CITY OF MARSHALL
344 WEST MAIN STREET
MARSHALL, MN 56258

TH 23 AND TIGER DRIVE J-TURN

RURAL HIGH-RISK ROADS (RHRR)

APPLICATION PACKAGE

MARSHALL
CULTIVATING THE BEST IN US

IN PARTNERSHIP WITH

DEPARTMENT OF TRANSPORTATION

SOUTHWEST MINNESOTA STATE UNIVERSITY

MARSHALL PUBLIC SCHOOLS TIGERS

TABLE OF CONTENTS

EXHIBITS:

DEPARTMENT OF TRANSPORTATION

Due March 29, 2024

Application for Rural High-Risk Roads (RHRR)

In the 2023 Transportation Omnibus bill, a new program entitled Rural High-Risk Roads was developed and listed under the trunk highway funding portion of the program. The legislation is written as:

General – Trunk Highway

- This appropriation includes use of consultants to support development and management of projects.
- **$10,000,000** in fiscal year 2024 is from the trunk highway fund for roadway design and related improvements that reduce speeds and eliminate intersection interactions on rural high-risk roadways. The commissioner must identify roadways based on crash information and in consultation with the Advisory Council on Traffic Safety (ACTS) under Minnesota Statutes, section 4.076, and local traffic safety partners.
- This is a onetime appropriation and is available until June 30, 2026.

This application is to apply for this funding. All projects must be encumbered by the June 30, 2026 deadline.

1. Contact Information Details

Lead Agency	Contact Name
City of Marshall, MN	Jason R. Anderson, P.E.

Agencies may also submit a shortened "Letter of Intent" (see attached) rather than completing this application. This application can serve as a guide to the information that may be needed to select a project.

2. Funding Details

State RHRR Funds	+	District/Local Match	=	Total Cost
Stage 1: $75,000 Stage 2: $175,000 Stage 3: $150,000	+	0	=	$400,000

NOTE: no maximum in state funds per agency per project. Program total is $10 Million statewide. Awarded amount is the total amount the district/local agency will receive. All overages and change orders will need to be covered by district/local agency funding sources. Projects must be set in a rural land use context (defined as the Minnesota State Aid definition: outside of incorporated municipal limits of city's of more then 5,000 people).

NOTE: A program exemption to the State Cost Participation Policy has been accepted. Projects funded with this source will not need to meet the normal State Cost Participation Policy requirements for project construction. Locals will not need to bring any funding to the project if agreed to by the appropriate MnDOT District. However, total funding request is a key criteria for project selection. The Cost Participation Policy Exception does not apply to items such as maintenance, electrical power, or other items usually covered by local agreements. See attached memo for the exemption.

Funding Notes
With this grant funding, the City of Marshall hired a consultant engineering firm through the RFP process to complete Stage 1-3 as outlined below. Ideally, the City would be funded the full $400,000 requested amount to complete the below Stages 1 - 3 tasks, but a lesser award to complete Stage 1 or Stages 1 and 2 would be acceptable. **Stage 1**: Intersection Control Evaluation (ICE) update, concept level drawing/layout, public engagement efforts - The grant funds will be utilized to make necessary updates to the December 2016 Intersection Control Evaluation (ICE) that was completed with the MN 23 Traffic Safety Assessment as well as assisting with conducting essential public participation and involvement. **Stage 2**: Level 1; final drawing/layout design work - Utilizing the grant funds, the City will work in coordination with MnDOT District 8 (D8) to complete concept level layouts as well as coordination with GDSU staff on the level 1 layout as outlined by the Geometric Layouts document. **Stage 3**: Create engineering plans to a minimum 30% design level - Utilizing the grant funds, the City will work with the selected consultant to create a 30% design level plans and estimate. The City's labor costs are not included in the total cost of $400,000 that is being requested. The City conservatively estimates their labor costs could be between 5% - 8% ($20,000 to $32,000) of the total requested amount. These costs will include developing the request for proposal (RFP), evaluating the RFPs, managing the project and stakeholders, and coordination with MnDOT D8 Staff.

Please include all project costs needed with this funding. This can include surveys, consultant needs, right-of-way, design costs, and (but not limited to) construction services and administration. Funding is limited and an important selection criteria. Long term maintenance should be understood at the time of application and explained below in Section 6.

3. Project Description

Project Description
TH 23 and Tiger Drive J-Turn—Marshall, MN TH 23 is a divided 4-lane bypass of Marshall with access control. Tiger Drive is a local roadway providing access to Marshall High School and sports facilities (ice arena/expo venue and softball fields) on the east leg; and Southwest Minnesota State University (SMSU) on the west leg. TH 23 has a posted speed limit of 55 mph, but has an 85th percentile travel speed of approximately 65 mph. The traffic volume on Highway 23 is 7900, 1632 on Tiger Drive east leg, and 1250 on Tiger Drive west leg. Since Tiger Drive provides access to a school, the traffic volume is relatively concentrated to peak hour. Both the FAR Index and CR Index exceed 1. The intersection has 3 risk factors. The cross product is over 11,000,000. Using the Rural Expressway Intersections Project Development Tree, the recommendation is reduced conflict intersection (J-turn) and close adjacent medians. A safety assessment of TH 23 around Marshall was conducted in 2016. The safety assessment and related ICE report recommended a roundabout at Tiger Drive. A J-turn was also an alternative considered; both alternatives had positive safety benefits, however, the roundabout was given priority due to traffic calming effects. Drone footage was supplied to MnDOT showing the operation of the intersection during school release. Notably, many drivers were using the intersection like a J-turn. Vehicles were exiting at Commencement Blvd (south of Tiger Drive), proceeding north on TH 23, then making a U-turn at Tiger Drive to continue south on TH 23. This movement has potential to create conflicts at the intersection since U-turning vehicles would "hug" the south median, which occupies the space that an eastbound vehicle would be utilizing. With this grant funding, the City of Marshall would intend to hire a consulting engineer firm through the RFP process to evaluate and update the existing 2016 ICE, review the conceptual layouts, conduct the appropriate public participation and involvement, and proceed into developing the design while preparing a Level 1 layout for the preferred alternative. City of Marshall, MnDOT, Marshall Public Schools, and Southwest Minnesota State University (SMSU) continue to engage in discussions regarding the intersection and overall routing of school traffic. It is our hope to receive funding to complete all of the necessary groundwork to make this intersection safety improvement a reality. The B/C ration for the J-Turn at this location is calculated to be 0.62.

Suggested Project Types (not exhaustive): Roundabouts, J-Turns, Curve Chevron Signing and Delineation, Dynamic Feedback Signing, Transition Zone Signing, Pedestrian Refuge Islands, Curb Extensions, 4 to 3 Lane Conversions, Bike Lanes, Trails/Sidewalks, etc.

ATP	District	County/City/MPO	Tribal Government
SW ATP—D8	MnDOT D8	City of Marshall	None

NOTE: if any portion of the project is located within MPO boundaries, a letter of support / priority from the MPO is needed.

Estimated Output	Units
0.0	Miles
1	Intersections
0	Curves

NOTE: estimate output for one of three metric: number of miles, number of intersections, or number of curves.

4. Selection Criteria

Describe how project was identified.
The project was identified in the 2016 MN 23 Traffic Safety Assessment and the 2016 MnDOT D8 Safety Plan. Based on public feedback and the technical analysis completed, roundabouts and J-Turns were considered as intersection strategies because they address the safety issues currently observed along the Highway 23 corridor (e.g. both strategies address right angle and opposing left-turn crashes). MnDOT, City of Marshall, Marshall Public Schools, and SMSU continue to engage in discussions regarding the intersection and overall routing of school traffic and ways to increase safety for all users.

Is this project in partnership with another agency?
The project would be completed in partnership with the City of Marshall, Marshall Public Schools, SMSU, and MnDOT District 8. The listed agencies have all been supporters of improved safety options for this intersection and have actively participated in public input sessions. In January of 2024 the Highway 23 Coalition met in Marshall to discuss this intersection and the potential project. Letters of support from are included with this application.

5. Crash Data for Reactive Projects ONLY: Jan. 1, 2019 through Dec. 31, 2023

Number of Crashes	K	A	B	C	PDO	Total
All Crash Types	0	1	0	1	7	9

NOTE: set filters to 2019 through 2023 in MnCMAT if you submit an Intersection Report or Section Report. MnDOT OTE can assist as well. Request “Help” to the email address listed below.

OPTIONAL: Description of any unique characteristics.
As development continues to evolve, this area of Marshall remains home to a variety of event spaces located on each side of this intersection. The west side includes SMSU, a four-year university with numerous sport venues that host local and reginal events in addition to private gatherings in their ballroom. On the east side is the Marshall High School which includes two indoor gyms, an auditorium, and a variety of outdoor sporting facilities. Marshall Public Schools recommends its high school students to avoid this intersection and utilize the signalized intersection at TH 23/ TH 19 to the south as a safer alternative. Additionally, on the east side is a softball complex and the Red Baron Arena and Expo which hosts an array of local and regional expo and ice rink events throughout the year. All these locations drive periodic high traffic volumes into the area and a higher contingency of youth drivers with less driving experience enhances the risk.

6. OPTIONAL: Additional Notes

Additional Notes for Selection Committee
Included with this application: - Exhibit A – Overview Map - Exhibit B – MNDOT Letter of Support - Exhibit C – Marshall Public Schools Letter of Support - Exhibit D - Southwest Minnesota State University (SMSU) Letter of Support - Exhibit E – 2023 HSIP (Cody Brand, Traffic Engineer for MnDOT D8) - Exhibit F - ICE report (December 2016)

7. Submission Information

Submit this application via PDF to SafetyProject.DOT@state.mn.us by March 29, 2024.

Please include the following as necessary:

- Map of project location(s)
- Letters of support (if needed)
    a. Metropolitan Planning Organization (MPO) if within borders
    b. MnDOT District Traffic Engineer or member of the District Management Team

Contact Information for Questions

Derek Leuer
Minnesota Department of Transportation
651-234-7372
derek.leuer@state.mn.us

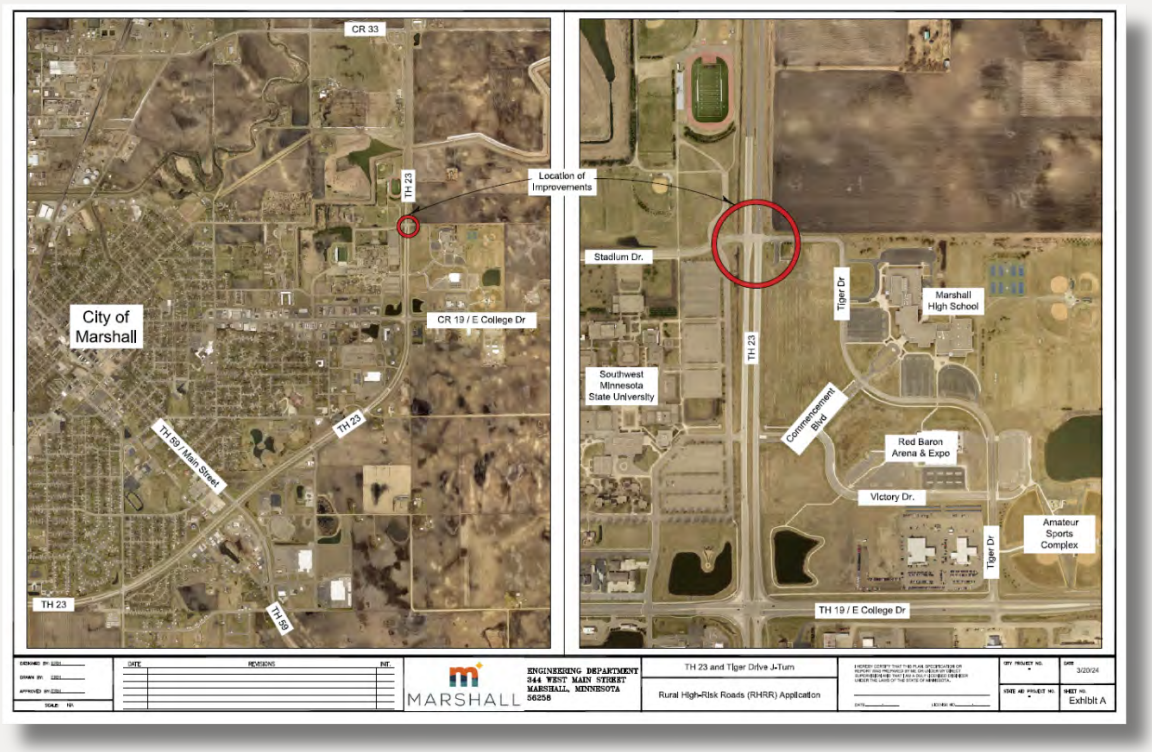
8. Scoring Criteria

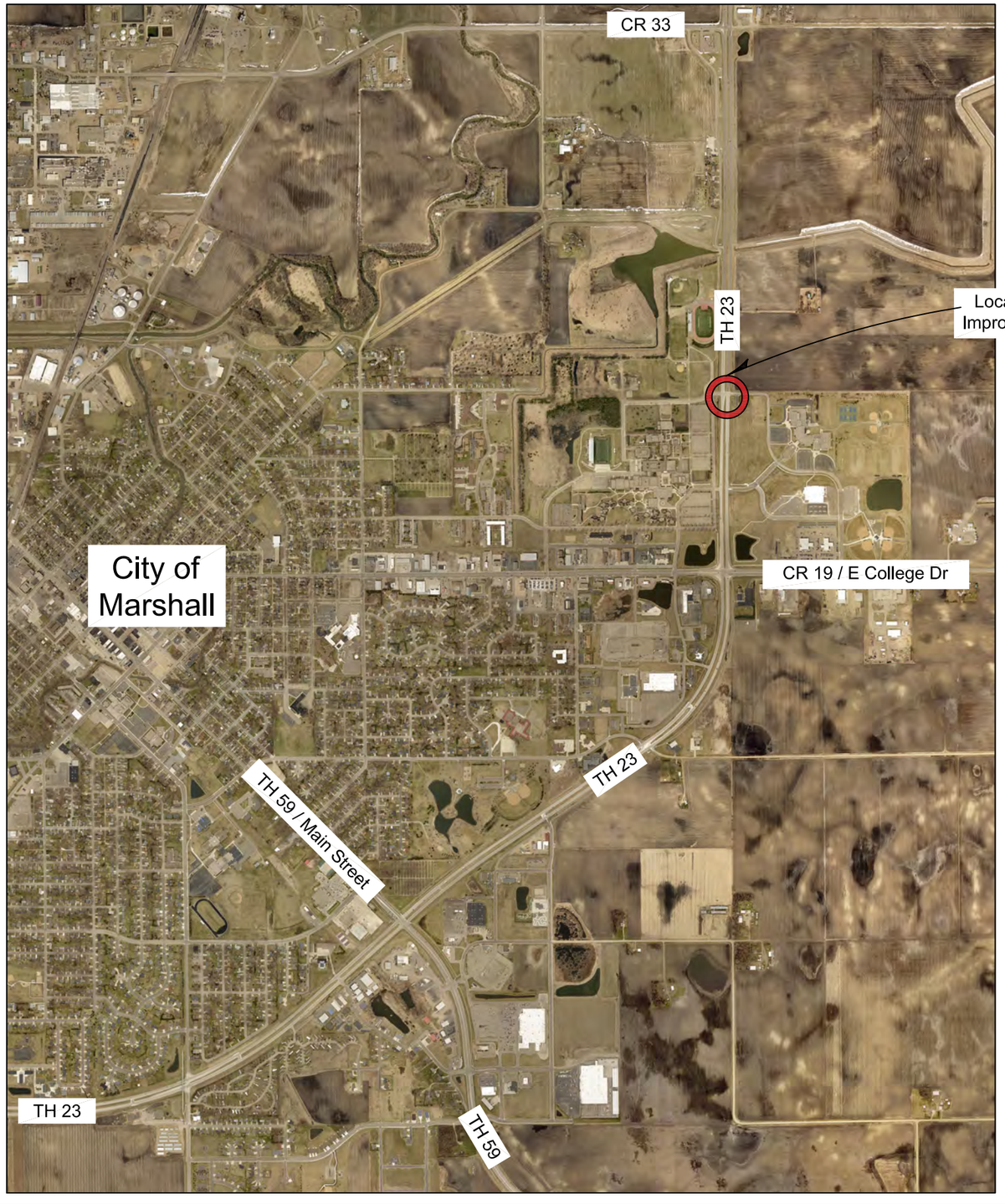
Scoring Amount	Description	Scoring Scale	Scored by:
25 Points	Meets Intent of the Program	All points are available	ACTS Work Group (3 members)
25 Points	Project Location identified by high risk or by high crash location criteria	Top project receives all points, bottom project receives 0 points. Points are staggered by the total number of applications.	OTE Rank and ACTS Work Group confirms/modifies (3 members)
25 Points	Municipal/Local Government Support	Support Given/Not Needed = All No Support = 0 points Even MnDOT Projects should have local Township/ City/County Agency Support.	Objective Score (OTE)
25 Points	Share of Requested Funds	Lowest cost project receives all points, highest cost project receives 0 points. Points are staggered by the total number of applications.	Objective Score (OTE)
25 Points	Share of non-program funding being used	Projects that contribute more funding from other sources (while not required) will be scored higher.	Objective Score (OTE)
25 Points	Benefit/Cost (B/C) Ratio Score	Highest B/C ratio receives all points, lowest B/C project receives 0 points. Points are staggered by the total number of applications.	Objective Score (OTE) If needed, OTE can compute the B/C ratio.
150 Points	**Total Points**	**NA**	**OTE/ACTS**

Projects will be scored, and funding will be distributed until all funds are expended.

EXHIBIT A

OVERVIEW MAP





DESIGNED BY: ERH
DRAWN BY: ERH
APPROVED BY: ERH
SCALE: NA

DATE	REVISIONS	INIT.

MARSHALL

ENGINEERING DEPARTMENT
344 WEST MAIN STREET
MARSHALL, MINNESOTA
56258

TH 23 and Tiger Drive J-Turn

Rural High-Risk Roads (RHRR) Application

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

DATE - LICENSE NO. -

CITY PROJECT NO. -

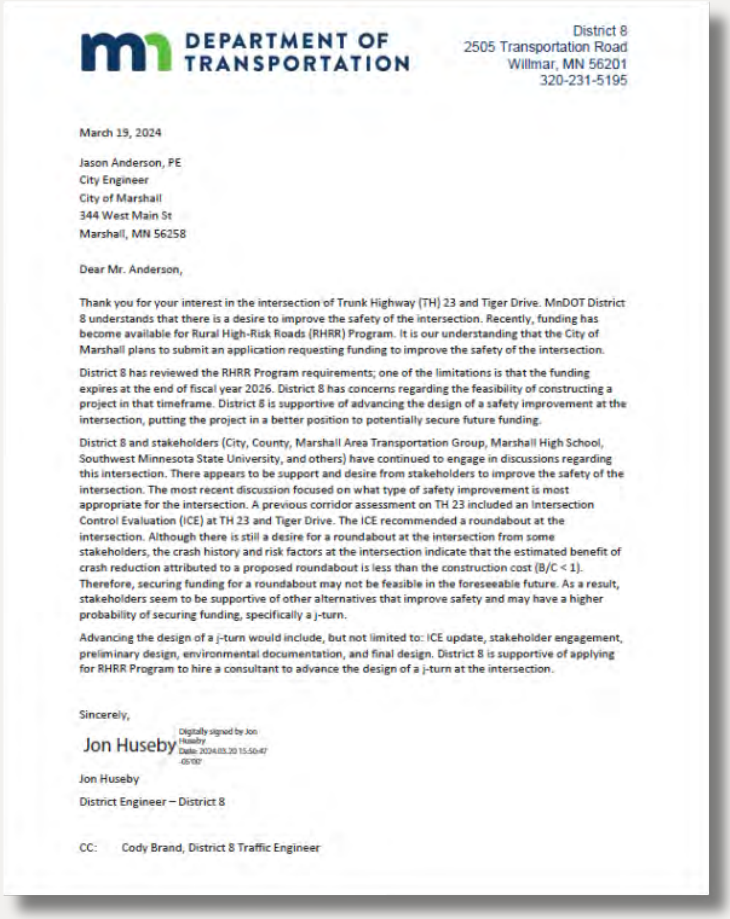
DATE 3/20/24

STATE AID PROJECT NO. -

SHEET NO. Exhibit A

EXHIBIT B

MNDOT LETTER OF SUPPORT



DEPARTMENT OF TRANSPORTATION

District 8
2505 Transportation Road
Willmar, MN 56201
320-231-5195

March 19, 2024

Jason Anderson, PE
City Engineer
City of Marshall
344 West Main St
Marshall, MN 56258

Dear Mr. Anderson,

Thank you for your interest in the intersection of Trunk Highway (TH) 23 and Tiger Drive. MnDOT District 8 understands that there is a desire to improve the safety of the intersection. Recently, funding has become available for Rural High-Risk Roads (RHRR) Program. It is our understanding that the City of Marshall plans to submit an application requesting funding to improve the safety of the intersection.

District 8 has reviewed the RHRR Program requirements; one of the limitations is that the funding expires at the end of fiscal year 2026. District 8 has concerns regarding the feasibility of constructing a project in that timeframe. District 8 is supportive of advancing the design of a safety improvement at the intersection, putting the project in a better position to potentially secure future funding.

District 8 and stakeholders (City, County, Marshall Area Transportation Group, Marshall High School, Southwest Minnesota State University, and others) have continued to engage in discussions regarding this intersection. There appears to be support and desire from stakeholders to improve the safety of the intersection. The most recent discussion focused on what type of safety improvement is most appropriate for the intersection. A previous corridor assessment on TH 23 included an Intersection Control Evaluation (ICE) at TH 23 and Tiger Drive. The ICE recommended a roundabout at the intersection. Although there is still a desire for a roundabout at the intersection from some stakeholders, the crash history and risk factors at the intersection indicate that the estimated benefit of crash reduction attributed to a proposed roundabout is less than the construction cost (B/C < 1). Therefore, securing funding for a roundabout may not be feasible in the foreseeable future. As a result, stakeholders seem to be supportive of other alternatives that improve safety and may have a higher probability of securing funding, specifically a j-turn.

Advancing the design of a j-turn would include, but not limited to: ICE update, stakeholder engagement, preliminary design, environmental documentation, and final design. District 8 is supportive of applying for RHRR Program to hire a consultant to advance the design of a j-turn at the intersection.

Sincerely,

Jon Huseby Digitally signed by Jon Huseby Date: 2024.03.20 15:50:47 -05'00'

Jon Huseby
District Engineer – District 8

CC: Cody Brand, District 8 Traffic Engineer

DEPARTMENT OF TRANSPORTATION

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District Engineer – District 8

CC: Cody Brand, District 8 Traffic Engineer

EXHIBIT C

MARSHALL PUBLIC SCHOOLS LETTER OF SUPPORT

Dion Caron – Director of Business Services
401 South Saratoga St | Marshall, MN 56258
(507) 537-6924 | Phone
(507) 537-6931 | Fax
www.marshall.k12.mn.us

City of Marshall
Jason Anderson
Director of Public Works/City Engineer
344 W. Main St
Marshall, MN 56258

Mr. Anderson,

It is with great enthusiasm that we at Marshall Public Schools add our support for the application of Rural High-Risk Roads grant funding to help further design and scoping efforts for intersection improvements at Tiger Drive and MN 23. There are several reasons why Marshall Public Schools believes that a J-turn on Highway 23/Tiger Drive would create a safer entrance/exit for everyone involved.

The northbound entrance/exit of Tiger Drive is heavily congested, particularly once school is dismissed with students/parents headed back to town. Also, Tiger Drive and the median are not well marked, thus making left hand turn and going straight very confusing. Added to the fact our students are inexperienced drivers, crossing a busy divided state highway to head south on Highway 23 is concerning, especially with people making a U-turn on Highway 23.

We are proud to live in a community where the City as well as the School District has taken a positive and proactive stance on safety. Located on Hwy 23 by the High School are flashers that indicate a 30-mph speed limit during morning and afternoon commute hours. High School also encourages to exit from Tiger Drive on the South end thus making a right turn onto Highway, which helps relieve some of the congestion.

We are very hopeful that the grant funding for this project is approved. Even with the safety measures already put in place, with the High School, Southwest Minnesota State University, Red Barron Arena and talk of additional businesses all being located in that same area, the risk of an accident is higher. We believe the addition of a J-Turn would lower that risk.

Sincerely,

Brian Jones
Marshall Public Schools
Marshall High School Principal
brian.jones@marshall.k12.mn.us

Dion Caron
Marshall Public Schools
Director of Business Services
dion.caron@marshall.k12.mn.us

The mission of the Marshall Public School District is to educate, support and prepare all learners for success.

Dion Caron – Director of Business Services
401 South Saratoga St | Marshall, MN 56258
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(507) 537-6931 | Fax
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Marshall Public Schools
Marshall High School Principal
brian.jones@marshall.k12.mn.us

Dion Caron
Marshall Public Schools
Director of Business Services
dion.caron@marshall.k12.mn.us

EXHIBIT D

SOUTHWEST MINNESOTA STATE UNIVERSITY LETTER OF SUPPORT

SOUTHWEST
MINNESOTA STATE UNIVERSITY

March 18, 2024

Mr. Jason Anderson
Director of Public Works/City Engineer
344 West Main Street
Marshall, MN 56258

Mr. Anderson,

I greatly appreciate the opportunity to meet and participate with the Marshall Area Transportation Group and fellow stakeholders in discussing the high risk road intersection at Tiger Drive, MN HWY 23 and Stadium Drive. This intersection is vital to our campus operation and improvement is needed to reduce risk and make this section of road safer for all.

It is with great enthusiasm that we at Southwest Minnesota State University add our support for the application of Rural High-Risk Roads grant funding to help further design and scoping efforts for intersection improvements at Tiger Drive and MN 23.

If there is any additional support I can provide, please let me know. Thanks for all your hard work on this project!

Best,

Tony Nubile
Director of Facilities and Physical Plant
Southwest Minnesota State University

Telephone (507) 537-7678 • Toll-Free (800) 642-0684
1501 State Street, Marshall MN 56258-1598 • www.SMSU.edu

MINNESOTA STATE

SOUTHWEST
MINNESOTA STATE UNIVERSITY

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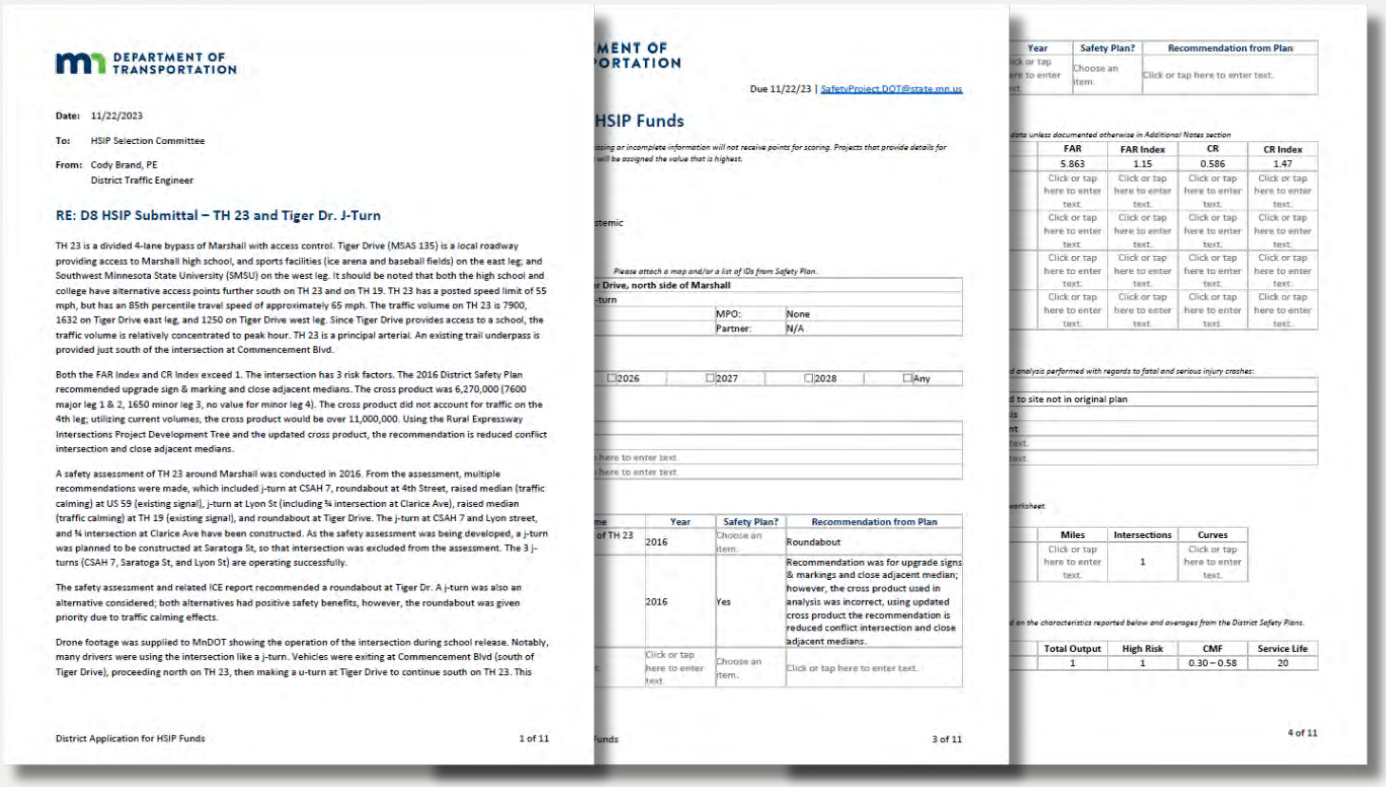
If there is any additional support I can provide, please let me know. Thanks for all your hard work on this project!

Best,

Tony Nubile
Director of Facilities and Physical Plant
Southwest Minnesota State University

EXHIBIT E

2023 HSIP



DEPARTMENT OF TRANSPORTATION

Date: 11/22/2023

To: HSIP Selection Committee

From: Cody Brand, PE
District Traffic Engineer

RE: D8 HSIP Submittal – TH 23 and Tiger Dr. J-Turn

TH 23 is a divided 4-lane bypass of Marshall with access control. Tiger Drive (MSAS 135) is a local roadway providing access to Marshall high school, and sports facilities (ice arena and baseball fields) on the east leg; and Southwest Minnesota State University (SMSU) on the west leg. It should be noted that both the high school and college have alternative access points further south on TH 23 and on TH 19. TH 23 has a posted speed limit of 55 mph, but has an 85th percentile travel speed of approximately 65 mph. The traffic volume on TH 23 is 7900, 1632 on Tiger Drive east leg, and 1250 on Tiger Drive west leg. Since Tiger Drive provides access to a school, the traffic volume is relatively concentrated to peak hour. TH 23 is a principal arterial. An existing trail underpass is provided just south of the intersection at Commencement Blvd.

Both the FAR Index and CR Index exceed 1. The intersection has 3 risk factors. The 2016 District Safety Plan recommended upgrade sign & marking and close adjacent medians. The cross product was 6,270,000 (7600 major leg 1 & 2, 1650 minor leg 3, no value for minor leg 4). The cross product did not account for traffic on the 4th leg; utilizing current volumes, the cross product would be over 11,000,000. Using the Rural Expressway Intersections Project Development Tree and the updated cross product, the recommendation is reduced conflict intersection and close adjacent medians.

A safety assessment of TH 23 around Marshall was conducted in 2016. From the assessment, multiple recommendations were made, which included j-turn at CSAH 7, roundabout at 4th Street, raised median (traffic calming) at US 59 (existing signal), j-turn at Lyon St (including ¾ intersection at Clarice Ave), raised median (traffic calming) at TH 19 (existing signal), and roundabout at Tiger Drive. The j-turn at CSAH 7 and Lyon street, and ¾ intersection at Clarice Ave have been constructed. As the safety assessment was being developed, a j-turn was planned to be constructed at Saratoga St, so that intersection was excluded from the assessment. The 3 j-turns (CSAH 7, Saratoga St, and Lyon St) are operating successfully.

The safety assessment and related ICE report recommended a roundabout at Tiger Dr. A j-turn was also an alternative considered; both alternatives had positive safety benefits, however, the roundabout was given priority due to traffic calming effects.

Drone footage was supplied to MnDOT showing the operation of the intersection during school release. Notably, many drivers were using the intersection like a j-turn. Vehicles were exiting at Commencement Blvd (south of Tiger Drive), proceeding north on TH 23, then making a u-turn at Tiger Drive to continue south on TH 23. This

District Application for HSIP Funds 1 of 11

MENT OF PORTATION

Due 11/22/23 | SafetyProject.DOT@state.mn.us

HSIP Funds

...sing or incomplete information will not receive points for scoring. Projects that provide details for ...will be assigned the value that is highest.

...stemic

Please attach a map and/or a list of IDs from Safety Plan.

...r Drive, north side of Marshall		
...-turn		
	MPO:	None
	Partner:	N/A

☐2026	☐2027	☐2028	☐Any

...here to enter text.
...here to enter text.

...me	Year	Safety Plan?	Recommendation from Plan
...of TH 23	2016	Choose an item.	Roundabout
	2016	Yes	Recommendation was for upgrade signs & markings and close adjacent median; however, the cross product used in analysis was incorrect, using updated cross product the recommendation is reduced conflict intersection and close adjacent medians.
...	Click or tap here to enter text.	Choose an item.	Click or tap here to enter text.

...Funds 3 of 11

Year	Safety Plan?	Recommendation from Plan
...ick or tap ...ere to enter ...ext.	Choose an item.	Click or tap here to enter text.

...data unless documented otherwise in Additional Notes section

	FAR	FAR Index	CR	CR Index
	5.863	1.15	0.586	1.47
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	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
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	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

...d analysis performed with regards to fatal and serious injury crashes:

...d to site not in original plan
...is
...nt
...text.
...text.

...worksheet.

	Miles	Intersections	Curves
	Click or tap here to enter text.	1	Click or tap here to enter text.

...d on the characteristics reported below and averages from the District Safety Plans.

	Total Output	High Risk	CMF	Service Life
	1	1	0.30 – 0.58	20

4 of 11

Date: 11/22/2023

To: HSIP Selection Committee

From: Cody Brand, PE
District Traffic Engineer

RE: D8 HSIP Submittal – TH 23 and Tiger Dr. J-Turn

TH 23 is a divided 4-lane bypass of Marshall with access control. Tiger Drive (MSAS 135) is a local roadway providing access to Marshall high school, and sports facilities (ice arena and baseball fields) on the east leg; and Southwest Minnesota State University (SMSU) on the west leg. It should be noted that both the high school and college have alternative access points further south on TH 23 and on TH 19. TH 23 has a posted speed limit of 55 mph, but has an 85th percentile travel speed of approximately 65 mph. The traffic volume on TH 23 is 7900, 1632 on Tiger Drive east leg, and 1250 on Tiger Drive west leg. Since Tiger Drive provides access to a school, the traffic volume is relatively concentrated to peak hour. TH 23 is a principal arterial. An existing trail underpass is provided just south of the intersection at Commencement Blvd.

Both the FAR Index and CR Index exceed 1. The intersection has 3 risk factors. The 2016 District Safety Plan recommended upgrade sign & marking and close adjacent medians. The cross product was 6,270,000 (7600 major leg 1 & 2, 1650 minor leg 3, no value for minor leg 4). The cross product did not account for traffic on the 4th leg; utilizing current volumes, the cross product would be over 11,000,000. Using the Rural Expressway Intersections Project Development Tree and the updated cross product, the recommendation is reduced conflict intersection and close adjacent medians.

A safety assessment of TH 23 around Marshall was conducted in 2016. From the assessment, multiple recommendations were made, which included j-turn at CSAH 7, roundabout at 4th Street, raised median (traffic calming) at US 59 (existing signal), j-turn at Lyon St (including ¾ intersection at Clarice Ave), raised median (traffic calming) at TH 19 (existing signal), and roundabout at Tiger Drive. The j-turn at CSAH 7 and Lyon street, and ¾ intersection at Clarice Ave have been constructed. As the safety assessment was being developed, a j-turn was planned to be constructed at Saratoga St, so that intersection was excluded from the assessment. The 3 j-turns (CSAH 7, Saratoga St, and Lyon St) are operating successfully.

The safety assessment and related ICE report recommended a roundabout at Tiger Dr. A j-turn was also an alternative considered; both alternatives had positive safety benefits, however, the roundabout was given priority due to traffic calming effects.

