



## Memorandum

To: Bob Doyle - SGJJR

From: Chris Wall – Wade Trim

Date: 5/16/2018

Subject: Huron Traffic Study Analysis Summary

### Overview

As part of the Huron Street Improvement project, the Downtown Development Authority (DDA) authorized traffic analyses to review options and provide critical input to design team and DDA decision-making. Numerous options were investigated and studied and weighed against the project goals, schedule, and budget, as well as discussed with City and Michigan Department of Transportation (MDOT) staff. The option that best aligned with such criteria maintained and enhanced the current five-lane cross-section and included the following modifications:

- 1) Permissive/Protected left turn phasing for the westbound left turn at Huron and Fifth Street intersection.
- 2) Restrict right turns on red for intersections along Huron.
- 3) Replace 3<sup>rd</sup>/Chapin and Huron HAWK pedestrian signal with standard signal.
- 4) Huron Street non-rush hour parking

These proposed amendments to the traffic function of the street are part of a larger effort to improve the corridor for pedestrian comfort and safety, enable vehicular and pedestrian connectivity in downtown Ann Arbor, and replace the aging streetscape, while recognizing and protecting the important role of the street in moving vehicles through and into downtown.

The proposed amendments to the traffic function of the street are part of a larger effort to improve safety for all users, prioritize pedestrian comfort, enable vehicular and pedestrian connectivity in downtown Ann Arbor, and replace the aging streetscape. The recommendations also recognize that as an MDOT corridor, Huron functions to move large volumes of vehicles through and into downtown. Any recommendations must acknowledge MDOT standards and design guidelines in order to gain approval and make significant progress toward making Huron a people-friendly street.

The proposed changes, coupled with streetscape improvements, are considered a first step in an iterative process to transition Huron Street toward a multifunctional street that honors and supports a higher degree of pedestrian, transit, and non-motorized forms of travel.

The DDA and City Transportation Commission have passed resolutions supporting the identified transportation enhancements on Huron Street. **Exhibit 6** contains copies of these resolutions. It is anticipated that the Ann Arbor City Council will enact a similar resolution soon.

This memorandum briefly summarizes the analysis and references specific documents for each of the above enhancements.

## Project Background

The City of Ann Arbor and the DDA have adopted a series of policies that reflect the values of the community and guide the development and improvement of public infrastructure in the community. Translating these values and policies into each built project through evidence-based assessments and thoughtful engineering can, at times, result in friction between the goals of the community and standard engineering practices. The planning and engineering process established for the Huron Street project seeks to implement the most appropriate set of solutions and positively resolve these differences while creating a safer corridor for all users.

The following policies and guidelines provide a framework for the Huron Street project that reflects specific community values.

### DDA Mission Statement

The mission of the Ann Arbor Downtown Development Authority (DDA) is to undertake public improvements that have the greatest impact in strengthening the downtown area and attracting new private investments. This mission is reflected in the efforts to make downtown streets people-friendly – streets that are safe and comfortable for all users, strengthen adjacent businesses, and encourage access and connectivity for all modes.

### Ann Arbor Sustainability Framework

This document combines goals from over 20 city-wide planning documents and is a central part of the city's master plan. The document is a reflection of community values, including-

- Economic vitality
- Energy conservation
- Safe community
- Active living
- Transportation options
- Integrated land use
- Clean air & water
- Responsible resource use

Each of these values is inherent in creating a pedestrian focused set of improvements for Huron that sufficiently manages current traffic demands and remains flexible for anticipated changes in mobility.

### Ann Arbor Downtown Street Design Manual

The vision for the Downtown Street Design Manual is to guide street design to deliver a network of downtown streets that:

- Acknowledges the unique land uses alongside each street. Streets are places.
- Supports desired land uses and activities throughout the downtown.
- Recognizes that not all streets can support all modes of travel equally.
- Emphasizes (or mixes) modes of travel to create safe and comfortable means of moving throughout the downtown for all users.

Although managed by MDOT, Huron Street also plays a role in the transportation network of downtown Ann Arbor, and recommendations for the street are incorporated into the Downtown Street Design Manual. The Downtown Street Design Manual assessed each street in downtown as to its role in the movement of people and support of public activity and commerce, considering:

- The land use and development context of each street
- The function each street should fill in the overall street network

Each public street must serve a broad spectrum of users, but within the transportation network a given street will have a specific role and function. For Huron Street, the Downtown Street Design Manual concluded that Huron Street should have a functional emphasis on serving vehicles, in recognition of its larger role within the city and to protect other pedestrian focused streets from undue impact related to high vehicular volumes.

### **Ann Arbor Complete Streets / Vision Zero Policy**

The City of Ann Arbor adopted a Complete Street policy in March of 2011 and confirmed their commitment to the policy in November of 2013 by establishing a Pedestrian Safety and Access Task Force. In October of 2015 the City accepted the recommendations of the Task Force, which included an affirmation of the “Vision Zero Goal of zero traffic fatalities by the year 2025. The overall objectives promoted by the Task Force include the following:

- Improve Pedestrian Access and Encourage Use
- Improve the Physical Conditions of the Roadway and Pedestrian Environment to Reflect Best Practices for Pedestrian Safety
- Address the Safety and Access for All Users

## **Enhancement Review**

### **Permissive/Protected Left Turn Phasing**

Using MDOT guidelines, it was found that a permissive/protected left turn phase for the westbound left turn at Huron and Fifth Street intersection was advisable. Therefore, this modification was added as an enhancement and modeled. See **Exhibit 1** for the detailed review of this enhancement.

### **Restricted Right Turns On Red**

Both City and MDOT No Turn on Red (NTOR) guidelines were reviewed for key intersections along Huron. It was found that sight distance from Huron Street and the cross streets could cause some right turning vehicles to move forward past the stop bar and into the crosswalk to turn right on red. Off-peak parking on Huron could further enhance the need for applying NTOR restrictions. Therefore, this modification was added as an enhancement and modeled. See **Exhibit 2** for the detailed review of this enhancement. In working through design improvements with the City and MDOT, it is suggested that each intersection be reviewed to see if such application of NTOR should be applied given sight distance concerns with vehicles and/or pedestrians, and with respect to driver expectations.

### **HAWK Replacement at 3<sup>rd</sup>/Chapin and Huron Intersection**

Due to a variety of pedestrian and vehicle safety and operational concerns, a review of signal warrants based on the MMUTCD guidelines was conducted for the 3<sup>rd</sup>/Chapin and Huron intersection. Based on August 2017 pedestrian and vehicle counts, the intersection was reviewed for Warrant 1, 2, 3B, 4, and 7.

Warrants 1, 2, 3B, and 4 were not met given existing traffic volumes. Assuming a slight increase (10% & 20%) in minor road traffic volumes occurs given a new signal is installed, the warrants were reviewed again and the Eight-Hour Vehicular Volume Warrant (#1) was met. In review of crash data, warrant 7 could be met given the traffic signal would correct five or more crashes. Based on the crash analysis, it may be possible to alleviate some of the failure to yield and angle crashes due to cross street traffic and HAWK related vehicle maneuvers.

As well, in consultation with the City, it was noted that crashes have been on the rise from 2013 to 2016 and that 2017 dataset has become available. Therefore, additional review of the crash data and a Highway Safety Manual evaluation may generate an outlook of safety expectancy with full signalization. This additional analysis could be performed if deemed necessary.

These findings coupled with numerous observations and concerns of the vehicle maneuvering issues given the existing HAWK installation, demonstrate the need to seriously review this application. See **Exhibit 3** for the detailed review of this enhancement.

This modification was also added as an enhancement and modeled separately. These models are included in the modelling section below and provided in **Exhibit 5**.

### **Huron Street Off-Peak Parking**

Based on DDA goals, public and business input, and from much research and study, the DDA is proposing a parking strategy that creates short term parking spaces and adequate service and drop-off space along the Huron Corridor for use during off-peak hours. This is a street use strategy that pushes the focus back toward a pedestrian orientation, while it preserves the vehicular capacity at peak hour and flexibility to adjust to future demands on the corridor. As there are many issues related to this matter, see **Exhibit 4** for the detailed review of this enhancement. Exhibit 4 also proposes applicable timeframes and context to maintaining and enforcing off-peak parking.

To test the application of off-peak parking on Huron Street, the Off-Peak Synchro models were reduced by one lane in each direction. The 2019 model demonstrated reasonable levels-of-service. See **Exhibit 5** for the traffic analysis review of this enhancement.

## **Modelling Analysis**

Synchro models were created for the Huron corridor for years 2019 and 2030. After much discussion by MDOT, WATS and the design team, a 1.5% annual growth rate in traffic was applied in the models.

There are two scenarios included in the modelling. Each scenario was modeled for the AM peak (7:30 am – 8:30 am), Off peak (12:00 pm – 1:00 pm), and PM peak (5:00 pm – 6:00 pm) hours. The first scenario is the no build option. The existing conditions were modeled for the 2019 build year and 2030 future scenario. There were no modifications to geometrics.

The second scenario is the mitigated option. These models do not allow right turn on red at any of the intersections. A protected left turn phase was added to 5<sup>th</sup> Street at Huron, which already had a dedicated left turn lane. Additionally, the off-peak models were analyzed with and without a parking lane on the outside lanes of Huron Street.

There are a set of models that also include the replacement of the HAWK installation with a new traffic signal system.

For all models, cycle lengths were kept but splits were adjusted within the existing cycle length to optimize. Further optimization would require the overall corridor to be modeled (including adjacent intersections) to determine the optimal cycle length, timing splits, and offsets. Further evaluation of the pedestrian, yellow and all-red clearance intervals can also be adjusted for additional optimization.

See **Exhibit 5** for the traffic analysis review for identified enhancements and scenarios.

## Exhibits

EXHIBIT 1 – HURON STREET (I-94BL) AND 5<sup>TH</sup> AVENUE LEFT-TURN PHASING ANALYSIS

EXHIBIT 2 – HURON STREET (I-94BL) NO TURN ON RED REVIEW

EXHIBIT 3 – HURON STREET (I-94BL) AND 3<sup>RD</sup>/CHAPIN STREET HAWK SIGNAL REVIEW

EXHIBIT 4 – HURON STREET OFF-PEAK PARKING PROPOSAL

EXHIBIT 5 – HURON STREET TRAFFIC STUDY

EXHIBIT 6 – RESOLUTIONS

CEW

ANN2104-02T

## EXHIBIT 1

# TECHNICAL MEMO

**SUBJECT:** Huron Street (I-94BL) and 5th Avenue Left-Turn Phasing Analysis

**DATE:** May 3, 2018

**PROJECT NO.:** 160673

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## Left-Turn Phasing Analysis

A left-turn phase was reviewed at the Huron Street (I-94BL) and 5th Avenue intersection for left turns from WB Huron Street to SB 5th Avenue using MDOT guidelines for traffic volumes during the a.m., midday, and p.m. peak hours.

Based on the existing traffic volumes and future traffic volumes for 2019, the left turn phasing analysis determined that two hours suggest permitted/protected phasing (4–6 p.m.) and zero hours suggest protected only phasing for the left turns.

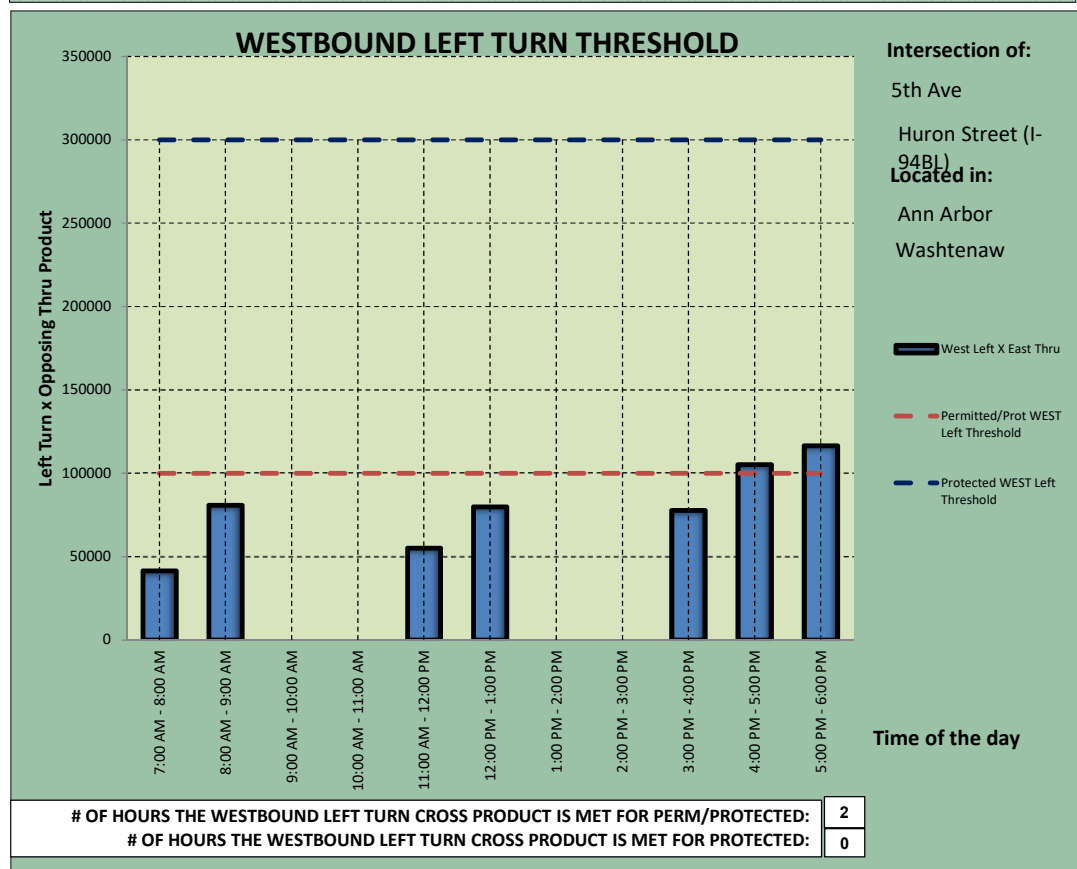
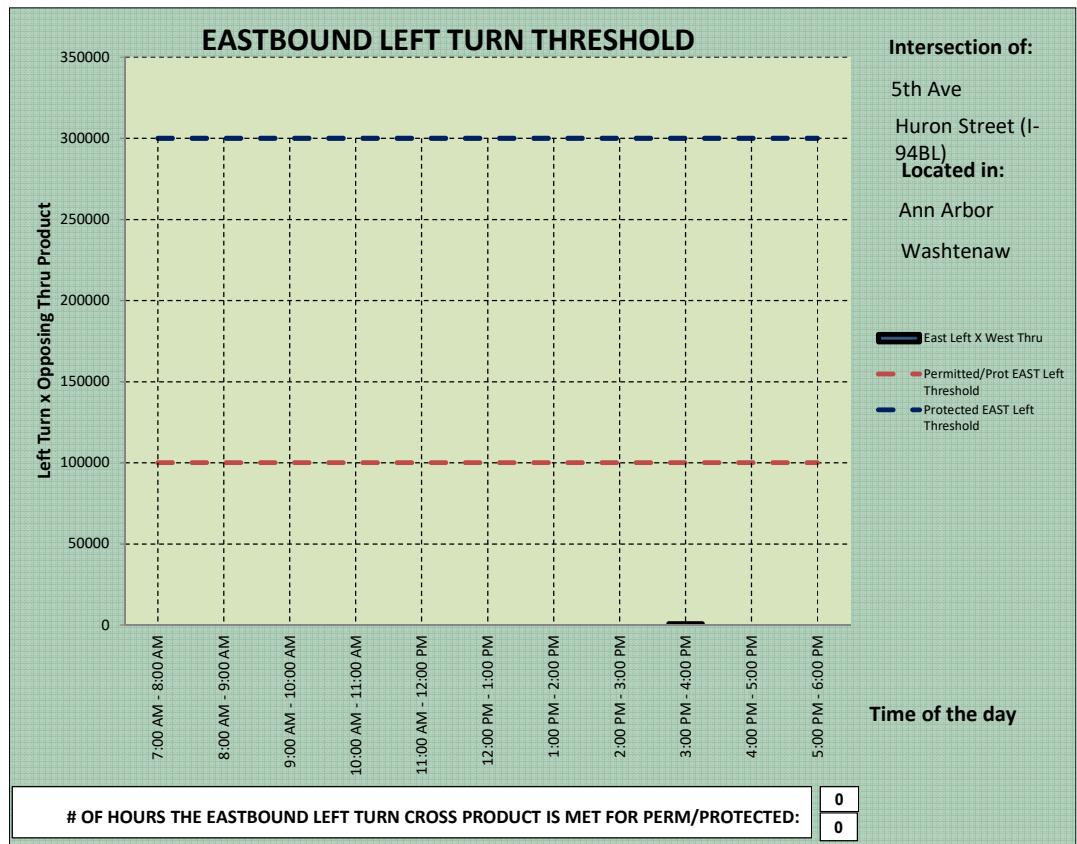
Based on the future traffic volumes for 2030, the left turn phasing analysis determined that five hours suggest permitted/protected phasing (8–9 a.m., 12–1 p.m., 3–6 p.m.) and zero hours suggest protected only phasing for the left turns.

Refer to attached left-turn phasing spreadsheets for more detail.

EASTBOUND AND WESTBOUND LEFT TURN PHASE THRESHOLDS			
Please enter Data in Yellow Boxes ONLY			
CONDITIONS		Items to Consider for Protected Only	Items to Consider for Permissive/Protected
<b>EASTBOUND LEFT TURN GEOMETRY</b>			
No. of Opposing WESTbound Thru Lanes (include combination thru lanes)	2	NO	YES
No. of Opposing WESTbound Right Turn Only Lanes	0	N / A	
What is the Opposing WESTbound speed limit or 85%ile? (mph)	30	NO	N / A
No. of EASTbound Left Turning Lanes	0	NO	N / A
What is the EASTbound sight distance in the field? (ft)	615	NO	YES
Minimum Required Sight Distance (ft)	265		
<b>WESTBOUND LEFT TURN GEOMETRY</b>			
No. of Opposing EASTbound Thru Lanes (include combination thru lanes)	2	NO	YES
No. of Opposing EASTbound Right Turn Only Lanes	0	N / A	
What is the Opposing EASTbound speed limit or 85%ile? (mph)	30	NO	N / A
No. of WESTbound Left Turning Lanes	1	NO	N / A
What is the WESTbound sight distance in the field? (ft)	375	NO	YES
Minimum Required Sight Distance (ft)	265		
<b>TRAFFIC CHARACTERISTICS</b>			
EASTbound Left Turn Vol (vph)	1	NO	
WESTbound Left Turn Vol (vph)	145	YES	
Cross Product of LEFT TURN EAST (See Chart Below)	838	NO	NO
Cross Product of LEFT TURN WEST (See Chart Below)	116545	NO	YES
<b>CRASH HISTORY</b>			
Is there an existing permissive/protected or permissive/protected LT phase?		NO	
Which Approach does the "One Left Turn Movement" crashes correspond to?		WESTBOUND	
ONE LEFT TURN MOVEMENT	Crash History for 12 Month Period		
	Enter Number of Correctable crashes? (Left-Turn Head-On)	0	NO
	Crash History for 24 Month Period		
	Enter Number of Correctable crashes? (Left-Turn Head-On)	0	NO
TWO LEFT TURN MOVEMENTS	Crash History for 12 Month Period		
	Enter Number of Correctable crashes? (Left-Turn Head-On)		NO
	Crash History for 24 Month Period		
	Enter Number of Correctable crashes? (Left-Turn Head-On)		NO
EASTbound Left Turn DELAY per vehicle? Sec. / Veh.			
EASTbound TOTAL Left Turn DELAY? Veh-Hr		0.00	
WESTbound Left Turn DELAY per vehicle? Sec. / Veh.		29.8	
WESTbound TOTAL Left Turn DELAY? Veh-Hr		1.20	

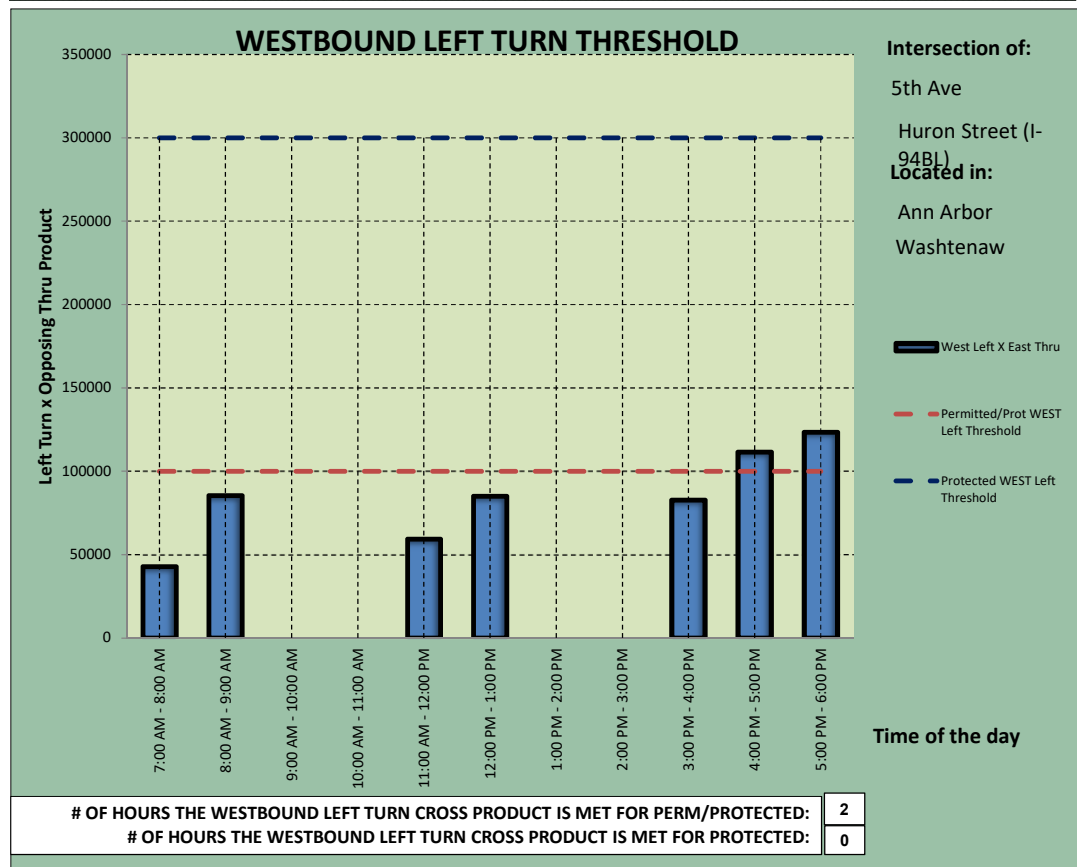
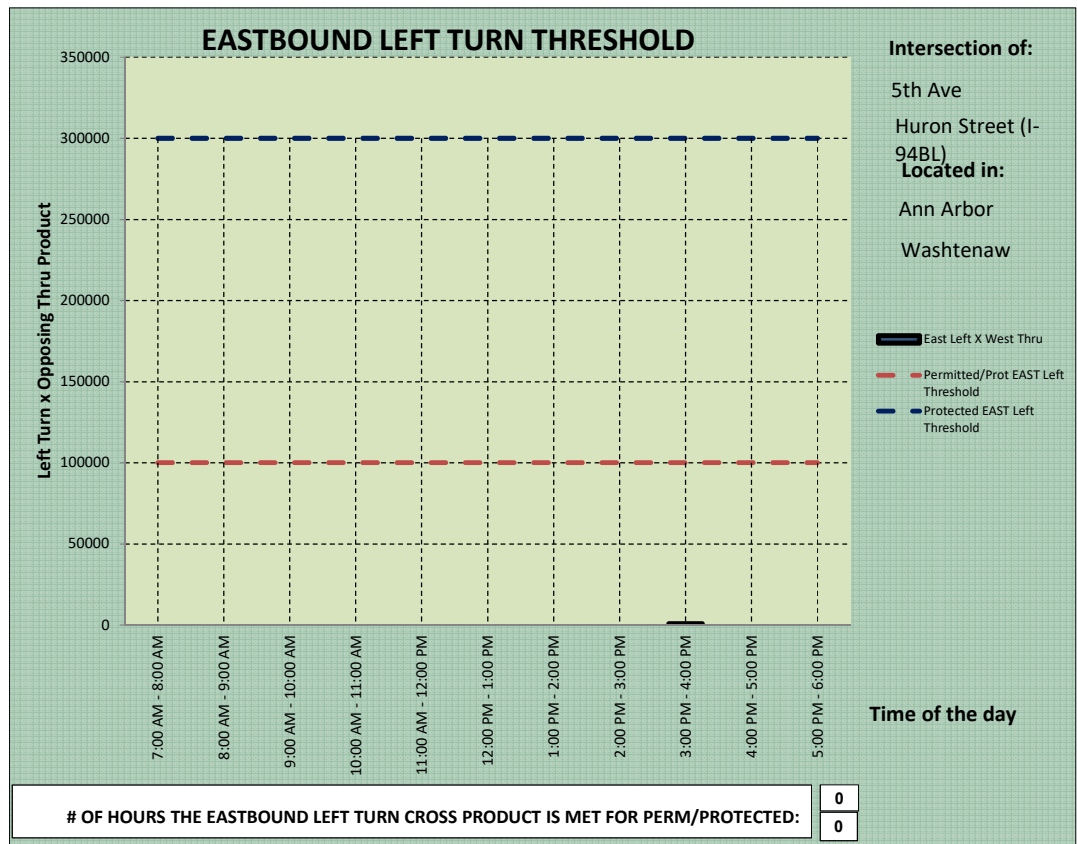
Left-turn phasing should only be approved and installed after a comprehensive engineering study indicates such an operation is necessary for the safe and efficient operation of an intersection. The type of left-turn phasing will be determined based on data from the engineering study which includes the amount of delay experienced by left-turning traffic, crash patterns that may be occurring and available capacity of the intersection.





