701	18.3	B				
Eastbound	Left	103	59	359	82.4	F	76.1	E		
	Thru	237	84	358	85.2	F				
	Right	46	2	88	14.7	B				
Westbound	Left	137	56	285	67.3	E	61.3	E		
	Thru	270	82	312	81.5	F				
	Right	128	6	132	12.5	B				

Snelling at HarMar

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	56	29	164	83.0	F	12.8	B	11.7	B
	Thru	954	17	247	9.4	A				
	Right	57	0	0	1.6	A				
Southbound	Left	58	25	168	68.9	E	4.6	A		
	Thru	1,598	6	126	2.4	A				
	Right	69	0	44	2.5	A				
Eastbound	Left	64	37	147	81.3	F	45.1	D		
	Thru	31	37	147	82.5	F				
	Right	112	40	151	13.9	B				
Westbound	Left	39	26	130	88.4	F	41.7	D		
	Thru	18	26	130	85.9	F				
	Right	78	7	116	8.1	A				

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Snelling at Roselawn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	10	4	58	73.5	E	5.6	A	13.1	B
	Thru	942	10	243	4.9	A				
	Right	10	0	31	3.2	A				
Southbound	Left	32	24	106	116.5	F	4.7	A		
	Thru	1,672	5	126	2.6	A				
	Right	47	0	28	2.3	A				
Eastbound	Left	24	50	214	122.4	F	60.9	E		
	Thru	42	47	207	112.1	F				
	Right	76	4	81	13.1	B				
Westbound	Left	47	113	513	104.2	F	70.5	E		
	Thru	113	113	514	106.3	F				
	Right	102	4	84	15.4	B				

Snelling at Larpenteur

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	182	93	385	77.7	E	27.5	C	95.6	F
	Thru	789	42	376	17.1	B				
	Right	40	1	66	4.2	A				
Southbound	Left	48	39	261	130.3	F	28.1	C		
	Thru	1,620	148	1,238	26.2	C				
	Right	121	3	85	13.6	B				
Eastbound	Left	83	37	183	73.2	E	67.4	E		
	Thru	192	52	228	66.2	E				
	Right	21	64	242	55.8	E				
Westbound	Left	222	1,147	1,701	282.6	F	289.0	F		
	Thru	712	1,332	1,702	291.3	F				
	Right	90	1,345	1,702	286.8	F				

Snelling at Hoyt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	0	42	21.1	C	5.5	A	6.4	A
	Thru	923	11	261	5.4	A				
	Right	30	0	0	2.9	A				
Southbound	Left	16	0	17	6.6	A	2.2	A		
	Thru	1,833	2	105	2.2	A				
	Right	14	0	0	4.0	A				
Eastbound	Left	10	4	45	73.1	E	60.4	E		
	Thru	7	4	67	88.5	F				
	Right	8	3	93	20.1	C				
Westbound	Left	73	39	212	87.2	F	52.1	D		
	Thru	9	10	140	75.3	E				
	Right	77	11	157	16.3	B				

Snelling at Midway

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	44	1	56	23.0	C	6.4	A	6.9	A
	Thru	940	13	251	5.7	A				
	Right	21	0	42	2.8	A				
Southbound	Left	43	0	33	8.1	A	3.9	A		
	Thru	1,820	4	166	3.8	A				
	Right	51	7	199	4.4	A				
Eastbound	Left	0	-	-	-	A	68.0	E		
	Thru	13	6	71	80.9	F				
	Right	3	0	37	10.4	B				
Westbound	Left	45	35	175	78.6	E	62.5	E		
	Thru	26	35	172	84.5	F				
	Right	23	1	58	6.9	A				

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Snelling at Hewitt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	0	27	12.2	B	12.8	B	11.6	B
	Thru	1,074	35	**429**	12.8	B				
	Right	21	43	**453**	10.9	B				
Southbound	Left	77	2	77	12.9	B	9.0	A		
	Thru	1,371	29	**461**	8.9	A				
	Right	29	0	52	4.1	A				
Eastbound	Left	49	13	134	30.5	C	25.9	C		
	Thru	11	14	135	34.2	C				
	Right	30	17	153	15.1	B				
Westbound	Left	58	11	110	31.9	C	30.3	C		
	Thru	5	11	108	33.6	C				
	Right	7	17	123	16.1	B				

Snelling at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	18	0	35	19.2	B	8.8	A	13.1	B
	Thru	996	20	**430**	8.6	A				
	Right	12	20	**428**	7.1	A				
Southbound	Left	35	1	55	15.9	B	12.3	B		
	Thru	1,298	33	**602**	12.1	B				
	Right	125	33	**601**	13.1	B				
Eastbound	Left	55	23	159	36.0	**D**	33.2	C		
	Thru	58	23	159	31.5	C				
	Right	22	23	156	30.6	C				
Westbound	Left	35	22	183	32.5	C	31.1	C		
	Thru	69	22	184	31.0	C				
	Right	53	22	184	30.3	C				

Snelling at Thomas

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	22	1	44	12.0	B	9.8	A	12.7	B
	Thru	945	26	**372**	9.8	A				
	Right	23	28	**376**	7.9	A				
Southbound	Left	33	0	48	15.0	B	13.1	B		
	Thru	1,256	35	**583**	13.2	B				
	Right	67	0	32	8.8	A				
Eastbound	Left	31	11	136	33.0	C	28.5	C		
	Thru	22	11	137	31.3	C				
	Right	16	16	153	16.4	B				
Westbound	Left	25	15	160	32.7	C	23.2	C		
	Thru	45	15	161	27.7	C				
	Right	49	20	175	14.2	B				

Snelling at University

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	161	28	289	28.8	C	16.9	B	31.9	C
	Thru	871	56	**311**	16.5	B				
	Right	126	57	**316**	4.3	A				
Southbound	Left	155	16	186	31.8	C	28.6	C		
	Thru	1,003	92	**673**	29.5	C				
	Right	143	3	107	18.6	B				
Eastbound	Left	50	15	126	46.8	**D**	36.5	**D**		
	Thru	227	55	287	37.9	**D**				
	Right	136	57	290	30.3	C				
Westbound	Left	153	146	**478**	129.0	**F**	57.6	**E**		
	Thru	551	98	**369**	40.7	**D**				
	Right	74	101	**374**	35.6	**D**				

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Snelling at Spruce Tree

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	66	1	60	10.7	B	5.8	A	6.0	A
	Thru	1,108	12	190	5.7	A				
	Right	54	15	205	2.1	A				
Southbound	Left	18	0	25	14.4	B	3.0	A		
	Thru	1,227	9	223	2.9	A				
	Right	51	13	245	2.2	A				
Eastbound	Left	19	6	71	49.3	D	17.8	B		
	Thru	0	7	72	73.1	E				
	Right	61	2	89	7.4	A				
Westbound	Left	47	13	115	44.7	D	35.6	D		
	Thru	22	8	110	47.1	D				
	Right	36	9	110	16.8	B				

Snelling at St Anthony

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	877	40	328	13.5	B	11.1	B	20.6	C
	Thru	825	40	328	8.6	A				
Southbound	Thru	937	93	542	37.1	D	29.1	C		
	Right	403	51	486	10.5	B				
Westbound	Left	214	64	262	32.1	C	24.9	C		
	Thru	526	64	263	34.4	C				
	Right	392	26	202	8.3	A				

Snelling at Concordia

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	1,371	46	348	19.2	B	17.4	B	15.6	B
	Right	414	7	261	11.5	B				
Southbound	Left	494	13	322	10.0	A	7.3	A		
	Thru	642	13	321	5.2	A				
Eastbound	Left	327	55	247	39.0	D	22.3	C		
	Thru	164	55	247	36.6	D				
	Right	413	0	0	3.4	A				

Snelling at Marshall

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	67	8	86	35.8	D	30.4	C	28.0	C
	Thru	1,472	185	682	30.7	C				
	Right	50	1	76	13.6	B				
Southbound	Left	26	3	65	26.6	C	21.9	C		
	Thru	795	66	317	24.7	C				
	Right	228	11	172	11.7	B				
Eastbound	Left	273	65	371	40.0	D	31.7	C		
	Thru	210	24	169	25.8	C				
	Right	58	28	197	14.4	B				
Westbound	Left	47	5	107	19.9	B	29.6	C		
	Thru	329	42	225	31.7	C				
	Right	47	42	233	24.8	C				

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Snelling at Selby

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	12	2	39	73.3	E	74.6	E	50.5	D
	Thru	1,075	351	1,050	74.8	E				
	Right	22	353	1,044	66.5	E				
Southbound	Left	229	100	436	66.5	E	27.7	C		
	Thru	646	33	237	14.6	B				
	Right	28	36	242	11.7	B				
Eastbound	Left	67	85	369	161.6	F	77.3	E		
	Thru	147	35	368	42.7	D				
	Right	13	35	371	31.6	C				
Westbound	Left	31	3	45	32.4	C	31.8	C		
	Thru	174	126	525	37.6	D				
	Right	452	129	531	29.5	C				

Snelling at Summit

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	41	1	38	9.8	A	5.3	A	20.1	C
	Thru	917	15	155	5.0	A				
	Right	32	15	153	6.4	A				
Southbound	Left	40	13	130	28.5	C	21.7	C		
	Thru	550	46	267	21.2	C				
	Right	101	47	271	21.7	C				
Eastbound	Left	49	14	195	54.8	D	30.9	C		
	Thru	178	28	262	25.1	C				
	Right	13	38	286	19.6	B				
Westbound	Left	64	8	219	39.5	D	39.5	D		
	Thru	357	138	597	41.3	D				
	Right	146	152	616	35.2	D				

Snelling at Grand

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	44	1	62	11.6	B	14.0	B	23.8	C
	Thru	764	34	256	14.2	B				
	Right	55	35	267	13.0	B				
Southbound	Left	98	14	126	29.9	C	18.5	B		
	Thru	422	33	197	17.4	B				
	Right	102	35	213	12.3	B				
Eastbound	Left	46	6	89	26.8	C	26.9	C		
	Thru	184	34	282	27.7	C				
	Right	23	36	299	21.2	C				
Westbound	Left	82	13	320	39.3	D	43.3	D		
	Thru	298	153	607	46.6	D				
	Right	176	158	623	39.5	D				

Snelling at St Clair

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	39	1	39	12.0	B	6.8	A	14.8	B
	Thru	646	13	127	6.7	A				
	Right	43	0	53	4.4	A				
Southbound	Left	46	2	75	13.3	B	7.7	A		
	Thru	450	11	164	7.2	A				
	Right	30	15	177	6.5	A				
Eastbound	Left	47	34	281	33.2	C	25.0	C		
	Thru	217	34	278	25.4	C				
	Right	39	42	297	12.9	B				
Westbound	Left	68	62	429	37.2	D	27.5	C		
	Thru	256	62	434	29.9	C				
	Right	179	73	454	20.3	C				

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Snelling at Jefferson

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	17	261	18.3	B	10.6	B	11.2	B
	Thru	647	17	264	10.7	B				
	Right	25	21	276	8.7	A				
Southbound	Left	16	6	108	7.2	A	3.5	A		
	Thru	544	6	110	3.4	A				
	Right	4	9	130	4.4	A				
Eastbound	Left	19	13	117	32.5	C	28.2	C		
	Thru	59	13	114	28.6	C				
	Right	7	21	137	14.1	B				
Westbound	Left	62	29	218	31.1	C	29.3	C		
	Thru	66	30	222	34.1	C				
	Right	54	37	234	21.2	C				

Snelling at Randolph

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	64	5	98	17.5	B	22.5	C	27.1	C
	Thru	487	41	213	24.2	C				
	Right	33	1	60	8.5	A				
Southbound	Left	98	5	118	16.2	B	16.8	B		
	Thru	352	24	289	19.3	B				
	Right	156	7	196	11.7	B				
Eastbound	Left	101	33	**417**	44.1	**D**	35.9	**D**		
	Thru	364	98	**517**	35.8	**D**				
	Right	44	1	68	18.2	B				
Westbound	Left	60	8	90	35.8	**D**	35.0	**D**		
	Thru	407	117	**584**	37.9	**D**				
	Right	88	9	**401**	21.4	C				

Snelling at Highland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	3	5	96	5.3	A	3.5	A	9.3	A
	Thru	489	5	95	3.6	A				
	Right	152	8	107	3.2	A				
Southbound	Left	20	6	167	10.3	B	6.3	A		
	Thru	426	6	171	6.1	A				
	Right	12	8	178	5.2	A				
Eastbound	Left	37	15	147	22.3	C	21.8	C		
	Thru	93	15	146	23.0	C				
	Right	9	0	35	7.0	A				
Westbound	Left	124	19	114	30.5	C	22.9	C		
	Thru	61	8	114	21.6	C				
	Right	61	12	127	8.7	A				

Snelling at Ford

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	76	8	106	11.9	B	5.9	A	7.6	A
	Thru	440	8	106	4.8	A				
	Right	5	11	123	3.3	A				
Southbound	Left	2	2	77	4.8	A	2.7	A		
	Thru	390	2	79	2.5	A				
	Right	171	1	86	2.9	A				
Eastbound	Left	202	22	162	24.8	C	20.3	C		
	Thru	3	22	164	23.9	C				
	Right	76	3	113	8.1	A				
Westbound	Left	8	1	43	22.0	C	18.2	B		
	Thru	5	1	46	17.8	B				
	Right	2	0	61	5.2	A				

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Consulting Group, Inc

Ford at Fairview

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	40	3	72	21.7	C	12.0	B	12.6	B
	Thru	435	21	246	11.4	B				
	Right	45	22	261	9.6	A				
Southbound	Left	22	1	47	19.9	B	10.8	B		
	Thru	428	19	283	10.7	B				
	Right	66	23	297	9.1	A				
Eastbound	Left	89	8	99	22.7	C	15.4	B		
	Thru	217	13	172	13.3	B				
	Right	27	1	79	7.8	A				
Westbound	Left	28	2	63	17.6	B	13.9	B		
	Thru	217	13	196	13.7	B				
	Right	7	0	47	4.5	A				

Ford at Kenneth

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	38	16	160	35.5	D	27.7	C	8.1	A
	Thru	27	16	157	31.4	C				
	Right	32	13	155	15.1	B				
Southbound	Left	11	11	120	33.5	C	22.6	C		
	Thru	44	11	120	30.0	C				
	Right	38	7	114	11.0	B				
Eastbound	Left	30	0	41	4.4	A	2.1	A		
	Thru	291	3	90	1.9	A				
	Right	20	3	100	2.0	A				
Westbound	Left	15	0	19	5.1	A	4.3	A		
	Thru	302	4	97	4.2	A				
	Right	7	4	101	3.6	A				

Ford at Cleveland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	296	24	266	17.2	B	17.3	B	17.0	B
	Thru	389	42	345	17.1	B				
	Right	56	39	347	19.1	B				
Southbound	Left	28	2	61	15.5	B	19.8	B		
	Thru	274	29	295	19.5	B				
	Right	86	27	292	22.0	C				
Eastbound	Left	92	9	107	21.7	C	14.7	B		
	Thru	257	19	153	12.4	B				
	Right	123	17	153	14.6	B				
Westbound	Left	50	6	91	27.3	C	16.5	B		
	Thru	288	19	147	15.0	B				
	Right	36	17	144	14.1	B				

Ford at Finn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	48	10	100	34.1	C	20.8	C	6.0	A
	Thru	1	6	89	41.0	D				
	Right	42	6	103	5.1	A				
Southbound	Left	31	7	99	32.8	C	22.3	C		
	Thru	1	7	91	17.0	B				
	Right	29	4	95	11.1	B				
Eastbound	Left	20	1	44	8.9	A	5.1	A		
	Thru	400	6	121	5.0	A				
	Right	20	4	130	3.9	A				
Westbound	Left	125	1	66	4.9	A	3.0	A		
	Thru	487	2	93	2.6	A				
	Right	59	2	95	2.1	A				

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Consulting Group, Inc

Ford at Cretin

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	117	23	148	32.4	C	22.3	C	7.6	A
	Right	65	1	79	4.0	A				
Eastbound	Left	112	2	79	8.1	A	4.9	A		
	Thru	320	3	101	3.8	A				
Westbound	Thru	379	7	113	4.6	A	5.0	A		
	Right	182	6	127	5.7	A				

46th at 46th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	28	18	170	55.1	E	13.1	B	16.2	B
	Thru	33	18	162	49.2	D				
	Right	217	0	3	2.3	A				
Southbound	Left	50	11	135	39.3	D	45.9	D		
	Thru	16	15	157	52.8	D				
	Right	42	17	150	51.0	D				
Eastbound	Left	25	2	80	16.4	B	20.6	C		
	Thru	168	17	152	21.8	C				
	Right	34	22	173	17.3	B				
Westbound	Left	142	5	112	9.6	A	8.7	A		
	Thru	219	7	107	8.2	A				
	Right	82	3	86	8.3	A				

46th at 42nd

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	1	41	24.7	C	17.5	B	18.3	B
	Thru	5	1	48	21.5	C				
	Right	4	1	48	3.7	A				
Southbound	Left	28	6	88	21.4	C	11.4	B		
	Thru	4	5	87	26.2	C				
	Right	84	5	90	7.4	A				
Eastbound	Left	49	7	105	27.3	C	23.7	C		
	Thru	190	18	152	23.4	C				
	Right	14	22	166	16.2	B				
Westbound	Left	4	0	38	19.1	B	16.3	B		
	Thru	270	17	166	16.5	B				
	Right	14	21	175	10.5	B				

46th at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	22	31	252	26.3	C	22.4	C	22.2	C
	Thru	274	32	260	22.5	C				
	Right	13	29	260	14.0	B				
Southbound	Left	38	23	258	29.8	C	18.3	B		
	Thru	166	23	255	21.0	C				
	Right	109	20	245	10.2	B				
Eastbound	Left	127	14	159	22.6	C	17.6	B		
	Thru	206	15	161	14.6	B				
	Right	25	20	173	16.2	B				
Westbound	Left	74	15	120	36.3	D	30.0	C		
	Thru	179	33	201	32.4	C				
	Right	114	35	204	22.2	C				

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Consulting Group, Inc

46th at Hiawatha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	26	6	75	39.7	D	20.8	C	21.7	C
	Thru	883	65	376	24.0	C				
	Right	183	0	0	2.3	A				
Southbound	Left	94	20	169	37.1	D	19.2	B		
	Thru	531	27	207	16.5	B				
	Right	14	0	0	1.2	A				
Eastbound	Left	63	6	82	21.8	C	27.8	C		
	Thru	80	20	122	29.5	C				
	Right	44	20	122	33.1	C				
Westbound	Left	162	34	232	35.9	D	26.3	C		
	Thru	71	9	130	22.2	C				
	Right	71	2	85	8.5	A				

46th at 36th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	0	30	8.1	A	6.3	A	5.1	A
	Thru	0	-	-	-	A				
	Right	5	0	33	4.4	A				
Southbound	Left	41	2	77	7.9	A	6.9	A		
	Thru	0	-	-	-	A				
	Right	15	2	81	4.2	A				
Eastbound	Left	15	0	41	6.2	A	5.7	A		
	Thru	142	2	96	5.8	A				
	Right	8	4	112	2.3	A				
Westbound	Left	1	1	101	5.2	A	3.2	A		
	Thru	86	1	92	3.4	A				
	Right	24	0	60	2.4	A				

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SRF Consulting Group, Inc

Co B2 at Snelling W Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	75	35	217	33.5	C	22.8	C	29.4	C
	Thru	151	36	218	35.0	C				
	Right	141	0	0	4.0	A				
Southbound	Left	6	27	200	43.1	D	21.8	C		
	Thru	106	27	210	44.8	D				
	Right	148	1	76	4.5	A				
Eastbound	Left	403	112	574	45.3	D	30.3	C		
	Thru	749	58	349	24.4	C				
	Right	77	0	1	9.5	A				
Westbound	Left	349	110	477	48.1	D	33.5	C		
	Thru	440	35	195	23.5	C				
	Right	24	0	0	5.5	A				

Co B2 at Snelling E Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	21	46	606	41.5	D	26.1	C	11.9	B
	Right	497	29	546	25.4	C				
Eastbound	Left	248	5	198	9.3	A	6.0	A		
	Thru	647	6	214	4.7	A				
Westbound	Thru	318	7	121	6.6	A	6.2	A		
	Right	38	0	0	2.8	A				

Snelling at Co B

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	154	70	319	72.8	E	13.6	B	73.5	E
	Thru	1,557	36	277	9.2	A				
	Right	211	0	0	3.2	A				
Southbound	Left	426	214	665	96.8	F	43.6	D		
	Thru	1,245	216	672	31.9	C				
	Right	294	89	627	16.3	B				
Eastbound	Left	178	1,013	1,547	329.0	F	300.2	F		
	Thru	505	1,042	1,548	304.9	F				
	Right	153	853	1,530	251.1	F				
Westbound	Left	167	81	353	79.1	E	52.2	D		
	Thru	260	72	380	70.5	E				
	Right	300	36	324	21.4	C				

Snelling at HarMar

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	51	22	156	72.3	E	6.6	A	14.2	B
	Thru	1,609	17	130	5.0	A				
	Right	266	0	0	3.4	A				
Southbound	Left	125	46	278	60.3	E	10.5	B		
	Thru	1,343	23	219	6.4	A				
	Right	99	1	70	3.2	A				
Eastbound	Left	115	56	201	79.7	E	58.2	E		
	Thru	49	57	201	82.8	F				
	Right	80	60	205	11.9	B				
Westbound	Left	100	55	218	79.7	E	41.5	D		
	Thru	57	55	217	77.6	E				
	Right	198	47	242	11.8	B				

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Consulting Group, Inc

Snelling at Roselawn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	15	12	73	125.7	F	4.7	A	23.5	C
	Thru	1,831	11	146	3.7	A				
	Right	27	0	15	3.9	A				
Southbound	Left	96	173	538	220.0	F	22.6	C		
	Thru	1,316	40	441	9.5	A				
	Right	102	0	53	4.9	A				
Eastbound	Left	51	223	709	126.7	F	102.9	F		
	Thru	193	216	706	117.1	F				
	Right	70	5	147	46.7	D				
Westbound	Left	22	97	414	136.0	F	96.7	F		
	Thru	94	93	400	120.2	F				
	Right	45	3	71	28.8	C				

Snelling at Larpenteur

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	221	122	502	94.9	F	54.0	D	66.2	E
	Thru	1,695	420	1,339	51.3	D				
	Right	185	6	131	30.7	C				
Southbound	Left	175	398	1,221	219.6	F	71.4	E		
	Thru	1,053	325	1,219	53.8	D				
	Right	173	31	210	28.7	C				
Eastbound	Left	27	8	73	76.8	E	94.0	F		
	Thru	699	324	885	93.6	F				
	Right	196	348	914	98.0	F				
Westbound	Left	153	73	309	79.2	E	54.8	D		
	Thru	352	87	389	49.7	D				
	Right	151	101	413	41.8	D				

Snelling at Hoyt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	7	0	20	18.5	B	11.5	B	10.1	B
	Thru	2,063	67	740	11.7	B				
	Right	124	0	12	7.6	A				
Southbound	Left	46	2	78	31.1	C	3.5	A		
	Thru	1,347	4	107	2.5	A				
	Right	9	0	0	3.0	A				
Eastbound	Left	23	11	86	83.2	F	79.2	E		
	Thru	6	3	56	77.5	E				
	Right	1	1	68	12.6	B				
Westbound	Left	41	20	127	85.8	F	63.5	E		
	Thru	10	7	85	80.3	F				
	Right	29	8	102	26.7	C				

Snelling at Midway

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	53	1	55	15.8	B	11.7	B	11.4	B
	Thru	2,094	77	768	11.6	B				
	Right	66	0	53	10.1	B				
Southbound	Left	76	1	68	17.9	B	5.1	A		
	Thru	1,266	9	206	4.4	A				
	Right	49	13	239	5.0	A				
Eastbound	Left	46	24	133	87.5	F	59.2	E		
	Thru	30	14	96	81.0	F				
	Right	39	2	65	9.0	A				
Westbound	Left	19	17	112	87.4	F	41.7	D		
	Thru	15	17	110	79.4	E				
	Right	51	2	65	13.2	B				

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Consulting Group, Inc

Snelling at Hewitt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	24	1	43	18.7	B	16.3	B	16.8	B
	Thru	1,570	79	**739**	16.3	B				
	Right	19	88	**759**	16.5	B				
Southbound	Left	72	4	89	23.7	C	14.8	B		
	Thru	1,350	59	**586**	14.9	B				
	Right	102	1	74	7.6	A				
Eastbound	Left	91	29	202	38.1	**D**	32.0	C		
	Thru	11	30	206	36.4	**D**				
	Right	74	38	220	23.7	C				
Westbound	Left	30	14	147	34.5	C	24.2	C		
	Thru	20	14	148	32.6	C				
	Right	80	20	163	18.3	B				

Snelling at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	39	2	77	27.9	C	21.4	C	24.0	C
	Thru	1,395	105	**850**	21.1	C				
	Right	50	106	**851**	23.2	C				
Southbound	Left	103	8	120	30.5	C	22.3	C		
	Thru	1,245	87	**716**	21.5	C				
	Right	106	87	**714**	23.7	C				
Eastbound	Left	134	57	**353**	43.6	**D**	36.8	**D**		
	Thru	175	56	**348**	33.6	C				
	Right	75	56	**349**	32.4	C				
Westbound	Left	50	31	220	37.3	**D**	29.2	C		
	Thru	131	31	219	27.8	C				
	Right	79	31	219	26.5	C				

Snelling at Thomas

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	44	2	68	24.8	C	23.3	C	28.4	C
	Thru	1,346	120	**874**	23.3	C				
	Right	72	122	**876**	22.7	C				
Southbound	Left	61	4	89	36.7	**D**	32.8	C		
	Thru	1,273	154	**835**	33.0	C				
	Right	32	0	46	20.5	C				
Eastbound	Left	110	51	**315**	35.0	C	33.5	C		
	Thru	85	51	**315**	34.8	C				
	Right	79	61	**333**	30.2	C				
Westbound	Left	40	21	197	34.2	C	27.5	C		
	Thru	55	21	200	29.0	C				
	Right	44	27	212	19.5	B				

Snelling at University

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	110	78	**330**	65.8	**E**	30.5	C	75.1	**E**
	Thru	1,059	145	**334**	29.8	C				
	Right	178	148	**338**	13.5	B				
Southbound	Left	197	77	**821**	89.9	**F**	79.7	**E**		
	Thru	1,114	**415**	**1,262**	79.4	**E**				
	Right	60	1	66	52.6	**D**				
Eastbound	Left	186	64	**354**	65.5	**E**	113.3	**F**		
	Thru	810	**453**	**1,241**	119.4	**F**				
	Right	172	**456**	**1,247**	136.7	**F**				
Westbound	Left	166	115	**433**	102.5	**F**	84.9	**F**		
	Thru	520	228	**758**	78.5	**E**				
	Right	213	233	**763**	86.8	**F**				

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Consulting Group, Inc

Snelling at Spruce Tree

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	61	5	87	43.8	D	48.6	D	35.1	D
	Thru	1,218	211	865	51.4	D				
	Right	146	225	883	27.8	C				
Southbound	Left	70	9	160	34.1	C	15.1	B		
	Thru	1,363	54	347	14.2	B				
	Right	14	65	370	12.3	B				
Eastbound	Left	35	25	158	67.6	E	25.4	C		
	Thru	64	24	157	41.6	D				
	Right	177	9	137	11.3	B				
Westbound	Left	141	45	255	57.4	E	76.8	E		
	Thru	53	95	469	92.3	F				
	Right	97	100	471	96.6	F				

Snelling at St Anthony

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	363	39	332	20.0	B	14.7	B	45.8	D
	Thru	980	39	332	12.8	B				
Southbound	Thru	1,338	361	1,002	78.6	E	63.9	E		
	Right	358	312	946	8.7	A				
Westbound	Left	363	197	943	75.9	E	54.9	D		
	Thru	432	194	937	70.2	E				
	Right	442	147	874	22.7	C				

Snelling at Concordia

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	1,034	126	640	49.6	D	45.7	D	44.3	D
	Right	235	62	555	28.3	C				
Southbound	Left	500	52	337	8.8	A	17.1	B		
	Thru	1,209	52	338	20.5	C				
Eastbound	Left	329	88	594	68.6	E	80.1	F		
	Thru	324	88	594	87.4	F				
	Right	593	410	1,318	82.6	F				

Snelling at Marshall

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	49	6	90	50.2	D	44.2	D	50.9	D
	Thru	1,015	181	629	45.3	D				
	Right	81	2	90	26.4	C				
Southbound	Left	47	3	68	62.0	E	61.1	E		
	Thru	1,525	645	1,064	62.7	E				
	Right	222	42	364	49.6	D				
Eastbound	Left	216	64	354	47.2	D	41.4	D		
	Thru	350	61	285	39.4	D				
	Right	85	73	312	35.1	D				
Westbound	Left	73	13	118	31.9	C	38.2	D		
	Thru	245	42	193	41.2	D				
	Right	43	43	202	32.1	C				

* Results shown are the average of 20 model runs.
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Year 2013 Scenario 3A Refined Rapid Bus Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
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Consulting Group, Inc

Snelling at Selby

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	25	15	155	126.9	F	79.6	E	43.0	D
	Thru	866	297	872	78.3	E				
	Right	53	314	889	79.2	E				
Southbound	Left	386	226	694	78.8	E	27.4	C		
	Thru	1,104	39	613	12.2	B				
	Right	184	40	614	10.6	B				
Eastbound	Left	53	11	144	51.5	D	34.1	C		
	Thru	285	64	404	32.0	C				
	Right	38	67	413	25.5	C				
Westbound	Left	43	8	89	44.5	D	31.6	C		
	Thru	204	76	470	34.2	C				
	Right	210	80	478	26.5	C				