Drone footage was supplied to MnDOT showing the operation of the intersection during school release. Notably, many drivers were using the intersection like a j-turn. Vehicles were exiting at Commencement Blvd (south of Tiger Drive), proceeding north on TH 23, then making a u-turn at Tiger Drive to continue south on TH 23. This

movement has potential to create conflicts at the intersection since u-turning vehicles would “hug” the south median, which occupies the space that an eastbound vehicle would be utilizing.

The project would construct a j-turn at the intersection which would address safety concerns, and meet driver expectations for the corridor. Other reduced conflict intersection configurations will also be considered, such as 3/4 intersection / offset-T.

The project cost is estimated at $2,800,000 (inflated to 2028). The cost estimate was developed using a similar concrete j-turn constructed in D8 in 2022.

MnDOT, City of Marshall, high school, and college continue to engage in discussions regarding the intersection and overall routing of school traffic.

Due 11/22/23 | SafetyProject.DOT@state.mn.us

Application for HSIP Funds

Please fill in ALL necessary fields; missing or incomplete information will not receive points for scoring. Projects that provide details for BOTH proactive and reactive scores will be assigned the value that is highest.

Project Description

TH 23 & Tiger Drive j-turn

Project Type: Proactive/Systemic

Location

Please attach a map and/or a list of IDs from Safety Plan.

Route:	**TH 23 & Tiger Drive, north side of Marshall**		
Description	Construct a j-turn		
District:	District 8	MPO:	None
Joint Project?	No	Partner:	N/A

Preferred Year

☐ 2025	☐ 2026	☐ 2027	☐ 2028	☐ Any

Estimated Costs

MnDOT HSIP:	$ **2,520,000**
District Match:	$ 280,000
Local HSIP:	$ Click or tap here to enter text.
Local Match:	$ Click or tap here to enter text.

Planning

Plan or Analysis Name	Year	Safety Plan?	Recommendation from Plan
TH 23 & Tiger Drive ICE (part of TH 23 corridor study)	2016	Choose an item.	Roundabout
District Safety Plan	2016	Yes	Recommendation was for upgrade signs & markings and close adjacent median; however, the cross product used in analysis was incorrect, using updated cross product the recommendation is reduced conflict intersection and close adjacent medians.
Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.	Click or tap here to enter text.

Plan or Analysis Name	Year	Safety Plan?	Recommendation from Plan
Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.	Click or tap here to enter text.

Reactive Screening Criteria

Please use 5 years of crash data unless documented otherwise in Additional Notes section

Location	FAR	FAR Index	CR	CR Index
TH 23 & Tiger Dr	5.863	1.15	0.586	1.47
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Proactive Screening Criteria

Describe the systemic or risk based analysis performed with regards to fatal and serious injury crashes:

☑	District Safety Plan
☐	District Safety Plan applied to site not in original plan
☐	HTCB Prioritization Analysis
☐	Pedestrian Risk Assessment
☐	Click or tap here to enter text.
☐	Click or tap here to enter text.

Reactive Safety Impact

Please attach the required benefit-cost calculation worksheet.

Benefit-Cost: 0.62

Output	Miles	Intersections	Curves
Estimated Project Output	Click or tap here to enter text.	1	Click or tap here to enter text.

Proactive Safety Impact

An estimated benefit-cost ratio will be derived based on the characteristics reported below and averages from the District Safety Plans.

Location	Total Output	High Risk	CMF	Service Life
Rural Intersections	1	1	0.30 – 0.58	20

Urban Intersections	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Rural Segments	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Urban Segments	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Curves	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Proactive Safety Impact Notes:

CMF from MnDOT j-turn website; 0.30 for fatal crashes, 0.58 for all other injury crashes.

Prioritization

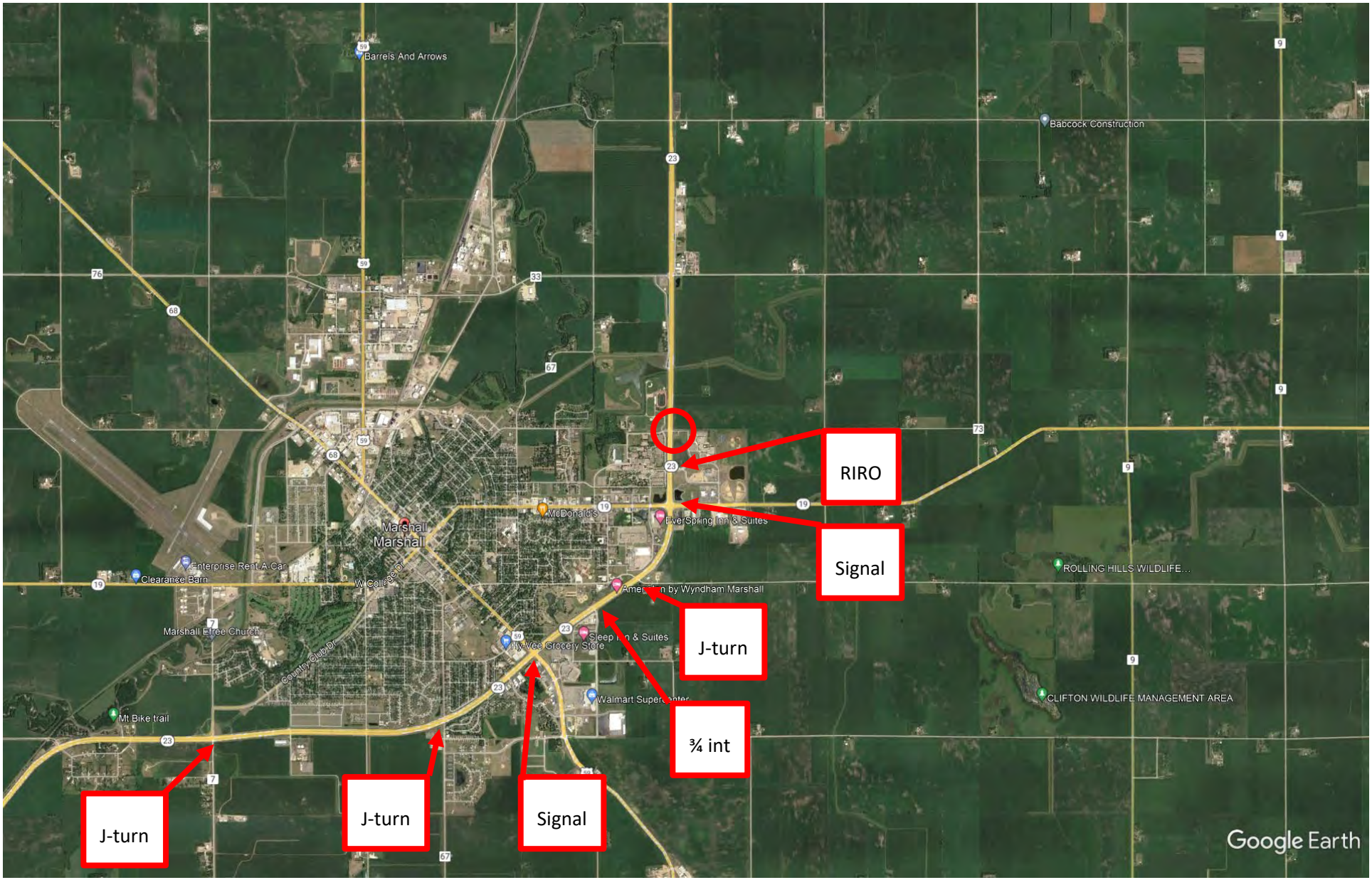
Please describe District priorities if more than one project is submitted:

Of the	Click or tap here to enter text.	application(s) submitted by the District, this is the	Click or tap here to enter text.	priority.

Additional Notes and Details

Attachments:
Project Location Map
District Safety Plan (Risk Factors and Project Development Tree)
Crash Data
Crash Modification Factor
Benefit Cost Ratio
ICE/Corridor Study Recommendation

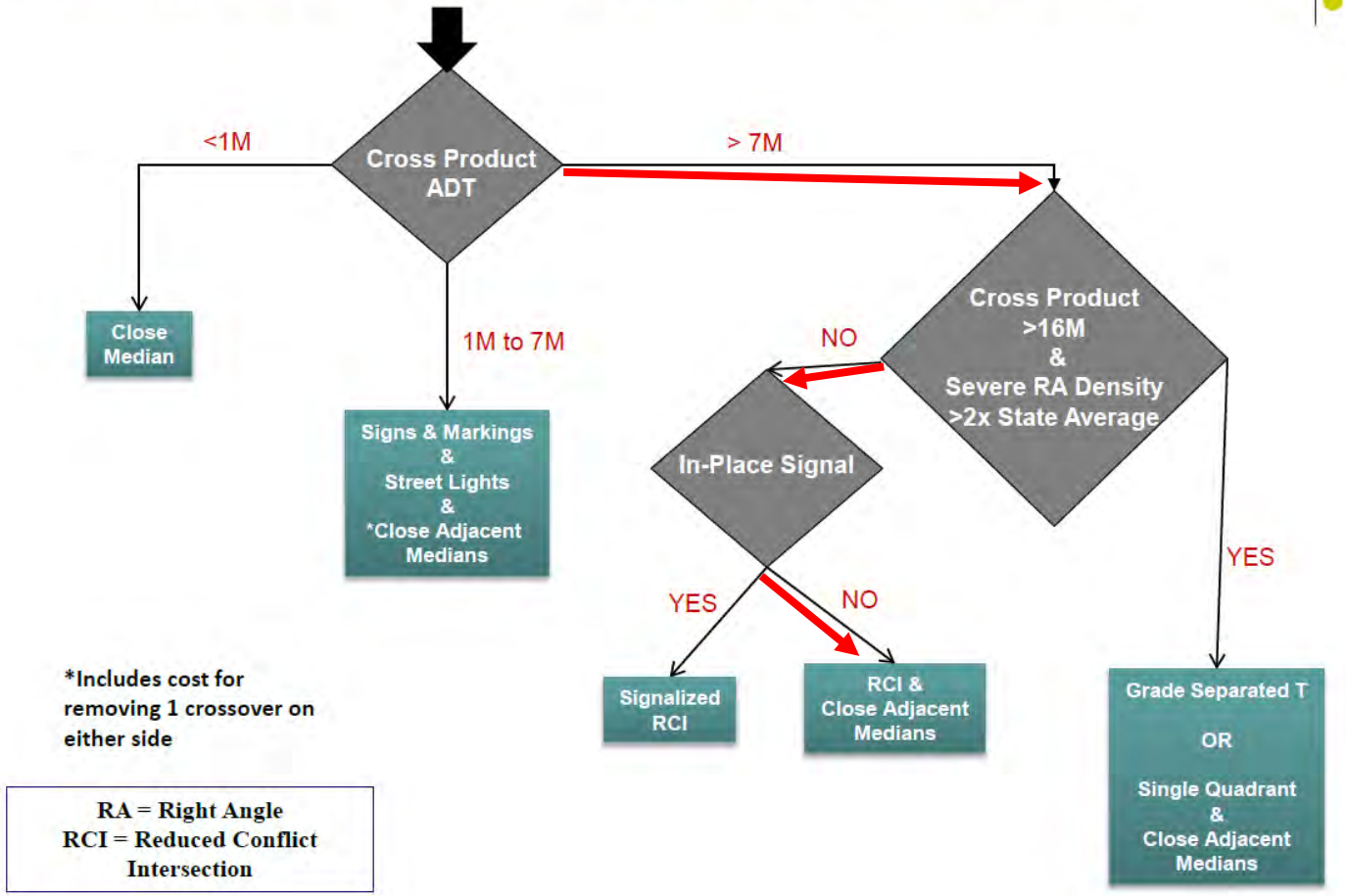
Project Location




Marshall Regional Track & Field Complex
SMSU Mustangs Baseball
High school
Southwest Minnesota State University (SMSU)
Southwest Minnesota State University
Mattke Field
McFarland Library
Recreation/ Athletic Facility
SMSU ADM Environmental
Office of Admission
Marshall Senior High School
MARSHALL HIGH SCHOOL
Prairie Roots' Sculpture
Playground
Schwans Regional Amateur Sports Complex
Kruse Motors Auto Group
Kruse Buick GMC
Borch's Sporting Goods
El Rancho
Quality Inn
Hardee's
Caribou Coffee
Arby's
LOCKWOOD MOTORS Chevrolet and CDJR
Applebee's Grill + Bar
EverSpring Inn & Suites
ABRA Auto Body Marshall
RDO Equipment Co
Transportation Department
Google Earth

Location Information				Multi-Lane/Divided Risk Factors								Project Summary							
Route System	Route N	Intersection Description	Tru Mil	Cross Product	Skew	On/Near Curve	Developme nt	Severe RA Density	Previous STOP (>5r	Total Star	Numerical Risk Ratin	Upgrade Signs & Markings	Street Lig	Close Median(s	Reduced Conflict Intersecti	Single Quadrant	Grade Separated	Project Co	Project Decision/DTE Comments
MN	23	CSAH 23/TIGER DR	75.41210779	«		«	«			«««	3	2	0	1	0	0	0	$56,000	Accepted

Rural Expressway Intersections



6

2018 – 2022 Crash Toolkit

INTERSECTION DESCRIPTION							CRITICAL RATES							2017-2021 CRASH DATA					
District	Route	RP	Route ID	Name	County	City / Twsp	Category	FAR	FAR*	FAR Index	CR	CR*	CR Index	K	A	B	C	PDO	Total
8	MN-23	075+0.553	030000000000	MN 23 and MSAS 135 (Tiger DR	Lyon	Fairview Twp	Thru/STOP, Urb	5.863	5.120	1.15	0.586	0.400	1.47	0	1	0	2	7	10

CMF – MnDOT j-turn website

J-turns

J-turns are a driving movement proven to reduce serious and fatal crashes caused by "T-bone" crashes at intersections. When using J-turns, drivers focus on one direction of traffic at a time.

Benefits of J-turns

- Eliminates or reduces the highest risk movements – directly crossing multiple lanes of traffic and left turns
- Shown to reduce fatalities by 70%
- Shown to reduce injuries by 42%
- Designed to help prevent severe broadside or "T-bone" crashes
- Moves traffic safely and effectively
- Simplifies navigation and traffic flow
- Can be designed and built quickly to address fatal crashes
- Maintains access to local roads and businesses

PDO crash CMF has been assumed as 1.00; PDO crashes have minimal effect on the benefit / cost analysis.

Benefit/Cost

F. Benefit-Cost Calculation

$1,731,338	**Benefit (present value)**
$2,800,000	**Cost**

B/C Ratio = 0.62

Proposed project expected to reduce 1 crashes annually, 1 of which involving fatality or serious injury.

F. Analysis Assumptions

Crash Severity	Crash Cost
K crashes	$1,600,000
A crashes	$800,000
B crashes	$250,000
C crashes	$130,000
PDO crashes	$15,000

Link: mndot.gov/planning/program/appendix_a.html

Real Discount Rate:	0.8%	Default
Traffic Growth Rate	0.5%	**Revised**
Project Service Life	20 years	**Revised**

G. Annual Benefit

Crash Severity	Crash Reduction	Annual Reduction	Annual Benefit
K crashes	0.00	0.00	$0
A crashes	0.42	0.08	$67,200
B crashes	0.00	0.00	$0
C crashes	0.84	0.17	$21,840
PDO crashes	0.00	0.00	$0
			$89,040

H. Amortized Benefit

Total = $1,731,338

Year	Crash Benefits	Present Value
2028	$89,040	$89,040
2029	$89,485	$88,775
2030	$89,933	$88,511
2031	$90,382	$88,247
2032	$90,834	$87,985
2033	$91,288	$87,723
2034	$91,745	$87,462
2035	$92,204	$87,201
2036	$92,665	$86,942
2037	$93,128	$86,683
2038	$93,594	$86,425
2039	$94,061	$86,168
2040	$94,532	$85,912
2041	$95,004	$85,656
2042	$95,479	$85,401
2043	$95,957	$85,147
2044	$96,437	$84,893
2045	$96,919	$84,641
2046	$97,403	$84,389
2047	$97,890	$84,138
0	$0	$0
0	$0	$0
0	$0	$0
0	$0	$0
0	$0	$0
0	$0	$0
0	$0	$0
0	$0	$0
0	$0	$0
0	$0	$0

NOTE:
This calculation relies on the real discount rate, which accounts for inflation. No further discounting is necessary.

2016 Safety Assessment

Recommended Corridor Improvement Plan E

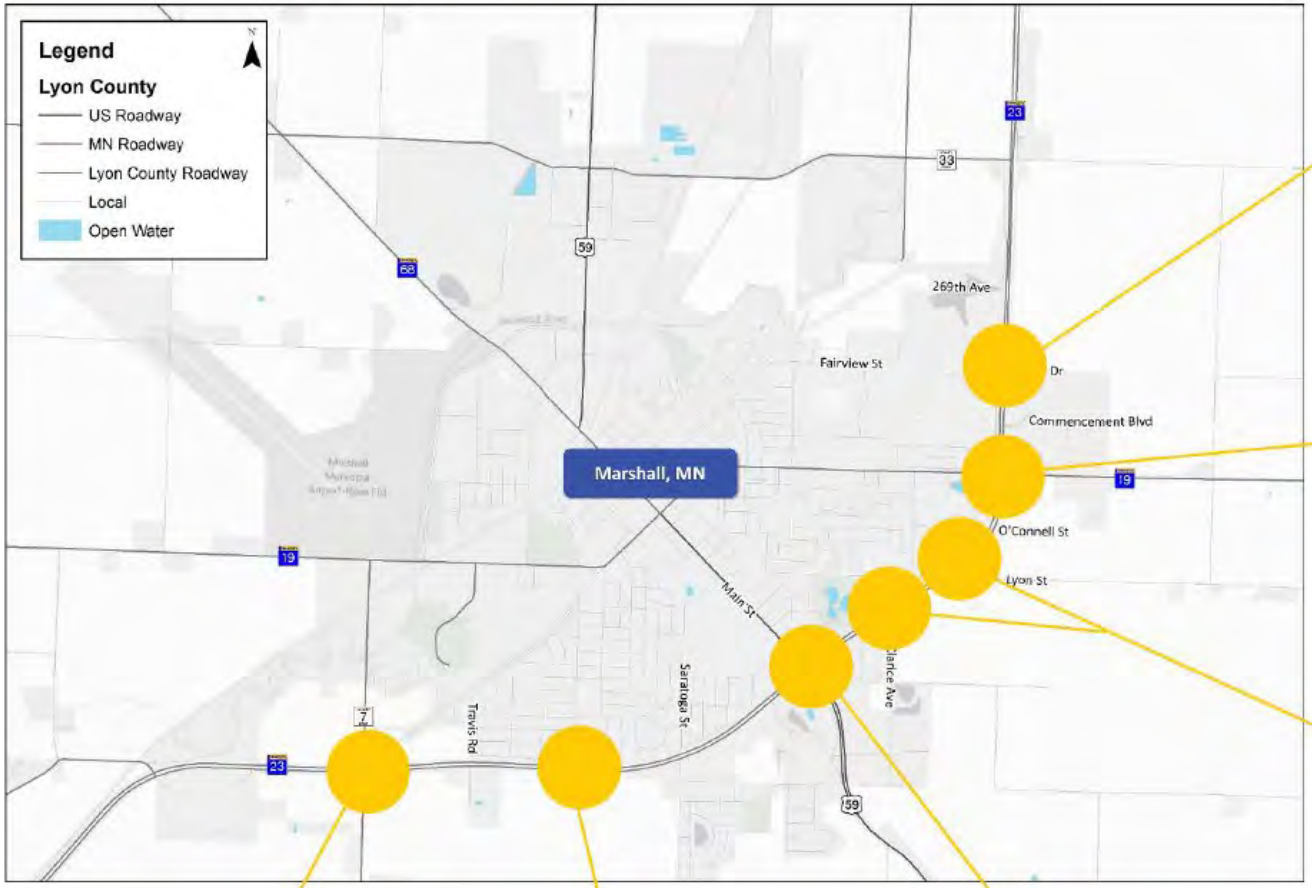
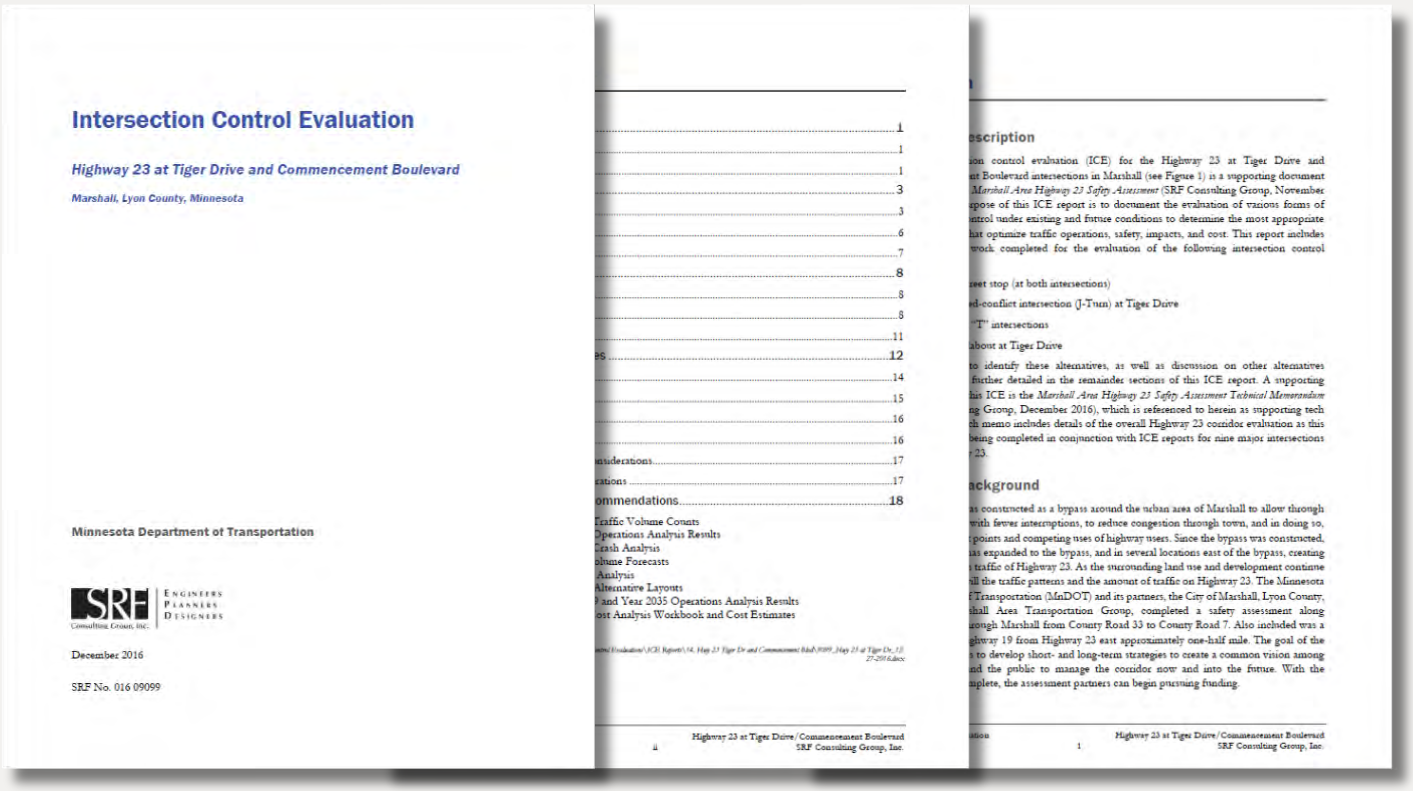


EXHIBIT F

ICE REPORT (DECEMBER 2016)



Intersection Control Evaluation

Highway 23 at Tiger Drive and Commencement Boulevard

Marshall, Lyon County, Minnesota

Minnesota Department of Transportation

SRF Consulting Group, Inc. Engineers Planners Designers

December 2016

SRF No. 016 09099

escription

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Marshall Area Highway 23 Safety Assessment (SRF Consulting Group, November
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d-conflict intersection (J-Turn) at Tiger Drive
"T" intersections
bout at Tiger Drive

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g Group, December 2016), which is referenced to herein as supporting tech
h memo includes details of the overall Highway 23 corridor evaluation as this
eing completed in conjunction with ICE reports for nine major intersections
23.

ackground

as constructed as a bypass around the urban area of Marshall to allow through
with fewer interruptions, to reduce congestion through town, and in doing so,
points and competing uses of highway users. Since the bypass was constructed,
as expanded to the bypass, and in several locations east of the bypass, creating
traffic of Highway 23. As the surrounding land use and development continue
ll the traffic patterns and the amount of traffic on Highway 23. The Minnesota
Transportation (MnDOT) and its partners, the City of Marshall, Lyon County,
hall Area Transportation Group, completed a safety assessment along
rough Marshall from County Road 33 to County Road 7. Also included was a
ghway 19 from Highway 23 east approximately one-half mile. The goal of the
to develop short- and long-term strategies to create a common vision among
nd the public to manage the corridor now and into the future. With the
mplete, the assessment partners can begin pursuing funding.

Intersection Control Evaluation

Highway 23 at Tiger Drive and Commencement Boulevard

Marshall, Lyon County, Minnesota

Minnesota Department of Transportation

SRF Consulting Group, Inc. | Engineers Planners Designers

December 2016

SRF No. 016 09099

INTERSECTION CONTROL EVALUATION

Highway 23 at Tiger Drive and Commencement Boulevard
Marshall, Lyon County, Minnesota

December 2016

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.

Leif A. Garnass
Print Name

Signature	*47153* Reg. No.	*December 27, 2016* Date

APPROVED BY:

City of Marshall: Director of Public Work/City Engineer — Date

Lyon County Highway Engineer — Date

MnDOT District 8 Traffic Engineer — Date

Table of Contents

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Introduction

Project Description

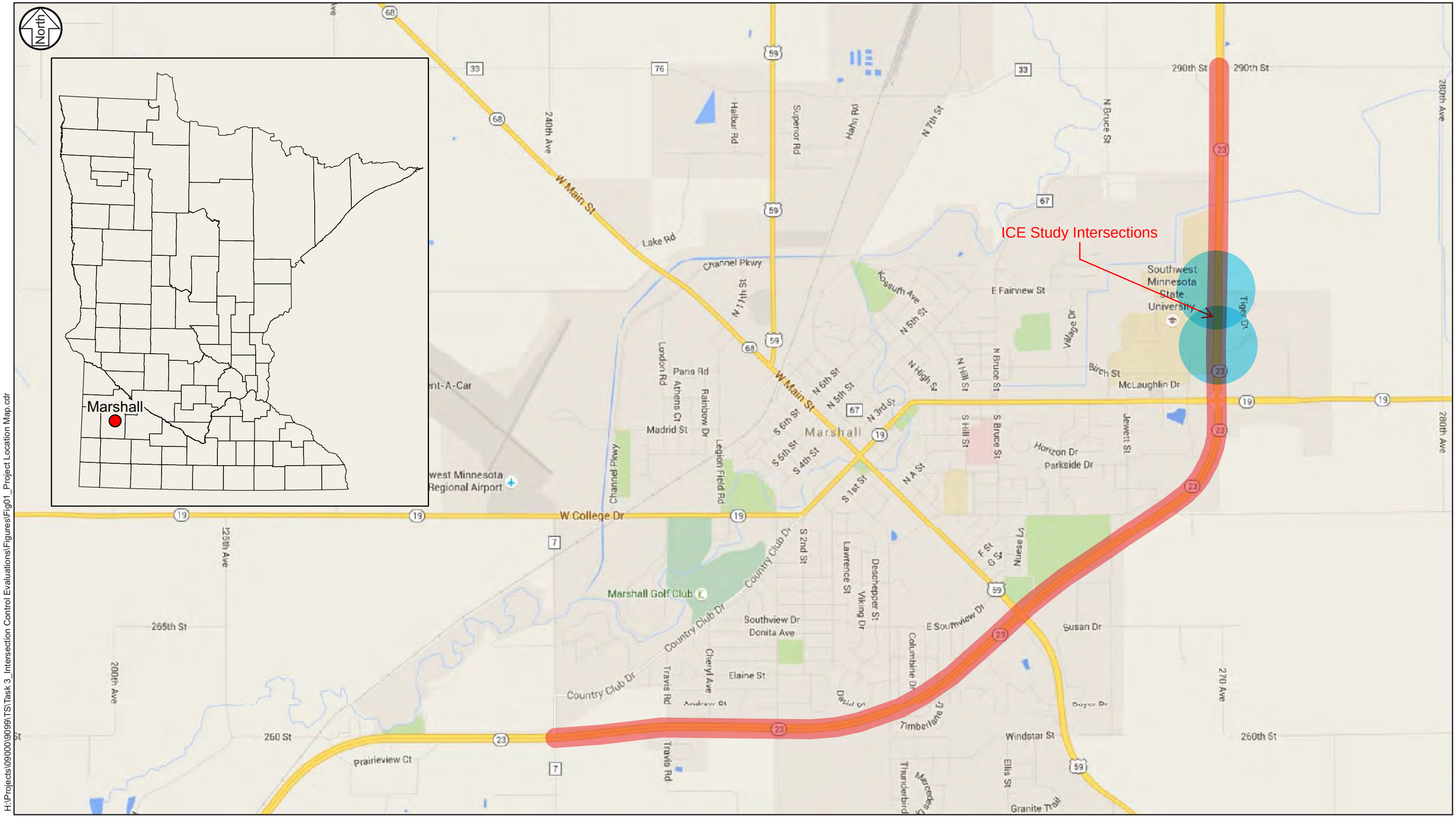
This intersection control evaluation (ICE) for the Highway 23 at Tiger Drive and Commencement Boulevard intersections in Marshall (see Figure 1) is a supporting document for the for the *Marshall Area Highway 23 Safety Assessment* (SRF Consulting Group, November 2016). The purpose of this ICE report is to document the evaluation of various forms of intersection control under existing and future conditions to determine the most appropriate alternative(s) that optimize traffic operations, safety, impacts, and cost. This report includes the technical work completed for the evaluation of the following intersection control alternatives:

- Side-street stop (at both intersections)
- Reduced-conflict intersection (J-Turn) at Tiger Drive
- Offset "T" intersections
- Roundabout at Tiger Drive

The process to identify these alternatives, as well as discussion on other alternatives considered, is further detailed in the remainder sections of this ICE report. A supporting document to this ICE is the *Marshall Area Highway 23 Safety Assessment Technical Memorandum* (SRF Consulting Group, December 2016), which is referenced to herein as supporting tech memo. The tech memo includes details of the overall Highway 23 corridor evaluation as this ICE report is being completed in conjunction with ICE reports for nine major intersections along Highway 23.

Project Background

Highway 23 was constructed as a bypass around the urban area of Marshall to allow through traffic to flow with fewer interruptions, to reduce congestion through town, and in doing so, reduce conflict points and competing uses of highway users. Since the bypass was constructed, development has expanded to the bypass, and in several locations east of the bypass, creating increased cross traffic of Highway 23. As the surrounding land use and development continue to evolve, so will the traffic patterns and the amount of traffic on Highway 23. The Minnesota Department of Transportation (MnDOT) and its partners, the City of Marshall, Lyon County, and the Marshall Area Transportation Group, completed a safety assessment along Highway 23 through Marshall from County Road 33 to County Road 7. Also included was a segment of Highway 19 from Highway 23 east approximately one-half mile. The goal of the assessment was to develop short- and long-term strategies to create a common vision among stakeholders and the public to manage the corridor now and into the future. With the assessment complete, the assessment partners can begin pursuing funding.



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SRF Consulting Group, Inc.

0169099
July 2016

Project Location Map

Marshall Area Highway 23 Safety Assessment
Marshall, MN

Figure 1

Existing Conditions

The subject intersections currently exist as a side-street stop controlled intersections where Highway 23 traffic has the right-of-way. Highway 23 is a four-lane divided principal arterial with a posted speed limit of 55 miles per hour (mph). Tiger Drive and Commencement Boulevard are a two-lane roadways that are functionally classified as local roadways with posted speed limits of 30 mph. There is a school speed zone (35 mph) along Highway 23 near the subject intersections as the Marshall High School and Southwest Minnesota State University (SMSU) campuses are located east and west of Highway 23, respectively. The existing lane configurations for the subject intersections are listed in Table 1.

Table 6. Existing Lane Configurations

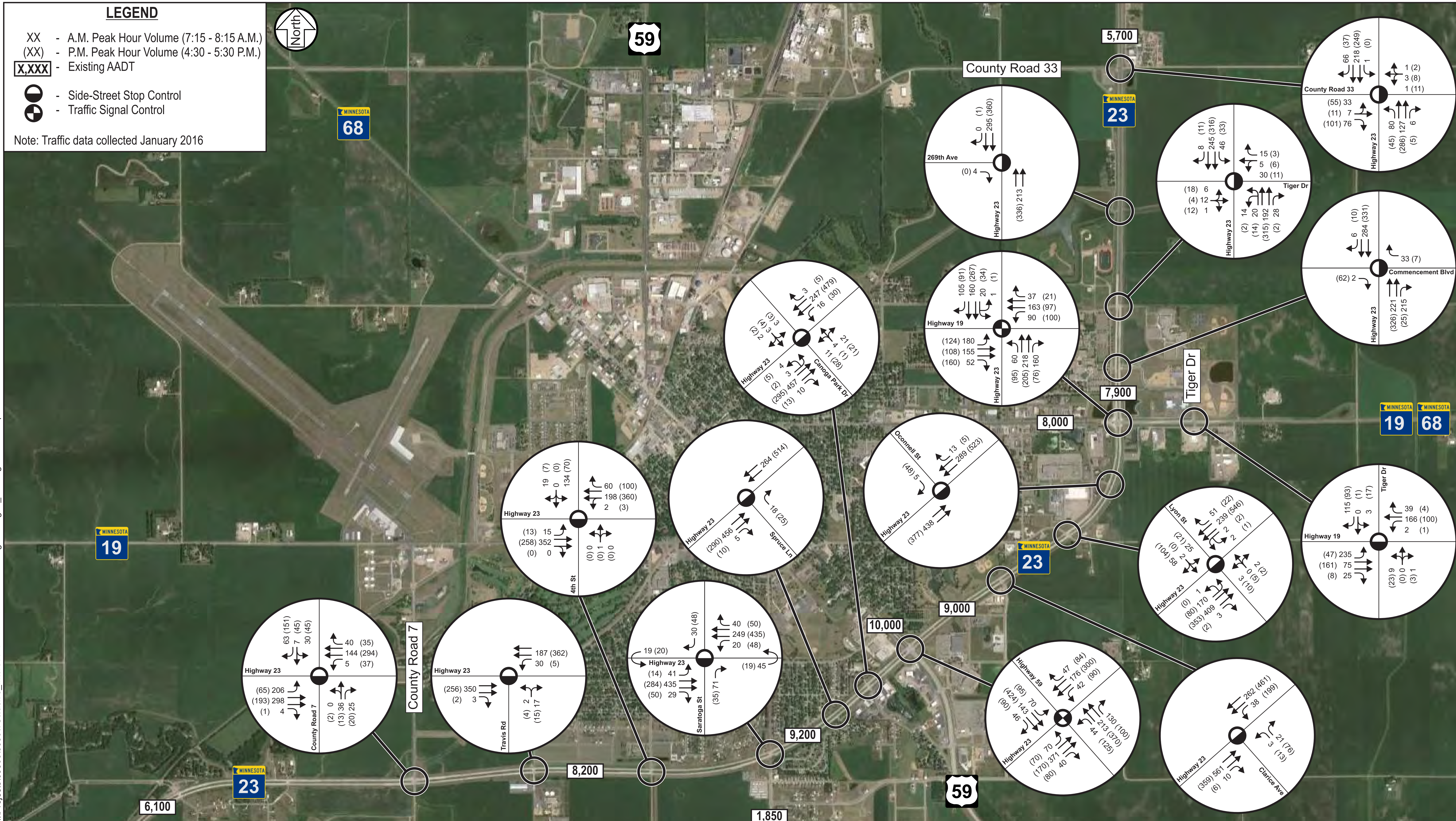
Approach Leg	Lane Configuration (at Tiger Drive)
Northbound Highway 23	One left-turn lane, two thru lanes, and one right-turn lane
Southbound Highway 23	One left-turn lane, two thru lanes, and one right-turn lane
Eastbound Tiger Drive	One shared left-turn/thru/right-turn lane
Westbound Tiger Drive	One shared left-turn/thru lane and one right-turn lane
Approach Leg	**Lane Configuration (at Commencement Boulevard)**
Northbound Highway 23	Two thru lanes and one right-turn lane
Southbound Highway 23	Two thru lanes and one right-turn lane
Eastbound Commencement Boulevard	One right-turn lane
Westbound Commencement Boulevard	One right-turn lane

Traffic Assessment

The amount of traffic using Highway 23 was determined by counting vehicles during the weeks of January 11, 2016 and January 25, 2016. These weekday 13-hour turning movement counts were used to establish morning and afternoon peak hour conditions and to estimate the amount of traffic that uses Highway 23 on an average day. The counts were utilized to establish a.m. and p.m. peak hour conditions at the subject intersections as well as to estimate current daily traffic volumes.