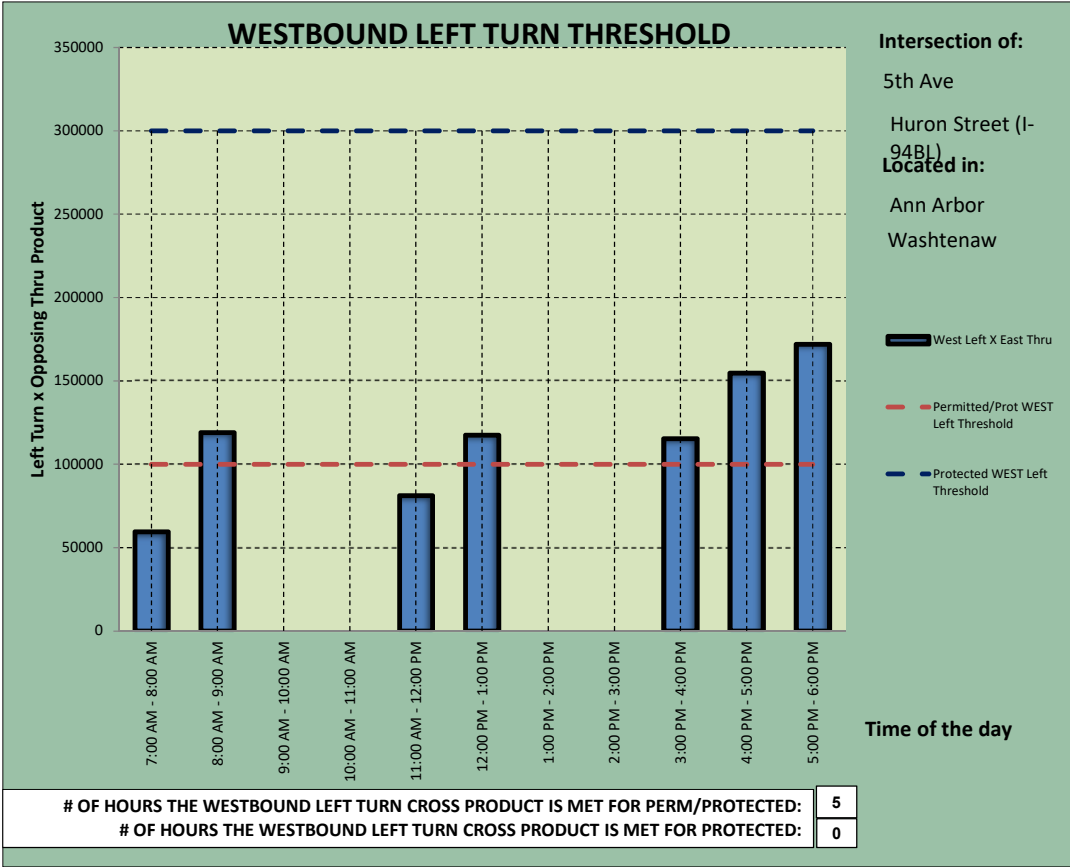
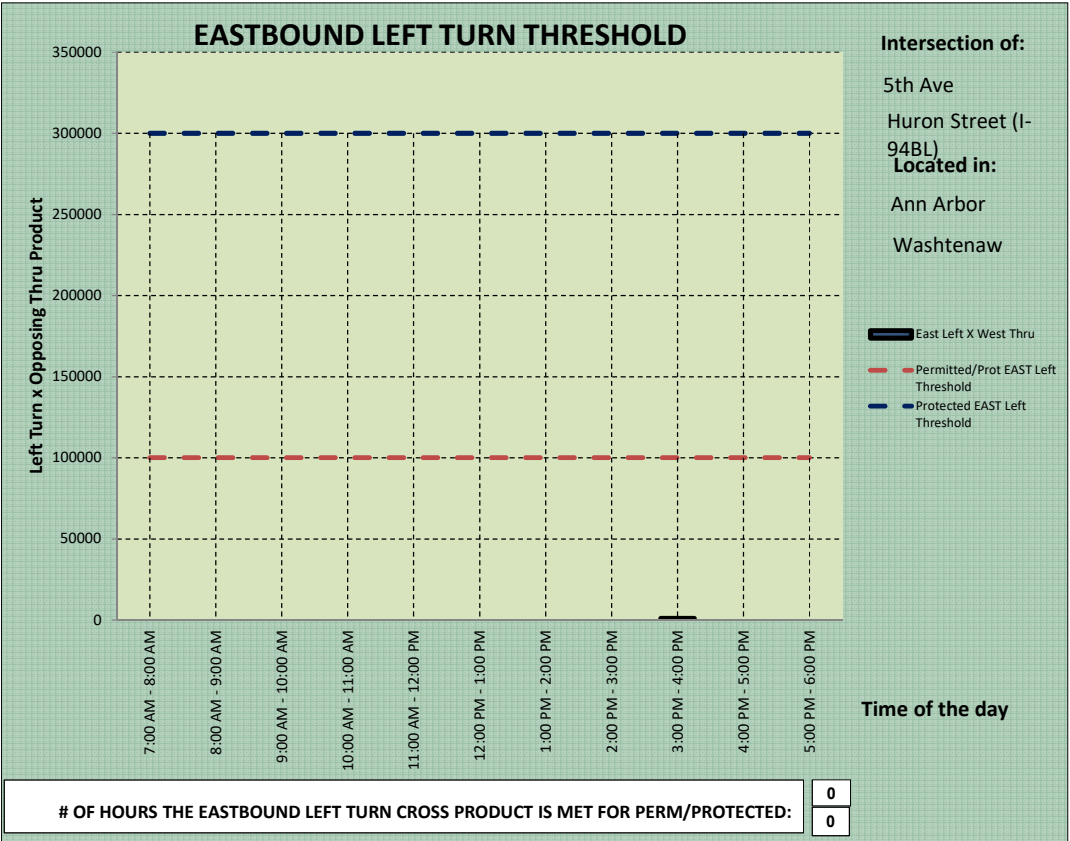
EASTBOUND AND WESTBOUND LEFT TURN PHASE THRESHOLDS			
Please enter Data in Yellow Boxes ONLY			
CONDITIONS		Items to Consider for Protected Only	Items to Consider for Permissive/Protected
<b>EASTBOUND LEFT TURN GEOMETRY</b>			
No. of Opposing WESTbound Thru Lanes (include combination thru lanes)	2	NO	YES
No. of Opposing WESTbound Right Turn Only Lanes	0	N / A	
What is the Opposing WESTbound speed limit or 85%ile? (mph)	30	NO	N / A
No. of EASTbound Left Turning Lanes	0	NO	N / A
What is the EASTbound sight distance in the field? (ft)	615	NO	YES
Minimum Required Sight Distance (ft)	265		
<b>WESTBOUND LEFT TURN GEOMETRY</b>			
No. of Opposing EASTbound Thru Lanes (include combination thru lanes)	2	NO	YES
No. of Opposing EASTbound Right Turn Only Lanes	0	N / A	
What is the Opposing EASTbound speed limit or 85%ile? (mph)	30	NO	N / A
No. of WESTbound Left Turning Lanes	1	NO	N / A
What is the WESTbound sight distance in the field? (ft)	375	NO	YES
Minimum Required Sight Distance (ft)	265		
<b>TRAFFIC CHARACTERISTICS</b>			
EASTbound Left Turn Vol (vph)	1	NO	
WESTbound Left Turn Vol (vph)	149	YES	
Cross Product of LEFT TURN EAST (See Chart Below)	863	NO	NO
Cross Product of LEFT TURN WEST (See Chart Below)	123480	NO	YES
<b>CRASH HISTORY</b>			
Is there an existing permissive/protected or permissive/protected LT phase?		NO	
Which Approach does the "One Left Turn Movement" crashes correspond to?		WESTBOUND	
ONE LEFT TURN MOVEMENT	Crash History for 12 Month Period		
	Enter Number of Correctable crashes? (Left-Turn Head-On)	0	NO
	Crash History for 24 Month Period		
	Enter Number of Correctable crashes? (Left-Turn Head-On)	0	NO
TWO LEFT TURN MOVEMENTS	Crash History for 12 Month Period		
	Enter Number of Correctable crashes? (Left-Turn Head-On)		NO
	Crash History for 24 Month Period		
	Enter Number of Correctable crashes? (Left-Turn Head-On)		NO
EASTbound Left Turn DELAY per vehicle? Sec. / Veh.			
EASTbound TOTAL Left Turn DELAY? Veh-Hr		0.00	
WESTbound Left Turn DELAY per vehicle? Sec. / Veh.		29.8	
WESTbound TOTAL Left Turn DELAY? Veh-Hr		1.23	

Left-turn phasing should only be approved and installed after a comprehensive engineering study indicates such an operation is necessary for the safe and efficient operation of an intersection. The type of left-turn phasing will be determined based on data from the engineering study which includes the amount of delay experienced by left-turning traffic, crash patterns that may be occurring and available capacity of the intersection.



EASTBOUND AND WESTBOUND LEFT TURN PHASE THRESHOLDS			
Please enter Data in Yellow Boxes ONLY			
CONDITIONS		Items to Consider for Protected Only	Items to Consider for Permissive/Protected
<b>EASTBOUND LEFT TURN GEOMETRY</b>			
No. of Opposing WESTbound Thru Lanes (include combination thru lanes)	2	NO	YES
No. of Opposing WESTbound Right Turn Only Lanes	0	N / A	
What is the Opposing WESTbound speed limit or 85%ile? (mph)	30	NO	N / A
No. of EASTbound Left Turning Lanes	0	NO	N / A
What is the EASTbound sight distance in the field? (ft)	615	NO	YES
Minimum Required Sight Distance (ft)	265		
<b>WESTBOUND LEFT TURN GEOMETRY</b>			
No. of Opposing EASTbound Thru Lanes (include combination thru lanes)	2	NO	YES
No. of Opposing EASTbound Right Turn Only Lanes	0	N / A	
What is the Opposing EASTbound speed limit or 85%ile? (mph)	30	NO	N / A
No. of WESTbound Left Turning Lanes	1	NO	N / A
What is the WESTbound sight distance in the field? (ft)	375	NO	YES
Minimum Required Sight Distance (ft)	265		
<b>TRAFFIC CHARACTERISTICS</b>			
EASTbound Left Turn Vol (vph)	1	NO	
WESTbound Left Turn Vol (vph)	176	YES	
Cross Product of LEFT TURN EAST (See Chart Below)	1016	NO	NO
Cross Product of LEFT TURN WEST (See Chart Below)	171912	NO	YES
<b>CRASH HISTORY</b>			
Is there an existing permissive/protected or permissive/protected LT phase?		NO	
Which Approach does the "One Left Turn Movement" crashes correspond to?		WESTBOUND	
ONE LEFT TURN MOVEMENT	Crash History for 12 Month Period		
	Enter Number of Correctable crashes? (Left-Turn Head-On)	0	NO
	Crash History for 24 Month Period		
TWO LEFT TURN MOVEMENTS	Enter Number of Correctable crashes? (Left-Turn Head-On)	0	NO
	Crash History for 24 Month Period		
	Enter Number of Correctable crashes? (Left-Turn Head-On)		NO
EASTbound Left Turn DELAY per vehicle? Sec. / Veh.		NO	
EASTbound TOTAL Left Turn DELAY? Veh-Hr		0.00	
WESTbound Left Turn DELAY per vehicle? Sec. / Veh.		29.8	
WESTbound TOTAL Left Turn DELAY? Veh-Hr		1.46	

Left-turn phasing should only be approved and installed after a comprehensive engineering study indicates such an operation is necessary for the safe and efficient operation of an intersection. The type of left-turn phasing will be determined based on data from the engineering study which includes the amount of delay experienced by left-turning traffic, crash patterns that may be occurring and available capacity of the intersection.



## EXHIBIT 2

# TECHNICAL MEMO

**SUBJECT:** Huron Street (I-94BL) No Turn on Red Review

**DATE:** February 9, 2018

**PROJECT NO.:** 160673

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## No Turn on Red Review

Restricting right turns on a red signal for both Huron Street (I-94BL) and the cross streets is under consideration in order to reduce vehicle encroachment into crosswalks where pedestrians may be crossing the street in front of the turning vehicle. The MMUTCD states a No Turn on Red (NTOR) should be considered when one the following conditions exists:

- Inadequate sight distance to vehicles approaching from the left (or right, if applicable);
- Geometrics or operational characteristics of the intersection that might result in unexpected conflicts;
- An exclusive pedestrian phase;
- An unacceptable number of pedestrian conflicts with right-turn-on-red maneuvers, especially involving children, older pedestrians, or persons with disabilities;
- More than three right-turn-on-red accidents reported in a 12-month period for the particular approach; or
- The skew angle of the intersecting roadways creates difficulty for drivers to see traffic approaching from their left.

MDOT and the City of Ann Arbor also follow these guidelines with the following additional conditions:

- At a signalized intersection with a railroad crossing (and pre-signal) in close proximity (less than 100 feet) shall have a NO TURN ON RED if one of the following conditions exists: (1) Insufficient clear storage distance for a design vehicle between the signalized intersection and the railroad crossing. (2) The highway-rail crossing does not have gates. (MDOT)
- At intersections where a designated school crosswalk is present. (City of Ann Arbor)
- Where unusual circumstances exist such as railroad tracks, protected turning movements, and exclusive pedestrian phases. (City of Ann Arbor)

In reviewing the conditions above, it was found that sight distance from Huron Street and the cross streets could cause some right turning vehicles to move forward past the stop bar and into the crosswalk in order to make a right turn on red.

Figures 1 through 10 show the sight distance triangles at each intersection along the corridor. Intersection sight distance triangles were drawn per the MDOT Sight Distance Guidelines. The driver's eye location is located 8 feet behind the stop bar. The intersection sight distance is 240 feet for 25 mph speed limit and 290 feet for 30 mph speed limit. Intersection approaches with building obstructions include the following:

- NB Main Street at Huron Street (I-94BL)
- NB 4th Avenue at Huron Street (I-94BL)



- NB Division Street at Huron Street (I-94BL)
- EB Huron Street (I-94BL) at Main Street
- WB Huron Street (I-94BL) at Main Street
- EB Huron Street (I-94BL) at 4th Avenue
- WB Huron Street (I-94BL) at 4th Avenue
- EB Huron Street (I-94BL) at 5th Avenue

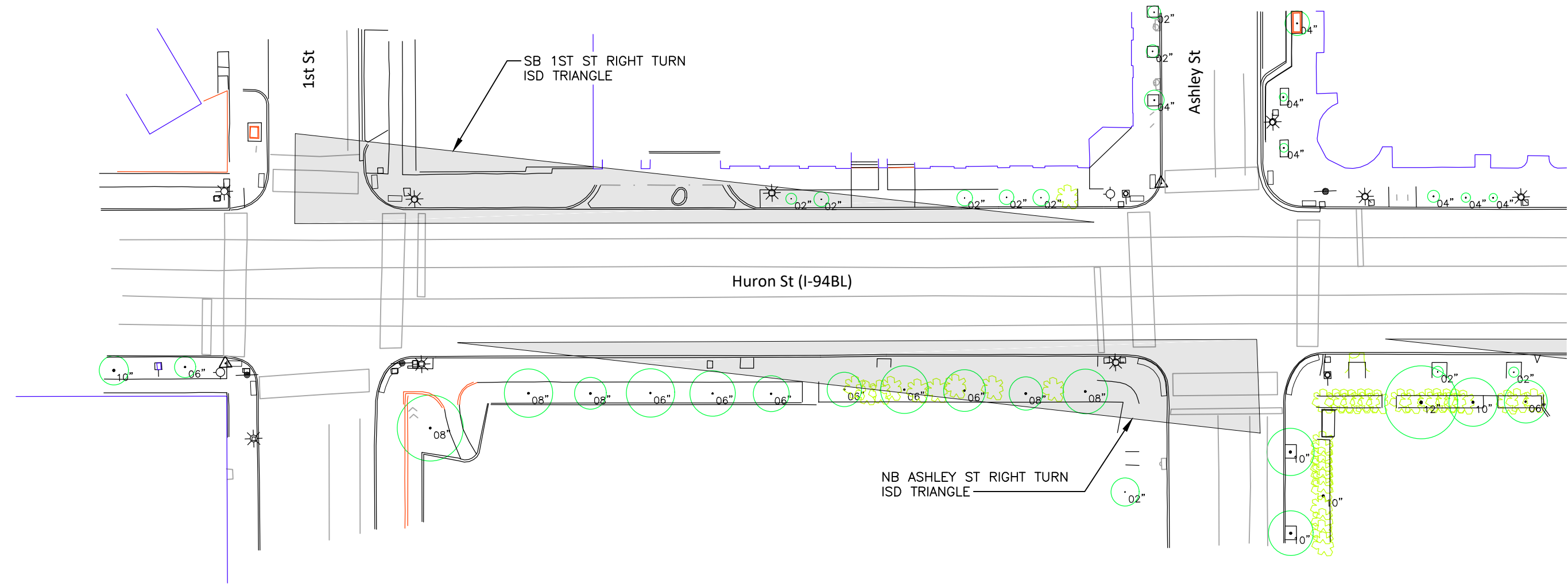
The remaining intersections may include other obstructions such as trees, planters, benches, signs, etc.

Pedestrian count data also shows are large number of pedestrians crossing at several of the intersections.



PLOT INFO: Z:\2016\160673\WORK\REPORT\TRAFFIC ANALYSIS\FIGURES\160673 ISD.DWG LAYOUT: F1 DATE: 1/29/2018 TIME: 12:36:09 PM USER: KP

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LEGEND

BUILDING

TREE CANOPY

VEGETATION

TOP OF WALL/PLANTER

ISD TRIANGLE

- NOTES
1.

ISD TRIANGLES ARE DRAWN PER MDOT SIGHT DISTANCE GUIDELINES.

2.

ISD ALONG HURON ST (I-94BL) IS 290 FT BASED ON 30 MPH SPEED LIMIT.

3.

DRIVER'S EYE LOCATION IS 8 FT BEHIND STOP BAR.

NORTH

MINOR STREETS: 1ST ST & ASHLEY ST

INTERSECTION SIGHT DISTANCE

SCALE: 1" = 40'

0

20

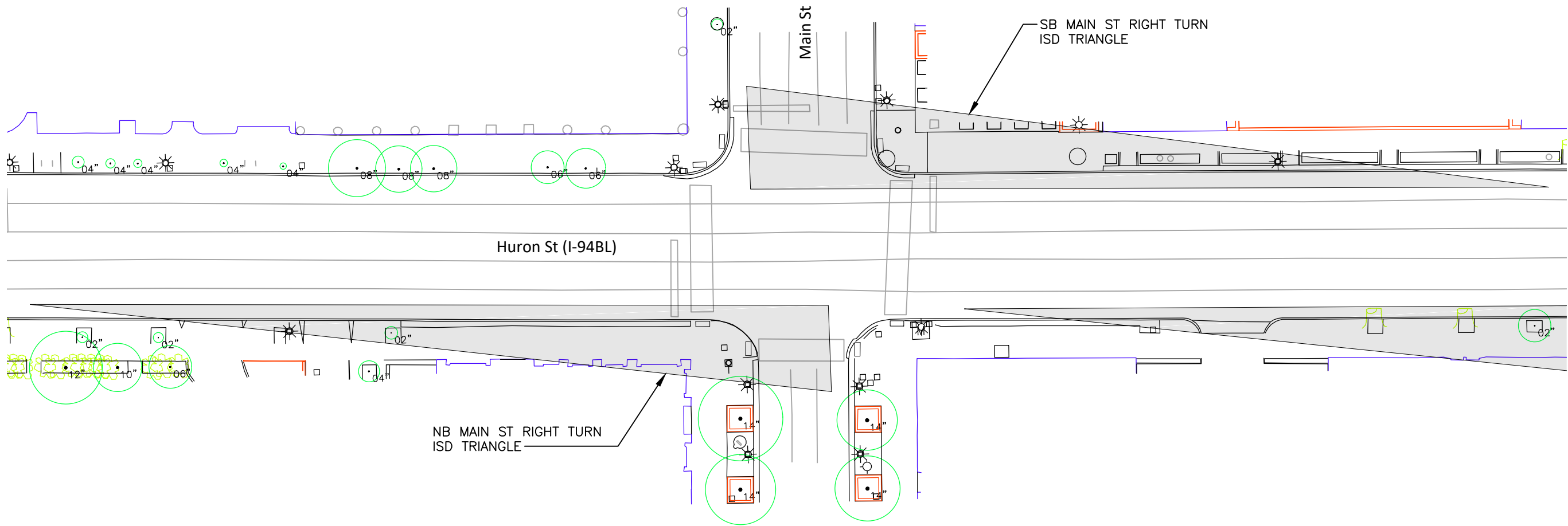
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carr & huber, inc.

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LEGEND

BUILDING

TREE CANOPY

VEGETATION

TOP OF WALL/PLANTER

ISD TRIANGLE

- NOTES
1. ISD TRIANGLES ARE DRAWN PER MDOT SIGHT DISTANCE GUIDELINES.

2. ISD ALONG HURON ST (I-94BL) IS 290 FT BASED ON 30 MPH SPEED LIMIT.

3. DRIVER'S EYE LOCATION IS 8 FT BEHIND STOP BAR.

NORTH

MINOR STREETS: MAIN ST

INTERSECTION SIGHT DISTANCE

SCALE: 1" = 40'

0

20

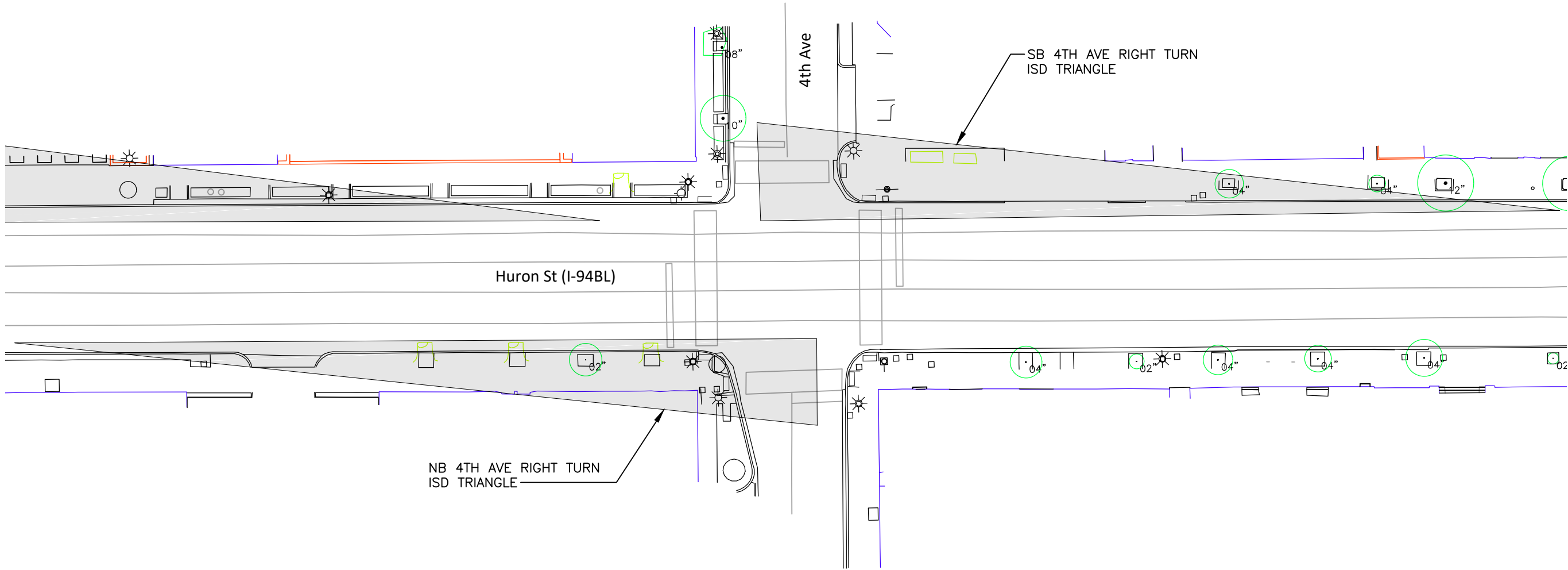
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carr & huber, inc.

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LEGEND

- BUILDING
- TREE CANOPY
- VEGETATION
- TOP OF WALL/PLANTER
- ISD TRIANGLE

NOTES

- ISD TRIANGLES ARE DRAWN PER MDOT SIGHT DISTANCE GUIDELINES.
- ISD ALONG HURON ST (I-94BL) IS 290 FT BASED ON 30 MPH SPEED LIMIT.
- DRIVER'S EYE LOCATION IS 8 FT BEHIND STOP BAR.



MINOR STREETS: 4TH AVE  
INTERSECTION SIGHT DISTANCE

SCALE: 1" = 40'  
0 20 40

fishc&h

engineers

scientists

architects

constructors

fishbeck, thompson,  
carr & huber, inc.

Hard copy is  
intended to be  
11"x17" when  
plotted. Scale(s)  
indicated and  
graphic quality may  
not be accurate for  
any other size.

Ann Arbor DDA

Huron Street (I-94BL)

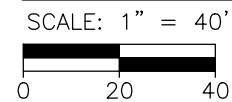
Intersection Sight Distance

PROJECT NO.

160673

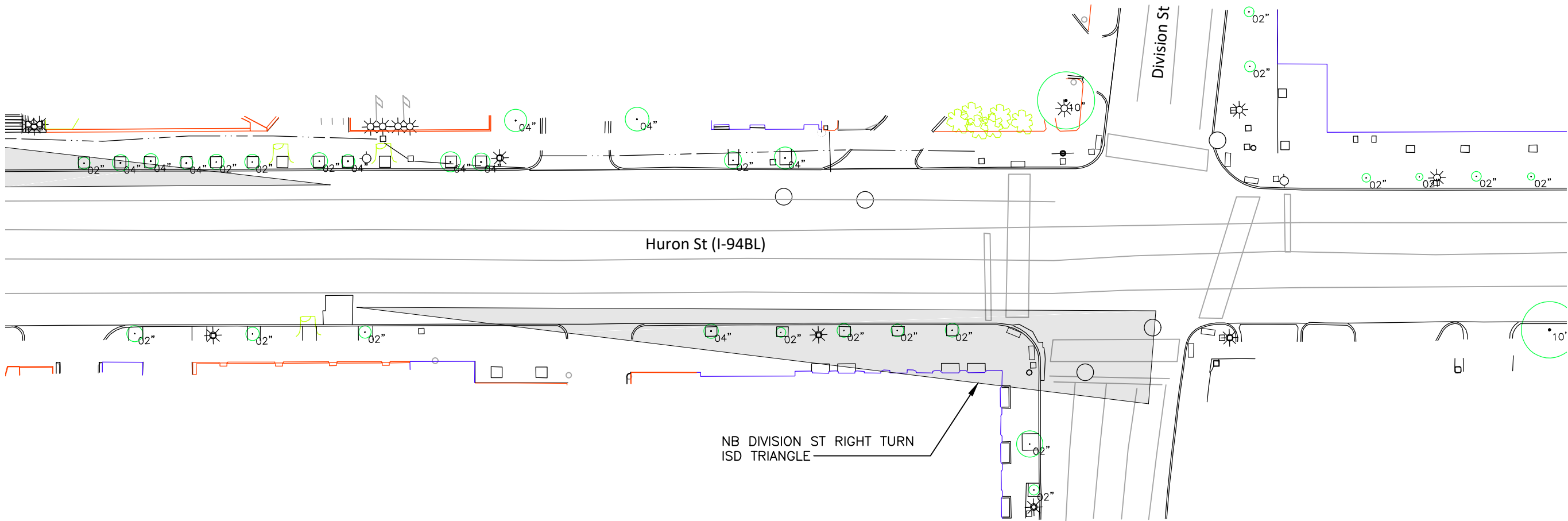
FIGURE NO.

3



PLOT INFO: Z:\2016\160673\WORK\REPORT\TRAFFIC ANALYSIS\FIGURES\160673 ISD.DWG LAYOUT: F5 DATE: 1/29/2018 TIME: 12:36:43 PM USER: KP

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LEGEND

- BUILDING
- TREE CANOPY
- VEGETATION
- TOP OF WALL/PLANTER
- ISD TRIANGLE

NOTES

- ISD TRIANGLES ARE DRAWN PER MDOT SIGHT DISTANCE GUIDELINES.
- ISD ALONG HURON ST (I-94BL) IS 290 FT BASED ON 30 MPH SPEED LIMIT.
- DRIVER'S EYE LOCATION IS 8 FT BEHIND STOP BAR.



MINOR STREETS: DIVISION ST  
INTERSECTION SIGHT DISTANCE

SCALE: 1" = 40'  
0 20 40

fish&h

engineers

scientists

architects

constructors

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Ann Arbor DDA  
Huron Street (I-94BL)

Intersection Sight Distance

PROJECT NO.

160673

FIGURE NO.

5

PLOT INFO: Z:\2016\160673\WORK\REPORT\TRAFFIC ANALYSIS\FIGURES\160673 ISD.DWG LAYOUT: F6 DATE: 1/29/2018 TIME: 2:38:52 PM USER: KP

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EB HURON ST RIGHT TURN  
ISD TRIANGLE

1st St

Huron St (I-94BL)

Ashley St

WB HURON ST RIGHT TURN  
ISD TRIANGLE

LEGEND

- BUILDING
- TREE CANOPY
- VEGETATION
- TOP OF WALL/PLANTER
- ISD TRIANGLE

NOTES

- ISD TRIANGLES ARE DRAWN PER MDOT SIGHT DISTANCE GUIDELINES (CASE B2 –RIGHT TURN FROM STOP).
- ISD ALONG MINOR STREET IS 240 FT BASED ON 25 MPH SPEED LIMIT.
- DRIVER'S EYE LOCATION IS 8 FT BEHIND STOP BAR.