Snelling at Summit

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	33	3	57	34.8	C	20.5	C	27.9	C
	Thru	721	54	306	19.6	B				
	Right	69	54	305	23.2	C				
Southbound	Left	92	23	323	35.1	D	27.8	C		
	Thru	976	101	667	27.2	C				
	Right	127	101	669	27.0	C				
Eastbound	Left	75	36	395	64.1	E	33.6	C		
	Thru	418	79	497	28.5	C				
	Right	18	90	514	26.0	C				
Westbound	Left	60	8	218	42.7	D	32.8	C		
	Thru	424	124	596	32.8	C				
	Right	166	137	615	29.1	C				

Snelling at Grand

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	72	8	165	29.3	C	30.9	C	27.8	C
	Thru	596	78	421	31.5	C				
	Right	138	81	431	29.3	C				
Southbound	Left	186	25	244	27.6	C	14.9	B		
	Thru	739	33	479	12.4	B				
	Right	130	34	495	11.4	B				
Eastbound	Left	76	13	207	40.8	D	35.5	D		
	Thru	423	118	598	35.3	D				
	Right	64	126	615	30.8	C				
Westbound	Left	95	20	338	45.3	D	39.1	D		
	Thru	346	130	593	39.6	D				
	Right	149	140	610	34.0	C				

Snelling at St Clair

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	55	11	110	43.9	D	10.9	B	18.7	B
	Thru	565	15	103	8.6	A				
	Right	87	1	57	4.8	A				
Southbound	Left	103	16	191	32.6	C	18.6	B		
	Thru	665	41	264	16.8	B				
	Right	117	49	278	16.3	B				
Eastbound	Left	75	46	380	34.3	C	24.8	C		
	Thru	310	46	382	23.7	C				
	Right	42	55	405	15.2	B				
Westbound	Left	77	58	460	34.6	C	24.4	C		
	Thru	316	56	455	25.2	C				
	Right	151	66	475	17.4	B				

* Results shown are the average of 20 model runs.
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Snelling Avenue Rapid Bus VISSIM Evaluation
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Consulting Group, Inc

Snelling at Jefferson

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	7	23	**313**	15.2	B	12.4	B	14.5	B
	Thru	671	23	**313**	12.4	B				
	Right	44	27	**327**	11.8	B				
Southbound	Left	38	20	183	14.5	B	9.0	A		
	Thru	746	20	183	8.7	A				
	Right	1	23	189	8.2	A				
Eastbound	Left	11	20	156	39.2	**D**	35.5	**D**		
	Thru	82	20	153	36.1	**D**				
	Right	8	29	177	23.8	C				
Westbound	Left	40	34	226	42.1	**D**	37.2	**D**		
	Thru	85	34	227	39.4	**D**				
	Right	37	42	242	26.4	C				

Snelling at Randolph

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	54	5	104	23.0	C	25.9	C	25.3	C
	Thru	496	50	296	28.7	C				
	Right	105	5	177	13.9	B				
Southbound	Left	146	13	162	21.4	C	17.4	B		
	Thru	539	30	261	17.9	B				
	Right	116	3	124	9.5	A				
Eastbound	Left	123	33	**493**	38.9	**D**	33.6	C		
	Thru	423	107	**601**	33.5	C				
	Right	41	1	63	19.3	B				
Westbound	Left	88	11	119	28.8	C	27.3	C		
	Thru	346	77	**546**	30.2	C				
	Right	103	8	**311**	16.4	B				

Snelling at Highland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	8	5	96	8.4	A	3.2	A	8.7	A
	Thru	606	5	97	3.1	A				
	Right	100	7	109	3.1	A				
Southbound	Left	32	12	245	14.4	B	8.0	A		
	Thru	596	12	244	7.8	A				
	Right	36	14	250	6.9	A				
Eastbound	Left	23	11	109	21.2	C	19.0	B		
	Thru	75	10	111	21.3	C				
	Right	18	1	40	6.0	A				
Westbound	Left	110	17	137	29.4	C	24.5	C		
	Thru	68	8	108	21.5	C				
	Right	21	10	120	9.1	A				

Snelling at Ford

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	124	14	149	17.6	B	8.3	A	9.6	A
	Thru	446	14	148	5.7	A				
	Right	5	18	165	4.9	A				
Southbound	Left	13	5	126	8.0	A	4.4	A		
	Thru	459	5	124	4.2	A				
	Right	251	4	135	4.7	A				
Eastbound	Left	266	25	193	25.1	C	20.3	C		
	Thru	8	25	187	24.3	C				
	Right	144	7	142	11.3	B				
Westbound	Left	8	1	43	21.5	C	18.0	B		
	Thru	5	1	39	19.2	B				
	Right	3	0	59	6.4	A				

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Consulting Group, Inc

Ford at Fairview

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	71	13	145	41.7	D	16.6	B	19.6	B
	Thru	497	32	350	13.2	B				
	Right	25	33	366	12.4	B				
Southbound	Left	26	1	49	23.8	C	16.3	B		
	Thru	463	44	463	16.3	B				
	Right	181	50	479	15.0	B				
Eastbound	Left	143	44	225	57.6	E	27.9	C		
	Thru	367	33	354	19.2	B				
	Right	66	2	83	11.7	B				
Westbound	Left	15	1	34	22.6	C	17.6	B		
	Thru	350	31	283	17.8	B				
	Right	16	0	50	8.7	A				

Ford at Kenneth

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	55	30	227	51.4	D	42.6	D	9.7	A
	Thru	21	29	226	48.1	D				
	Right	37	24	223	26.6	C				
Southbound	Left	29	18	150	45.8	D	34.3	C		
	Thru	26	18	154	46.1	D				
	Right	43	15	151	19.6	B				
Eastbound	Left	47	1	52	8.3	A	3.1	A		
	Thru	504	6	132	2.6	A				
	Right	49	7	144	2.7	A				
Westbound	Left	14	0	29	9.9	A	6.1	A		
	Thru	567	8	164	6.1	A				
	Right	21	9	168	5.2	A				

Ford at Cleveland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	247	44	292	32.5	C	29.1	C	31.8	C
	Thru	352	63	391	26.9	C				
	Right	38	61	388	27.6	C				
Southbound	Left	79	10	221	35.9	D	42.0	D		
	Thru	403	138	764	41.5	D				
	Right	170	138	764	45.9	D				
Eastbound	Left	159	32	324	36.0	D	29.0	C		
	Thru	487	78	458	23.2	C				
	Right	269	79	459	35.5	D				
Westbound	Left	84	15	144	33.8	C	28.1	C		
	Thru	496	57	313	26.9	C				
	Right	83	57	316	29.0	C				

Ford at Finn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	200	58	269	47.4	D	30.0	C	16.8	B
	Thru	10	56	274	28.8	C				
	Right	176	59	275	10.4	B				
Southbound	Left	114	39	243	41.4	D	35.9	D		
	Thru	16	39	244	36.9	D				
	Right	66	39	250	26.3	C				
Eastbound	Left	52	3	127	18.0	B	14.8	B		
	Thru	636	34	317	14.8	B				
	Right	43	34	324	11.4	B				
Westbound	Left	195	11	151	14.3	B	8.6	A		
	Thru	659	14	180	7.2	A				
	Right	52	15	184	5.5	A				

* Results shown are the average of 20 model runs.

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Year 2013 Scenario 3A Refined Rapid Bus Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Arterial MOEs (P.M. Peak Hour 4:45 - 5:45)

Consulting Group, Inc

Ford at Cretin

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	172	49	258	47.1	D	30.9	C	11.9	B
	Right	111	3	71	5.8	A				
Eastbound	Left	111	4	105	13.3	B	6.5	A		
	Thru	560	7	158	5.1	A				
Westbound	Thru	782	28	261	9.1	A	10.0	B		
	Right	145	28	261	15.0	B				

46th at 46th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	16	148	53.6	D	11.4	B	14.4	B
	Thru	38	16	143	52.4	D				
	Right	252	0	16	2.9	A				
Southbound	Left	81	21	168	42.6	D	47.4	D		
	Thru	31	12	109	52.9	D				
	Right	10	10	109	69.5	E				
Eastbound	Left	26	1	43	10.2	B	12.2	B		
	Thru	340	19	163	11.4	B				
	Right	51	26	181	19.1	B				
Westbound	Left	299	17	252	16.6	B	12.0	B		
	Thru	474	12	228	9.6	A				
	Right	118	4	148	9.8	A				

46th at 42nd

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	2	38	29.5	C	19.7	B	14.6	B
	Thru	6	1	38	21.6	C				
	Right	4	1	42	3.9	A				
Southbound	Left	37	9	126	26.7	C	17.4	B		
	Thru	5	9	125	27.6	C				
	Right	58	7	127	10.6	B				
Eastbound	Left	85	13	148	30.5	C	22.1	C		
	Thru	374	28	207	20.3	C				
	Right	5	33	220	17.5	B				
Westbound	Left	3	0	12	8.3	A	6.8	A		
	Thru	459	9	168	6.9	A				
	Right	34	11	178	5.9	A				

46th at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	42	60	**408**	41.3	D	32.4	C	46.5	D
	Thru	271	59	**406**	33.6	C				
	Right	66	58	**405**	21.5	C				
Southbound	Left	122	**366**	**1,147**	101.1	F	89.5	F		
	Thru	314	**360**	**1,140**	89.1	F				
	Right	121	**351**	**1,130**	79.0	E				
Eastbound	Left	173	24	208	27.9	C	19.6	B		
	Thru	277	20	209	14.6	B				
	Right	15	25	221	15.6	B				
Westbound	Left	82	17	150	39.8	D	34.9	C		
	Thru	352	55	**304**	35.2	D				
	Right	91	56	**306**	29.6	C				

* Results shown are the average of 20 model runs.
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Year 2013 Scenario 3A Refined Rapid Bus Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
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Consulting Group, Inc

46th at Hiawatha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	84	19	139	41.1	D	23.1	C	25.4	C
	Thru	806	69	**346**	27.4	C				
	Right	243	0	2	2.7	A				
Southbound	Left	144	34	216	41.2	D	25.9	C		
	Thru	858	65	**359**	24.4	C				
	Right	40	0	0	2.2	A				
Eastbound	Left	52	6	86	24.9	C	30.8	C		
	Thru	77	18	118	33.8	C				
	Right	22	18	119	34.7	C				
Westbound	Left	203	52	**351**	43.1	D	28.0	C		
	Thru	146	20	223	25.5	C				
	Right	168	6	164	12.0	B				

46th at 36th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	1	0	29	9.1	A	10.2	B	3.7	A
	Thru	2	0	27	11.2	B				
	Right	0	-	-	-	A				
Southbound	Left	36	1	59	6.2	A	6.0	A		
	Thru	1	1	61	7.9	A				
	Right	5	1	66	4.1	A				
Eastbound	Left	5	0	21	4.9	A	4.6	A		
	Thru	115	1	71	4.6	A				
	Right	1	2	96	2.3	A				
Westbound	Left	0	-	-	-	A	2.9	A		
	Thru	241	3	141	3.0	A				
	Right	28	0	52	1.9	A				

* Results shown are the average of 20 model runs.
** Results shown are from all vehicles except transit vehicles.

Year 2013 Scenario 4 Rapid Bus w/TSP VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Arterial MOEs (A.M. Peak Hour 7:30 - 8:30)

SRF Consulting Group, Inc

Co B2 at Snelling W Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	11	8	90	27.8	C	25.8	C	14.1	B
	Thru	21	8	86	31.9	C				
	Right	6	0	0	1.6	A				
Southbound	Left	20	8	74	36.4	D	22.2	C		
	Thru	33	8	74	35.3	D				
	Right	37	0	0	2.7	A				
Eastbound	Left	22	4	56	36.5	D	12.3	B		
	Thru	101	3	64	8.3	A				
	Right	14	0	0	3.6	A				
Westbound	Left	118	32	211	42.8	D	12.6	B		
	Thru	446	9	138	6.6	A				
	Right	77	0	0	1.2	A				

Co B2 at Snelling E Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	50	10	125	31.9	C	14.8	B	5.5	A
	Right	148	0	53	9.1	A				
Eastbound	Left	13	0	34	3.4	A	2.1	A		
	Thru	114	1	50	1.9	A				
Westbound	Thru	492	3	113	2.9	A	2.8	A		
	Right	31	0	0	1.6	A				

Snelling at Co B

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	134	81	305	94.4	F	15.9	B	34.9	C
	Thru	881	11	183	5.3	A				
	Right	83	0	0	1.8	A				
Southbound	Left	153	84	663	88.0	F	26.9	C		
	Thru	1,538	131	753	23.0	C				
	Right	334	55	660	17.2	B				
Eastbound	Left	103	72	394	98.2	F	83.5	F		
	Thru	237	94	397	90.7	F				
	Right	46	2	83	12.8	B				
Westbound	Left	138	68	300	79.8	E	69.0	E		
	Thru	273	92	369	88.7	F				
	Right	129	7	193	15.7	B				

Snelling at HarMar

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	55	26	162	78.2	E	12.9	B	12.0	B
	Thru	952	18	263	9.8	A				
	Right	57	0	0	1.6	A				
Southbound	Left	58	26	168	71.8	E	5.2	A		
	Thru	1,597	9	191	2.8	A				
	Right	69	0	45	2.4	A				
Eastbound	Left	66	37	143	83.3	F	44.8	D		
	Thru	31	37	144	78.5	E				
	Right	112	40	147	12.8	B				
Westbound	Left	39	26	130	88.7	F	41.9	D		
	Thru	18	26	130	86.1	F				
	Right	78	7	116	8.3	A				

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Snelling at Roselawn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	10	4	53	77.8	E	5.4	A	13.6	B
	Thru	937	9	236	4.6	A				
	Right	9	0	30	2.6	A				
Southbound	Left	33	24	120	117.2	F	4.9	A		
	Thru	1,663	6	164	2.8	A				
	Right	46	0	28	2.5	A				
Eastbound	Left	24	49	217	121.4	F	60.1	E		
	Thru	42	46	210	108.7	F				
	Right	77	4	81	13.9	B				
Westbound	Left	47	121	513	111.0	F	75.1	E		
	Thru	114	122	514	112.2	F				
	Right	103	4	96	17.4	B				

Snelling at Larpenteur

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	182	101	403	84.2	F	28.6	C	105.5	F
	Thru	787	42	385	17.1	B				
	Right	40	0	57	4.2	A				
Southbound	Left	48	36	182	122.1	F	26.3	C		
	Thru	1,620	129	999	24.4	C				
	Right	120	3	91	13.2	B				
Eastbound	Left	84	40	183	79.8	E	71.3	E		
	Thru	192	55	225	69.0	E				
	Right	21	67	248	59.0	E				
Westbound	Left	208	1,375	1,709	328.2	F	341.6	F		
	Thru	679	1,493	1,709	345.4	F				
	Right	85	1,496	1,709	344.1	F				

Snelling at Hoyt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	0	28	18.0	B	5.3	A	6.5	A
	Thru	922	10	228	5.2	A				
	Right	30	0	0	2.9	A				
Southbound	Left	15	0	11	8.0	A	2.3	A		
	Thru	1,820	2	114	2.2	A				
	Right	14	0	0	2.6	A				
Eastbound	Left	10	4	40	71.6	E	58.4	E		
	Thru	7	4	67	85.9	F				
	Right	8	3	93	18.0	B				
Westbound	Left	73	40	212	90.5	F	53.9	D		
	Thru	9	10	140	76.5	E				
	Right	77	12	157	16.6	B				

Snelling at Midway

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	44	1	59	22.0	C	6.0	A	6.9	A
	Thru	940	11	244	5.3	A				
	Right	21	0	41	2.6	A				
Southbound	Left	42	0	15	8.3	A	4.1	A		
	Thru	1,808	4	146	4.0	A				
	Right	52	7	178	4.6	A				
Eastbound	Left	0	-	-	-	A	68.7	E		
	Thru	14	6	71	81.4	F				
	Right	3	0	37	11.0	B				
Westbound	Left	45	36	171	80.0	E	63.4	E		
	Thru	26	35	166	85.1	F				
	Right	23	1	58	7.4	A				

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Snelling at Hewitt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	0	26	13.3	B	13.1	B	12.0	B
	Thru	1,069	38	**419**	13.1	B				
	Right	21	45	**444**	12.7	B				
Southbound	Left	75	2	87	14.1	B	9.4	A		
	Thru	1,360	29	**486**	9.2	A				
	Right	28	0	54	4.9	A				
Eastbound	Left	49	14	143	32.0	C	27.0	C		
	Thru	11	14	144	34.2	C				
	Right	30	18	163	15.9	B				
Westbound	Left	58	12	110	32.8	C	31.1	C		
	Thru	5	12	108	33.7	C				
	Right	7	17	123	16.2	B				

Snelling at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	18	1	50	21.0	C	8.6	A	13.9	B
	Thru	995	20	**367**	8.4	A				
	Right	12	20	**359**	6.6	A				
Southbound	Left	35	1	61	13.8	B	12.8	B		
	Thru	1,289	35	**575**	12.6	B				
	Right	124	35	**578**	14.1	B				
Eastbound	Left	55	27	170	45.4	**D**	39.9	**D**		
	Thru	58	27	171	36.4	**D**				
	Right	22	27	170	35.1	**D**				
Westbound	Left	35	26	210	38.0	**D**	36.4	**D**		
	Thru	69	26	212	36.9	**D**				
	Right	53	26	212	34.8	C				

Snelling at Thomas

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	22	1	50	13.8	B	9.7	A	12.5	B
	Thru	946	25	**331**	9.6	A				
	Right	24	26	**336**	7.9	A				
Southbound	Left	33	1	44	14.0	B	12.7	B		
	Thru	1,248	33	**546**	12.9	B				
	Right	67	0	39	9.1	A				
Eastbound	Left	31	11	136	32.9	C	28.9	C		
	Thru	22	11	137	32.1	C				
	Right	16	16	153	16.9	B				
Westbound	Left	25	15	160	32.7	C	22.9	C		
	Thru	45	15	161	26.9	C				
	Right	49	20	175	14.2	B				

Snelling at University

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	161	26	**303**	26.8	C	14.8	B	36.0	**D**
	Thru	869	48	298	14.1	B				
	Right	126	48	**302**	4.2	A				
Southbound	Left	154	15	167	30.2	C	25.5	C		
	Thru	998	78	**654**	26.1	C				
	Right	144	3	104	16.6	B				
Eastbound	Left	50	15	127	48.4	**D**	36.4	**D**		
	Thru	227	54	286	37.9	**D**				
	Right	137	56	289	29.4	C				
Westbound	Left	148	298	**606**	227.2	**F**	85.1	**F**		
	Thru	549	116	**574**	52.1	**D**				
	Right	75	122	**604**	46.6	**D**				

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Snelling at Spruce Tree

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	66	1	80	11.2	B	4.7	A	5.4	A
	Thru	1,105	8	137	4.4	A				
	Right	54	11	154	1.8	A				
Southbound	Left	17	0	26	12.7	B	2.8	A		
	Thru	1,216	8	185	2.7	A				
	Right	51	11	209	1.9	A				
Eastbound	Left	19	6	70	48.0	D	17.3	B		
	Thru	0	6	72	34.3	C				
	Right	61	2	93	7.5	A				
Westbound	Left	47	14	119	47.4	D	36.9	D		
	Thru	22	9	110	47.8	D				
	Right	36	9	110	16.4	B				

Snelling at St Anthony

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	875	40	305	14.1	B	11.2	B	20.5	C
	Thru	822	40	306	8.2	A				
Southbound	Thru	930	85	469	35.3	D	27.8	C		
	Right	401	43	411	10.3	B				
Westbound	Left	214	68	351	33.4	C	25.9	C		
	Thru	526	68	347	35.8	D				
	Right	392	29	287	8.5	A				

Snelling at Concordia

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	1,367	53	454	20.6	C	18.7	B	16.6	B
	Right	412	11	369	12.6	B				
Southbound	Left	491	17	332	10.7	B	8.3	A		
	Thru	640	17	332	6.5	A				
Eastbound	Left	327	56	252	40.0	D	22.7	C		
	Thru	164	56	252	37.0	D				
	Right	413	0	0	3.4	A				

Snelling at Marshall

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	67	5	87	27.8	C	21.8	C	26.2	C
	Thru	1,468	128	586	22.0	C				
	Right	50	1	67	7.5	A				
Southbound	Left	26	3	68	28.0	C	19.8	B		
	Thru	792	58	337	21.9	C				
	Right	226	10	183	11.5	B				
Eastbound	Left	273	120	517	66.5	E	47.1	D		
	Thru	211	28	188	29.6	C				
	Right	58	34	214	18.6	B				
Westbound	Left	46	6	120	23.9	C	32.2	C		
	Thru	329	46	230	34.1	C				
	Right	47	46	239	27.6	C				

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Snelling at Selby

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	12	2	55	44.6	D	44.7	D	47.0	D
	Thru	1,073	187	679	44.9	D				
	Right	21	190	666	39.4	D				
Southbound	Left	228	78	494	53.5	D	23.6	C		
	Thru	643	31	301	13.5	B				
	Right	28	33	302	12.5	B				
Eastbound	Left	66	241	519	332.8	F	168.6	F		
	Thru	144	65	506	101.0	F				
	Right	12	64	515	84.4	F				
Westbound	Left	30	4	48	45.0	D	41.6	D		
	Thru	176	175	535	47.7	D				
	Right	454	177	540	39.0	D				

Snelling at Summit

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	40	1	49	9.8	A	5.1	A	21.3	C
	Thru	916	14	137	4.9	A				
	Right	31	14	137	5.8	A				
Southbound	Left	40	11	124	27.3	C	20.4	C		
	Thru	552	43	276	20.1	C				
	Right	101	44	277	19.7	B				
Eastbound	Left	49	15	198	58.0	E	32.2	C		
	Thru	178	29	263	25.9	C				
	Right	13	39	286	21.6	C				
Westbound	Left	63	8	231	46.2	D	46.0	D		
	Thru	355	163	596	47.7	D				
	Right	146	178	615	41.7	D				

Snelling at Grand

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	44	1	50	12.6	B	13.1	B	30.1	C
	Thru	763	30	221	13.2	B				
	Right	56	31	231	12.3	B				
Southbound	Left	99	11	118	24.5	C	14.8	B		
	Thru	423	25	184	13.8	B				
	Right	101	26	198	9.9	A				
Eastbound	Left	46	7	88	31.8	C	30.4	C		
	Thru	184	39	292	30.8	C				
	Right	23	42	308	24.5	C				
Westbound	Left	81	20	453	69.0	E	73.6	E		
	Thru	295	283	637	77.0	E				
	Right	176	294	652	69.9	E				

Snelling at St Clair

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	39	1	42	11.1	B	6.0	A	18.8	B
	Thru	645	11	115	5.9	A				
	Right	43	0	46	3.3	A				
Southbound	Left	46	2	76	13.9	B	7.8	A		
	Thru	449	11	158	7.2	A				
	Right	30	15	176	6.6	A				
Eastbound	Left	47	48	356	43.8	D	32.3	C		
	Thru	217	46	344	32.1	C				
	Right	39	56	368	19.1	B				
Westbound	Left	69	108	583	51.3	D	40.5	D		
	Thru	256	109	585	43.5	D				
	Right	180	122	602	32.1	C				

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Snelling at Jefferson

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	18	250	19.2	B	10.8	B	13.4	B
	Thru	646	17	243	10.8	B				
	Right	24	21	256	9.3	A				
Southbound	Left	16	6	102	9.2	A	3.7	A		
	Thru	545	6	100	3.6	A				
	Right	4	7	103	3.4	A				
Eastbound	Left	19	18	164	39.8	**D**	36.6	**D**		
	Thru	59	18	163	37.7	**D**				
	Right	7	28	191	20.1	C				
Westbound	Left	62	44	296	43.8	**D**	41.9	**D**		
	Thru	66	45	**305**	46.9	**D**				
	Right	54	53	**317**	33.5	C				

Snelling at Randolph

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	64	4	92	15.7	B	19.8	B	31.4	C
	Thru	485	35	226	21.1	C				
	Right	33	1	73	8.0	A				
Southbound	Left	100	5	84	15.9	B	16.3	B		
	Thru	353	22	244	18.2	B				
	Right	156	7	187	12.1	B				
Eastbound	Left	100	52	**594**	60.6	**E**	47.3	**D**		
	Thru	363	136	**600**	46.3	**D**				
	Right	44	1	74	26.3	C				
Westbound	Left	60	10	88	48.2	**D**	45.5	**D**		
	Thru	407	163	**631**	48.2	**D**				
	Right	89	21	**591**	31.2	C				

Snelling at Highland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	3	6	126	6.1	A	3.9	A	10.5	B
	Thru	488	6	113	3.9	A				
	Right	154	8	125	3.6	A				
Southbound	Left	20	8	175	12.9	B	7.1	A		
	Thru	425	8	175	6.9	A				
	Right	12	9	184	7.3	A				
Eastbound	Left	37	18	169	27.5	C	24.9	C		
	Thru	93	18	168	25.5	C				
	Right	9	0	54	7.0	A				
Westbound	Left	124	23	161	35.6	**D**	26.3	C		
	Thru	61	10	115	24.6	C				
	Right	61	13	128	9.0	A				

Snelling at Ford

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	75	9	126	12.9	B	7.0	A	8.2	A
	Thru	441	9	126	6.0	A				
	Right	5	14	144	2.6	A				
Southbound	Left	2	4	121	11.7	B	3.7	A		
	Thru	389	3	114	3.7	A				
	Right	171	1	93	3.4	A				
Eastbound	Left	203	20	154	23.3	C	19.0	B		
	Thru	3	20	152	18.3	B				
	Right	76	3	104	7.6	A				
Westbound	Left	8	1	43	21.9	C	17.9	B		
	Thru	5	1	46	16.3	B				
	Right	2	0	61	6.8	A				

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Ford at Fairview

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	40	3	58	22.5	C	12.1	B	12.7	B
	Thru	436	22	297	11.5	B				
	Right	45	22	**320**	9.3	A				
Southbound	Left	22	1	46	19.5	B	11.1	B		
	Thru	430	21	275	11.0	B				
	Right	66	24	292	9.3	A				
Eastbound	Left	88	9	110	23.1	C	15.7	B		
	Thru	215	13	179	13.6	B				
	Right	28	1	89	8.2	A				
Westbound	Left	28	2	53	16.9	B	13.2	B		
	Thru	216	12	178	12.9	B				
	Right	7	0	51	5.2	A				

Ford at Kenneth

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	38	18	165	37.2	**D**	29.4	C	8.4	A
	Thru	27	18	162	34.3	C				
	Right	32	14	159	15.9	B				
Southbound	Left	11	12	118	36.3	**D**	23.8	C		
	Thru	44	11	117	31.8	C				
	Right	38	8	112	10.9	B				
Eastbound	Left	31	0	37	4.2	A	2.0	A		
	Thru	291	3	75	1.8	A				
	Right	20	3	86	1.5	A				
Westbound	Left	15	0	24	5.2	A	4.5	A		
	Thru	300	4	89	4.4	A				
	Right	7	4	91	3.7	A				

Ford at Cleveland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	296	26	260	18.6	B	18.7	B	17.5	B
	Thru	389	47	**363**	18.6	B				
	Right	56	44	**362**	21.0	C				
Southbound	Left	28	2	61	16.8	B	20.7	C		
	Thru	274	30	**301**	20.4	C				
	Right	86	28	298	22.8	C				
Eastbound	Left	91	11	119	23.1	C	14.6	B		
	Thru	258	18	154	11.9	B				
	Right	123	17	154	13.9	B				
Westbound	Left	50	6	90	26.8	C	15.5	B		
	Thru	288	17	121	14.1	B				
	Right	37	14	124	11.4	B				

Ford at Finn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	48	9	91	32.4	C	19.7	B	5.8	A
	Thru	1	6	85	28.2	C				
	Right	42	6	90	4.8	A				
Southbound	Left	31	7	100	32.3	C	22.0	C		
	Thru	1	7	92	17.0	B				
	Right	29	4	95	10.9	B				
Eastbound	Left	20	1	56	9.7	A	4.9	A		
	Thru	400	6	114	4.8	A				
	Right	20	4	122	3.3	A				
Westbound	Left	125	1	73	4.8	A	2.9	A		
	Thru	487	2	100	2.5	A				
	Right	59	2	105	2.2	A				

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Ford at Cretin

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	117	23	148	32.2	C	22.2	C	7.6	A
	Right	65	1	78	4.1	A				
Eastbound	Left	112	2	71	8.0	A	4.9	A		
	Thru	322	3	107	3.8	A				
Westbound	Thru	380	7	156	4.6	A	4.9	A		
	Right	181	7	165	5.7	A				

46th at 46th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	28	20	188	61.9	E	14.5	B	16.1	B
	Thru	33	20	179	53.4	D				
	Right	217	0	3	2.6	A				
Southbound	Left	50	13	136	43.3	D	48.8	D		
	Thru	15	16	160	52.6	D				
	Right	42	19	152	54.0	D				
Eastbound	Left	25	2	81	14.4	B	18.1	B		
	Thru	169	16	139	19.1	B				
	Right	34	20	159	15.7	B				
Westbound	Left	142	5	121	9.3	A	8.3	A		
	Thru	219	6	113	8.0	A				
	Right	81	3	70	7.4	A				

46th at 42nd

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	2	51	29.0	C	23.9	C	16.3	B
	Thru	5	2	54	32.2	C				
	Right	4	1	54	7.7	A				
Southbound	Left	28	10	146	32.7	C	17.7	B		
	Thru	4	10	153	28.7	C				
	Right	84	9	148	12.2	B				
Eastbound	Left	49	6	114	21.9	C	18.0	B		
	Thru	190	13	128	17.4	B				
	Right	14	16	141	12.1	B				
Westbound	Left	4	0	34	18.6	B	13.8	B		
	Thru	269	14	170	14.0	B				
	Right	13	17	179	7.4	A				