The daily traffic volume estimates were compared to historical Annual Average Daily Traffic (AADT) volumes, which were provided by MnDOT. In addition to 13-hour turning movement counts, speed data was collected the week of January 25, 2016. Existing traffic volume data is shown in Figure 2 and included in Attachment A.

Existing peak hour truck volumes are also included in Attachment A. The primary truck turning patterns are at Tiger Drive and they include movements to and from the high school from the south on Highway 23.


LEGEND
XX - A.M. Peak Hour Volume (7:15 - 8:15 A.M.)
(XX) - P.M. Peak Hour Volume (4:30 - 5:30 P.M.)
X,XXX - Existing AADT
Side-Street Stop Control
Traffic Signal Control
Note: Traffic data collected January 2016
North
59
68
23
19
County Road 33
County Road 7
Tiger Dr
5,700
7,900
8,000
9,000
10,000
9,200
8,200
6,100
1,850
269th Ave
Highway 23
Highway 19
Commencement Blvd
Canoga Park Dr
Oconnell St
Lyon St
Spruce Ln
4th St
Saratoga St
Travis Rd
Highway 59
Clarice Ave

SRF Consulting Group, Inc.

Existing Conditions

Marshall Area Highway 23 Safety Assessment

Marshall, MN

Figure 2

0169099

July 2016

An intersection operations analysis was conducted using Synchro/SimTraffic (V9.0) software to determine how traffic is currently operating at the key corridor intersections under existing traffic control and geometry. Intersection operations analysis results identify a Level of Service (LOS) which indicates how well an intersection is operating. Intersections are ranked from LOS A through LOS F. The LOS results are based on the average delay per vehicle, which corresponds to the delay threshold values shown in Table 2. LOS A indicates the best traffic operation and LOS F indicates an intersection where demand exceeds capacity.

Table 2. Level of Service Criteria for Signalized and Unsignalized Intersections

LOS Designation	Signalized Intersection Average Delay/Vehicle (seconds)	Unsignalized Intersection Average Delay/Vehicle (seconds)
A	≤ 10	≤ 10
B	> 10 - 20	> 10 - 15
C	> 20 - 35	> 15 - 25
D	> 35 - 55	> 25 - 35
E	> 55 - 80	> 35 - 50
F	> 80	> 50

Traffic operations at an unsignalized intersection with side-street stop control can be described in two ways. First, consideration is given to the overall intersection level of service. This takes into account the total number of vehicles entering the intersection and the capability of the intersection to support these volumes. Second, it is important to consider the delay on the minor side-street approach. Since the mainline does not have to stop, the majority of delay is attributed to the side-street approaches. It is typical of intersections with higher mainline traffic volumes to experience high levels of delay (i.e. poor levels of service) on the side-street approaches, but an acceptable overall intersection level of service during peak hour conditions.

Results of the existing intersection operations analysis shown in Table 3 indicate the subject intersections currently operate at an overall LOS A or better during the a.m. and p.m. peak hours. In addition, no significant side-street delays or queuing issues were observed in the field or traffic simulation. Details of the existing conditions analysis are included in Attachment B.

Due to the proximity of Marshall High School to the assessment corridor, traffic operations were analyzed to better understand peak conditions. Schools generally have condensed busy periods as compared to typical roadway network a.m. and p.m. peak periods (e.g. traffic near school grounds tends to be busy for a short duration close to school start and end times). The peak 15-minute interval was analyzed (see Table 3), which provides an understanding of operations related to the immediate school area. No changes in delays were observed from acceptable to failing for this time period.

Table 3. Existing Intersection Operations Analysis

Intersection	A.M. Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay
Highway 23 and Tiger Drive [1]	A/C	15 sec.	A/B	10 sec.
Highway 23 and Commencement Boulevard [1]	A/A	5 sec.	A/A	5 sec.
Intersection (15 Minute School Peak)	**A.M. Peak Hour**		**P.M. Peak Hour**	
	LOS	**Delay**	**LOS**	**Delay**
Highway 23 and Tiger Drive [1]	A/B	14 sec.	A/B	12 sec.
Highway 23 and Commencement Boulevard [1]	A/A	9 sec.	A/A	9 sec.

1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst approach LOS. The delay shown represents the worst side-street approach delay.

Safety Assessment

The Minnesota Crash Mapping Analysis Tool (MnCMAT) was used to obtain the crash history for the years 2010 through 2014. This data included the type of crash that occurred, when and where, the severity of, and contributing factors to the crash, and other useful information. Year 2015 crash data was omitted from the analysis due to impacts from the Highway 23/Saratoga Street intersection construction project.

Intersection and segment crash rates were calculated and compared to statewide average crash rates and critical crash rates. Intersection crash rates are calculated as the number of crashes per million entering vehicles (MEV) while segment crash rates are calculated as the number of crashes per million vehicle miles (MVM). The critical crash rate is a statistical comparison based on similar intersections and segments statewide. An observed crash rate greater than the critical crash rate indicates that the intersection or segment operates outside the expected, normal range. Table 4 summarizes the crash data for the subject intersections. Details are included in Attachment C.

Table 4. Intersection Crash Summary

Intersection	Total Crashes	Severe Crashes (K + A)	Observed Crash Rate	Statewide Average	Critical Rate
Highway 23 and Tiger Drive	3	0	0.18	0.26	0.61
Highway 23 and Commencement Boulevard	2	0	0.13	0.26	0.63

Intersection crash history indicates three recorded crashes at Tiger Drive and two recorded crashes at Commencement Boulevard and from 2010 through 2014. Tiger Drive had one sideswipe passing, one left-turn, and one right angle type crashes. Commencement Boulevard had one rear end and one right angle crash. The calculated crash rate at Tiger Drive is 0.18 per million entering vehicles (MEV), which is less than the expected crash rate of 0.26 per MEV. The calculated crash rate at Commencement Boulevard is 0.13 per MEV, which is less than the expected crash rate of 0.26 per MEV.

One crash at Tiger Drive was an injury related crash (Type A, B, or C). No segments of the Highway 23 corridor experienced crash rates higher than the critical crash rate, as documented in the supporting tech memo.

Speed Assessment

The speed at which drivers are currently driving was determined in February 2016, using radar equipment at five locations along Highway 23. The speeds for 100 vehicles at each location and in each direction were collected. The speeds were only measured for free-flow vehicles that were not part of a platoon (i.e. impeded by another vehicle), slowing down to turn, or accelerating after turning onto Highway 23. Further details of this assessment are provided in the supporting tech memo.

As the assessment relates to this ICE, the maximum speed observed on Highway 23 at 269th Avenue was 64 mph in the northbound direction and 67 mph in the southbound direction. The 85th percentile speed was 61 mph in the northbound direction and 62 mph in the southbound direction. The maximum observed speed in either direction was 12 mph over the posted speed limit, and the 85th percentile speed in both directions was greater than five (5) mph over the posted speed limit. The *Minnesota Manual on Uniform Traffic Control Devices* (MnMUTCD) states, "When a speed limit within a speed zone is posted, it should be within five (5) mph of the 85th percentile speed of free-flowing traffic." Both of these results indicate that drivers are not obeying the posted speed limit on Highway 23 in vicinity of 269th Avenue.

Based on the speed data collected at this location, drivers are not obeying the posted speed limit on Highway 23 in the vicinity of 269th Avenue. This could potentially be due to the existence of few access points in the area, the location on the fringe of Marshall, and a straight, wide, and flat roadway geometry.

Additional speed data was collected along Highway 23 between Tiger Drive and Commencement Boulevard. The speeds at these locations were impacted by nearby traffic signals, thus vehicles may not have been free-flow. The 85th percentile speeds at these locations were approximately five (5) mph slower than 85th percentile speeds collected at Lyon Street.

Future Conditions

Traffic Volume Forecasts

To evaluate future year conditions, near-term year 2019 and long-term year 2035 a.m. and p.m. peak turning movement volumes were developed for the intersections along the Highway 23 corridor through Marshall between County Road 7 and County Road 33.

Peak hour forecasts were based on both published MnDOT AADTs and existing peak hour turning movement counts collected. For locations with historical AADTs, a trend analysis was completed to estimate year 2035 traffic volumes. The historical annual growth rate was calculated, applied to the most recent AADT and projected to year 2035. A minimum annual growth rate of one percent was assumed for all locations. The resulting annual growth rate was approximately 1.4 percent throughout the corridor. To forecast year 2035 turning movements, daily volumes by approach were estimated based on these growth rates. Linear interpolation between existing and year 2035 turning movement volumes was used to forecast year 2019 volumes.

Details of the traffic volume forecasts are included in Attachment D. Forecasted year 2019 and year 2035 peak hour turning movement volumes are shown in Figures 3 and 4, respectively.

Warrants Analysis

A traffic signal and multiway stop applications warrants analysis was performed as outlined in the January 2014 *Minnesota Manual on Uniform Traffic Control Devices* (Mn/MUTCD) with year 2019 and year 2035 volumes assuming the 70 percent volume thresholds and existing posted speed limits. Minor approach right-turning traffic typically experiences less delay than left-turning traffic under side-street stop and traffic signal controlled conditions depending on the approach lane configuration. Policies established by MnDOT recommend inclusion percentages of right-turning traffic for the warrants analysis based on approach lane configurations and the potential capacity of the minor approach right-turn movement. For the purpose of this ICE which supports a planning study, the minor approach right-turning traffic was included as a part of the warrants analysis.

Based on the results of the analysis, traffic signal control is not warranted under either year 2019 or year 2035 volumes at Tiger Drive. Warrants were not evaluated at Commencement Boulevard since it is not a full access intersection. Detailed warrants analysis results are included in Attachment E.

LEGEND

XX - A.M. Peak Hour Volume (7:15 - 8:15 A.M.)
(XX) - P.M. Peak Hour Volume (4:30 - 5:30 P.M.)
X,XXX - Year 2019 AADT

- Side-Street Stop Control
- Traffic Signal Control

Note: Traffic data collected January 2016

North

MINNESOTA 68 | MINNESOTA 19 | MINNESOTA 23 | MINNESOTA 19 | MINNESOTA 68 | MINNESOTA 23 | MINNESOTA 23 | 59 | 59

6,200 | 8,400 | 8,400 | 9,700 | 10,900 | 9,800 | 8,700 | 2,100 | 6,400

County Road 33 | Tiger Dr | County Road 7

269th Ave | Highway 23 | Highway 19 | Canopa Park Dr | 4th St | Travis Rd | Saratoga St | Spruce Ln | Oconnell St | Lyon St | Commencement Blvd | Clarice Ave | Highway 59

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Year 2019 Conditions

Marshall Area Highway 23 Safety Assessment
Marshall, MN

0169099
July 2016

Figure 3

LEGEND

XX - A.M. Peak Hour Volume (7:15 - 8:15 A.M.)
(XX) - P.M. Peak Hour Volume (4:30 - 5:30 P.M.)
X,XXX - Year 2035 AADT

- Side-Street Stop Control
- Traffic Signal Control

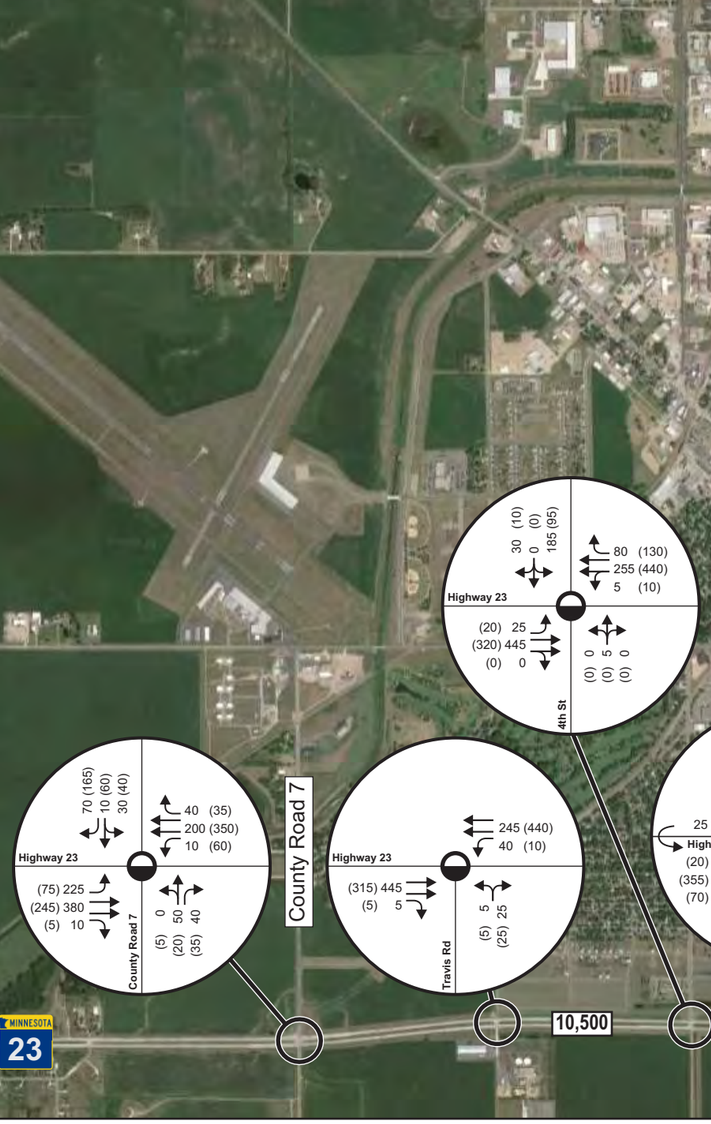
Note: Traffic data collected January 2016

North

MINNESOTA 68 | 59 | MINNESOTA 23 | MINNESOTA 19 | MINNESOTA 68

County Road 33 | Tiger Dr | County Road 7 | 4th St | Spruce Ln | Saratoga St | Travis Rd | Oconnell St | Lyon St | Clarice Ave | Commencement Blvd | Canopy Park Dr | 269th Ave

7,800 | 10,000 | 9,500 | 11,900 | 13,700 | 11,900 | 10,500 | 2,800 | 7,400



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July 2016

Year 2035 Conditions

Marshall Area Highway 23 Safety Assessment
Marshall, MN

Figure 4

Intersection Alternatives

Throughout the public and stakeholder engagement process conducted for the assessment, the assessment team heard concerns regarding travel speeds along Highway 23. It was often suggested that the posted speed limit should be lowered along Highway 23 to make the roadway safer. In addition to comments regarding travel speeds and speed limits along the corridor, it was often suggested that interchanges should be constructed through Marshall.

Based on this feedback and the technical analysis completed, roundabouts and J-Turns were considered as intersection strategies because they address the safety issues currently observed along the Highway 23 corridor (e.g. both strategies address right angle and opposing left-turn crashes). In addition to addressing safety, when placed strategically, roundabouts can reduce travel speeds along the Highway 23 corridor and provide safer at-grade pedestrian crossings. The following intersection control alternatives were identified for the Highway 23 at Tiger Drive and Commencement Boulevard intersections:

- Side-street stop (at both intersections)
- Reduced-conflict intersection (J-Turn) at Tiger Drive
- Offset "T" intersections
- Roundabout at Tiger Drive

Detailed alternative layouts are included in Attachment F.

Analysis of Alternatives

The alternatives identified for the subject intersections were evaluated based on the following:

- **Traffic Operations:**
  - Comparison of overall average delay (in seconds) per vehicle under future year 2019 and year 2035 traffic volumes.
  - Travel time comparison of each intersection movement (in seconds) to account for any out of direction travel required.
- **Safety:**
  - Expected crash reduction values were estimated from a combination of Crash Modification Factors Clearinghouse, FHWA's *Desktop Reference for Crash Reduction Factors*, and Locally Expected Values. The crash reduction values were applied to the total number of crashes for each intersection improvement. Engineering judgement was used due to site-specific conditions.
  - Safety is also related to the number of conflict points at an intersection. Conflict points occur at intersections where the travel paths of two vehicles merge, diverge, or cross. Each of these conflict points is a potential location for a crash to occur. The evaluation included a comparison of conflict points by lane.
- **Right-of-Way:**
  - Square footage of right-of-way that will need to be acquired**.**
- **Benefit-Cost:**
  - Estimated project cost based on year 2015 dollars inflated to year 2016 dollars. Includes right-of-way costs, paving and grading costs, drainage and erosion control costs, bridge costs, street lighting costs, signing and striping costs, and other miscellaneous costs (e.g. mobilization and temporary costs).
  - Benefit-Cost Analysis provides an indication of the economic desirability of an alternative, but results must be weighed by decision-makers along with the assessment of other effects and impacts. Projects are considered cost-effective if the benefit-cost ratio is greater than 1.0. The larger the ratio number, the greater the benefits per unit cost.
  - HSIP BCA Methodology was used to only analyze the safety benefit as it is expected that vehicle miles traveled and vehicle hours traveled will show a disbenefit due to the intersection improvements.

As previously noted, this ICE report is being completed in conjunction with ICE reports for nine major intersections along Highway 23. The alternatives evaluation matrix (Figure 5) summarizes the results of the above evaluation and additional details are provided in the following sections. Pedestrian and bicycle considerations, as well as overall roadway system considerations, were also evaluated and detailed in the following sections.

Location	Existing Access	Meets Access Spacing Guidelines?	Crash History		Total Entering Volume		Alternatives	Safety		Traffic Operations (Future Year 2035 Volumes)						Right-of-Way Impacts (sq ft)	Benefit-Cost Analysis	
			Number of Crashes	Crash Rate	Existing Daily	Year 2035 Daily		Expected Crash Reduction [1]	Conflict Points (per lane)	Overall Delay (sec) A.M. Peak	Worst Movement Travel Time (sec) A.M. Peak		Overall Delay (sec) P.M. Peak	Worst Movement Travel Time (sec) P.M. Peak			Year 2016 Cost ($)	Benefit-Cost Ratio [2]
CR 7	Full Access (Side-street Stop)	Yes	13	**0.75 >Critical**	9,500	11,400	Do-Nothing	---	40	4.3	32	SBL	3.4	21	SBT	---	---	---
							J-Turn	50%	24	3.2	35	SBT	3.3	35	SBT	---	$1.7M	1.1
							Offset "T" Intersections with J-Turn	70%	22	3.9	37	SBL	3.2	36	NBL	300,000	$3.3M	0.9
							Roundabout	50%	20	6.1	8	EBT	5.6	7	WBT	---	$1.6M	1.2
							Overpass with Jug Handles	70%	22	7.7	19	EBL	6.8	18	WBL	440,000	$8.2M	0.4
							Interchange	70%	30	7.7	19	EBL	7.2	18	WBL	440,000	$8.2M	0.4
Travis Rd	Full Access "T" (Side-street Stop)	Yes	1	0.07 <Expected	8,400	10,450	CONTINUE TO MONITOR SAFETY NEAR-TERM RESTRICT OR CLOSE ACCESS LONG-TERM											
4th Street	Full Access (Side-street Stop)	Yes	5	**0.30 >Expected**	9,100	12,500	Do-Nothing	---	40	5.4	24	SBL	2.3	16	SBL	---	---	---
							J-Turn	50%	24	3.4	39	SBL	1.8	36	SBL	---	$1.5M	1.5
							Roundabout	50%	20	6.1	8	EBT	5.8	6	WBT	---	$1.6M	1.4
							J-Turn with closed south leg	60%	11	3.4	39	SBL	2.1	36	SBL	---	$0.6M	5.4
							Roundabout with closed south leg	60%	10	5.9	8	EBT	5.9	6	WBT	---	$1.5M	1.9
Spruce Ln	Full Access "T" (Side-street Stop)	No	0	0.00 <Expected	9,350	12,000	CONTINUE TO MONITOR SAFETY NEAR-TERM RESTRICT OR CLOSE ACCESS LONG-TERM											
Canoga Park Dr	Full Access (Side-street Stop)	No	2	0.11 <Expected	9,650	12,900	Do-Nothing	---	40	2.8	17	SBT	3.8	20	SBT	---	---	---
							Partial 3/4 Access Intersection (close northwest leg)	50%	11	2.5	9	WBU	3.1	7	WBU	---	$0.3M	1.9
							Full 3/4 Access Intersection	50%	24	2.6	8	WBU	3.1	7	EBU	---	$0.5M	1.0
Hwy 59	Full Access (Traffic Signal)	Yes	35	**1.16 >Critical**	16,600	25,750	Do-Nothing	---	52	21.4	50	EBL	28.6	48	EBL	---	---	---
							Raised median and Landscaping	55% Peds	52	21.4	50	EBL	28.6	48	EBL	---	$0.3M	---
							Roundabout	20%	28	7.7	57	WBL	13.3	63	WBL	---	---[3]	---
Clarice Ave	Full Access "T" (Side-street Stop)	Yes	7	**0.37 >Expected**	10,350	13,550	Do-Nothing	---	11	1.5	14	NBL	2.6	8	WBL	---	---	---
Lyon St	Full Access (Side-street Stop)	Yes	10	**0.51 >Expected**	10,800	14,450	Do-Nothing	---	40	4.0	40	SBL	6.2	71	SBL	---	---	---
							J-Turn (with no left-turn conflict at Clarice Ave)	50%	24	2.7	34	WBU	2.6	33	EBU	---	$1.3M	1.8
							Roundabout (with no left-turn conflict at Clarice Ave)	50%	20	6.3	7	WBL	7.2	9	EBL	---	$1.8M	1.4
							J-Turn (combined with frontage roads)	70%	24	1.5	36	WBU	1.7	39	EBU	501,000	$3.5M	1.1
							Roundabout (combined with frontage roads)	70%	20	6.2	7	WBL	6.4	8	EBL	501,000	$2.4M	1.6
OConnel St	Right-in/Right-out (Side-street Stop)	Yes	0	0.00 <Expected	9,200	13,050	CONTINUE TO MONITOR SAFETY NEAR-TERM RESTRICT OR CLOSE ACCESS LONG-TERM											
Hwy 19	Full Access (Traffic Signal)	Yes	24	**0.99 >Critical**	13,350	19,500	Do-Nothing	---	52	19.3	50	EBL	21.4	48	EBL	---	---	---
							Lengthen Acceleration Lanes	10%	52	20.8	46	WBL	22.1	46	WBL	---	$0.9M	0.8
							Remove Right-Turn Channelization	10%	52	21.7	55	WBL	23.4	52	WBL	---	$1.0M	2.1
							Raised Median with Landscaping	55% Peds	52	19.3	50	EBL	21.4	48	EBL	---	$0.2M	---
							Roundabout	20%	28	7.2	11	WBT	6.6	10	EBT	---	---[3]	---
Commencement Blvd	Right-in/Right-out (Side-street Stop)	No	2	0.13 <Expected	8,400	11,400	Do-Nothing	---	4	0.9	40	SBL	0.9	71	SBL	---	---	---
Tiger Dr	Full Access (Side-street Stop)	Yes	3	0.18 <Expected	9,050	10,850	Do-Nothing	---	40	1.9	15	EBL	1.4	18	WBT	---	---	---
							Roundabout	50%	20	5.7	7	EBT	6.5	8	EBT	---	$1.5M	0.3
							J-Turn	50%	24	1.1	32	EBL	1.0	31	WBT	---	$1.0M	0.4
							Offset "T" Intersections	---[4]	---[4]	1.7	17	WBL	1.0	14	WBL	---[4]	---[3,4]	---[4]
269th Avenue	Right-in/Right-out (Side-street Stop)	No	1	0.07 <Expected	7,900	9,950	CONTINUE TO MONITOR SAFETY NEAR-TERM RESTRICT OR CLOSE ACCESS LONG-TERM											
CR 33	Full Access (Side-street Stop)	Yes	8	**0.42 >Expected**	10,350	12,700	CONTINUE TO MONITOR SAFETY NEAR-TERM LONG-TERM CONSTRUCT WB-TO-NB RIGHT-TURN ACCELERATION LANE AND WB-TO-SB LEFT-TURN (INSIDE) ACCELERATION LANE											

Notes:
1) Expected Crash Reduction Values estimated from a combination of Crash Modification Factors Clearinghouse, FHWA's Desktop Reference for Crash Reduction Factors, and Locally Expected Values. The crash reduction values were applied to the total number of crashes for each intersection improvement.
Engineering judgement was used due to site-specific conditions. From FHWA: "The estimate is a useful guide, but it remains necessary to apply engineering judgment and to consider site-specific environmental, traffic volume, traffic mix, geometric, and operational conditions which will affect the safety impact of a countermeasure."
2) Benefits were calculated from Expected Crash Reduction.
3) Concept cost estimates were not prepared for alternative.
4) Strategy was elimated during discussions with Assessment Team due to needed infrastructure when other viable strategies exist.

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Evaluation of Safety Improvement Alternatives

Marshall Area Highway 23 Safety Assessment
Marshall, MN

0169099
October 2016

Figure 5

Traffic Operations

The year 2019 and year 2035 analyses evaluated the alternatives under future year 2019 and year 2025 volumes, respectively, to determine the expected intersection operations at the subject intersections in the future. Results for year 2019 are shown in Table 5, and results for year 2035 are shown in Table 5. To compare the side-street stop controlled approaches, the worst minor approach movement delay and level of service were also calculated. Results of the year 2019 and year 2035 analyses indicate that all alternatives are expected to operate acceptably. Detailed analysis results are included in Attachment G.

Table 5. Year 2019 Operations Analysis

A.M. Peak	Tiger Drive		Commencement Boulevard	
	LOS	Delay	LOS	Delay
Side-street stop (at both intersections) [1]	A/B	2/12	A/A	1/7
J-Turn at Tiger Drive [1]	A/A	1/2	A/A	1/6
Offset "T" intersections [1]	A/A	1/9	A/B	1/13
Roundabout at Tiger Drive [1]	A/A	5/6	A/A	1/4
P.M. Peak	**Tiger Drive**		**Commencement Boulevard**	
	LOS	Delay	LOS	Delay
Side-street stop (at both intersections) [1]	A/B	1/12	A/A	1/5
J-Turn at Tiger Drive [1]	A/A	1/1	A/A	1/5
Offset "T" intersections [1]	A/A	2/8	A/A	1/6
Roundabout at Tiger Drive [1]	A/A	6/7	A/A	1/5

1) Side-street stop controlled intersection "Overall intersection operations/Worst minor approach delay".
2) Roundabout intersection "Overall intersection operations/Worst minor approach delay".

Table 6. Year 2035 Operations Analysis

A.M. Peak	Tiger Drive		Commencement Boulevard	
	LOS	Delay	LOS	Delay
Side-street stop (at both intersections) [1]	A/B	2/12	A/A	1/6
J-Turn at Tiger Drive [1]	A/A	1/2	A/A	1/5
Offset "T" intersections [1]	A/A	2/9	A/B	1/12
Roundabout at Tiger Drive [1]	A/A	6/6	A/A	1/6
P.M. Peak	**Tiger Drive**		**Commencement Boulevard**	
	LOS	Delay	LOS	Delay
Side-street stop (at both intersections) [1]	A/B	1/11	A/A	1/5
J-Turn at Tiger Drive [1]	A/A	1/1	A/A	1/6
Offset "T" intersections [1]	A/B	1/10	A/A	1/7
Roundabout at Tiger Drive [1]	A/A	7/7	A/A	1/5

1) Side-street stop controlled intersection "Overall intersection operations/Worst minor approach delay".
2) Roundabout intersection "Overall intersection operations/Worst minor approach delay".

Constructing either a J-Turn or roundabout at Tiger Drive would minimize the side-street delay for drivers at both intersections compared to the existing side-street stop controlled conditions; however, the J-Turn does include additional travel time for out-of-direction travel. This is due to minor-street drivers wanting to make a left-turn on Highway 23 or cross over Highway 23 needing to make a right-turn and downstream U-Turn to complete their movement. It is also important to note the roundabout would require all traffic using the intersection to slow down prior to entering the roundabout; therefore, drivers on Highway 23 would experience added delay that they do not experience today or would experience if a J-Turn is constructed. There is no evident operational benefit for the Offset "T" intersections; therefore, it was not recommended for final consideration by the assessment team and it was removed from further consideration.

Safety

As previously noted, the existing intersection crash history indicates no existing crash issues identified. However, it is typical of intersections with higher mainline traffic volumes to experience delay on the side-street approaches, and as the side-street delay increases drivers tend to accept unsafe gaps and/or take greater risks. Each alternative was analyzed for its potential safety benefit (see Table 7). Each alternative provided a positive safety benefit to the subject intersections over the existing intersection conditions.

Table 7. Crash Reduction Factor

Intersection Alternative	Crash Reduction Factor
Side-street stop (at both intersections)	0%
J-Turn at Tiger Drive	50%
Roundabout	50%

Safety is also related to the number of conflict points at an intersection. Conflict points occur at intersections where the travel paths of two vehicles merge, diverge, or cross. Each of these conflict points is a potential location for a crash to occur. Both J-Turns and roundabouts reduce the number of directions in which drivers are required to look for conflicting traffic. The number of conflict points at Tiger Drive are expected to be minimized with either a J-Turn or roundabout, particularly severe crossing conflicts. J-Turns eliminate the left-turn and through movements from cross street approaches which requires drivers to turn right onto the main road and then make a U-turn maneuver at a one-way median opening after the intersection. Comparatively, the roundabout would have the largest reduction in conflict points per lane. The Commencement Boulevard is already a right-in/right-out intersection that minimizes intersection conflicts, so it is not recommended to change the intersection configuration.

Right-of-Way

Based on the concept drawings developed for each alternative, none of the alternatives are expected to require the acquisition of right-of-way, except the Offset "T" intersections.

Benefit-Cost Analysis

The benefit-cost analysis provides an indication of the economic desirability of an alternative, but results must be weighed by decision-makers along with the assessment of other effects and impacts. Projects are considered cost-effective if the benefit-cost ratio is greater than 1.0. The larger the ratio number, the greater the benefits per unit cost. The following methodology and assumptions were used for the benefit-cost analysis in accordance with Highway Safety Improvement Plan (HSIP) methodology:

1. **Main Components**: The main components analyzed included:
    a. Crashes by severity.
    b. Initial capital costs: These costs were broken into different categories in accordance with service life (consistent with the recommendations of MnDOT Office of Planning and Programming, July 2014).
    c. Remaining Capital Value: The remaining capital value (value of improvement beyond the analysis period) was considered a reduction in cost.
    d. Maintenance costs.
2. **Analysis Years:** The analysis assumed that each alternative would be constructed in 2019. Therefore, 2020 is the first full year that benefits will be realized from the project. The analysis focused on the twenty-year period from 2020 to 2040 based on 365 days of benefit.
3. **Economic Assumptions:** Project improvements are expected to cause a speed reduction on the corridor therefore Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT) were not included as benefits. The present value of all benefits and all costs were calculated considering 2016 as the year of current dollars. The assumed discount rate is 1.7 percent per guidelines from the *"Recommended standard values for use in B/C analysis in SFY 2016",* Minnesota Department of Transportation, Office of Transportation System Management, July 2015. Value of time, operating costs for vehicles, and remaining capital value assumptions were consistent with values also published in the document.
4. **Safety Analysis:** Safety benefits were estimated based on intersection crash data collected above based on the severity of the crashes (Type Fatal, A, B, C, or Property Damage). These crashes were then compared against the estimated crash reduction of each alternative to calculate a safety benefit for each alternative.

5. **Calculation of Remaining Capital Value:** Because many components of the initial capital costs have service lives well beyond the 20-year benefit-cost analysis period, the remaining capital value was calculated for each alternative. The remaining capital value was subtracted from the initial capital cost to determine the net capital cost. In determining remaining capital value, the initial costs of the alternatives were separated into the following categories:
    a. Right-of-Way
    b. Major Structures
    c. Grading and Drainage
    d. Sub-Base and Base
    e. Surface

Results of the benefit-cost analysis are included in Table 8. The benefit-cost analysis workbook summary and detailed cost estimates for the alternatives are included in Attachment H.

Table 8. Benefit-Costs Analysis Results

Intersection Alternative	Initial Capital Costs (2016 Dollars)	B/C Ratio
J-Turn at Tiger Drive	$1.0M	0.4
Roundabout at Tiger Drive	$1.5M	0.3

Both intersection alternatives carried forward for consideration are not considered cost-effective since the benefit-cost ratio is less than 1.0. This is mainly due to the lack of crash history at the Tiger Drive intersection. However, it is important to note that even though the intersection does not have statistically significant crash history, it has design characteristics similar to other locations along Highway 23 that do have crash issues. Therefore, there are risks in the future for potential crash issues.

Pedestrian and Bicycle Considerations

From a pedestrian and bicycle perspective, there is an existing pedestrian and bicycle underpass at Commencement Boulevard. This facility should be utilized by non-motorized users, and all future non-motorized user infrastructure should direct users to this facility.

Roadway System Considerations

Arterial corridors are intended to provide high mobility with minimal access. Considering the roadway system impacts is important when evaluating the most appropriate form of intersection control. J-Turns would provide easy access to Highway 23 with minimal conflicts, and not impede the flow of traffic along Highway 23. A roundabout, however, would require all traffic to slow down as the geometry of a roundabout induces lower speeds. A roundabout at Tiger Drive would provide the best opportunity to reduce mainline Highway 23 traffic speeds.

Key Findings and Recommendations

The purpose of this ICE was to evaluate various forms of intersection control under existing and future conditions at the Highway 23 at Tiger Drive and Commencement Boulevard intersections in Marshall to determine the most appropriate alternative(s) that optimize traffic operations, safety, impacts, and cost. **Based on the results of this ICE, as well as additional analysis documented in the supporting tech memo, a roundabout is recommended long-term at Highway 23 and Tiger Drive and no changes are recommended for Commencement Boulevard as this intersection is already a partial access intersection.**

The following summarizes the key findings to support this recommendation:

- The existing intersection crash history indicates no existing crash issues identified at either of the subject intersections. However, it is typical of intersections with higher mainline traffic volumes to experience delay on the side-street approaches, and as the side-street delay increases drivers tend to accept unsafe gaps and/or take greater risks. Even though the Tiger Drive intersection does not have a statistically significant crash history, it has design characteristics similar to other locations along Highway 23 that do have crash issues. Therefore, there are risks in the future for potential crash issues.
- Constructing a roundabout would minimize the side-street delay for drivers. It is important to note the roundabout would require all traffic using the intersection to slow down prior to entering the roundabout; therefore, drivers on Highway 23 would experience added delay.
- Based on the speed data collected at 269th Avenue just north of the subject intersections, drivers are not obeying the posted speed limit on Highway 23. Roundabouts calm traffic (i.e. reduce speeds) along roadways by using geometric design rather than traffic control devices. Furthermore, they provide a transition between high-speed rural and low-speed urban environments.
- Based on the concept drawings developed the roundabout is not expected to require the acquisition of right-of-way. As result, constructing a roundabout is considered cost-effective since the benefit-cost ratio is greater than 1.0.