HURON STREET (I-94BL): 1ST ST & ASHLEY ST  
INTERSECTION SIGHT DISTANCE

SCALE: 1" = 40'  
0 20 40

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Huron Street (I-94BL)

Intersection Sight Distance

PROJECT NO.

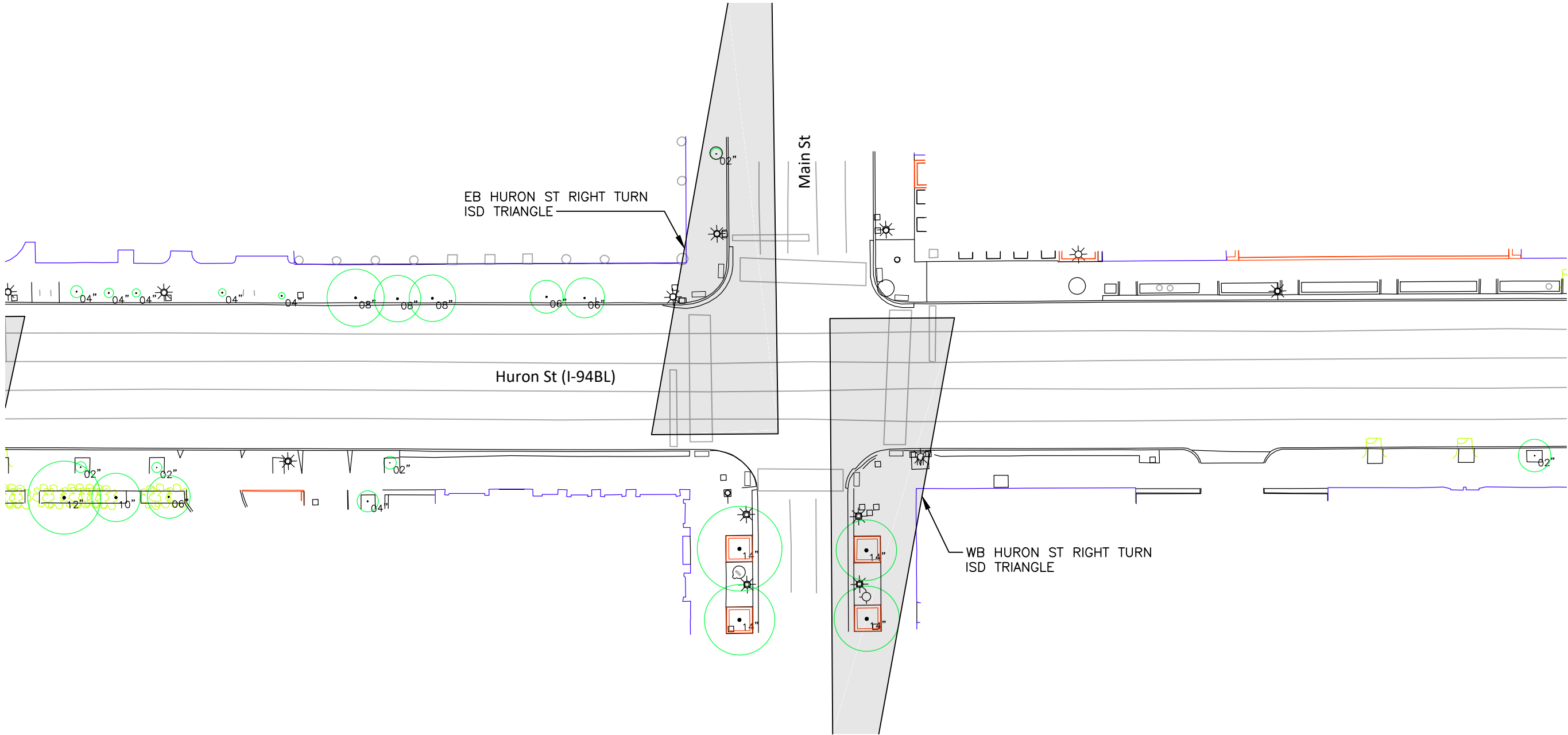
160673

FIGURE NO.

6

PLOT INFO: Z:\2016\160673\WORK\REPORT\TRAFFIC ANALYSIS\FIGURES\160673 ISD.DWG LAYOUT: F7 DATE: 1/29/2018 TIME: 2:39:00 PM USER: KP

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LEGEND

- BUILDING
- TREE CANOPY
- VEGETATION
- TOP OF WALL/PLANTER
- ISD TRIANGLE

NOTES

- ISD TRIANGLES ARE DRAWN PER MDOT SIGHT DISTANCE GUIDELINES (CASE B2 -RIGHT TURN FROM STOP).
- ISD ALONG MINOR STREET IS 240 FT BASED ON 25 MPH SPEED LIMIT.
- DRIVER'S EYE LOCATION IS 8 FT BEHIND STOP BAR.



HURON STREET (I-94BL): MAIN ST  
INTERSECTION SIGHT DISTANCE

SCALE: 1" = 40'  
0 20 40

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Ann Arbor DDA  
Huron Street (I-94BL)

Intersection Sight Distance

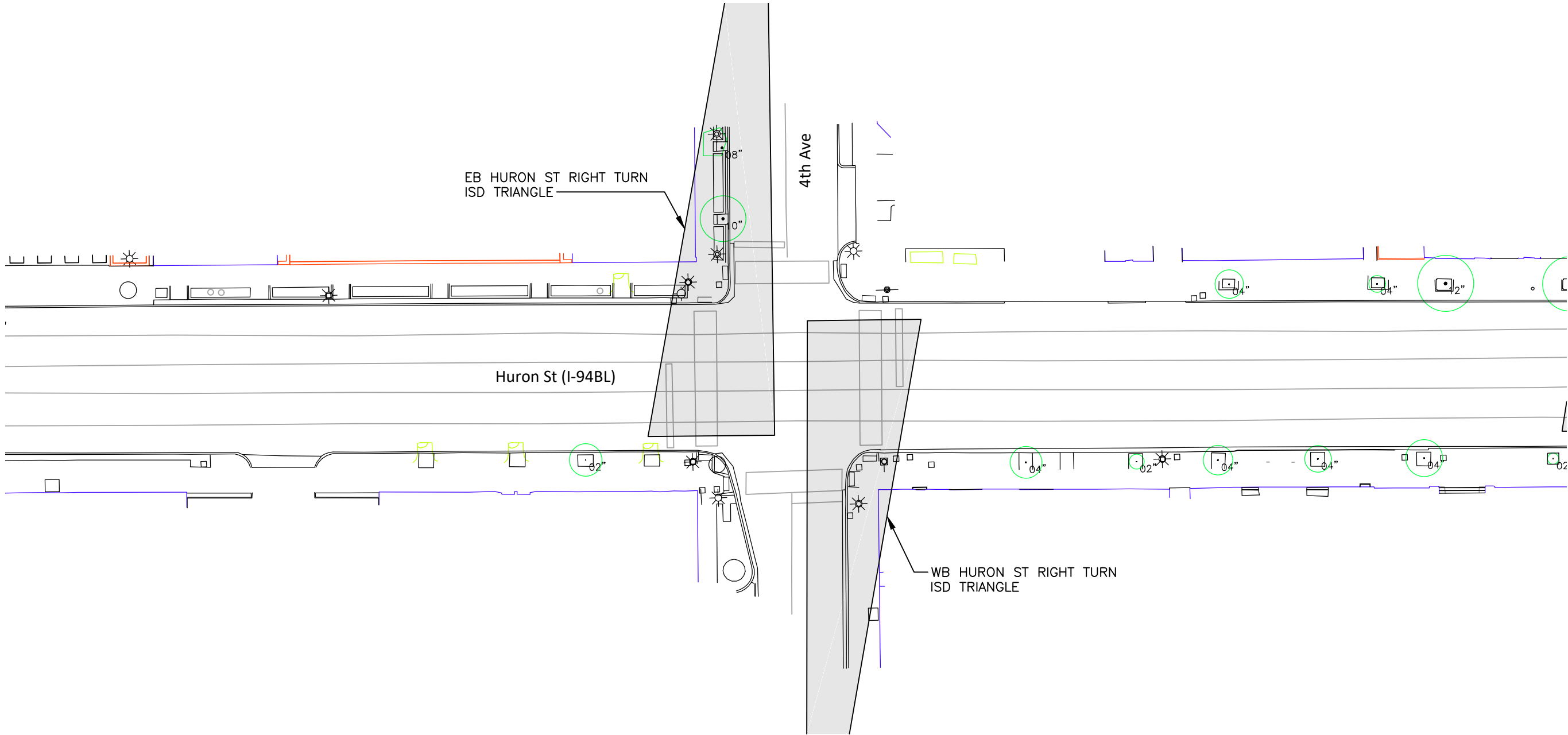
PROJECT NO.  
160673

FIGURE NO.

7

PLOT INFO: Z:\2016\160673\WORK\REPORT\TRAFFIC ANALYSIS\FIGURES\160673 ISD.DWG LAYOUT: F8 DATE: 1/29/2018 TIME: 2:39:09 PM USER: KP

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LEGEND

- BUILDING
- TREE CANOPY
- VEGETATION
- TOP OF WALL/PLANTER
- ISD TRIANGLE

NOTES

- ISD TRIANGLES ARE DRAWN PER MDOT SIGHT DISTANCE GUIDELINES (CASE B2 –RIGHT TURN FROM STOP).
- ISD ALONG MINOR STREET IS 240 FT BASED ON 25 MPH SPEED LIMIT.
- DRIVER’S EYE LOCATION IS 8 FT BEHIND STOP BAR.



HURON STREET (I-94BL): 4TH AVE  
INTERSECTION SIGHT DISTANCE

SCALE: 1" = 40'  
0 20 40

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architects

constructors

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Ann Arbor DDA  
Huron Street (I-94BL)

Intersection Sight Distance

PROJECT NO.  
160673

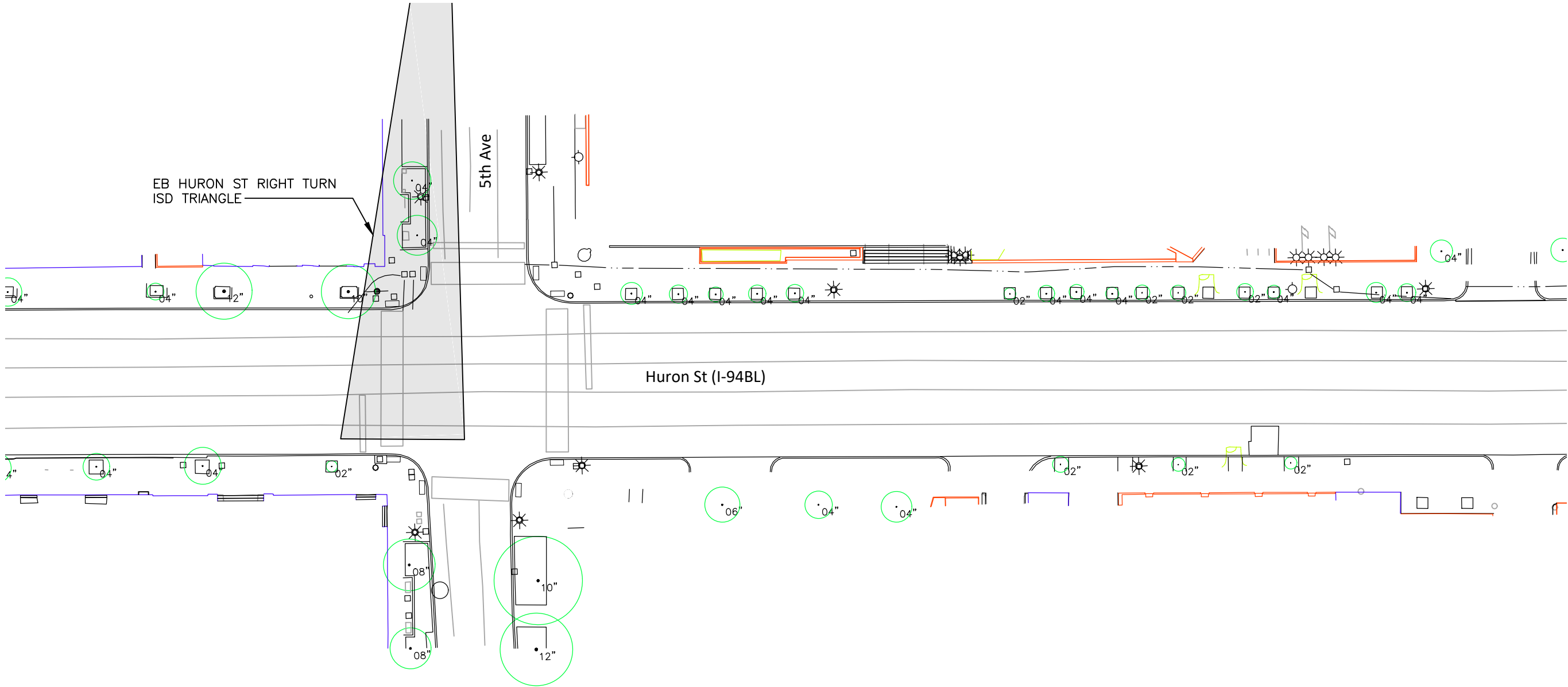
FIGURE NO.

8



PLOT INFO: Z:\2016\160673\WORK\REPORT\TRAFFIC ANALYSIS\FIGURES\160673 ISD.DWG LAYOUT: F9 DATE: 1/29/2018 TIME: 2:39:18 PM USER: KP

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LEGEND

- BUILDING
- TREE CANOPY
- VEGETATION
- TOP OF WALL/PLANTER
- ISD TRIANGLE

NOTES

- ISD TRIANGLES ARE DRAWN PER MDOT SIGHT DISTANCE GUIDELINES (CASE B2 –RIGHT TURN FROM STOP).
- ISD ALONG MINOR STREET IS 240 FT BASED ON 25 MPH SPEED LIMIT.
- DRIVER’S EYE LOCATION IS 8 FT BEHIND STOP BAR.



HURON STREET (I-94BL): 5TH AVE  
INTERSECTION SIGHT DISTANCE

SCALE: 1" = 40'  
0 20 40

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scientists

architects

constructors

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Huron Street (I-94BL)

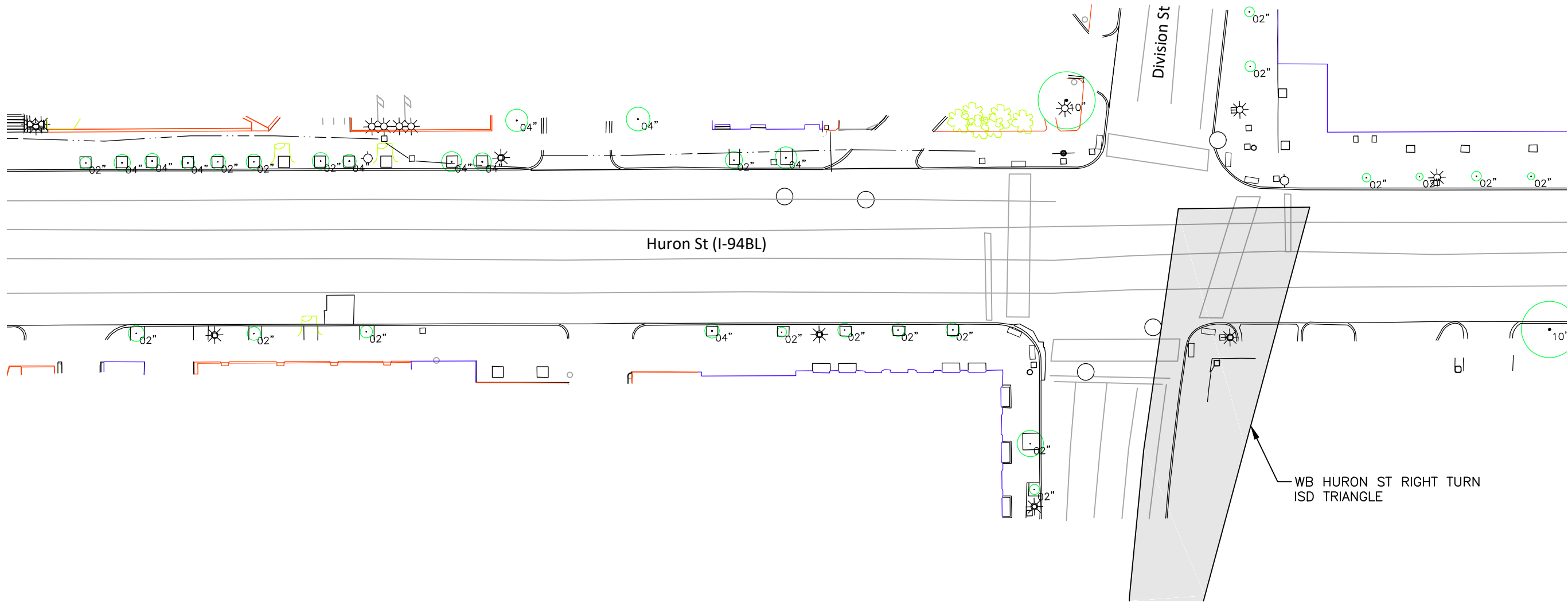
Intersection Sight Distance

PROJECT NO.  
160673

FIGURE NO.  
9

PLOT INFO: Z:\2016\160673\WORK\REPORT\TRAFFIC ANALYSIS\FIGURES\160673 ISD.DWG LAYOUT: F10 DATE: 1/29/2018 TIME: 2:39:26 PM USER: KP

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## LEGEND

- BUILDING
- TREE CANOPY
- VEGETATION
- TOP OF WALL/PLANTER
- ISD TRIANGLE

## NOTES

- ISD TRIANGLES ARE DRAWN PER MDOT SIGHT DISTANCE GUIDELINES (CASE B2 -RIGHT TURN FROM STOP).
- ISD ALONG MINOR STREET IS 240 FT BASED ON 25 MPH SPEED LIMIT.
- DRIVER'S EYE LOCATION IS 8 FT BEHIND STOP BAR.



NORTH

## HURON STREET (I-94BL): DIVISION ST INTERSECTION SIGHT DISTANCE

SCALE: 1" = 40'



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architects

constructors

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Huron Street (I-94BL)

Intersection Sight Distance

PROJECT NO.

160673

FIGURE NO.

10

## EXHIBIT 3

# TECHNICAL MEMO

**SUBJECT:** Huron Street (I-94BL) and 3rd Street/Chapin Street HAWK Signal Review

**DATE:** February 28, 2018

**PROJECT NO.:** 160673

---

## HAWK Signal Review

### Signal Warrant Review

Vehicle and pedestrian counts were gathered on Friday, August 18, 2017 at the Huron Street (I-94BL) and 3rd Street/Chapin Street intersection to evaluate the existing operation of the crossing (with an existing HAWK signal) on the west leg of the intersection. The intersection was also evaluated using signal warrants for a full signal. The following warrants were reviewed:

1. WARRANT 1: Eight-Hour Vehicular Volume
2. WARRANT 2: Four-Hour Vehicular Volume
3. WARRANT 3B (100%): Peak-Hour Vehicular Volume
4. WARRANT 4 (100%): Four-Hour Pedestrian Volume
5. WARRANT 4 (100%): Peak-Hour Pedestrian Volume
6. WARRANT 7: Crash Experience

For the pedestrian volume warrant, pedestrian speeds were observed and calculated for a 12-hour period. The 15th-percentile crossing speed was approximately 3.62 feet per second and the average crossing speed was approximately 4.97 feet per second. Therefore, a reduction in pedestrian volume criterion was not used.

It was found that a full signal was not warranted using existing volumes based on Warrant 1, 2, 3B, and 4. It should be noted that the intersection is close to meeting Warrant 1 (Eight-Hour Vehicular Volume) with existing volumes. If a signal were to be installed at the intersection, then it could reasonably be assumed that neighborhood traffic would gravitate toward the signal and there would be an increase in minor street traffic. Therefore, the intersection was evaluated for two scenarios: (1) 10% increase in volumes on 3rd Street/Chapin Street and (2) 20% increase in volumes on 3rd Street/Chapin Street.

With a 10% increase in minor street traffic, Warrant 1 (Eight-Hour Vehicular Volume) was met for 9 hours. With a 20% increase in minor street traffic, Warrant 1 (Eight-Hour Vehicular Volume) was met for 11 hours. In these two scenarios, the Warrants 2, 3B, and 4 are not met.

The intersection was also evaluated for a full signal based on crash history. Warrant 7B (Crash Experience) was met for 12 or 13 hours depending on the scenario. Refer to the Crash Analysis section for further details.

Traffic counts, crash data, and signal warrant calculations are attached.

### Crash Analysis

Crash data was reviewed for the Huron Street (I-94BL) and 3rd Street/Chapin Street intersection from 2013 to 2016. There was a total of 51 crashes at the intersection for the 4-year analysis period. The two highest crash types included angle straight (41.2%) and rear-end straight (25.5%). There was 1 bicycle crash without an injury



and no fatalities were reported at the intersection. Table 1 shows a summary of the crash type for the intersection.

**Table 1 – Crash Type Summary**

Type of Crash	Crashes from 2013 to 2016	
	Total Number of Crashes	Percentage
Angle Driveway	2	3.9%
Angle Straight	21	41.2%
Angle Turn	4	7.8%
Backing	1	2.0%
Bicycle	1	2.0%
Fixed Object	2	3.9%
Head-On Left-Turn Not Associated with Driveway	2	3.9%
Misc. Multiple Vehicle	1	2.0%
Parking	1	2.0%
Rear End Straight	13	25.5%
Side-Swipe Same	3	5.9%
<b>TOTAL</b>	<b>51</b>	<b>100.0%</b>

The intersection crash rate and crash frequency were calculated and compared to the Southeast Michigan Council of Governments' (SEMCOG) 'Regional Critical Intersection Crash Rates, Frequencies, and Casualty Ratios' from the January 2016 "Crash Analysis Process" based on intersection type, volume, geometry, and intersection control. The Huron Street (I-94BL) and 3rd Street/Chapin Street intersection exceeded the average SEMCOG crash rate and crash frequency for an unsignalized intersection. A detailed crash data summary is attached.

The UD-10 reports were reviewed to identify trends for the angle and rear end type crashes. Some of trends identified include:

1. Several reports identified the cause of the crash as failure to yield for 3rd Street/Chapin Street traffic. Drivers would try to cross Huron Street (I-94BL) but would not see oncoming traffic on Huron Street (I-94BL) which resulted in an angle crash.
2. Some reports stated that traffic on 3rd Street/Chapin Street would try crossing Huron Street (I-94BL) while the HAWK signal was activated assuming Huron Street (I-94BL) traffic would stop. If Huron Street (I-94BL) did not stop, this would result in an angle crash.
3. Several reports identified driver confusion at the HAWK signal as the cause of the crash. Some drivers would stop for the different phases of the HAWK signal (flashing yellow, flashing red, and solid red) while other drivers would try proceeding through the intersection. This would result in a rear end crash on Huron Street (I-94BL).

Assuming five or more crashes are correctable by a traffic signal in a 12-month period, a traffic signal is warranted per Warrant 7B (Crash Experience) using existing volumes and a 10%/20% increase in minor street volumes.



## Observations

The existing HAWK signal timing permit states the pedestrian clearance time is based on a walking speed of 3.5 feet per second. This equates to 7 seconds of WALK time and 15 seconds of FLASHING DON'T WALK time.

Observations in the field showed that due to the high amount of vehicle traffic on Huron Street (I-94BL), the compliance of pedestrians using the HAWK signal was high. During data collection, only 38 out of 627 pedestrians crossed Huron Street (I-94BL) at the crosswalk without pushing the button to activate the HAWK signal. Also, an additional 37 pedestrians crossed Huron Street (I-94BL) outside of the crosswalk. The pedestrians that crossed outside of the crosswalk on Huron Street (I-94BL) typically had to wait for an extended period of time or crossed once another pedestrian started to cross at the crosswalk.

Observations showed that most pedestrians appeared to be familiar with the intersection and using the HAWK signal. There were some pedestrians that did not wait for the WALK symbol before proceeding across Huron Street (I-94BL). The HAWK signal operates using 4 phases for vehicles once the push button is activated: flashing yellow, solid yellow, solid red and flashing red. Pedestrians unfamiliar with the HAWK signal did not realize they needed to wait for the signal to turn solid red for the vehicles, before the pedestrian WALK symbol would illuminate.

Most vehicles along Huron Street (I-94BL) appeared to understand the HAWK signal, but there were 9 occasions when a vehicle proceeded through the intersection on a solid red. Some vehicles were unsure of the different phases of the HAWK signal. The most confusion for vehicles occurred when the signal changed from solid red to flashing red. Drivers appeared to be unsure if they could proceed if no pedestrians were present. The vehicles that did proceed through the flashing red HAWK signal, once the crosswalk was clear of pedestrians, caused the entire queue along Huron Street (I-94BL) to proceed without stopping at the stop bar first before proceeding.

The YMCA utilized the crosswalk crossing Huron Street (I-94BL) approximately 11 times throughout the day. The YMCA groups waited to activate the HAWK signal until all of the kids were close enough to cross together as a single group. A vehicle did not stop for pedestrians within the crosswalk during the flashing red signal 2 out of the 11 times the YMCA groups crossed Huron Street (I-94BL). The YMCA groups were able to cross Huron Street (I-94BL) within the WALK and FLASHING DON'T WALK time allotted.

Most vehicles on 3rd Street and Chapin Street had to wait for the HAWK signal to be activated to cross Huron Street (I-94BL) or make left turns. The northbound vehicles turning left would wait for the pedestrians in the crosswalk then try and turn before the Huron traffic started moving.

# Intersection Summary Count Data Sheet - Weekday

## Vehicles and Pedestrians

Intersection: Huron St at 3rd St / Chapin St 3rd St / Chapin St

Time		Eastbound		Westbound		Northbound		Southbound	
		Veh	Ped W-Leg	Veh	Ped E-Leg	Veh	Ped S-Leg	Veh	Ped N-Leg
12:00 AM	1:00 AM	76		142		21		2	
1:00 AM	2:00 AM	39		68		8		1	
2:00 AM	3:00 AM	36		57		16		3	
3:00 AM	4:00 AM	18		26		8		2	
4:00 AM	5:00 AM	31		24		6		0	
5:00 AM	6:00 AM	219		51		7		6	
6:00 AM	7:00 AM	560		131		26		6	
7:00 AM	8:00 AM	840	20	281	0	44	18	21	11
8:00 AM	9:00 AM	813	40	428	1	75	28	36	11
9:00 AM	10:00 AM	643	62	508	2	63	24	37	17
10:00 AM	11:00 AM	648	57	442	0	68	17	28	15
11:00 AM	12:00 PM	569	45	579	0	52	17	35	12
12:00 PM	1:00 PM	633	59	633	2	85	26	38	31
1:00 PM	2:00 PM	580	77	626	1	72	12	41	17
2:00 PM	3:00 PM	549	78	621	10	71	27	41	18
3:00 PM	4:00 PM	530	46	768	0	64	12	48	12
4:00 PM	5:00 PM	510	38	866	0	114	17	29	6
5:00 PM	6:00 PM	463	58	794	0	101	18	44	13
6:00 PM	7:00 PM	583	47	646	0	72	21	42	18
7:00 PM	8:00 PM	492		570		71		23	
8:00 PM	9:00 PM	399		491		90		24	
9:00 PM	10:00 PM	337		381		69		17	
10:00 PM	11:00 PM	248		291		55		15	
11:00 PM	12:00 AM	135		193		21		6	

**Michigan Manual of Uniform Traffic Control Devices**  
**Worksheet for Signal Warrants (Section 4C)**  
**WARRANT 1: Eight-Hour Vehicular Volume**

Intersection:	I-94BL (Huron St) @ 3rd St		
Date	8/28/2017	by	FTCH

<b>2</b>	: No. of Lanes on Major St?
<b>1</b>	: No. of Lanes on Minor St?
<b>30</b>	: Speed limit or 85th Percentile? (MPH)
<b>NO</b>	: Is the intersection within an Isolated community?
<b>0</b>	: if answer 4 is Yes, then what is the of the population isolated community?
<b>YES</b>	: Have other remedial measures been tried?