46th at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	22	34	252	28.3	C	24.0	C	21.8	C
	Thru	274	34	260	24.2	C				
	Right	13	31	260	14.1	B				
Southbound	Left	38	26	277	32.4	C	20.0	B		
	Thru	166	26	275	22.9	C				
	Right	109	21	253	11.2	B				
Eastbound	Left	127	13	173	21.0	C	16.2	B		
	Thru	206	13	163	13.8	B				
	Right	25	18	175	11.9	B				
Westbound	Left	74	13	114	32.8	C	26.9	C		
	Thru	179	29	195	28.7	C				
	Right	113	30	199	20.0	C				

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Consulting Group, Inc

46th at Hiawatha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	26	6	76	39.5	**D**	21.0	C	21.6	C
	Thru	882	66	**360**	24.3	C				
	Right	183	0	0	2.3	A				
Southbound	Left	94	19	172	36.1	**D**	19.0	B		
	Thru	530	27	193	16.4	B				
	Right	14	0	0	0.9	A				
Eastbound	Left	63	7	101	22.9	C	27.9	C		
	Thru	80	20	123	29.1	C				
	Right	44	19	122	32.9	C				
Westbound	Left	164	31	224	34.0	C	25.6	C		
	Thru	71	10	125	23.9	C				
	Right	71	1	70	7.6	A				

46th at 36th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	0	29	7.7	A	6.1	A	5.3	A
	Thru	0	-	-	-	A				
	Right	5	0	33	4.5	A				
Southbound	Left	41	2	77	8.3	A	7.2	A		
	Thru	0	-	-	-	A				
	Right	15	2	81	4.2	A				
Eastbound	Left	15	0	42	6.2	A	5.9	A		
	Thru	142	3	96	6.1	A				
	Right	8	4	112	2.8	A				
Westbound	Left	1	2	94	4.7	A	3.3	A		
	Thru	86	1	74	3.6	A				
	Right	24	0	67	2.5	A				

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Co B2 at Snelling W Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	75	34	216	32.6	C	22.3	C	30.7	C
	Thru	151	34	215	34.3	C				
	Right	142	0	0	4.0	A				
Southbound	Left	6	25	182	42.0	D	21.0	C		
	Thru	106	26	195	43.2	D				
	Right	148	1	61	4.4	A				
Eastbound	Left	403	136	653	52.2	D	34.3	C		
	Thru	747	64	405	27.0	C				
	Right	77	0	0	10.4	B				
Westbound	Left	350	104	478	46.1	D	32.3	C		
	Thru	438	33	194	22.7	C				
	Right	24	0	0	6.2	A				

Co B2 at Snelling E Ramps

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	21	40	550	41.1	D	24.3	C	11.8	B
	Right	495	23	486	23.6	C				
Eastbound	Left	248	5	203	9.6	A	6.3	A		
	Thru	648	7	238	5.0	A				
Westbound	Thru	318	8	142	8.1	A	7.5	A		
	Right	38	0	0	2.8	A				

Snelling at Co B

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	153	78	350	79.5	E	13.6	B	87.5	F
	Thru	1,562	33	298	8.6	A				
	Right	212	0	0	3.3	A				
Southbound	Left	425	232	680	112.6	F	45.8	D		
	Thru	1,246	226	679	30.1	C				
	Right	294	95	612	15.7	B				
Eastbound	Left	166	1,339	1,646	436.4	F	406.5	F		
	Thru	467	1,359	1,643	414.0	F				
	Right	142	1,231	1,662	346.8	F				
Westbound	Left	167	92	363	88.2	F	55.7	E		
	Thru	261	75	392	73.7	E				
	Right	299	37	317	21.8	C				

Snelling at HarMar

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	51	23	167	74.7	E	7.0	A	14.8	B
	Thru	1,612	17	161	5.5	A				
	Right	268	0	0	3.3	A				
Southbound	Left	124	54	296	69.8	E	11.1	B		
	Thru	1,334	22	217	6.2	A				
	Right	98	1	67	3.3	A				
Eastbound	Left	115	58	195	80.3	F	59.1	E		
	Thru	49	58	196	87.6	F				
	Right	80	61	198	11.2	B				
Westbound	Left	100	58	220	83.8	F	42.7	D		
	Thru	57	58	219	78.1	E				
	Right	197	49	246	11.7	B				

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Snelling at Roselawn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	15	11	71	120.9	F	5.1	A	26.8	C
	Thru	1,834	14	313	4.1	A				
	Right	28	0	19	3.6	A				
Southbound	Left	96	187	577	229.7	F	25.0	C		
	Thru	1,305	37	392	11.5	B				
	Right	101	1	57	6.1	A				
Eastbound	Left	51	282	731	152.1	F	127.2	F		
	Thru	192	273	729	143.4	F				
	Right	70	6	171	64.1	E				
Westbound	Left	22	104	462	144.1	F	102.1	F		
	Thru	94	100	454	126.3	F				
	Right	45	3	90	31.7	C				

Snelling at Larpenteur

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	222	120	458	88.3	F	41.7	D	88.3	F
	Thru	1,700	276	1,307	37.9	D				
	Right	185	6	146	20.8	C				
Southbound	Left	172	403	1,238	219.4	F	71.1	E		
	Thru	1,044	315	1,234	53.3	D				
	Right	171	9	213	30.2	C				
Eastbound	Left	26	11	74	213.2	F	246.2	F		
	Thru	669	930	1,511	245.0	F				
	Right	187	954	1,537	255.2	F				
Westbound	Left	153	91	355	96.1	F	62.0	E		
	Thru	352	96	423	53.9	D				
	Right	151	110	446	46.1	D				

Snelling at Hoyt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	7	0	16	13.7	B	7.0	A	7.6	A
	Thru	2,065	26	507	7.0	A				
	Right	124	0	5	5.6	A				
Southbound	Left	45	2	78	32.3	C	3.8	A		
	Thru	1,331	4	123	2.9	A				
	Right	9	0	0	2.8	A				
Eastbound	Left	23	11	86	82.7	F	78.2	E		
	Thru	6	3	56	74.9	E				
	Right	1	1	68	11.6	B				
Westbound	Left	41	21	127	86.3	F	62.1	E		
	Thru	10	7	85	80.2	F				
	Right	29	7	103	22.1	C				

Snelling at Midway

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	53	1	61	16.4	B	11.0	B	11.1	B
	Thru	2,098	69	756	10.9	B				
	Right	66	1	86	9.1	A				
Southbound	Left	75	1	73	19.1	B	5.0	A		
	Thru	1,251	8	232	4.2	A				
	Right	48	11	265	5.1	A				
Eastbound	Left	46	25	140	91.5	F	61.7	E		
	Thru	30	15	98	84.3	F				
	Right	39	2	66	9.1	A				
Westbound	Left	19	19	117	96.4	F	45.1	D		
	Thru	15	19	115	86.9	F				
	Right	51	2	66	13.1	B				

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Snelling at Hewitt

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	24	0	42	18.2	B	16.7	B	17.2	B
	Thru	1,582	83	**750**	16.6	B				
	Right	19	94	**785**	17.7	B				
Southbound	Left	71	4	101	24.5	C	14.2	B		
	Thru	1,341	57	**588**	14.2	B				
	Right	102	1	73	7.3	A				
Eastbound	Left	91	38	236	45.8	**D**	39.5	**D**		
	Thru	11	39	236	47.1	**D**				
	Right	74	48	254	30.4	C				
Westbound	Left	30	18	192	39.4	**D**	29.0	C		
	Thru	20	18	191	36.8	**D**				
	Right	80	25	207	23.1	C				

Snelling at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	40	2	80	26.5	C	21.3	C	25.6	C
	Thru	1,411	103	**820**	21.2	C				
	Right	51	103	**822**	21.6	C				
Southbound	Left	103	8	137	30.5	C	21.1	C		
	Thru	1,235	80	**701**	20.2	C				
	Right	105	80	**704**	22.7	C				
Eastbound	Left	135	91	**616**	60.5	**E**	51.1	**D**		
	Thru	176	91	**609**	46.7	**D**				
	Right	76	91	**609**	44.5	**D**				
Westbound	Left	50	42	**328**	49.2	**D**	36.8	**D**		
	Thru	131	42	**330**	35.2	**D**				
	Right	79	42	**332**	31.8	C				

Snelling at Thomas

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	45	2	68	21.8	C	21.0	C	23.2	C
	Thru	1,358	103	**754**	21.0	C				
	Right	72	105	**760**	20.4	C				
Southbound	Left	61	3	82	27.0	C	20.9	C		
	Thru	1,266	75	**622**	20.9	C				
	Right	31	0	45	11.8	B				
Eastbound	Left	110	68	**409**	43.6	**D**	41.3	**D**		
	Thru	85	67	**402**	43.5	**D**				
	Right	79	79	**423**	35.7	**D**				
Westbound	Left	40	26	219	39.4	**D**	32.9	C		
	Thru	55	26	223	35.2	**D**				
	Right	44	33	235	24.1	C				

Snelling at University

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	112	40	**316**	44.4	**D**	21.0	C	122.5	**F**
	Thru	1,078	90	**324**	20.8	C				
	Right	180	92	**328**	8.1	A				
Southbound	Left	197	52	**475**	59.1	**E**	47.1	**D**		
	Thru	1,110	195	**990**	46.0	**D**				
	Right	60	1	66	27.7	C				
Eastbound	Left	174	130	**696**	190.5	**F**	282.1	**F**		
	Thru	743	**1,376**	**1,687**	293.0	**F**				
	Right	155	**1,386**	**1,689**	332.7	**F**				
Westbound	Left	167	122	**572**	166.6	**F**	201.4	**F**		
	Thru	522	**714**	**1,203**	205.6	**F**				
	Right	213	**703**	**1,205**	218.3	**F**				

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Snelling at Spruce Tree

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	61	3	80	21.9	C	14.4	B	17.3	B
	Thru	1,240	45	**500**	14.8	B				
	Right	148	54	**517**	7.3	A				
Southbound	Left	70	6	132	28.0	C	11.0	B		
	Thru	1,350	37	**313**	10.2	B				
	Right	14	46	**337**	9.8	A				
Eastbound	Left	35	27	171	55.2	**E**	24.9	C		
	Thru	64	27	172	45.7	**D**				
	Right	177	9	128	11.3	B				
Westbound	Left	141	49	252	60.8	**E**	55.0	**D**		
	Thru	54	44	**313**	57.8	**E**				
	Right	98	48	**328**	45.1	**D**				

Snelling at St Anthony

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	368	38	**329**	19.6	B	13.5	B	41.5	**D**
	Thru	1,001	38	**329**	11.3	B				
Southbound	Thru	1,319	**346**	**1,012**	76.0	**E**	61.5	**E**		
	Right	355	295	**955**	7.7	A				
Westbound	Left	367	150	**848**	63.3	**E**	45.2	**D**		
	Thru	435	148	**847**	60.0	**E**				
	Right	446	104	**790**	16.0	B				

Snelling at Concordia

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	1,029	92	**558**	39.7	**D**	36.4	**D**	36.9	**D**
	Right	236	35	**473**	21.8	C				
Southbound	Left	497	56	**341**	10.9	B	16.3	B		
	Thru	1,198	56	**341**	18.6	B				
Eastbound	Left	357	91	**635**	61.6	**E**	63.2	**E**		
	Thru	353	91	**640**	72.6	**E**				
	Right	644	272	**1,241**	58.8	**E**				

Snelling at Marshall

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	47	6	88	46.5	**D**	38.4	**D**	46.6	**D**
	Thru	1,003	153	**617**	39.3	**D**				
	Right	80	2	92	22.1	C				
Southbound	Left	48	3	64	51.3	**D**	52.0	**D**		
	Thru	1,564	**522**	**1,058**	53.5	**D**				
	Right	227	29	**441**	41.5	**D**				
Eastbound	Left	216	87	**396**	62.1	**E**	48.6	**D**		
	Thru	349	67	296	42.8	**D**				
	Right	85	80	**323**	38.4	**D**				
Westbound	Left	73	15	126	35.9	**D**	41.4	**D**		
	Thru	245	46	203	44.4	**D**				
	Right	43	47	211	34.0	C				

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Snelling at Selby

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	26	12	85	99.9	F	51.7	D	36.4	D
	Thru	857	172	674	50.5	D				
	Right	53	180	685	48.0	D				
Southbound	Left	393	231	697	78.4	E	27.7	C		
	Thru	1,131	47	682	12.9	B				
	Right	188	49	687	11.1	B				
Eastbound	Left	53	15	161	61.4	E	37.7	D		
	Thru	285	70	424	34.5	C				
	Right	38	73	431	28.3	C				
Westbound	Left	43	10	93	51.6	D	36.7	D		
	Thru	204	91	502	39.3	D				
	Right	210	95	509	31.1	C				

Snelling at Summit

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	32	2	52	30.3	C	16.0	B	50.5	D
	Thru	721	41	336	15.2	B				
	Right	69	41	336	17.8	B				
Southbound	Left	94	19	238	31.1	C	24.2	C		
	Thru	985	86	704	23.5	C				
	Right	128	86	703	23.7	C				
Eastbound	Left	68	389	856	256.1	F	139.9	F		
	Thru	382	378	872	120.7	F				
	Right	16	387	892	105.8	F				
Westbound	Left	58	33	516	102.2	F	80.4	F		
	Thru	401	336	612	79.5	E				
	Right	156	350	630	74.5	E				

Snelling at Grand

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	71	7	142	27.3	C	30.3	C	33.5	C
	Thru	596	77	409	31.0	C				
	Right	138	80	418	29.1	C				
Southbound	Left	188	25	298	26.8	C	17.7	B		
	Thru	749	47	522	16.0	B				
	Right	131	50	539	14.7	B				
Eastbound	Left	76	18	299	53.5	D	44.0	D		
	Thru	423	151	610	43.4	D				
	Right	64	162	627	37.3	D				
Westbound	Left	94	36	488	68.3	E	56.5	E		
	Thru	345	201	610	56.2	E				
	Right	149	213	626	49.6	D				

Snelling at St Clair

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	55	8	93	35.9	D	9.8	A	23.6	C
	Thru	566	13	133	8.1	A				
	Right	87	1	54	4.8	A				
Southbound	Left	104	13	149	28.1	C	15.9	B		
	Thru	675	35	269	14.1	B				
	Right	119	42	286	15.3	B				
Eastbound	Left	76	100	553	59.3	E	42.9	D		
	Thru	310	98	552	40.6	D				
	Right	42	108	568	30.3	C				
Westbound	Left	77	111	607	50.4	D	39.1	D		
	Thru	317	109	605	40.5	D				
	Right	152	122	624	30.6	C				

* Results shown are the average of 20 model runs.
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Year 2013 Scenario 4 Rapid Bus w/TSP VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Arterial MOEs (P.M. Peak Hour 4:45 - 5:45)

SRF Consulting Group, Inc

Snelling at Jefferson

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	7	22	**307**	14.4	B	11.5	B	16.4	B
	Thru	671	22	**310**	11.5	B				
	Right	44	25	**322**	11.3	B				
Southbound	Left	38	18	196	13.9	B	8.2	A		
	Thru	755	18	196	7.9	A				
	Right	1	20	207	12.3	B				
Eastbound	Left	11	29	201	54.8	**D**	49.3	**D**		
	Thru	82	29	200	49.5	**D**				
	Right	8	40	224	39.5	**D**				
Westbound	Left	40	57	**331**	64.2	**E**	58.0	**E**		
	Thru	85	57	**329**	60.8	**E**				
	Right	37	67	**348**	44.8	**D**				

Snelling at Randolph

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	53	5	91	21.4	C	23.9	C	27.5	C
	Thru	495	45	285	26.5	C				
	Right	106	5	166	13.1	B				
Southbound	Left	148	12	202	20.3	C	17.1	B		
	Thru	545	31	292	17.9	B				
	Right	117	4	157	9.6	A				
Eastbound	Left	123	53	**562**	50.9	**D**	42.3	**D**		
	Thru	423	140	**618**	41.3	**D**				
	Right	41	1	62	26.4	C				
Westbound	Left	88	13	159	34.5	C	31.5	C		
	Thru	347	91	**578**	34.3	C				
	Right	103	11	**348**	19.6	B				

Snelling at Highland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	8	5	100	8.6	A	3.3	A	9.2	A
	Thru	607	5	100	3.3	A				
	Right	100	7	112	2.9	A				
Southbound	Left	33	11	252	14.8	B	7.6	A		
	Thru	603	11	252	7.3	A				
	Right	36	13	259	6.5	A				
Eastbound	Left	23	13	139	25.0	C	22.1	C		
	Thru	75	13	140	24.9	C				
	Right	18	1	41	6.5	A				
Westbound	Left	110	20	162	34.4	C	28.4	C		
	Thru	68	9	116	24.1	C				
	Right	21	12	127	10.5	B				

Snelling at Ford

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	124	16	169	18.9	B	9.2	A	10.2	B
	Thru	446	16	168	6.6	A				
	Right	5	21	183	4.2	A				
Southbound	Left	13	6	149	8.5	A	4.9	A		
	Thru	461	6	145	4.8	A				
	Right	253	4	151	4.8	A				
Eastbound	Left	267	24	200	24.9	C	20.3	C		
	Thru	8	24	201	26.9	C				
	Right	143	7	151	11.4	B				
Westbound	Left	8	1	43	21.8	C	18.5	B		
	Thru	5	1	40	21.1	C				
	Right	3	0	58	5.6	A				

* Results shown are the average of 20 model runs.

** Results shown are from all vehicles except transit vehicles.

Year 2013 Scenario 4 Rapid Bus w/TSP VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Arterial MOEs (P.M. Peak Hour 4:45 - 5:45)

Consulting Group, Inc

Ford at Fairview

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	71	14	150	44.9	D	17.3	B	19.4	B
	Thru	498	33	362	13.6	B				
	Right	25	35	372	12.3	B				
Southbound	Left	26	2	50	24.1	C	17.8	B		
	Thru	464	50	501	17.9	B				
	Right	181	57	517	16.4	B				
Eastbound	Left	143	39	253	52.6	D	25.7	C		
	Thru	366	29	387	17.8	B				
	Right	67	2	85	11.0	B				
Westbound	Left	15	1	33	21.6	C	16.4	B		
	Thru	352	28	259	16.5	B				
	Right	16	0	51	8.4	A				

Ford at Kenneth

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	54	32	226	54.8	D	45.3	D	9.9	A
	Thru	21	31	227	49.9	D				
	Right	37	26	227	28.7	C				
Southbound	Left	29	20	162	49.6	D	36.9	D		
	Thru	26	20	168	47.7	D				
	Right	43	16	166	22.0	C				
Eastbound	Left	46	1	62	7.9	A	2.9	A		
	Thru	505	6	120	2.5	A				
	Right	48	7	131	2.2	A				
Westbound	Left	14	0	24	9.8	A	5.9	A		
	Thru	568	8	149	5.8	A				
	Right	21	8	152	4.6	A				

Ford at Cleveland

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	247	79	404	51.9	D	39.4	D	38.8	D
	Thru	352	77	458	31.4	C				
	Right	38	75	454	32.3	C				
Southbound	Left	79	20	464	68.3	E	72.5	E		
	Thru	403	300	978	71.4	E				
	Right	169	303	980	76.9	E				
Eastbound	Left	158	25	259	30.3	C	24.6	C		
	Thru	488	61	400	20.4	C				
	Right	269	62	402	28.9	C				
Westbound	Left	85	14	141	31.6	C	24.7	C		
	Thru	496	48	293	23.6	C				
	Right	83	48	295	24.0	C				

Ford at Finn

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	201	66	299	53.1	D	33.2	C	17.2	B
	Thru	10	65	306	32.7	C				
	Right	176	68	304	10.6	B				
Southbound	Left	114	41	244	42.9	D	37.5	D		
	Thru	16	41	245	38.6	D				
	Right	67	41	248	27.9	C				
Eastbound	Left	52	3	108	18.0	B	14.2	B		
	Thru	635	32	329	14.2	B				
	Right	43	32	338	10.2	B				
Westbound	Left	195	10	143	13.6	B	8.3	A		
	Thru	659	14	183	6.9	A				
	Right	52	15	186	5.4	A				

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Year 2013 Scenario 4 Rapid Bus w/TSP VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Arterial MOEs (P.M. Peak Hour 4:45 - 5:45)

SRF Consulting Group, Inc

Ford at Cretin

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	172	51	257	48.1	D	31.4	C	11.9	B
	Right	111	3	68	5.6	A				
Eastbound	Left	111	4	119	13.7	B	6.5	A		
	Thru	559	7	145	5.0	A				
Westbound	Thru	783	27	246	8.8	A	9.8	A		
	Right	145	28	247	15.4	B				

46th at 46th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	14	16	148	53.6	D	11.6	B	14.2	B
	Thru	39	16	143	53.0	D				
	Right	252	0	20	3.0	A				
Southbound	Left	81	21	169	42.6	D	47.1	D		
	Thru	31	12	105	52.4	D				
	Right	10	9	104	66.7	E				
Eastbound	Left	26	1	49	10.4	B	11.6	B		
	Thru	338	18	159	11.0	B				
	Right	50	25	175	16.6	B				
Westbound	Left	299	16	249	16.2	B	11.9	B		
	Thru	475	12	207	9.7	A				
	Right	118	4	156	9.4	A				

46th at 42nd

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	5	2	45	35.2	D	26.1	C	13.2	B
	Thru	6	2	46	32.0	C				
	Right	4	1	50	5.8	A				
Southbound	Left	37	12	145	32.4	C	21.7	C		
	Thru	5	11	145	33.3	C				
	Right	58	10	144	13.8	B				
Eastbound	Left	85	11	159	26.4	C	18.0	B		
	Thru	372	21	197	16.1	B				
	Right	5	26	213	12.9	B				
Westbound	Left	3	0	15	10.2	B	6.6	A		
	Thru	460	9	185	6.6	A				
	Right	34	11	192	5.9	A				

46th at Minnehaha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	42	68	**436**	44.9	D	35.5	D	63.0	E
	Thru	271	67	**430**	36.8	D				
	Right	66	65	**428**	24.2	C				
Southbound	Left	120	**693**	**1,339**	165.5	F	151.6	F		
	Thru	306	**679**	**1,333**	150.5	F				
	Right	118	**678**	**1,331**	140.1	F				
Eastbound	Left	173	21	190	25.9	C	18.0	B		
	Thru	277	17	198	13.4	B				
	Right	15	22	211	13.6	B				
Westbound	Left	82	15	148	35.4	D	31.1	C		
	Thru	353	49	289	31.3	C				
	Right	91	50	290	26.6	C				

* Results shown are the average of 20 model runs.
** Results shown are from all vehicles except transit vehicles.

Year 2013 Scenario 4 Rapid Bus w/TSP VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Arterial MOEs (P.M. Peak Hour 4:45 - 5:45)

Consulting Group, Inc

46th at Hiawatha

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	85	20	140	41.6	**D**	23.2	C	25.4	C
	Thru	808	69	**356**	27.4	C				
	Right	243	0	0	2.7	A				
Southbound	Left	145	34	192	40.5	**D**	25.9	C		
	Thru	859	65	**345**	24.5	C				
	Right	39	0	0	2.2	A				
Eastbound	Left	52	6	86	25.1	C	31.1	C		
	Thru	77	18	123	34.2	C				
	Right	22	18	123	34.6	C				
Westbound	Left	201	50	**352**	42.3	**D**	27.6	C		
	Thru	145	20	256	25.2	C				
	Right	166	6	182	11.8	B				

46th at 36th

Approach	Movement	Simulated Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	1	0	29	9.0	A	10.1	B	4.0	A
	Thru	2	0	27	11.1	B				
	Right	0	-	-	-	A				
Southbound	Left	36	1	58	6.5	A	6.2	A		
	Thru	1	1	58	7.1	A				
	Right	5	1	66	4.2	A				
Eastbound	Left	5	0	21	5.0	A	4.8	A		
	Thru	115	1	74	4.8	A				
	Right	1	2	99	2.0	A				
Westbound	Left	0	-	-	-	A	3.3	A		
	Thru	241	3	149	3.4	A				
	Right	28	0	50	2.1	A				

* Results shown are the average of 20 model runs.
** Results shown are from all vehicles except transit vehicles.

Table X –
Overall Average Delay Per Vehicle Summary

No.	Signalized Intersection	AM Peak Hour					PM Peak Hour				
		Baseline	*Rapid Bus Alpha*	*Rapid Bus Beta*	*Rapid Bus Refined*	*Rapid Bus Refined w/ TSP*	*Baseline*	*Rapid Bus Alpha*	*Rapid Bus Beta*	*Rapid Bus Refined*	*Rapid Bus Refined w/ TSP*
1	County Road B2 at Snelling Ave. W. Ramps	14.0	13.9	13.9	13.9	14.1	29.1	29.4	29.5	29.4	30.7
2	County Road B2 at Snelling Ave. E. Ramps	5.1	5.2	5.2	5.1	5.5	11.6	11.9	11.9	11.9	11.8
3	Snelling Avenue at County Road B	33.7	33.9	33.9	33.9	34.9	71.4	73.9	73.9	73.5	87.5
4	Snelling Avenue at Har Mar Mall	11.5	11.6	11.6	11.7	12.0	14.3	14.4	14.4	14.2	14.8
5	Snelling Avenue at Roselawn Avenue	13.0	13.0	13.0	13.1	13.6	24.6	24.0	23.9	23.5	26.8
6	Snelling Avenue at Larpenteur Avenue	96.2	95.7	95.8	95.6	105.5	65.5	64.9	65.9	66.2	88.3
7	Snelling Avenue at Hoyt Avenue	6.2	6.2	6.3	6.4	6.5	9.3	8.9	10.3	10.1	7.6
8	Snelling Avenue at Midway Parkway	7.0	6.9	6.9	6.9	6.9	11.6	11.5	11.5	11.4	11.1
9	Snelling Avenue at Hewitt Avenue	11.7	11.9	11.9	11.6	12.0	17.1	16.9	17.1	16.8	17.2
10	Snelling Avenue at Minnehaha Avenue	13.1	13.3	13.1	13.1	13.9	23.5	23.4	24.3	24.0	25.6
11	Snelling Avenue at Thomas Avenue	12.4	12.7	12.7	12.7	12.5	27.5	26.8	28.3	28.4	23.2
12	Snelling Avenue at University Avenue	32.5	31.6	31.8	31.9	36.0	71.9	76.2	74.3	75.1	122.5
13	Snelling Avenue at Spruce Tree Avenue	6.2	6.1	6.4	6.0	5.4	29.6	34.1	29.1	35.1	17.3
14	Snelling Ave. at St Anthony Ave. (I-94 N. Ramps)	20.9	20.8	21.1	20.6	20.5	43.6	44.2	44.5	45.8	41.5
15	Snelling Ave. at Concordia Ave. (I-94 S. Ramps)	15.6	15.5	15.6	15.6	16.6	42.5	45.7	44.1	44.3	36.9
16	Snelling Avenue at Marshall Avenue	27.1	26.9	27.6	28.0	26.2	49.3	52.1	50.8	50.9	46.6
17	Snelling Avenue at Selby Avenue	42.4	41.5	46.1	50.5	47.0	36.9	40.1	42.5	43.0	36.4
18	Snelling Avenue at Summit Avenue	20.1	20.3	20.3	20.1	21.3	27.8	27.9	28.1	27.9	50.5
19	Snelling Avenue at Grand Avenue	23.5	23.8	23.5	23.8	30.1	27.5	27.8	27.7	27.8	33.5
20	Snelling Avenue at St. Clair Avenue	14.6	14.7	14.7	14.8	18.8	18.4	18.5	18.7	18.7	23.6
21	Snelling Avenue at Jefferson Avenue	11.2	11.3	11.2	11.2	13.4	14.6	14.4	14.4	14.5	16.4
22	Snelling Avenue at Randolph Avenue	26.9	26.9	27.1	27.1	31.4	25.2	25.3	25.2	25.3	27.5
23	Snelling Avenue at Highland Parkway	9.3	9.4	9.3	9.3	10.5	8.7	8.8	8.8	8.7	9.2
24	Snelling Avenue at Ford Parkway	7.6	7.6	7.5	7.6	8.2	9.4	9.6	9.7	9.6	10.2
25	Ford Parkway at Fairview Avenue	12.4	12.7	12.5	12.6	12.7	18.7	19.6	19.5	19.6	19.4
26	Ford Parkway at Kenneth Street	8.0	8.2	8.1	8.1	8.4	9.5	9.6	9.6	9.7	9.9
27	Ford Parkway at Cleveland Avenue	16.8	17.0	17.1	17.0	17.5	31.3	32.0	32.0	31.8	38.8
28	Ford Parkway at Finn Street	5.8	5.8	5.9	6.0	5.8	16.6	17.0	17.0	16.8	17.2
29	Ford Parkway at Cretin Avenue	7.5	7.6	7.5	7.6	7.6	11.5	11.7	11.9	11.9	11.9
30	46th Street at 46th Avenue	16.4	16.3	16.3	16.2	16.1	14.2	14.4	14.5	14.4	14.2
31	46th Street at 42nd Avenue	18.2	18.2	18.2	18.3	16.3	14.5	14.6	14.5	14.6	13.2
32	46th Street at Minnehaha Avenue	22.3	22.4	22.4	22.2	21.8	45.2	47.3	43.6	46.5	63.0
33	TH 55 (Hiawatha Avenue) at 46th Street	21.7	22.0	21.7	21.7	21.6	25.6	25.6	25.6	25.4	25.4
34	46th Street at 36th Avenue	4.9	5.0	5.1	5.1	5.3	3.5	3.8	3.7	3.7	4.0

Year 2013 Scenario 3A Refined Rapid Bus Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (A.M. Peak Hour 7:30 - 8:30)

SRF Consulting Group, Inc.