Attachment A

Existing Traffic Volume Counts

Highway 23 at Tiger Dr **1/14/2016**

Time	Peds	SB Right	SB Thru	SB Left	SB UTrn	Peds	WB Right	WB Thru	WB Left	WB Utrn	Peds	NB Right	NB Thru	NB Left	NB UTrn	Peds	EB Right	EB Thru	EB Left	EB UTrn	15 Minute Total	Hourly Total
06:00	0	1	18	1	0	0	0	0	0	0	0	0	25	0	0	0	0	0	1	0	46	293
06:15	0	1	26	0	0	0	0	0	0	0	0	2	24	0	0	0	3	0	0	0	56	366
06:30	0	0	17	2	0	0	0	0	1	0	0	2	43	1	0	0	0	1	0	0	67	437
06:45	0	0	40	3	0	0	2	0	6	0	0	7	63	3	0	0	0	0	0	0	124	532
07:00	0	0	39	8	0	0	3	0	9	0	0	5	50	3	0	0	1	0	1	0	119	651
07:15	0	1	54	9	0	0	0	0	3	0	0	5	52	2	0	0	0	0	1	0	127	661
07:30	0	1	63	10	0	0	4	1	8	0	0	13	48	3	7	0	0	4	0	0	162	632
07:45	0	1	73	26	0	0	10	3	15	0	0	12	68	13	10	0	1	8	3	0	243	581
08:00	0	5	55	1	0	0	0	1	4	0	0	3	47	10	1	0	0	0	2	0	129	456
08:15	0	6	47	2	0	0	0	0	1	0	0	2	32	7	0	0	0	1	0	0	98	405
08:30	0	6	45	1	0	0	0	0	2	0	0	3	31	18	3	0	1	0	1	0	111	399
08:45	0	7	53	0	0	0	1	0	1	0	0	1	18	33	0	0	2	1	1	0	118	379
09:00	0	4	37	0	0	0	0	0	3	0	0	0	24	10	0	0	0	0	0	0	78	358
09:15	0	3	49	0	0	0	2	0	0	0	0	1	29	5	0	0	1	0	2	0	92	366
09:30	0	2	46	1	0	0	1	0	1	0	0	4	30	5	1	0	0	0	0	0	91	386
09:45	0	4	43	1	0	0	1	1	0	0	0	1	36	5	1	0	3	1	0	0	97	400
10:00	0	4	38	0	0	0	2	0	2	0	0	0	28	9	0	0	2	0	1	0	86	399
10:15	0	1	40	0	0	0	0	0	2	0	0	0	38	19	1	0	8	1	2	0	112	404
10:30	0	1	47	2	0	0	0	1	2	0	0	3	45	0	0	0	3	0	1	0	105	373
10:45	0	1	52	1	0	0	0	0	4	0	0	1	32	4	0	0	0	0	1	0	96	389
11:00	0	1	43	1	0	0	0	0	6	0	0	0	26	8	2	0	0	0	4	0	91	424
11:15	0	0	36	0	0	0	0	1	2	0	0	1	36	1	0	0	1	0	3	0	81	493
11:30	0	5	56	2	0	0	0	0	2	0	0	0	42	2	1	0	7	1	3	0	121	530
11:45	0	2	59	0	0	0	1	0	2	0	0	1	42	6	1	0	12	1	4	0	131	525
12:00	0	0	80	2	0	0	1	1	2	0	0	2	59	4	2	0	2	1	4	0	160	487
12:15	0	1	51	0	0	0	1	0	2	0	0	1	51	5	1	0	1	1	3	0	118	451
12:30	0	2	49	0	0	0	0	1	0	0	0	1	51	6	0	0	2	0	4	0	116	448
12:45	0	1	30	0	0	0	0	0	2	0	0	0	54	5	0	0	0	0	1	0	93	453
13:00	0	1	49	1	0	0	0	4	1	0	0	2	55	10	0	0	0	0	1	0	124	473
13:15	0	3	42	1	1	0	0	3	1	0	0	1	46	15	0	0	1	0	1	0	115	447
13:30	0	5	42	0	0	0	1	4	6	0	0	0	53	3	0	0	1	1	5	0	121	431
13:45	0	0	50	1	0	0	0	0	5	0	0	1	49	2	1	0	1	1	2	0	113	418
14:00	0	0	45	0	0	0	0	0	0	0	0	0	41	7	1	0	1	2	1	0	98	468
14:15	0	2	35	1	0	0	0	0	3	0	0	0	47	1	0	0	5	1	4	0	99	571
14:30	0	1	39	1	0	0	2	0	2	0	0	3	50	1	1	0	4	2	2	0	108	667
14:45	0	1	50	4	0	0	2	0	8	0	0	5	59	2	1	0	13	5	13	0	163	710
15:00	0	2	60	2	0	0	8	4	21	0	0	5	64	8	12	0	5	2	8	0	201	693
15:15	0	3	51	3	0	0	7	2	22	0	0	2	78	4	18	0	4	0	1	0	195	631
15:30	0	0	72	2	0	0	0	1	5	0	0	1	56	1	2	0	5	1	5	0	151	610
15:45	0	0	66	1	0	0	2	4	7	0	0	0	59	3	0	0	2	1	1	0	146	693
16:00	0	4	44	1	0	0	1	1	8	0	0	1	64	4	2	0	4	0	5	0	139	692
16:15	0	5	67	5	0	0	0	1	10	0	0	1	68	6	2	0	3	0	6	0	174	747
16:30	0	4	110	12	0	0	0	1	3	0	0	1	83	3	1	0	7	0	9	0	234	741
16:45	0	2	56	8	0	0	2	2	2	0	0	1	63	3	0	0	1	1	4	0	145	665
17:00	0	2	64	5	0	0	1	2	5	0	0	0	106	4	0	0	1	1	3	0	194	653
17:15	0	2	86	8	0	0	0	1	1	0	0	0	58	4	1	0	3	2	2	0	168	567
17:30	0	2	68	0	0	0	2	1	10	0	0	1	63	3	0	0	4	0	4	0	158	501
17:45	0	4	54	4	0	0	0	1	7	0	0	1	52	2	1	0	3	1	3	0	133	432
18:00	0	1	47	2	0	0	0	1	2	0	0	0	46	4	1	0	1	2	1	0	108	377
18:15	0	1	36	1	0	0	0	1	1	0	0	1	55	2	0	0	1	2	1	0	102	
18:30	0	1	35	0	0	0	0	0	4	0	0	0	40	0	1	0	3	2	3	0	89	
18:45	0	0	33	0	0	0	0	0	0	0	0	0	37	4	0	0	3	0	1	0	78	
7:15		8	245	46	0		14	5	30	0		33	215	28	18		1	12	6			
HV		0	36	0	0		0	0	6	0		5	19	1	0		0	0	0			
HV%		0.0%	17.2%	0.0%	0.0%		0.0%	0.0%	25.0%	0.0%		17.9%	9.7%	3.7%	0.0%		0.0%	0.0%	0.0%			
16:30		10	316	33	0		3	6	11	0		2	310	14	2		12	4	18			
HV		0	23	0	0		0	0	1	0		0	27	0	0		0	0	0			
HV%		0.0%	7.8%	0.0%	0.0%		0.0%	0.0%	10.0%	0.0%		0.0%	9.5%	0.0%	0.0%		0.0%	0.0%	0.0%			

Highway 23 at Tiger Dr **1/19/2016**

Time	Peds	SB Right	SB Thru	SB Left	SB UTrn	Peds	WB Right	WB Thru	WB Left	WB Utrn	Peds	NB Right	NB Thru	NB Left	NB UTrn	Peds	EB Right	EB Thru	EB Left	EB UTrn	15 Minute Total	Hourly Total
06:00	0	0	17	0	0	0	0	0	0	0	0	1	21	2	0	0	0	0	0	0	41	265
06:15	0	1	20	1	0	0	0	0	2	0	0	1	27	0	0	0	0	0	1	0	53	327
06:30	0	0	19	0	0	0	0	0	0	0	0	3	45	2	0	0	0	1	0	0	70	400
06:45	0	0	28	4	0	0	0	1	6	0	0	11	47	2	0	0	0	2	0	0	101	482
07:00	0	2	33	6	0	0	0	0	0	0	0	5	53	3	0	0	0	0	1	0	103	646
07:15	0	1	54	7	0	0	3	1	2	0	0	8	46	2	0	0	1	0	1	0	126	699
07:30	0	0	59	14	0	0	2	0	6	0	0	7	48	7	3	0	0	6	0	0	152	707
07:45	0	5	86	31	0	0	10	2	11	0	0	24	61	20	9	0	0	4	2	0	265	686
08:00	0	14	50	1	0	0	1	1	3	0	0	2	57	24	1	0	0	1	1	0	156	534
08:15	0	8	67	1	0	0	0	1	2	0	0	2	24	24	0	0	1	2	2	0	134	496
08:30	0	9	57	2	0	0	0	0	2	0	0	1	39	16	0	0	1	0	4	0	131	481
08:45	0	5	48	1	1	0	0	1	0	0	0	2	34	19	1	0	0	0	1	0	113	432
09:00	0	10	42	2	0	0	0	1	3	0	0	0	41	17	1	0	1	0	0	0	118	417
09:15	0	6	51	0	0	0	0	2	1	0	0	1	31	24	0	0	2	1	0	0	119	399
09:30	0	4	37	0	0	0	0	1	2	0	0	0	23	11	0	0	1	1	2	0	82	388
09:45	0	5	42	1	0	0	0	0	0	0	0	2	35	8	1	0	2	0	2	0	98	385
10:00	0	0	49	1	0	0	0	1	1	0	0	0	32	13	1	0	2	0	0	0	100	390
10:15	0	8	37	2	0	0	0	0	2	0	0	3	38	12	0	0	4	0	2	0	108	405
10:30	0	1	32	1	0	0	0	0	2	0	0	0	32	7	1	0	2	0	1	0	79	399
10:45	0	1	46	1	0	0	1	0	6	0	0	0	39	6	0	0	2	0	1	0	103	410
11:00	0	2	53	0	0	0	0	1	6	0	0	0	47	5	1	0	0	0	0	0	115	427
11:15	0	3	37	0	0	0	0	1	0	0	0	0	33	13	2	0	10	1	2	0	102	431
11:30	0	3	37	0	0	0	0	0	3	0	0	0	36	2	1	0	4	0	4	0	90	464
11:45	0	1	53	1	0	0	2	0	2	0	0	2	48	4	1	0	3	0	3	0	120	507
12:00	0	4	56	1	0	0	1	0	0	0	0	1	44	5	2	0	2	0	3	0	119	505
12:15	0	2	51	2	0	0	0	0	0	0	0	1	45	12	0	0	18	1	3	0	135	495
12:30	0	1	48	0	0	0	0	0	3	0	0	0	66	4	2	0	8	0	1	0	133	466
12:45	0	2	49	1	0	0	0	0	2	0	0	1	53	4	1	0	0	0	5	0	118	439
13:00	0	4	34	0	0	0	0	1	2	0	0	1	49	11	0	0	3	1	3	0	109	414
13:15	0	3	29	0	0	0	1	0	6	0	0	0	43	16	1	0	4	0	3	0	106	419
13:30	0	2	46	0	0	0	1	1	7	0	0	1	40	3	1	0	1	0	3	0	106	487
13:45	0	2	40	0	0	0	0	1	2	0	0	2	38	4	0	0	1	1	2	0	93	489
14:00	0	2	45	3	0	0	0	0	7	0	0	4	39	5	0	0	2	2	5	0	114	536
14:15	0	3	35	4	0	0	12	2	24	0	0	8	35	14	20	0	7	3	7	0	174	590
14:30	0	1	34	2	0	0	0	1	2	0	0	3	41	1	0	0	13	2	8	0	108	578
14:45	0	1	51	3	0	0	2	1	7	0	0	5	45	11	3	0	2	1	8	0	140	604
15:00	0	3	40	4	0	0	14	0	22	0	0	8	49	3	14	0	4	0	7	0	168	596
15:15	0	2	51	1	0	0	12	4	21	0	0	0	40	4	25	0	1	0	1	0	162	557
15:30	0	1	51	5	0	0	2	0	6	0	0	1	54	3	0	0	8	1	2	0	134	520
15:45	0	0	59	1	0	0	0	4	7	0	0	1	52	2	2	0	3	1	0	0	132	562
16:00	0	1	65	0	0	0	1	0	6	0	0	0	51	1	0	0	2	0	2	0	129	560
16:15	0	4	49	1	0	0	1	2	4	0	0	1	43	4	1	0	9	1	5	0	125	594
16:30	0	2	94	1	1	0	2	1	3	0	0	1	50	3	4	0	4	1	9	0	176	648
16:45	0	1	62	3	0	0	2	2	2	0	0	2	48	3	2	0	1	0	2	0	130	615
17:00	0	2	65	1	0	0	1	2	4	0	0	1	68	6	2	0	4	2	5	0	163	614
17:15	0	0	83	6	0	0	1	1	4	0	0	1	66	5	2	0	2	3	5	0	179	558
17:30	0	1	67	4	0	0	1	0	1	0	0	1	56	3	0	0	3	0	6	0	143	496
17:45	0	2	39	10	0	0	1	0	2	0	0	0	56	9	0	0	4	2	4	0	129	419
18:00	0	2	32	10	0	0	1	1	4	0	0	2	45	3	0	0	3	0	4	0	107	367
18:15	0	1	38	3	0	0	3	1	14	0	0	0	40	7	2	0	3	1	4	0	117	
18:30	0	0	20	4	0	0	0	0	2	0	0	0	36	0	1	0	1	0	2	0	66	
18:45	0	2	33	3	0	0	0	0	0	0	0	0	32	2	1	0	3	1	0	0	77	
7:15		20	249	53	0		16	4	22	0		41	212	53	13		1	11	4			
HV		0	36	0	0		0	1	5	0		4	26	0	0		0	0	0			
HV%		0.0%	16.9%	0.0%	0.0%		0.0%	33.3%	29.4%	0.0%		10.8%	14.0%	0.0%	0.0%		0.0%	0.0%	0.0%			
16:30		5	304	11	1		6	6	13	0		5	232	17	10		11	6	21			
HV		0	26	1	0		0	0	0	0		0	20	0	0		0	0	0			
HV%		0.0%	9.4%	10.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	9.4%	0.0%	0.0%		0.0%	0.0%	0.0%			

Highway 23 at Commencement Blvd **1/27/2016**

Time	Peds	SB Right	SB Thru	SB Left	SB UTrn	Peds	WB Right	WB Thru	WB Left	WB Utrn	Peds	NB Right	NB Thru	NB Left	NB UTrn	Peds	EB Right	EB Thru	EB Left	EB UTrn	15 Minute Total	Hourly Total
06:00	0	0	16	0	0	0	0	0	0	0	0	1	21	0	0	0	0	0	0	0	38	297
06:15	0	1	16	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0	0	0	53	390
06:30	0	2	16	0	0	0	0	0	0	0	0	2	59	0	0	0	0	0	0	0	79	505
06:45	0	2	45	0	0	0	0	0	0	0	0	8	72	0	0	0	0	0	0	0	127	677
07:00	0	1	35	0	0	0	2	0	0	0	0	10	83	0	0	0	0	0	0	0	131	846
07:15	0	2	62	0	0	0	4	0	0	0	0	22	77	0	0	0	1	0	0	0	168	849
07:30	0	3	69	0	0	0	8	0	0	0	0	67	104	0	0	0	0	0	0	0	251	783
07:45	0	1	98	0	0	0	13	0	0	0	0	98	85	0	0	0	1	0	0	0	296	622
08:00	0	4	55	0	0	0	2	0	0	0	0	4	69	0	0	0	0	0	0	0	134	435
08:15	0	2	47	0	0	0	1	0	0	0	0	7	44	0	0	0	1	0	0	0	102	403
08:30	0	3	46	0	0	0	1	0	0	0	0	2	37	0	0	0	1	0	0	0	90	413
08:45	0	1	63	0	0	0	0	0	0	0	0	2	42	0	0	0	1	0	0	0	109	414
09:00	0	0	56	0	0	0	1	0	0	0	0	1	44	0	0	0	0	0	0	0	102	396
09:15	0	0	46	0	0	0	1	0	0	0	0	5	57	0	0	0	3	0	0	0	112	416
09:30	0	1	39	0	0	0	0	0	0	0	0	2	46	0	0	0	3	0	0	0	91	396
09:45	0	2	42	0	0	0	0	0	0	0	0	0	41	0	0	0	6	0	0	0	91	398
10:00	0	1	72	0	0	0	1	0	0	0	0	2	45	0	0	0	1	0	0	0	122	396
10:15	0	1	30	0	0	0	0	0	0	0	0	2	48	0	0	0	11	0	0	0	92	385
10:30	0	1	38	0	0	0	0	0	0	0	0	2	50	0	0	0	2	0	0	0	93	424
10:45	0	0	35	0	0	0	2	0	0	0	0	7	43	0	0	0	2	0	0	0	89	429
11:00	0	0	53	0	0	0	1	0	0	0	0	4	50	0	0	0	3	0	0	0	111	451
11:15	0	1	61	0	0	0	1	0	0	0	0	5	55	0	0	0	8	0	0	0	131	485
11:30	0	2	50	0	0	0	0	0	0	0	0	2	36	0	0	0	8	0	0	0	98	480
11:45	0	1	53	0	0	0	0	0	0	0	0	2	42	0	0	0	13	0	0	0	111	512
12:00	0	0	81	0	0	0	0	0	0	0	0	2	47	0	0	0	15	0	0	0	145	529
12:15	0	0	59	0	0	0	0	0	0	0	0	0	57	0	0	0	10	0	0	0	126	489
12:30	0	0	48	0	0	0	0	0	0	0	0	0	69	0	0	0	13	0	0	0	130	490
12:45	0	0	46	0	0	0	0	0	0	0	0	4	69	0	0	0	9	0	0	0	128	482
13:00	0	1	46	0	0	0	0	0	0	0	0	2	52	0	0	0	4	0	0	0	105	463
13:15	0	0	49	0	0	0	0	0	0	0	0	3	63	0	0	0	12	0	0	0	127	496
13:30	0	0	56	0	0	0	1	0	0	0	0	1	59	0	0	0	5	0	0	0	122	574
13:45	0	0	65	0	0	0	1	0	0	0	0	4	38	0	0	0	1	0	0	0	109	665
14:00	0	0	55	0	0	0	2	0	0	0	0	13	66	0	0	0	2	0	0	0	138	691
14:15	0	1	94	0	0	0	18	0	0	0	0	17	63	0	0	0	12	0	0	0	205	670
14:30	0	0	118	0	0	0	19	0	0	0	0	16	47	0	0	0	13	0	0	0	213	617
14:45	0	1	65	0	0	0	4	0	0	0	0	8	51	0	0	0	6	0	0	0	135	535
15:00	0	1	46	0	0	0	2	0	0	0	0	4	60	0	0	0	4	0	0	0	117	520
15:15	0	2	69	0	0	0	1	0	0	0	0	5	61	0	0	0	14	0	0	0	152	565
15:30	0	0	66	0	0	0	1	0	0	0	0	1	57	0	0	0	6	0	0	0	131	549
15:45	0	0	52	0	0	0	0	0	0	0	0	3	55	0	0	0	10	0	0	0	120	573
16:00	0	2	64	0	0	0	6	0	0	0	0	6	74	0	0	0	10	0	0	0	162	619
16:15	0	0	65	0	0	0	0	0	0	0	0	1	63	0	0	0	7	0	0	0	136	618
16:30	0	1	85	0	0	0	1	0	0	0	0	3	50	0	0	0	15	0	0	0	155	710
16:45	0	2	79	0	0	0	2	0	0	0	0	5	62	0	0	0	16	0	0	0	166	726
17:00	0	2	73	0	0	0	2	0	0	0	0	4	76	0	0	0	4	0	0	0	161	696
17:15	0	2	113	0	0	0	0	0	0	0	0	1	98	0	0	0	14	0	0	0	228	635
17:30	0	2	79	0	0	0	5	0	0	0	0	3	65	0	0	0	17	0	0	0	171	522
17:45	0	1	54	0	0	0	2	0	0	0	0	4	63	0	0	0	12	0	0	0	136	414
18:00	0	2	45	0	0	0	1	0	0	0	0	0	49	0	0	0	3	0	0	0	100	342
18:15	0	0	50	0	0	0	0	0	0	0	0	2	60	0	0	0	3	0	0	0	115	
18:30	0	0	24	0	0	0	0	0	0	0	0	0	36	0	0	0	3	0	0	0	63	
18:45	0	1	22	0	0	0	0	0	0	0	0	2	38	0	0	0	1	0	0	0	64	
7:15		10	284	0	0		27	0	0	0		191	335	0	0		2	0	0			
HV		0	38	0	0		1	0	0	0		0	34	0	0		0	0	0			
HV%		0.0%	15.4%	0.0%	0.0%		3.8%	0.0%	0.0%	0.0%		0.0%	11.3%	0.0%	0.0%		0.0%	0.0%	0.0%			
16:30		7	350	0	0		5	0	0	0		13	286	0	0		49	0	0			
HV		1	18	0	0		0	0	0	0		0	20	0	0		0	0	0			
HV%		16.7%	5.4%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	7.5%	0.0%	0.0%		0.0%	0.0%	0.0%			

Highway 23 at Commencement Blvd **1/28/2016**

Time	Peds	SB Right	SB Thru	SB Left	SB UTrn	Peds	WB Right	WB Thru	WB Left	WB Utrn	Peds	NB Right	NB Thru	NB Left	NB UTrn	Peds	EB Right	EB Thru	EB Left	EB UTrn	15 Minute Total	Hourly Total
06:00	0	0	13	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	37	272
06:15	0	1	24	0	0	0	0	0	0	0	0	1	28	0	0	0	0	0	0	0	54	344
06:30	0	0	23	0	0	0	0	0	0	0	0	4	44	0	0	0	0	0	0	0	71	426
06:45	0	0	37	0	0	0	0	0	0	0	0	16	57	0	0	0	0	0	0	0	110	567
07:00	0	0	39	0	0	0	1	0	0	0	0	13	56	0	0	0	0	0	0	0	109	748
07:15	0	1	56	0	0	0	2	0	0	0	0	24	53	0	0	0	0	0	0	0	136	829
07:30	0	3	78	0	0	0	10	0	0	0	0	63	58	0	0	0	0	0	0	0	212	893
07:45	0	1	92	0	0	0	17	0	0	0	0	103	77	0	0	0	1	0	0	0	291	779
08:00	0	2	63	0	0	0	4	0	0	0	0	59	61	0	0	0	1	0	0	0	190	586
08:15	0	1	53	0	0	0	0	0	0	0	0	89	57	0	0	0	0	0	0	0	200	490
08:30	0	1	45	0	0	0	0	0	0	0	0	6	43	0	0	0	3	0	0	0	98	378
08:45	0	1	47	0	0	0	0	0	0	0	0	3	44	0	0	0	3	0	0	0	98	398
09:00	0	0	45	0	0	0	0	0	0	0	0	3	46	0	0	0	0	0	0	0	94	396
09:15	0	0	40	0	0	0	0	0	0	0	0	4	42	0	0	0	2	0	0	0	88	377
09:30	0	1	56	0	0	0	0	0	0	0	0	6	52	0	0	0	3	0	0	0	118	402
09:45	0	1	41	0	0	0	1	0	0	0	0	4	46	0	0	0	3	0	0	0	96	377
10:00	0	0	37	0	0	0	0	0	0	0	0	1	34	0	0	0	3	0	0	0	75	380
10:15	0	0	49	0	0	0	1	0	0	0	0	1	52	0	0	0	10	0	0	0	113	417
10:30	0	0	41	0	0	0	0	0	0	0	0	4	45	0	0	0	3	0	0	0	93	405
10:45	0	1	49	0	0	0	0	0	0	0	0	5	42	0	0	0	2	0	0	0	99	426
11:00	0	0	62	0	0	0	1	0	0	0	0	6	41	0	0	0	2	0	0	0	112	474
11:15	0	0	47	0	0	0	0	0	0	0	0	4	49	0	0	0	1	0	0	0	101	476
11:30	0	1	59	0	0	0	1	0	0	0	0	4	41	0	0	0	8	0	0	0	114	627
11:45	0	0	72	0	0	0	0	0	0	0	0	5	51	0	0	0	19	0	0	0	147	648
12:00	0	0	60	0	0	0	0	0	0	0	0	1	43	0	0	0	10	0	0	0	114	639
12:15	0	0	150	0	0	0	42	0	0	0	0	4	53	0	0	0	3	0	0	0	252	652
12:30	0	1	65	0	0	0	1	0	0	0	0	3	63	0	0	0	2	0	0	0	135	525
12:45	0	2	57	0	0	0	0	0	0	0	0	4	72	0	0	0	3	0	0	0	138	504
13:00	0	1	47	0	0	0	1	0	0	0	0	3	71	0	0	0	4	0	0	0	127	483
13:15	0	0	48	0	0	0	2	0	0	0	0	0	72	0	0	0	3	0	0	0	125	473
13:30	0	0	46	0	0	0	1	0	0	0	0	4	60	0	0	0	3	0	0	0	114	468
13:45	0	0	54	0	0	0	1	0	0	0	0	3	53	0	0	0	6	0	0	0	117	463
14:00	0	0	55	0	0	0	1	0	0	0	0	2	53	0	0	0	6	0	0	0	117	521
14:15	0	2	58	0	0	0	2	0	0	0	0	3	49	0	0	0	6	0	0	0	120	620
14:30	0	2	50	0	0	0	1	0	0	0	0	4	45	0	0	0	7	0	0	0	109	722
14:45	0	1	75	0	0	0	1	0	0	0	0	15	63	0	0	0	20	0	0	0	175	760
15:00	0	2	87	0	0	0	18	0	0	0	0	20	82	0	0	0	7	0	0	0	216	732
15:15	0	0	98	0	0	0	16	0	0	0	0	22	77	0	0	0	9	0	0	0	222	678
15:30	0	1	67	0	0	0	2	0	0	0	0	6	63	0	0	0	8	0	0	0	147	615
15:45	0	0	79	0	0	0	3	0	0	0	0	5	56	0	0	0	4	0	0	0	147	650
16:00	0	0	92	0	0	0	4	0	0	0	0	5	46	0	0	0	15	0	0	0	162	686
16:15	0	2	74	0	0	0	2	0	0	0	0	7	62	0	0	0	12	0	0	0	159	695
16:30	0	1	97	0	0	0	1	0	0	0	0	7	58	0	0	0	18	0	0	0	182	751
16:45	0	3	86	0	0	0	2	0	0	0	0	4	77	0	0	0	11	0	0	0	183	746
17:00	0	3	72	0	0	0	3	0	0	0	0	3	82	0	0	0	8	0	0	0	171	750
17:15	0	3	91	0	0	0	1	0	0	0	0	11	84	0	0	0	25	0	0	0	215	693
17:30	0	0	84	0	0	0	1	0	0	0	0	9	74	0	0	0	9	0	0	0	177	585
17:45	0	2	77	0	0	0	1	0	0	0	0	16	82	0	0	0	9	0	0	0	187	513
18:00	0	0	48	0	0	0	2	0	0	0	0	6	55	0	0	0	3	0	0	0	114	442
18:15	0	2	44	0	0	0	1	0	0	0	0	6	53	0	0	0	1	0	0	0	107	
18:30	0	0	38	0	0	0	2	0	0	0	0	11	49	0	0	0	5	0	0	0	105	
18:45	0	1	33	0	0	0	2	0	0	0	0	16	59	0	0	0	5	0	0	0	116	
7:15		7	289	0	0		33	0	0	0		249	249	0	0		2	0	0			
HV		0	42	0	0		0	0	0	0		0	29	0	0		0	0	0			
HV%		0.0%	17.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	13.2%	0.0%	0.0%		0.0%	0.0%	0.0%			
16:30		10	346	0	0		7	0	0	0		25	301	0	0		62	0	0			
HV		0	19	0	0		0	0	0	0		0	16	0	0		0	0	0			
HV%		0.0%	5.8%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	5.6%	0.0%	0.0%		0.0%	0.0%	0.0%			

Attachment B

Existing Operations Analysis Results

5: TH 23 & CR 33 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	2.2	0.1	0.0	0.0	0.4
Total Del/Veh (s)	3.5	5.2	1.0	0.7	1.4

10: TH 23 & 269th Ave Performance by approach

Approach	EB	NB	SB	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0
Total Del/Veh (s)	4.7	0.5	0.4	0.5

15: TH 23 & Tiger Dr Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	1.2	0.1	0.0	0.2
Total Del/Veh (s)	14.1	14.7	0.8	0.9	2.5

20: TH 23 & Commencement Blvd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.1
Total Del/Veh (s)	5.0	4.6	3.4	0.6	2.4

25: TH 23 & TH 19 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	1.8	0.1	0.0	0.0	0.5
Total Del/Veh (s)	25.4	26.0	14.4	14.5	20.1

30: TH 23 & O'Connell St Performance by approach

Approach	EB	NB	SB	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0
Total Del/Veh (s)	4.7	0.8	4.5	2.3

35: TH 23 & Lyon St Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.1	0.0	0.0	0.0
Total Del/Veh (s)	13.5	16.1	2.1	0.8	2.7

40: Clarice Ave & TH 23 Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.8	0.0
Total Del/Veh (s)	4.6	1.2	6.5	3.6

45: TH 59 & TH 23 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	1.6	1.6	0.8
Total Del/Veh (s)	21.6	20.0	22.3	24.4	22.0

50: Canoga Park Dr & TH 23 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	0.7	4.4	8.3	9.3	2.4

55: Spruce Ln & TH 23 Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0
Total Del/Veh (s)	0.3	0.6	4.9	0.5

58: TH 23 & East RCUT U-Turn Performance by approach

Approach	EB	WB	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.8	0.4	0.7

60: Saratoga St & TH 23 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	2.0	0.9	6.7	4.9	2.1

62: West RCUT U-Turn & TH 23 Performance by approach

Approach	EB	WB	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.9	0.6	0.8

65: 4th St & TH 23 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.2	0.0
Total Del/Veh (s)	1.2	0.5	13.9	10.1	2.8

70: Travis Rd & TH 23 Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0
Total Del/Veh (s)	0.8	1.1	4.9	1.1

75: CR 7 & TH 23 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	2.0	2.8	0.5
Total Del/Veh (s)	1.7	1.1	10.4	7.9	2.8

80: TH 19 & Tiger Dr Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.6	0.8	0.1	3.9	1.2
Total Del/Veh (s)	6.6	0.8	15.3	1.0	4.1

Total Network Performance

Denied Del/Veh (s)	1.1
Total Del/Veh (s)	26.5

Intersection: 5: TH 23 & CR 33

Movement	EB	WB	NB	SB
Directions Served	LT	LTR	L	L
Maximum Queue (ft)	68	22	55	5
Average Queue (ft)	25	4	13	0
95th Queue (ft)	60	16	43	4
Link Distance (ft)	1697	1749		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			500	500
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 10: TH 23 & 269th Ave

Movement	EB
Directions Served	R
Maximum Queue (ft)	23
Average Queue (ft)	3
95th Queue (ft)	15
Link Distance (ft)	635
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 15: TH 23 & Tiger Dr

Movement	EB	WB	WB	NB	NB	SB
Directions Served	LTR	LT	R	UL	R	L
Maximum Queue (ft)	48	128	34	32	3	29
Average Queue (ft)	12	26	7	6	0	4
95th Queue (ft)	36	79	26	25	3	19
Link Distance (ft)	426	678				
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			300	450	450	480
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 20: TH 23 & Commencement Blvd

Movement	EB	WB
Directions Served	R	R
Maximum Queue (ft)	17	32
Average Queue (ft)	2	14
95th Queue (ft)	11	34
Link Distance (ft)	402	534
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 25: TH 23 & TH 19

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	T	UL	T	T	UL	T	T
Maximum Queue (ft)	219	158	99	155	104	108	100	86	134	82	114	128
Average Queue (ft)	108	61	25	59	47	50	40	28	58	21	41	48
95th Queue (ft)	188	121	70	119	83	94	82	68	113	62	89	104
Link Distance (ft)		1101	1101		1548	1548		1339	1339		1120	1120
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	310			465			450			450		
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 30: TH 23 & O'Connell St

Movement	EB
Directions Served	R
Maximum Queue (ft)	37
Average Queue (ft)	5
95th Queue (ft)	25
Link Distance (ft)	545
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 35: TH 23 & Lyon St

Movement	EB	WB	NB
Directions Served	LTR	LTR	UL
Maximum Queue (ft)	108	56	65
Average Queue (ft)	42	5	12
95th Queue (ft)	84	28	42
Link Distance (ft)	490	643	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			500
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 40: Clarice Ave & TH 23

Movement	WB	NB	NB
Directions Served	UL	L	R
Maximum Queue (ft)	38	24	42
Average Queue (ft)	9	4	11
95th Queue (ft)	29	17	32
Link Distance (ft)			633
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	500	85	
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

Intersection: 45: TH 59 & TH 23

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	UL	T	T	R	UL	T	T	R	L	T	T	R
Maximum Queue (ft)	124	174	148	45	102	115	141	47	114	168	148	81
Average Queue (ft)	47	70	69	10	32	40	49	12	34	75	29	26
95th Queue (ft)	100	130	126	30	77	93	110	34	80	141	91	56
Link Distance (ft)		1140	1140			2405	2405			701	701	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500			500	500			500	280			280
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 45: TH 59 & TH 23

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	105	135	104	53
Average Queue (ft)	42	58	18	13
95th Queue (ft)	86	113	61	34
Link Distance (ft)		624	624	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	200			200
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 50: Canoga Park Dr & TH 23

Movement	EB	EB	WB	NB	SB
Directions Served	UL	T	UL	LTR	LTR
Maximum Queue (ft)	17	4	36	42	52
Average Queue (ft)	2	0	6	14	8
95th Queue (ft)	12	3	24	33	31
Link Distance (ft)		904		493	333
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	500		500		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 55: Spruce Ln & TH 23

Movement	NB
Directions Served	R
Maximum Queue (ft)	24
Average Queue (ft)	10
95th Queue (ft)	27
Link Distance (ft)	517
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 58: TH 23 & East RCUT U-Turn

Movement	EB
Directions Served	U
Maximum Queue (ft)	36
Average Queue (ft)	10
95th Queue (ft)	34
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	500
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 60: Saratoga St & TH 23

Movement	EB	WB	WB	NB	SB
Directions Served	L	L	R	R	R
Maximum Queue (ft)	17	26	7	59	51
Average Queue (ft)	4	3	0	23	15
95th Queue (ft)	14	13	3	45	37
Link Distance (ft)				549	668
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	500	500	500		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 62: West RCUT U-Turn & TH 23

Movement	WB
Directions Served	U
Maximum Queue (ft)	32
Average Queue (ft)	6
95th Queue (ft)	24
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	500
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 65: 4th St & TH 23

Movement	EB	EB	WB	NB	SB
Directions Served	L	TR	LT	LTR	LTR
Maximum Queue (ft)	40	5	13	31	126
Average Queue (ft)	3	0	0	1	45
95th Queue (ft)	22	4	6	11	88
Link Distance (ft)		2499	1474	897	1052
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	500				
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 70: Travis Rd & TH 23

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	80	52
Average Queue (ft)	15	14
95th Queue (ft)	55	44
Link Distance (ft)		911
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	500	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 75: CR 7 & TH 23

Movement	EB	WB	WB	NB	NB	SB
Directions Served	L	L	R	LT	R	LT
Maximum Queue (ft)	86	12	16	54	44	67
Average Queue (ft)	25	1	1	18	12	17
95th Queue (ft)	57	8	6	38	31	46
Link Distance (ft)				813		664
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	500	500	500		110	
Storage Blk Time (%)						0
Queuing Penalty (veh)						0

Intersection: 80: TH 19 & Tiger Dr

Movement	EB	WB	NB	SB
Directions Served	L	R	LTR	LT
Maximum Queue (ft)	120	12	66	34
Average Queue (ft)	30	0	9	3
95th Queue (ft)	89	5	39	17
Link Distance (ft)			448	629
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	480	275		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 0

5: TH 23 & CR 33 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	2.2	0.1	0.1	0.0	0.5
Total Del/Veh (s)	4.4	8.5	0.8	0.5	1.7

10: TH 23 & 269th Ave Performance by approach

Approach	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.7	0.5	0.6

15: TH 23 & Tiger Dr Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.6	0.0	0.0	0.0
Total Del/Veh (s)	8.7	9.5	0.7	0.9	1.4

20: TH 23 & Commencement Blvd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	4.8	4.6	3.2	0.6	2.2

25: TH 23 & TH 19 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	1.2	0.1	0.1	0.0	0.4
Total Del/Veh (s)	17.8	27.8	17.3	17.1	19.0

30: TH 23 & O'Connell St Performance by approach

Approach	EB	NB	SB	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0
Total Del/Veh (s)	6.1	0.5	4.9	3.2

35: TH 23 & Lyon St Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.1	0.0	0.0	0.0
Total Del/Veh (s)	10.3	19.0	1.7	1.1	2.5

40: Clarice Ave & TH 23 Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.8	0.1
Total Del/Veh (s)	4.1	2.5	7.7	3.5

45: TH 59 & TH 23 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	1.3	1.1	0.7
Total Del/Veh (s)	24.7	26.7	29.0	28.1	27.4

50: Canoga Park Dr & TH 23 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	0.6	3.9	7.9	9.9	2.9

55: Spruce Ln & TH 23 Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0
Total Del/Veh (s)	0.2	0.6	4.5	0.5

58: TH 23 & East RCUT U-Turn Performance by approach

Approach	EB	WB	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.5	0.3	0.4

60: Saratoga St & TH 23 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.0	0.1	0.1	0.0
Total Del/Veh (s)	1.5	1.0	4.7	5.7	1.6