USE 100% FOR WARRANTS 1A AND 1B. USE 80% FOR WARRANT 1A&B

Time	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?	Combination Major A	Combination Minor A	Combination Major B	Combination Minor B	Warrant Condition A&B met?
00:01 - 01:00	218	21	600	150	NO	900	75	NO	480	120	720	60	NO
01:00 - 02:00	107	8	600	150	NO	900	75	NO	480	120	720	60	NO
02:00 - 03:00	93	16	600	150	NO	900	75	NO	480	120	720	60	NO
03:00 - 04:00	44	8	600	150	NO	900	75	NO	480	120	720	60	NO
04:00 - 05:00	55	6	600	150	NO	900	75	NO	480	120	720	60	NO
05:00 - 06:00	270	7	600	150	NO	900	75	NO	480	120	720	60	NO
06:00 - 07:00	691	26	600	150	NO	900	75	NO	480	120	720	60	NO
07:00 - 08:00	1121	44	600	150	NO	900	75	NO	480	120	720	60	NO
08:00 - 09:00	1241	75	600	150	NO	900	75	YES	480	120	720	60	NO
09:00 - 10:00	1151	63	600	150	NO	900	75	NO	480	120	720	60	NO
10:00 - 11:00	1090	68	600	150	NO	900	75	NO	480	120	720	60	NO
11:00 - 12:00	1148	52	600	150	NO	900	75	NO	480	120	720	60	NO
12:00 - 13:00	1266	85	600	150	NO	900	75	YES	480	120	720	60	NO
13:00 - 14:00	1206	72	600	150	NO	900	75	NO	480	120	720	60	NO
14:00 - 15:00	1170	71	600	150	NO	900	75	NO	480	120	720	60	NO
15:00 - 16:00	1298	64	600	150	NO	900	75	NO	480	120	720	60	NO
16:00 - 17:00	1376	114	600	150	NO	900	75	YES	480	120	720	60	NO
17:00 - 18:00	1257	101	600	150	NO	900	75	YES	480	120	720	60	NO
18:00 - 19:00	1229	72	600	150	NO	900	75	NO	480	120	720	60	NO
19:00 - 20:00	1062	71	600	150	NO	900	75	NO	480	120	720	60	NO
20:00 - 21:00	890	90	600	150	NO	900	75	NO	480	120	720	60	NO
21:00 - 22:00	718	69	600	150	NO	900	75	NO	480	120	720	60	NO
22:00 - 23:00	539	55	600	150	NO	900	75	NO	480	120	720	60	NO
23:00 - 00:00	328	21	600	150	NO	900	75	NO	480	120	720	60	NO

Number of Hours that met the warrant 1A =	0
Number of Hours that met the warrant 1B =	4
Number of Hours that met the warrant 1 A & B =	0

**A. Is the Minimum Vehicular Volume Warrant Met? (Condition A)**

**NO**

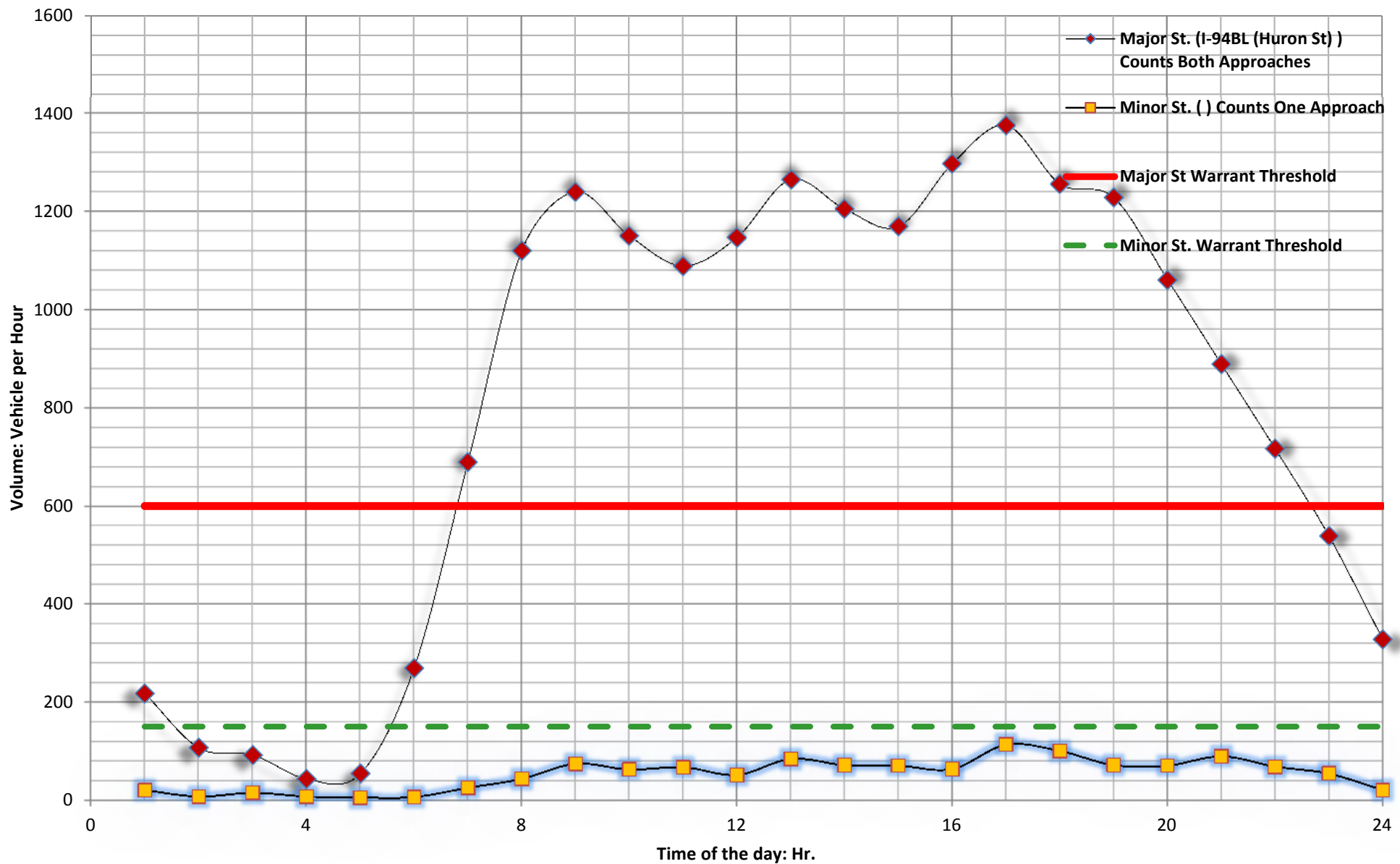
**B. Is the Interruption of Continuous Traffic Met? (Condition B)**

**NO**

**C. Combination of Warrants A and B Criteria Met?**

**NO**





## FIGURE 1: WARRANT 1A

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? NO

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: 14-012

I-94BL (Huron St) @ 3rd St

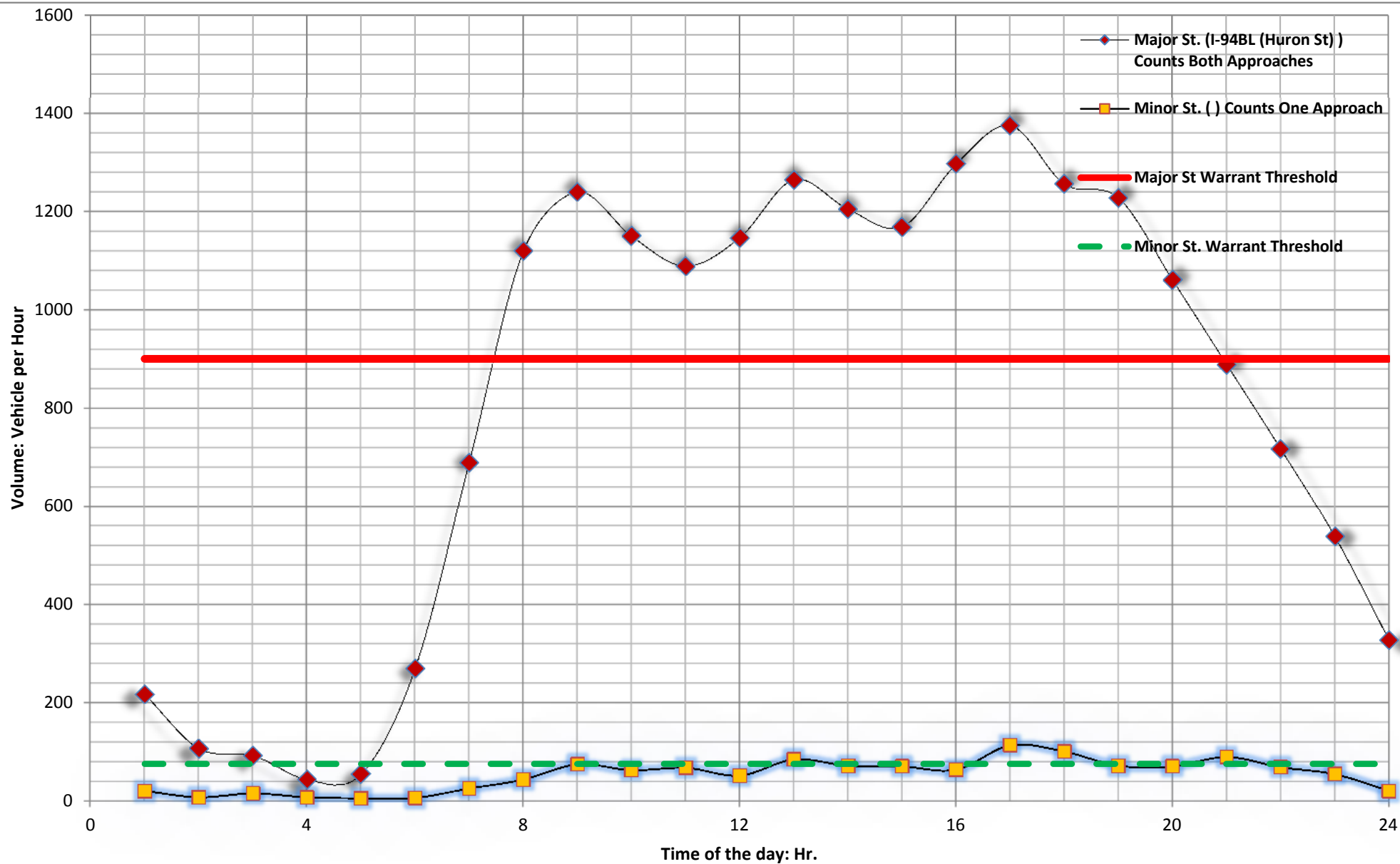
NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 0

Does this intersection meet Warrant 1A for signal installation? NO

Data Collection Date: 8/18/2017



## FIGURE 1: WARRANT 1B

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? NO

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: 14-012

I-94BL (Huron St) @ 3rd St

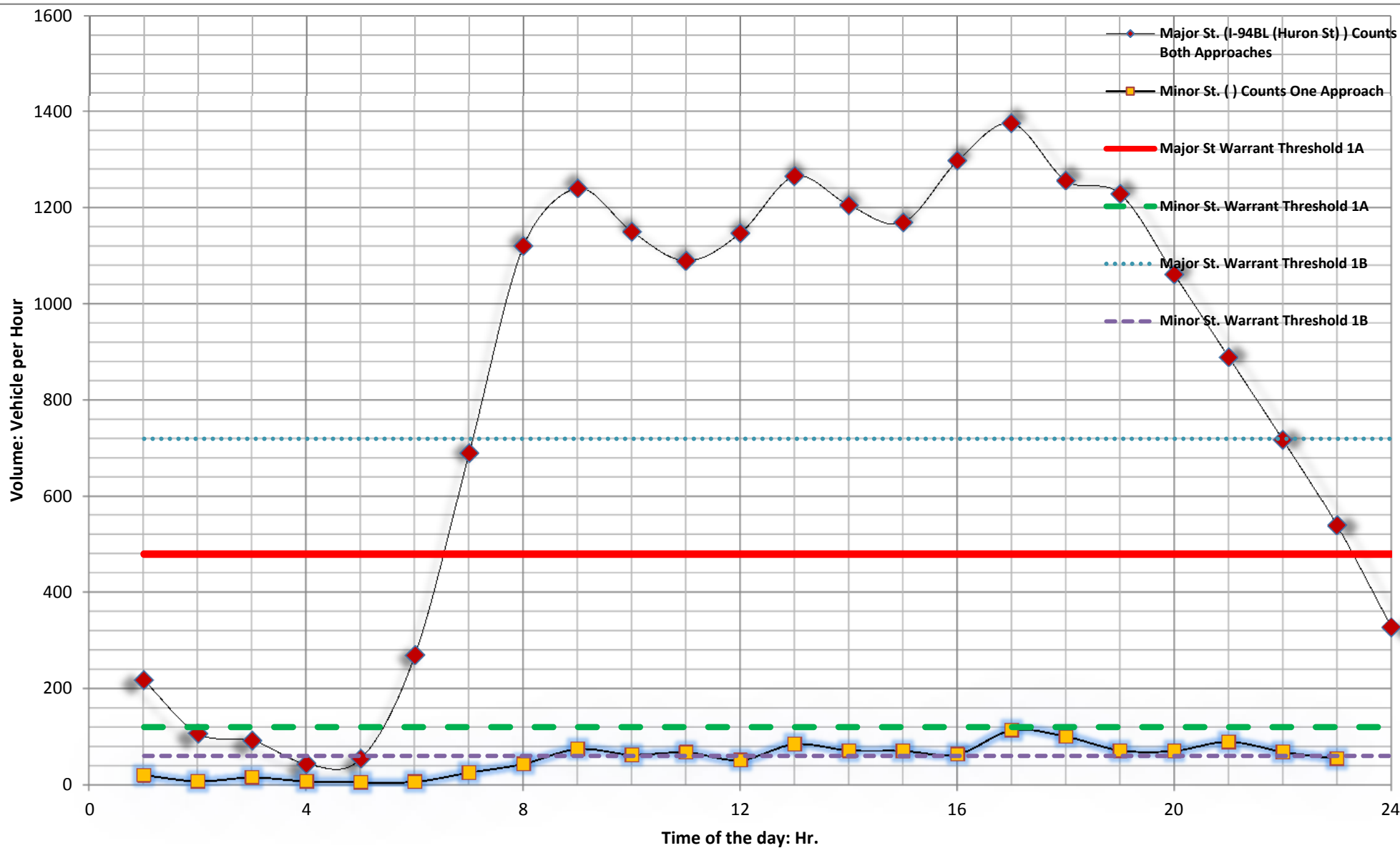
NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 4

Does this intersection meet Warrant 1B for signal installation? NO

Data Collection Date: 8/18/2017



## FIGURE 3: WARRANT 1A&B

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 56% ...

1- DUE TO SPEED? NO

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: 14-012

I-94BL (Huron St) @ 3rd St

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 0

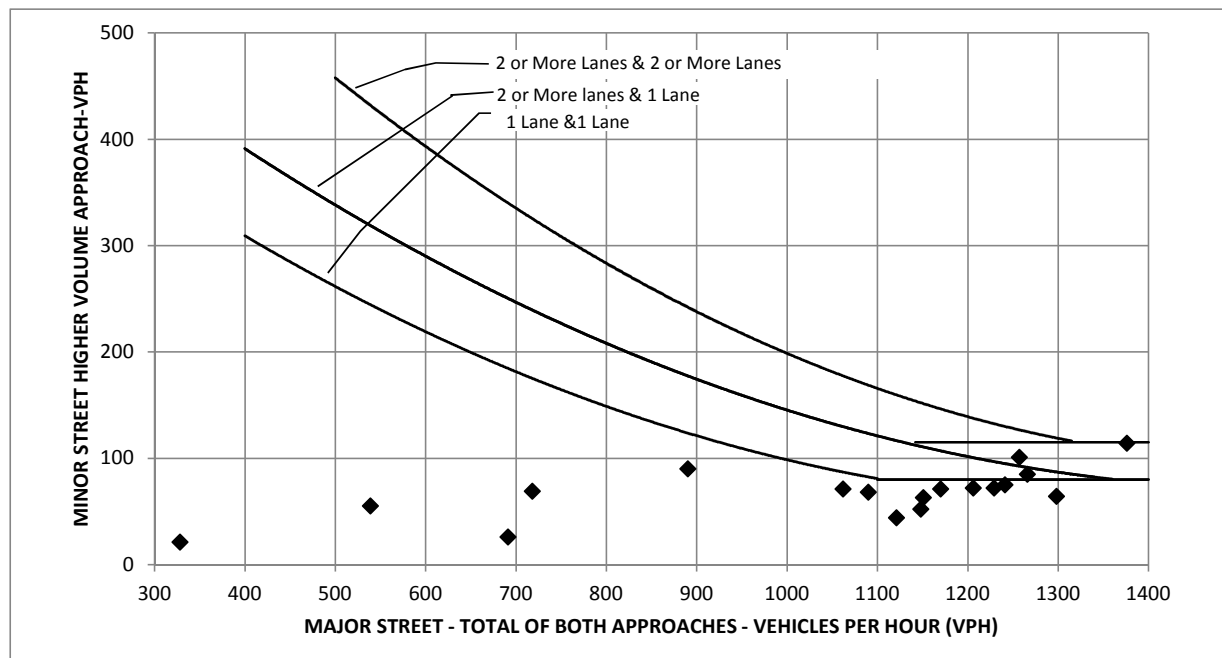
Does this intersection meet Warrant 1A&B for signal installation? NO

Data Collection Date: 8/18/2017

**Michigan Manual of Uniform Traffic Control Devices**  
**Worksheet for Signal Warrants (Section 4C)**  
**WARRANT 2: Four-Hour Vehicular Volume**

Spot Number:	14-012		
Intersection:	I-94BL (Huron St) @ 3rd St		
Date	8/28/2017	by	FTCH

2	: No. of Lanes on Major St.
1	: No. of Lanes on Minor St.
30	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

0

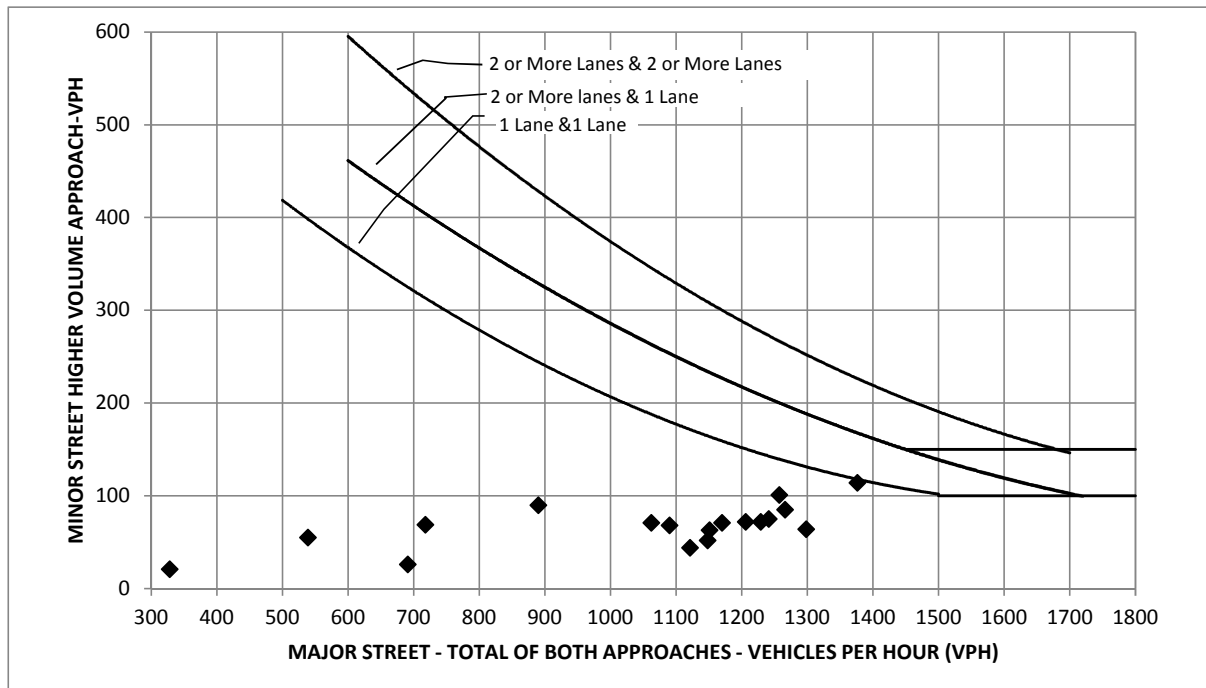
Is Warrant 2 (100%) Met?

NO

**Michigan Manual of Uniform Traffic Control Devices**  
**Worksheet for Signal Warrants (Section 4C)**  
**WARRANT 3 B(100%): Peak-Hour Vehicular Volume**

Spot Number:	14-012
Intersection:	I-94BL (Huron St) @ 3rd St
Date	8/28/2017 by FTCH

2	: No. of Lanes on Major St.
1	: No. of Lanes on Minor St.
30	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

0

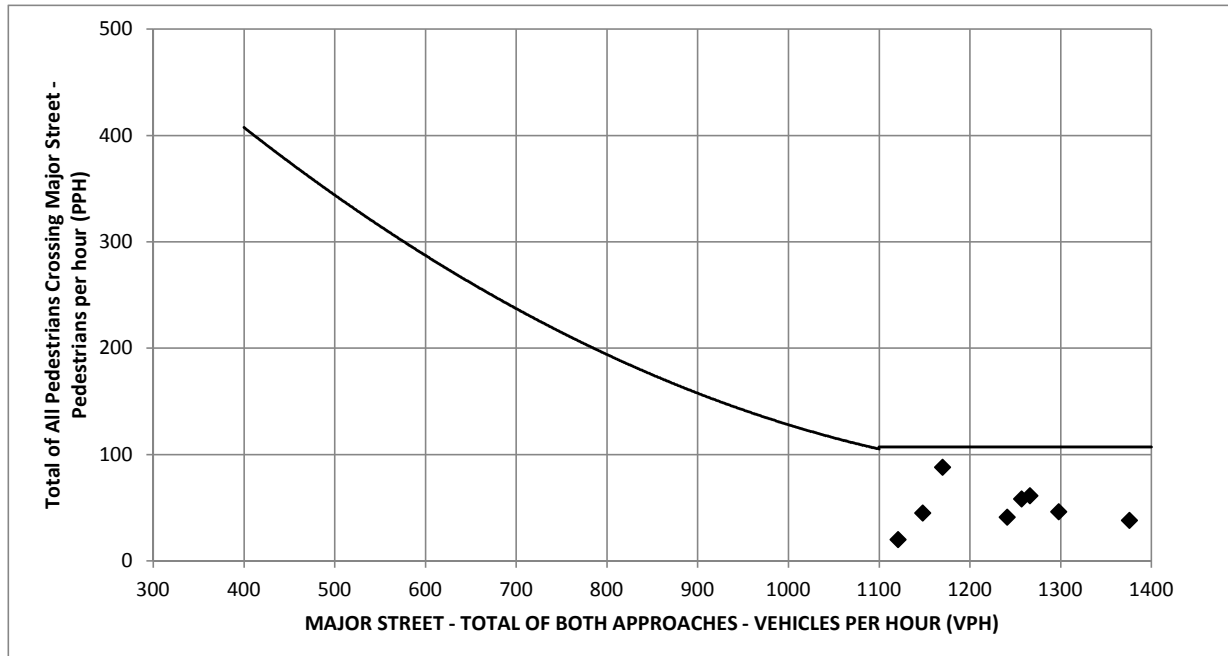
Is Warrant 3 B (100%) Met?

NO

**Michigan Manual of Uniform Traffic Control Devices**  
**Worksheet for Signal Warrants (Section 4C)**  
**WARRANT 4 (100%): Four-Hour Pedestrian Volume**

Spot Number:	14-012		
Intersection:	I-94BL (Huron St) @ 3rd St		
Date	8/28/2017	by	FTCH

800	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
30	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

0

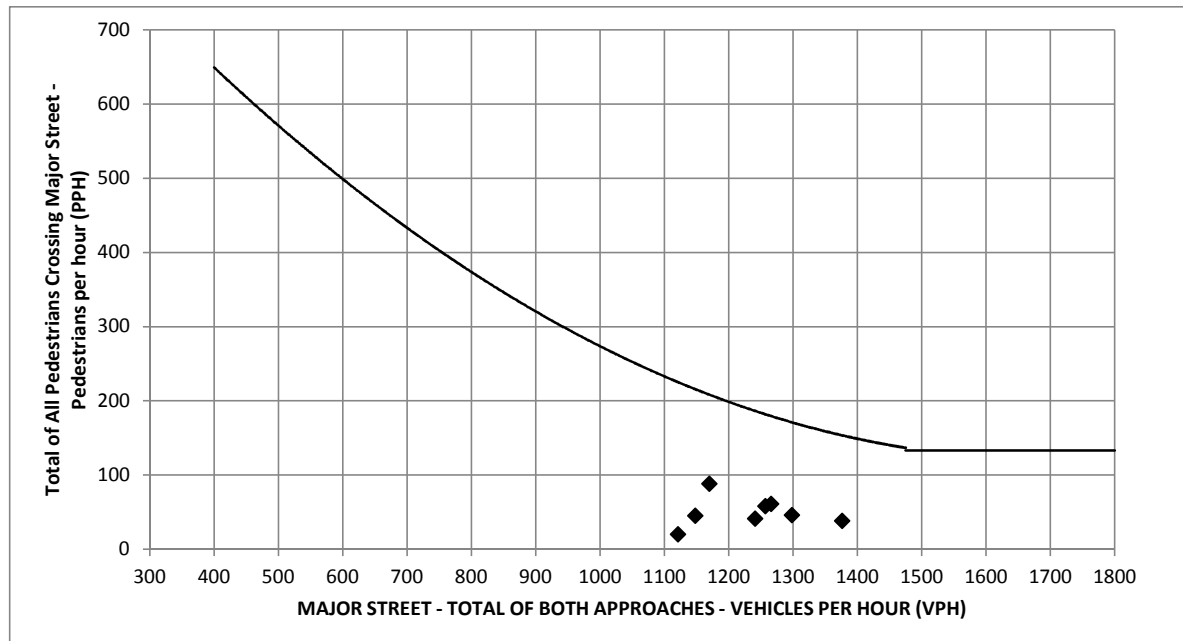
Is Warrant 4 B (100%): Four Hour Met?