Co B2 at Snelling W Ramps

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	11	29.9			0.09	14	0.1	6.2
	Thru	21	32.9	6	5.3	0.19	92	0.8	
	Right	6	1.6			0.00	9	0.0	
Southbound	Left	20	37.3			0.21	25	0.3	
	Thru	33	34.9			0.32	42	0.4	
	Right	37	2.5			0.03	50	0.0	
Eastbound	Left	22	36.8			0.22	28	0.3	
	Thru	101	7.0			0.20	128	0.2	
	Right	14	3.6			0.01	16	0.0	
Westbound	Left	118	42.6	6	9.4	1.40	247	2.9	
	Thru	446	6.4			0.79	576	1.0	
	Right	78	1.3			0.03	122	0.0	

Co B2 at Snelling E Ramps

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Southbound	Left	50	31.9			0.44	62	0.6	1.8
	Right	148	9.1	6	9.4	0.37	299	0.8	
Eastbound	Left	13	4.1			0.01	17	0.0	
	Thru	114	1.3			0.04	144	0.1	
Westbound	Thru	492	2.3			0.32	642	0.4	
	Right	30	1.4			0.01	39	0.0	

Snelling at Co B

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	134	86.9			3.24	175	4.2	50.5
	Thru	881	5.5	6	9.4	1.35	1,233	1.9	
	Right	83	2.1			0.05	105	0.1	
Southbound	Left	153	87.7			3.73	213	5.2	
	Thru	1,539	25.2	6	5.3	10.78	2,067	14.5	
	Right	333	18.3			1.69	438	2.2	
Eastbound	Left	103	82.4			2.37	130	3.0	
	Thru	237	85.2			5.61	307	7.3	
	Right	46	14.7			0.19	59	0.2	
Westbound	Left	137	67.3			2.57	175	3.3	
	Thru	270	81.5			6.12	353	8.0	
	Right	128	12.5			0.45	181	0.6	

Snelling at HarMar

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	56	83.0			1.28	72	1.7	13.5
	Thru	954	9.4	6	9.4	2.50	1,328	3.5	
	Right	57	1.6			0.02	71	0.0	
Southbound	Left	58	68.9			1.12	77	1.5	
	Thru	1,598	2.4	6	5.3	1.05	2,139	1.4	
	Right	69	2.5			0.05	88	0.1	
Eastbound	Left	64	81.3			1.46	84	1.9	
	Thru	31	82.5			0.72	41	0.9	
	Right	112	13.9			0.43	145	0.6	
Westbound	Left	39	88.4			0.95	50	1.2	
	Thru	18	85.9			0.43	22	0.5	
	Right	78	8.1			0.17	96	0.2	

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SRF Consulting Group, Inc.

Snelling at Roselawn

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	10	73.5			0.21	14	0.3	14.8
	Thru	942	4.9	6	9.4	1.28	1,310	1.8	
	Right	10	3.2			0.01	11	0.0	
Southbound	Left	32	116.5			1.05	41	1.3	
	Thru	1,672	2.6	6	5.3	1.21	2,232	1.6	
	Right	47	2.3			0.03	62	0.0	
Eastbound	Left	24	122.4			0.82	32	1.1	
	Thru	42	112.1			1.31	54	1.7	
	Right	76	13.1			0.28	100	0.4	
Westbound	Left	47	104.2			1.37	60	1.7	
	Thru	113	106.3			3.35	147	4.4	
	Right	102	15.4			0.44	133	0.6	

Snelling at Larpenteur

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	182	77.7			3.93	235	5.1	142.3
	Thru	789	17.1	6	9.4	3.75	1,109	5.3	
	Right	40	4.2			0.05	54	0.1	
Southbound	Left	48	130.3			1.74	60	2.2	
	Thru	1,620	26.2	6	5.3	11.79	2,167	15.8	
	Right	121	13.6			0.46	160	0.6	
Eastbound	Left	83	73.2			1.69	111	2.2	
	Thru	192	66.2			3.53	249	4.6	
	Right	21	55.8			0.33	27	0.4	
Westbound	Left	222	282.6			17.44	285	22.4	
	Thru	712	291.3			57.62	921	74.5	
	Right	90	286.8			7.15	116	9.3	

Snelling at Hoyt

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	14	21.1			0.08	19	0.1	7.1
	Thru	923	5.4	6	9.4	1.38	1,282	1.9	
	Right	30	2.9			0.02	35	0.0	
Southbound	Left	16	6.6			0.03	21	0.0	
	Thru	1,833	2.2	6	5.3	1.10	2,440	1.5	
	Right	14	4.0			0.02	18	0.0	
Eastbound	Left	10	73.1			0.20	13	0.3	
	Thru	7	88.5			0.17	9	0.2	
	Right	8	20.1			0.04	11	0.1	
Westbound	Left	73	87.2			1.78	96	2.3	
	Thru	9	75.3			0.18	11	0.2	
	Right	77	16.3			0.35	100	0.5	

Snelling at Midway

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	44	23.0			0.28	56	0.4	7.8
	Thru	940	5.7	6	9.4	1.48	1,302	2.1	
	Right	21	2.8			0.02	27	0.0	
Southbound	Left	43	8.1			0.10	55	0.1	
	Thru	1,820	3.8	6	5.3	1.94	2,426	2.6	
	Right	51	4.4			0.06	66	0.1	
Eastbound	Left	0	-			-	0	-	
	Thru	13	80.9			0.30	18	0.4	
	Right	3	10.4			0.01	4	0.0	
Westbound	Left	45	78.6			0.98	60	1.3	
	Thru	26	84.5			0.61	33	0.8	
	Right	23	6.9			0.04	29	0.1	

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SRF Consulting Group, Inc.

Snelling at Hewitt

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	14	12.2			0.05	18	0.1	12.1
	Thru	1,074	12.8	6	15.5	3.82	1,512	5.4	
	Right	21	10.9			0.06	26	0.1	
Southbound	Left	77	12.9			0.27	98	0.3	
	Thru	1,371	8.9	6	9.7	3.40	1,873	4.6	
	Right	29	4.1			0.03	37	0.0	
Eastbound	Left	49	30.5			0.41	62	0.5	
	Thru	11	34.2			0.10	14	0.1	
	Right	30	15.1			0.12	39	0.2	
Westbound	Left	58	31.9			0.51	75	0.7	
	Thru	5	33.6			0.04	6	0.1	
	Right	7	16.1			0.03	9	0.0	

Snelling at Minnehaha

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	18	19.2			0.10	24	0.1	13.6
	Thru	996	8.6	6	15.5	2.38	1,408	3.4	
	Right	12	7.1			0.02	15	0.0	
Southbound	Left	35	15.9			0.15	46	0.2	
	Thru	1,298	12.1	6	9.7	4.36	1,775	6.0	
	Right	125	13.1			0.46	165	0.6	
Eastbound	Left	55	36.0			0.55	73	0.7	
	Thru	58	31.5			0.51	72	0.6	
	Right	22	30.6			0.18	28	0.2	
Westbound	Left	35	32.5			0.32	45	0.4	
	Thru	69	31.0			0.59	90	0.8	
	Right	53	30.3			0.45	68	0.6	

Snelling at Thomas

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	22	12.0			0.07	30	0.1	12.2
	Thru	945	9.8	6	15.5	2.58	1,344	3.7	
	Right	23	7.9			0.05	29	0.1	
Southbound	Left	33	15.0			0.14	41	0.2	
	Thru	1,256	13.2	6	9.7	4.62	1,722	6.3	
	Right	67	8.8			0.17	86	0.2	
Eastbound	Left	31	33.0			0.28	39	0.4	
	Thru	22	31.3			0.19	27	0.2	
	Right	16	16.4			0.07	22	0.1	
Westbound	Left	25	32.7			0.23	32	0.3	
	Thru	45	27.7			0.35	60	0.5	
	Right	49	14.2			0.19	63	0.2	

Snelling at University

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	161	28.8			1.29	209	1.7	44.3
	Thru	871	16.5	6	15.5	3.99	1,251	5.7	
	Right	126	4.3			0.15	198	0.2	
Southbound	Left	155	31.8			1.37	197	1.7	
	Thru	1,003	29.5	6	9.7	8.22	1,403	11.5	
	Right	143	18.6			0.74	183	0.9	
Eastbound	Left	50	46.8			0.64	64	0.8	
	Thru	227	37.9			2.39	289	3.0	
	Right	136	30.3			1.14	173	1.5	
Westbound	Left	153	129.0			5.50	229	8.2	
	Thru	551	40.7			6.23	711	8.0	
	Right	74	35.6			0.73	94	0.9	

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SRF Consulting Group, Inc.

Snelling at Spruce Tree

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	66	10.7			0.19	86	0.3	6.4
	Thru	1,108	5.7	6	36.8	1.74	1,717	2.7	
	Right	54	2.1			0.03	70	0.0	
Southbound	Left	18	14.4			0.07	23	0.1	
	Thru	1,227	2.9	6	9.9	0.99	1,723	1.4	
	Right	51	2.2			0.03	65	0.0	
Eastbound	Left	19	49.3			0.27	27	0.4	
	Thru	0	73.1			0.01	1	0.0	
	Right	61	7.4			0.13	79	0.2	
Westbound	Left	47	44.7			0.58	60	0.7	
	Thru	22	47.1			0.29	30	0.4	
	Right	36	16.8			0.17	47	0.2	

Snelling at St Anthony

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	877	13.5			3.28	1,138	4.3	33.0
	Thru	825	8.6	6	36.8	1.96	1,355	3.2	
Southbound	Thru	937	37.1	6	9.9	9.66	1,344	13.9	
	Right	403	10.5			1.17	528	1.5	
Westbound	Left	214	32.1			1.91	279	2.5	
	Thru	526	34.4			5.02	681	6.5	
	Right	392	8.3			0.91	504	1.2	

Snelling at Concordia

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Thru	1,371	19.2	6	36.8	7.32	2,061	11.0	23.3
	Right	414	11.5			1.32	564	1.8	
Southbound	Left	494	10.0			1.37	641	1.8	
	Thru	642	5.2	6	9.9	0.93	960	1.4	
Eastbound	Left	327	39.0			3.54	427	4.6	
	Thru	164	36.6			1.67	216	2.2	
	Right	413	3.4			0.39	541	0.5	

Snelling at Marshall

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	67	35.8			0.67	88	0.9	39.9
	Thru	1,472	30.7	6	36.8	12.54	2,159	18.4	
	Right	50	13.6			0.19	66	0.2	
Southbound	Left	26	26.6			0.19	32	0.2	
	Thru	795	24.7	6	9.9	5.45	1,134	7.8	
	Right	228	11.7			0.74	325	1.1	
Eastbound	Left	273	40.0			3.03	414	4.6	
	Thru	210	25.8			1.50	268	1.9	
	Right	58	14.4			0.23	76	0.3	
Westbound	Left	47	19.9			0.26	59	0.3	
	Thru	329	31.7			2.89	428	3.8	
	Right	47	24.8			0.33	60	0.4	

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Snelling at Selby

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	12	73.3			0.25	15	0.3	58.5
	Thru	1,075	74.8	6	36.8	22.35	1,651	34.3	
	Right	22	66.5			0.40	29	0.5	
Southbound	Left	229	66.5			4.24	298	5.5	
	Thru	646	14.6	6	9.9	2.61	941	3.8	
	Right	28	11.7			0.09	37	0.1	
Eastbound	Left	67	161.6			3.03	89	4.0	
	Thru	147	42.7			1.75	191	2.3	
	Right	13	31.6			0.11	16	0.1	
Westbound	Left	31	32.4			0.28	41	0.4	
	Thru	174	37.6			1.82	226	2.4	
	Right	452	29.5			3.71	583	4.8	

Snelling at Summit

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	41	9.8			0.11	53	0.1	18.9
	Thru	917	5.0	6	36.8	1.28	1,442	2.0	
	Right	32	6.4			0.06	41	0.1	
Southbound	Left	40	28.5			0.32	51	0.4	
	Thru	550	21.2	6	9.9	3.24	816	4.8	
	Right	101	21.7			0.61	132	0.8	
Eastbound	Left	49	54.8			0.74	63	1.0	
	Thru	178	25.1			1.24	229	1.6	
	Right	13	19.6			0.07	17	0.1	
Westbound	Left	64	39.5			0.70	83	0.9	
	Thru	357	41.3			4.10	461	5.3	
	Right	146	35.2			1.43	191	1.9	

Snelling at Grand

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	44	11.6			0.14	57	0.2	21.1
	Thru	764	14.2	6	36.8	3.02	1,244	4.9	
	Right	55	13.0			0.20	75	0.3	
Southbound	Left	98	29.9			0.81	129	1.1	
	Thru	422	17.4	6	9.9	2.04	646	3.1	
	Right	102	12.3			0.35	134	0.5	
Eastbound	Left	46	26.8			0.34	59	0.4	
	Thru	184	27.7			1.42	243	1.9	
	Right	23	21.2			0.14	30	0.2	
Westbound	Left	82	39.3			0.89	105	1.1	
	Thru	298	46.6			3.86	379	4.9	
	Right	176	39.5			1.93	227	2.5	

Snelling at St Clair

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	39	12.0			0.13	49	0.2	11.4
	Thru	646	6.7	6	22.9	1.19	1,010	1.9	
	Right	43	4.4			0.05	55	0.1	
Southbound	Left	46	13.3			0.17	60	0.2	
	Thru	450	7.2	6	8.8	0.90	672	1.4	
	Right	30	6.5			0.05	41	0.1	
Eastbound	Left	47	33.2			0.43	61	0.6	
	Thru	217	25.4			1.53	278	2.0	
	Right	39	12.9			0.14	50	0.2	
Westbound	Left	68	37.2			0.71	86	0.9	
	Thru	256	29.9			2.12	332	2.8	
	Right	179	20.3			1.01	235	1.3	

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Snelling at Jefferson

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	5	18.3			0.02	5	0.0	6.7
	Thru	647	10.7	6	22.9	1.92	1,008	3.0	
	Right	25	8.7			0.06	31	0.1	
Southbound	Left	16	7.2			0.03	20	0.0	
	Thru	544	3.4	6	8.8	0.52	793	0.8	
	Right	4	4.4			0.00	5	0.0	
Eastbound	Left	19	32.5			0.17	24	0.2	
	Thru	59	28.6			0.47	75	0.6	
	Right	7	14.1			0.03	9	0.0	
Westbound	Left	62	31.1			0.54	82	0.7	
	Thru	66	34.1			0.63	87	0.8	
	Right	54	21.2			0.32	70	0.4	

Snelling at Randolph

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	64	17.5			0.31	80	0.4	23.5
	Thru	487	24.2	6	22.9	3.27	801	5.4	
	Right	33	8.5			0.08	44	0.1	
Southbound	Left	98	16.2			0.44	127	0.6	
	Thru	352	19.3	6	6.6	1.88	530	2.8	
	Right	156	11.7			0.51	201	0.7	
Eastbound	Left	101	44.1			1.23	133	1.6	
	Thru	364	35.8			3.62	474	4.7	
	Right	44	18.2			0.22	56	0.3	
Westbound	Left	60	35.8			0.59	78	0.8	
	Thru	407	37.9			4.28	521	5.5	
	Right	88	21.4			0.53	111	0.7	

Snelling at Highland

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	3	5.3			0.00	4	0.0	5.2
	Thru	489	3.6	6	10.0	0.49	725	0.7	
	Right	152	3.2			0.14	195	0.2	
Southbound	Left	20	10.3			0.06	26	0.1	
	Thru	426	6.1	6	6.6	0.72	626	1.1	
	Right	12	5.2			0.02	14	0.0	
Eastbound	Left	37	22.3			0.23	48	0.3	
	Thru	93	23.0			0.60	121	0.8	
	Right	9	7.0			0.02	12	0.0	
Westbound	Left	124	30.5			1.05	163	1.4	
	Thru	61	21.6			0.37	79	0.5	
	Right	61	8.7			0.15	78	0.2	

Snelling at Ford

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	76	11.9			0.25	98	0.3	4.5
	Thru	440	4.8			0.59	566	0.8	
	Right	5	3.3			0.00	7	0.0	
Southbound	Left	2	4.8			0.00	2	0.0	
	Thru	390	2.5			0.27	506	0.4	
	Right	171	2.9	6	6.6	0.14	300	0.2	
Eastbound	Left	202	24.8	6	10.0	1.40	356	2.5	
	Thru	3	23.9			0.02	4	0.0	
	Right	76	8.1			0.17	102	0.2	
Westbound	Left	8	22.0			0.05	10	0.1	
	Thru	5	17.8			0.02	6	0.0	
	Right	2	5.2			0.00	3	0.0	

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Year 2013 Scenario 3A Refined Rapid Bus Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (A.M. Peak Hour 7:30 - 8:30)

SRF Consulting Group, Inc.

Ford at Fairview

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	40	21.7			0.24	52	0.3	8.0
	Thru	435	11.4			1.38	561	1.8	
	Right	45	9.6			0.12	57	0.2	
Southbound	Left	22	19.9			0.12	28	0.2	
	Thru	428	10.7			1.27	558	1.7	
	Right	66	9.1			0.17	83	0.2	
Eastbound	Left	89	22.7			0.56	113	0.7	
	Thru	217	13.3	6	10.0	0.80	379	1.4	
	Right	27	7.8			0.06	33	0.1	
Westbound	Left	28	17.6			0.14	36	0.2	
	Thru	217	13.7	6	6.6	0.82	355	1.4	
	Right	7	4.5			0.01	10	0.0	

Ford at Kenneth

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	38	35.5			0.37	66	0.7	2.9
	Thru	27	31.4			0.24	36	0.3	
	Right	32	15.1			0.13	40	0.2	
Southbound	Left	11	33.5			0.10	14	0.1	
	Thru	44	30.0			0.36	56	0.5	
	Right	38	11.0			0.12	66	0.2	
Eastbound	Left	30	4.4			0.04	58	0.1	
	Thru	291	1.9	6	10.0	0.15	473	0.2	
	Right	20	2.0			0.01	26	0.0	
Westbound	Left	15	5.1			0.02	19	0.0	
	Thru	302	4.2	6	6.6	0.36	463	0.5	
	Right	7	3.6			0.01	10	0.0	

Ford at Cleveland

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	296	17.2			1.41	383	1.8	13.5
	Thru	389	17.1			1.84	499	2.4	
	Right	56	19.1			0.30	107	0.6	
Southbound	Left	28	15.5			0.12	37	0.2	
	Thru	274	19.5			1.48	355	1.9	
	Right	86	22.0			0.53	149	0.9	
Eastbound	Left	92	21.7			0.55	155	0.9	
	Thru	257	12.4	6	8.7	0.88	404	1.4	
	Right	123	14.6			0.50	182	0.7	
Westbound	Left	50	27.3			0.38	84	0.6	
	Thru	288	15.0	6	6.6	1.20	462	1.9	
	Right	36	14.1			0.14	46	0.2	

Ford at Finn

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	48	34.1			0.46	62	0.6	3.0
	Thru	1	41.0			0.01	1	0.0	
	Right	42	5.1			0.06	53	0.1	
Southbound	Left	31	32.8			0.28	40	0.4	
	Thru	1	17.0			0.00	1	0.0	
	Right	29	11.1			0.09	35	0.1	
Eastbound	Left	20	8.9			0.05	25	0.1	
	Thru	400	5.0	6	8.7	0.55	650	0.9	
	Right	20	3.9			0.02	27	0.0	
Westbound	Left	125	4.9			0.17	161	0.2	
	Thru	487	2.6	6	5.5	0.35	751	0.5	
	Right	59	2.1			0.03	76	0.0	

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Year 2013 Scenario 3A Refined Rapid Bus Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (A.M. Peak Hour 7:30 - 8:30)

SRF Consulting Group, Inc.

Ford at Cretin

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Southbound	Left	117	32.4			1.06	168	1.5	3.7
	Right	65	4.0			0.07	85	0.1	
Eastbound	Left	112	8.1			0.25	145	0.3	
	Thru	320	3.8	6	8.7	0.34	529	0.6	
Westbound	Thru	379	4.6	6	5.5	0.49	588	0.8	
	Right	182	5.7			0.29	257	0.4	

46th at 46th

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	28	55.1			0.43	36	0.5	7.1
	Thru	33	49.2			0.45	40	0.6	
	Right	217	2.3			0.14	281	0.2	
Southbound	Left	50	39.3			0.54	71	0.8	
	Thru	16	52.8			0.23	21	0.3	
	Right	42	51.0			0.60	56	0.8	
Eastbound	Left	25	16.4			0.11	30	0.1	
	Thru	168	21.8	6	8.7	1.02	325	2.0	
	Right	34	17.3			0.16	45	0.2	
Westbound	Left	142	9.6			0.38	179	0.5	
	Thru	219	8.2	6	5.5	0.50	366	0.8	
	Right	82	8.3			0.19	125	0.3	

46th at 42nd

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	5	24.7			0.04	8	0.1	5.5
	Thru	5	21.5			0.03	6	0.0	
	Right	4	3.7			0.00	5	0.0	
Southbound	Left	28	21.4			0.17	36	0.2	
	Thru	4	26.2			0.03	5	0.0	
	Right	84	7.4			0.17	111	0.2	
Eastbound	Left	49	27.3			0.37	64	0.5	
	Thru	190	23.4	6	8.7	1.23	351	2.3	
	Right	14	16.2			0.06	18	0.1	
Westbound	Left	4	19.1			0.02	6	0.0	
	Thru	270	16.5	6	5.5	1.24	431	2.0	
	Right	14	10.5			0.04	18	0.1	

46th at Minnehaha

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	22	26.3			0.16	29	0.2	11.9
	Thru	274	22.5			1.71	353	2.2	
	Right	13	14.0			0.05	18	0.1	
Southbound	Left	38	29.8			0.32	49	0.4	
	Thru	166	21.0			0.96	211	1.2	
	Right	109	10.2			0.31	138	0.4	
Eastbound	Left	127	22.6			0.80	164	1.0	
	Thru	206	14.6	6	8.7	0.84	373	1.5	
	Right	25	16.2			0.11	31	0.1	
Westbound	Left	74	36.3			0.75	95	1.0	
	Thru	179	32.4	6	5.5	1.61	317	2.8	
	Right	114	22.2			0.70	149	0.9	

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Year 2013 Scenario 3A Refined Rapid Bus Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (A.M. Peak Hour 7:30 - 8:30)

Consulting Group, Inc.

46th at Hiawatha

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	26	39.7			0.29	34	0.4	18.6
	Thru	883	24.0			5.90	1,129	7.5	
	Right	183	2.3			0.12	238	0.2	
Southbound	Left	94	37.1			0.97	119	1.2	
	Thru	531	16.5			2.44	682	3.1	
	Right	14	1.2			0.00	17	0.0	
Eastbound	Left	63	21.8			0.38	83	0.5	
	Thru	80	29.5	6	8.7	0.65	210	1.7	
	Right	44	33.1			0.41	58	0.5	
Westbound	Left	162	35.9			1.62	210	2.1	
	Thru	71	22.2	6	5.5	0.44	174	1.1	
	Right	71	8.5			0.17	92	0.2	

46th at 36th

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	5	8.1			0.01	6	0.0	0.9
	Thru	0	-			-	0	-	
	Right	5	4.4			0.01	6	0.0	
Southbound	Left	41	7.9	6	8.7	0.09	160	0.4	
	Thru	0	-			-	0	-	
	Right	15	4.2			0.02	21	0.0	
Eastbound	Left	15	6.2			0.03	18	0.0	
	Thru	142	5.8			0.23	182	0.3	
	Right	8	2.3			0.01	11	0.0	
Westbound	Left	1	5.2			0.00	2	0.0	
	Thru	86	3.4			0.08	111	0.1	
	Right	24	2.4	6	5.5	0.02	112	0.1	

* Results shown are the average of 5 model runs.
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Year 2013 Scenario 3A Refined Rapid Bus Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (P.M. Peak Hour 4:45 - 5:45)

SRF Consulting Group, Inc.

Co B2 at Snelling W Ramps

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	75	33.5			0.70	99	0.9	31.7
	Thru	151	35.0	6	16.9	1.47	332	3.2	
	Right	141	4.0			0.16	184	0.2	
Southbound	Left	6	43.1			0.07	7	0.1	
	Thru	106	44.8			1.32	138	1.7	
	Right	148	4.5			0.19	192	0.2	
Eastbound	Left	403	45.3			5.07	524	6.6	
	Thru	749	24.4			5.08	974	6.6	
	Right	77	9.5			0.20	99	0.3	
Westbound	Left	349	48.1	6	19.2	4.66	603	8.0	
	Thru	440	23.5			2.87	577	3.8	
	Right	24	5.5			0.04	49	0.1	

Co B2 at Snelling E Ramps

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Southbound	Left	21	41.5			0.24	27	0.3	8.8
	Right	497	25.4	6	19.2	3.51	816	5.8	
Eastbound	Left	248	9.3			0.64	322	0.8	
	Thru	647	4.7			0.85	841	1.1	
Westbound	Thru	318	6.6			0.59	414	0.8	
	Right	38	2.8			0.03	50	0.0	

Snelling at Co B

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	154	72.8			3.11	199	4.0	146.9
	Thru	1,557	9.2	6	19.2	3.97	2,170	5.5	
	Right	211	3.2			0.19	274	0.2	
Southbound	Left	426	96.8			11.45	568	15.3	
	Thru	1,245	31.9	6	16.9	11.03	1,749	15.5	
	Right	294	16.3			1.33	382	1.7	
Eastbound	Left	178	329.0			16.30	233	21.3	
	Thru	505	304.9			42.74	655	55.5	
	Right	153	251.1			10.66	200	14.0	
Westbound	Left	167	79.1			3.67	218	4.8	
	Thru	260	70.5			5.10	338	6.6	
	Right	300	21.4			1.79	404	2.4	

Snelling at HarMar

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	51	72.3			1.02	67	1.4	21.3
	Thru	1,609	5.0	6	19.2	2.25	2,239	3.1	
	Right	266	3.4			0.25	344	0.3	
Southbound	Left	125	60.3			2.10	161	2.7	
	Thru	1,343	6.4	6	16.9	2.38	1,880	3.3	
	Right	99	3.2			0.09	129	0.1	
Eastbound	Left	115	79.7			2.55	150	3.3	
	Thru	49	82.8			1.14	64	1.5	
	Right	80	11.9			0.27	104	0.3	
Westbound	Left	100	79.7			2.21	128	2.8	
	Thru	57	77.6			1.23	75	1.6	
	Right	198	11.8			0.65	255	0.8	

* Results shown are the average of 20 model runs.
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Year 2013 Scenario 3A Refined Rapid Bus Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (P.M. Peak Hour 4:45 - 5:45)

SRF Consulting Group, Inc.

Snelling at Roselawn

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	15	125.7			0.52	19	0.7	33.2
	Thru	1,831	3.7	6	19.2	1.90	2,523	2.6	
	Right	27	3.9			0.03	36	0.0	
Southbound	Left	96	220.0			5.89	124	7.6	
	Thru	1,316	9.5	6	16.9	3.47	1,845	4.9	
	Right	102	4.9			0.14	132	0.2	
Eastbound	Left	51	126.7			1.78	67	2.4	
	Thru	193	117.1			6.27	250	8.1	
	Right	70	46.7			0.91	91	1.2	
Westbound	Left	22	136.0			0.82	28	1.0	
	Thru	94	120.2			3.13	122	4.1	
	Right	45	28.8			0.36	59	0.5	

Snelling at Larpenteur

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	221	94.9			5.82	284	7.5	125.2
	Thru	1,695	51.3	6	19.2	24.14	2,346	33.4	
	Right	185	30.7			1.58	239	2.0	
Southbound	Left	175	219.6			10.67	227	13.8	
	Thru	1,053	53.8	6	16.9	15.73	1,504	22.5	
	Right	173	28.7			1.38	225	1.8	
Eastbound	Left	27	76.8			0.58	37	0.8	
	Thru	699	93.6			18.18	907	23.6	
	Right	196	98.0			5.34	256	7.0	
Westbound	Left	153	79.2			3.36	198	4.4	
	Thru	352	49.7			4.86	456	6.3	
	Right	151	41.8			1.75	196	2.3	

Snelling at Hoyt

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	7	18.5			0.04	9	0.0	14.1
	Thru	2,063	11.7	6	19.2	6.69	2,820	9.2	
	Right	124	7.6			0.26	162	0.3	
Southbound	Left	46	31.1			0.39	59	0.5	
	Thru	1,347	2.5	6	16.9	0.94	1,885	1.3	
	Right	9	3.0			0.01	12	0.0	
Eastbound	Left	23	83.2			0.54	30	0.7	
	Thru	6	77.5			0.13	8	0.2	
	Right	1	12.6			0.00	2	0.0	
Westbound	Left	41	85.8			0.97	53	1.3	
	Thru	10	80.3			0.22	13	0.3	
	Right	29	26.7			0.22	38	0.3	

Snelling at Midway

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	53	15.8			0.23	69	0.3	16.3
	Thru	2,094	11.6	6	19.2	6.77	2,861	9.2	
	Right	66	10.1			0.19	84	0.2	
Southbound	Left	76	17.9			0.38	100	0.5	
	Thru	1,266	4.4	6	16.9	1.54	1,780	2.2	
	Right	49	5.0			0.07	62	0.1	
Eastbound	Left	46	87.5			1.12	60	1.5	
	Thru	30	81.0			0.67	38	0.9	
	Right	39	9.0			0.10	51	0.1	
Westbound	Left	19	87.4			0.47	25	0.6	
	Thru	15	79.4			0.33	21	0.5	
	Right	51	13.2			0.19	66	0.2	

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Year 2013 Scenario 3A Refined Rapid Bus Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (P.M. Peak Hour 4:45 - 5:45)

SRF Consulting Group, Inc.