62: West RCUT U-Turn & TH 23 Performance by approach

Approach	EB	WB	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.7	0.7	0.7

65: 4th St & TH 23 Performance by approach

Approach	EB	WB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0
Total Del/Veh (s)	0.8	0.7	9.2	1.5

70: Travis Rd & TH 23 Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0
Total Del/Veh (s)	0.8	1.0	4.7	1.1

75: CR 7 & TH 23 Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	2.2	2.6	0.8
Total Del/Veh (s)	1.1	1.6	7.5	6.3	2.8

80: TH 19 & Tiger Dr Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.3	0.1	3.3	0.8
Total Del/Veh (s)	3.5	0.4	6.9	1.6	2.5

Total Network Performance

Denied Del/Veh (s)	1.0
Total Del/Veh (s)	29.0

Intersection: 5: TH 23 & CR 33

Movement	EB	WB	NB
Directions Served	LT	LTR	L
Maximum Queue (ft)	80	31	45
Average Queue (ft)	33	10	10
95th Queue (ft)	66	27	36
Link Distance (ft)	1697	1749	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			500
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: TH 23 & 269th Ave

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 15: TH 23 & Tiger Dr

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	R	UL	L
Maximum Queue (ft)	37	42	22	30	33
Average Queue (ft)	16	12	2	3	6
95th Queue (ft)	35	35	12	17	21
Link Distance (ft)	426	678			
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			300	450	480
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 20: TH 23 & Commencement Blvd

Movement	EB	WB
Directions Served	R	R
Maximum Queue (ft)	45	23
Average Queue (ft)	21	6
95th Queue (ft)	38	22
Link Distance (ft)	402	534
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 25: TH 23 & TH 19

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	T	UL	T	T	UL	T	T
Maximum Queue (ft)	158	110	72	127	68	74	167	97	113	77	121	125
Average Queue (ft)	72	45	20	62	29	32	71	35	46	25	63	56
95th Queue (ft)	127	86	54	114	58	67	131	79	88	63	110	102
Link Distance (ft)		1101	1101		1548	1548		1339	1339		1120	1120
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	310			465			450			450		
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 30: TH 23 & O'Connell St

Movement	EB
Directions Served	R
Maximum Queue (ft)	58
Average Queue (ft)	22
95th Queue (ft)	44
Link Distance (ft)	545
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 35: TH 23 & Lyon St

Movement	EB	WB	NB
Directions Served	LTR	LTR	UL
Maximum Queue (ft)	124	54	43
Average Queue (ft)	45	13	5
95th Queue (ft)	85	42	25
Link Distance (ft)	490	643	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			500
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 40: Clarice Ave & TH 23

Movement	EB	WB	NB	NB
Directions Served	T	UL	L	R
Maximum Queue (ft)	4	90	37	52
Average Queue (ft)	0	36	11	23
95th Queue (ft)	3	71	31	43
Link Distance (ft)	2405			633
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		500	85	
Storage Blk Time (%)				0
Queuing Penalty (veh)				0

Intersection: 45: TH 59 & TH 23

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	UL	T	T	R	UL	T	T	R	L	T	T	R
Maximum Queue (ft)	109	128	127	59	158	185	162	54	158	217	198	84
Average Queue (ft)	52	53	42	20	63	69	74	18	77	113	70	23
95th Queue (ft)	97	102	89	45	127	138	134	40	135	188	156	53
Link Distance (ft)		1140	1140			2405	2405			701	701	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500			500	500			500	280			280
Storage Blk Time (%)										0		
Queuing Penalty (veh)										0		

Intersection: 45: TH 59 & TH 23

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	156	236	207	77
Average Queue (ft)	64	136	86	23
95th Queue (ft)	121	207	175	55
Link Distance (ft)		624	624	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	200			200
Storage Blk Time (%)	0	1	0	
Queuing Penalty (veh)	0	1	0	

Intersection: 50: Canoga Park Dr & TH 23

Movement	EB	WB	NB	SB
Directions Served	UL	UL	LTR	LTR
Maximum Queue (ft)	28	32	54	25
Average Queue (ft)	2	7	20	5
95th Queue (ft)	16	26	43	20
Link Distance (ft)			493	333
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	500	500		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 55: Spruce Ln & TH 23

Movement	NB
Directions Served	R
Maximum Queue (ft)	28
Average Queue (ft)	12
95th Queue (ft)	29
Link Distance (ft)	517
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 58: TH 23 & East RCUT U-Turn

Movement	EB	EB
Directions Served	U	T
Maximum Queue (ft)	39	11
Average Queue (ft)	5	0
95th Queue (ft)	25	0
Link Distance (ft)		1037
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	500	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 60: Saratoga St & TH 23

Movement	EB	EB	WB	NB	SB
Directions Served	L	R	L	R	R
Maximum Queue (ft)	13	4	26	47	47
Average Queue (ft)	1	0	5	14	16
95th Queue (ft)	7	3	17	35	33
Link Distance (ft)				549	668
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	500	500	500		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 62: West RCUT U-Turn & TH 23

Movement	WB
Directions Served	U
Maximum Queue (ft)	25
Average Queue (ft)	6
95th Queue (ft)	22
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	500
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 65: 4th St & TH 23

Movement	EB	EB	WB	SB
Directions Served	L	TR	LT	LTR
Maximum Queue (ft)	20	5	9	59
Average Queue (ft)	3	0	0	26
95th Queue (ft)	16	4	5	46
Link Distance (ft)		2499	1474	1052
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	500			
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 70: Travis Rd & TH 23

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	40	46
Average Queue (ft)	3	13
95th Queue (ft)	21	37
Link Distance (ft)		911
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	500	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 75: CR 7 & TH 23

Movement	EB	WB	WB	NB	NB	SB
Directions Served	L	L	R	LT	R	LT
Maximum Queue (ft)	55	24	21	40	36	76
Average Queue (ft)	12	5	1	10	8	28
95th Queue (ft)	40	20	11	31	26	54
Link Distance (ft)				813		664
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	500	500	500		110	
Storage Blk Time (%)						0
Queuing Penalty (veh)						0

Intersection: 80: TH 19 & Tiger Dr

Movement	EB	NB	SB
Directions Served	UL	LTR	LT
Maximum Queue (ft)	43	47	45
Average Queue (ft)	5	15	11
95th Queue (ft)	24	37	36
Link Distance (ft)		448	629
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	480		
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 1

Attachment C

Existing Crash Analysis

Intersection Crash History (2010-2014) Summary
Marshall Area Highway 23 Access and Safety Assessment

								Crash Rates					Crashes		Severity				
Description	Traffic Control	Major 1	Major 2	Minor 1	Minor 2	ADT	Entering Vehicles	Expected Crash Rate*	Facility Type	Actual Crash Rate	Critical Crash Rate	Severity Rate	Total Crashes	Total Severe Crashes	K	A	B	C	PD
Hwy 23 and CR 7	Thru Stop	6,100	8,200	3,900	830	9,515	17,364,875	0.26	Rural Thru/Stop	0.75	0.60	1.32	13	0	0	0	1	8	4
Hwy 23 and Travis Rd	Thru Stop	8,200	8,200	350		8,375	15,284,375	0.26	Rural Thru/Stop	0.07	0.63	0.20	1	0	0	0	1	0	0
Hwy 23 and 4th Street	Thru Stop	8,200	8,200	1,800		9,100	16,607,500	0.26	Rural Thru/Stop	0.30	0.61	0.66	5	1	0	1	1	1	2
Hwy 23 and Spruce Ln	Thru Stop	9,200	9,200	300		9,350	17,063,750	0.26	Rural Thru/Stop	0.00	0.61	0.00	0	0	0	0	0	0	0
Hwy 23 and Conoga Park Dr	Thru Stop	9,200	9,200	900		9,650	17,611,250	0.26	Rural Thru/Stop	0.11	0.60	0.23	2	0	0	0	1	0	1
Hwy 23 and Hwy 59	Signalized	9,200	9,000	10,000	5,000	16,600	30,295,000	0.43	Signal - Low Volume/High Speed	1.16	0.75	1.45	35	0	0	0	2	5	28
Hwy 23 and Baseline Rd	Thru Stop	9,000	9,000	2,700		10,350	18,888,750	0.26	Rural Thru/Stop	0.37	0.59	0.53	7	0	0	0	1	1	5
Hwy 23 and Lyon St	Thru Stop	9,000	9,000	3,450	150	10,800	19,710,000	0.26	Rural Thru/Stop	0.51	0.58	0.81	10	1	0	1	0	3	6
Hwy 23 and Oconnell St	Thru Stop	9,000	9,000	350		9,175	16,744,375	0.26	Rural Thru/Stop	0.00	0.61	0.00	0	0	0	0	0	0	0
Hwy 23 and Hwy 19	Signalized	9,000	7,900	6,000	3,800	13,350	24,363,750	0.43	Signal - Low Volume/High Speed	0.99	0.79	1.44	24	1	0	1	4	0	19
Hwy 19 and Tiger Dr	Thru Stop	6,000	3,200	2,550		5,875	10,721,875	0.26	Rural Thru/Stop	0.28	0.71	0.28	3	0	0	0	0	0	3
Hwy 23 and Loop St/Commencement Blvd	Thru Stop	7,900	7,900	550	400	8,375	15,284,375	0.26	Rural Thru/Stop	0.13	0.63	0.26	2	0	0	0	1	0	1
Hwy 23 and Tiger Dr	Thru Stop	7,900	7,900	1,500	750	9,025	16,470,625	0.26	Rural Thru/Stop	0.18	0.61	0.30	3	0	0	0	0	2	1
Hwy 23 and 269th Ave	Thru Stop	7,900	7,900	30		7,915	14,444,875	0.26	Rural Thru/Stop	0.07	0.64	0.07	1	0	0	0	0	0	1
Hwy 23 and CR 33	Thru Stop	7,900	5,700	3,550	450	10,350	18,888,750	0.26	Rural Thru/Stop	0.42	0.59	0.74	8	1	0	1	1	1	5
													137	4	0	4	17	27	89
															0%	3%	12%	20%	65%

Notes:

*Expected rates from MnDOT's 2013 Intersection Green Sheets

ADT estimated using peak hour turning movement counts

Crash Rate < Expected Crash Rate

Expected Crash Rate < Crash Rate < Critical Crash Rate

Crash Rate > Critical Crash Rate

Intersections using 300ft Radius

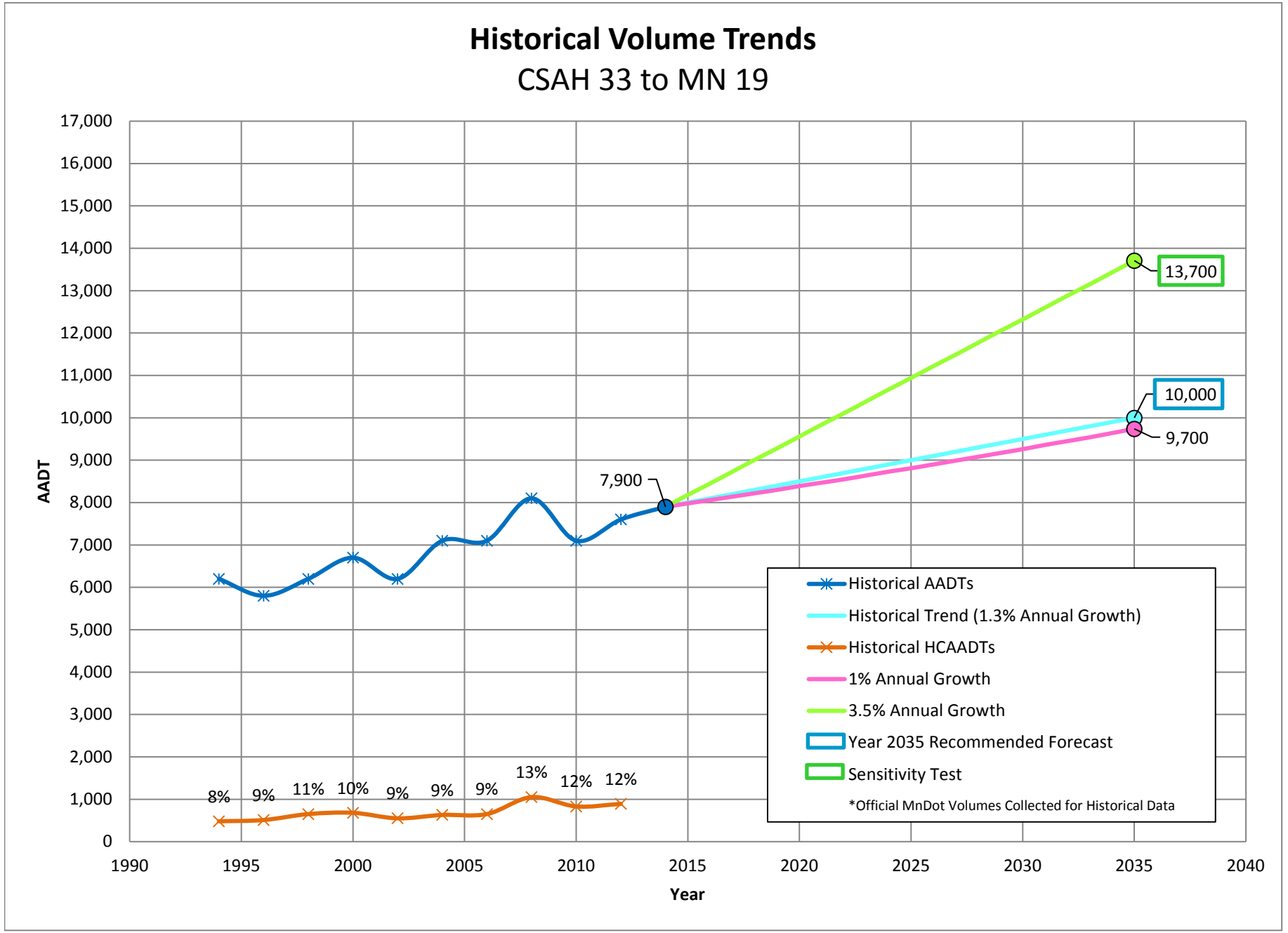
Intersection Crash History (2010-2014) Summary
Marshall Area Highway 23 Access and Safety Assessment

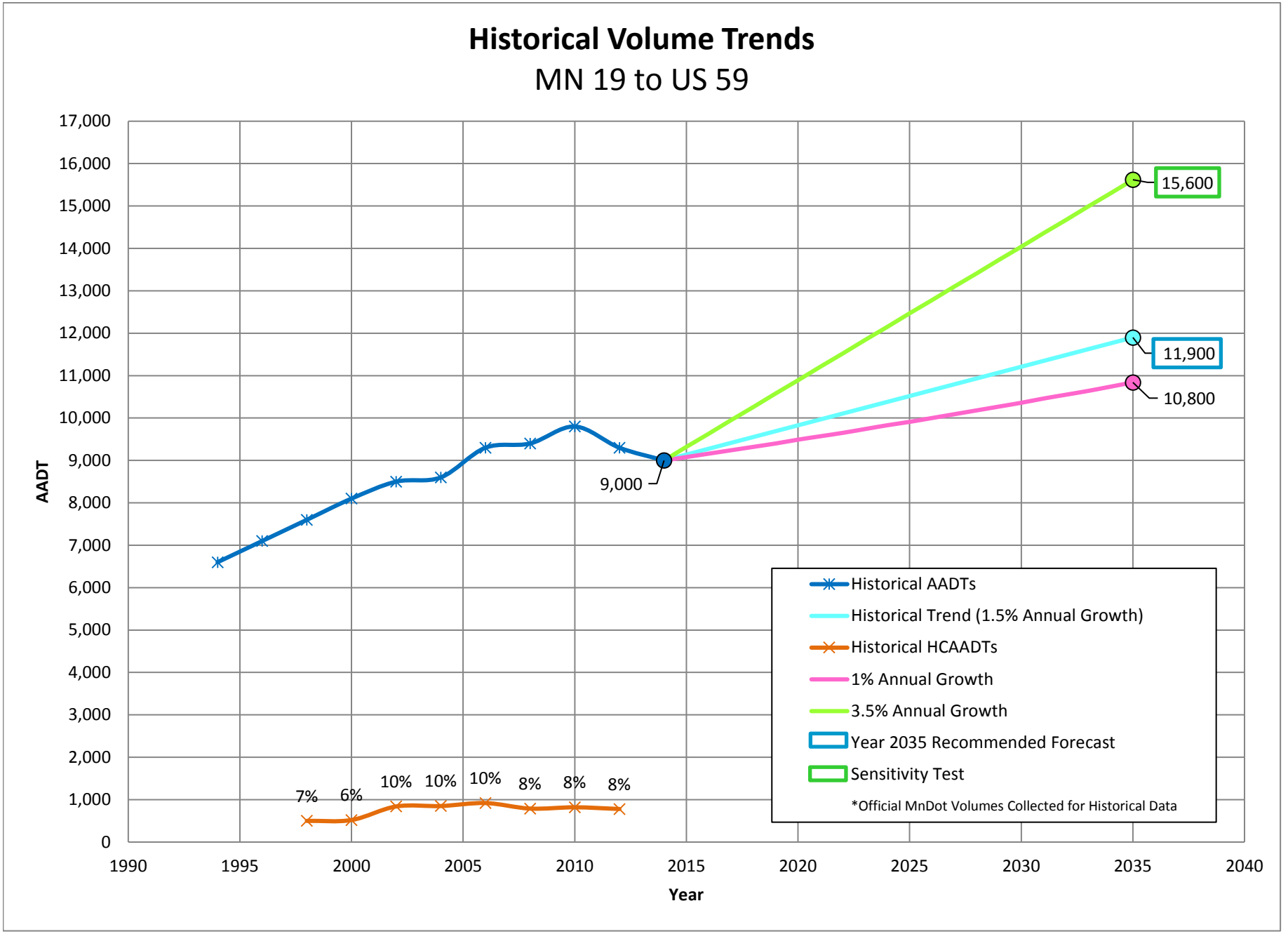
	Diagram									Light Condition					Road Condition			
Description	Rear End	Sideswipe Passing	Left Turn	Runoff Road	Right Angle	Right Turn	Head On	Sideswipe Opposing	Other	Day	Dawn/Dusk	Dark with Streetlights	Dark	Other/Unknown	Dry	Wet	Snow/Slush	Other
Hwy 23 and CR 7	3	0	2	1	4	0	0	0	3	11	0	2	0	0	10	0	3	0
Hwy 23 and Travis Rd	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0
Hwy 23 and 4th Street	1	0	0	0	1	0	0	0	3	5	0	0	0	0	4	1	0	0
Hwy 23 and Spruce Ln	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hwy 23 and Conoga Park Dr	0	0	0	0	1	0	1	0	0	1	1	0	0	0	2	0	0	0
Hwy 23 and Hwy 59	15	9	2	1	4	0	1	0	3	23	0	11	1	0	18	4	12	1
Hwy 23 and Baseline Rd	4	0	0	1	1	0	0	0	1	5	1	1	0	0	6	1	0	0
Hwy 23 and Lyon St	2	3	0	0	3	0	0	0	2	7	2	0	1	0	4	0	6	0
Hwy 23 and Oconnell St	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hwy 23 and Hwy 19	5	4	3	1	6	0	2	0	3	19	1	3	1	0	14	5	5	0
Hwy 19 and Tiger Dr	1	0	0	0	1	0	0	0	1	3	0	0	0	0	3	0	0	0
Hwy 23 and Loop St/Commencement Blvd	1	0	0	0	1	0	0	0	0	2	0	0	0	0	1	1	0	0
Hwy 23 and Tiger Dr	0	1	1	0	1	0	0	0	0	2	0	1	0	0	2	0	1	0
Hwy 23 and 269th Ave	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0
Hwy 23 and CR 33	0	1	1	1	4	0	0	0	1	7	0	0	1	0	6	0	2	0
	33	20	9	7	41	0	4	1	22	107	5	21	4	0	86	15	34	2
Notes:	24%	15%	7%	5%	30%	0%	3%	1%	16%	78%	4%	15%	3%	0%	63%	11%	25%	1%

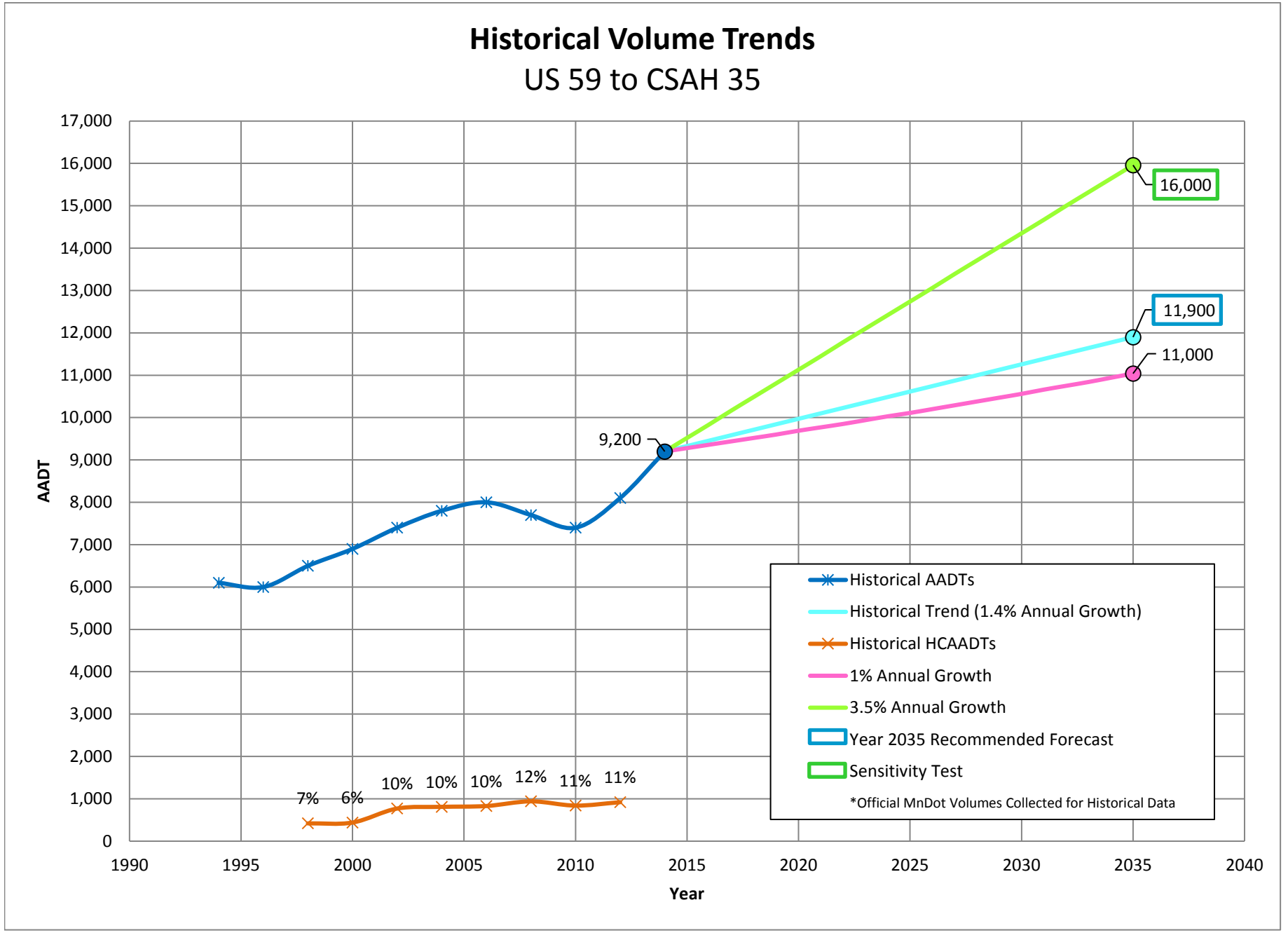
*Expected rates from MnDOT's 2013 Intersection Green Sheets
ADT estimated using peak hour turning movement counts
Crash Rate < Expected Crash Rate
Expected Crash Rate < Crash Rate < Critical Crash Rate
Crash Rate > Critical Crash Rate
Intersections using 300ft Radius

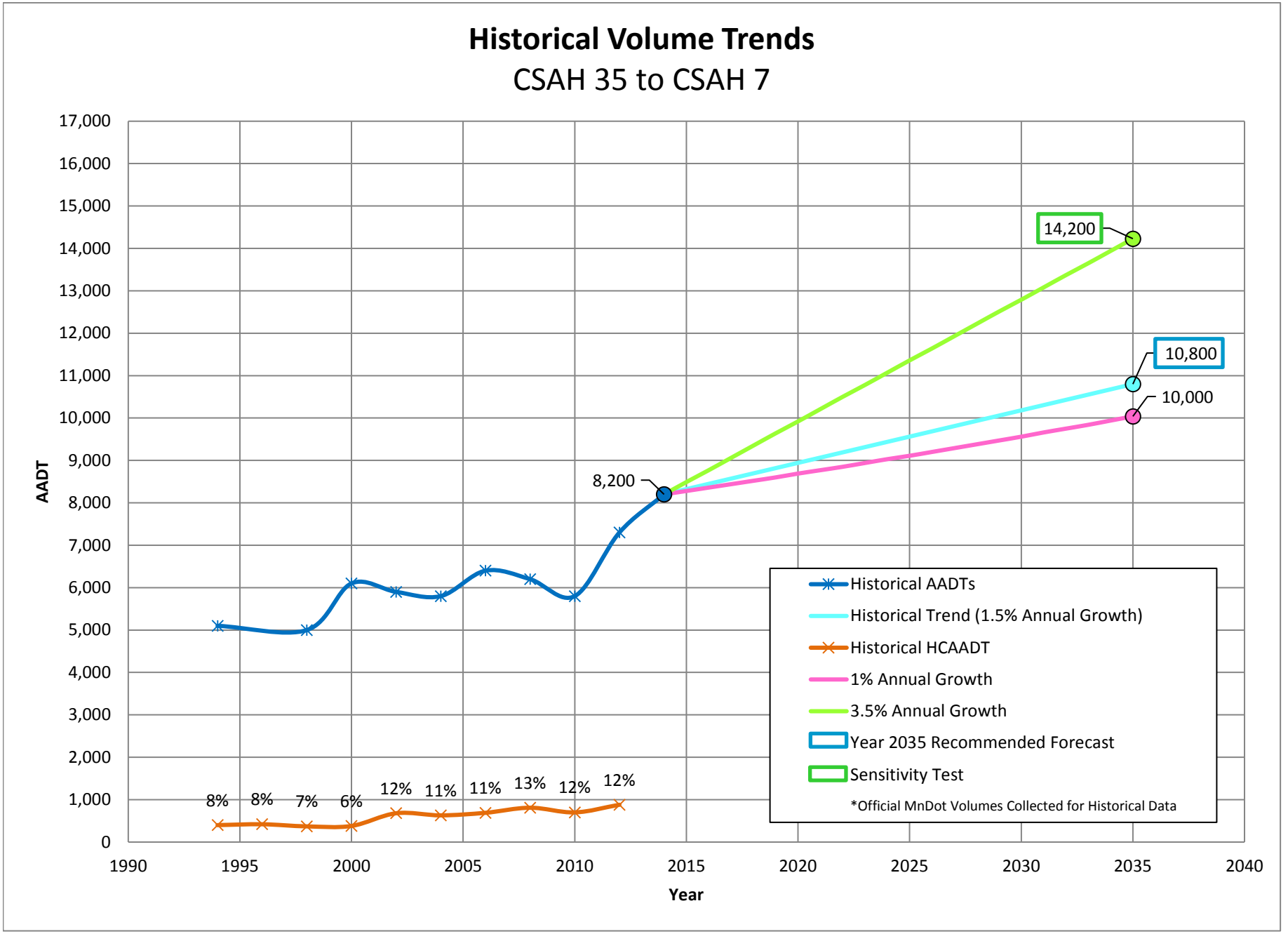
Attachment D

Traffic Volume Forecasts


Historical Volume Trends
CSAH 33 to MN 19
AADT
Year
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
7,900
13,700
10,000
9,700
8%
9%
11%
10%
9%
9%
9%
13%
12%
12%
Historical AADTs
Historical Trend (1.3% Annual Growth)
Historical HCAADTs
1% Annual Growth
3.5% Annual Growth
Year 2035 Recommended Forecast
Sensitivity Test
*Official MnDot Volumes Collected for Historical Data


Historical Volume Trends
MN 19 to US 59
AADT
Year
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
15,600
11,900
10,800
9,000
7%
6%
10%
10%
10%
8%
8%
8%
Historical AADTs
Historical Trend (1.5% Annual Growth)
Historical HCAADTs
1% Annual Growth
3.5% Annual Growth
Year 2035 Recommended Forecast
Sensitivity Test
*Official MnDot Volumes Collected for Historical Data


Historical Volume Trends
US 59 to CSAH 35
AADT
Year
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
9,200
16,000
11,900
11,000
7%
6%
10%
10%
10%
12%
11%
11%
Historical AADTs
Historical Trend (1.4% Annual Growth)
Historical HCAADTs
1% Annual Growth
3.5% Annual Growth
Year 2035 Recommended Forecast
Sensitivity Test
*Official MnDot Volumes Collected for Historical Data


Historical Volume Trends
CSAH 35 to CSAH 7
AADT
Year
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
14,200
10,800
10,000
8,200
8% 8% 7% 6% 12% 11% 11% 13% 12% 12%
Historical AADTs
Historical Trend (1.5% Annual Growth)
Historical HCAADT
1% Annual Growth
3.5% Annual Growth
Year 2035 Recommended Forecast
Sensitivity Test
*Official MnDot Volumes Collected for Historical Data

Attachment E

Warrants Analysis

Consulting Group, Inc.

WARRANTS ANALYSIS

Year 2019

Highway 23 at Tiger Drive
Marshall Area Hwy 23 Safety Assessment
City of Marshall, Lyon County

Background Information

		Speed (mph)	Lanes	Approach	
Location :	City of Marshall, Lyon County	55	2 or more	Major Approach 1:	Northbound Highway 23
Date:	6/23/2016	55	2 or more	Major Approach 3:	Southbound Highway 23
Analysis Prepared By:	Joe DeVore	30	1	Minor Approach 2:	Eastbound Tiger Drive
Population Less than 10,000:	No	30	1	Minor Approach 4:	Westbound Tiger Drive
Seventy Percent Factor Used:	Yes				

Warrants Analysis: Warrants 1A, 1B and 1C

Hour	Major Approach 1	Major Approach 3	Total 1 + 3	Warrant Met 420	Warrant Met 630	Minor Approach 2	Minor Approach 4	Largest Minor App.	Warrant Met 105	Warrant Met 53	Met Same Hours Condition A	Met Same Hours Condition B	Combination A	Combination B	MWSA (C) 210	MWSA (C) 140
6 - 7 AM	174	104	278			5	9	9							X	
7 - 8 AM	307	305	612	X		18	49	49						X	X	
8 - 9 AM	238	257	495	X		12	11	12							X	
9 - 10 AM	182	204	386			10	10	10							X	
10 - 11 AM	190	192	382			18	14	18							X	
11 - 12 AM	191	207	398			33	16	33							X	
12 - 1 PM	253	227	480	X		32	8	32							X	
1 - 2 PM	235	186	421	X		19	25	25							X	
2 - 3 PM	237	190	427	X		59	40	59		X					X	
3 - 4 PM	299	251	550	X		33	92	92		X			X	X	X	
4 - 5 PM	271	315	586	X		40	30	40							X	
5 - 6 PM	300	303	603	X		35	26	35							X	
6 - 7 PM	190	160	350			22	18	22							X	
7 - 8 PM	0	0	0			0	0	0								
8 - 9 PM	0	0	0			0	0	0								
9 - 10 PM	0	0	0			0	0	0								
10 - 11 PM	0	0	0			0	0	0								
											0	0	1	2	0	

Warrant Summary

Warrant and Description		Hours Met	Hours Required	Met/Not Met
Warrant 1A:	Minimum Vehicular Volume	0	8	Not Met
Warrant 1B:	Interruption of Continuous Traffic	0	8	Not Met
Warrant 1C:	Combination of Warrants	1	8	Not Met
Warrant 2:	Four-Hour Vehicular Volume	0	4	Not Met
Warrant 3B:	Peak Hour	0	1	Not Met
MWSA (C):	Multiway Stop Applications Condition C	0	8	Not Met

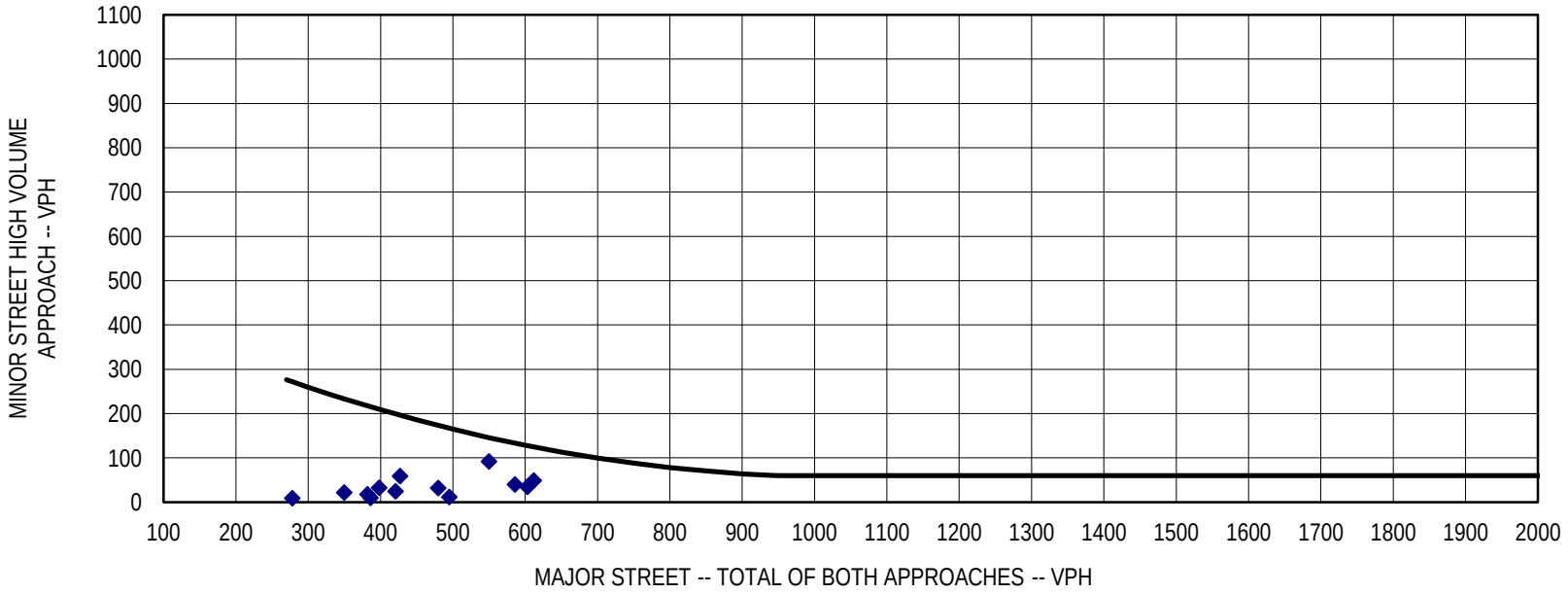
WARRANTS ANALYSIS

Year 2019

Highway 23 at Tiger Drive
Marshall Area Hwy 23 Safety Assessment
City of Marshall, Lyon County

Warrants Analysis: Warrant 2

WARRANT 2 - FOUR-HOUR VEHICULAR VOLUME



Number of Hours Satisfying Requirements:	0

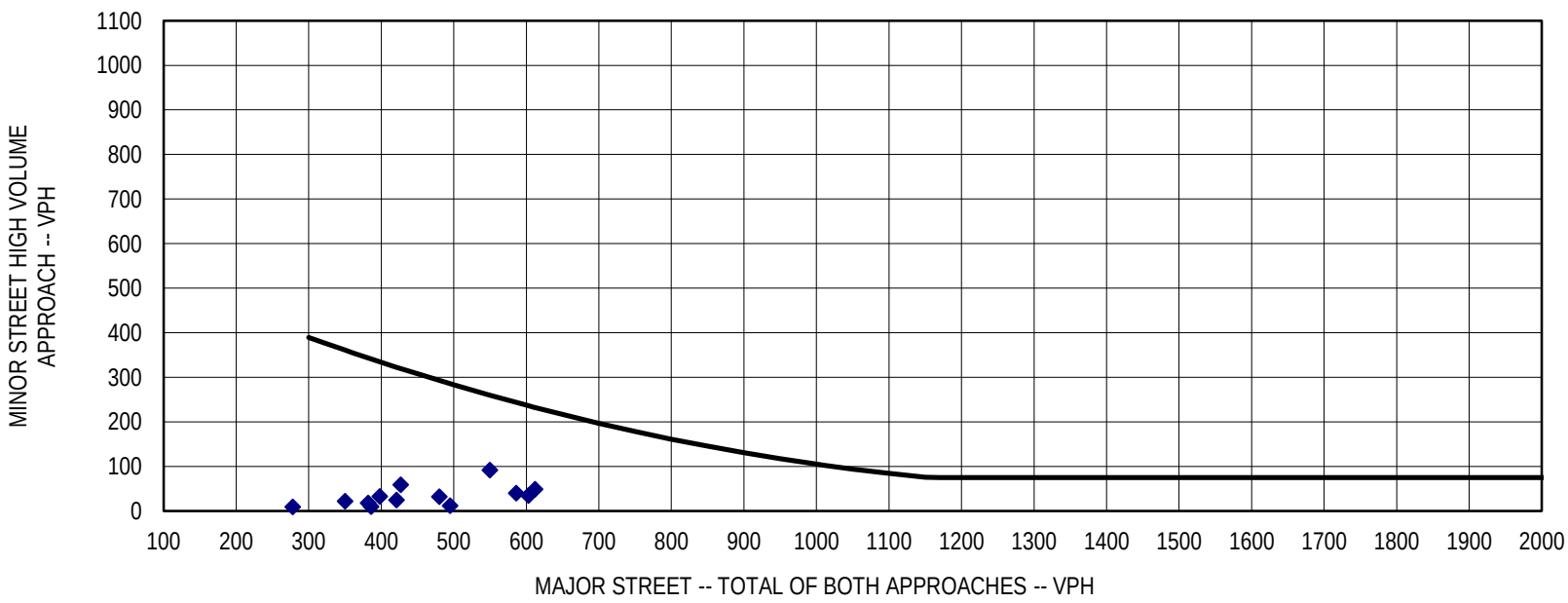
Notes:
1. 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 60 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.
2. INTERSECTION IS EITHER (1) WITHIN A COMMUNITY LESS THAN 10,000 POPULATION OR (2) HAS SPEEDS ABOVE 40 MPH ON MAJOR STREET.