NO

**Michigan Manual of Uniform Traffic Control Devices**  
**Worksheet for Signal Warrants (Section 4C)**  
**WARRANT 4 (100%): Peak-Hour Pedestrian Volume**

Spot Number:	14-012		
Intersection:	I-94BL (Huron St) @ 3rd St		
Date	8/28/2017	by	FTCH

800	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
30	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

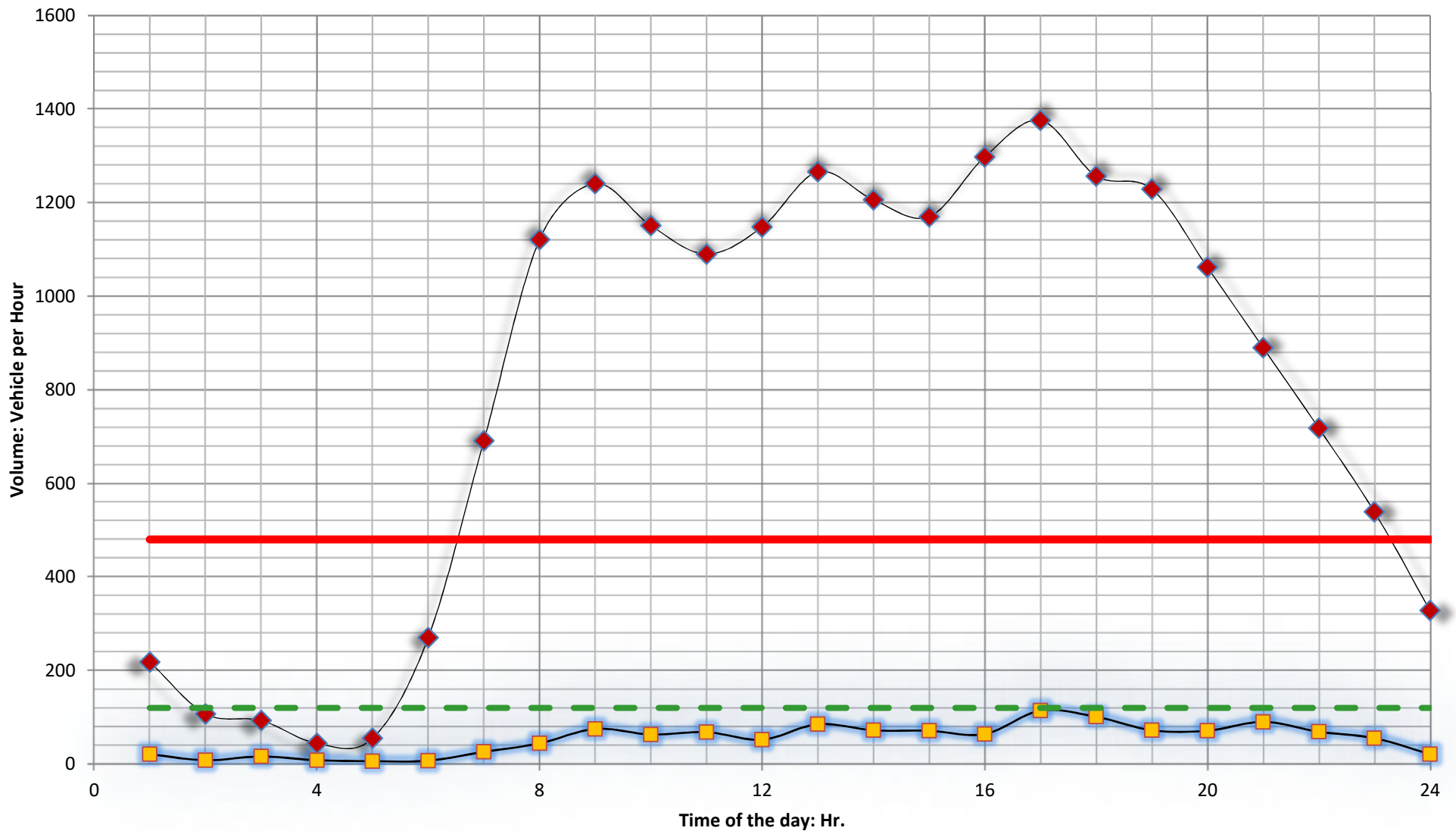
0

Is Warrant 4 B (100%): Peak Hour Met?

NO

<b>Michigan Manual of Uniform Traffic Control Devices</b> <b>Worksheet for Signal Warrants (Section 4C)</b> <b>WARRANT 7: Crash Experience</b>																
Spot Number:	14-012															
Intersection:	I-94BL (Huron St) @ 3rd St															
Date	8/28/2017	by	FTCH													
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: center;">2</td> <td>: No. of Lanes on Major St?</td> </tr> <tr> <td style="text-align: center;">1</td> <td>: No. of Lanes on Minor St?</td> </tr> <tr> <td style="text-align: center;">YES</td> <td>: Has adequate trial of remedial measure with adequate enforcement been tried?</td> </tr> <tr> <td style="text-align: center;">YES</td> <td>: Are there 5 or more Crashes Susceptable to Correction by Signalization in a 12 Month Period?</td> </tr> </table>									2	: No. of Lanes on Major St?	1	: No. of Lanes on Minor St?	YES	: Has adequate trial of remedial measure with adequate enforcement been tried?	YES	: Are there 5 or more Crashes Susceptable to Correction by Signalization in a 12 Month Period?
2	: No. of Lanes on Major St?															
1	: No. of Lanes on Minor St?															
YES	: Has adequate trial of remedial measure with adequate enforcement been tried?															
YES	: Are there 5 or more Crashes Susceptable to Correction by Signalization in a 12 Month Period?															
	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?								
Time	E-W	N-S														
00:01 - 01:00	218	21	480	120	NO	720	60	NO								
01:00 - 02:00	107	8	480	120	NO	720	60	NO								
02:00 - 03:00	93	16	480	120	NO	720	60	NO								
03:00 - 04:00	44	8	480	120	NO	720	60	NO								
04:00 - 05:00	55	6	480	120	NO	720	60	NO								
05:00 - 06:00	270	7	480	120	NO	720	60	NO								
06:00 - 07:00	691	26	480	120	NO	720	60	NO								
07:00 - 08:00	1121	44	480	120	NO	720	60	NO								
08:00 - 09:00	1241	75	480	120	NO	720	60	YES								
09:00 - 10:00	1151	63	480	120	NO	720	60	YES								
10:00 - 11:00	1090	68	480	120	NO	720	60	YES								
11:00 - 12:00	1148	52	480	120	NO	720	60	NO								
12:00 - 13:00	1266	85	480	120	NO	720	60	YES								
13:00 - 14:00	1206	72	480	120	NO	720	60	YES								
14:00 - 15:00	1170	71	480	120	NO	720	60	YES								
15:00 - 16:00	1298	64	480	120	NO	720	60	YES								
16:00 - 17:00	1376	114	480	120	NO	720	60	YES								
17:00 - 18:00	1257	101	480	120	NO	720	60	YES								
18:00 - 19:00	1229	72	480	120	NO	720	60	YES								
19:00 - 20:00	1062	71	480	120	NO	720	60	YES								
20:00 - 21:00	890	90	480	120	NO	720	60	YES								
21:00 - 22:00	718	69	480	120	NO	720	60	NO								
22:00 - 23:00	539	55	480	120	NO	720	60	NO								
23:00 - 00:00	328	21	480	120	NO	720	60	NO								
Is there a reduction in the warrant thresholds to 56% = <b>NO</b> Number of Hours that met the warrant 7A = <b>0</b> Number of Hours that met the warrant 7B = <b>12</b>																
A. Is the Minimum Vehicular Volume Warrant Met Based on Crash Patterns? (Condition A)								NO								
B. Is the Interruption of Continuous Traffic Met Based on Crash Patterns? (Condition B)								YES								





**FIGURE 1: WARRANT 7A**

Spot Number: **14-012**

**I-94BL (Huron St) @ 3rd St**

NO. OF LANES ON MAJOR ST.? **2**

NO. OF LANES ON MINOR ST.? **1**

Is there a reduction in the Warrant Threshold to 56%:

**NO**

Number of Hours that met the Warrant:

**0**

Does this intersection meet Warrant 7A for signal installation?

**NO**

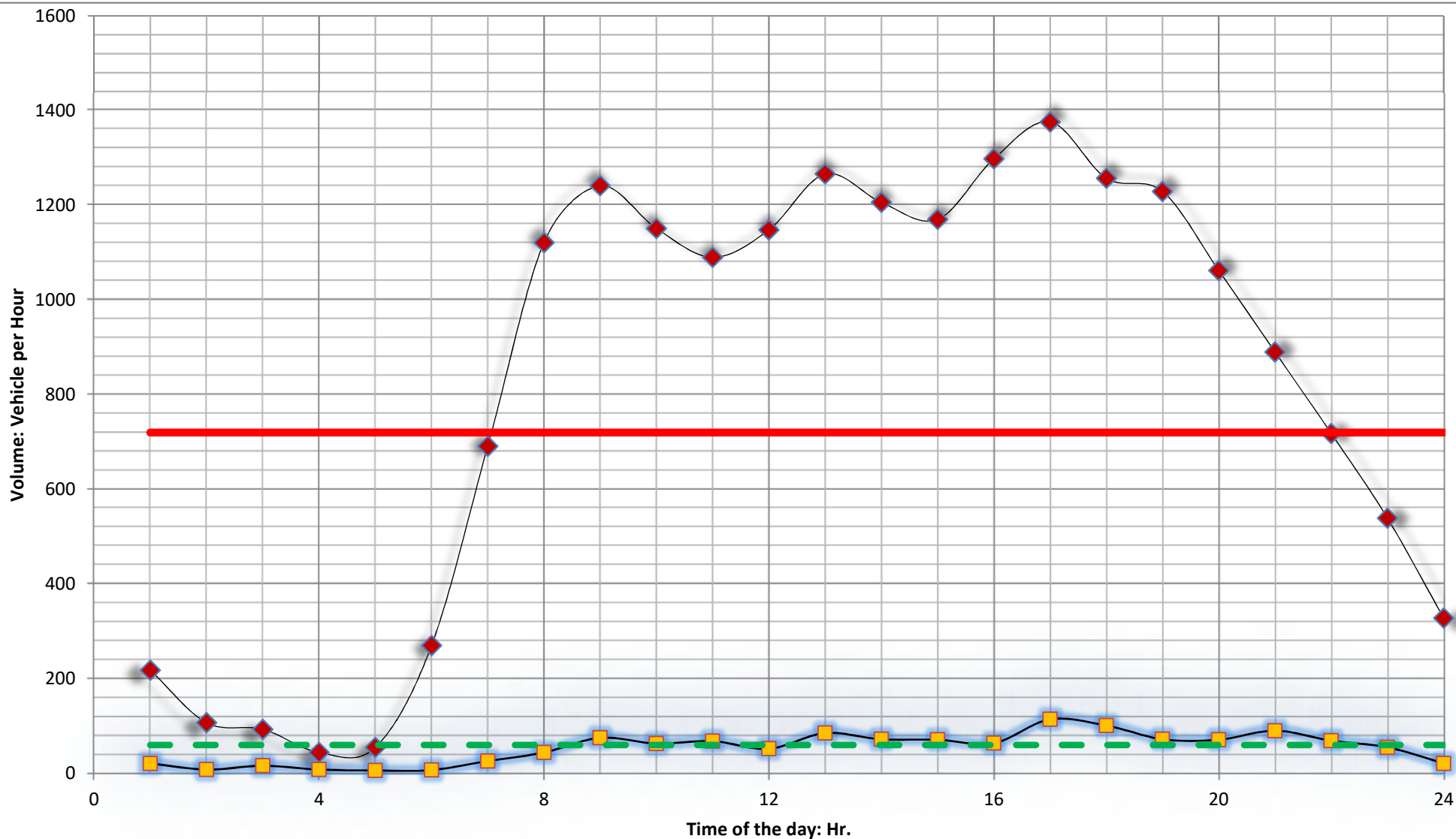
◆ Major St. (I-94BL (Huron St)) Counts Both Approaches

■ Minor St. ( ) Counts One Approach

— Major St Warrant Threshold

— Minor St. Warrant Threshold

Data Collection Date: **8/18/2017**



**FIGURE 2: WARRANT 7B**

Spot Number: 14-012

I-94BL (Huron St) @ 3rd St

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Is there a reduction in the Warrant Threshold to 56%:

NO

Number of Hours that met the Warrant:

12

Does this intersection meet Warrant 7B for signal installation?

YES

—◆— Major St. (I-94BL (Huron St) ) Counts Both Approaches

—■— Minor St. ( ) Counts One Approach

— Major St Warrant Threshold

— Minor St. Warrant Threshold

Data Collection Date: 8/18/2017

**Michigan Manual of Uniform Traffic Control Devices**  
**Worksheet for Signal Warrants (Section 4C)**  
**WARRANT 1: Eight-Hour Vehicular Volume**

Intersection:	I-94BL (Huron St) @ 3rd St (10% Increase)
Date	8/28/2017 by FTCH

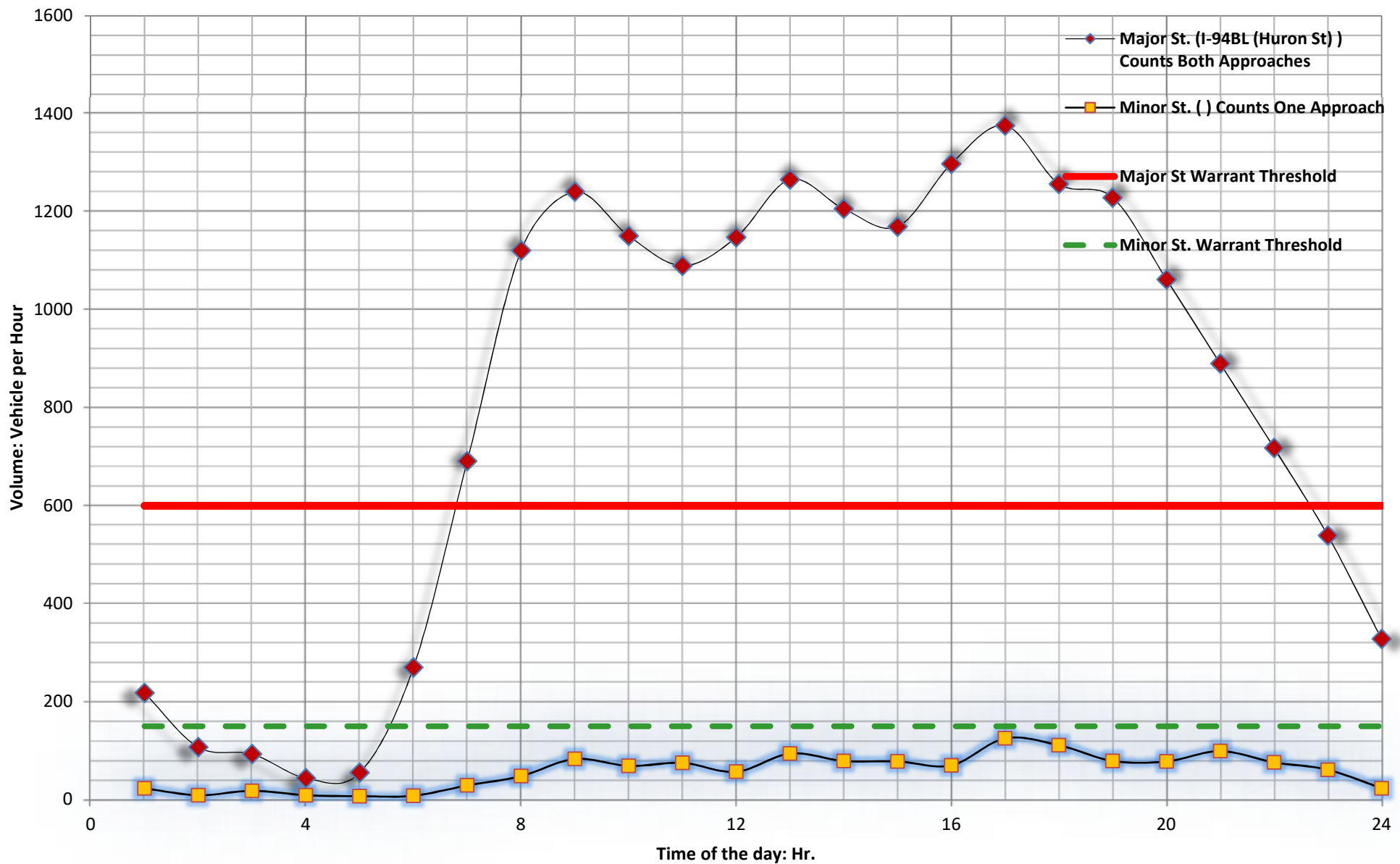
2	: No. of Lanes on Major St?
1	: No. of Lanes on Minor St?
30	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: if answer 4 is Yes, then what is the of the population isolated community?
YES	: Have other remedial measures been tried?

USE 100% FOR WARRANTS 1A AND 1B. USE 80% FOR WARRANT 1A&B

	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?	Combination Major A	Combination Minor A	Combination Major B	Combination Minor B	Warrant Condition A&B met?
<b>Time</b>	<b>E-W</b>	<b>N-S</b>											
00:01 - 01:00	218	23	600	150	NO	900	75	NO	480	120	720	60	NO
01:00 - 02:00	107	9	600	150	NO	900	75	NO	480	120	720	60	NO
02:00 - 03:00	93	18	600	150	NO	900	75	NO	480	120	720	60	NO
03:00 - 04:00	44	9	600	150	NO	900	75	NO	480	120	720	60	NO
04:00 - 05:00	55	7	600	150	NO	900	75	NO	480	120	720	60	NO
05:00 - 06:00	270	8	600	150	NO	900	75	NO	480	120	720	60	NO
06:00 - 07:00	691	29	600	150	NO	900	75	NO	480	120	720	60	NO
07:00 - 08:00	1121	48	600	150	NO	900	75	NO	480	120	720	60	NO
08:00 - 09:00	1241	83	600	150	NO	900	75	YES	480	120	720	60	NO
09:00 - 10:00	1151	69	600	150	NO	900	75	NO	480	120	720	60	NO
10:00 - 11:00	1090	75	600	150	NO	900	75	YES	480	120	720	60	NO
11:00 - 12:00	1148	57	600	150	NO	900	75	NO	480	120	720	60	NO
12:00 - 13:00	1266	94	600	150	NO	900	75	YES	480	120	720	60	NO
13:00 - 14:00	1206	79	600	150	NO	900	75	YES	480	120	720	60	NO
14:00 - 15:00	1170	78	600	150	NO	900	75	YES	480	120	720	60	NO
15:00 - 16:00	1298	70	600	150	NO	900	75	NO	480	120	720	60	NO
16:00 - 17:00	1376	125	600	150	NO	900	75	YES	480	120	720	60	YES
17:00 - 18:00	1257	111	600	150	NO	900	75	YES	480	120	720	60	NO
18:00 - 19:00	1229	79	600	150	NO	900	75	YES	480	120	720	60	NO
19:00 - 20:00	1062	78	600	150	NO	900	75	YES	480	120	720	60	NO
20:00 - 21:00	890	99	600	150	NO	900	75	NO	480	120	720	60	NO
21:00 - 22:00	718	76	600	150	NO	900	75	NO	480	120	720	60	NO
22:00 - 23:00	539	61	600	150	NO	900	75	NO	480	120	720	60	NO
23:00 - 00:00	328	23	600	150	NO	900	75	NO	480	120	720	60	NO

Number of Hours that met the warrant 1A =	0
Number of Hours that met the warrant 1B =	9
Number of Hours that met the warrant 1 A & B =	1

A. Is the Minimum Vehicular Volume Warrant Met? (Condition A)	NO
B. Is the Interruption of Continuous Traffic Met? (Condition B)	YES
C. Combination of Warrants A and B Criteria Met?	NO



## FIGURE 1: WARRANT 1A

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? NO

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: 14-012

I-94BL (Huron St) @ 3rd St (10% Increase)

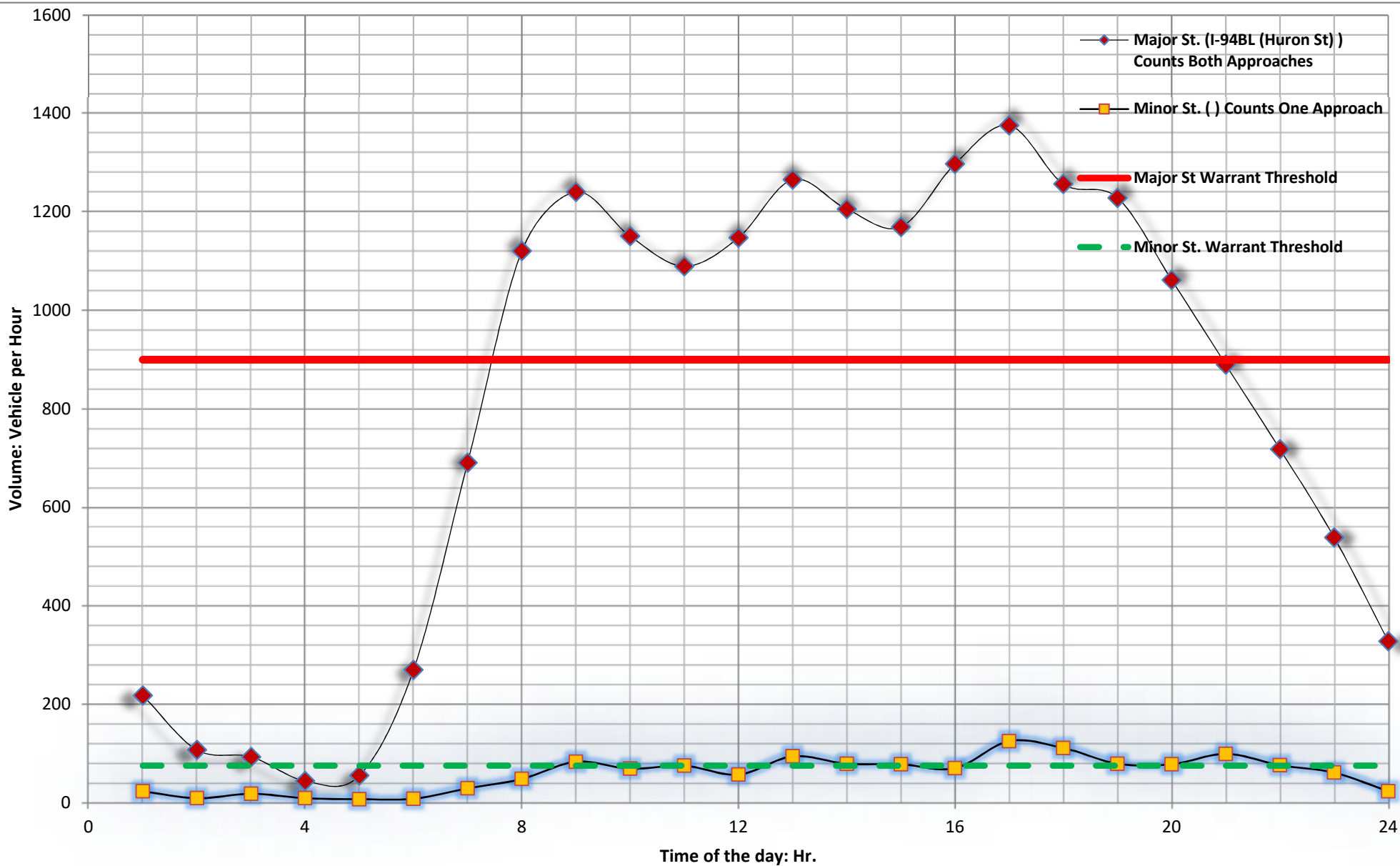
NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 0

Does this intersection meet Warrant 1A for signal installation? NO

Data Collection Date: 8/18/2017



## FIGURE 1: WARRANT 1B

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? NO

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: 14-012

I-94BL (Huron St) @ 3rd St (10% Increase)

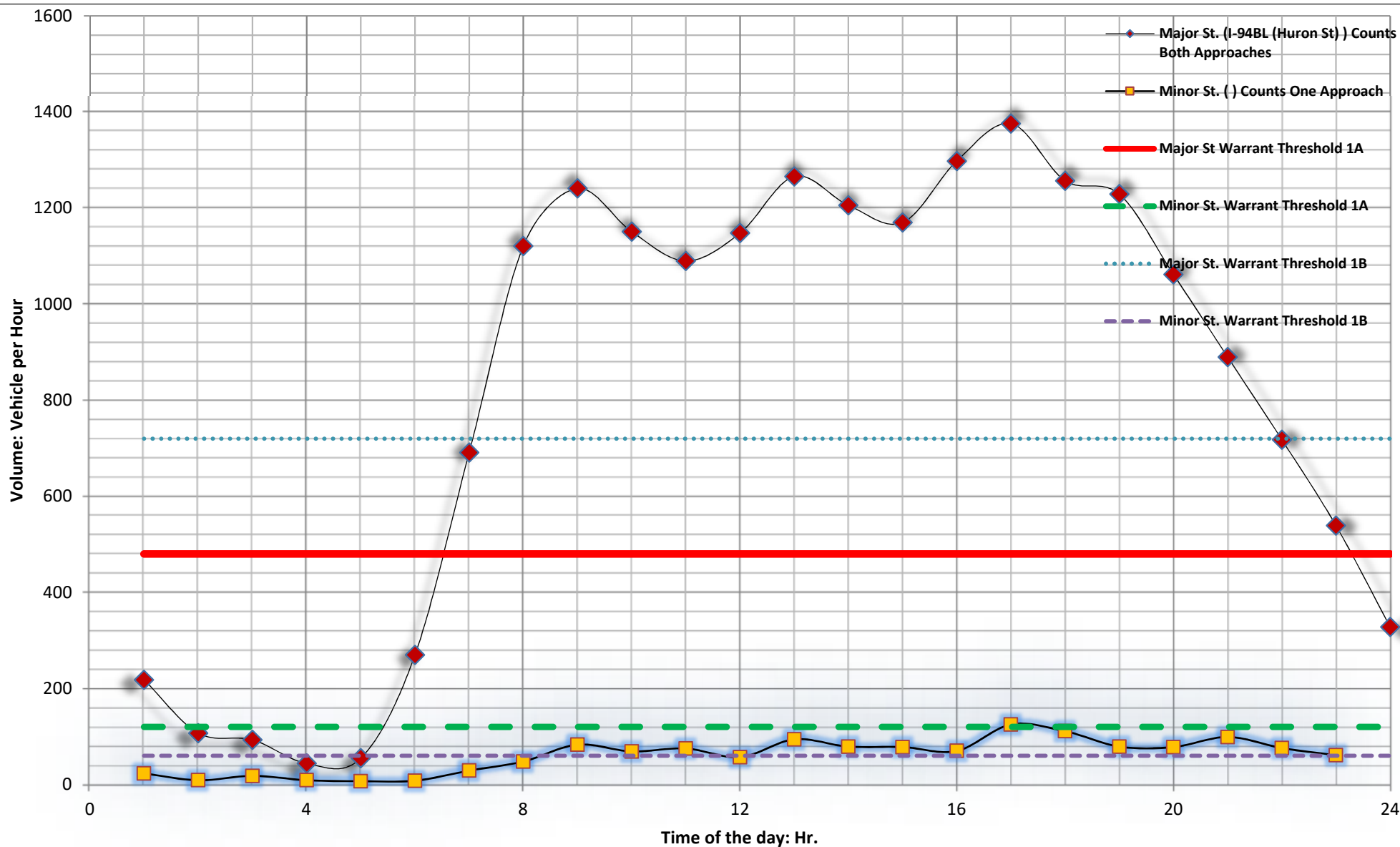
NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 9

Does this intersection meet Warrant 1B for signal installation? YES

Data Collection Date: 8/18/2017



## FIGURE 3: WARRANT 1A&B

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 56% ...