Snelling at Hewitt

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	24	18.7			0.12	30	0.2	22.4
	Thru	1,570	16.3	6	24.4	7.10	2,214	10.0	
	Right	19	16.5			0.09	24	0.1	
Southbound	Left	72	23.7			0.47	94	0.6	
	Thru	1,350	14.9	6	25.7	5.59	1,937	8.0	
	Right	102	7.6			0.22	133	0.3	
Eastbound	Left	91	38.1			0.96	118	1.3	
	Thru	11	36.4			0.11	15	0.1	
	Right	74	23.7			0.48	96	0.6	
Westbound	Left	30	34.5			0.29	40	0.4	
	Thru	20	32.6			0.18	27	0.2	
	Right	80	18.3			0.41	104	0.5	

Snelling at Minnehaha

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	39	27.9			0.30	51	0.4	33.1
	Thru	1,395	21.1	6	24.4	8.20	1,987	11.7	
	Right	50	23.2			0.32	65	0.4	
Southbound	Left	103	30.5			0.87	134	1.1	
	Thru	1,245	21.5	6	25.7	7.43	1,801	10.8	
	Right	106	23.7			0.70	137	0.9	
Eastbound	Left	134	43.6			1.62	175	2.1	
	Thru	175	33.6			1.64	227	2.1	
	Right	75	32.4			0.68	99	0.9	
Westbound	Left	50	37.3			0.51	63	0.7	
	Thru	131	27.8			1.01	170	1.3	
	Right	79	26.5			0.58	103	0.8	

Snelling at Thomas

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	44	24.8			0.31	58	0.4	36.0
	Thru	1,346	23.3	6	24.4	8.71	1,927	12.5	
	Right	72	22.7			0.45	92	0.6	
Southbound	Left	61	36.7			0.63	79	0.8	
	Thru	1,273	33.0	6	25.7	11.65	1,837	16.8	
	Right	32	20.5			0.18	41	0.2	
Eastbound	Left	110	35.0			1.07	141	1.4	
	Thru	85	34.8			0.82	110	1.1	
	Right	79	30.2			0.66	101	0.8	
Westbound	Left	40	34.2			0.38	51	0.5	
	Thru	55	29.0			0.45	72	0.6	
	Right	44	19.5			0.24	56	0.3	

Snelling at University

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	110	65.8			2.00	142	2.6	138.0
	Thru	1,059	29.8	6	24.4	8.75	1,557	12.9	
	Right	178	13.5			0.67	266	1.0	
Southbound	Left	197	89.9			4.92	254	6.3	
	Thru	1,114	79.4	6	42.3	24.56	1,727	38.1	
	Right	60	52.6			0.88	78	1.1	
Eastbound	Left	186	65.5			3.39	242	4.4	
	Thru	810	119.4			26.86	1,049	34.8	
	Right	172	136.7			6.53	223	8.5	
Westbound	Left	166	102.5			4.72	248	7.1	
	Thru	520	78.5			11.33	671	14.6	
	Right	213	86.8			5.14	273	6.6	

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Snelling at Spruce Tree

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	61	43.8			0.74	80	1.0	47.5
	Thru	1,218	51.4	6	21.6	17.37	1,779	25.4	
	Right	146	27.8			1.12	189	1.5	
Southbound	Left	70	34.1			0.66	90	0.9	
	Thru	1,363	14.2	6	42.3	5.37	2,082	8.2	
	Right	14	12.3			0.05	18	0.1	
Eastbound	Left	35	67.6			0.65	45	0.8	
	Thru	64	41.6			0.74	83	1.0	
	Right	177	11.3			0.56	232	0.7	
Westbound	Left	141	57.4			2.25	183	2.9	
	Thru	53	92.3			1.37	68	1.7	
	Right	97	96.6			2.61	126	3.4	

Snelling at St Anthony

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	363	20.0			2.01	471	2.6	78.8
	Thru	980	12.8	6	21.6	3.49	1,467	5.2	
Southbound	Thru	1,338	78.6	6	42.3	29.22	2,056	44.9	
	Right	358	8.7			0.86	462	1.1	
Westbound	Left	363	75.9			7.65	490	10.3	
	Thru	432	70.2			8.43	562	11.0	
	Right	442	22.7			2.79	576	3.6	

Snelling at Concordia

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Thru	1,034	49.6	6	21.6	14.25	1,539	21.2	72.2
	Right	235	28.3			1.85	308	2.4	
Southbound	Left	500	8.8			1.23	644	1.6	
	Thru	1,209	20.5	6	42.3	6.88	1,912	10.9	
Eastbound	Left	329	68.6			6.27	430	8.2	
	Thru	324	87.4			7.85	421	10.2	
	Right	593	82.6			13.62	772	17.7	

Snelling at Marshall

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	49	50.2			0.68	63	0.9	80.7
	Thru	1,015	45.3	6	21.6	12.78	1,483	18.7	
	Right	81	26.4			0.59	105	0.8	
Southbound	Left	47	62.0			0.81	63	1.1	
	Thru	1,525	62.7	6	42.3	26.56	2,271	39.5	
	Right	222	49.6			3.06	338	4.7	
Eastbound	Left	216	47.2			2.83	314	4.1	
	Thru	350	39.4			3.83	453	5.0	
	Right	85	35.1			0.83	110	1.1	
Westbound	Left	73	31.9			0.64	96	0.8	
	Thru	245	41.2			2.80	317	3.6	
	Right	43	32.1			0.39	56	0.5	

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Snelling at Selby

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	25	126.9			0.88	32	1.1	58.1
	Thru	866	78.3	6	21.6	18.82	1,290	28.0	
	Right	53	79.2			1.18	71	1.6	
Southbound	Left	386	78.8			8.46	504	11.0	
	Thru	1,104	12.2	6	42.3	3.73	1,722	5.8	
	Right	184	10.6			0.54	238	0.7	
Eastbound	Left	53	51.5			0.75	68	1.0	
	Thru	285	32.0			2.53	368	3.3	
	Right	38	25.5			0.27	49	0.3	
Westbound	Left	43	44.5			0.53	56	0.7	
	Thru	204	34.2			1.94	264	2.5	
	Right	210	26.5			1.54	272	2.0	

Snelling at Summit

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	33	34.8			0.31	42	0.4	35.1
	Thru	721	19.6	6	21.6	3.92	1,105	6.0	
	Right	69	23.2			0.45	89	0.6	
Southbound	Left	92	35.1			0.90	119	1.2	
	Thru	976	27.2	6	42.3	7.37	1,560	11.8	
	Right	127	27.0			0.95	164	1.2	
Eastbound	Left	75	64.1			1.33	98	1.7	
	Thru	418	28.5			3.32	546	4.3	
	Right	18	26.0			0.13	23	0.2	
Westbound	Left	60	42.7			0.71	78	0.9	
	Thru	424	32.8			3.86	552	5.0	
	Right	166	29.1			1.34	215	1.7	

Snelling at Grand

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	72	29.3			0.58	93	0.8	32.6
	Thru	596	31.5	6	21.6	5.21	939	8.2	
	Right	138	29.3			1.12	177	1.4	
Southbound	Left	186	27.6			1.42	243	1.9	
	Thru	739	12.4	6	42.3	2.54	1,251	4.3	
	Right	130	11.4			0.41	168	0.5	
Eastbound	Left	76	40.8			0.86	98	1.1	
	Thru	423	35.3			4.14	550	5.4	
	Right	64	30.8			0.55	84	0.7	
Westbound	Left	95	45.3			1.19	123	1.5	
	Thru	346	39.6			3.80	446	4.9	
	Right	149	34.0			1.41	195	1.8	

Snelling at St Clair

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	55	43.9			0.67	71	0.9	18.7
	Thru	565	8.6	6	18.6	1.36	878	2.1	
	Right	87	4.8			0.12	111	0.1	
Southbound	Left	103	32.6			0.94	134	1.2	
	Thru	665	16.8	6	30.0	3.11	1,080	5.0	
	Right	117	16.3			0.53	150	0.7	
Eastbound	Left	75	34.3			0.72	96	0.9	
	Thru	310	23.7			2.04	405	2.7	
	Right	42	15.2			0.18	54	0.2	
Westbound	Left	77	34.6			0.74	99	1.0	
	Thru	316	25.2			2.22	412	2.9	
	Right	151	17.4			0.73	196	0.9	

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Snelling at Jefferson

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	7	15.2			0.03	9	0.0	10.3
	Thru	671	12.4	6	18.6	2.32	1,014	3.5	
	Right	44	11.8			0.14	57	0.2	
Southbound	Left	38	14.5			0.15	50	0.2	
	Thru	746	8.7	6	30.0	1.81	1,185	2.9	
	Right	1	8.2			0.00	1	0.0	
Eastbound	Left	11	39.2			0.12	15	0.2	
	Thru	82	36.1			0.82	107	1.1	
	Right	8	23.8			0.05	10	0.1	
Westbound	Left	40	42.1			0.47	53	0.6	
	Thru	85	39.4			0.94	111	1.2	
	Right	37	26.4			0.27	48	0.4	

Snelling at Randolph

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	54	23.0			0.34	68	0.4	25.2
	Thru	496	28.7	6	18.6	3.95	787	6.3	
	Right	105	13.9			0.41	138	0.5	
Southbound	Left	146	21.4			0.87	191	1.1	
	Thru	539	17.9	6	15.1	2.68	824	4.1	
	Right	116	9.5			0.30	152	0.4	
Eastbound	Left	123	38.9			1.33	159	1.7	
	Thru	423	33.5			3.93	546	5.1	
	Right	41	19.3			0.22	53	0.3	
Westbound	Left	88	28.8			0.70	112	0.9	
	Thru	346	30.2			2.90	449	3.8	
	Right	103	16.4			0.47	133	0.6	

Snelling at Highland

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	8	8.4			0.02	10	0.0	5.7
	Thru	606	3.1	6	12.0	0.53	887	0.8	
	Right	100	3.1			0.09	130	0.1	
Southbound	Left	32	14.4			0.13	42	0.2	
	Thru	596	7.8	6	15.1	1.28	896	1.9	
	Right	36	6.9			0.07	47	0.1	
Eastbound	Left	23	21.2			0.13	30	0.2	
	Thru	75	21.3			0.44	97	0.6	
	Right	18	6.0			0.03	22	0.0	
Westbound	Left	110	29.4			0.90	144	1.2	
	Thru	68	21.5			0.41	88	0.5	
	Right	21	9.1			0.05	27	0.1	

Snelling at Ford

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	124	17.6			0.61	162	0.8	6.9
	Thru	446	5.7			0.71	577	0.9	
	Right	5	4.9			0.01	7	0.0	
Southbound	Left	13	8.0			0.03	17	0.0	
	Thru	459	4.2			0.53	596	0.7	
	Right	251	4.7	6	15.1	0.33	445	0.6	
Eastbound	Left	266	25.1	6	12.0	1.85	447	3.1	
	Thru	8	24.3			0.05	10	0.1	
	Right	144	11.3			0.45	190	0.6	
Westbound	Left	8	21.5			0.05	10	0.1	
	Thru	5	19.2			0.02	6	0.0	
	Right	3	6.4			0.00	4	0.0	

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Ford at Fairview

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	71	41.7			0.82	91	1.1	16.9
	Thru	497	13.2			1.82	645	2.4	
	Right	25	12.4			0.09	33	0.1	
Southbound	Left	26	23.8			0.17	33	0.2	
	Thru	463	16.3			2.10	603	2.7	
	Right	181	15.0			0.76	236	1.0	
Eastbound	Left	143	57.6			2.30	186	3.0	
	Thru	367	19.2	6	12.0	1.96	585	3.1	
	Right	66	11.7			0.21	87	0.3	
Westbound	Left	15	22.6			0.09	20	0.1	
	Thru	350	17.8	6	15.1	1.74	574	2.8	
	Right	16	8.7			0.04	20	0.0	

Ford at Kenneth

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	55	51.4			0.78	88	1.3	5.6
	Thru	21	48.1			0.29	28	0.4	
	Right	37	26.6			0.28	48	0.4	
Southbound	Left	29	45.8			0.37	40	0.5	
	Thru	26	46.1			0.33	33	0.4	
	Right	43	19.6			0.24	73	0.4	
Eastbound	Left	47	8.3			0.11	79	0.2	
	Thru	504	2.6	6	12.0	0.37	762	0.6	
	Right	49	2.7			0.04	65	0.0	
Westbound	Left	14	9.9			0.04	18	0.1	
	Thru	567	6.1	6	15.1	0.95	855	1.4	
	Right	21	5.2			0.03	27	0.0	

Ford at Cleveland

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	247	32.5			2.23	319	2.9	35.9
	Thru	352	26.9			2.64	455	3.4	
	Right	38	27.6			0.29	86	0.7	
Southbound	Left	79	35.9			0.79	102	1.0	
	Thru	403	41.5			4.65	523	6.0	
	Right	170	45.9			2.17	254	3.2	
Eastbound	Left	159	36.0			1.59	241	2.4	
	Thru	487	23.2	6	10.7	3.13	715	4.6	
	Right	269	35.5			2.65	383	3.8	
Westbound	Left	84	33.8			0.79	126	1.2	
	Thru	496	26.9	6	15.1	3.71	781	5.8	
	Right	83	29.0			0.67	106	0.8	

Ford at Finn

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	200	47.4			2.64	263	3.5	14.4
	Thru	10	28.8			0.08	12	0.1	
	Right	176	10.4			0.51	229	0.7	
Southbound	Left	114	41.4			1.31	149	1.7	
	Thru	16	36.9			0.17	21	0.2	
	Right	66	26.3			0.49	85	0.6	
Eastbound	Left	52	18.0			0.26	68	0.3	
	Thru	636	14.8	6	10.7	2.62	978	4.0	
	Right	43	11.4			0.14	57	0.2	
Westbound	Left	195	14.3			0.77	252	1.0	
	Thru	659	7.2	6	10.1	1.32	995	2.0	
	Right	52	5.5			0.08	68	0.1	

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Ford at Cretin

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Southbound	Left	172	47.1			2.25	241	3.2	8.9
	Right	111	5.8			0.18	144	0.2	
Eastbound	Left	111	13.3			0.41	143	0.5	
	Thru	560	5.1	6	10.7	0.80	862	1.2	
Westbound	Thru	782	9.1	6	10.1	1.98	1,142	2.9	
	Right	145	15.0			0.60	204	0.9	

46th at 46th

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	14	53.6			0.21	18	0.3	10.0
	Thru	38	52.4			0.56	50	0.7	
	Right	252	2.9			0.20	327	0.3	
Southbound	Left	81	42.6			0.96	123	1.5	
	Thru	31	52.9			0.45	40	0.6	
	Right	10	69.5			0.19	13	0.2	
Eastbound	Left	26	10.2			0.07	34	0.1	
	Thru	340	11.4	6	10.7	1.07	559	1.8	
	Right	51	19.1			0.27	65	0.3	
Westbound	Left	299	16.6			1.38	388	1.8	
	Thru	474	9.6	6	10.1	1.27	723	1.9	
	Right	118	9.8			0.32	170	0.5	

46th at 42nd

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	5	29.5			0.04	7	0.1	6.5
	Thru	6	21.6			0.03	7	0.0	
	Right	4	3.9			0.00	5	0.0	
Southbound	Left	37	26.7			0.27	50	0.4	
	Thru	5	27.6			0.04	6	0.0	
	Right	58	10.6			0.17	74	0.2	
Eastbound	Left	85	30.5			0.72	110	0.9	
	Thru	374	20.3	6	10.7	2.11	603	3.4	
	Right	5	17.5			0.03	7	0.0	
Westbound	Left	3	8.3			0.01	4	0.0	
	Thru	459	6.9	6	10.1	0.88	705	1.3	
	Right	34	5.9			0.06	43	0.1	

46th at Minnehaha

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	42	41.3			0.48	56	0.6	33.8
	Thru	271	33.6			2.53	353	3.3	
	Right	66	21.5			0.39	87	0.5	
Southbound	Left	122	101.1			3.43	157	4.4	
	Thru	314	89.1			7.77	410	10.1	
	Right	121	79.0			2.66	155	3.4	
Eastbound	Left	173	27.9			1.34	225	1.7	
	Thru	277	14.6	6	10.7	1.12	476	1.9	
	Right	15	15.6			0.07	20	0.1	
Westbound	Left	82	39.8			0.90	108	1.2	
	Thru	352	35.2	6	10.1	3.44	563	5.5	
	Right	91	29.6			0.74	117	1.0	

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Consulting Group, Inc.

46th at Hiawatha

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	84	41.1			0.95	107	1.2	27.8
	Thru	806	27.4			6.13	1,040	7.9	
	Right	243	2.7			0.18	316	0.2	
Southbound	Left	144	41.2			1.65	186	2.1	
	Thru	858	24.4			5.82	1,113	7.5	
	Right	40	2.2			0.02	51	0.0	
Eastbound	Left	52	24.9			0.36	67	0.5	
	Thru	77	33.8	6	10.7	0.72	216	2.0	
	Right	22	34.7			0.21	28	0.3	
Westbound	Left	203	43.1			2.43	264	3.2	
	Thru	146	25.5	6	10.1	1.03	296	2.1	
	Right	168	12.0			0.56	215	0.7	

46th at 36th

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	1	9.1			0.00	2	0.0	0.8
	Thru	2	11.2			0.00	2	0.0	
	Right	0	-			-	0	-	
Southbound	Left	36	6.2	6	10.7	0.06	163	0.3	
	Thru	1	7.9			0.00	1	0.0	
	Right	5	4.1			0.01	7	0.0	
Eastbound	Left	5	4.9			0.01	7	0.0	
	Thru	115	4.6			0.15	148	0.2	
	Right	1	2.3			0.00	1	0.0	
Westbound	Left	0	-			-	0	-	
	Thru	241	3.0			0.20	310	0.3	
	Right	28	1.9	6	10.1	0.01	143	0.1	

* Results shown are the average of 20 model runs.
** Results shown are from all vehicles except transit vehicles.

Year 2013 Scenario 4 Rapid Bus w/TSP Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (A.M. Peak Hour 7:30 - 8:30)

SRF Consulting Group, Inc.

Co B2 at Snelling W Ramps

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	11	27.8			0.08	14	0.1	6.2
	Thru	21	31.9	6	5.3	0.19	92	0.8	
	Right	6	1.6			0.00	9	0.0	
Southbound	Left	20	36.4			0.20	25	0.3	
	Thru	33	35.3			0.33	42	0.4	
	Right	37	2.7			0.03	50	0.0	
Eastbound	Left	22	36.5			0.22	28	0.3	
	Thru	101	8.3			0.23	128	0.3	
	Right	14	3.6			0.01	16	0.0	
Westbound	Left	118	42.8	6	9.4	1.40	245	2.9	
	Thru	446	6.6			0.82	580	1.1	
	Right	77	1.2			0.03	117	0.0	

Co B2 at Snelling E Ramps

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Southbound	Left	50	31.9			0.44	62	0.5	1.9
	Right	148	9.1	6	9.4	0.37	299	0.8	
Eastbound	Left	13	3.4			0.01	17	0.0	
	Thru	114	1.9			0.06	145	0.1	
Westbound	Thru	492	2.9			0.40	640	0.5	
	Right	31	1.6			0.01	41	0.0	

Snelling at Co B

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	134	94.4			3.51	174	4.6	51.8
	Thru	881	5.3	6	9.4	1.29	1,231	1.8	
	Right	83	1.8			0.04	104	0.1	
Southbound	Left	153	88.0			3.74	213	5.2	
	Thru	1,538	23.0	6	5.3	9.82	2,064	13.2	
	Right	334	17.2			1.60	438	2.1	
Eastbound	Left	103	98.2			2.82	130	3.5	
	Thru	237	90.7			5.97	307	7.7	
	Right	46	12.8			0.16	59	0.2	
Westbound	Left	138	79.8			3.05	178	3.9	
	Thru	273	88.7			6.72	353	8.7	
	Right	129	15.7			0.56	184	0.8	

Snelling at HarMar

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	55	78.2			1.19	70	1.5	13.8
	Thru	952	9.8	6	9.4	2.58	1,324	3.6	
	Right	57	1.6			0.03	72	0.0	
Southbound	Left	58	71.8			1.16	78	1.5	
	Thru	1,597	2.8	6	5.3	1.26	2,140	1.7	
	Right	69	2.4			0.05	88	0.1	
Eastbound	Left	66	83.3			1.52	85	2.0	
	Thru	31	78.5			0.68	43	0.9	
	Right	112	12.8			0.40	142	0.5	
Westbound	Left	39	88.7			0.96	50	1.2	
	Thru	18	86.1			0.44	22	0.5	
	Right	78	8.3			0.18	96	0.2	

* Results shown are the average of 5 model runs.
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Year 2013 Scenario 4 Rapid Bus w/TSP Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (A.M. Peak Hour 7:30 - 8:30)

Consulting Group, Inc.

Snelling at Roselawn

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	10	77.8			0.22	14	0.3	
	Thru	937	4.6	6	9.4	1.20	1,301	1.7	
	Right	9	2.6			0.01	11	0.0	
Southbound	Left	33	117.2			1.07	42	1.4	
	Thru	1,663	2.8	6	5.3	1.27	2,221	1.7	
	Right	46	2.5			0.03	61	0.0	15.3
Eastbound	Left	24	121.4			0.82	32	1.1	
	Thru	42	108.7			1.28	54	1.6	
	Right	77	13.9			0.30	100	0.4	
Westbound	Left	47	111.0			1.46	60	1.9	
	Thru	114	112.2			3.54	148	4.6	
	Right	103	17.4			0.50	133	0.6	

Snelling at Larpenteur

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	182	84.2			4.25	236	5.5	
	Thru	787	17.1	6	9.4	3.73	1,105	5.2	
	Right	40	4.2			0.05	54	0.1	
Southbound	Left	48	122.1			1.63	61	2.1	
	Thru	1,620	24.4	6	5.3	10.99	2,165	14.7	
	Right	120	13.2			0.44	159	0.6	
Eastbound	Left	84	79.8			1.86	111	2.5	155.2
	Thru	192	69.0			3.69	249	4.8	
	Right	21	59.0			0.35	26	0.4	
Westbound	Left	208	328.2			18.92	265	24.2	
	Thru	679	345.4			65.18	883	84.7	
	Right	85	344.1			8.14	110	10.5	

Snelling at Hoyt

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	14	18.0			0.07	19	0.1	
	Thru	922	5.2	6	9.4	1.32	1,283	1.8	
	Right	30	2.9			0.02	35	0.0	
Southbound	Left	15	8.0			0.03	21	0.0	
	Thru	1,820	2.2	6	5.3	1.13	2,419	1.5	
	Right	14	2.6			0.01	18	0.0	
Eastbound	Left	10	71.6			0.20	13	0.3	7.2
	Thru	7	85.9			0.17	9	0.2	
	Right	8	18.0			0.04	11	0.1	
Westbound	Left	73	90.5			1.85	96	2.4	
	Thru	9	76.5			0.18	11	0.2	
	Right	77	16.6			0.36	100	0.5	

Snelling at Midway

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	44	22.0			0.27	56	0.3	
	Thru	940	5.3	6	9.4	1.39	1,302	1.9	
	Right	21	2.6			0.02	27	0.0	
Southbound	Left	42	8.3			0.10	55	0.1	
	Thru	1,808	4.0	6	5.3	1.99	2,406	2.6	
	Right	52	4.6			0.07	66	0.1	
Eastbound	Left	0	-			-	0	-	7.7
	Thru	14	81.4			0.31	18	0.4	
	Right	3	11.0			0.01	4	0.0	
Westbound	Left	45	80.0			1.00	60	1.3	
	Thru	26	85.1			0.61	33	0.8	
	Right	23	7.4			0.05	29	0.1	

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Year 2013 Scenario 4 Rapid Bus w/TSP Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (A.M. Peak Hour 7:30 - 8:30)

Consulting Group, Inc.

Snelling at Hewitt

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	14	13.3			0.05	18	0.1	12.5
	Thru	1,069	13.1	6	15.5	3.90	1,505	5.5	
	Right	21	12.7			0.07	25	0.1	
Southbound	Left	75	14.1			0.30	97	0.4	
	Thru	1,360	9.2	6	9.7	3.49	1,852	4.7	
	Right	28	4.9			0.04	36	0.0	
Eastbound	Left	49	32.0			0.44	63	0.6	
	Thru	11	34.2			0.10	14	0.1	
	Right	30	15.9			0.13	39	0.2	
Westbound	Left	58	32.8			0.53	75	0.7	
	Thru	5	33.7			0.04	6	0.1	
	Right	7	16.2			0.03	9	0.0	

Snelling at Minnehaha

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	18	21.0			0.10	23	0.1	14.4
	Thru	995	8.4	6	15.5	2.32	1,406	3.3	
	Right	12	6.6			0.02	15	0.0	
Southbound	Left	35	13.8			0.13	46	0.2	
	Thru	1,289	12.6	6	9.7	4.53	1,758	6.2	
	Right	124	14.1			0.48	163	0.6	
Eastbound	Left	55	45.4			0.70	73	0.9	
	Thru	58	36.4			0.59	72	0.7	
	Right	22	35.1			0.21	28	0.3	
Westbound	Left	35	38.0			0.37	45	0.5	
	Thru	69	36.9			0.70	90	0.9	
	Right	53	34.8			0.51	68	0.7	

Snelling at Thomas

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	22	13.8			0.08	28	0.1	11.9
	Thru	946	9.6	6	15.5	2.53	1,344	3.6	
	Right	24	7.9			0.05	30	0.1	
Southbound	Left	33	14.0			0.13	41	0.2	
	Thru	1,248	12.9	6	9.7	4.46	1,707	6.1	
	Right	67	9.1			0.17	86	0.2	
Eastbound	Left	31	32.9			0.28	39	0.4	
	Thru	22	32.1			0.19	27	0.2	
	Right	16	16.9			0.08	22	0.1	
Westbound	Left	25	32.7			0.23	32	0.3	
	Thru	45	26.9			0.34	60	0.5	
	Right	49	14.2			0.19	63	0.2	

Snelling at University

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	161	26.8			1.20	209	1.6	49.9
	Thru	869	14.1	6	15.5	3.41	1,246	4.9	
	Right	126	4.2			0.15	196	0.2	
Southbound	Left	154	30.2			1.30	197	1.7	
	Thru	998	26.1	6	9.7	7.23	1,390	10.1	
	Right	144	16.6			0.67	185	0.9	
Eastbound	Left	50	48.4			0.67	64	0.9	
	Thru	227	37.9			2.39	289	3.1	
	Right	137	29.4			1.12	174	1.4	
Westbound	Left	148	227.2			9.33	220	13.9	
	Thru	549	52.1			7.93	706	10.2	
	Right	75	46.6			0.97	95	1.2	

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Year 2013 Scenario 4 Rapid Bus w/TSP Conditions VISSIM Model
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Person Delay (A.M. Peak Hour 7:30 - 8:30)

Consulting Group, Inc.

Snelling at Spruce Tree

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	66	11.2			0.20	86	0.3	5.7
	Thru	1,105	4.4	6	36.8	1.35	1,709	2.1	
	Right	54	1.8			0.03	72	0.0	
Southbound	Left	17	12.7			0.06	22	0.1	
	Thru	1,216	2.7	6	9.9	0.91	1,703	1.3	
	Right	51	1.9			0.03	63	0.0	
Eastbound	Left	19	48.0			0.26	27	0.4	
	Thru	0	34.3			0.00	1	0.0	
	Right	61	7.5			0.13	79	0.2	
Westbound	Left	47	47.4			0.62	61	0.8	
	Thru	22	47.8			0.29	30	0.4	
	Right	36	16.4			0.16	47	0.2	

Snelling at St Anthony

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	875	14.1			3.42	1,130	4.4	32.5
	Thru	822	8.2	6	36.8	1.87	1,349	3.1	
Southbound	Thru	930	35.3	6	9.9	9.11	1,327	13.0	
	Right	401	10.3			1.15	525	1.5	
Westbound	Left	214	33.4			1.98	279	2.6	
	Thru	526	35.8			5.23	681	6.8	
	Right	392	8.5			0.92	503	1.2	

Snelling at Concordia

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Thru	1,367	20.6	6	36.8	7.81	2,050	11.7	24.7
	Right	412	12.6			1.44	562	2.0	
Southbound	Left	491	10.7			1.46	635	1.9	
	Thru	640	6.5	6	9.9	1.16	953	1.7	
Eastbound	Left	327	40.0			3.63	427	4.7	
	Thru	164	37.0			1.68	216	2.2	
	Right	413	3.4			0.39	541	0.5	

Snelling at Marshall

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	67	27.8			0.51	84	0.7	37.2
	Thru	1,468	22.0	6	36.8	8.96	2,148	13.1	
	Right	50	7.5			0.10	67	0.1	
Southbound	Left	26	28.0			0.20	31	0.2	
	Thru	792	21.9	6	9.9	4.82	1,130	6.9	
	Right	226	11.5			0.72	322	1.0	
Eastbound	Left	273	66.5			5.05	414	7.6	
	Thru	211	29.6			1.73	272	2.2	
	Right	58	18.6			0.30	76	0.4	
Westbound	Left	46	23.9			0.31	60	0.4	
	Thru	329	34.1			3.11	427	4.0	
	Right	47	27.6			0.36	60	0.5	

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Consulting Group, Inc.