SRF Consulting Group, Inc.

WARRANTS ANALYSIS Year 2019

Highway 23 at Tiger Drive
Marshall Area Hwy 23 Safety Assessment
City of Marshall, Lyon County

Warrants Analysis: Warrant 3



Number of Hours Satisfying Requirements:	0

Notes:
1. 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.
2. INTERSECTION IS EITHER (1) WITHIN A COMMUNITY LESS THAN 10,000 POPULATION OR (2) HAS SPEEDS ABOVE 40 MPH ON MAJOR STREET.

WARRANTS ANALYSIS

Year 2035

Highway 23 at Tiger Drive
Marshall Area Hwy 23 Safety Assessment
City of Marshall, Lyon County

Background Information

		Speed (mph)	Lanes	Approach	
Location :	City of Marshall, Lyon County	55	2 or more	Major Approach 1:	Northbound Highway 23
Date:	6/23/2016	55	2 or more	Major Approach 3:	Southbound Highway 23
Analysis Prepared By:	Joe DeVore	30	1	Minor Approach 2:	Eastbound Tiger Drive
Population Less than 10,000:	No	30	1	Minor Approach 4:	Westbound Tiger Drive
Seventy Percent Factor Used:	Yes				

Warrants Analysis: Warrants 1A, 1B and 1C

Hour	Major Approach 1	Major Approach 3	Total 1 + 3	Warrant Met 420	Warrant Met 630	Minor Approach 2	Minor Approach 4	Largest Minor App.	Warrant Met 105	Warrant Met 53	Met Same Hours Condition A	Met Same Hours Condition B	Combination A	Combination B	MWSA (C) 210	MWSA (C) 140
6 - 7 AM	226	145	371			5	6	6							X	
7 - 8 AM	405	432	837	X	X	17	32	32							X	
8 - 9 AM	317	362	679	X	X	11	8	11							X	
9 - 10 AM	245	286	531	X		10	7	10							X	
10 - 11 AM	250	268	518	X		18	10	18							X	
11 - 12 AM	254	289	543	X		34	11	34							X	
12 - 1 PM	330	317	647	X	X	29	6	29							X	
1 - 2 PM	303	258	561	X		18	18	18							X	
2 - 3 PM	313	266	579	X		58	28	58		X				X	X	
3 - 4 PM	382	349	731	X	X	34	65	65		X		X		X	X	
4 - 5 PM	378	453	831	X	X	41	22	41							X	
5 - 6 PM	389	423	812	X	X	34	19	34							X	
6 - 7 PM	245	223	468	X		22	13	22							X	
7 - 8 PM	0	0	0			0	0	0								
8 - 9 PM	0	0	0			0	0	0								
9 - 10 PM	0	0	0			0	0	0								
10 - 11 PM	0	0	0			0	0	0								
											0	1	0	2	0	

Warrant Summary

Warrant and Description		Hours Met	Hours Required	Met/Not Met
Warrant 1A:	Minimum Vehicular Volume	0	8	Not Met
Warrant 1B:	Interruption of Continuous Traffic	1	8	Not Met
Warrant 1C:	Combination of Warrants	0	8	Not Met
Warrant 2:	Four-Hour Vehicular Volume	0	4	Not Met
Warrant 3B:	Peak Hour	0	1	Not Met
MWSA (C):	Multiway Stop Applications Condition C	0	8	Not Met

Consulting Group, Inc.

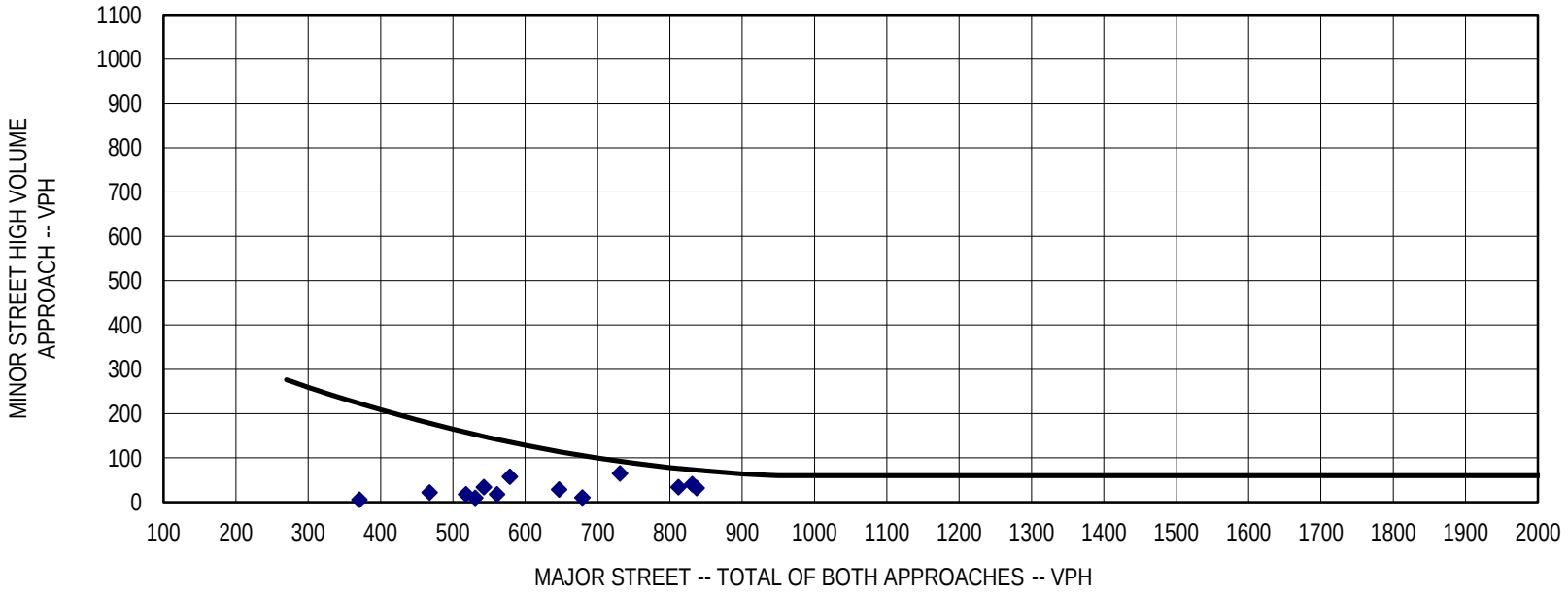
WARRANTS ANALYSIS

Year 2035

Highway 23 at Tiger Drive
Marshall Area Hwy 23 Safety Assessment
City of Marshall, Lyon County

Warrants Analysis: Warrant 2

WARRANT 2 - FOUR-HOUR VEHICULAR VOLUME



Number of Hours Satisfying Requirements:	0

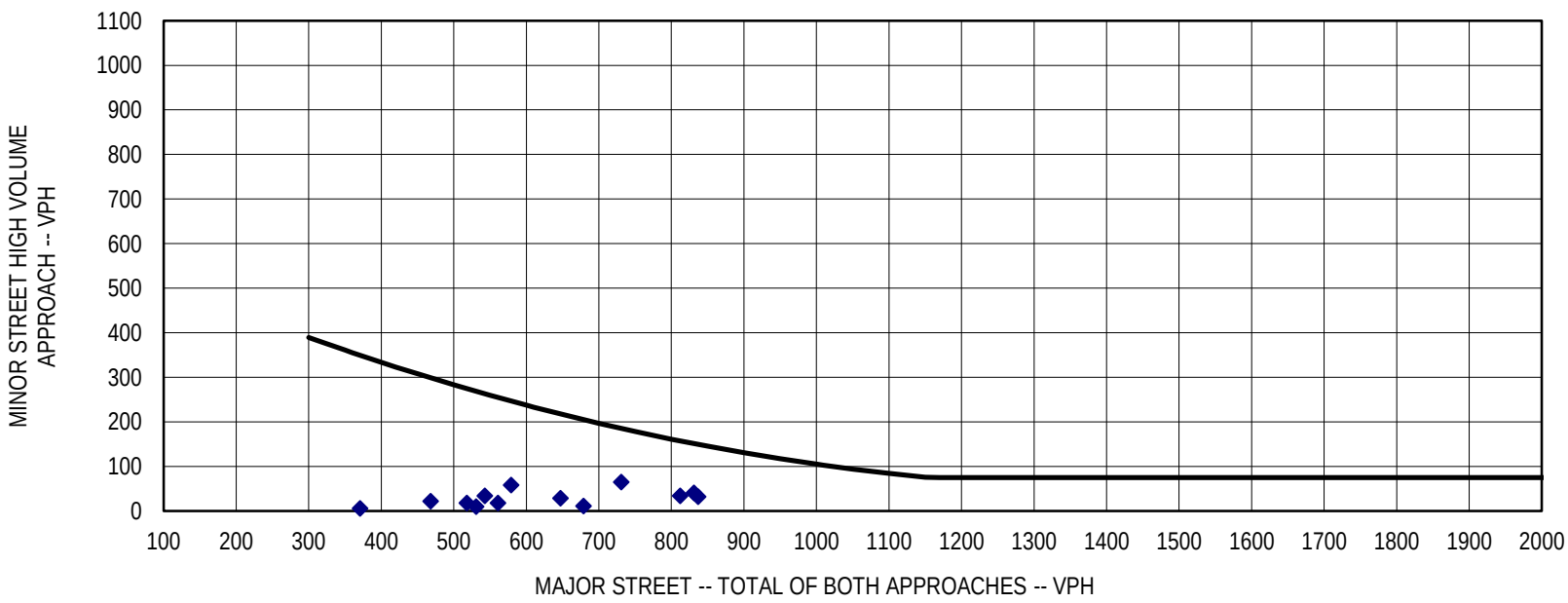
Notes:
1. 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 60 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.
2. INTERSECTION IS EITHER (1) WITHIN A COMMUNITY LESS THAN 10,000 POPULATION OR (2) HAS SPEEDS ABOVE 40 MPH ON MAJOR STREET.

WARRANTS ANALYSIS

Year 2035

Highway 23 at Tiger Drive
Marshall Area Hwy 23 Safety Assessment
City of Marshall, Lyon County

Warrants Analysis: Warrant 3



Number of Hours Satisfying Requirements:	0

Notes:
1. 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.
2. INTERSECTION IS EITHER (1) WITHIN A COMMUNITY LESS THAN 10,000 POPULATION OR (2) HAS SPEEDS ABOVE 40 MPH ON MAJOR STREET.

Attachment F

Detailed Alternative Layouts

LEGEND

- PROPOSED GEOMETRICS
- INPLACE R/W
- INPLACE PROPERTY LINE
- ROADWAYS
- PAVED SHOULDER
- RAISED MEDIAN & CURBS
- SHOULDER PI

TIGER DR.

STATE ST.

STATE ST.

T.H. 23 SB

T.H. 23 NB

T.H. 23 SB

T.H. 23 NB

TIGER DR.

100

SCALE IN FEET

ISTHMUS engineering, inc.

LEGEND

- PROPOSED GEOMETRICS
- INPLACE R/W
- INPLACE PROPERTY LINE
- ROADWAYS
- LANDSCAPED MEDIAN
- RAISED MEDIAN & CURBS
- TRUCK APRON

TIGER DR.

STATE ST.

STATE ST.

T.H. 23 SB

T.H. 23 NB

T.H. 23 SB

T.H. 23 NB

TIGER DR.

ISTHMUS engineering, inc.

100

SCALE IN FEET

Attachment G

Year 2019 and Year 2035 Operations Analysis Results

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:50	6:50	6:50	6:50	6:50	6:50
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	895	885	869	802	865	862
Vehs Exited	895	882	867	797	865	862
Starting Vehs	7	12	9	8	16	9
Ending Vehs	7	15	11	13	16	11
Travel Distance (mi)	597	593	575	541	585	578
Travel Time (hr)	13.5	13.4	13.1	12.1	13.2	13.1
Total Delay (hr)	1.0	0.9	1.0	0.8	0.9	0.9
Total Stops	132	134	137	102	155	130
Fuel Used (gal)	19.5	19.4	18.8	17.2	19.2	18.8

Interval #0 Information Seeding

Start Time	6:50
End Time	7:00
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	7:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	193	212	209	171	208	198
Vehs Exited	193	215	205	168	214	199
Starting Vehs	7	12	9	8	16	9
Ending Vehs	7	9	13	11	10	11
Travel Distance (mi)	136	142	130	109	141	132
Travel Time (hr)	3.0	3.2	3.1	2.5	3.2	3.0
Total Delay (hr)	0.2	0.2	0.2	0.2	0.2	0.2
Total Stops	27	25	33	26	33	29
Fuel Used (gal)	4.3	4.6	4.2	3.6	4.7	4.3

Interval #2 Information

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	299	260	271	239	267	267
Vehs Exited	289	255	270	235	254	260
Starting Vehs	7	9	13	11	10	11
Ending Vehs	17	14	14	15	23	14
Travel Distance (mi)	193	177	180	164	178	178
Travel Time (hr)	4.5	4.0	4.2	3.6	4.1	4.1
Total Delay (hr)	0.3	0.3	0.4	0.2	0.3	0.3
Total Stops	45	39	53	30	60	44
Fuel Used (gal)	6.4	5.7	5.9	5.1	5.9	5.8

Interval #3 Information

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	201	195	192	190	201	195
Vehs Exited	206	193	194	195	211	200
Starting Vehs	17	14	14	15	23	14
Ending Vehs	12	16	12	10	13	11
Travel Distance (mi)	137	125	127	135	140	133
Travel Time (hr)	3.1	2.9	2.8	2.9	3.2	3.0
Total Delay (hr)	0.2	0.2	0.2	0.2	0.2	0.2
Total Stops	28	27	26	25	33	28
Fuel Used (gal)	4.4	4.3	4.2	4.3	4.6	4.4

Interval #4 Information

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	202	218	197	202	189	201
Vehs Exited	207	219	198	199	186	200
Starting Vehs	12	16	12	10	13	11
Ending Vehs	7	15	11	13	16	11
Travel Distance (mi)	131	150	138	132	126	135
Travel Time (hr)	3.0	3.3	3.0	3.0	2.8	3.0
Total Delay (hr)	0.2	0.2	0.2	0.2	0.2	0.2
Total Stops	32	43	25	21	29	30
Fuel Used (gal)	4.3	4.8	4.4	4.2	4.0	4.3

15: TH 23 & Tiger Dr Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	1.4	0.0	0.6	0.4
Total Del/Veh (s)	11.5	9.1	0.7	0.8	1.9
Travel Dist (mi)	1.9	7.5	69.4	120.9	199.7
Travel Time (hr)	0.1	0.4	1.4	2.4	4.4

20: TH 23 & Commencement Blvd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	1.7	0.0	1.0
Total Del/Veh (s)	6.9	4.7	0.9	0.5	0.9
Travel Dist (mi)	0.2	3.3	97.9	78.0	179.4
Travel Time (hr)	0.0	0.2	2.4	1.6	4.1

Total Network Performance

Denied Del/Veh (s)	1.2
Total Del/Veh (s)	2.6
Travel Dist (mi)	578.3
Travel Time (hr)	13.1

Intersection: 15: TH 23 & Tiger Dr

Movement	EB	WB	WB	NB	SB	SB
Directions Served	LTR	LT	R	UL	L	T
Maximum Queue (ft)	65	71	50	32	38	2
Average Queue (ft)	15	24	11	6	6	0
95th Queue (ft)	46	54	34	25	23	1
Link Distance (ft)	426	678				2082
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			300	450	480	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 20: TH 23 & Commencement Blvd

Movement	EB	WB
Directions Served	R	R
Maximum Queue (ft)	22	54
Average Queue (ft)	2	16
95th Queue (ft)	12	41
Link Distance (ft)	402	534
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:20	4:20	4:20	4:20	4:20	4:20
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	915	923	866	818	888	880
Vehs Exited	921	920	872	816	885	884
Starting Vehs	13	11	18	10	10	10
Ending Vehs	7	14	12	12	13	10
Travel Distance (mi)	610	626	587	557	609	598
Travel Time (hr)	13.9	14.2	13.3	12.5	13.7	13.5
Total Delay (hr)	0.7	0.8	0.7	0.7	0.8	0.7
Total Stops	78	87	80	70	86	80
Fuel Used (gal)	20.2	20.5	19.5	18.3	20.3	19.8

Interval #0 Information Seeding

Start Time	4:20
End Time	4:30
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	201	196	215	183	193	197
Vehs Exited	201	195	224	187	194	201
Starting Vehs	13	11	18	10	10	10
Ending Vehs	13	12	9	6	9	8
Travel Distance (mi)	136	132	146	130	132	135
Travel Time (hr)	3.1	2.9	3.4	2.8	3.0	3.0
Total Delay (hr)	0.2	0.1	0.2	0.1	0.2	0.1
Total Stops	15	19	20	12	21	17
Fuel Used (gal)	4.4	4.2	4.9	4.2	4.3	4.4

Interval #2 Information

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	299	287	264	259	279	277
Vehs Exited	297	281	258	246	275	272
Starting Vehs	13	12	9	6	9	8
Ending Vehs	15	18	15	19	13	16
Travel Distance (mi)	198	185	180	174	191	186
Travel Time (hr)	4.6	4.3	4.1	4.0	4.3	4.2
Total Delay (hr)	0.3	0.3	0.3	0.2	0.3	0.3
Total Stops	29	22	28	30	24	27
Fuel Used (gal)	6.6	6.1	6.0	5.8	6.6	6.2

Interval #3 Information

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	203	210	188	189	216	202
Vehs Exited	209	212	194	195	215	204
Starting Vehs	15	18	15	19	13	16
Ending Vehs	9	16	9	13	14	11
Travel Distance (mi)	139	144	126	131	146	137
Travel Time (hr)	3.1	3.3	2.8	2.9	3.2	3.1
Total Delay (hr)	0.1	0.2	0.1	0.1	0.2	0.2
Total Stops	18	19	22	18	19	19
Fuel Used (gal)	4.7	4.8	4.2	4.2	4.8	4.5

Interval #4 Information

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	212	230	199	187	200	205
Vehs Exited	214	232	196	188	201	206
Starting Vehs	9	16	9	13	14	11
Ending Vehs	7	14	12	12	13	10
Travel Distance (mi)	137	165	135	122	141	140
Travel Time (hr)	3.1	3.7	3.0	2.8	3.2	3.2
Total Delay (hr)	0.2	0.2	0.1	0.2	0.2	0.2
Total Stops	16	27	10	10	22	17
Fuel Used (gal)	4.6	5.5	4.5	4.1	4.6	4.6

1: TH 23 Performance by approach

Approach	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.2	0.5	0.4
Travel Dist (mi)	25.4	54.9	80.3
Travel Time (hr)	0.5	1.1	1.6

4: TH 23 Performance by approach

Approach	NB	SB	All
Denied Del/Veh (s)	0.0	0.1	0.1
Total Del/Veh (s)	1.1	0.4	0.7
Travel Dist (mi)	47.8	62.4	110.1
Travel Time (hr)	1.1	1.2	2.3

15: TH 23 & Tiger Dr Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	0.8	0.9	0.4	0.5	0.5
Travel Dist (mi)	1.8	6.7	49.1	60.6	118.3
Travel Time (hr)	0.1	0.3	1.0	1.3	2.7

20: TH 23 & Commencement Blvd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	1.8	0.0	1.0
Total Del/Veh (s)	5.0	4.4	0.8	0.1	0.7
Travel Dist (mi)	0.1	3.5	101.9	27.0	132.5
Travel Time (hr)	0.0	0.2	2.5	0.5	3.1

Total Network Performance

Denied Del/Veh (s)	1.0
Total Del/Veh (s)	2.0
Travel Dist (mi)	598.0
Travel Time (hr)	13.5

Intersection: 1: TH 23

Movement	SB
Directions Served	U
Maximum Queue (ft)	43
Average Queue (ft)	5
95th Queue (ft)	25
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: TH 23

Movement	NB
Directions Served	U
Maximum Queue (ft)	62
Average Queue (ft)	13
95th Queue (ft)	41
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 15: TH 23 & Tiger Dr

Movement	NB	NB	SB
Directions Served	L	R	L
Maximum Queue (ft)	48	5	38
Average Queue (ft)	5	0	8
95th Queue (ft)	26	4	30
Link Distance (ft)			
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	450	450	480
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 20: TH 23 & Commencement Blvd

Movement	EB	WB
Directions Served	R	R
Maximum Queue (ft)	17	61
Average Queue (ft)	1	19
95th Queue (ft)	8	45
Link Distance (ft)	402	534
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:20	4:20	4:20	4:20	4:20	4:20
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	926	873	872	852	851	874
Vehs Exited	926	872	869	844	852	873
Starting Vehs	12	15	11	10	12	12
Ending Vehs	12	16	14	18	11	12
Travel Distance (mi)	691	647	655	636	636	653
Travel Time (hr)	15.3	14.3	14.2	13.9	14.1	14.4
Total Delay (hr)	0.9	0.7	0.7	0.6	0.8	0.8
Total Stops	142	127	135	117	131	130
Fuel Used (gal)	21.9	20.6	20.9	19.4	20.2	20.6

Interval #0 Information Seeding

Start Time	4:20
End Time	4:30
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	220	199	200	182	172	194
Vehs Exited	213	203	200	181	170	193
Starting Vehs	12	15	11	10	12	12
Ending Vehs	19	11	11	11	14	15
Travel Distance (mi)	162	147	150	136	127	144
Travel Time (hr)	3.5	3.2	3.2	2.9	2.8	3.1
Total Delay (hr)	0.2	0.1	0.2	0.1	0.1	0.1
Total Stops	29	26	32	23	23	27
Fuel Used (gal)	5.0	4.6	4.7	4.1	3.9	4.5

Interval #2 Information

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	289	283	278	273	307	285
Vehs Exited	291	273	276	274	296	282
Starting Vehs	19	11	11	11	14	15
Ending Vehs	17	21	13	10	25	17
Travel Distance (mi)	219	211	209	206	225	214
Travel Time (hr)	4.9	4.6	4.6	4.6	5.1	4.8
Total Delay (hr)	0.3	0.2	0.3	0.2	0.4	0.3
Total Stops	40	42	35	40	54	41
Fuel Used (gal)	6.9	6.8	6.7	6.3	7.3	6.8

Interval #3 Information

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	210	183	215	185	181	195
Vehs Exited	217	192	218	180	198	201
Starting Vehs	17	21	13	10	25	17
Ending Vehs	10	12	10	15	8	11
Travel Distance (mi)	157	138	161	137	142	147
Travel Time (hr)	3.5	3.0	3.6	3.0	3.1	3.2
Total Delay (hr)	0.2	0.1	0.2	0.1	0.2	0.2
Total Stops	47	23	42	23	28	33
Fuel Used (gal)	5.2	4.4	5.3	4.2	4.5	4.7

Interval #4 Information

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	207	208	179	212	191	199
Vehs Exited	205	204	175	209	188	195
Starting Vehs	10	12	10	15	8	11
Ending Vehs	12	16	14	18	11	12
Travel Distance (mi)	153	151	135	157	143	148
Travel Time (hr)	3.3	3.4	2.9	3.5	3.1	3.2
Total Delay (hr)	0.2	0.2	0.1	0.2	0.1	0.2
Total Stops	26	36	26	31	26	29
Fuel Used (gal)	4.8	4.8	4.2	4.9	4.5	4.6

15: TH 23 & Tiger Dr Performance by approach

Approach	WB	NB	SB	All
Denied Del/Veh (s)	1.8	0.0	0.5	0.4
Total Del/Veh (s)	7.7	0.7	0.9	1.5
Travel Dist (mi)	10.6	119.4	123.7	253.6
Travel Time (hr)	0.6	2.6	2.4	5.6

20: TH 23 Performance by approach

Approach	EB	NB	SB	All
Denied Del/Veh (s)	0.9	0.3	0.0	0.2
Total Del/Veh (s)	13.3	0.5	0.6	0.9
Travel Dist (mi)	2.7	101.4	83.3	187.4
Travel Time (hr)	0.2	2.0	1.7	3.8

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	2.6
Travel Dist (mi)	652.7
Travel Time (hr)	14.4

Intersection: 15: TH 23 & Tiger Dr

Movement	WB	WB	NB	SB
Directions Served	L	R	R	L
Maximum Queue (ft)	74	56	31	47
Average Queue (ft)	25	18	2	13
95th Queue (ft)	53	42	14	36
Link Distance (ft)	678			
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		300	450	480
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 20: TH 23

Movement	EB	EB	NB
Directions Served	L	R	L
Maximum Queue (ft)	65	22	40
Average Queue (ft)	15	3	5
95th Queue (ft)	45	15	24
Link Distance (ft)	657		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		200	450
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:50	6:50	6:50	6:50	6:50	6:50
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	930	930	891	866	868	896
Vehs Exited	922	924	893	871	866	895
Starting Vehs	12	11	18	11	12	11
Ending Vehs	20	17	16	6	14	15
Travel Distance (mi)	627	631	595	587	583	605
Travel Time (hr)	15.7	15.8	15.1	14.6	14.7	15.2
Total Delay (hr)	1.5	1.5	1.5	1.4	1.4	1.5
Total Stops	79	66	95	60	88	75
Fuel Used (gal)	23.0	23.7	22.5	21.9	21.9	22.6

Interval #0 Information Seeding

Start Time	6:50
End Time	7:00
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	7:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	206	194	201	198	190	196
Vehs Exited	208	192	203	192	186	196
Starting Vehs	12	11	18	11	12	11
Ending Vehs	10	13	16	17	16	13
Travel Distance (mi)	138	131	131	132	128	132
Travel Time (hr)	3.5	3.2	3.3	3.3	3.2	3.3
Total Delay (hr)	0.3	0.3	0.3	0.3	0.3	0.3
Total Stops	18	10	29	15	23	18
Fuel Used (gal)	5.1	4.9	5.0	4.9	4.8	5.0

Interval #2 Information

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	321	283	269	260	273	282
Vehs Exited	305	277	272	263	272	278
Starting Vehs	10	13	16	17	16	13
Ending Vehs	26	19	13	14	17	17
Travel Distance (mi)	214	189	181	183	179	189
Travel Time (hr)	5.4	4.8	4.6	4.6	4.6	4.8
Total Delay (hr)	0.6	0.5	0.5	0.5	0.5	0.5
Total Stops	30	23	26	24	40	28
Fuel Used (gal)	7.8	7.1	6.8	6.9	6.7	7.1

Interval #3 Information

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	210	223	205	190	219	208
Vehs Exited	222	222	200	186	220	209
Starting Vehs	26	19	13	14	17	17
Ending Vehs	14	20	18	18	16	16
Travel Distance (mi)	148	147	133	122	146	139
Travel Time (hr)	3.7	3.7	3.3	3.0	3.6	3.5
Total Delay (hr)	0.4	0.3	0.3	0.3	0.3	0.3
Total Stops	16	14	15	9	15	13
Fuel Used (gal)	5.4	5.6	4.9	4.6	5.5	5.2

Interval #4 Information

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	193	230	216	218	186	208
Vehs Exited	187	233	218	230	188	211
Starting Vehs	14	20	18	18	16	16
Ending Vehs	20	17	16	6	14	15
Travel Distance (mi)	126	163	150	149	131	144
Travel Time (hr)	3.1	4.0	3.8	3.8	3.2	3.6
Total Delay (hr)	0.3	0.4	0.4	0.4	0.3	0.3
Total Stops	15	19	25	12	10	15
Fuel Used (gal)	4.8	6.1	5.8	5.4	4.8	5.4

15: TH 23 & Tiger Dr Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.1	0.1
Total Del/Veh (s)	3.8	3.1	4.7	6.2	5.3
Travel Dist (mi)	1.7	7.1	71.7	122.4	203.0
Travel Time (hr)	0.1	0.3	1.8	2.9	5.1

20: TH 23 & Commencement Blvd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	1.7	0.0	1.0
Total Del/Veh (s)	3.9	4.3	0.9	0.4	0.8
Travel Dist (mi)	0.1	3.5	105.2	82.9	191.7
Travel Time (hr)	0.0	0.2	2.5	2.2	4.9

Total Network Performance

Denied Del/Veh (s)	1.0
Total Del/Veh (s)	4.8
Travel Dist (mi)	604.5
Travel Time (hr)	15.2

Intersection: 15: TH 23 & Tiger Dr

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	ULT	TR	LT	TR
Maximum Queue (ft)	50	51	39	27	57	30
Average Queue (ft)	5	9	6	2	12	2
95th Queue (ft)	29	36	27	15	40	16
Link Distance (ft)	442	693	1302	1302	2070	2070
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 20: TH 23 & Commencement Blvd

Movement	EB	WB
Directions Served	R	R
Maximum Queue (ft)	13	46
Average Queue (ft)	1	17
95th Queue (ft)	7	41
Link Distance (ft)	402	534
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:20	4:20	4:20	4:20	4:20	4:20
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	881	916	889	873	852	883
Vehs Exited	882	904	887	873	849	880
Starting Vehs	11	8	14	16	10	10
Ending Vehs	10	20	16	16	13	12
Travel Distance (mi)	686	709	690	672	667	685
Travel Time (hr)	14.1	14.5	14.1	13.8	13.5	14.0
Total Delay (hr)	0.7	0.7	0.7	0.7	0.6	0.7
Total Stops	130	140	148	149	136	140
Fuel Used (gal)	21.4	22.1	21.6	21.0	20.7	21.4

Interval #0 Information Seeding

Start Time	4:20
End Time	4:30
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	201	212	191	211	199	202
Vehs Exited	202	204	192	218	196	202
Starting Vehs	11	8	14	16	10	10
Ending Vehs	10	16	13	9	13	10
Travel Distance (mi)	161	163	148	165	153	158
Travel Time (hr)	3.2	3.3	3.1	3.4	3.1	3.2
Total Delay (hr)	0.1	0.1	0.2	0.2	0.1	0.1
Total Stops	21	32	31	39	42	33
Fuel Used (gal)	5.2	5.1	4.6	5.2	4.7	5.0

Interval #2 Information

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	281	247	245	217	273	252
Vehs Exited	267	244	240	212	269	246
Starting Vehs	10	16	13	9	13	10
Ending Vehs	24	19	18	14	17	16
Travel Distance (mi)	214	192	188	163	208	193
Travel Time (hr)	4.4	3.9	3.9	3.4	4.3	4.0
Total Delay (hr)	0.3	0.2	0.2	0.2	0.2	0.2
Total Stops	46	34	39	33	54	40
Fuel Used (gal)	6.6	6.0	5.8	5.0	6.7	6.0

Interval #3 Information

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	195	222	231	218	178	209
Vehs Exited	205	227	233	218	183	214
Starting Vehs	24	19	18	14	17	16
Ending Vehs	14	14	16	14	12	14
Travel Distance (mi)	154	177	182	174	143	166
Travel Time (hr)	3.2	3.6	3.7	3.5	2.8	3.4
Total Delay (hr)	0.2	0.2	0.2	0.2	0.1	0.2
Total Stops	36	34	42	32	19	33
Fuel Used (gal)	4.8	5.5	5.7	5.3	4.4	5.1

Interval #4 Information

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	204	235	222	227	202	218
Vehs Exited	208	229	222	225	201	217
Starting Vehs	14	14	16	14	12	14
Ending Vehs	10	20	16	16	13	12
Travel Distance (mi)	157	177	172	170	163	168
Travel Time (hr)	3.2	3.7	3.5	3.5	3.3	3.4
Total Delay (hr)	0.2	0.2	0.1	0.2	0.1	0.2
Total Stops	27	40	36	45	21	35
Fuel Used (gal)	4.8	5.5	5.4	5.4	5.0	5.2

15: TH 23 & Tiger Dr Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.6	0.0	0.4	0.2
Total Del/Veh (s)	9.8	11.5	0.5	0.8	1.3
Travel Dist (mi)	2.7	2.7	91.4	152.5	249.3
Travel Time (hr)	0.2	0.2	1.8	3.0	5.1

20: TH 23 & Commencement Blvd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.1	0.4	0.0	0.2
Total Del/Veh (s)	4.9	3.9	0.3	0.5	0.8
Travel Dist (mi)	5.1	0.6	82.5	94.9	183.1
Travel Time (hr)	0.3	0.0	1.6	1.8	3.8

Total Network Performance

Denied Del/Veh (s)	0.4
Total Del/Veh (s)	2.4
Travel Dist (mi)	684.9
Travel Time (hr)	14.0

Intersection: 15: TH 23 & Tiger Dr

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	R	UL	L
Maximum Queue (ft)	57	70	22	26	27
Average Queue (ft)	17	13	1	3	5
95th Queue (ft)	42	41	10	16	20
Link Distance (ft)	426	678			
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			300	450	480
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 20: TH 23 & Commencement Blvd

Movement	EB	WB
Directions Served	R	R
Maximum Queue (ft)	54	23
Average Queue (ft)	23	4
95th Queue (ft)	44	18
Link Distance (ft)	402	534
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:20	4:20	4:20	4:20	4:20	4:20
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	902	871	886	865	861	877
Vehs Exited	901	875	890	864	856	877
Starting Vehs	16	15	14	17	10	13
Ending Vehs	17	11	10	18	15	12
Travel Distance (mi)	695	673	678	668	661	675
Travel Time (hr)	14.3	13.6	13.8	13.6	13.5	13.8
Total Delay (hr)	0.6	0.5	0.5	0.5	0.5	0.5
Total Stops	97	101	101	110	115	104
Fuel Used (gal)	21.9	21.2	21.3	20.8	20.7	21.2

Interval #0 Information Seeding

Start Time	4:20
End Time	4:30
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	209	215	207	187	196	203
Vehs Exited	214	215	206	186	196	204
Starting Vehs	16	15	14	17	10	13
Ending Vehs	11	15	15	18	10	13
Travel Distance (mi)	164	166	156	145	150	156
Travel Time (hr)	3.4	3.3	3.2	2.9	3.1	3.2
Total Delay (hr)	0.1	0.1	0.1	0.1	0.1	0.1
Total Stops	24	26	26	26	29	26
Fuel Used (gal)	5.3	5.3	4.7	4.7	4.7	4.9