1- DUE TO SPEED? NO

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: 14-012

I-94BL (Huron St) @ 3rd St (10% Increase)

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 1

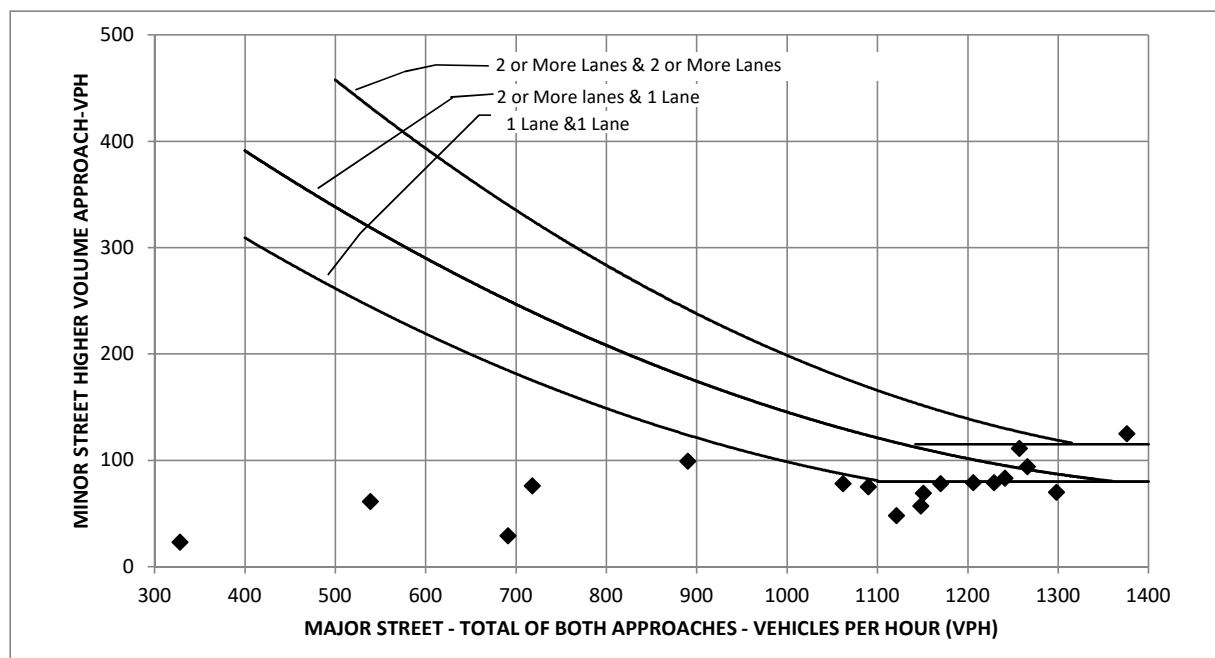
Does this intersection meet Warrant 1A&B for signal installation? NO

Data Collection Date: 8/18/2017

**Michigan Manual of Uniform Traffic Control Devices**  
**Worksheet for Signal Warrants (Section 4C)**  
**WARRANT 2: Four-Hour Vehicular Volume**

Spot Number:	14-012		
Intersection:	I-94BL (Huron St) @ 3rd St (10% Increase)		
Date	8/28/2017	by	FTCH

2	: No. of Lanes on Major St.
1	: No. of Lanes on Minor St.
30	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

1

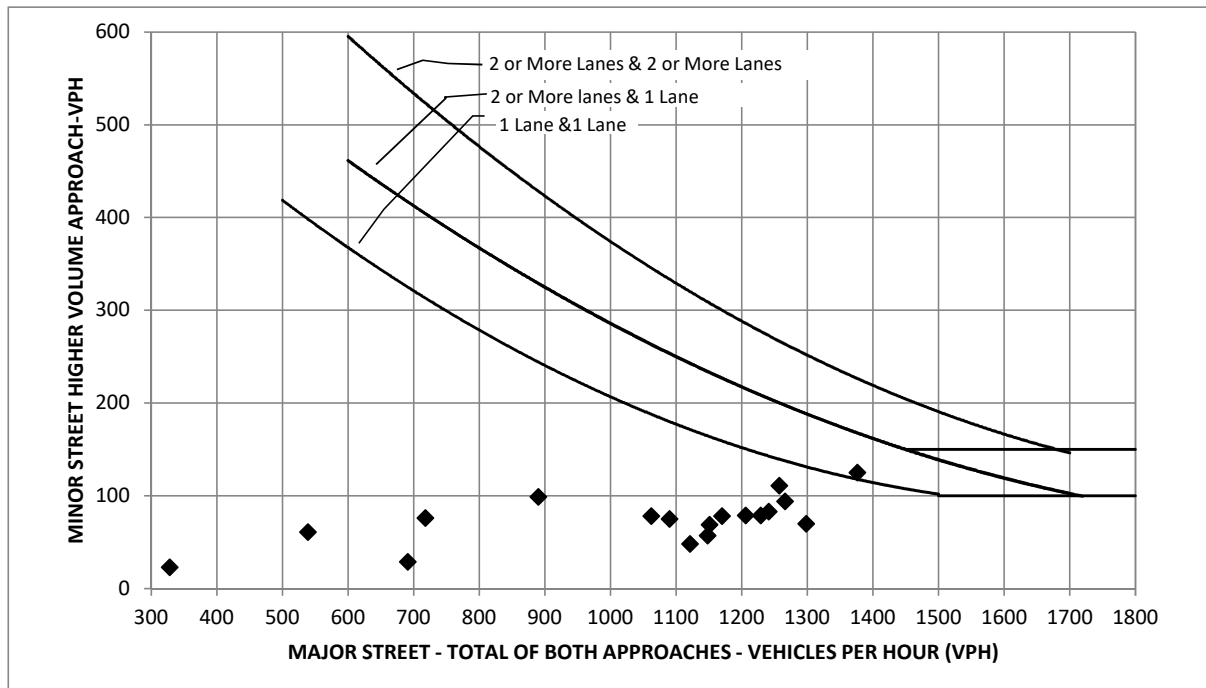
Is Warrant 2 (100%) Met?

NO

**Michigan Manual of Uniform Traffic Control Devices**  
**Worksheet for Signal Warrants (Section 4C)**  
**WARRANT 3 B(100%): Peak-Hour Vehicular Volume**

Spot Number:	14-012
Intersection:	I-94BL (Huron St) @ 3rd St (10% Increase)
Date	8/28/2017 by FTCH

2	: No. of Lanes on Major St.
1	: No. of Lanes on Minor St.
30	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



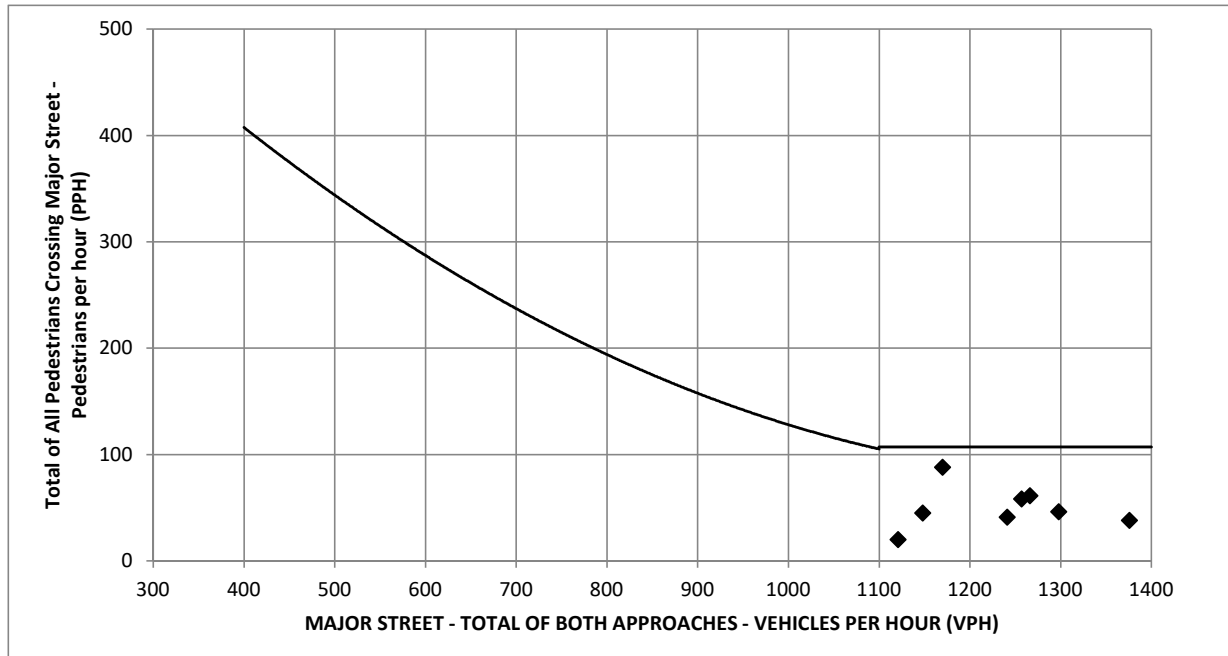
How Many Hours Are Met	0
Is Warrant 3 B (100%) Met?	NO



**Michigan Manual of Uniform Traffic Control Devices**  
**Worksheet for Signal Warrants (Section 4C)**  
**WARRANT 4 (100%): Four-Hour Pedestrian Volume**

Spot Number:	14-012		
Intersection:	I-94BL (Huron St) @ 3rd St (10% Increase)		
Date	8/28/2017	by	FTCH

800	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
30	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

0

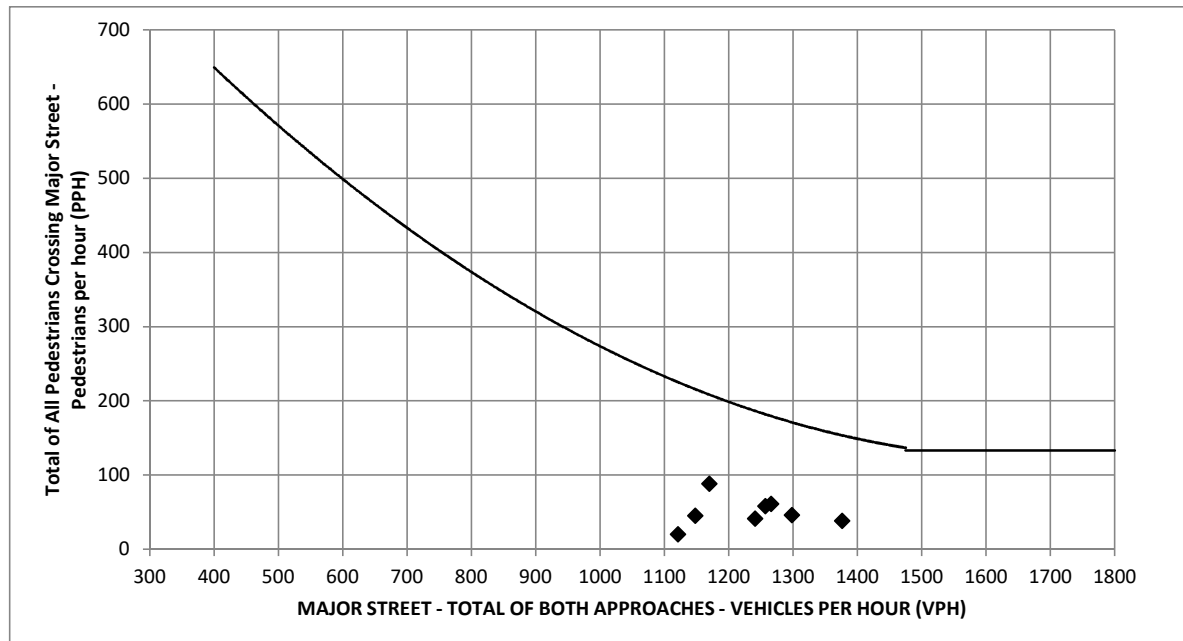
Is Warrant 4 B (100%): Four Hour Met?

NO

**Michigan Manual of Uniform Traffic Control Devices**  
**Worksheet for Signal Warrants (Section 4C)**  
**WARRANT 4 (100%): Peak-Hour Pedestrian Volume**

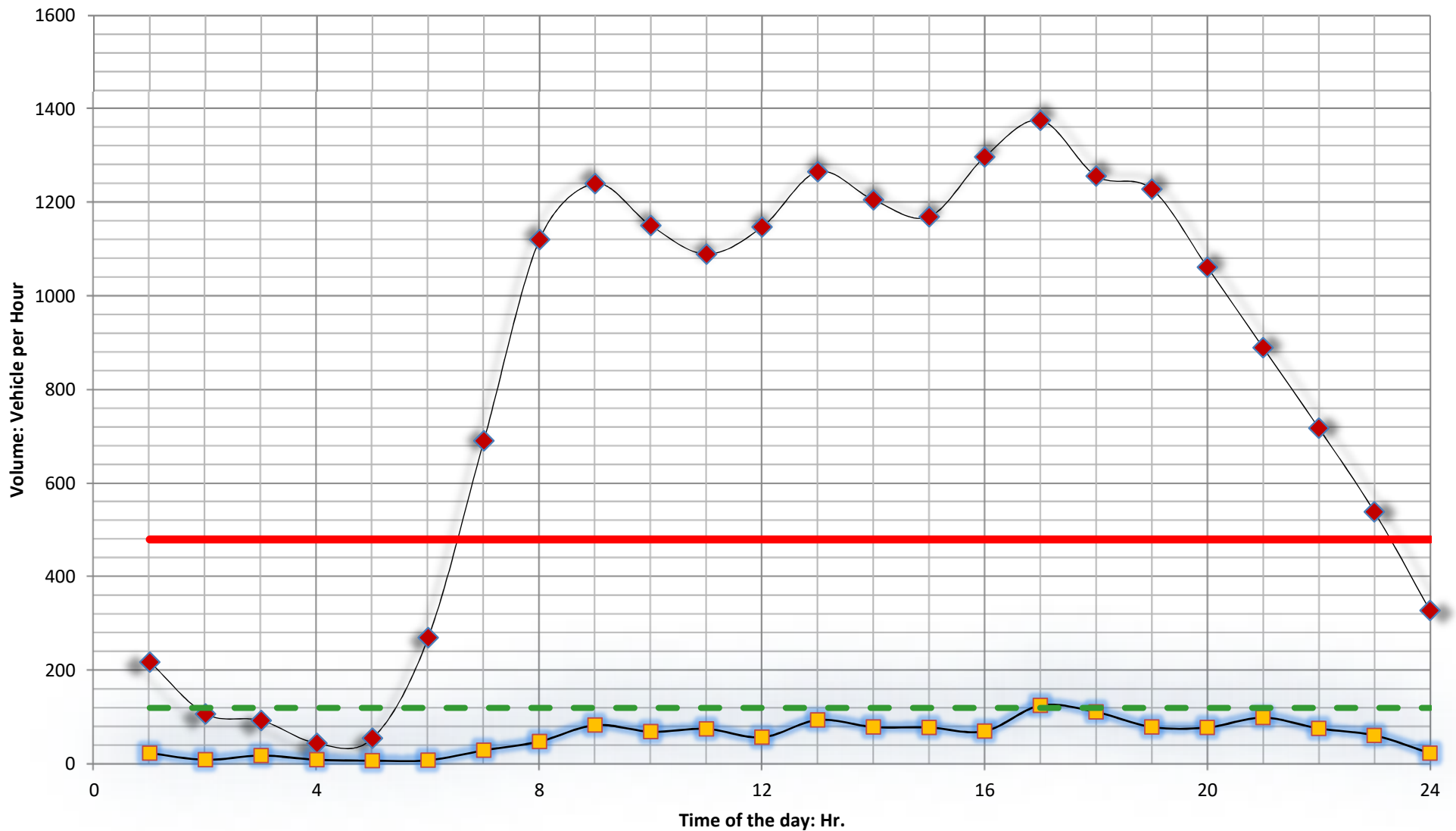
Spot Number:	14-012		
Intersection:	I-94BL (Huron St) @ 3rd St (10% Increase)		
Date	8/28/2017	by	FTCH

800	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
30	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met	0
Is Warrant 4 B (100%): Peak Hour Met?	NO

Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 7: Crash Experience								
Spot Number:	14-012							
Intersection:	I-94BL (Huron St) @ 3rd St (10% Increase)							
Date	8/28/2017	by	FTCH					
		<div style="border: 1px solid black; padding: 2px;"> <div style="display: flex; justify-content: space-between;"> <span><b>2</b></span> <span>: No. of Lanes on Major St?</span> </div> <div style="display: flex; justify-content: space-between;"> <span><b>1</b></span> <span>: No. of Lanes on Minor St?</span> </div> <div style="display: flex; justify-content: space-between;"> <span><b>YES</b></span> <span>: Has adequate trial of remedial measure with adequate enforcement been tried?</span> </div> <div style="display: flex; justify-content: space-between;"> <span><b>YES</b></span> <span>: Are there 5 or more Crashes Susceptable to Correction by Signalization in a 12 Month Period?</span> </div> </div>						
	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?
<b>Time</b>	<b>E-W</b>	<b>N-S</b>						
00:01 - 01:00	218	23	480	120	NO	720	60	NO
01:00 - 02:00	107	9	480	120	NO	720	60	NO
02:00 - 03:00	93	18	480	120	NO	720	60	NO
03:00 - 04:00	44	9	480	120	NO	720	60	NO
04:00 - 05:00	55	7	480	120	NO	720	60	NO
05:00 - 06:00	270	8	480	120	NO	720	60	NO
06:00 - 07:00	691	29	480	120	NO	720	60	NO
07:00 - 08:00	1121	48	480	120	NO	720	60	NO
08:00 - 09:00	1241	83	480	120	NO	720	60	YES
09:00 - 10:00	1151	69	480	120	NO	720	60	YES
10:00 - 11:00	1090	75	480	120	NO	720	60	YES
11:00 - 12:00	1148	57	480	120	NO	720	60	NO
12:00 - 13:00	1266	94	480	120	NO	720	60	YES
13:00 - 14:00	1206	79	480	120	NO	720	60	YES
14:00 - 15:00	1170	78	480	120	NO	720	60	YES
15:00 - 16:00	1298	70	480	120	NO	720	60	YES
16:00 - 17:00	1376	125	480	120	YES	720	60	YES
17:00 - 18:00	1257	111	480	120	NO	720	60	YES
18:00 - 19:00	1229	79	480	120	NO	720	60	YES
19:00 - 20:00	1062	78	480	120	NO	720	60	YES
20:00 - 21:00	890	99	480	120	NO	720	60	YES
21:00 - 22:00	718	76	480	120	NO	720	60	NO
22:00 - 23:00	539	61	480	120	NO	720	60	NO
23:00 - 00:00	328	23	480	120	NO	720	60	NO
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div> <p>Is there a reduction in the warrant thresholds to 56% = <b>NO</b></p> <p>Number of Hours that met the warrant 7A = <div style="border: 1px solid black; padding: 2px 10px;">1</div></p> <p>Number of Hours that met the warrant 7B = <div style="border: 1px solid black; padding: 2px 10px;">12</div></p> </div> </div>								
<b>A. Is the Minimum Vehicular Volume Warrant Met Based on Crash Patterns? (Condition A)</b>								<b>NO</b>
<b>B. Is the Interruption of Continuous Traffic Met Based on Crash Patterns? (Condition B)</b>								<b>YES</b>



**FIGURE 1: WARRANT 7A**

Spot Number: **14-012**

**I-94BL (Huron St) @ 3rd St (10% Increase)**

NO. OF LANES ON MAJOR ST.? **2**

NO. OF LANES ON MINOR ST.? **1**

Is there a reduction in the Warrant Threshold to 56%:

**NO**

Number of Hours that met the Warrant:

**1**

Does this intersection meet Warrant 7A for signal installation?

**NO**

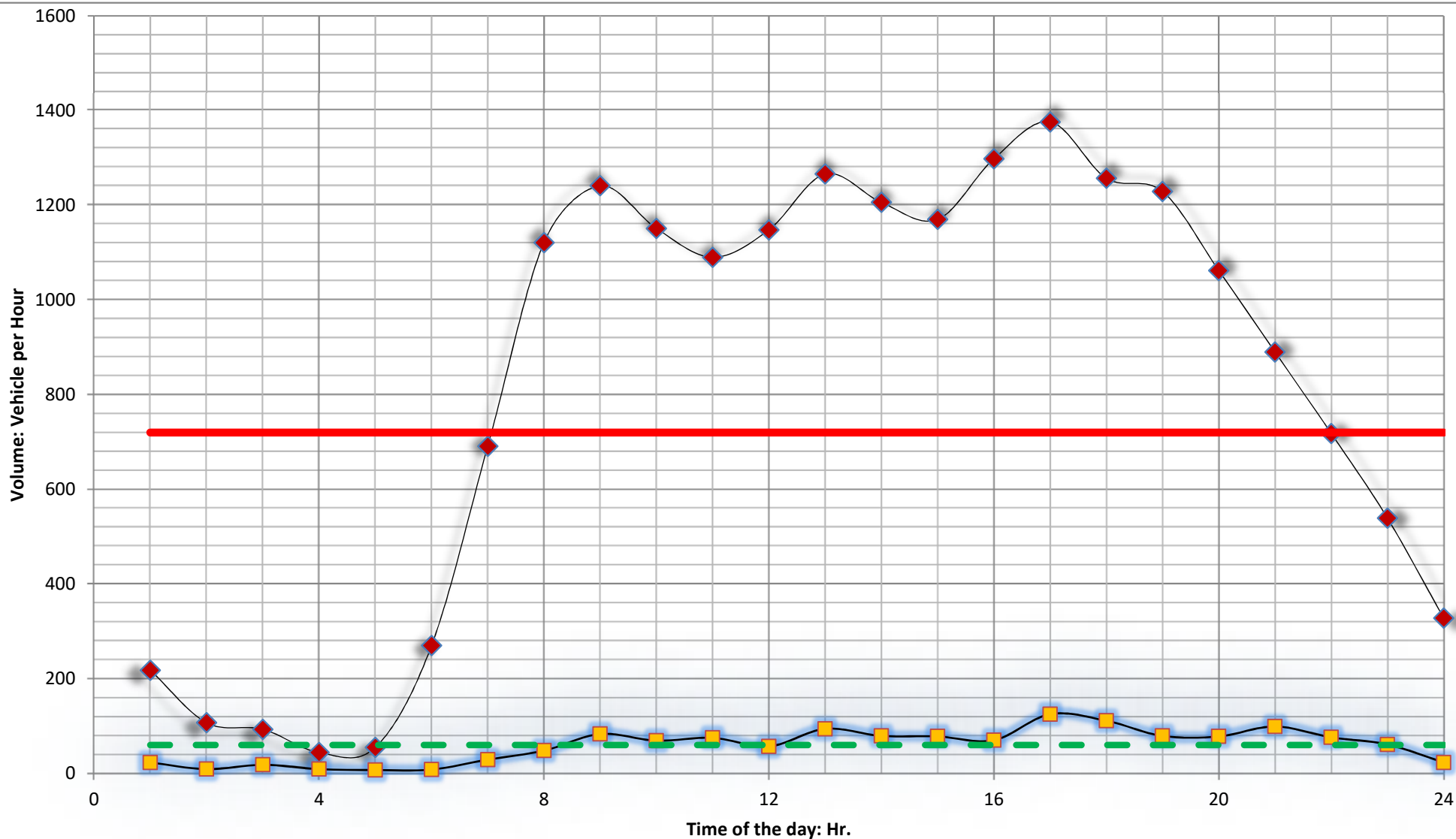
◆ Major St. (I-94BL (Huron St)) Counts Both Approaches

■ Minor St. ( ) Counts One Approach

— Major St Warrant Threshold

— Minor St. Warrant Threshold

Data Collection Date: **8/18/2017**



**FIGURE 2: WARRANT 7B**

Spot Number: 14-012

I-94BL (Huron St) @ 3rd St (10% Increase)

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Is there a reduction in the Warrant Threshold to 56%:

NO

Number of Hours that met the Warrant:

12

Does this intersection meet Warrant 7B for signal installation?

YES

—◆— Major St. (I-94BL (Huron St)) Counts Both Approaches

—■— Minor St. ( ) Counts One Approach

— Major St Warrant Threshold

— Minor St. Warrant Threshold

Data Collection Date: 8/18/2017

**Michigan Manual of Uniform Traffic Control Devices**  
**Worksheet for Signal Warrants (Section 4C)**  
**WARRANT 1: Eight-Hour Vehicular Volume**

Intersection:	I-94BL (Huron St) @ 3rd St (20% Increase)
Date	8/28/2017 by FTCH

2	: No. of Lanes on Major St?
1	: No. of Lanes on Minor St?
30	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: if answer 4 is Yes, then what is the of the population isolated community?
YES	: Have other remedial measures been tried?