Snelling at Selby

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	12	44.6			0.15	15	0.2	52.5
	Thru	1,073	44.9	6	36.8	13.36	1,644	20.5	
	Right	21	39.4			0.23	27	0.3	
Southbound	Left	228	53.5			3.39	293	4.4	
	Thru	643	13.5	6	9.9	2.41	939	3.5	
	Right	28	12.5			0.10	37	0.1	
Eastbound	Left	66	332.8			6.08	86	8.0	
	Thru	144	101.0			4.05	188	5.3	
	Right	12	84.4			0.29	16	0.4	
Westbound	Left	30	45.0			0.38	39	0.5	
	Thru	176	47.7			2.33	230	3.1	
	Right	454	39.0			4.92	584	6.3	

Snelling at Summit

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	40	9.8			0.11	51	0.1	19.9
	Thru	916	4.9	6	36.8	1.24	1,438	1.9	
	Right	31	5.8			0.05	40	0.1	
Southbound	Left	40	27.3			0.31	51	0.4	
	Thru	552	20.1	6	9.9	3.08	820	4.6	
	Right	101	19.7			0.55	132	0.7	
Eastbound	Left	49	58.0			0.78	63	1.0	
	Thru	178	25.9			1.28	229	1.7	
	Right	13	21.6			0.08	17	0.1	
Westbound	Left	63	46.2			0.81	83	1.1	
	Thru	355	47.7			4.70	459	6.1	
	Right	146	41.7			1.69	189	2.2	

Snelling at Grand

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	44	12.6			0.15	56	0.2	26.0
	Thru	763	13.2	6	36.8	2.81	1,238	4.6	
	Right	56	12.3			0.19	74	0.3	
Southbound	Left	99	24.5			0.67	130	0.9	
	Thru	423	13.8	6	9.9	1.62	650	2.5	
	Right	101	9.9			0.28	131	0.4	
Eastbound	Left	46	31.8			0.40	59	0.5	
	Thru	184	30.8			1.58	243	2.1	
	Right	23	24.5			0.16	30	0.2	
Westbound	Left	81	69.0			1.54	103	2.0	
	Thru	295	77.0			6.32	375	8.0	
	Right	176	69.9			3.42	229	4.4	

Snelling at St Clair

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	39	11.1			0.12	48	0.1	14.3
	Thru	645	5.9	6	22.9	1.05	1,001	1.6	
	Right	43	3.3			0.04	55	0.1	
Southbound	Left	46	13.9			0.18	60	0.2	
	Thru	449	7.2	6	8.8	0.90	672	1.3	
	Right	30	6.6			0.06	40	0.1	
Eastbound	Left	47	43.8			0.57	61	0.7	
	Thru	217	32.1			1.93	278	2.5	
	Right	39	19.1			0.21	50	0.3	
Westbound	Left	69	51.3			0.98	87	1.2	
	Thru	256	43.5			3.10	332	4.0	
	Right	180	32.1			1.60	236	2.1	

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Year 2013 Scenario 4 Rapid Bus w/TSP Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (A.M. Peak Hour 7:30 - 8:30)

Consulting Group, Inc.

Snelling at Jefferson

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	5	19.2			0.02	5	0.0	7.8
	Thru	646	10.8	6	22.9	1.93	1,000	3.0	
	Right	24	9.3			0.06	31	0.1	
Southbound	Left	16	9.2			0.04	20	0.1	
	Thru	545	3.6	6	8.8	0.54	796	0.8	
	Right	4	3.4			0.00	5	0.0	
Eastbound	Left	19	39.8			0.21	24	0.3	
	Thru	59	37.7			0.62	75	0.8	
	Right	7	20.1			0.04	9	0.1	
Westbound	Left	62	43.8			0.76	82	1.0	
	Thru	66	46.9			0.86	87	1.1	
	Right	54	33.5			0.50	70	0.7	

Snelling at Randolph

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	64	15.7			0.28	81	0.4	26.8
	Thru	485	21.1	6	22.9	2.85	792	4.6	
	Right	33	8.0			0.07	44	0.1	
Southbound	Left	100	15.9			0.44	131	0.6	
	Thru	353	18.2	6	6.6	1.79	532	2.7	
	Right	156	12.1			0.52	201	0.7	
Eastbound	Left	100	60.6			1.69	132	2.2	
	Thru	363	46.3			4.67	474	6.1	
	Right	44	26.3			0.32	56	0.4	
Westbound	Left	60	48.2			0.80	78	1.0	
	Thru	407	48.2			5.45	521	7.0	
	Right	89	31.2			0.77	111	1.0	

Snelling at Highland

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	3	6.1			0.01	4	0.0	5.9
	Thru	488	3.9	6	10.0	0.53	719	0.8	
	Right	154	3.6			0.16	203	0.2	
Southbound	Left	20	12.9			0.07	25	0.1	
	Thru	425	6.9	6	6.6	0.81	626	1.2	
	Right	12	7.3			0.02	14	0.0	
Eastbound	Left	37	27.5			0.29	48	0.4	
	Thru	93	25.5			0.66	121	0.9	
	Right	9	7.0			0.02	12	0.0	
Westbound	Left	124	35.6			1.22	163	1.6	
	Thru	61	24.6			0.42	79	0.5	
	Right	61	9.0			0.15	78	0.2	

Snelling at Ford

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	75	12.9			0.27	98	0.4	4.8
	Thru	441	6.0			0.73	565	0.9	
	Right	5	2.6			0.00	6	0.0	
Southbound	Left	2	11.7			0.01	2	0.0	
	Thru	389	3.7			0.40	505	0.5	
	Right	171	3.4	6	6.6	0.16	301	0.3	
Eastbound	Left	203	23.3	6	10.0	1.31	359	2.3	
	Thru	3	18.3			0.02	4	0.0	
	Right	76	7.6			0.16	101	0.2	
Westbound	Left	8	21.9			0.05	10	0.1	
	Thru	5	16.3			0.02	6	0.0	
	Right	2	6.8			0.00	3	0.0	

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Year 2013 Scenario 4 Rapid Bus w/TSP Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (A.M. Peak Hour 7:30 - 8:30)

Consulting Group, Inc.

Ford at Fairview

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	40	22.5			0.25	53	0.3	8.0
	Thru	436	11.5			1.39	563	1.8	
	Right	45	9.3			0.12	57	0.1	
Southbound	Left	22	19.5			0.12	28	0.2	
	Thru	430	11.0			1.31	560	1.7	
	Right	66	9.3			0.17	83	0.2	
Eastbound	Left	88	23.1			0.57	112	0.7	
	Thru	215	13.6	6	10.0	0.81	379	1.4	
	Right	28	8.2			0.06	35	0.1	
Westbound	Left	28	16.9			0.13	34	0.2	
	Thru	216	12.9	6	6.6	0.78	358	1.3	
	Right	7	5.2			0.01	10	0.0	

Ford at Kenneth

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	38	37.2			0.39	66	0.7	3.0
	Thru	27	34.3			0.26	36	0.3	
	Right	32	15.9			0.14	40	0.2	
Southbound	Left	11	36.3			0.11	14	0.1	
	Thru	44	31.8			0.39	56	0.5	
	Right	38	10.9			0.12	66	0.2	
Eastbound	Left	31	4.2			0.04	58	0.1	
	Thru	291	1.8	6	10.0	0.15	475	0.2	
	Right	20	1.5			0.01	25	0.0	
Westbound	Left	15	5.2			0.02	19	0.0	
	Thru	300	4.4	6	6.6	0.37	463	0.6	
	Right	7	3.7			0.01	11	0.0	

Ford at Cleveland

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	296	18.6			1.52	382	2.0	13.9
	Thru	389	18.6			2.01	499	2.6	
	Right	56	21.0			0.33	109	0.6	
Southbound	Left	28	16.8			0.13	37	0.2	
	Thru	274	20.4			1.55	355	2.0	
	Right	86	22.8			0.55	149	0.9	
Eastbound	Left	91	23.1			0.59	155	1.0	
	Thru	258	11.9	6	8.7	0.85	404	1.3	
	Right	123	13.9			0.48	181	0.7	
Westbound	Left	50	26.8			0.37	85	0.6	
	Thru	288	14.1	6	6.6	1.13	463	1.8	
	Right	37	11.4			0.12	48	0.2	

Ford at Finn

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	48	32.4			0.44	63	0.6	2.9
	Thru	1	28.2			0.01	1	0.0	
	Right	42	4.8			0.06	52	0.1	
Southbound	Left	31	32.3			0.28	40	0.4	
	Thru	1	17.0			0.00	1	0.0	
	Right	29	10.9			0.09	35	0.1	
Eastbound	Left	20	9.7			0.05	25	0.1	
	Thru	400	4.8	6	8.7	0.53	651	0.9	
	Right	20	3.3			0.02	27	0.0	
Westbound	Left	125	4.8			0.17	161	0.2	
	Thru	487	2.5	6	5.5	0.34	752	0.5	
	Right	59	2.2			0.04	75	0.0	

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Year 2013 Scenario 4 Rapid Bus w/TSP Conditions VISSIM Model
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Person Delay (A.M. Peak Hour 7:30 - 8:30)

Consulting Group, Inc.

Ford at Cretin

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Southbound	Left	117	32.2			1.05	168	1.5	3.6
	Right	65	4.1			0.07	85	0.1	
Eastbound	Left	112	8.0			0.25	145	0.3	
	Thru	322	3.8	6	8.7	0.34	532	0.6	
Westbound	Thru	380	4.6	6	5.5	0.48	589	0.7	
	Right	181	5.7			0.29	257	0.4	

46th at 46th

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	28	61.9			0.47	36	0.6	7.0
	Thru	33	53.4			0.48	40	0.6	
	Right	217	2.6			0.16	281	0.2	
Southbound	Left	50	43.3			0.60	71	0.9	
	Thru	15	52.6			0.22	20	0.3	
	Right	42	54.0			0.63	55	0.8	
Eastbound	Left	25	14.4			0.10	30	0.1	
	Thru	169	19.1	6	8.7	0.89	324	1.7	
	Right	34	15.7			0.15	44	0.2	
Westbound	Left	142	9.3			0.37	179	0.5	
	Thru	219	8.0	6	5.5	0.49	367	0.8	
	Right	81	7.4			0.17	125	0.3	

46th at 42nd

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	5	29.0			0.04	8	0.1	4.7
	Thru	5	32.2			0.05	6	0.1	
	Right	4	7.7			0.01	5	0.0	
Southbound	Left	28	32.7			0.25	36	0.3	
	Thru	4	28.7			0.03	5	0.0	
	Right	84	12.2			0.28	111	0.4	
Eastbound	Left	49	21.9			0.30	63	0.4	
	Thru	190	17.4	6	8.7	0.92	349	1.7	
	Right	14	12.1			0.05	18	0.1	
Westbound	Left	4	18.6			0.02	5	0.0	
	Thru	269	14.0	6	5.5	1.05	431	1.7	
	Right	13	7.4			0.03	18	0.0	

46th at Minnehaha

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	22	28.3			0.17	29	0.2	11.6
	Thru	274	24.2			1.84	353	2.4	
	Right	13	14.1			0.05	18	0.1	
Southbound	Left	38	32.4			0.35	49	0.4	
	Thru	166	22.9			1.05	211	1.3	
	Right	109	11.2			0.34	138	0.4	
Eastbound	Left	127	21.0			0.74	165	1.0	
	Thru	206	13.8	6	8.7	0.79	370	1.4	
	Right	25	11.9			0.08	31	0.1	
Westbound	Left	74	32.8			0.67	94	0.9	
	Thru	179	28.7	6	5.5	1.43	319	2.5	
	Right	113	20.0			0.63	147	0.8	

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Year 2013 Scenario 4 Rapid Bus w/TSP Conditions VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (A.M. Peak Hour 7:30 - 8:30)

46th at Hiawatha

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	26	39.5			0.29	35	0.4	18.6
	Thru	882	24.3			5.97	1,128	7.6	
	Right	183	2.3			0.12	238	0.2	
Southbound	Left	94	36.1			0.94	117	1.2	
	Thru	530	16.4			2.42	682	3.1	
	Right	14	0.9			0.00	17	0.0	
Eastbound	Left	63	22.9			0.40	83	0.5	
	Thru	80	29.1	6	8.7	0.65	210	1.7	
	Right	44	32.9			0.41	58	0.5	
Westbound	Left	164	34.0			1.55	213	2.0	
	Thru	71	23.9	6	5.5	0.47	174	1.2	
	Right	71	7.6			0.15	92	0.2	

46th at 36th

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	5	7.7			0.01	6	0.0	1.0
	Thru	0	-			-	0	-	
	Right	5	4.5			0.01	6	0.0	
Southbound	Left	41	8.3	6	8.7	0.09	160	0.4	
	Thru	0	-			-	0	-	
	Right	15	4.2			0.02	21	0.0	
Eastbound	Left	15	6.2			0.03	18	0.0	
	Thru	142	6.1			0.24	182	0.3	
	Right	8	2.8			0.01	11	0.0	
Westbound	Left	1	4.7			0.00	2	0.0	
	Thru	86	3.6			0.08	111	0.1	
	Right	24	2.5	6	5.5	0.02	112	0.1	

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Year 2013 Scenario 4 Rapid Bus w/TSP VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (P.M. Peak Hour 4:45 - 5:45)

Consulting Group, Inc.

Co B2 at Snelling W Ramps

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	75	32.6			0.68	99	0.9	32.8
	Thru	151	34.3	6	16.9	1.44	331	3.2	
	Right	142	4.0			0.16	185	0.2	
Southbound	Left	6	42.0			0.07	7	0.1	
	Thru	106	43.2			1.27	137	1.6	
	Right	148	4.4			0.18	192	0.2	
Eastbound	Left	403	52.2			5.85	521	7.6	
	Thru	747	27.0			5.61	973	7.3	
	Right	77	10.4			0.22	99	0.3	
Westbound	Left	350	46.1	6	19.2	4.48	603	7.7	
	Thru	438	22.7			2.76	574	3.6	
	Right	24	6.2			0.04	49	0.1	

Co B2 at Snelling E Ramps

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Southbound	Left	21	41.1			0.24	28	0.3	8.6
	Right	495	23.6	6	19.2	3.24	813	5.3	
Eastbound	Left	248	9.6			0.66	324	0.9	
	Thru	648	5.0			0.90	843	1.2	
Westbound	Thru	318	8.1			0.71	413	0.9	
	Right	38	2.8			0.03	50	0.0	

Snelling at Co B

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	153	79.5			3.39	198	4.4	172.4
	Thru	1,562	8.6	6	19.2	3.73	2,175	5.2	
	Right	212	3.3			0.20	276	0.3	
Southbound	Left	425	112.6			13.28	566	17.7	
	Thru	1,246	30.1	6	16.9	10.42	1,750	14.6	
	Right	294	15.7			1.28	382	1.7	
Eastbound	Left	166	436.4			20.13	217	26.3	
	Thru	467	414.0			53.75	606	69.6	
	Right	142	346.8			13.69	186	17.9	
Westbound	Left	167	88.2			4.10	216	5.3	
	Thru	261	73.7			5.34	339	6.9	
	Right	299	21.8			1.81	404	2.4	

Snelling at HarMar

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	51	74.7			1.05	67	1.4	22.2
	Thru	1,612	5.5	6	19.2	2.46	2,240	3.4	
	Right	268	3.3			0.25	346	0.3	
Southbound	Left	124	69.8			2.41	159	3.1	
	Thru	1,334	6.2	6	16.9	2.30	1,865	3.2	
	Right	98	3.3			0.09	128	0.1	
Eastbound	Left	115	80.3			2.57	150	3.3	
	Thru	49	87.6			1.20	63	1.5	
	Right	80	11.2			0.25	103	0.3	
Westbound	Left	100	83.8			2.32	128	3.0	
	Thru	57	78.1			1.24	75	1.6	
	Right	197	11.7			0.64	255	0.8	

* Results shown are the average of 20 model runs.
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Year 2013 Scenario 4 Rapid Bus w/TSP VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (P.M. Peak Hour 4:45 - 5:45)

Consulting Group, Inc.

Snelling at Roselawn

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	15	120.9			0.50	19	0.6	37.7
	Thru	1,834	4.1	6	19.2	2.11	2,524	2.9	
	Right	28	3.6			0.03	37	0.0	
Southbound	Left	96	229.7			6.10	122	7.8	
	Thru	1,305	11.5	6	16.9	4.17	1,828	5.8	
	Right	101	6.1			0.17	130	0.2	
Eastbound	Left	51	152.1			2.14	67	2.8	
	Thru	192	143.4			7.66	250	10.0	
	Right	70	64.1			1.24	91	1.6	
Westbound	Left	22	144.1			0.87	27	1.1	
	Thru	94	126.3			3.28	122	4.3	
	Right	45	31.7			0.40	59	0.5	

Snelling at Larpenteur

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	222	88.3			5.45	286	7.0	163.7
	Thru	1,700	37.9	6	19.2	17.92	2,352	24.8	
	Right	185	20.8			1.07	240	1.4	
Southbound	Left	172	219.4			10.51	223	13.6	
	Thru	1,044	53.3	6	16.9	15.47	1,492	22.1	
	Right	171	30.2			1.44	222	1.9	
Eastbound	Left	26	213.2			1.55	34	2.0	
	Thru	669	245.0			45.50	868	59.1	
	Right	187	255.2			13.25	244	17.3	
Westbound	Left	153	96.1			4.10	199	5.3	
	Thru	352	53.9			5.28	456	6.8	
	Right	151	46.1			1.93	195	2.5	

Snelling at Hoyt

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	7	13.7			0.03	9	0.0	10.5
	Thru	2,065	7.0	6	19.2	4.02	2,823	5.5	
	Right	124	5.6			0.19	161	0.3	
Southbound	Left	45	32.3			0.40	58	0.5	
	Thru	1,331	2.9	6	16.9	1.06	1,865	1.5	
	Right	9	2.8			0.01	12	0.0	
Eastbound	Left	23	82.7			0.53	30	0.7	
	Thru	6	74.9			0.12	8	0.2	
	Right	1	11.6			0.00	2	0.0	
Westbound	Left	41	86.3			0.97	53	1.3	
	Thru	10	80.2			0.22	13	0.3	
	Right	29	22.1			0.18	38	0.2	

Snelling at Midway

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	53	16.4			0.24	69	0.3	15.8
	Thru	2,098	10.9	6	19.2	6.36	2,865	8.7	
	Right	66	9.1			0.17	84	0.2	
Southbound	Left	75	19.1			0.40	98	0.5	
	Thru	1,251	4.2	6	16.9	1.45	1,760	2.0	
	Right	48	5.1			0.07	62	0.1	
Eastbound	Left	46	91.5			1.17	60	1.5	
	Thru	30	84.3			0.69	38	0.9	
	Right	39	9.1			0.10	51	0.1	
Westbound	Left	19	96.4			0.52	26	0.7	
	Thru	15	86.9			0.37	21	0.5	
	Right	51	13.1			0.19	66	0.2	

* Results shown are the average of 20 model runs.
** Results shown are from all vehicles except transit vehicles.

Year 2013 Scenario 4 Rapid Bus w/TSP VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (P.M. Peak Hour 4:45 - 5:45)

Consulting Group, Inc.

Snelling at Hewitt

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	24	18.2			0.12	31	0.2	22.9
	Thru	1,582	16.6	6	24.4	7.31	2,228	10.3	
	Right	19	17.7			0.09	24	0.1	
Southbound	Left	71	24.5			0.49	92	0.6	
	Thru	1,341	14.2	6	25.7	5.30	1,928	7.6	
	Right	102	7.3			0.21	132	0.3	
Eastbound	Left	91	45.8			1.15	118	1.5	
	Thru	11	47.1			0.15	15	0.2	
	Right	74	30.4			0.62	96	0.8	
Westbound	Left	30	39.4			0.33	40	0.4	
	Thru	20	36.8			0.21	27	0.3	
	Right	80	23.1			0.51	104	0.7	

Snelling at Minnehaha

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	40	26.5			0.29	51	0.4	35.1
	Thru	1,411	21.2	6	24.4	8.29	2,004	11.8	
	Right	51	21.6			0.31	65	0.4	
Southbound	Left	103	30.5			0.87	135	1.1	
	Thru	1,235	20.2	6	25.7	6.93	1,790	10.0	
	Right	105	22.7			0.66	135	0.9	
Eastbound	Left	135	60.5			2.26	176	3.0	
	Thru	176	46.7			2.28	228	3.0	
	Right	76	44.5			0.93	99	1.2	
Westbound	Left	50	49.2			0.68	63	0.9	
	Thru	131	35.2			1.28	170	1.7	
	Right	79	31.8			0.70	103	0.9	

Snelling at Thomas

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	45	21.8			0.27	59	0.4	29.2
	Thru	1,358	21.0	6	24.4	7.93	1,941	11.3	
	Right	72	20.4			0.41	93	0.5	
Southbound	Left	61	27.0			0.46	80	0.6	
	Thru	1,266	20.9	6	25.7	7.34	1,830	10.6	
	Right	31	11.8			0.10	41	0.1	
Eastbound	Left	110	43.6			1.34	141	1.7	
	Thru	85	43.5			1.03	110	1.3	
	Right	79	35.7			0.79	101	1.0	
Westbound	Left	40	39.4			0.44	51	0.6	
	Thru	55	35.2			0.54	72	0.7	
	Right	44	24.1			0.30	56	0.4	

Snelling at University

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	112	44.4			1.38	145	1.8	214.0
	Thru	1,078	20.8	6	24.4	6.22	1,582	9.1	
	Right	180	8.1			0.40	268	0.6	
Southbound	Left	197	59.1			3.23	254	4.2	
	Thru	1,110	46.0	6	42.3	14.18	1,724	22.0	
	Right	60	27.7			0.46	78	0.6	
Eastbound	Left	174	190.5			9.19	224	11.8	
	Thru	743	293.0			60.45	962	78.3	
	Right	155	332.7			14.36	204	18.8	
Westbound	Left	167	166.6			7.72	250	11.6	
	Thru	522	205.6			29.79	676	38.6	
	Right	213	218.3			12.94	273	16.6	

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Year 2013 Scenario 4 Rapid Bus w/TSP VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (P.M. Peak Hour 4:45 - 5:45)

Consulting Group, Inc.

Snelling at Spruce Tree

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	61	21.9			0.37	81	0.5	23.2
	Thru	1,240	14.8	6	21.6	5.11	1,808	7.5	
	Right	148	7.3			0.30	192	0.4	
Southbound	Left	70	28.0			0.54	90	0.7	
	Thru	1,350	10.2	6	42.3	3.81	2,071	5.8	
	Right	14	9.8			0.04	17	0.0	
Eastbound	Left	35	55.2			0.53	45	0.7	
	Thru	64	45.7			0.82	83	1.1	
	Right	177	11.3			0.56	232	0.7	
Westbound	Left	141	60.8			2.38	183	3.1	
	Thru	54	57.8			0.87	69	1.1	
	Right	98	45.1			1.23	128	1.6	

Snelling at St Anthony

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	368	19.6			2.00	479	2.6	71.9
	Thru	1,001	11.3	6	21.6	3.15	1,495	4.7	
Southbound	Thru	1,319	76.0	6	42.3	27.82	2,034	42.9	
	Right	355	7.7			0.76	458	1.0	
Westbound	Left	367	63.3			6.45	495	8.7	
	Thru	435	60.0			7.24	566	9.4	
	Right	446	16.0			1.98	581	2.6	

Snelling at Concordia

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Thru	1,029	39.7	6	21.6	11.35	1,534	16.9	61.5
	Right	236	21.8			1.43	308	1.9	
Southbound	Left	497	10.9			1.50	642	1.9	
	Thru	1,198	18.6	6	42.3	6.19	1,900	9.8	
Eastbound	Left	357	61.6			6.12	467	8.0	
	Thru	353	72.6			7.13	460	9.3	
	Right	644	58.8			10.53	840	13.7	

Snelling at Marshall

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	47	46.5			0.61	61	0.8	74.2
	Thru	1,003	39.3	6	21.6	10.95	1,468	16.0	
	Right	80	22.1			0.49	103	0.6	
Southbound	Left	48	51.3			0.69	64	0.9	
	Thru	1,564	53.5	6	42.3	23.23	2,323	34.5	
	Right	227	41.5			2.62	346	4.0	
Eastbound	Left	216	62.1			3.73	315	5.4	
	Thru	349	42.8			4.15	451	5.4	
	Right	85	38.4			0.91	110	1.2	
Westbound	Left	73	35.9			0.72	96	1.0	
	Thru	245	44.4			3.02	317	3.9	
	Right	43	34.0			0.41	56	0.5	

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Year 2013 Scenario 4 Rapid Bus w/TSP VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (P.M. Peak Hour 4:45 - 5:45)

SRF Consulting Group, Inc.

Snelling at Selby

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	26	99.9			0.71	33	0.9	49.2
	Thru	857	50.5	6	21.6	12.03	1,279	18.0	
	Right	53	48.0			0.71	70	0.9	
Southbound	Left	393	78.4			8.56	514	11.2	
	Thru	1,131	12.9	6	42.3	4.05	1,759	6.3	
	Right	188	11.1			0.58	245	0.8	
Eastbound	Left	53	61.4			0.90	67	1.1	
	Thru	285	34.5			2.73	368	3.5	
	Right	38	28.3			0.30	49	0.4	
Westbound	Left	43	51.6			0.62	57	0.8	
	Thru	204	39.3			2.22	263	2.9	
	Right	210	31.1			1.81	271	2.3	

Snelling at Summit

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	32	30.3			0.27	41	0.3	59.5
	Thru	721	15.2	6	21.6	3.04	1,103	4.7	
	Right	69	17.8			0.34	90	0.4	
Southbound	Left	94	31.1			0.81	122	1.1	
	Thru	985	23.5	6	42.3	6.44	1,571	10.3	
	Right	128	23.7			0.84	165	1.1	
Eastbound	Left	68	256.1			4.83	90	6.4	
	Thru	382	120.7			12.82	499	16.7	
	Right	16	105.8			0.48	21	0.6	
Westbound	Left	58	102.2			1.65	76	2.2	
	Thru	401	79.5			8.85	523	11.5	
	Right	156	74.5			3.23	202	4.2	

Snelling at Grand

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	71	27.3			0.54	93	0.7	39.2
	Thru	596	31.0	6	21.6	5.13	940	8.1	
	Right	138	29.1			1.11	177	1.4	
Southbound	Left	188	26.8			1.40	244	1.8	
	Thru	749	16.0	6	42.3	3.32	1,265	5.6	
	Right	131	14.7			0.53	169	0.7	
Eastbound	Left	76	53.5			1.13	98	1.5	
	Thru	423	43.4			5.10	550	6.6	
	Right	64	37.3			0.67	84	0.9	
Westbound	Left	94	68.3			1.79	123	2.3	
	Thru	345	56.2			5.38	444	6.9	
	Right	149	49.6			2.05	195	2.7	

Snelling at St Clair

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	55	35.9			0.55	71	0.7	23.1
	Thru	566	8.1	6	18.6	1.27	881	2.0	
	Right	87	4.8			0.12	112	0.2	
Southbound	Left	104	28.1			0.81	136	1.1	
	Thru	675	14.1	6	30.0	2.64	1,096	4.3	
	Right	119	15.3			0.50	151	0.6	
Eastbound	Left	76	59.3			1.24	97	1.6	
	Thru	310	40.6			3.50	404	4.6	
	Right	42	30.3			0.36	54	0.5	
Westbound	Left	77	50.4			1.08	100	1.4	
	Thru	317	40.5			3.56	412	4.6	
	Right	152	30.6			1.29	197	1.7	

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Year 2013 Scenario 4 Rapid Bus w/TSP VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (P.M. Peak Hour 4:45 - 5:45)

SRF Consulting Group, Inc.

Snelling at Jefferson

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	7	14.4			0.03	10	0.0	11.5
	Thru	671	11.5	6	18.6	2.15	1,017	3.3	
	Right	44	11.3			0.14	56	0.2	
Southbound	Left	38	13.9			0.15	50	0.2	
	Thru	755	7.9	6	30.0	1.66	1,200	2.6	
	Right	1	12.3			0.00	1	0.0	
Eastbound	Left	11	54.8			0.17	15	0.2	
	Thru	82	49.5			1.13	107	1.5	
	Right	8	39.5			0.09	10	0.1	
Westbound	Left	40	64.2			0.72	53	0.9	
	Thru	85	60.8			1.44	111	1.9	
	Right	37	44.8			0.45	48	0.6	

Snelling at Randolph

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	53	21.4			0.32	68	0.4	27.4
	Thru	495	26.5	6	18.6	3.65	790	5.8	
	Right	106	13.1			0.38	136	0.5	
Southbound	Left	148	20.3			0.83	193	1.1	
	Thru	545	17.9	6	15.1	2.71	835	4.2	
	Right	117	9.6			0.31	153	0.4	
Eastbound	Left	123	50.9			1.75	159	2.3	
	Thru	423	41.3			4.85	547	6.3	
	Right	41	26.4			0.30	53	0.4	
Westbound	Left	88	34.5			0.84	113	1.1	
	Thru	347	34.3			3.30	449	4.3	
	Right	103	19.6			0.56	133	0.7	

Snelling at Highland

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	8	8.6			0.02	11	0.0	6.0
	Thru	607	3.3	6	12.0	0.55	891	0.8	
	Right	100	2.9			0.08	129	0.1	
Southbound	Left	33	14.8			0.14	43	0.2	
	Thru	603	7.3	6	15.1	1.22	909	1.8	
	Right	36	6.5			0.07	46	0.1	
Eastbound	Left	23	25.0			0.16	30	0.2	
	Thru	75	24.9			0.52	97	0.7	
	Right	18	6.5			0.03	22	0.0	
Westbound	Left	110	34.4			1.05	144	1.4	
	Thru	68	24.1			0.46	88	0.6	
	Right	21	10.5			0.06	27	0.1	

Snelling at Ford

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	124	18.9			0.65	160	0.8	7.2
	Thru	446	6.6			0.82	578	1.1	
	Right	5	4.2			0.01	7	0.0	
Southbound	Left	13	8.5			0.03	18	0.0	
	Thru	461	4.8			0.62	601	0.8	
	Right	253	4.8	6	15.1	0.34	452	0.6	
Eastbound	Left	267	24.9	6	12.0	1.85	450	3.1	
	Thru	8	26.9			0.06	10	0.1	
	Right	143	11.4			0.45	188	0.6	
Westbound	Left	8	21.8			0.05	10	0.1	
	Thru	5	21.1			0.03	6	0.0	
	Right	3	5.6			0.00	4	0.0	

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Year 2013 Scenario 4 Rapid Bus w/TSP VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (P.M. Peak Hour 4:45 - 5:45)

Consulting Group, Inc.