Interval #2 Information

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	262	242	249	236	286	254
Vehs Exited	250	240	247	243	284	252
Starting Vehs	11	15	15	18	10	13
Ending Vehs	23	17	17	11	12	15
Travel Distance (mi)	194	187	190	186	218	195
Travel Time (hr)	4.0	3.8	3.9	3.8	4.5	4.0
Total Delay (hr)	0.2	0.1	0.2	0.2	0.2	0.2
Total Stops	31	25	30	31	38	31
Fuel Used (gal)	6.0	5.9	6.1	5.8	7.0	6.2

Interval #3 Information

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	213	200	223	216	194	209
Vehs Exited	217	207	222	216	189	209
Starting Vehs	23	17	17	11	12	15
Ending Vehs	19	10	18	11	17	13
Travel Distance (mi)	165	155	169	167	144	160
Travel Time (hr)	3.4	3.1	3.4	3.4	2.9	3.3
Total Delay (hr)	0.1	0.1	0.1	0.1	0.1	0.1
Total Stops	22	20	24	30	25	23
Fuel Used (gal)	5.2	4.7	5.4	5.2	4.4	5.0

Interval #4 Information

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	218	214	207	226	185	209
Vehs Exited	220	213	215	219	187	211
Starting Vehs	19	10	18	11	17	13
Ending Vehs	17	11	10	18	15	12
Travel Distance (mi)	172	164	163	170	148	163
Travel Time (hr)	3.5	3.4	3.3	3.4	3.0	3.3
Total Delay (hr)	0.1	0.1	0.1	0.1	0.1	0.1
Total Stops	20	30	21	23	23	23
Fuel Used (gal)	5.5	5.3	5.1	5.2	4.5	5.1

1: TH 23 Performance by approach

Approach	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.1	0.6	0.4
Travel Dist (mi)	32.9	65.8	98.7
Travel Time (hr)	0.6	1.3	2.0

4: TH 23 Performance by approach

Approach	NB	SB	All
Denied Del/Veh (s)	0.0	0.1	0.1
Total Del/Veh (s)	0.5	0.3	0.4
Travel Dist (mi)	63.0	77.2	140.2
Travel Time (hr)	1.3	1.5	2.7

15: TH 23 & Tiger Dr Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	0.8	0.7	0.4	0.4	0.4
Travel Dist (mi)	2.6	2.4	62.9	67.3	135.2
Travel Time (hr)	0.1	0.1	1.3	1.4	2.8

20: TH 23 & Commencement Blvd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.4	0.0	0.2
Total Del/Veh (s)	4.7	4.3	0.3	0.2	0.6
Travel Dist (mi)	4.9	0.7	81.7	32.5	119.8
Travel Time (hr)	0.3	0.0	1.6	0.6	2.5

Total Network Performance

Denied Del/Veh (s)	0.2
Total Del/Veh (s)	1.9
Travel Dist (mi)	674.9
Travel Time (hr)	13.8

Intersection: 1: TH 23

Movement	SB
Directions Served	U
Maximum Queue (ft)	38
Average Queue (ft)	7
95th Queue (ft)	28
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: TH 23

Movement	NB
Directions Served	U
Maximum Queue (ft)	26
Average Queue (ft)	5
95th Queue (ft)	21
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 15: TH 23 & Tiger Dr

Movement	NB	SB
Directions Served	L	L
Maximum Queue (ft)	23	42
Average Queue (ft)	4	7
95th Queue (ft)	18	27
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	450	480
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 20: TH 23 & Commencement Blvd

Movement	EB	WB
Directions Served	R	R
Maximum Queue (ft)	51	23
Average Queue (ft)	23	5
95th Queue (ft)	42	20
Link Distance (ft)	402	534
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:20	4:20	4:20	4:20	4:20	4:20
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	885	821	863	835	827	846
Vehs Exited	885	817	863	831	828	846
Starting Vehs	18	16	12	14	15	14
Ending Vehs	18	20	12	18	14	15
Travel Distance (mi)	713	653	676	671	658	674
Travel Time (hr)	14.7	13.6	14.1	13.7	13.6	13.9
Total Delay (hr)	0.8	0.7	0.8	0.6	0.7	0.7
Total Stops	143	152	154	122	135	141
Fuel Used (gal)	22.2	20.5	21.2	20.6	20.7	21.0

Interval #0 Information Seeding

Start Time	4:20
End Time	4:30
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	224	171	177	194	194	192
Vehs Exited	227	172	176	199	189	192
Starting Vehs	18	16	12	14	15	14
Ending Vehs	15	15	13	9	20	15
Travel Distance (mi)	186	139	138	160	152	155
Travel Time (hr)	3.8	2.9	2.8	3.3	3.2	3.2
Total Delay (hr)	0.2	0.1	0.1	0.2	0.2	0.2
Total Stops	30	29	33	31	35	33
Fuel Used (gal)	5.8	4.3	4.3	5.0	4.7	4.8

Interval #2 Information

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	262	264	263	246	294	265
Vehs Exited	254	257	262	236	303	263
Starting Vehs	15	15	13	9	20	15
Ending Vehs	23	22	14	19	11	17
Travel Distance (mi)	205	206	206	193	235	209
Travel Time (hr)	4.3	4.3	4.3	4.0	4.9	4.4
Total Delay (hr)	0.3	0.2	0.2	0.2	0.3	0.2
Total Stops	50	48	48	33	56	46
Fuel Used (gal)	6.4	6.6	6.4	6.0	7.6	6.6

Interval #3 Information

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	197	171	222	188	169	190
Vehs Exited	208	186	222	197	167	196
Starting Vehs	23	22	14	19	11	17
Ending Vehs	12	7	14	10	13	11
Travel Distance (mi)	163	138	174	154	132	152
Travel Time (hr)	3.3	2.9	3.7	3.1	2.7	3.1
Total Delay (hr)	0.1	0.2	0.2	0.1	0.1	0.2
Total Stops	30	39	40	27	21	32
Fuel Used (gal)	5.0	4.3	5.5	4.7	4.0	4.7

Interval #4 Information

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	202	215	201	207	170	199
Vehs Exited	196	202	203	199	169	194
Starting Vehs	12	7	14	10	13	11
Ending Vehs	18	20	12	18	14	15
Travel Distance (mi)	159	171	158	164	139	158
Travel Time (hr)	3.3	3.6	3.2	3.4	2.7	3.2
Total Delay (hr)	0.2	0.2	0.2	0.1	0.1	0.2
Total Stops	33	36	33	31	23	32
Fuel Used (gal)	5.0	5.3	4.9	5.0	4.4	4.9

15: TH 23 & Tiger Dr Performance by approach

Approach	WB	NB	SB	All
Denied Del/Veh (s)	1.6	0.0	0.3	0.2
Total Del/Veh (s)	8.6	0.5	0.7	0.9
Travel Dist (mi)	3.8	96.3	143.2	243.3
Travel Time (hr)	0.2	1.9	2.8	4.9

20: TH 23 Performance by approach

Approach	EB	NB	SB	All
Denied Del/Veh (s)	3.1	0.2	0.0	0.5
Total Del/Veh (s)	6.2	0.4	0.4	1.1
Travel Dist (mi)	12.2	79.4	91.5	183.0
Travel Time (hr)	0.7	1.5	1.8	4.0

Total Network Performance

Denied Del/Veh (s)	0.7
Total Del/Veh (s)	2.3
Travel Dist (mi)	674.1
Travel Time (hr)	13.9

Intersection: 15: TH 23 & Tiger Dr

Movement	WB	WB	SB
Directions Served	L	R	L
Maximum Queue (ft)	38	41	35
Average Queue (ft)	14	7	10
95th Queue (ft)	37	27	32
Link Distance (ft)	678		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		300	480
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 20: TH 23

Movement	EB	EB	NB
Directions Served	L	R	L
Maximum Queue (ft)	49	62	29
Average Queue (ft)	15	24	4
95th Queue (ft)	39	45	19
Link Distance (ft)	657		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		200	450
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:20	4:20	4:20	4:20	4:20	4:20
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	900	897	893	875	834	880
Vehs Exited	902	893	885	875	836	878
Starting Vehs	22	9	14	18	16	16
Ending Vehs	20	13	22	18	14	17
Travel Distance (mi)	702	696	697	679	651	685
Travel Time (hr)	16.7	16.6	16.6	16.1	15.4	16.3
Total Delay (hr)	1.7	1.7	1.6	1.5	1.5	1.6
Total Stops	97	112	86	96	93	96
Fuel Used (gal)	26.4	26.0	25.7	25.3	24.3	25.5

Interval #0 Information Seeding

Start Time	4:20
End Time	4:30
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	204	203	205	211	181	201
Vehs Exited	216	199	205	215	184	205
Starting Vehs	22	9	14	18	16	16
Ending Vehs	10	13	14	14	13	12
Travel Distance (mi)	165	151	159	168	141	157
Travel Time (hr)	3.9	3.6	3.8	4.0	3.3	3.7
Total Delay (hr)	0.4	0.4	0.4	0.4	0.3	0.4
Total Stops	20	31	25	28	20	23
Fuel Used (gal)	6.3	5.7	5.8	6.4	5.2	5.9

Interval #2 Information

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	275	268	246	245	265	260
Vehs Exited	257	261	235	238	268	252
Starting Vehs	10	13	14	14	13	12
Ending Vehs	28	20	25	21	10	20
Travel Distance (mi)	210	208	189	190	208	201
Travel Time (hr)	5.0	5.0	4.5	4.5	5.0	4.8
Total Delay (hr)	0.5	0.5	0.5	0.4	0.5	0.5
Total Stops	23	36	17	27	32	26
Fuel Used (gal)	7.7	7.8	6.9	7.1	7.7	7.4

Interval #3 Information

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	187	208	217	205	194	202
Vehs Exited	198	210	225	212	188	207
Starting Vehs	28	20	25	21	10	20
Ending Vehs	17	18	17	14	16	17
Travel Distance (mi)	152	166	174	159	151	160
Travel Time (hr)	3.6	3.9	4.1	3.7	3.6	3.8
Total Delay (hr)	0.3	0.4	0.4	0.4	0.3	0.4
Total Stops	20	21	21	20	15	17
Fuel Used (gal)	5.8	6.1	6.4	5.9	5.6	6.0

Interval #4 Information

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	234	218	225	214	194	217
Vehs Exited	231	223	220	210	196	215
Starting Vehs	17	18	17	14	16	17
Ending Vehs	20	13	22	18	14	17
Travel Distance (mi)	176	171	174	162	151	167
Travel Time (hr)	4.2	4.1	4.1	3.8	3.5	3.9
Total Delay (hr)	0.4	0.4	0.4	0.3	0.3	0.4
Total Stops	34	24	23	21	26	24
Fuel Used (gal)	6.6	6.5	6.6	6.0	5.7	6.3

15: TH 23 & Tiger Dr Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.1	0.1
Total Del/Veh (s)	3.2	3.4	6.0	6.5	6.1
Travel Dist (mi)	3.0	2.7	87.2	153.4	246.4
Travel Time (hr)	0.1	0.1	2.2	3.6	6.1

20: TH 23 & Commencement Blvd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.4	0.0	0.2
Total Del/Veh (s)	4.9	4.0	0.3	0.4	0.7
Travel Dist (mi)	4.7	0.5	80.8	97.6	183.7
Travel Time (hr)	0.3	0.0	1.6	2.5	4.4

Total Network Performance

Denied Del/Veh (s)	0.2
Total Del/Veh (s)	6.3
Travel Dist (mi)	685.0
Travel Time (hr)	16.3

Intersection: 15: TH 23 & Tiger Dr

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	ULT	TR	LT	TR
Maximum Queue (ft)	31	38	45	32	49	24
Average Queue (ft)	6	5	7	2	5	1
95th Queue (ft)	26	25	30	19	28	9
Link Distance (ft)	442	693	1302	1302	2070	2070
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 20: TH 23 & Commencement Blvd

Movement	EB	WB
Directions Served	R	R
Maximum Queue (ft)	56	22
Average Queue (ft)	24	3
95th Queue (ft)	45	16
Link Distance (ft)	402	534
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:50	6:50	6:50	6:50	6:50	6:50
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	1096	1097	1044	1028	1036	1060
Vehs Exited	1102	1094	1050	1028	1038	1064
Starting Vehs	18	17	16	10	20	15
Ending Vehs	12	20	10	10	18	13
Travel Distance (mi)	750	761	701	708	717	727
Travel Time (hr)	16.7	17.1	15.8	15.6	15.8	16.2
Total Delay (hr)	1.2	1.2	1.1	1.0	1.1	1.1
Total Stops	152	149	149	140	138	146
Fuel Used (gal)	24.4	24.5	22.7	22.8	23.3	23.5

Interval #0 Information Seeding

Start Time	6:50
End Time	7:00
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	7:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	282	260	264	222	214	249
Vehs Exited	283	260	264	219	221	248
Starting Vehs	18	17	16	10	20	15
Ending Vehs	17	17	16	13	13	15
Travel Distance (mi)	196	188	172	154	147	171
Travel Time (hr)	4.4	4.2	3.9	3.3	3.3	3.8
Total Delay (hr)	0.3	0.3	0.3	0.2	0.2	0.3
Total Stops	37	38	32	31	30	34
Fuel Used (gal)	6.3	6.1	5.5	4.9	4.8	5.5

Interval #2 Information

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	353	331	315	322	329	330
Vehs Exited	349	328	312	318	327	327
Starting Vehs	17	17	16	13	13	15
Ending Vehs	21	20	19	17	15	18
Travel Distance (mi)	236	223	212	225	233	226
Travel Time (hr)	5.3	5.1	4.8	4.9	5.1	5.0
Total Delay (hr)	0.4	0.4	0.4	0.3	0.4	0.4
Total Stops	44	48	51	32	44	42
Fuel Used (gal)	7.6	7.3	6.9	7.1	7.7	7.3

Interval #3 Information

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	239	234	229	241	249	238
Vehs Exited	247	234	235	244	243	239
Starting Vehs	21	20	19	17	15	18
Ending Vehs	13	20	13	14	21	16
Travel Distance (mi)	168	157	155	161	175	163
Travel Time (hr)	3.8	3.5	3.5	3.7	3.8	3.7
Total Delay (hr)	0.3	0.2	0.2	0.3	0.2	0.3
Total Stops	42	26	31	41	35	35
Fuel Used (gal)	5.5	5.1	5.1	5.3	5.7	5.3

Interval #4 Information

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	222	272	236	243	244	243
Vehs Exited	223	272	239	247	247	245
Starting Vehs	13	20	13	14	21	16
Ending Vehs	12	20	10	10	18	13
Travel Distance (mi)	150	192	161	169	162	167
Travel Time (hr)	3.3	4.3	3.6	3.7	3.6	3.7
Total Delay (hr)	0.2	0.3	0.2	0.2	0.3	0.2
Total Stops	29	37	35	36	29	33
Fuel Used (gal)	5.0	6.1	5.2	5.5	5.1	5.4

15: TH 23 & Tiger Dr Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	1.9	0.0	0.6	0.4
Total Del/Veh (s)	11.7	10.7	0.8	1.0	1.9
Travel Dist (mi)	2.4	6.8	94.0	147.7	250.9
Travel Time (hr)	0.2	0.4	1.9	3.0	5.5

20: TH 23 & Commencement Blvd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	1.5	0.0	0.9
Total Del/Veh (s)	5.8	4.8	0.9	0.5	0.9
Travel Dist (mi)	0.4	3.4	126.2	91.0	221.1
Travel Time (hr)	0.0	0.2	3.0	1.8	5.0

Total Network Performance

Denied Del/Veh (s)	1.1
Total Del/Veh (s)	2.6
Travel Dist (mi)	727.2
Travel Time (hr)	16.2

Intersection: 15: TH 23 & Tiger Dr

Movement	EB	WB	WB	NB	NB	SB
Directions Served	LTR	LT	R	UL	R	L
Maximum Queue (ft)	57	60	60	43	4	37
Average Queue (ft)	15	20	14	9	0	7
95th Queue (ft)	40	48	39	31	3	24
Link Distance (ft)	426	678				
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			300	450	450	480
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 20: TH 23 & Commencement Blvd

Movement	EB	WB
Directions Served	R	R
Maximum Queue (ft)	27	60
Average Queue (ft)	4	18
95th Queue (ft)	20	44
Link Distance (ft)	402	534
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:50	6:50	6:50	6:50	6:50	6:50
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	1119	1086	1092	983	1051	1065
Vehs Exited	1121	1089	1089	980	1056	1066
Starting Vehs	16	18	16	12	18	16
Ending Vehs	14	15	19	15	13	13
Travel Distance (mi)	789	759	735	687	741	742
Travel Time (hr)	17.6	17.0	16.3	15.2	16.5	16.5
Total Delay (hr)	1.1	1.0	0.9	0.8	0.9	0.9
Total Stops	118	124	91	101	99	107
Fuel Used (gal)	26.2	24.9	24.2	22.4	24.6	24.5

Interval #0 Information Seeding

Start Time	6:50
End Time	7:00
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	7:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	252	250	250	215	223	238
Vehs Exited	256	257	252	215	234	242
Starting Vehs	16	18	16	12	18	16
Ending Vehs	12	11	14	12	7	11
Travel Distance (mi)	178	176	168	153	165	168
Travel Time (hr)	4.1	4.0	3.7	3.3	3.6	3.7
Total Delay (hr)	0.2	0.2	0.2	0.2	0.2	0.2
Total Stops	28	31	23	24	23	25
Fuel Used (gal)	5.9	5.7	5.4	5.0	5.5	5.5

Interval #2 Information

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	376	329	331	298	351	337
Vehs Exited	368	323	331	293	338	330
Starting Vehs	12	11	14	12	7	11
Ending Vehs	20	17	14	17	20	16
Travel Distance (mi)	261	221	227	202	241	230
Travel Time (hr)	5.9	5.0	5.0	4.5	5.4	5.2
Total Delay (hr)	0.4	0.3	0.3	0.3	0.3	0.3
Total Stops	51	36	26	27	33	36
Fuel Used (gal)	8.7	7.3	7.5	6.6	8.0	7.6

Interval #3 Information

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	256	241	256	224	240	243
Vehs Exited	252	245	248	227	241	243
Starting Vehs	20	17	14	17	20	16
Ending Vehs	24	13	22	14	19	17
Travel Distance (mi)	177	178	169	162	165	170
Travel Time (hr)	3.9	3.9	3.7	3.7	3.8	3.8
Total Delay (hr)	0.2	0.2	0.2	0.2	0.2	0.2
Total Stops	22	33	19	27	26	25
Fuel Used (gal)	6.0	6.0	5.5	5.4	5.5	5.7

Interval #4 Information

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	235	266	255	246	237	248
Vehs Exited	245	264	258	245	243	251
Starting Vehs	24	13	22	14	19	17
Ending Vehs	14	15	19	15	13	13
Travel Distance (mi)	172	182	172	171	170	173
Travel Time (hr)	3.7	4.1	3.9	3.7	3.7	3.8
Total Delay (hr)	0.2	0.2	0.2	0.2	0.2	0.2
Total Stops	17	24	23	23	17	22
Fuel Used (gal)	5.6	6.0	5.7	5.4	5.6	5.7

1: TH 23 Performance by approach

Approach	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.3	0.6	0.5
Travel Dist (mi)	34.1	66.8	100.9
Travel Time (hr)	0.7	1.4	2.1

4: TH 23 Performance by approach

Approach	NB	SB	All
Denied Del/Veh (s)	0.0	0.1	0.1
Total Del/Veh (s)	1.0	0.5	0.7
Travel Dist (mi)	62.4	76.0	138.4
Travel Time (hr)	1.4	1.5	2.8

15: TH 23 & Tiger Dr Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.2	0.0	0.0	0.0
Total Del/Veh (s)	0.8	0.9	0.5	0.7	0.6
Travel Dist (mi)	2.3	5.9	65.1	73.3	146.6
Travel Time (hr)	0.1	0.2	1.4	1.6	3.3

20: TH 23 & Commencement Blvd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	1.5	0.0	0.9
Total Del/Veh (s)	4.7	4.4	0.9	0.1	0.8
Travel Dist (mi)	0.6	3.5	126.3	33.0	163.3
Travel Time (hr)	0.0	0.2	3.0	0.6	3.8

Total Network Performance

Denied Del/Veh (s)	0.9
Total Del/Veh (s)	2.3
Travel Dist (mi)	742.1
Travel Time (hr)	16.5

Intersection: 1: TH 23

Movement	SB
Directions Served	U
Maximum Queue (ft)	46
Average Queue (ft)	10
95th Queue (ft)	37
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: TH 23

Movement	NB
Directions Served	U
Maximum Queue (ft)	61
Average Queue (ft)	16
95th Queue (ft)	45
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 15: TH 23 & Tiger Dr

Movement	NB	SB
Directions Served	L	L
Maximum Queue (ft)	49	43
Average Queue (ft)	5	12
95th Queue (ft)	24	34
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	450	480
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 20: TH 23 & Commencement Blvd

Movement	EB	WB
Directions Served	R	R
Maximum Queue (ft)	31	56
Average Queue (ft)	5	17
95th Queue (ft)	20	42
Link Distance (ft)	402	534
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:50	6:50	6:50	6:50	6:50	6:50
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	1115	1131	1080	1069	1068	1094
Vehs Exited	1117	1132	1085	1064	1077	1096
Starting Vehs	23	16	23	11	22	19
Ending Vehs	21	15	18	16	13	17
Travel Distance (mi)	834	842	811	807	798	819
Travel Time (hr)	18.6	18.6	17.8	17.7	17.8	18.1
Total Delay (hr)	1.2	1.0	1.0	1.0	1.2	1.1
Total Stops	170	157	175	149	179	167
Fuel Used (gal)	26.5	26.5	25.8	25.5	25.4	25.9

Interval #0 Information Seeding

Start Time	6:50
End Time	7:00
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	7:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	245	252	250	260	237	248
Vehs Exited	247	248	258	256	245	250
Starting Vehs	23	16	23	11	22	19
Ending Vehs	21	20	15	15	14	18
Travel Distance (mi)	186	187	188	193	177	186
Travel Time (hr)	4.1	4.1	4.2	4.2	4.0	4.1
Total Delay (hr)	0.2	0.2	0.3	0.2	0.2	0.2
Total Stops	31	35	48	35	31	36
Fuel Used (gal)	5.9	5.8	6.0	6.2	5.5	5.9

Interval #2 Information

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	343	334	338	340	368	345
Vehs Exited	346	334	341	335	357	343
Starting Vehs	21	20	15	15	14	18
Ending Vehs	18	20	12	20	25	18
Travel Distance (mi)	252	245	254	255	269	255
Travel Time (hr)	5.8	5.6	5.6	5.8	6.1	5.8
Total Delay (hr)	0.5	0.4	0.4	0.5	0.5	0.4
Total Stops	71	48	56	53	80	62
Fuel Used (gal)	8.1	7.8	8.1	8.0	8.8	8.2

Interval #3 Information

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	259	249	248	241	227	245
Vehs Exited	257	250	245	251	242	248
Starting Vehs	18	20	12	20	25	18
Ending Vehs	20	19	15	10	10	16
Travel Distance (mi)	196	187	184	191	177	187
Travel Time (hr)	4.3	4.1	4.0	4.0	3.9	4.1
Total Delay (hr)	0.2	0.2	0.2	0.2	0.2	0.2
Total Stops	36	33	33	30	43	35
Fuel Used (gal)	6.3	5.9	6.0	6.0	5.7	6.0

Interval #4 Information

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	268	296	244	228	236	254
Vehs Exited	267	300	241	222	233	252
Starting Vehs	20	19	15	10	10	16
Ending Vehs	21	15	18	16	13	17
Travel Distance (mi)	201	223	185	168	176	191
Travel Time (hr)	4.4	4.9	4.0	3.6	3.8	4.1
Total Delay (hr)	0.2	0.3	0.2	0.2	0.2	0.2
Total Stops	32	41	38	31	25	34
Fuel Used (gal)	6.2	7.1	5.7	5.2	5.4	5.9

15: TH 23 & Tiger Dr Performance by approach

Approach	WB	NB	SB	All
Denied Del/Veh (s)	2.6	0.0	0.5	0.4
Total Del/Veh (s)	9.0	0.8	1.2	1.7
Travel Dist (mi)	11.5	148.2	152.4	312.1
Travel Time (hr)	0.7	3.2	3.0	6.9

20: TH 23 Performance by approach

Approach	EB	NB	SB	All
Denied Del/Veh (s)	1.6	0.4	0.0	0.3
Total Del/Veh (s)	12.3	0.6	0.5	0.9
Travel Dist (mi)	3.7	130.4	94.4	228.6
Travel Time (hr)	0.3	2.6	1.9	4.7

Total Network Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	2.9
Travel Dist (mi)	818.5
Travel Time (hr)	18.1

Intersection: 15: TH 23 & Tiger Dr

Movement	WB	WB	NB	SB
Directions Served	L	R	R	L
Maximum Queue (ft)	71	70	25	76
Average Queue (ft)	21	22	1	20
95th Queue (ft)	51	49	11	53
Link Distance (ft)	678			
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		300	450	480
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 20: TH 23

Movement	EB	EB	NB
Directions Served	L	R	L
Maximum Queue (ft)	62	40	62
Average Queue (ft)	16	8	13
95th Queue (ft)	45	30	42
Link Distance (ft)	657		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		200	450
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:50	6:50	6:50	6:50	6:50	6:50
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	1064	1095	1051	1022	1039	1055
Vehs Exited	1071	1096	1052	1021	1036	1055
Starting Vehs	17	21	16	15	16	16
Ending Vehs	10	20	15	16	19	15
Travel Distance (mi)	733	766	718	698	720	727
Travel Time (hr)	18.3	19.2	18.0	17.5	18.0	18.2
Total Delay (hr)	1.8	2.0	1.8	1.7	1.8	1.8
Total Stops	80	106	84	78	85	89
Fuel Used (gal)	27.5	28.4	26.4	25.8	26.4	26.9

Interval #0 Information Seeding

Start Time	6:50
End Time	7:00
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	7:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	265	249	255	208	209	238
Vehs Exited	270	254	248	210	215	239
Starting Vehs	17	21	16	15	16	16
Ending Vehs	12	16	23	13	10	14
Travel Distance (mi)	181	178	171	147	141	164
Travel Time (hr)	4.5	4.4	4.3	3.6	3.6	4.1
Total Delay (hr)	0.4	0.4	0.4	0.3	0.3	0.4
Total Stops	11	17	15	20	13	14
Fuel Used (gal)	6.6	6.6	6.1	5.4	5.2	6.0

Interval #2 Information

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	344	347	315	329	339	335
Vehs Exited	336	340	313	319	325	327
Starting Vehs	12	16	23	13	10	14
Ending Vehs	20	23	25	23	24	20
Travel Distance (mi)	236	235	219	224	232	229
Travel Time (hr)	5.9	6.0	5.5	5.6	5.9	5.8
Total Delay (hr)	0.6	0.7	0.6	0.6	0.6	0.6
Total Stops	29	39	33	22	32	31
Fuel Used (gal)	8.8	8.7	8.0	8.2	8.6	8.5

Interval #3 Information

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	226	242	254	244	247	241
Vehs Exited	234	247	264	248	260	251
Starting Vehs	20	23	25	23	24	20
Ending Vehs	12	18	15	19	11	14
Travel Distance (mi)	157	169	174	161	180	168
Travel Time (hr)	3.9	4.2	4.4	4.1	4.4	4.2
Total Delay (hr)	0.4	0.4	0.4	0.4	0.4	0.4
Total Stops	22	15	21	14	21	17
Fuel Used (gal)	6.0	6.2	6.5	6.0	6.6	6.3

Interval #4 Information

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	229	257	227	241	244	238
Vehs Exited	231	255	227	244	236	239
Starting Vehs	12	18	15	19	11	14
Ending Vehs	10	20	15	16	19	15
Travel Distance (mi)	159	183	155	166	166	166
Travel Time (hr)	3.9	4.6	3.8	4.2	4.1	4.1
Total Delay (hr)	0.4	0.5	0.4	0.4	0.4	0.4
Total Stops	18	35	15	22	19	20
Fuel Used (gal)	6.0	6.8	5.7	6.2	6.0	6.1

15: TH 23 & Tiger Dr Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.1	0.1
Total Del/Veh (s)	3.4	3.1	5.5	6.3	5.7
Travel Dist (mi)	2.4	7.1	90.7	146.5	246.9
Travel Time (hr)	0.1	0.3	2.3	3.5	6.2

20: TH 23 & Commencement Blvd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	1.5	0.0	0.9
Total Del/Veh (s)	6.2	4.4	0.9	0.4	0.9
Travel Dist (mi)	0.5	3.4	123.9	95.2	222.9
Travel Time (hr)	0.0	0.2	2.9	2.5	5.6

Total Network Performance

Denied Del/Veh (s)	0.9
Total Del/Veh (s)	5.3
Travel Dist (mi)	727.2
Travel Time (hr)	18.2

Intersection: 15: TH 23 & Tiger Dr

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	ULT	TR	LT	TR
Maximum Queue (ft)	40	60	39	47	72	40
Average Queue (ft)	5	8	8	4	12	3
95th Queue (ft)	27	37	30	24	46	20
Link Distance (ft)	442	693	1302	1302	2070	2070
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 20: TH 23 & Commencement Blvd

Movement	EB	WB
Directions Served	R	R
Maximum Queue (ft)	26	49
Average Queue (ft)	4	16
95th Queue (ft)	18	40
Link Distance (ft)	402	534
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:20	4:20	4:20	4:20	4:20	4:20
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	1123	1083	1098	1061	1068	1088
Vehs Exited	1111	1085	1093	1059	1065	1083
Starting Vehs	13	19	14	19	19	16
Ending Vehs	25	17	19	21	22	19
Travel Distance (mi)	867	847	858	820	831	845
Travel Time (hr)	17.9	17.4	17.5	16.8	17.1	17.3
Total Delay (hr)	1.0	0.9	1.0	0.9	0.9	0.9
Total Stops	192	173	187	180	175	181
Fuel Used (gal)	27.3	26.9	26.6	25.5	26.0	26.5

Interval #0 Information Seeding

Start Time	4:20
End Time	4:30
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	284	255	268	243	238	257
Vehs Exited	281	253	256	246	245	255
Starting Vehs	13	19	14	19	19	16
Ending Vehs	16	21	26	16	12	18
Travel Distance (mi)	216	197	206	190	184	199
Travel Time (hr)	4.4	4.1	4.2	3.9	3.8	4.1
Total Delay (hr)	0.2	0.2	0.2	0.2	0.2	0.2
Total Stops	50	46	46	38	45	44
Fuel Used (gal)	6.9	6.2	6.4	6.0	5.7	6.2

Interval #2 Information

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	320	296	283	300	340	307
Vehs Exited	318	297	291	301	330	308
Starting Vehs	16	21	26	16	12	18
Ending Vehs	18	20	18	15	22	16
Travel Distance (mi)	250	232	221	237	266	241
Travel Time (hr)	5.2	4.8	4.6	4.8	5.4	5.0
Total Delay (hr)	0.3	0.3	0.3	0.2	0.3	0.3
Total Stops	56	41	56	44	55	50
Fuel Used (gal)	7.8	7.5	6.9	7.3	8.4	7.6

Interval #3 Information

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	281	260	274	236	253	262
Vehs Exited	283	263	269	238	252	261
Starting Vehs	18	20	18	15	22	16
Ending Vehs	16	17	23	13	23	17
Travel Distance (mi)	219	209	213	185	195	204
Travel Time (hr)	4.5	4.3	4.3	3.8	4.0	4.2
Total Delay (hr)	0.2	0.2	0.2	0.2	0.2	0.2
Total Stops	46	39	40	43	46	44
Fuel Used (gal)	6.8	6.5	6.6	5.7	6.1	6.3

Interval #4 Information

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	238	272	273	282	237	261
Vehs Exited	229	272	277	274	238	258
Starting Vehs	16	17	23	13	23	17
Ending Vehs	25	17	19	21	22	19
Travel Distance (mi)	181	209	218	208	187	201
Travel Time (hr)	3.7	4.2	4.4	4.4	3.8	4.1
Total Delay (hr)	0.2	0.2	0.2	0.3	0.2	0.2
Total Stops	40	47	45	55	29	41
Fuel Used (gal)	5.8	6.7	6.7	6.6	5.9	6.3

15: TH 23 & Tiger Dr Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.9	0.0	0.4	0.2
Total Del/Veh (s)	10.7	10.6	0.6	0.9	1.4
Travel Dist (mi)	3.5	3.0	115.0	186.1	307.6
Travel Time (hr)	0.3	0.2	2.2	3.7	6.3

20: TH 23 & Commencement Blvd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.3	0.0	0.2
Total Del/Veh (s)	5.0	4.4	0.3	0.6	0.9
Travel Dist (mi)	6.5	1.1	101.6	114.3	223.5
Travel Time (hr)	0.4	0.1	2.0	2.2	4.6

Total Network Performance

Denied Del/Veh (s)	0.4
Total Del/Veh (s)	2.7
Travel Dist (mi)	844.5
Travel Time (hr)	17.3

Intersection: 15: TH 23 & Tiger Dr

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	R	UL	L
Maximum Queue (ft)	64	43	22	30	30
Average Queue (ft)	22	13	3	4	8
95th Queue (ft)	49	35	14	21	23
Link Distance (ft)	426	678			
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			300	450	480
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 20: TH 23 & Commencement Blvd

Movement	EB	WB
Directions Served	R	R
Maximum Queue (ft)	59	30
Average Queue (ft)	26	6
95th Queue (ft)	45	24
Link Distance (ft)	402	534
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:20	4:20	4:20	4:20	4:20	4:20
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	1137	1086	1133	1051	1064	1095
Vehs Exited	1137	1091	1132	1064	1063	1098
Starting Vehs	18	19	20	19	18	19
Ending Vehs	18	14	21	6	19	14
Travel Distance (mi)	877	827	862	814	805	837
Travel Time (hr)	18.1	17.2	17.7	16.6	16.6	17.2
Total Delay (hr)	0.9	0.8	0.8	0.7	0.8	0.8
Total Stops	155	163	150	128	132	146
Fuel Used (gal)	27.8	26.5	27.6	25.9	25.5	26.7

Interval #0 Information Seeding

Start Time	4:20
End Time	4:30
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	277	242	275	251	248	258
Vehs Exited	277	239	281	253	249	260
Starting Vehs	18	19	20	19	18	19
Ending Vehs	18	22	14	17	17	16
Travel Distance (mi)	215	180	211	198	181	197
Travel Time (hr)	4.4	3.7	4.3	4.0	3.8	4.1
Total Delay (hr)	0.2	0.2	0.2	0.2	0.2	0.2
Total Stops	37	33	35	31	35	35
Fuel Used (gal)	6.9	5.8	6.8	6.3	5.9	6.3

Interval #2 Information

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	318	321	306	322	340	321
Vehs Exited	310	323	300	321	339	318
Starting Vehs	18	22	14	17	17	16
Ending Vehs	26	20	20	18	18	21
Travel Distance (mi)	248	241	234	250	258	246
Travel Time (hr)	5.2	5.1	4.9	5.1	5.4	5.1
Total Delay (hr)	0.3	0.3	0.2	0.2	0.3	0.3
Total Stops	48	56	42	41	50	48
Fuel Used (gal)	7.9	7.9	7.6	7.9	8.4	7.9

Interval #3 Information

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	256	258	268	240	245	253
Vehs Exited	267	260	274	241	247	259
Starting Vehs	26	20	20	18	18	21
Ending Vehs	15	18	14	17	16	16
Travel Distance (mi)	201	199	210	185	188	197
Travel Time (hr)	4.1	4.1	4.3	3.8	3.9	4.0
Total Delay (hr)	0.2	0.2	0.2	0.1	0.2	0.2
Total Stops	31	44	34	30	25	33
Fuel Used (gal)	6.3	6.4	6.7	5.9	5.8	6.2

Interval #4 Information

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	286	265	284	238	231	260
Vehs Exited	283	269	277	249	228	259
Starting Vehs	15	18	14	17	16	16
Ending Vehs	18	14	21	6	19	14
Travel Distance (mi)	212	207	208	181	177	197
Travel Time (hr)	4.4	4.3	4.3	3.7	3.6	4.1
Total Delay (hr)	0.2	0.2	0.2	0.2	0.1	0.2
Total Stops	39	30	39	26	22	31
Fuel Used (gal)	6.8	6.5	6.6	5.8	5.5	6.2

1: TH 23 Performance by approach

Approach	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.2	0.8	0.5
Travel Dist (mi)	39.9	82.6	122.5
Travel Time (hr)	0.8	1.7	2.5