USE 100% FOR WARRANTS 1A AND 1B. USE 80% FOR WARRANT 1A&B

	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?	Combination Major A	Combination Minor A	Combination Major B	Combination Minor B	Warrant Condition A&B met?
<b>Time</b>	<b>E-W</b>	<b>N-S</b>											
00:01 - 01:00	218	25	600	150	NO	900	75	NO	480	120	720	60	NO
01:00 - 02:00	107	10	600	150	NO	900	75	NO	480	120	720	60	NO
02:00 - 03:00	93	19	600	150	NO	900	75	NO	480	120	720	60	NO
03:00 - 04:00	44	10	600	150	NO	900	75	NO	480	120	720	60	NO
04:00 - 05:00	55	7	600	150	NO	900	75	NO	480	120	720	60	NO
05:00 - 06:00	270	8	600	150	NO	900	75	NO	480	120	720	60	NO
06:00 - 07:00	691	31	600	150	NO	900	75	NO	480	120	720	60	NO
07:00 - 08:00	1121	53	600	150	NO	900	75	NO	480	120	720	60	NO
08:00 - 09:00	1241	90	600	150	NO	900	75	YES	480	120	720	60	NO
09:00 - 10:00	1151	76	600	150	NO	900	75	YES	480	120	720	60	NO
10:00 - 11:00	1090	82	600	150	NO	900	75	YES	480	120	720	60	NO
11:00 - 12:00	1148	62	600	150	NO	900	75	NO	480	120	720	60	NO
12:00 - 13:00	1266	102	600	150	NO	900	75	YES	480	120	720	60	NO
13:00 - 14:00	1206	86	600	150	NO	900	75	YES	480	120	720	60	NO
14:00 - 15:00	1170	85	600	150	NO	900	75	YES	480	120	720	60	NO
15:00 - 16:00	1298	77	600	150	NO	900	75	YES	480	120	720	60	NO
16:00 - 17:00	1376	137	600	150	NO	900	75	YES	480	120	720	60	YES
17:00 - 18:00	1257	121	600	150	NO	900	75	YES	480	120	720	60	YES
18:00 - 19:00	1229	86	600	150	NO	900	75	YES	480	120	720	60	NO
19:00 - 20:00	1062	85	600	150	NO	900	75	YES	480	120	720	60	NO
20:00 - 21:00	890	108	600	150	NO	900	75	NO	480	120	720	60	NO
21:00 - 22:00	718	83	600	150	NO	900	75	NO	480	120	720	60	NO
22:00 - 23:00	539	66	600	150	NO	900	75	NO	480	120	720	60	NO
23:00 - 00:00	328	25	600	150	NO	900	75	NO	480	120	720	60	NO

Number of Hours that met the warrant 1A = 0

Number of Hours that met the warrant 1B = 11

Number of Hours that met the warrant 1 A & B = 2

A. Is the Minimum Vehicular Volume Warrant Met? (Condition A)

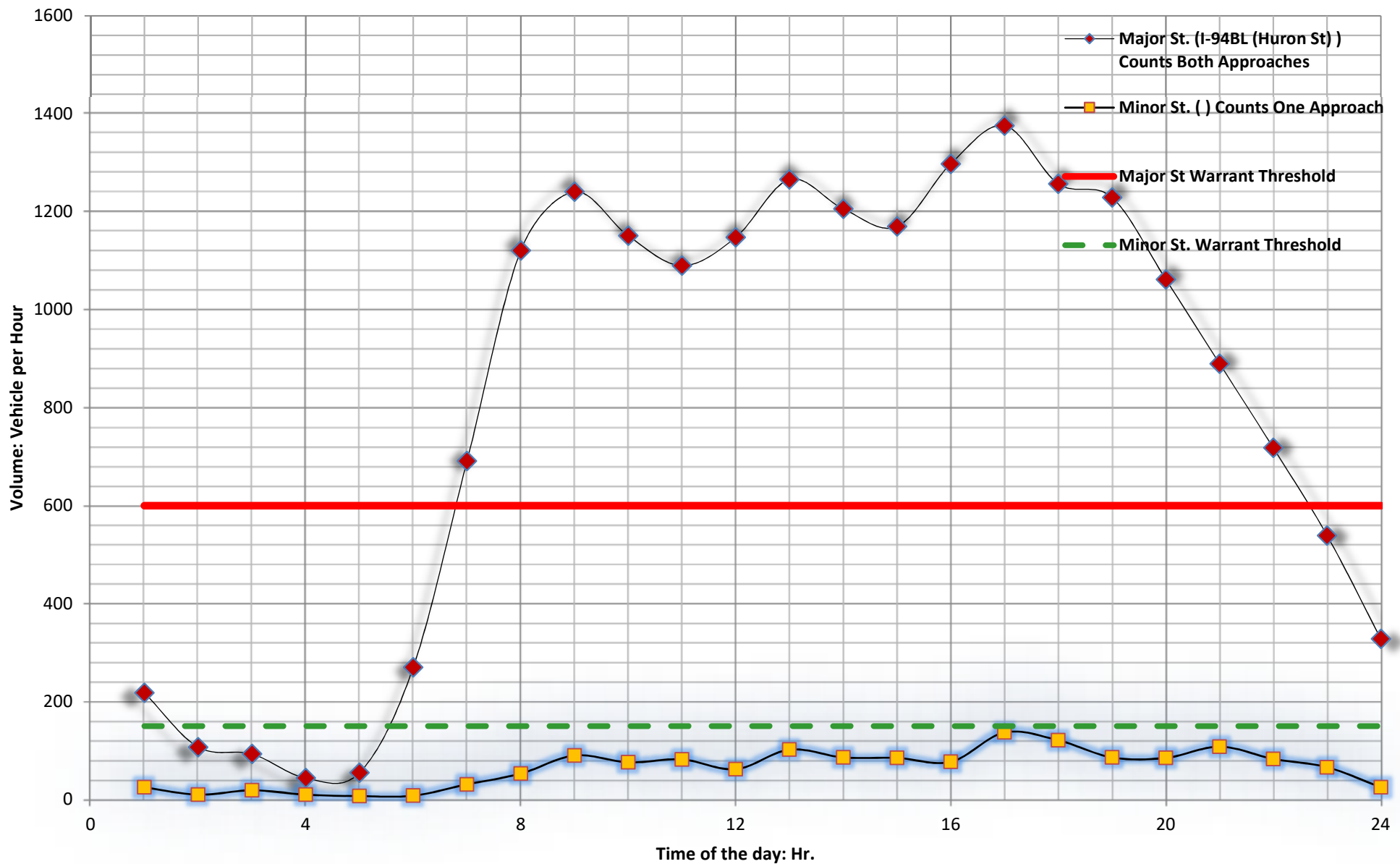
NO

B. Is the Interruption of Continuous Traffic Met? (Condition B)

YES

C. Combination of Warrants A and B Criteria Met?

NO



## FIGURE 1: WARRANT 1A

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? NO

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: 14-012

I-94BL (Huron St) @ 3rd St (20% Increase)

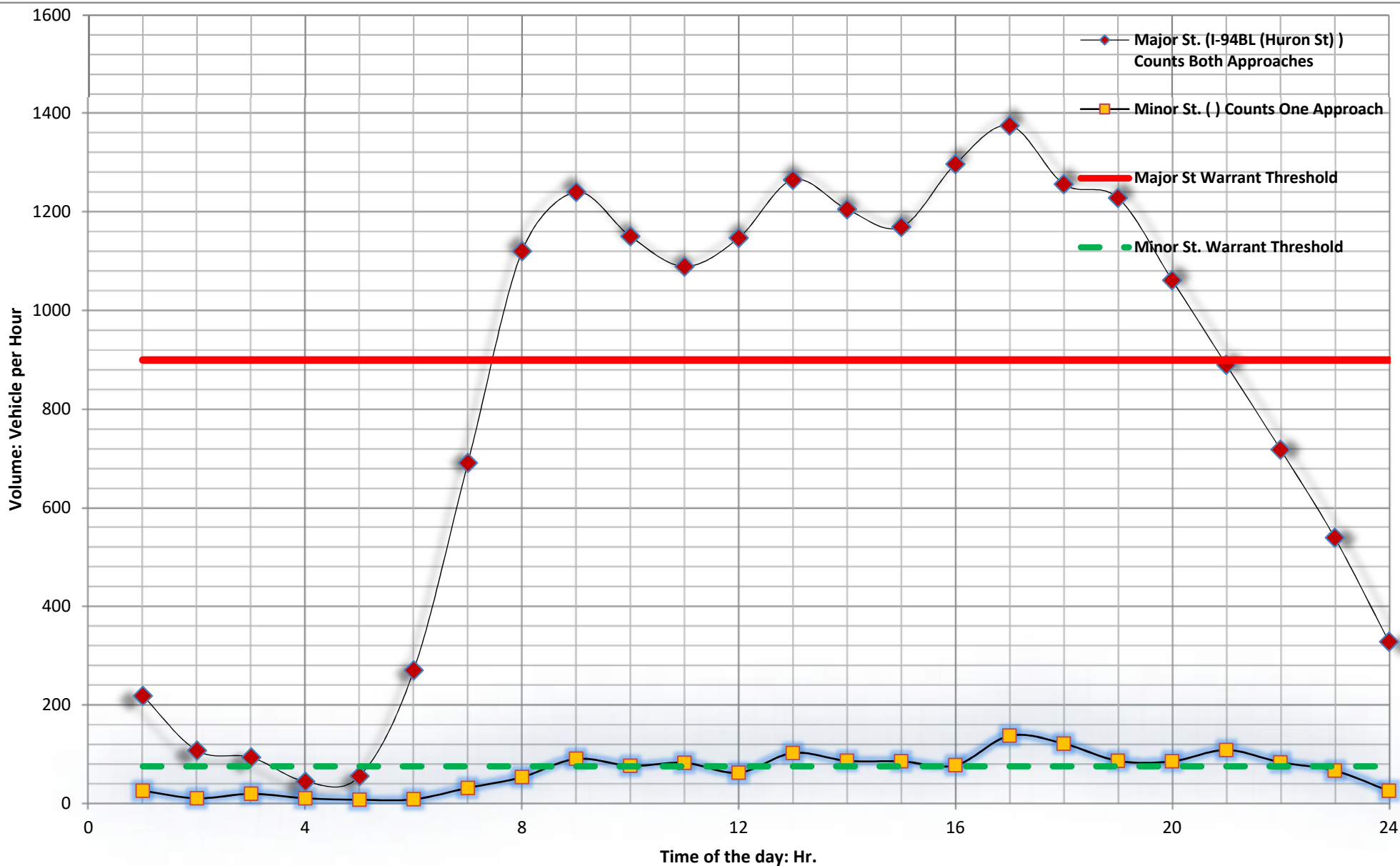
NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 0

Does this intersection meet Warrant 1A for signal installation? NO

Data Collection Date: 8/18/2017



## FIGURE 1: WARRANT 1B

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? NO

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: 14-012

I-94BL (Huron St) @ 3rd St (20% Increase)

NO. OF LANES ON MAJOR ST.? 2

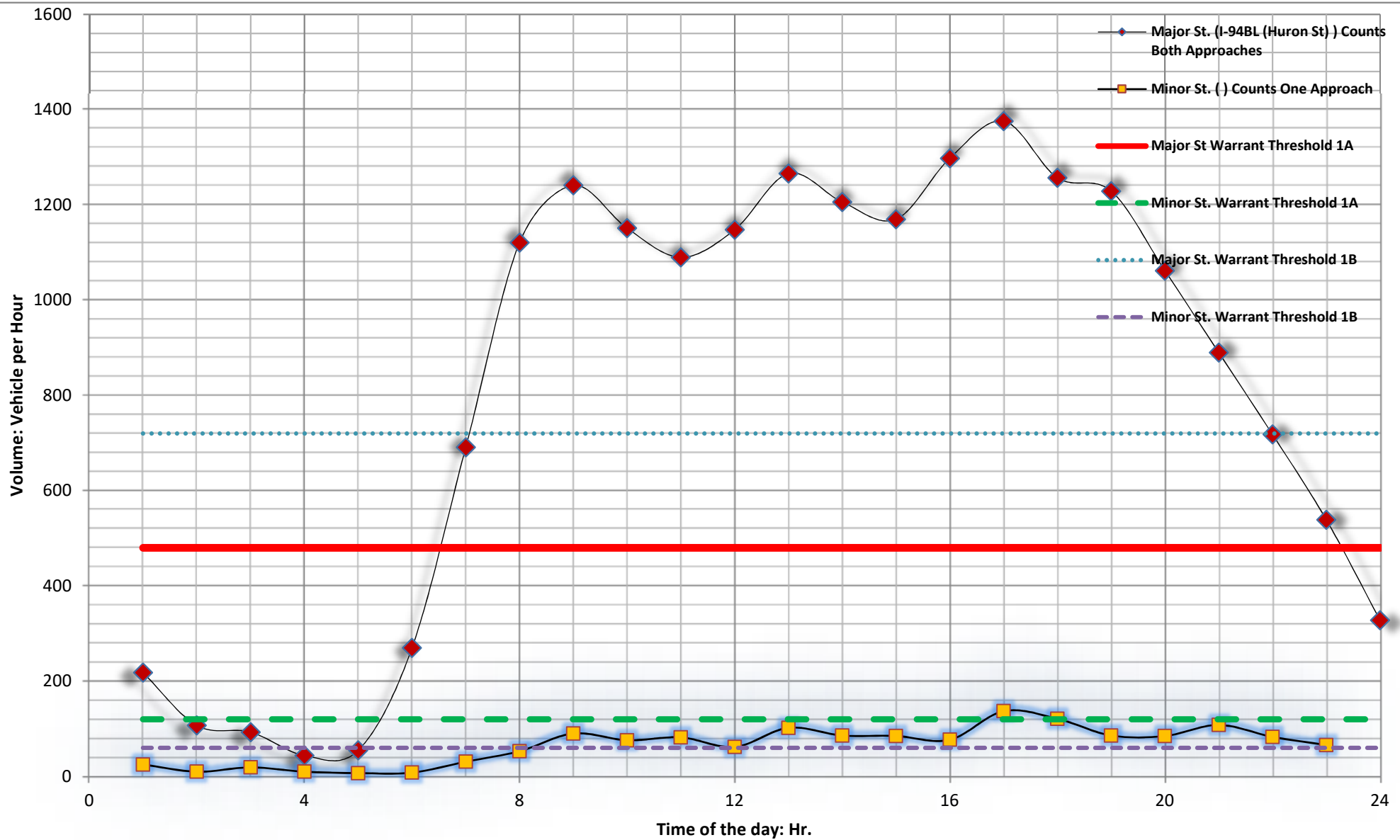
NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 11

Does this intersection meet Warrant 1B for signal installation? YES

Data Collection Date: 8/18/2017





## FIGURE 3: WARRANT 1A&B

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 56% ...

1- DUE TO SPEED? NO

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: 14-012  
I-94BL (Huron St) @ 3rd St (20% Increase)

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 2

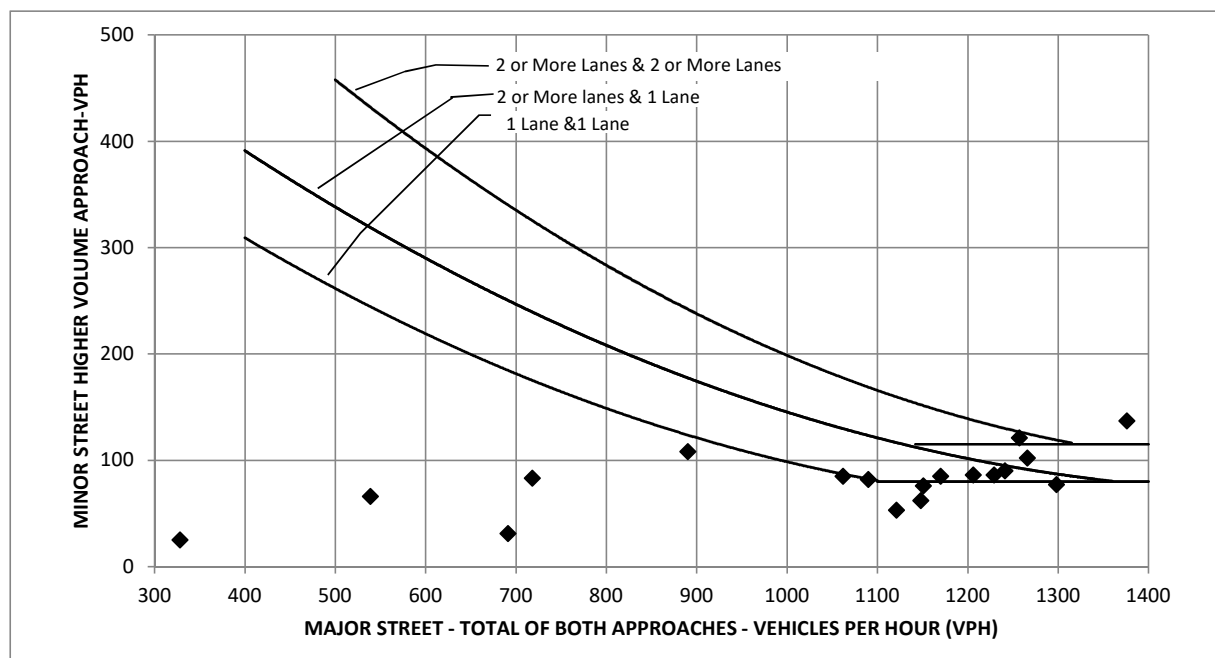
Does this intersection meet Warrant 1A&B for signal installation? NO

Data Collection Date: 8/18/2017

**Michigan Manual of Uniform Traffic Control Devices**  
**Worksheet for Signal Warrants (Section 4C)**  
**WARRANT 2: Four-Hour Vehicular Volume**

Spot Number:	14-012		
Intersection:	I-94BL (Huron St) @ 3rd St (20% Increase)		
Date	8/28/2017	by	FTCH

2	: No. of Lanes on Major St.
1	: No. of Lanes on Minor St.
30	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

2

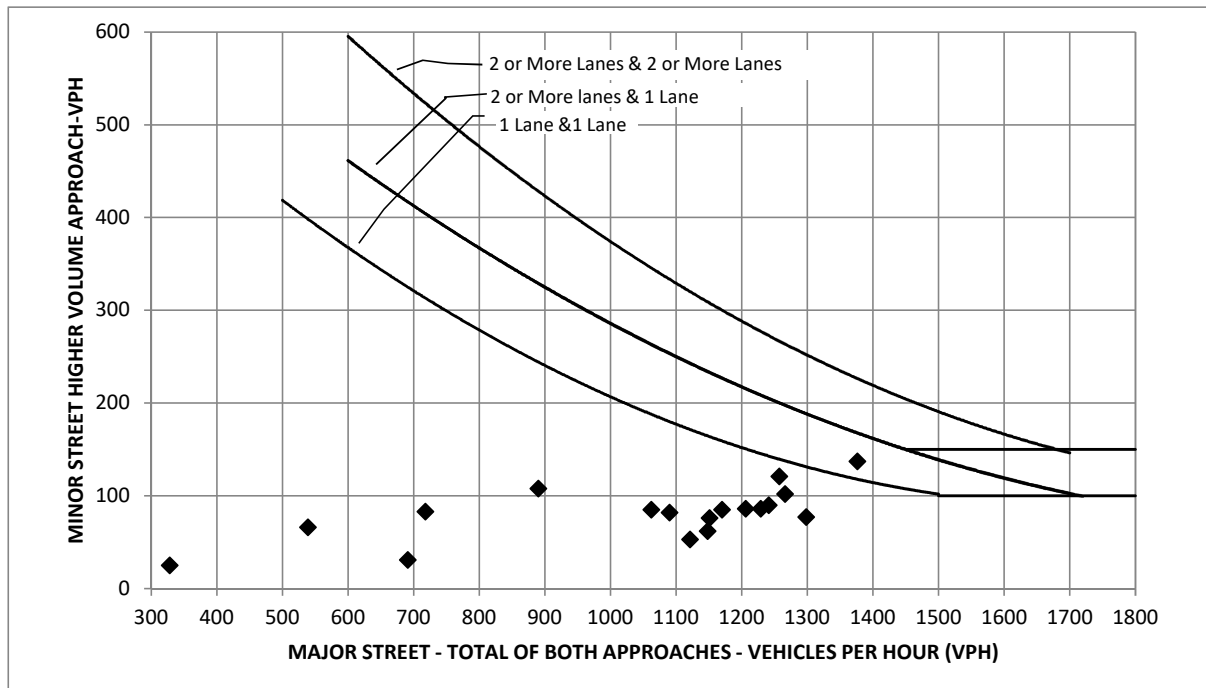
Is Warrant 2 (100%) Met?

NO

**Michigan Manual of Uniform Traffic Control Devices**  
**Worksheet for Signal Warrants (Section 4C)**  
**WARRANT 3 B(100%): Peak-Hour Vehicular Volume**

Spot Number:	14-012
Intersection:	I-94BL (Huron St) @ 3rd St (20% Increase)
Date	8/28/2017 by FTCH

2	: No. of Lanes on Major St.
1	: No. of Lanes on Minor St.
30	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met	0
Is Warrant 3 B (100%) Met?	NO

**Michigan Manual of Uniform Traffic Control Devices**  
**Worksheet for Signal Warrants (Section 4C)**  
**WARRANT 4 (100%): Four-Hour Pedestrian Volume**

Spot Number: 14-012

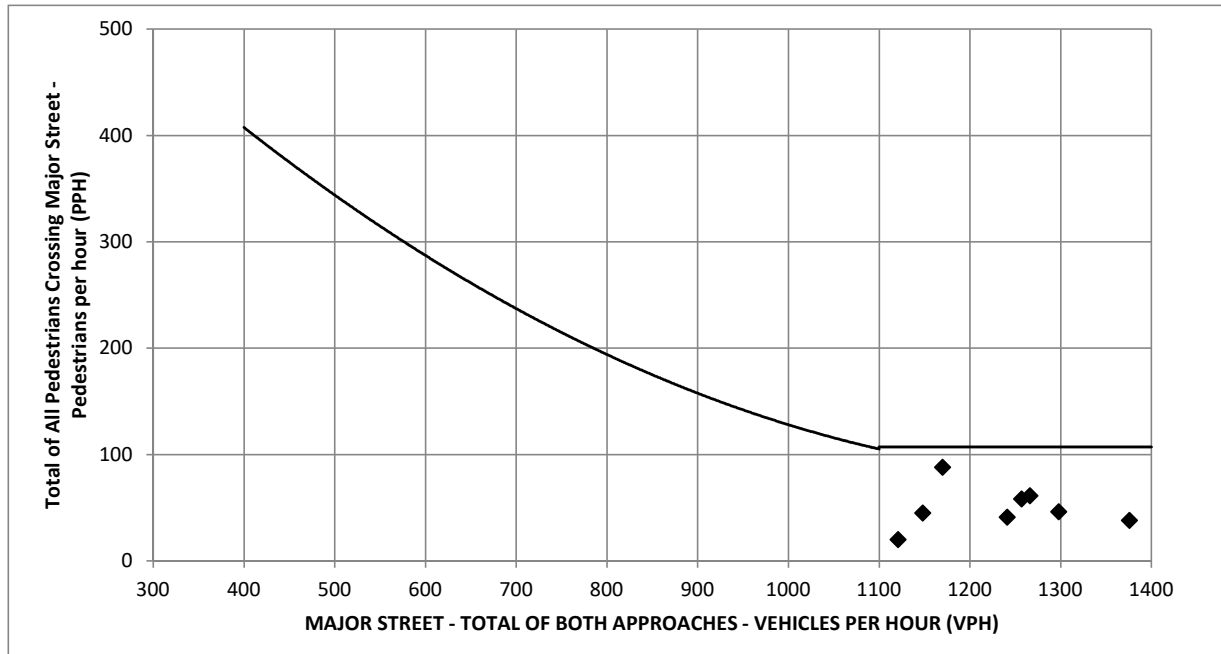
Intersection: I-94BL (Huron St) @ 3rd St (20% Increase)

Date: 8/28/2017

by:

FTCH

800	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
30	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

0

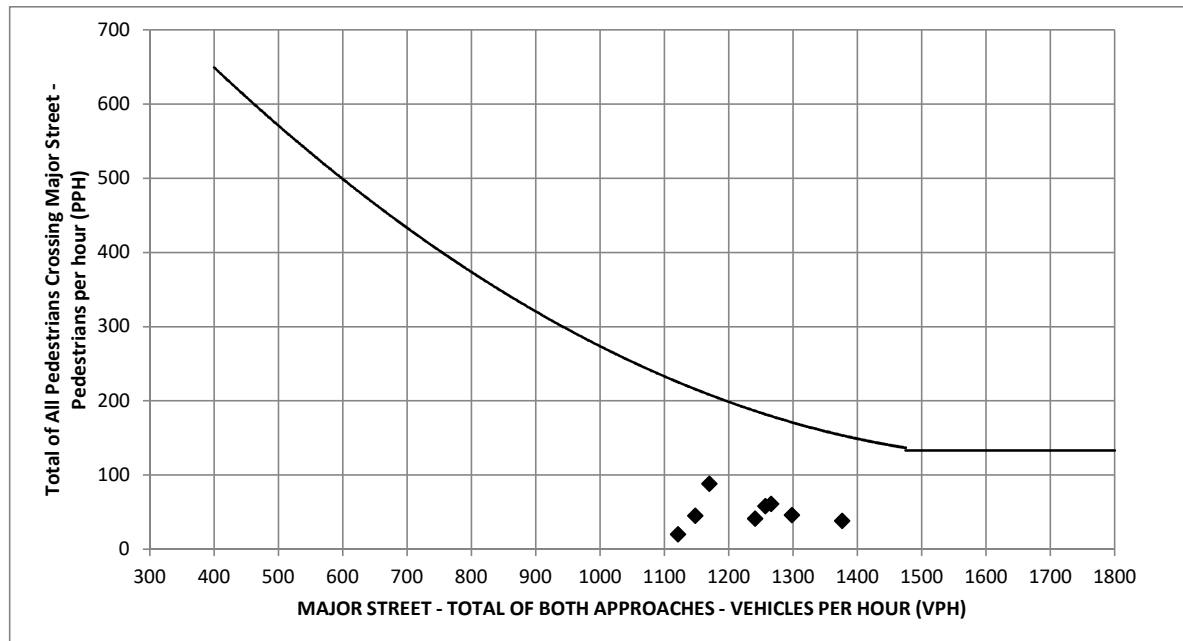
Is Warrant 4 B (100%): Four Hour Met?

NO

**Michigan Manual of Uniform Traffic Control Devices**  
**Worksheet for Signal Warrants (Section 4C)**  
**WARRANT 4 (100%): Peak-Hour Pedestrian Volume**

Spot Number:	14-012		
Intersection:	I-94BL (Huron St) @ 3rd St (20% Increase)		
Date	8/28/2017	by	FTCH

800	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
30	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



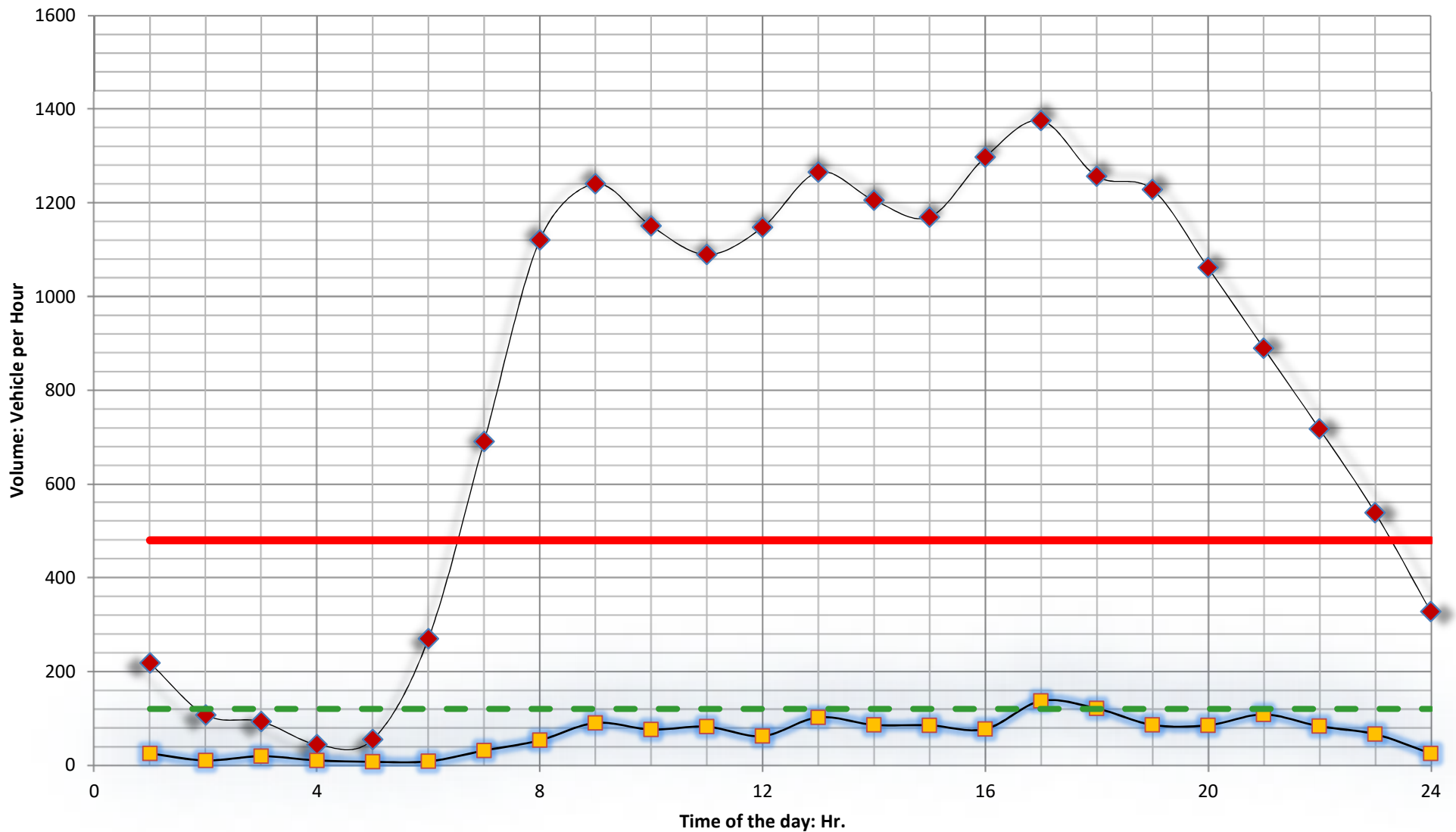
How Many Hours Are Met

0

Is Warrant 4 B (100%): Peak Hour Met?