Ford at Fairview

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	71	44.9			0.88	91	1.1	16.7
	Thru	498	13.6			1.88	646	2.4	
	Right	25	12.3			0.09	33	0.1	
Southbound	Left	26	24.1			0.17	33	0.2	
	Thru	464	17.9			2.31	604	3.0	
	Right	181	16.4			0.83	236	1.1	
Eastbound	Left	143	52.6			2.09	186	2.7	
	Thru	366	17.8	6	12.0	1.81	584	2.9	
	Right	67	11.0			0.20	88	0.3	
Westbound	Left	15	21.6			0.09	20	0.1	
	Thru	352	16.5	6	15.1	1.61	579	2.7	
	Right	16	8.4			0.04	20	0.0	

Ford at Kenneth

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	54	54.8			0.83	88	1.3	5.7
	Thru	21	49.9			0.29	28	0.4	
	Right	37	28.7			0.30	48	0.4	
Southbound	Left	29	49.6			0.40	40	0.5	
	Thru	26	47.7			0.34	33	0.4	
	Right	43	22.0			0.26	73	0.4	
Eastbound	Left	46	7.9			0.10	78	0.2	
	Thru	505	2.5	6	12.0	0.35	763	0.5	
	Right	48	2.2			0.03	64	0.0	
Westbound	Left	14	9.8			0.04	18	0.1	
	Thru	568	5.8	6	15.1	0.92	860	1.4	
	Right	21	4.6			0.03	27	0.0	

Ford at Cleveland

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	247	51.9			3.56	320	4.6	43.2
	Thru	352	31.4			3.07	454	4.0	
	Right	38	32.3			0.34	86	0.8	
Southbound	Left	79	68.3			1.51	102	1.9	
	Thru	403	71.4			7.99	522	10.4	
	Right	169	76.9			3.62	254	5.4	
Eastbound	Left	158	30.3			1.33	241	2.0	
	Thru	488	20.4	6	10.7	2.77	717	4.1	
	Right	269	28.9			2.16	384	3.1	
Westbound	Left	85	31.6			0.74	127	1.1	
	Thru	496	23.6	6	15.1	3.26	784	5.1	
	Right	83	24.0			0.55	106	0.7	

Ford at Finn

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	201	53.1			2.96	262	3.9	14.6
	Thru	10	32.7			0.09	12	0.1	
	Right	176	10.6			0.52	228	0.7	
Southbound	Left	114	42.9			1.36	149	1.8	
	Thru	16	38.6			0.17	21	0.2	
	Right	67	27.9			0.52	85	0.7	
Eastbound	Left	52	18.0			0.26	67	0.3	
	Thru	635	14.2	6	10.7	2.50	979	3.9	
	Right	43	10.2			0.12	56	0.2	
Westbound	Left	195	13.6			0.74	251	0.9	
	Thru	659	6.9	6	10.1	1.26	1,000	1.9	
	Right	52	5.4			0.08	67	0.1	

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Year 2013 Scenario 4 Rapid Bus w/TSP VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (P.M. Peak Hour 4:45 - 5:45)

SRF Consulting Group, Inc.

Ford at Cretin

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Southbound	Left	172	48.1			2.30	241	3.2	8.9
	Right	111	5.6			0.17	143	0.2	
Eastbound	Left	111	13.7			0.42	142	0.5	
	Thru	559	5.0	6	10.7	0.78	862	1.2	
Westbound	Thru	783	8.8	6	10.1	1.92	1,144	2.8	
	Right	145	15.4			0.62	205	0.9	

46th at 46th

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	14	53.6			0.21	18	0.3	9.8
	Thru	39	53.0			0.57	50	0.7	
	Right	252	3.0			0.21	327	0.3	
Southbound	Left	81	42.6			0.96	123	1.5	
	Thru	31	52.4			0.45	40	0.6	
	Right	10	66.7			0.18	13	0.2	
Eastbound	Left	26	10.4			0.07	34	0.1	
	Thru	338	11.0	6	10.7	1.03	556	1.7	
	Right	50	16.6			0.23	65	0.3	
Westbound	Left	299	16.2			1.35	389	1.7	
	Thru	475	9.7	6	10.1	1.28	728	2.0	
	Right	118	9.4			0.31	170	0.4	

46th at 42nd

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	5	35.2			0.05	7	0.1	5.8
	Thru	6	32.0			0.05	7	0.1	
	Right	4	5.8			0.01	5	0.0	
Southbound	Left	37	32.4			0.33	50	0.4	
	Thru	5	33.3			0.05	6	0.1	
	Right	58	13.8			0.22	74	0.3	
Eastbound	Left	85	26.4			0.62	110	0.8	
	Thru	372	16.1	6	10.7	1.67	599	2.7	
	Right	5	12.9			0.02	7	0.0	
Westbound	Left	3	10.2			0.01	4	0.0	
	Thru	460	6.6	6	10.1	0.84	708	1.3	
	Right	34	5.9			0.06	44	0.1	

46th at Minnehaha

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	42	44.9			0.52	55	0.7	44.8
	Thru	271	36.8			2.77	353	3.6	
	Right	66	24.2			0.44	87	0.6	
Southbound	Left	120	165.5			5.49	154	7.1	
	Thru	306	150.5			12.80	399	16.7	
	Right	118	140.1			4.58	150	5.8	
Eastbound	Left	173	25.9			1.25	227	1.6	
	Thru	277	13.4	6	10.7	1.03	475	1.8	
	Right	15	13.6			0.06	20	0.1	
Westbound	Left	82	35.4			0.80	108	1.1	
	Thru	353	31.3	6	10.1	3.07	567	4.9	
	Right	91	26.6			0.67	117	0.9	

* Results shown are the average of 20 model runs.
** Results shown are from all vehicles except transit vehicles.

Year 2013 Scenario 4 Rapid Bus w/TSP VISSIM Model
Snelling Avenue Rapid Bus VISSIM Evaluation
Person Delay (P.M. Peak Hour 4:45 - 5:45)

Consulting Group, Inc.

46th at Hiawatha

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	85	41.6			0.98	109	1.3	27.8
	Thru	808	27.4			6.14	1,043	7.9	
	Right	243	2.7			0.18	316	0.2	
Southbound	Left	145	40.5			1.63	188	2.1	
	Thru	859	24.5			5.85	1,113	7.6	
	Right	39	2.2			0.02	52	0.0	
Eastbound	Left	52	25.1			0.36	66	0.5	
	Thru	77	34.2	6	10.7	0.73	217	2.1	
	Right	22	34.6			0.21	28	0.3	
Westbound	Left	201	42.3			2.36	263	3.1	
	Thru	145	25.2	6	10.1	1.02	296	2.1	
	Right	166	11.8			0.54	214	0.7	

46th at 36th

Approach	Movement	Simulated Volume (vph)	Movement Delay (sec/veh)	Rapid Bus Volume	Rapid Bus Passengers/Bus	Total Delay (hrs)	Total Persons	Person Delay (hrs)	Person Delay (hrs)
Northbound	Left	1	9.0			0.00	2	0.0	0.9
	Thru	2	11.1			0.00	2	0.0	
	Right	0	-			-	0	-	
Southbound	Left	36	6.5	6	10.7	0.06	163	0.3	
	Thru	1	7.1			0.00	1	0.0	
	Right	5	4.2			0.01	7	0.0	
Eastbound	Left	5	5.0			0.01	7	0.0	
	Thru	115	4.8			0.15	148	0.2	
	Right	1	2.0			0.00	1	0.0	
Westbound	Left	0	-			-	0	-	
	Thru	241	3.4			0.23	311	0.3	
	Right	28	2.1	6	10.1	0.02	145	0.1	

* Results shown are the average of 20 model runs.
** Results shown are from all vehicles except transit vehicles.

Snelling Avenue Rapid Bus VISSIM Evaluation
Station Travel Time Comparison (A.M. Peak Hour 7:30 - 8:30)

Consulting Group, Inc.

Station	Segment (ft)	Travel Time (sec)				
		Baseline Scenario 1	Preliminary Rapid Bus Scenario 2 (Alpha)	Refined Rapid Bus Scenario 3 (Beta)	Refined Rapid Bus Scenario 3A	Rapid Bus w/TSP Scenario 4
Northbound						
46th Street Station	-	-	-	-	-	-
Minnehaha Avenue	752	31.9	32.1	32.1	31.3	30.3
46th Avenue/Minnehaha Park	931	42.0	42.0	41.9	41.3	38.5
Woodlawn Avenue/Ford Plant	950	20.7	20.7	20.7	20.7	20.7
Finn Street	613	18.0	17.9	18.1	18.1	17.9
Kenneth Street	921	21.8	21.9	21.8	21.9	21.9
Fairview Avenue	984	34.2	34.9	34.6	34.0	34.2
Highland Parkway	784	18.1	18.1	18.0	18.1	18.3
Randolph Avenue	728	36.6	35.8	37.2	37.3	34.3
St. Clair Avenue	797	20.9	21.0	21.0	21.2	20.6
Grand Avenue	829	30.4	31.1	31.2	31.0	29.9
Hague_Selby	785	65.4	65.0	71.8	76.3	59.8
University_Spruce Tree	1,028	43.3	43.5	43.5	43.5	39.7
Minnehaha Avenue	776	23.4	23.7	23.4	23.6	23.6
Hewitt Avenue	877	30.2	30.2	30.5	30.1	30.6
Como Avenue	-	-	-	-	-	-
Larpenteur Avenue	1,531	39.8	40.4	39.3	39.7	39.6
Roselawn Avenue	612	12.9	12.9	12.9	13.0	12.8
County Road B/Har Mar Mall	629	10.6	10.6	10.6	10.7	10.5
Rosedale Transit Center	-	-	-	-	-	-
Southbound						
Rosedale Transit Center	-	-	-	-	-	-
County Road B	812	14.9	15.0	15.0	15.0	14.7
Roselawn Avenue	610	10.5	10.6	10.6	10.7	10.7
Larpenteur Avenue	1,528	46.2	46.9	46.6	46.7	45.2
Como Avenue	-	-	-	-	-	-
Hewitt Avenue	1,242	23.6	23.9	23.7	23.6	23.8
Minnehaha Avenue	875	24.1	24.3	24.2	24.0	24.3
University Avenue	778	38.7	38.5	38.4	38.8	35.8
Hague_Dayton	1,267	41.9	42.1	41.9	42.2	41.3
Grand Avenue	567	35.4	35.2	35.3	35.5	31.8
St. Clair Avenue	828	23.0	23.0	22.9	22.9	22.9
Randolph Avenue	794	31.6	31.7	32.1	32.1	31.0
Highland Parkway	730	20.4	20.6	20.5	20.5	21.2
Fairview Avenue	786	33.7	35.1	34.5	34.6	33.9
Kenneth Street	983	23.1	23.4	23.2	22.9	23.3
Finn Street	918	15.5	15.5	15.6	15.7	15.6
Woodlawn Avenue/Ford Plant	612	20.5	20.6	20.6	20.6	20.6
45th Avenue/46th Avenue	949	28.9	28.1	28.2	28.4	28.1
Minnehaha Avenue	968	49.0	48.6	48.6	48.6	45.1
46th Street Station	-	-	-	-	-	-

Note:

Travel time segments are from approximately 2 blocks upstream to 2 blocks downstream of a Rapid Bus station.

* Results shown are the average of 5 model runs.

** Results shown are from all vehicles except transit vehicles.

Snelling Avenue Rapid Bus VISSIM Evaluation
Station Travel Time Comparison (P.M. Peak Hour 4:45 - 5:45)

	Baseline Scenario 1	Preliminary Rapid Bus Scenario 2 (Alpha)	Refined Rapid Bus Scenario 3 (Beta)	Refined Rapid Bus Scenario 3A	Rapid Bus w/TSP Scenario 4

Station	Segment (ft)	Travel Time (sec)				
Northbound						
46th Street Station	-	-	-	-	-	-
Minnehaha Avenue	752	31.6	32.1	31.9	31.8	30.4
46th Avenue/Minnehaha Park	931	30.5	31.1	31.2	30.8	30.5
Woodlawn Avenue/Ford Plant	950	21.0	21.1	21.1	21.1	21.1
Finn Street	613	28.3	29.1	29.1	29.1	28.0
Kenneth Street	921	23.0	23.0	23.0	23.1	23.0
Fairview Avenue	984	37.3	38.1	38.5	38.7	37.2
Highland Parkway	784	17.6	17.6	17.6	17.6	17.7
Randolph Avenue	728	41.4	41.5	41.2	41.6	39.4
St. Clair Avenue	797	23.1	23.2	23.3	23.3	22.8
Grand Avenue	829	59.5	60.0	60.1	59.6	56.7
Hague_Selby	785	72.8	79.7	84.8	84.3	66.7
University_Spruce Tree	1,028	79.9	89.4	78.2	89.5	53.6
Minnehaha Avenue	776	29.9	30.6	31.3	30.7	31.2
Hewitt Avenue	877	31.0	31.1	31.3	31.1	31.4
Como Avenue	-	-	-	-	-	-
Larpenteur Avenue	1,531	62.9	63.4	63.2	63.1	55.4
Roselawn Avenue	612	11.3	11.3	11.4	11.4	11.7
County Road B/Har Mar Mall	629	10.8	10.8	10.7	10.7	10.8
Rosedale Transit Center	-	-	-	-	-	-
Southbound						
Rosedale Transit Center	-	-	-	-	-	-
County Road B	812	17.9	17.8	18.0	17.7	17.4
Roselawn Avenue	610	15.6	15.1	15.2	15.4	16.4
Larpenteur Avenue	1,528	67.8	67.4	67.5	67.8	65.8
Como Avenue	-	-	-	-	-	-
Hewitt Avenue	1,242	29.6	29.0	29.2	29.0	28.3
Minnehaha Avenue	875	31.9	31.4	31.9	32.7	30.9
University Avenue	778	68.7	70.3	71.4	71.1	53.8
Hague_Dayton	1,267	39.3	39.7	40.3	40.0	40.8
Grand Avenue	567	29.8	30.3	30.3	30.3	33.8
St. Clair Avenue	828	31.0	31.3	31.7	31.7	29.0
Randolph Avenue	794	30.5	30.5	30.3	30.6	30.5
Highland Parkway	730	21.9	22.1	22.1	21.9	21.5
Fairview Avenue	786	37.4	38.6	38.7	38.7	37.4
Kenneth Street	983	25.8	26.2	26.1	26.2	25.5
Finn Street	918	20.1	20.7	20.4	20.5	20.2
Woodlawn Avenue/Ford Plant	612	21.2	21.5	21.5	21.5	21.5
45th Avenue/46th Avenue	949	28.7	28.8	28.7	28.7	28.8
Minnehaha Avenue	968	51.6	51.4	51.4	51.6	47.6
46th Street Station	-	-	-	-	-	-

Note:

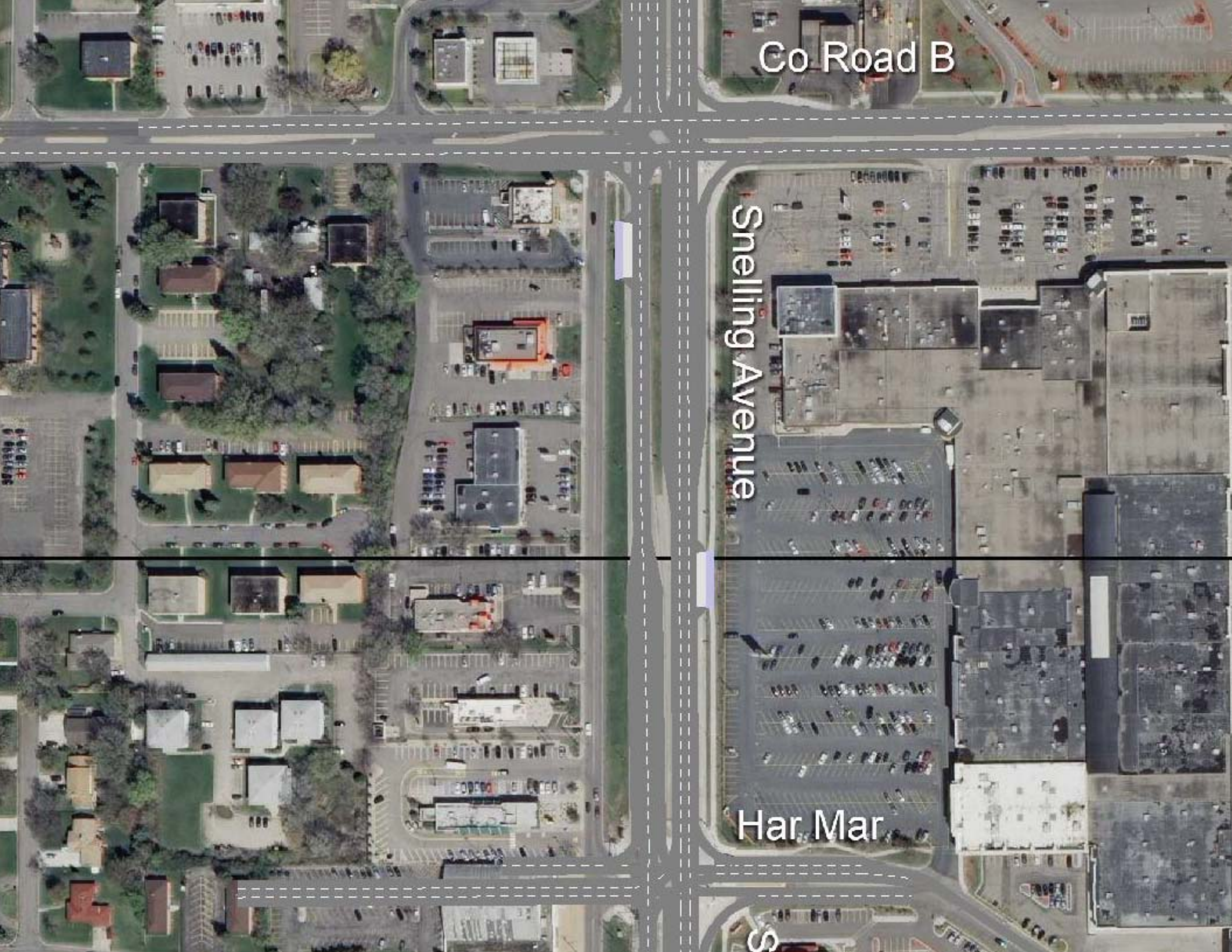
Travel time segments are from approximately 2 blocks upstream to 2 blocks downstream of a Rapid Bus station.

* Results shown are the average of 20 model runs.

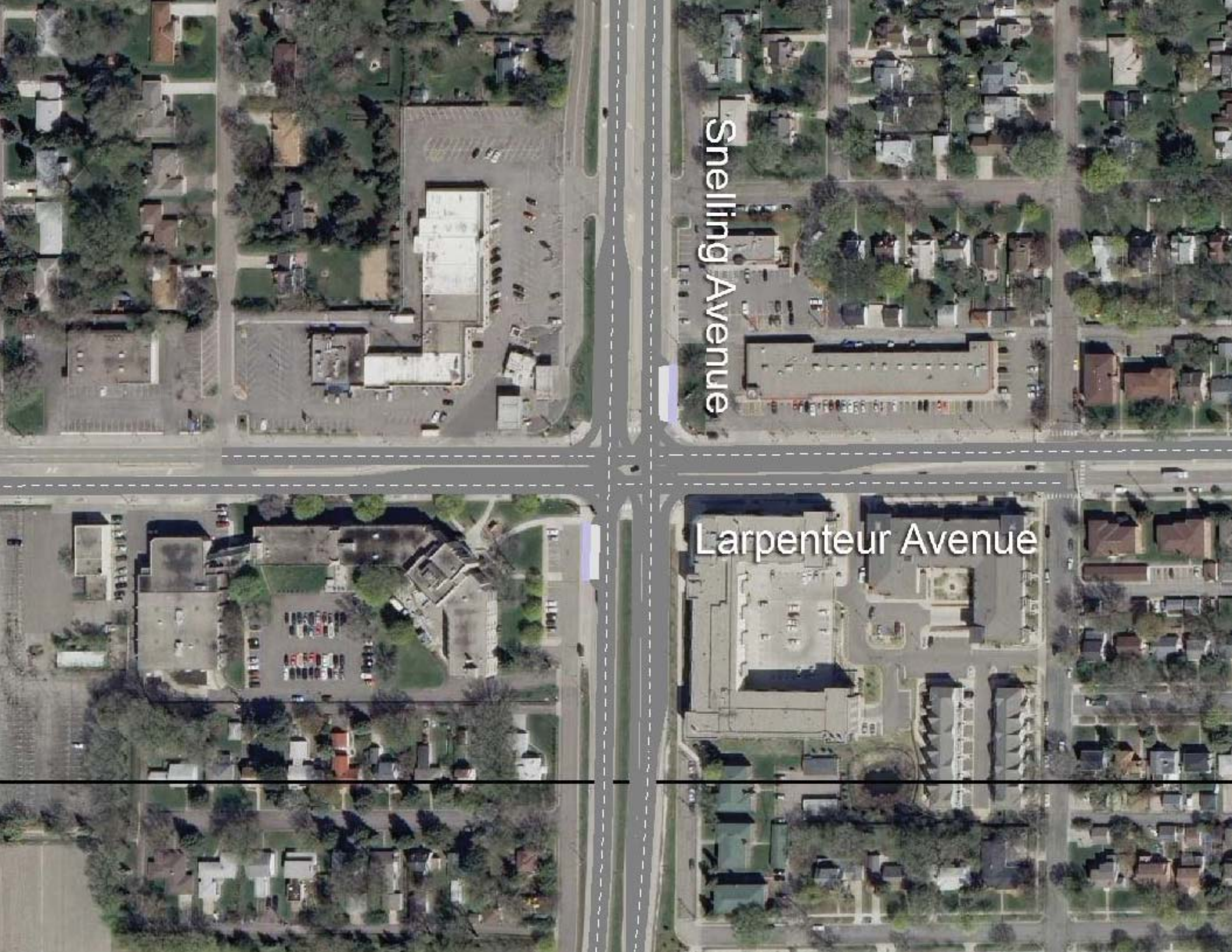
** Results shown are from all vehicles except transit vehicles.