4: TH 23 Performance by approach

Approach	NB	SB	All
Denied Del/Veh (s)	0.0	0.1	0.1
Total Del/Veh (s)	0.6	0.4	0.5
Travel Dist (mi)	77.4	96.6	174.1
Travel Time (hr)	1.5	1.8	3.4

15: TH 23 & Tiger Dr Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	0.8	0.7	0.4	0.5	0.5
Travel Dist (mi)	3.7	3.0	77.7	83.7	168.1
Travel Time (hr)	0.2	0.1	1.6	1.7	3.6

20: TH 23 & Commencement Blvd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.1	0.3	0.0	0.2
Total Del/Veh (s)	5.3	4.5	0.4	0.2	0.7
Travel Dist (mi)	6.5	1.0	98.7	40.2	146.4
Travel Time (hr)	0.4	0.0	1.9	0.8	3.1

Total Network Performance

Denied Del/Veh (s)	0.2
Total Del/Veh (s)	2.3
Travel Dist (mi)	836.9
Travel Time (hr)	17.2

Intersection: 1: TH 23

Movement	SB
Directions Served	U
Maximum Queue (ft)	46
Average Queue (ft)	11
95th Queue (ft)	34
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: TH 23

Movement	NB
Directions Served	U
Maximum Queue (ft)	30
Average Queue (ft)	8
95th Queue (ft)	27
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 15: TH 23 & Tiger Dr

Movement	NB	SB
Directions Served	L	L
Maximum Queue (ft)	31	32
Average Queue (ft)	4	9
95th Queue (ft)	19	28
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	450	480
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 20: TH 23 & Commencement Blvd

Movement	EB	WB
Directions Served	R	R
Maximum Queue (ft)	68	27
Average Queue (ft)	27	6
95th Queue (ft)	51	22
Link Distance (ft)	402	534
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:20	4:20	4:20	4:20	4:20	4:20
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	1127	1109	1071	1031	1069	1082
Vehs Exited	1122	1102	1063	1038	1073	1079
Starting Vehs	13	12	17	21	18	16
Ending Vehs	18	19	25	14	14	17
Travel Distance (mi)	912	884	845	826	846	862
Travel Time (hr)	18.7	18.5	17.6	17.2	17.6	17.9
Total Delay (hr)	1.0	1.1	1.0	1.0	1.0	1.0
Total Stops	170	185	194	180	188	183
Fuel Used (gal)	28.4	28.0	26.4	25.7	26.9	27.1

Interval #0 Information Seeding

Start Time	4:20
End Time	4:30
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	271	249	205	244	253	244
Vehs Exited	260	237	210	255	252	242
Starting Vehs	13	12	17	21	18	16
Ending Vehs	24	24	12	10	19	16
Travel Distance (mi)	215	188	162	201	196	193
Travel Time (hr)	4.4	4.0	3.3	4.2	4.1	4.0
Total Delay (hr)	0.2	0.2	0.2	0.3	0.2	0.2
Total Stops	43	42	38	44	50	43
Fuel Used (gal)	6.8	6.0	5.1	6.3	6.2	6.1

Interval #2 Information

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	350	328	300	305	355	327
Vehs Exited	350	335	293	298	346	325
Starting Vehs	24	24	12	10	19	16
Ending Vehs	24	17	19	17	28	19
Travel Distance (mi)	282	266	233	233	274	257
Travel Time (hr)	5.8	5.6	4.9	5.0	5.8	5.4
Total Delay (hr)	0.3	0.3	0.3	0.3	0.4	0.3
Total Stops	55	57	55	63	74	62
Fuel Used (gal)	8.7	8.6	7.4	7.3	8.9	8.2

Interval #3 Information

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	246	251	293	245	224	254
Vehs Exited	251	249	280	253	234	253
Starting Vehs	24	17	19	17	28	19
Ending Vehs	19	19	32	9	18	20
Travel Distance (mi)	206	203	228	205	187	206
Travel Time (hr)	4.2	4.2	4.8	4.2	3.8	4.2
Total Delay (hr)	0.2	0.2	0.3	0.2	0.2	0.2
Total Stops	34	37	56	35	29	38
Fuel Used (gal)	6.3	6.2	7.0	6.3	5.9	6.3

Interval #4 Information

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	260	281	273	237	237	257
Vehs Exited	261	281	280	232	241	258
Starting Vehs	19	19	32	9	18	20
Ending Vehs	18	19	25	14	14	17
Travel Distance (mi)	208	227	222	187	189	207
Travel Time (hr)	4.3	4.8	4.5	3.9	3.9	4.3
Total Delay (hr)	0.2	0.3	0.3	0.2	0.2	0.2
Total Stops	38	49	45	38	35	43
Fuel Used (gal)	6.6	7.3	7.0	5.8	5.9	6.5

15: TH 23 & Tiger Dr Performance by approach

Approach	WB	NB	SB	All
Denied Del/Veh (s)	1.9	0.0	0.3	0.2
Total Del/Veh (s)	9.6	0.6	0.9	1.0
Travel Dist (mi)	4.3	123.3	186.4	313.9
Travel Time (hr)	0.3	2.4	3.6	6.3

20: TH 23 Performance by approach

Approach	EB	NB	SB	All
Denied Del/Veh (s)	3.0	0.2	0.0	0.5
Total Del/Veh (s)	6.8	0.4	0.6	1.3
Travel Dist (mi)	16.0	99.5	118.4	233.9
Travel Time (hr)	0.9	1.9	2.3	5.2

Total Network Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	2.7
Travel Dist (mi)	862.4
Travel Time (hr)	17.9

Intersection: 15: TH 23 & Tiger Dr

Movement	WB	WB	SB
Directions Served	L	R	L
Maximum Queue (ft)	38	41	44
Average Queue (ft)	12	9	13
95th Queue (ft)	34	31	36
Link Distance (ft)	678		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		300	480
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 20: TH 23

Movement	EB	EB	NB
Directions Served	L	R	L
Maximum Queue (ft)	59	75	27
Average Queue (ft)	19	28	3
95th Queue (ft)	45	53	17
Link Distance (ft)	657		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		200	450
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:20	4:20	4:20	4:20	4:20	4:20
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	1161	1075	1102	1077	1071	1096
Vehs Exited	1152	1072	1103	1082	1070	1097
Starting Vehs	18	22	18	23	24	19
Ending Vehs	27	25	17	18	25	22
Travel Distance (mi)	905	840	858	849	836	858
Travel Time (hr)	21.6	20.1	20.5	20.2	19.9	20.5
Total Delay (hr)	2.3	2.1	2.2	2.2	2.1	2.2
Total Stops	121	116	117	135	133	124
Fuel Used (gal)	33.9	31.4	32.0	31.6	31.5	32.1

Interval #0 Information Seeding

Start Time	4:20
End Time	4:30
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	274	249	273	261	250	261
Vehs Exited	271	252	265	261	256	261
Starting Vehs	18	22	18	23	24	19
Ending Vehs	21	19	26	23	18	19
Travel Distance (mi)	212	193	209	206	194	203
Travel Time (hr)	5.1	4.6	5.0	4.9	4.6	4.8
Total Delay (hr)	0.6	0.5	0.5	0.5	0.5	0.5
Total Stops	34	30	30	24	33	29
Fuel Used (gal)	8.0	7.3	7.7	7.8	7.3	7.6

Interval #2 Information

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	327	324	292	295	323	313
Vehs Exited	321	317	285	293	320	307
Starting Vehs	21	19	26	23	18	19
Ending Vehs	27	26	33	25	21	26
Travel Distance (mi)	255	254	222	232	252	243
Travel Time (hr)	6.1	6.1	5.3	5.5	6.1	5.8
Total Delay (hr)	0.7	0.7	0.6	0.6	0.7	0.7
Total Stops	32	32	37	36	40	35
Fuel Used (gal)	9.3	9.5	8.3	8.5	9.4	9.0

Interval #3 Information

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	279	235	253	235	254	249
Vehs Exited	289	249	265	237	250	259
Starting Vehs	27	26	33	25	21	26
Ending Vehs	17	12	21	23	25	19
Travel Distance (mi)	220	190	204	188	200	200
Travel Time (hr)	5.2	4.5	4.8	4.5	4.7	4.7
Total Delay (hr)	0.5	0.5	0.5	0.5	0.5	0.5
Total Stops	30	23	19	43	32	30
Fuel Used (gal)	8.3	7.2	7.6	7.0	7.6	7.5

Interval #4 Information

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	281	267	284	286	244	272
Vehs Exited	271	254	288	291	244	271
Starting Vehs	17	12	21	23	25	19
Ending Vehs	27	25	17	18	25	22
Travel Distance (mi)	219	204	224	223	190	212
Travel Time (hr)	5.2	4.9	5.4	5.3	4.5	5.1
Total Delay (hr)	0.5	0.5	0.6	0.6	0.5	0.5
Total Stops	25	31	31	32	28	29
Fuel Used (gal)	8.3	7.5	8.3	8.3	7.2	7.9

15: TH 23 & Tiger Dr Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.1	0.1
Total Del/Veh (s)	3.4	3.5	6.5	7.0	6.5
Travel Dist (mi)	4.5	2.9	112.0	187.3	306.6
Travel Time (hr)	0.2	0.1	2.9	4.5	7.7

20: TH 23 & Commencement Blvd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.3	0.0	0.2
Total Del/Veh (s)	5.0	4.4	0.3	0.4	0.8
Travel Dist (mi)	5.9	0.9	102.3	119.7	228.7
Travel Time (hr)	0.3	0.0	2.0	3.1	5.5

Total Network Performance

Denied Del/Veh (s)	0.2
Total Del/Veh (s)	6.8
Travel Dist (mi)	857.6
Travel Time (hr)	20.5

Intersection: 15: TH 23 & Tiger Dr

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	LT	TR	LT	TR
Maximum Queue (ft)	56	31	35	45	47	29
Average Queue (ft)	11	4	8	5	6	1
95th Queue (ft)	38	20	29	25	28	13
Link Distance (ft)	442	693	1302	1302	2070	2070
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 20: TH 23 & Commencement Blvd

Movement	EB	WB
Directions Served	R	R
Maximum Queue (ft)	60	34
Average Queue (ft)	25	6
95th Queue (ft)	45	25
Link Distance (ft)	402	534
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Attachment H

Benefit-Cost Analysis Workbook and Cost Estimates

TABLE B/C: BENEFIT-COST SUMMARY - LOW COST SCENARIO
Highway 23 and Tiger Dr J Turns - Marshall, MN

SRF PROJECT NUMBER:	9099
PROJECT NAME:	Marshall Area Highway 23 Safety Assessment - Programmed vs. Build
B/C ANALYSIS FIRST YEAR OF BENEFIT:	2020
B/C ANALYSIS FINAL YEAR OF ANALYSIS:	2039

BENEFIT-COST ANALYSIS
SUMMARY RESULTS

PRESENT VALUE OF ITEMIZED BENEFITS (mil. $)	
VMT Savings	$0.00
VHT Savings	$0.00
Accident Reduction Benefits	$0.32
PRESENT VALUE OF TOTAL BENEFITS (mil. $)	$0.32

PRESENT VALUE OF ITEMIZED COSTS (mil. $)	
Capital Cost Differential	$0.99
Maintenance Cost Differential	$0.04
Remaining Capital Value Differential [(a)]	$0.20
PRESENT VALUE OF TOTAL COSTS (mil. $)	$0.82

Net Cost of Project (mil. $)	$0.82
Present Value of Benefits (mil. $)	$0.32
Net Present Value (mil. $)	-$0.50
BENEFIT/COST RATIO:	0.39

NOTES:
(a) Remaining capital value was considered a reduction of cost in this analysis and was subtracted from construction and maintenance costs to obtain a net cost.

TABLE D4: SAFETY DATA AND PARAMETERS
Highway 23 and Tiger Dr J Turns - Marshall, MN

CRASH DATA

Crash Analysis (a)		2016		2035		Crash Values ($ per crash) (b)
		Existing	Build	No Build	Build	
Intersection ADT		8,900	8,900	10,825	10,825	
Build Crash Reduction			50%		50%	
Crash Severity (5 year data)	Fatal	0	0	0	0	$ 10,600,000
	A	0	0	0	0	$ 570,000
	B	0	0	0	0	$ 170,000
	C	2	1	2	1	$ 83,000
	PDO	1	1	1	1	$ 7,600

2016	0.6	$	34,720	0.3	$ 17,360
2035	0.7	$	42,230	0.4	$ 21,115

CRASH CALCULATIONS

		No Build		Build		Benefit	Present Value of Savings ($)
		Annual Forecast Number of Crashes	Estimated Cost	Annual Forecast Number of Crashes	Estimated Cost		
Prelim	2016	0.6	$ 34,720	0.3	$ 17,360	$ 17,360	$ 17,360
	2017	0.6	$ 35,115	0.3	$ 17,558	$ 17,558	$ 17,264
	2018	0.6	$ 35,510	0.3	$ 17,755	$ 17,755	$ 17,167
	2019	0.6	$ 35,906	0.3	$ 17,953	$ 17,953	$ 17,068
Analysis Range	2020	0.6	$ 36,301	0.3	$ 18,150	$ 18,150	$ 16,967
	2021	0.6	$ 36,696	0.3	$ 18,348	$ 18,348	$ 16,865
	2022	0.6	$ 37,091	0.3	$ 18,546	$ 18,546	$ 16,762
	2023	0.6	$ 37,487	0.3	$ 18,743	$ 18,743	$ 16,657
	2024	0.7	$ 37,882	0.3	$ 18,941	$ 18,941	$ 16,551
	2025	0.7	$ 38,277	0.3	$ 19,139	$ 19,139	$ 16,445
	2026	0.7	$ 38,672	0.3	$ 19,336	$ 19,336	$ 16,337
	2027	0.7	$ 39,068	0.3	$ 19,534	$ 19,534	$ 16,228
	2028	0.7	$ 39,463	0.3	$ 19,731	$ 19,731	$ 16,118
	2029	0.7	$ 39,858	0.3	$ 19,929	$ 19,929	$ 16,007
	2030	0.7	$ 40,253	0.3	$ 20,127	$ 20,127	$ 15,896
	2031	0.7	$ 40,649	0.4	$ 20,324	$ 20,324	$ 15,783
	2032	0.7	$ 41,044	0.4	$ 20,522	$ 20,522	$ 15,671
	2033	0.7	$ 41,439	0.4	$ 20,720	$ 20,720	$ 15,557
	2034	0.7	$ 41,834	0.4	$ 20,917	$ 20,917	$ 15,443
	2035	0.7	$ 42,230	0.4	$ 21,115	$ 21,115	$ 15,328
	2036	0.7	$ 42,625	0.4	$ 21,312	$ 21,312	$ 15,213
	2037	0.7	$ 43,020	0.4	$ 21,510	$ 21,510	$ 15,097
	2038	0.8	$ 43,415	0.4	$ 21,708	$ 21,708	$ 14,981
	2039	0.8	$ 43,811	0.4	$ 21,905	$ 21,905	$ 14,865
		Total	$ 801,116		$ 400,558	$ 400,558	$ 318,771

NOTES:

(a) The analysis used a crash rate developed from existing crash data for 5 years of crash data from 2010 to 2014. Data between 2020 and 2039 was interpolated based on ADT growth between Existing 2016 and forecast 2035 volumes. The B/C analysis was derived from these results and is for the twenty year period between 2020 and 2039.

(b) Rates from "Recommended standard values for use in B/C analysis in SFY 2016", Minnesota Department of Transportation, Office of Transportation System Management, July 2015.

TABLE B4: ACCIDENT REDUCTION BENEFITS
Highway 23 and Tiger Dr J Turns - Marshall, MN

	Year	ANN. EST. CRASH COST TOTAL ($) (b) (c)		Annual Savings Safety User Benefits ($)	Present Value of Savings ($) (d)
		No Build	Build		
2020	**1**	**$36,301**	**$18,150**	**$18,150**	**$16,967**
2021	2	$36,696	$18,348	$18,348	$16,865
2022	3	$37,091	$18,546	$18,546	$16,762
2023	4	$37,487	$18,743	$18,743	$16,657
2024	5	$37,882	$18,941	$18,941	$16,551
2025	6	$38,277	$19,139	$19,139	$16,445
2026	7	$38,672	$19,336	$19,336	$16,337
2027	8	$39,068	$19,534	$19,534	$16,228
2028	9	$39,463	$19,731	$19,731	$16,118
2029	10	$39,858	$19,929	$19,929	$16,007
2030	11	$40,253	$20,127	$20,127	$15,896
2031	12	$40,649	$20,324	$20,324	$15,783
2032	13	$41,044	$20,522	$20,522	$15,671
2033	14	$41,439	$20,720	$20,720	$15,557
2034	15	$41,834	$20,917	$20,917	$15,443
2035	16	$42,230	$21,115	$21,115	$15,328
2036	17	$42,625	$21,312	$21,312	$15,213
2037	18	$43,020	$21,510	$21,510	$15,097
2038	19	$43,415	$21,708	$21,708	$14,981
2039	20	$43,811	$21,905	$21,905	$14,865

Total Benefits During Project Life (2020 - 2039)	**$318,771**

NOTES:

(a) *Based on projected daily VMT values found in Table D1.*

(b) *Metro District crash data for each facility type was gathered from MnDOT Toolkit for the five year period from 2010-2014. This data was used to find a crash rate by severity per million vehicle miles traveled. These were then used to estimate crash costs for 2016 and 2035. Data between 2016 and 2039 was interpolated based on a linear growth rate. The B/C analysis was derived from these results and is for the twenty year period between 2020 and 2039.*

(c) *Based on the crash data shown in Table D4, split by No Build vs Build*

(d) *Present value of savings during the benefit-cost analysis period in terms of 2016 dollars.*

TH 23 & Tiger Drive J-Turn, City of Marshall
Concept Cost Estimate (based upon 2015 bid price information)
Prepared By: Isthmus Engineering, Inc., July 2016

					TH 23		TIGER DRIVE WEST OF TH 23		TIGER DRIVE EAST OF TH 23		TOTAL	
ITEM DESCRIPTION		UNIT	UNIT PRICE		EST. QUANTITY	EST. AMOUNT	EST. QUANTITY	EST. AMOUNT	EST. QUANTITY	EST. AMOUNT	EST. QUANTITY	EST. AMOUNT
PAVING AND GRADING COSTS												
GrP 1	Excavation - common & subgrade	cu. yd.	$7.00		5800	$40,600.00	400	$2,800.00	400	$2,800.00	6600	$46,200.00
GrP 2	Granular Subgrade (CV)	cu. yd.	$16.00		4600	$73,600.00	200	$3,200.00	200	$3,200.00	5000	$80,000.00
GrP 3	Concrete Mainline/Turn Lane Pavement	sq. yd.	$40.00		3359	$134,360.00					3359	$134,360.00
GrP 4	Concrete Shoulder Pavement	sq. yd.	$40.00		120	$4,800.00					120	$4,800.00
GrP 5	County/Local Road Bituminous Pavement	ton	$70.00				124	$8,680.00	123	$8,610.00	247	$17,290.00
GrP 7	Aggregate Base (CV)	cu. yd.	$25.00		640	$16,000.00	80	$2,000.00	76	$1,900.00	796	$19,900.00
GrP 8	Concrete Curb and Gutter	lin. ft.	$18.00		445	$8,010.00	130	$2,340.00	126	$2,268.00	701	$12,618.00
GrP 9	Concrete Median	sq. ft.	$6.00		4391	$26,346.00	541	$3,246.00	423	$2,538.00	5355	$32,130.00
GrP 10	Removals - Concrete Pavement	sq. yd.	$9.00		1560	$14,040.00					1560	$14,040.00
GrP 11	Removals - Bituminous Pavment	sq. yd.	$3.50				308	$1,078.00	330	$1,155.00	638	$2,233.00
GrP 12	Removals - Bituminous Shoulder Pavement	sq. yd.	$2.50		926	$2,315.00	0	$0.00			926	$2,315.00
SUBTOTAL PAVING AND GRADING COSTS:						**$320,071.00**		**$23,344.00**		**$22,471.00**		**$365,886.00**
DRAINAGE AND EROSION CONTROL												
Dr 1	Drainage - rural	mile	$110,000.00		0.32	$35,200.00	0.02	$2,200.00	0.02	$2,200	0.36	$39,600.00
Dr 2	Turf Establishment & Erosion Control	10%				$32,000.00		$2,000.00		$2,000		$36,000.00
Dr 3	Landscaping	2%				$6,000.00		$0.00		$0		$6,000.00
SUBTOTAL DRAINAGE AND EROSION CONTROL:						**$73,200.00**		**$4,200.00**		**$4,200**		**$81,600.00**
LIGHTING COSTS												
Lt 1	Lighting	each	$8,000.00		8	$64,000.00	1	$8,000.00	1	$8,000.00	10	$80,000.00
SUBTOTAL LIGHTING COSTS:						**$64,000.00**		**$8,000.00**		**$8,000.00**		**$80,000.00**
SIGNING & STRIPING COSTS												
Sgn 1	Signs (C&D)	each	$250.00		42	$10,500.00	20	$5,000.00	20	$5,000	82	$20,500
Sgn 2	Striping	lin. Ft.	$1.00		3568	$3,568.00	689	$689.00	792	$792	5049	$5,049
SUBTOTAL SIGNING & STRIPING COSTS:						**$14,068.00**		**$5,689.00**		**$5,792**		**$25,549**
SUBTOTAL CONSTRUCTION COSTS:						**$471,339.00**		**$41,233.00**		**$40,463.00**		**$553,035.00**
MISCELLANEOUS COSTS												
M 1	Mobilization	5%				$24,000.00		$2,000.00		$2,000.00		$28,000.00
M 2	Non Quantified Minor Items (10% to 30%)	20%				$94,000.00		$8,000.00		$8,000.00		$110,000.00
M 3	Temporary Pavement and Drainage	5%				$24,000.00		$2,000.00		$2,000.00		$28,000.00
M 4	Traffic Control	3%				$14,000.00		$1,000.00		$1,000.00		$16,000.00
SUBTOTAL MISCELLANEOUS COSTS:						**$156,000.00**		**$13,000.00**		**$13,000.00**		**$182,000.00**
ESTIMATED TOTAL CONSTRUCTION COSTS without Contingency:						**$627,339.00**		**$54,233.00**		**$53,463.00**		**$735,035.00**
1	Contingency or "risk" (10% to 30%)	30%				$188,000.00		$16,000.00		$16,000.00		$220,000.00
ESTIMATED TOTAL CONSTRUCTION COSTS PLUS CONTINGENCY:						**$815,339.00**		**$70,233.00**		**$69,463.00**		**$955,035.00**

OTHER PROJECT COSTS										
R/W ACQUISITIONS	Lump Sum									
DESIGN ENG. & CONSTRUCTION ADMIN.	Lump Sum	15%		$71,000.00		$6,000.00		$6,000.00		$83,000.00
SUBTOTAL OTHER PROJECT COSTS				**$71,000.00**		**$6,000.00**		**$6,000.00**		**$83,000.00**
TOTAL PROJECT COST (based upon 2015 bid price information)				**$886,339.00**		**$76,233.00**		**$75,463.00**		**$1,038,035.00**

INFLATION COST (CURRENT YR. TO YR. OF OPENING)	Years	3%		$0.00		$0.00		$0.00		$0.00
TOTAL PROJECT COST (OPENING YEAR DOLLARS)				**$886,339.00**		**$76,233.00**		**$75,463.00**		**$1,038,035.00**

TABLE B/C: BENEFIT-COST SUMMARY - LOW COST SCENARIO
Highway 23 and Tiger Dr RAB - Marshall, MN

SRF PROJECT NUMBER:	9099
PROJECT NAME:	Marshall Area Highway 23 Safety Assessment - Programmed vs. Build
B/C ANALYSIS FIRST YEAR OF BENEFIT:	2020
B/C ANALYSIS FINAL YEAR OF ANALYSIS:	2039

BENEFIT-COST ANALYSIS
SUMMARY RESULTS

PRESENT VALUE OF ITEMIZED BENEFITS (mil. $)	
VMT Savings	$0.00
VHT Savings	$0.00
Accident Reduction Benefits	$0.32
PRESENT VALUE OF TOTAL BENEFITS (mil. $)	$0.32

PRESENT VALUE OF ITEMIZED COSTS (mil. $)	
Capital Cost Differential	$1.45
Maintenance Cost Differential	-$0.14
Remaining Capital Value Differential [(a)]	$0.33
PRESENT VALUE OF TOTAL COSTS (mil. $)	$0.98

Net Cost of Project (mil. $)	$0.98
Present Value of Benefits (mil. $)	$0.32
Net Present Value (mil. $)	-$0.66
BENEFIT/COST RATIO:	0.32

NOTES:
(a) Remaining capital value was considered a reduction of cost in this analysis and was subtracted from construction and maintenance costs to obtain a net cost.

TABLE D4: SAFETY DATA AND PARAMETERS
Highway 23 and Tiger Dr RAB - Marshall, MN

CRASH DATA

Crash Analysis (a)		2016		2035		Crash Values ($ per crash) (b)
		Existing	Build	No Build	Build	
Intersection ADT		8,900	8,900	10,825	10,825	
Build Crash Reduction			50%		50%	
Crash Severity (5 year data)	Fatal	0	0	0	0	$ 10,600,000
	A	0	0	0	0	$ 570,000
	B	0	0	0	0	$ 170,000
	C	2	1	2	1	$ 83,000
	PDO	1	1	1	1	$ 7,600

2016	0.6	$	34,720	0.3	$ 17,360
2035	0.7	$	42,230	0.4	$ 21,115

CRASH CALCULATIONS

		No Build		Build		Benefit	Present Value of Savings ($)
		Annual Forecast Number of Crashes	Estimated Cost	Annual Forecast Number of Crashes	Estimated Cost		
Prelim	2016	0.6	$ 34,720	0.3	$ 17,360	$ 17,360	$ 17,360
	2017	0.6	$ 35,115	0.3	$ 17,558	$ 17,558	$ 17,264
	2018	0.6	$ 35,510	0.3	$ 17,755	$ 17,755	$ 17,167
	2019	0.6	$ 35,906	0.3	$ 17,953	$ 17,953	$ 17,068
Analysis Range	2020	0.6	$ 36,301	0.3	$ 18,150	$ 18,150	$ 16,967
	2021	0.6	$ 36,696	0.3	$ 18,348	$ 18,348	$ 16,865
	2022	0.6	$ 37,091	0.3	$ 18,546	$ 18,546	$ 16,762
	2023	0.6	$ 37,487	0.3	$ 18,743	$ 18,743	$ 16,657
	2024	0.7	$ 37,882	0.3	$ 18,941	$ 18,941	$ 16,551
	2025	0.7	$ 38,277	0.3	$ 19,139	$ 19,139	$ 16,445
	2026	0.7	$ 38,672	0.3	$ 19,336	$ 19,336	$ 16,337
	2027	0.7	$ 39,068	0.3	$ 19,534	$ 19,534	$ 16,228
	2028	0.7	$ 39,463	0.3	$ 19,731	$ 19,731	$ 16,118
	2029	0.7	$ 39,858	0.3	$ 19,929	$ 19,929	$ 16,007
	2030	0.7	$ 40,253	0.3	$ 20,127	$ 20,127	$ 15,896
	2031	0.7	$ 40,649	0.4	$ 20,324	$ 20,324	$ 15,783
	2032	0.7	$ 41,044	0.4	$ 20,522	$ 20,522	$ 15,671
	2033	0.7	$ 41,439	0.4	$ 20,720	$ 20,720	$ 15,557
	2034	0.7	$ 41,834	0.4	$ 20,917	$ 20,917	$ 15,443
	2035	0.7	$ 42,230	0.4	$ 21,115	$ 21,115	$ 15,328
	2036	0.7	$ 42,625	0.4	$ 21,312	$ 21,312	$ 15,213
	2037	0.7	$ 43,020	0.4	$ 21,510	$ 21,510	$ 15,097
	2038	0.8	$ 43,415	0.4	$ 21,708	$ 21,708	$ 14,981
	2039	0.8	$ 43,811	0.4	$ 21,905	$ 21,905	$ 14,865
		Total	$ 801,116		$ 400,558	$ 400,558	$ 318,771

NOTES:

(a) The analysis used a crash rate developed from existing crash data for 5 years of crash data from 2010 to 2014. Data between 2020 and 2039 was interpolated based on ADT growth between Existing 2016 and forecast 2035 volumes. The B/C analysis was derived from these results and is for the twenty year period between 2020 and 2039.

(b) Rates from "Recommended standard values for use in B/C analysis in SFY 2016", Minnesota Department of Transportation, Office of Transportation System Management, July 2015.

TABLE B4: ACCIDENT REDUCTION BENEFITS
Highway 23 and Tiger Dr RAB - Marshall, MN

	Year	ANN. EST. CRASH COST TOTAL ($) (b) (c)		Annual Savings Safety User Benefits ($)	Present Value of Savings ($) (d)
		No Build	Build		
2020	**1**	**$36,301**	**$18,150**	**$18,150**	**$16,967**
2021	2	$36,696	$18,348	$18,348	$16,865
2022	3	$37,091	$18,546	$18,546	$16,762
2023	4	$37,487	$18,743	$18,743	$16,657
2024	5	$37,882	$18,941	$18,941	$16,551
2025	6	$38,277	$19,139	$19,139	$16,445
2026	7	$38,672	$19,336	$19,336	$16,337
2027	8	$39,068	$19,534	$19,534	$16,228
2028	9	$39,463	$19,731	$19,731	$16,118
2029	10	$39,858	$19,929	$19,929	$16,007
2030	11	$40,253	$20,127	$20,127	$15,896
2031	12	$40,649	$20,324	$20,324	$15,783
2032	13	$41,044	$20,522	$20,522	$15,671
2033	14	$41,439	$20,720	$20,720	$15,557
2034	15	$41,834	$20,917	$20,917	$15,443
2035	16	$42,230	$21,115	$21,115	$15,328
2036	17	$42,625	$21,312	$21,312	$15,213
2037	18	$43,020	$21,510	$21,510	$15,097
2038	19	$43,415	$21,708	$21,708	$14,981
2039	20	$43,811	$21,905	$21,905	$14,865

Total Benefits During Project Life (2020 - 2039)	**$318,771**

NOTES:

(a) *Based on projected daily VMT values found in Table D1.*

(b) *Metro District crash data for each facility type was gathered from MnDOT Toolkit for the five year period from 2010-2014. This data was used to find a crash rate by severity per million vehicle miles traveled. These were then used to estimate crash costs for 2016 and 2035. Data between 2016 and 2039 was interpolated based on a linear growth rate. The B/C analysis was derived from these results and is for the twenty year period between 2020 and 2039.*

(c) *Based on the crash data shown in Table D4, split by No Build vs Build*

(d) *Present value of savings during the benefit-cost analysis period in terms of 2016 dollars.*

TH 23 & Tiger Drive Roundabout, City of Marshall
Concept Cost Estimate (based upon 2015 bid price information)
Prepared By: Isthmus Engineering, Inc., July 2016

					TH 23		TIGER DRIVE WEST OF TH 23		TIGER DRIVE EAST OF TH 23		TOTAL	
ITEM DESCRIPTION			UNIT	UNIT PRICE	EST. QUANTITY	EST. AMOUNT	EST. QUANTITY	EST. AMOUNT	EST. QUANTITY	EST. AMOUNT	EST. QUANTITY	EST. AMOUNT
PAVING AND GRADING COSTS												
GrP 1	Excavation - common & subgrade		cu. yd.	$7.00	6500	$45,500.00	500	$3,500.00			7000	$49,000.00
GrP 2	Granular Subgrade (CV)		cu. yd.	$16.00	5200	$83,200.00	300	$4,800.00			5500	$88,000.00
GrP 3	Concrete Mainline/Turn Lane Pavement		sq. yd.	$40.00	3883	$155,320.00					3883	$155,320.00
GrP 6	County/Local Road Bituminous Pavement		ton	$70.00			164	$11,480.00	148	$10,360.00	312	$21,840.00
GrP 8	Aggregate Base (CV)		cu. yd.	$25.00	754	$18,850.00	120	$3,000.00	100	$2,500.00	974	$24,350.00
GrP 9	Concrete Curb and Gutter		lin. ft.	$18.00	2710	$48,780.00	658	$11,844.00	523	$9,414.00	3891	$70,038.00
GrP 10	Concrete Median		sq. ft.	$6.00	5026	$30,156.00	1306	$7,836.00	876	$5,256.00	7208	$43,248.00
GrP 11	Truck Apron		sq. ft.	$9.00	2938	$26,442.00					2938	$26,442.00
GrP 12	Removals - Concrete Pavement		sq. yd.	$9.00	5179	$46,611.00					5179	$46,611.00
GrP 13	Removals - Bituminous Pavment		sq. yd.	$3.50	1361	$4,763.50	802	$2,807.00	691	$2,418.50	2854	$9,989.00
GrP 14	Removals - Bituminous Shoulder Pavement		sq. yd.	$2.50	200	$500.00					200	$500.00
SUBTOTAL PAVING AND GRADING COSTS:						**$460,122.50**		**$45,267.00**		**$29,948.50**		**$535,338.00**
DRAINAGE AND EROSION CONTROL												
Dr 1	Drainage - urban		25%			$115,000.00		$11,000.00		$7,490.00		$133,490.00
Dr 2	Turf Establishment & Erosion Control		12%			$55,000.00		$5,000.00		$3,590.00		$63,590.00
Dr 3	Landscaping		5%			$23,000.00		$2,000.00		$1,500.00		$26,500.00
SUBTOTAL DRAINAGE AND EROSION CONTROL:						**$193,000.00**		**$18,000.00**		**$12,580.00**		**$223,580.00**
LIGHTING COSTS												
Lt 1	Lighting		each	$8,000.00	2	$16,000.00	1	$8,000.00	1	$8,000.00	4	$32,000.00
SUBTOTAL LIGHTING COSTS:						**$16,000.00**		**$8,000.00**		**$8,000.00**		**$32,000.00**
SIGNING & STRIPING COSTS												
Sgn 1	Signs (C&D)		each	$250.00	30	$7,500.00	10	$2,500.00	10	$2,500.00	50	$12,500.00
Sgn 2	Striping		lin. ft.	$1.00	5452	$5,452.00	688	$688.00	852	$852.00	6992	$6,992.00
SUBTOTAL SIGNING & STRIPING COSTS:						**$12,952.00**		**$3,188.00**		**$3,352.00**		**$19,492.00**
SUBTOTAL CONSTRUCTION COSTS:						**$682,074.50**		**$74,455.00**		**$53,880.50**		**$810,410.00**
MISCELLANEOUS COSTS												
M 1	Mobilization		5%			$34,000.00		$4,000.00		$2,700.00		$40,700.00
M 2	Non Quantified Minor Items (10% to 30%)		20%			$136,000.00		$15,000.00		$10,800.00		$161,800.00
M 3	Temporary Pavement and Drainage		5%			$34,000.00		$4,000.00		$2,700.00		$40,700.00
M 4	Traffic Control		3%			$20,000.00		$2,000.00		$1,620.00		$23,620.00
SUBTOTAL MISCELLANEOUS COSTS:						**$224,000.00**		**$25,000.00**		**$17,820.00**		**$266,820.00**
ESTIMATED TOTAL CONSTRUCTION COSTS without Contingency:						**$906,074.50**		**$99,455.00**		**$71,700.50**		**$1,077,230.00**
1	Contingency or "risk" (10% to 30%)		30%			$272,000.00		$30,000.00		$21,500.00		$323,500.00
ESTIMATED TOTAL CONSTRUCTION COSTS PLUS CONTINGENCY:						**$1,178,074.50**		**$129,455.00**		**$93,200.50**		**$1,400,730.00**

OTHER PROJECT COSTS												
R/W ACQUISITIONS			Lump Sum									
DESIGN ENG. & CONSTRUCTION ADMIN.			Lump Sum	15%		$102,000.00		$11,000.00		$8,100.00		$121,100.00
SUBTOTAL OTHER PROJECT COSTS						**$102,000.00**		**$11,000.00**		**$8,100.00**		**$121,100.00**
TOTAL PROJECT COST (based upon 2015 bid price information)						**$1,280,074.50**		**$140,455.00**		**$101,300.50**		**$1,521,830.00**

INFLATION COST (CURRENT YR. TO YR. OF OPENING)			Years	3%		$0.00		$0.00		$0.00		$0.00
TOTAL PROJECT COST (OPENING YEAR DOLLARS)						**$1,280,074.50**		**$140,455.00**		**$101,300.50**		**$1,521,830.00**