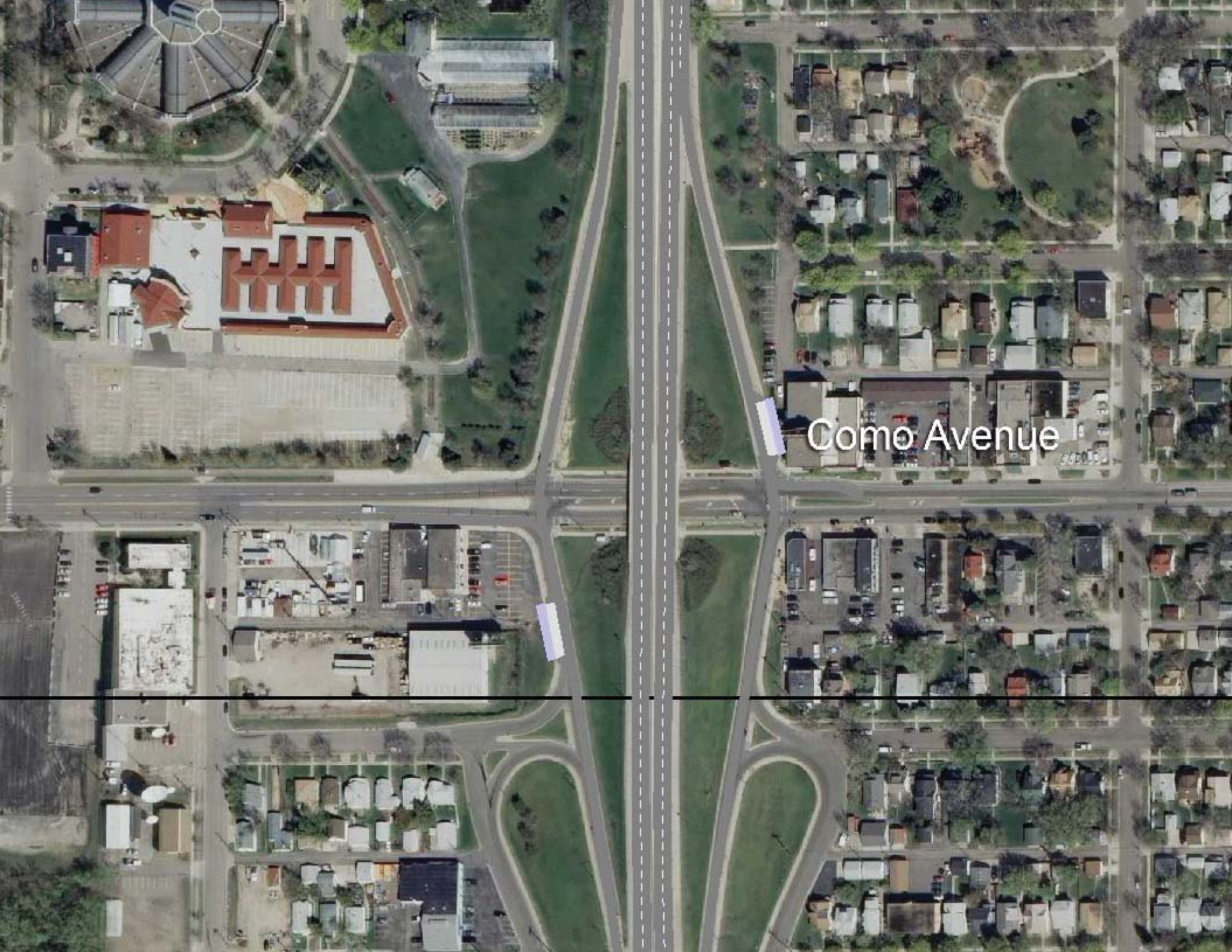
APPENDIX D

VISSIM STATION PLACEMENT AERIAL IMAGES – *RAPID BUS REFINED* SCENARIOS

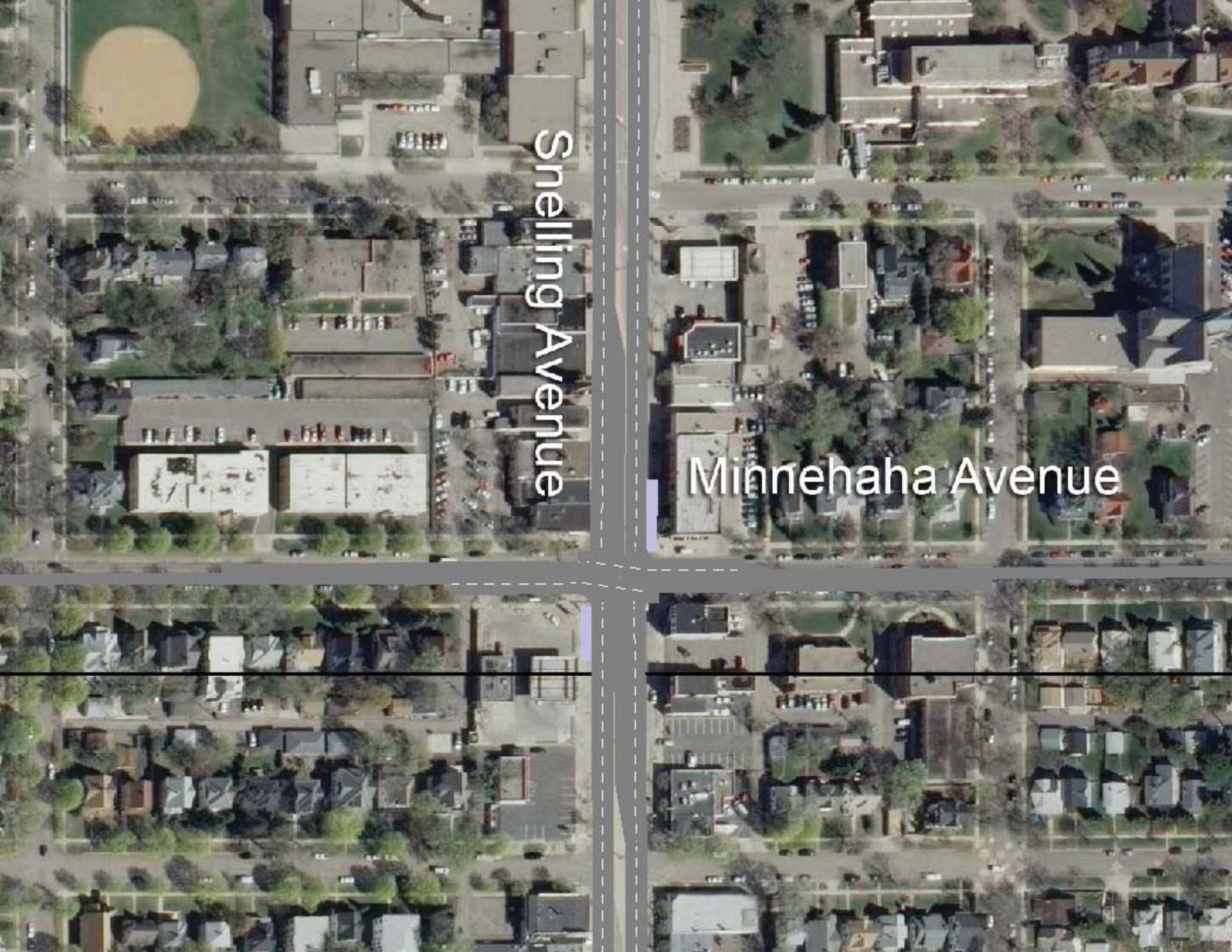

Co Road B
Snelling Avenue
Har Mar

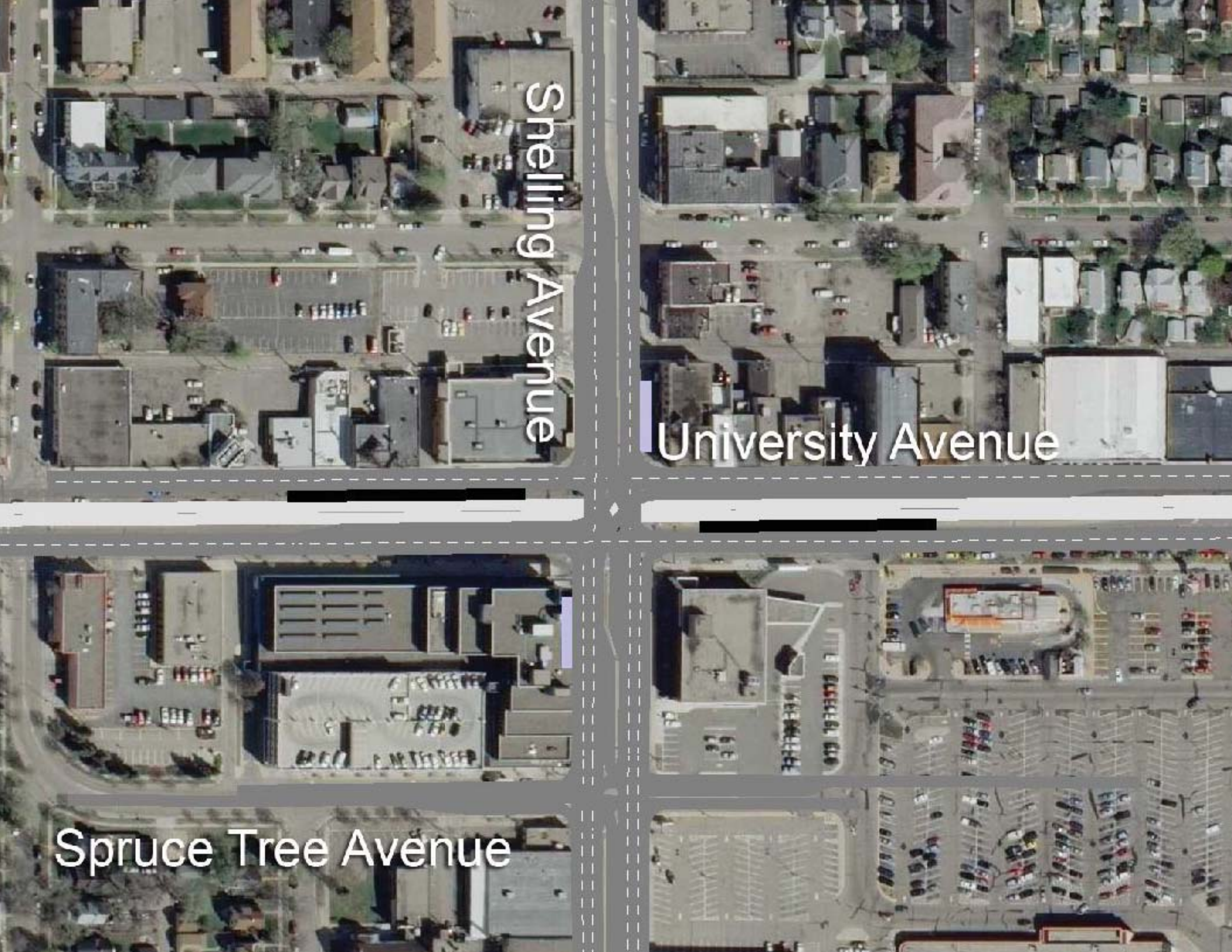
Roselawn Avenue
Snelling Avenue


Snelling Avenue
Larpenteur Avenue

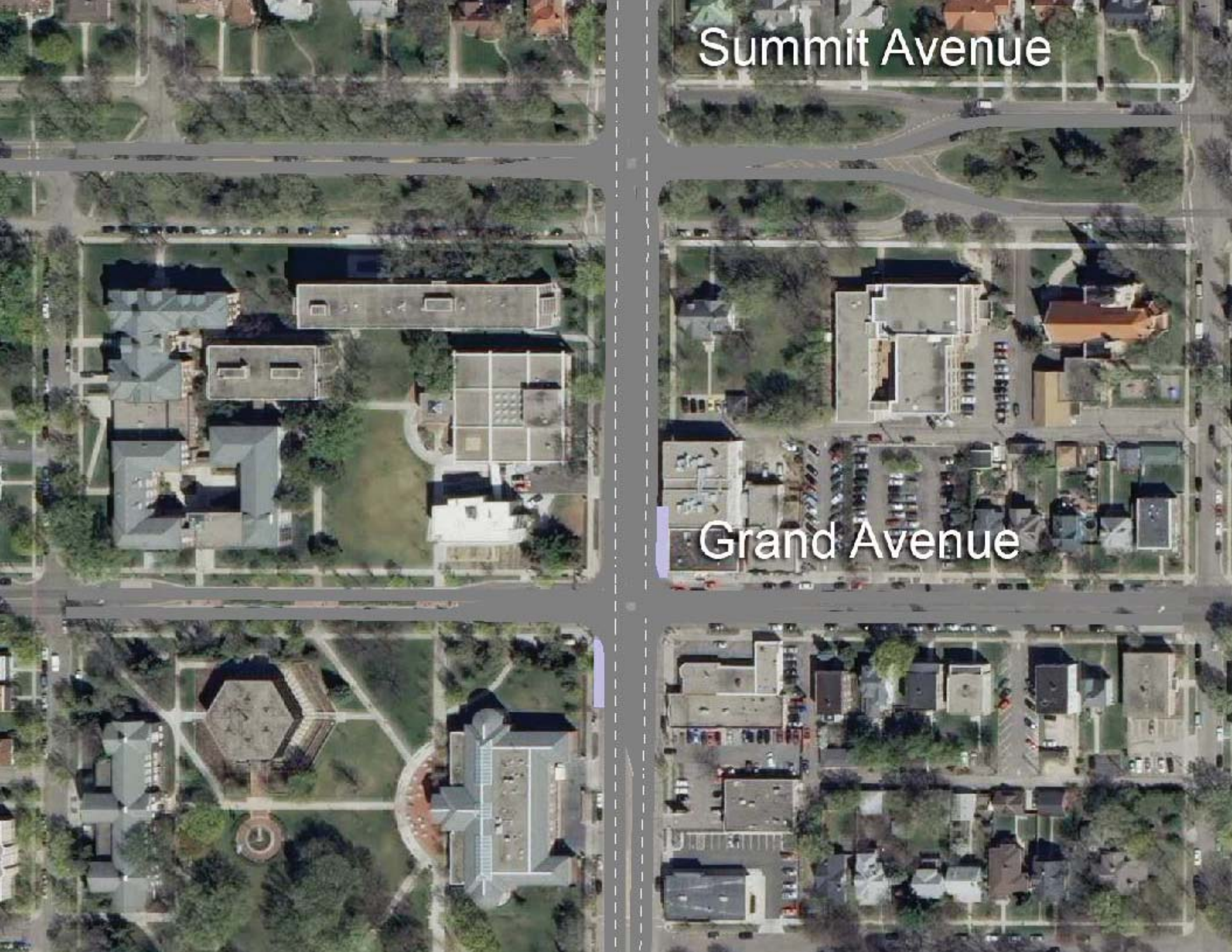

Como Avenue

S. Snelling Avenue
Hewitt Avenue


Snelling Avenue
Minnehaha Avenue

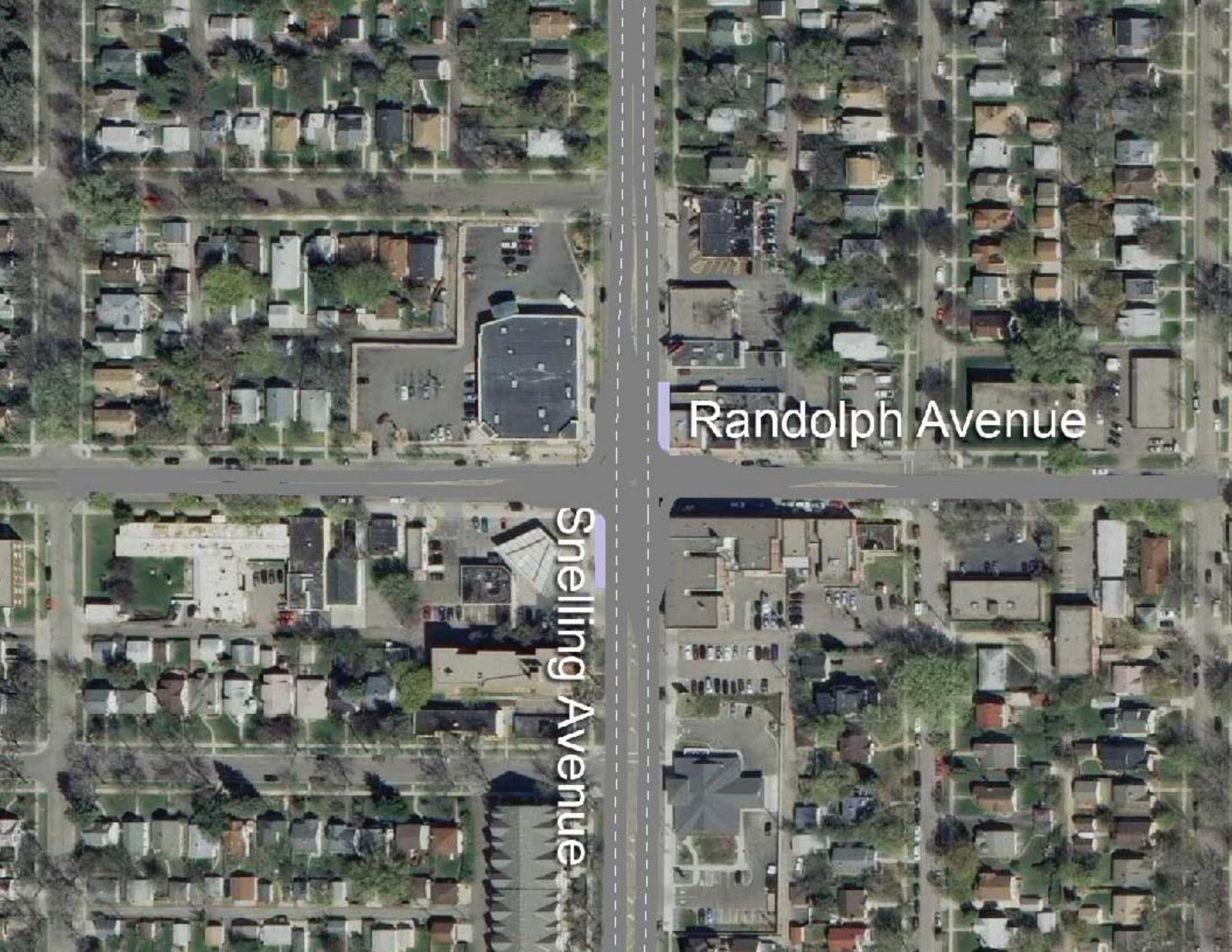

Shelling Avenue
University Avenue
Spruce Tree Avenue


Snelling Avenue
Marshall Avenue
Selby Avenue

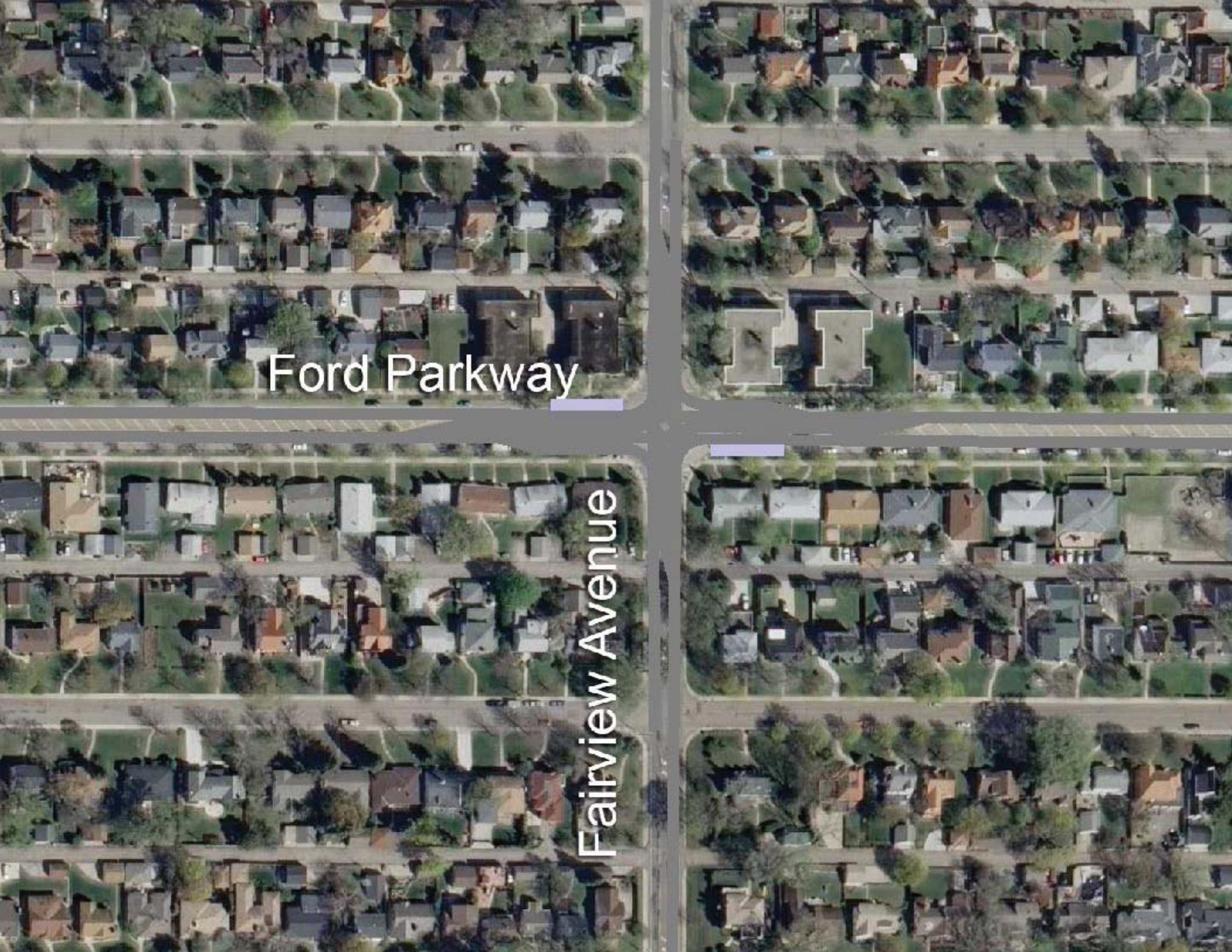

Summit Avenue
Grand Avenue

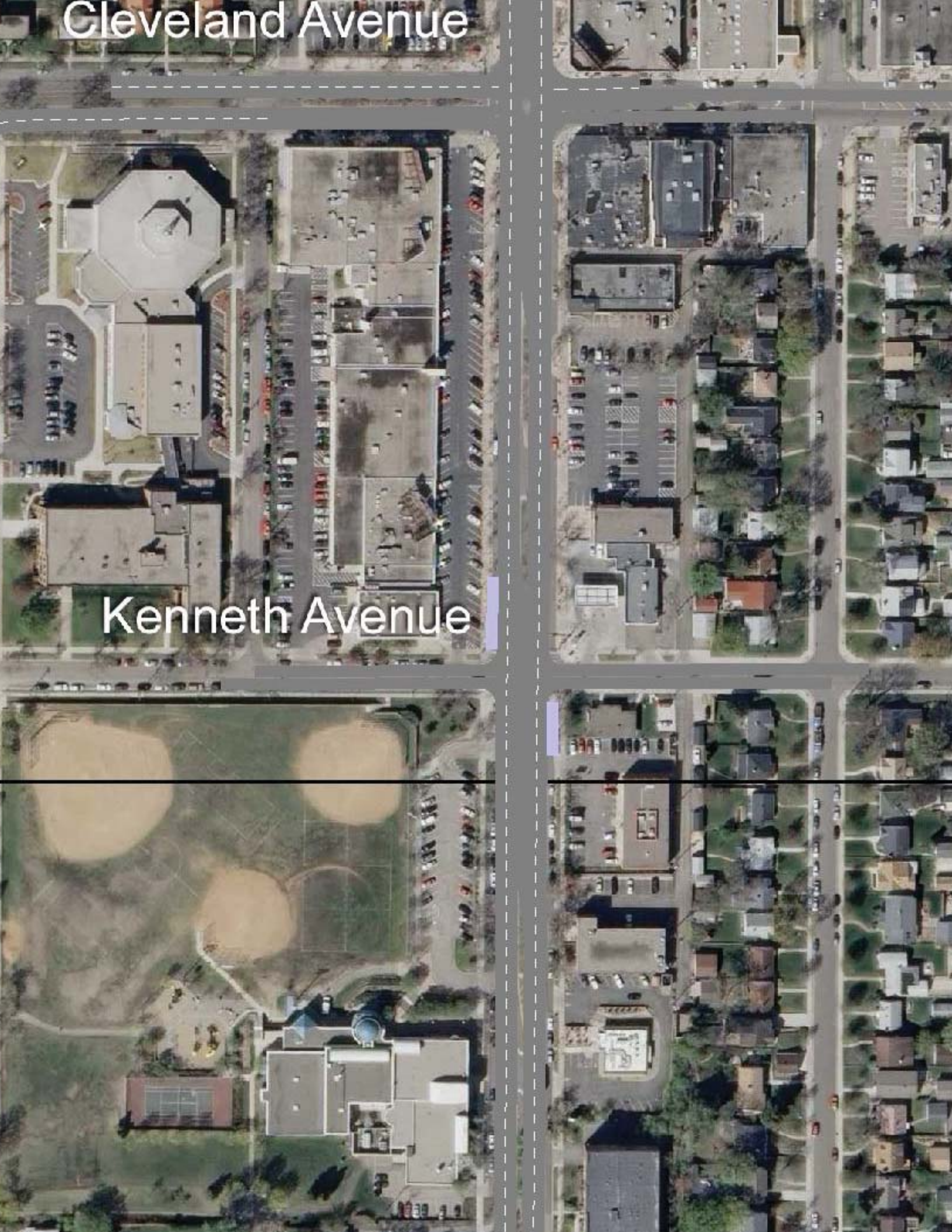
St. Clair Avenue

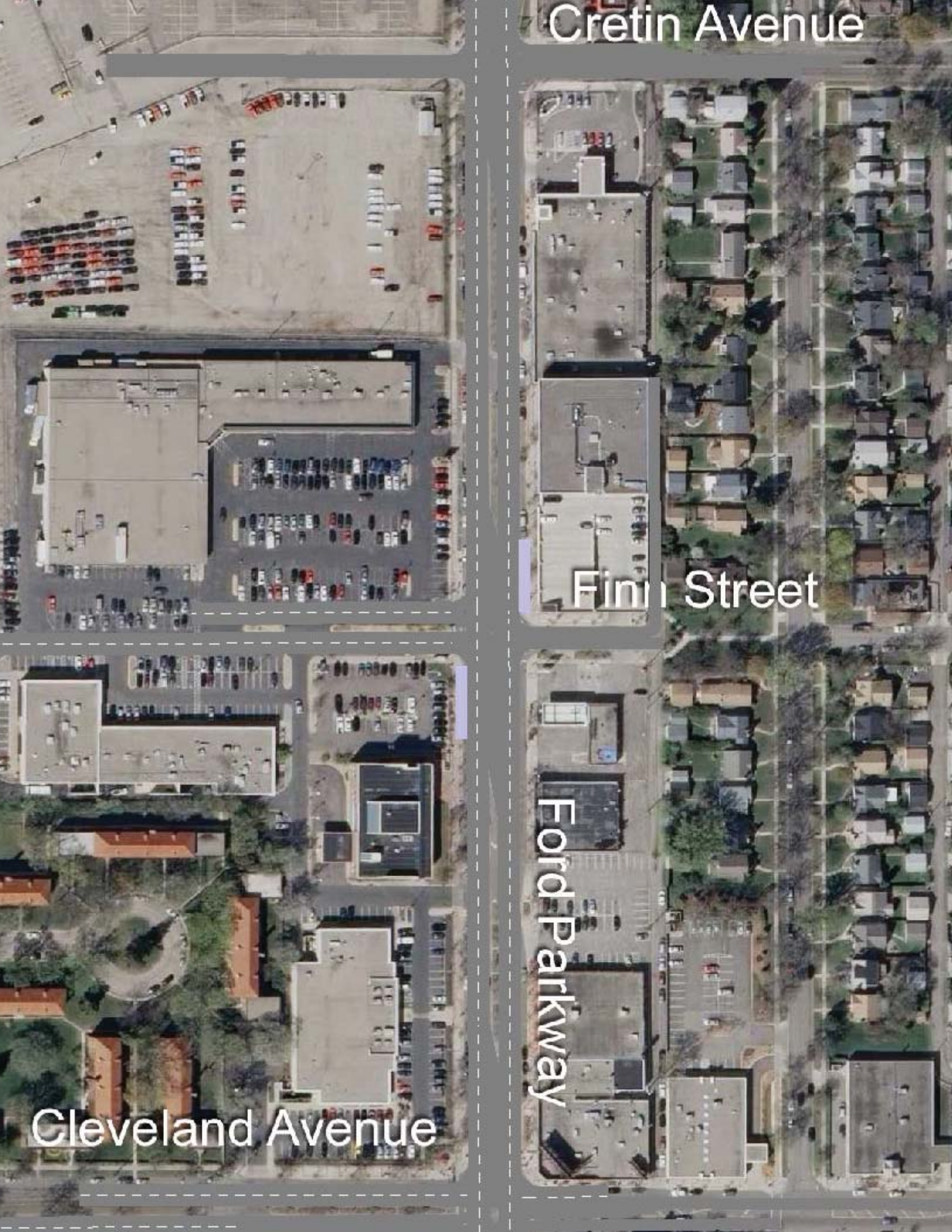
Snelling Avenue

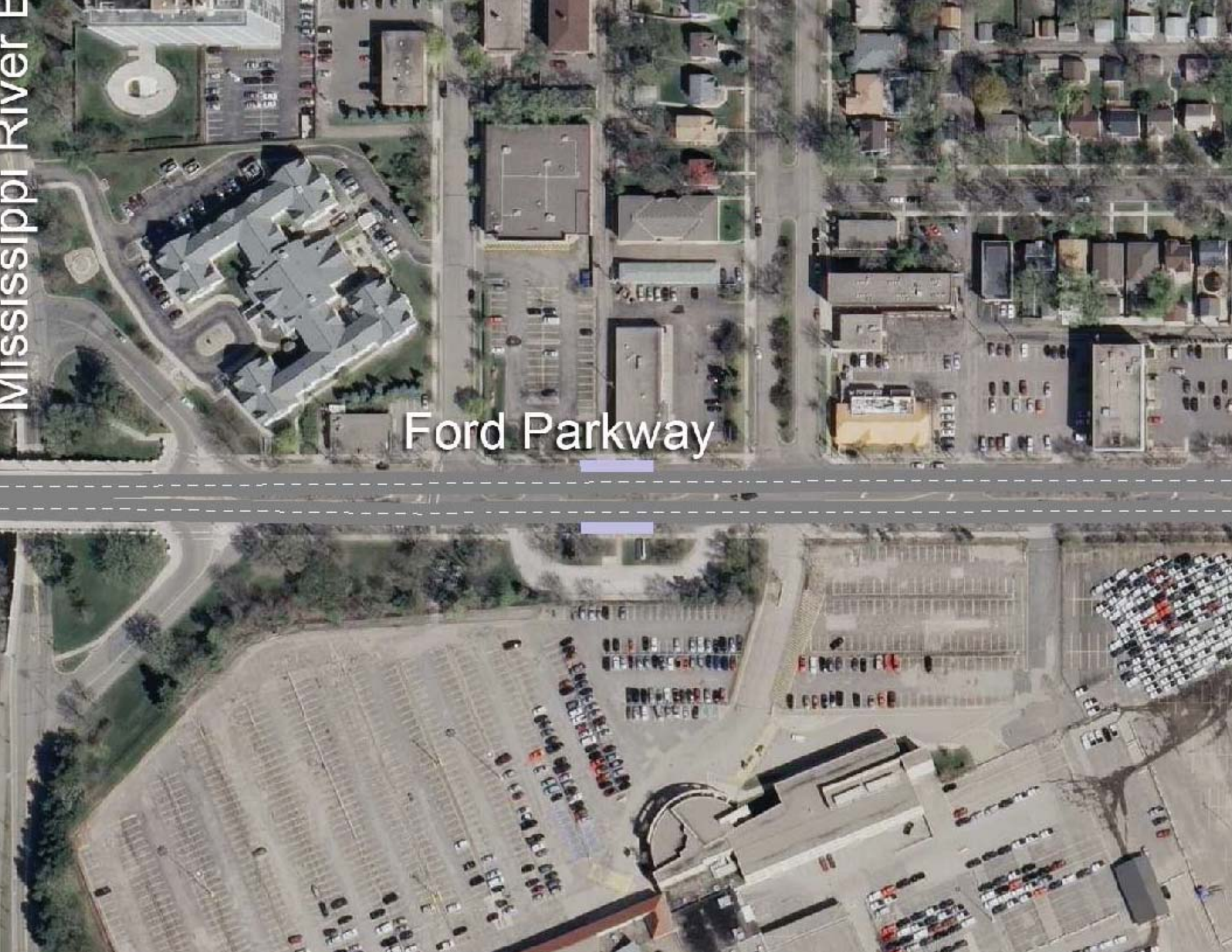

Randolph Avenue
Snelling Avenue

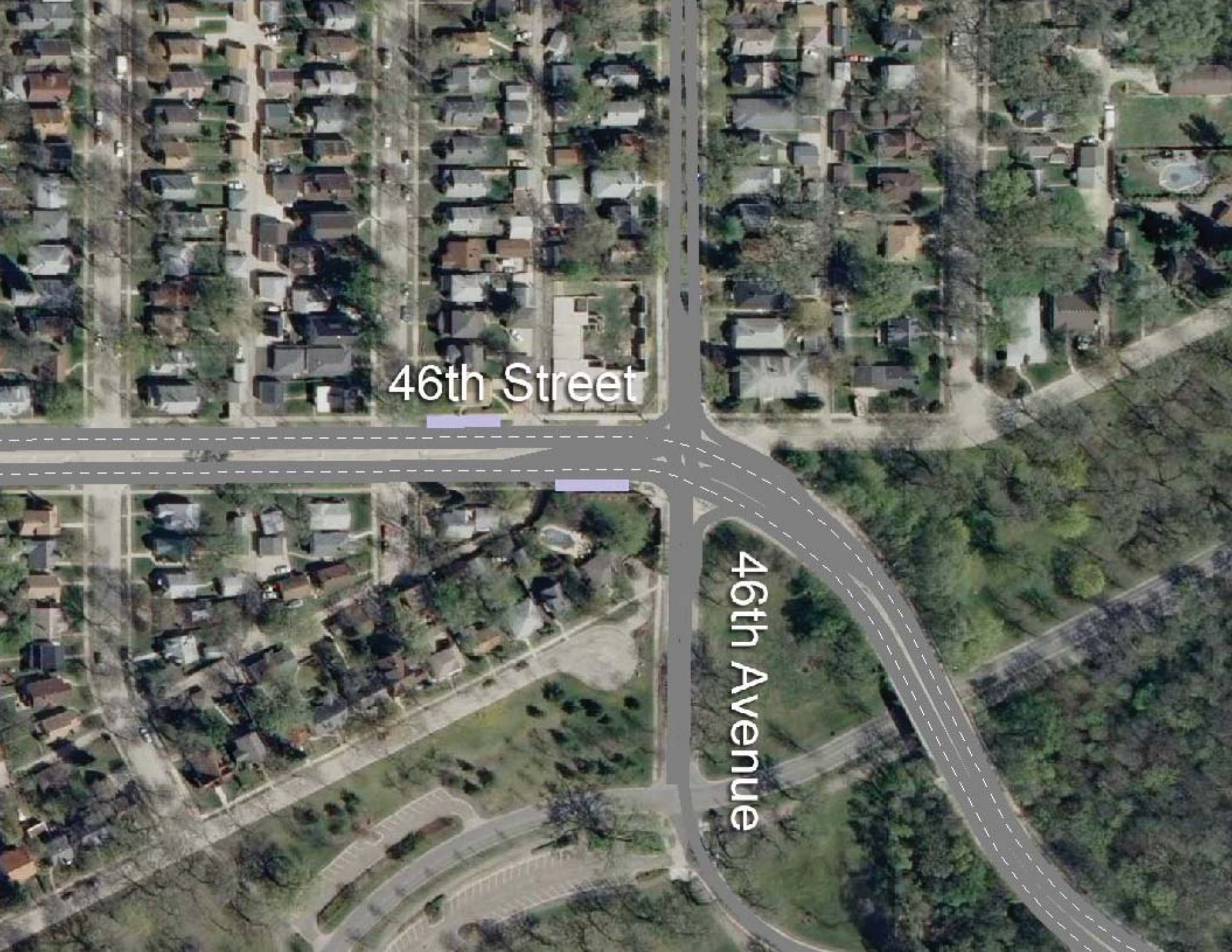
Highland Parkway
Snelling Avenue


Ford Parkway
Fairview Avenue


Cleveland Avenue
Kenneth Avenue


Cretin Avenue
Finn Street
Ford Parkway
Cleveland Avenue


Mississippi River
Ford Parkway


46th Street
46th Avenue

46th Street
Hiawatha Avenue
Minnehaha Avenue
42nd Avenue