NO

<b>Michigan Manual of Uniform Traffic Control Devices</b> <b>Worksheet for Signal Warrants (Section 4C)</b> <b>WARRANT 7: Crash Experience</b>								
Spot Number:	14-012							
Intersection:	I-94BL (Huron St) @ 3rd St (20% Increase)							
Date	8/28/2017	by	FTCH					
		<div style="border: 1px solid black; padding: 2px;"> <div style="display: flex; justify-content: space-between;"> <span><b>2</b></span> <span><b>: No. of Lanes on Major St?</b></span> </div> <div style="display: flex; justify-content: space-between;"> <span><b>1</b></span> <span><b>: No. of Lanes on Minor St?</b></span> </div> <div style="display: flex; justify-content: space-between;"> <span><b>YES</b></span> <span><b>: Has adequate trial of remedial measure with adequate enforcement been tried?</b></span> </div> <div style="display: flex; justify-content: space-between;"> <span><b>YES</b></span> <span><b>: Are there 5 or more Crashes Susceptable to Correction by Signalization in a 12 Month Period?</b></span> </div> </div>						
	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?
Time	E-W	N-S						
00:01 - 01:00	218	25	480	120	NO	720	60	NO
01:00 - 02:00	107	10	480	120	NO	720	60	NO
02:00 - 03:00	93	19	480	120	NO	720	60	NO
03:00 - 04:00	44	10	480	120	NO	720	60	NO
04:00 - 05:00	55	7	480	120	NO	720	60	NO
05:00 - 06:00	270	8	480	120	NO	720	60	NO
06:00 - 07:00	691	31	480	120	NO	720	60	NO
07:00 - 08:00	1121	53	480	120	NO	720	60	NO
08:00 - 09:00	1241	90	480	120	NO	720	60	YES
09:00 - 10:00	1151	76	480	120	NO	720	60	YES
10:00 - 11:00	1090	82	480	120	NO	720	60	YES
11:00 - 12:00	1148	62	480	120	NO	720	60	YES
12:00 - 13:00	1266	102	480	120	NO	720	60	YES
13:00 - 14:00	1206	86	480	120	NO	720	60	YES
14:00 - 15:00	1170	85	480	120	NO	720	60	YES
15:00 - 16:00	1298	77	480	120	NO	720	60	YES
16:00 - 17:00	1376	137	480	120	YES	720	60	YES
17:00 - 18:00	1257	121	480	120	YES	720	60	YES
18:00 - 19:00	1229	86	480	120	NO	720	60	YES
19:00 - 20:00	1062	85	480	120	NO	720	60	YES
20:00 - 21:00	890	108	480	120	NO	720	60	YES
21:00 - 22:00	718	83	480	120	NO	720	60	NO
22:00 - 23:00	539	66	480	120	NO	720	60	NO
23:00 - 00:00	328	25	480	120	NO	720	60	NO
<div style="display: flex; justify-content: space-between;"> <div>Is there a reduction in the warrant thresholds to 56% =</div> <div>NO</div> </div> <div style="display: flex; justify-content: space-between;"> <div>Number of Hours that met the warrant 7A =</div> <div>2</div> </div> <div style="display: flex; justify-content: space-between;"> <div>Number of Hours that met the warrant 7B =</div> <div>13</div> </div>								
A. Is the Minimum Vehicular Volume Warrant Met Based on Crash Patterns? (Condition A)								NO
B. Is the Interruption of Continuous Traffic Met Based on Crash Patterns? (Condition B)								YES



## FIGURE 1: WARRANT 7A

Spot Number: 14-012

I-94BL (Huron St) @ 3rd St (20% Increase)

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Is there a reduction in the Warrant Threshold to 56%:

NO

Number of Hours that met the Warrant:

2

Does this intersection meet Warrant 7A for signal installation?

NO

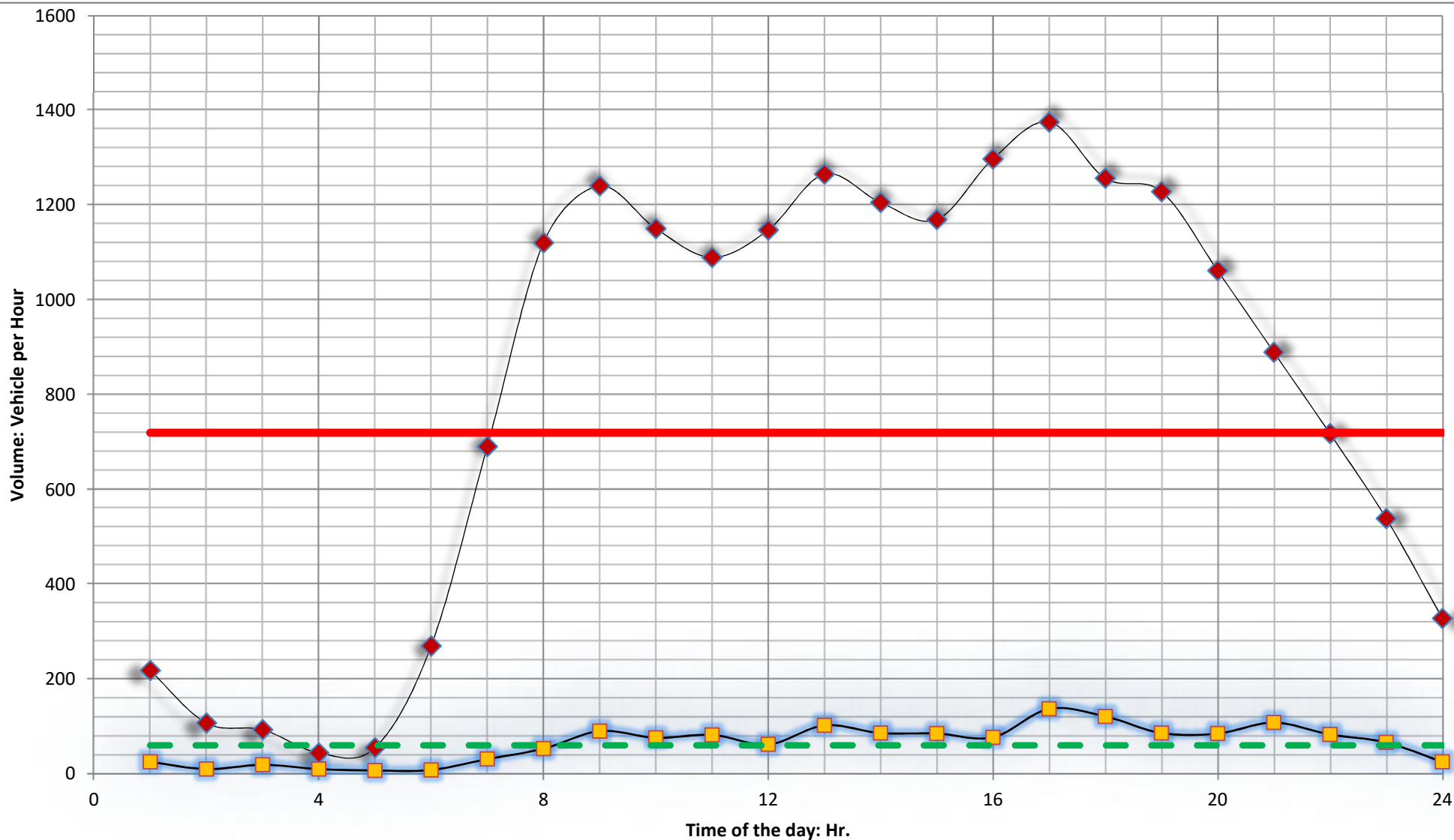
◆ Major St. (I-94BL (Huron St)) Counts Both Approaches

■ Minor St. ( ) Counts One Approach

— Major St Warrant Threshold

— Minor St. Warrant Threshold

Data Collection Date: 8/18/2017



## FIGURE 2: WARRANT 7B

Spot Number: 14-012

I-94BL (Huron St) @ 3rd St (20% Increase)

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Is there a reduction in the Warrant Threshold to 56%:

NO

Number of Hours that met the Warrant:

13

Does this intersection meet Warrant 7B for signal installation?

YES

—◆— Major St. (I-94BL (Huron St)) Counts Both Approaches

—■— Minor St. ( ) Counts One Approach

— Major St Warrant Threshold

— Minor St. Warrant Threshold

Data Collection Date: 8/18/2017



Huron St & 3rd St		CALC'ed RATE	SEMCOG	4 YEAR	Ave. Crash	SEMCOG	SEMCOG	Casualty Ratio	SEMCOG	SEMCOG	ADT	Miles	Injury Freq	Fatal
INTERSECTION (SPOT)			Average Crash Rate	Crashes		Average Crash Frequency	Critical Crash Frequency		Average Casualty Ratio	Critical Casualty Ratio				
1	Huron St & 3rd St	1.92	0.46	51	12.75	2.36	4.71	0.10	0.22	0.49	18208	U	5	0

Type of Crash	# of Crashes	Percentage
Angle Driveway	2	3.9%
Angle Straight	21	41.2%
Angle Turn	4	7.8%
Backing	1	2.0%
Bicycle	1	2.0%
Fixed Object	2	3.9%
Head-on	0	0.0%
Head-On Left-Turn Not Associated	2	3.9%
Misc. Multiple Vehicle	1	2.0%
Other Driveway	0	0.0%
Other Object	0	0.0%
Parking	1	2.0%
Pedestrian	0	0.0%
Rear End Driveway	0	0.0%
Rear End Right Turn	0	0.0%
Rear End Straight	13	25.5%
Side-Swipe Same	3	5.9%
<b>TOTAL</b>	<b>51</b>	<b>100.0%</b>

Crash Severity	# of Crashes	Percentage
Injury Crashes	5	9.8%
Injury A - Incapacitating	0	0.0%
Injury B - Non-Incapacitating	0	0.0%
Injury C - Possible	5	9.8%
Fatal	0	0.0%
Pedestrian with Injury	0	0.0%
Pedestrian without Injury	0	0.0%
Bicyclist with Injury	0	0.0%
Bicyclist without Injury	1	2.0%
<b>Causality Ratio</b>	<b>0.10</b>	

Time of Day	# of Crashes	Percentage
Morning	12	23.5%
Afternoon	20	39.2%
Evening	17	33.3%
Night	2	3.9%
<b>TOTAL</b>	<b>51</b>	<b>100.0%</b>

Day of Week	# of Crashes	Percentage
Monday	8	15.7%
Tuesday	10	19.6%
Wednesday	8	15.7%
Thursday	9	17.6%
Friday	6	11.8%
Saturday	6	11.8%
Sunday	4	7.8%
<b>TOTAL</b>	<b>51</b>	<b>100.0%</b>

Month	# of Crashes	Percentage
January	5	9.8%
February	3	5.9%
March	6	11.8%
April	3	5.9%
May	6	11.8%
June	6	11.8%
July	4	7.8%
August	5	9.8%
September	1	2.0%
October	2	3.9%
November	7	13.7%
December	3	5.9%
<b>TOTAL</b>	<b>51</b>	<b>100.0%</b>

Year	# of Crashes	Percentage
2013	6	11.8%
2014	10	19.6%
2015	15	29.4%
2016	20	39.2%
<b>TOTAL</b>	<b>51</b>	<b>100.0%</b>

## EXHIBIT 4

## **Exhibit 4**

# **Huron Street Non-Rush Hour Parking Proposal**

May 16, 2018

## **Introduction**

Cities all over the country are re-thinking how to utilize the public right of way and urban streets in the context of an increased call for the right of way to serve a broader set of users. In response to similar pressures and opportunities the City of Ann Arbor adopted a Downtown Street Design Manual in 2015, and this document provides guidance and recommendations on the improvement of downtown streets to balance the needs of all users and recognize the land use context of each street.

One opportunity being recognized by many cities is to use the street in a flexible way that allows for the full capacity of the street to serve vehicles during peak hours while promoting other uses of parts of the street during off-peak hours. Alternative uses being considered and allowed include parking, food trucks, and lunch/dinner time parklets. Such uses increase the civic and commercial use of the public space, while providing for a safer and more comfortable pedestrian environment.

Huron Street in downtown Ann Arbor is an urban corridor that functions well for vehicles during peak hours of traffic; at midday, and in the evening, there is less traffic and more vehicular capacity. Public input gathered during the design process for streetscape improvements to Huron frequently focused on the uncomfortable, auto-dominated character of the street, the lack of business frontages on the street, and the perception of poor safety for pedestrians along the corridor.

Designated as a vehicular focused street in the Downtown Street Design Manual, Huron's role is to carry the large volume of vehicular traffic as the primary east-west corridor in the area. In this role Huron takes the strain of vehicular traffic from more pedestrian focused streets such as Catherine and Liberty; however, all streets need to provide comfortable, safe and pleasant environment for pedestrians, and the DDA is seeking a street use strategy that pushes the focus back toward a pedestrian orientation, while it preserves the vehicular capacity at peak hour and flexibility to adjust to future demands on the corridor.

The DDA is proposing a parking strategy that creates 50 to 60 short term parking spaces and adequate service and drop-off space along the Huron Corridor for use during the non-rush hour periods of the day.

## **Planning Goals**

Many communities across the country are implementing off peak parking for major thoroughfares and downtown streets as a means of balancing the need for traffic capacity at peak hours and the multiple demands for the use of the public right of way. In response to public input and the Downtown Street Design Manual, non-peak hour parking is proposed for Huron Street to address the following:

- Address the desire for pedestrian safety and comfort and utilize the parking lane as a buffer for pedestrians from traffic.
- Balance the need for transformative change with encouraging access to downtown
- Efficiently utilize the public infrastructure to maximize the public benefit
- Address the demand for parking and managing deliveries
- Encourage existing and future businesses and institutions to re-orient Huron
- Create a flexible street that can adapt to changes in Autonomous Vehicles and Artificial Intelligence

## **Design Approach**

The proposal to use the outside traffic lane for parking and service during non-rush hour periods does not change the overall street lane plan, which provides two lanes of traffic each way and a center turn lane from Division Street to First Street. The value of the left turn lane through downtown is allowing turns onto the street grid of north south street, allowing a dispersed pattern of traffic to access parking facilities and destinations.

The proposal for adding parking onto Huron Street is allow such use from 9:00 am to 3:30 pm and 6:30 pm to 3:00 am. These times correspond to the lower volume of traffic in non-rush hour periods (see attached table). The precise times need to be refined based on further discussion with City of Ann Arbor, stakeholders, and MDOT, and based on traffic volume hourly volume data.

Key design elements for the streetscape design include the following:

- Allow access between sidewalk and street parking and service spaces.
- Maintain two through lanes in each direction without intrusion of bump-outs into Huron Street
- Follow Michigan Vehicular Code and Ann Arbor ordinances for placement of parking to insure appropriate stopping sight distances.
- Allow curb cuts and alleys to continue to function where needed.
- Provide space for off-peak delivery of materials and bus drop-off without indiscriminate use of through lane, as occurs today.
- Sign and meter the parking spaces as with other downtown street parking, with appropriate signage for parking restrictions and loading zones.

## **Street Management**

Current street management techniques in downtown establish a precedence for the ability to manage non-rush hour parking on Huron Street. Currently the street has Sunday parking on the eastbound lane between State and Division Streets to help meet the demand of parking during church hours. In addition, the City of Ann Arbor currently restricts parking on all downtown streets after 3 am; the DDA, through Republic Parking, manages the early morning restriction by coordinating with the City of Ann Arbor to ticket vehicles and tow vehicles in violation.

The proposed non-rush hour parking will be managed by the DDA, through Republic Parking, in cooperation with the City of Ann Arbor. Policies will be established to-

- Allow for bagging meters during peak downtown events such as football game Saturdays and the Art Fair.

- Towing of vehicles with a zero-tolerance policy to insure clear vehicular lanes during peak hours.
- Conduct on-going analysis to determine the efficacy of the parking, and adjust this proposal as needed to respond to actual use patterns and issues.

## **Future Flexibility**

Transportation planners, engineers and system managers are engaged in a number of discussions and research initiatives to prepare for the large-scale implementation of autonomous vehicles and related increases in use of transit and non-motorized travel. The National Association of City Traffic Officials (NACTO) published a “Blueprint for Autonomous Urbanism” in 2017 in which they considered the changing role of streets and sidewalks as it relates to the evolving vehicular technologies and trends.

The primary conclusion one comes to in reviewing this publication relative to major thoroughfares such as Huron Street is that the design of such streets should focus on remaining as flexible as possible to adapt to-

- Decreasing long term parking demand
- Increases in the use of drop-off space for downtown visitors and employees utilizing autonomous vehicles
- Increases in service and delivery needs
- Opportunities for temporary street uses, such as food trucks
- The potential for Huron’s outside traffic lanes to full time flex lane status

Given that current prognostications about the future of transportation demand borders on the speculative, the strategy of leaving the basic street configuration in place provides the most flexible platform to manage future demands.

## **Case Studies**

The trend of using the street right of way in a flexible manner is reasonable new to traffic planning and management, but case studies are emerging that appear to demonstrate the value of the approach and the lessons learned from implementation. Three such case studies were documented in a report prepared in 2012 by Michael Baker Jr. for the Hillsborough County Metropolitan Planning Organization. Each of the three cities studied converted the outside lane of a major thoroughfare into a parking lane during off peak hours of traffic. The characteristics of each community’s effort and the findings are summarized below.

### **Richmond, Virginia-Main Street**

Allowed parking on a 4 lane (total) urban arterial (approximately 20,000 ADT) along a 2-mile-long segment, during the hours of 9:00 am and 4:00 pm. The managing agency was the city itself, which utilized ticketing and private towing companies for enforcement.

### **Washington DC-14<sup>th</sup> Street**

Allowed parking on a 6 lane (total) urban arterial along a 1.5-mile-long segment, during the hours of 9:00 am and 4:00 pm. Included 15-minute loading and unloading areas at the ends of the parking lanes. The managing agency was the city itself, which utilized signage, lane markings and private towing companies for enforcement.

## Miami-North Miami Avenue

Allowed parking on a 4 lane (total) urban arterial (approximately 30,000 ADT) along a 2-mile-long segment, during the hours of 9:00 am and 4:00 pm. Due to the directional nature of the traffic demand, the parking restriction is on one side of the street in the morning and the other side in the evening. The managing agency was the City Parking Division, which utilized towing for enforcement.

## Summary of Lessons Learned

- Management
  - Need for dedicated enforcement program and monitoring
  - Clear signage is valuable
  - Use of temporary, large information signs at the beginning of the restriction area suggested
  - Non-rush hour parking is not compatible with use of street as a bike facility
- Implementation
  - Expect an adjustment period for users of the street, but long-term acceptance is strong
  - Community feedback to shape the non-rush hour parking approach improves the plan and increases buy-in
  - Monitoring and continued feedback are important
- Safety
  - Crash rate increases attributed to policy were not experienced or occurred at limited to minor levels and frequency.
- Efficacy
  - Typically implemented on corridors with 20-30,000 ADT
  - Increases pedestrian activity and improves appearance of corridor
  - Parking is utilized
  - Communities reported impacts to traffic as non-existent to limited.
- Land Use Impact
  - Buy-in from local businesses is high
  - Increases development desirability for corridor and acts as a catalyst

## Community Support

The DDA and project staff have conducted meetings with local commercial and institutional interests to seek input on the proposal, including land owners, business owners, governmental agencies, public safety officials, and the Ann Arbor Area Transportation Authority. In addition, the proposal was presented in a series of well attended public meetings in April. Support and enthusiasm for the proposal has been very high. The Ann Arbor Transportation Commission and the Ann Arbor Downtown Development Authority have each issued resolutions of support for the proposal to use the outside lanes for parking, service and transit during the off-peak hours (see Exhibit 6). The Ann Arbor City Council will be considering a resolution of support later this summer.



As the project moves forward the DDA and project staff will continue to coordinate with local stakeholders to refine the relative need for service, transit, and parking spaces per block, so that service vehicle and transit demand is adequately managed.

## EXHIBIT 5



**Synchro analyses for the year 2019 existing conditions.**

Intersection	Approach Direction														
	AM Peak Hour					OP Peak Hour					PM Peak Hour				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total
Huron Street and 3rd Street/Chapin Street (Stop Controlled)	A 1.0	A 1.3	F 117.9	F 58.7	A 5.2	A 0.5	A 0.6	D 29.0	C 22.2	A 2.5	A 1.2	A 1.7	F 910.9	F 854.6	F 62.2
Huron Street and 1st Street (Signalized)	C 32.5	A 2.0	- -	C 28.1	C 25.3	A 1.1	A 0.4	- -	C 22.7	A 4.9	A 1.3	A 1.3	- -	D 37.1	B 11.5
Huron Street and Ashley Street (Signalized)	A 1.5	A 0.7	C 24.8	- -	A 4.7	A 0.5	A 0.8	C 20.2	- -	A 3.6	A 0.6	A 2.6	C 27.1	- -	A 6.6
Huron Street and Main Street (Signalized)	A 3.8	A 8.8	C 27.4	C 31.5	B 13.6	A 1.2	A 0.9	C 24.9	C 25.4	A 9.8	A 1.7	A 4.9	C 29.9	C 30.8	B 12.0
Huron Street and 4th Avenue (Signalized)	D 52.0	B 10.1	B 13.7	B 14.6	D 35.1	A 1.1	A 0.8	C 20.6	B 19.4	A 4.3	B 14.4	D 45.4	B 15.1	B 14.6	C 29.2
Huron Street and 5th Avenue (Signalized)	A 6.4	C 24.2	- -	C 25.8	B 15.9	A 1.2	C 21.6	- -	C 21.9	B 14.4	A 1.9	C 32.5	- -	C 28.5	C 22.9
Huron Street and Division Street (Signalized)	C 28.8	B 12.5	C 30.2	- -	C 25.6	B 13.5	B 12.9	C 25.2	- -	B 17.1	C 29.5	B 18.9	C 32.2	- -	C 26.5
Huron Street and State Street (Signalized)	A 4.6	B 13.5	C 23.8	C 26.3	B 11.6	A 0.9	B 11.5	C 21.5	C 21.0	A 9.4	A 1.7	B 18.3	C 26.5	C 25.7	B 14.6

Synchro analyses for the year 2019 5 lane enhanced

Intersection	Approach Direction																			
	AM Peak Hour					OP Peak Hour					OP Peak Hour-Parking					PM Peak Hour				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total
Huron Street and 3rd Street/Chapin Street (Stop Controlled)	A	A	F	F	A	A	A	C	F	A	A	A	D	C	A	A	A	F	F	F
	1.0	1.3	117.9	58.7	5.2	0.5	0.6	29.0	22.2	2.5	0.5	0.6	29.0	22.2	2.5	1.2	1.7	910.9	854.6	62.2
Huron Street and 1st Street (Signalized)	C	A	-	C	C	A	A	-	C	A	A	A	-	C	A	A	A	-	D	B
	29.4	1.7	-	34.0	25.0	1.2	0.4	-	23.9	5.9	3.0	1.5	-	26.2	7.6	1.4	1.4	-	36.5	11.6
Huron Street and Ashley Street (Signalized)	A	A	C	-	A	A	A	C	-	A	A	A	C	-	A	A	A	C	-	A
	1.1	0.6	30.4	-	5.7	0.5	0.8	20.8	-	4.2	2.8	1.8	24.4	-	6.3	0.5	2.3	30.0	-	7.2
Huron Street and Main Street (Signalized)	A	A	C	C	B	A	A	C	C	A	A	A	C	C	B	A	A	D	D	B
	4.1	9.5	26.7	29.7	13.6	1.9	1.6	23.0	22.8	9.7	3.8	2.5	30.1	29.0	13.1	1.4	3.9	35.9	35.9	13.4
Huron Street and 4th Avenue (Signalized)	A	A	C	C	A	A	A	C	B	A	A	A	C	C	A	A	A	C	C	A
	3.4	0.7	24.8	26.7	7.0	1.1	0.9	21.0	19.6	4.6	3.0	1.9	26.1	23.8	6.7	1.8	3.6	25.9	24.7	7.1
Huron Street and 5th Avenue (Signalized)	B	B	-	D	C	A	C	-	C	B	C	C	-	C	C	B	A	-	C	B
	10.4	18.5	-	44.2	21.8	9.6	20.1	-	25.0	17.8	27.2	27.2	-	27.4	27.2	12.0	4.4	-	33.7	15.0
Huron Street and Division Street (Signalized)	C	B	C	-	C	B	B	C	-	B	C	C	C	-	C	A	C	D	-	C
	26.7	14.1	30.7	-	25.1	18.1	13.0	24.4	-	18.5	23.9	33.8	23.5	-	27.1	6.8	24.1	36.0	-	23.8
Huron Street and State Street (Signalized)	A	A	C	D	B	A	B	C	C	B	A	B	C	C	B	C	B	C	C	C
	2.9	10.0	30.5	35.2	12.0	0.9	10.4	24.1	23.5	10.1	3.0	13.2	24.5	23.6	11.9	25.3	14.9	32.3	32.0	22.3

**Synchro analyses for the year 2030 existing conditions.**

Intersection	Approach Direction														
	AM Peak Hour					OP Peak Hour					PM Peak Hour				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total
Huron Street and 3rd Street/Chapin Street (Stop Controlled)	A 0.8	A 1.7	F 341.8	F 101.8	B 12.2	A 0.6	A 0.7	E 49.5	D 33.8	A 3.8	A 1.3	A 1.4	F 999.0	F 999.0	F 999.0
Huron Street and 1st Street (Signalized)	C 33.4	A 2.9	- -	D 36.7	C 28.1	A 1.5	A 0.5	- -	C 23.5	A 5.3	A 1.8	A 2.3	- -	D 43.8	B 14.0
Huron Street and Ashley Street (Signalized)	A 1.7	A 0.7	C 30.6	- -	A 5.7	A 0.7	A 1.0	C 20.5	- -	A 3.8	A 0.7	A 3.0	C 34.2	- -	A 8.2
Huron Street and Main Street (Signalized)	A 8.7	A 1.7	C 27.6	C 33.6	B 15.1	A 3.0	A 2.5	C 23.4	C 24.1	B 10.4	A 2.3	A 9.7	D 35.1	D 37.2	B 16.0
Huron Street and 4th Avenue (Signalized)	A 6.6	A 1.0	C 24.5	C 27.1	A 8.9	A 1.4	A 1.1	C 21.3	B 19.8	A 4.7	A 2.2	A 5.0	C 29.8	C 28.1	A 8.6
Huron Street and 5th Avenue (Signalized)	A 6.1	C 21.7	- -	D 42.6	C 20.1	A 1.1	B 20.0	- -	C 29.1	B 15.9	A 2.1	C 33.3	- -	D 44.9	C 28.1
Huron Street and Division Street (Signalized)	C 27.2	B 14.1	C 32.8	- -	C 26.1	B 13.7	B 14.5	C 25.0	- -	B 17.6	C 27.6	C 25.8	D 43.5	- -	C 32.7
Huron Street and State Street (Signalized)	A 5.1	B 11.2	C 29.9	D 35.2	B 13.1	A 1.1	B 10.9	C 24.0	C 23.3	A 9.7	A 1.9	B 18.5	C 32.9	C 31.3	B 16.0

Synchro analyses for the year 2030 5 lane enhanced

Intersection	Approach Direction																			
	AM Peak Hour					OP Peak Hour					OP Peak Hour w/ parking					PM Peak Hour				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total
Huron Street and 3rd Street/Chapin Street (Stop Controlled)	A	A	F	F	A	A	A	E	D	A	A	A	E	D	A	A	A	F	F	A
	0.8	1.7	342.3	101.8	12.1	0.6	0.7	49.5	33.8	3.8	0.6	0.7	49.5	33.8	3.8	1.9	3.6	999.0	999.0	2.8
Huron Street and 1st Street (Signalized)	C	A	-	D	C	A	A	-	C	A	A	A	-	C	A	A	A	-	D	B
	32.6	2.8	-	40.4	26.6	1.5	0.5	-	25.0	6.4	5.1	2.1	-	27.5	9.0	1.9	2.3	-	48.2	15.5
Huron Street and Ashley Street (Signalized)	A	A	C	-	A	A	A	C	-	A	A	A	C	-	A	A	A	D	-	A
	1.7	0.7	31.9	-	6.3	0.7	1.0	21.3	-	4.4	4.7	2.7	25.2	-	7.6	0.7	3.0	35.5	-	8.7
Huron Street and Main Street (Signalized)	A	A	C	D	B	A	A	C	C	B	A	A	D	D	B	A	B	D	D	B
	7.4	10.0	29.9	35.5	16.9	3.1	2.6	23.9	23.6	10.7	6.3	3.5	37.9	35.4	16.9	2.4	10.2	36.1	36.7	16.4
Huron Street and 4th Avenue (Signalized)	A	A	C	C	A	A	A	C	C	A	A	A	C	C	A	A	A	C	C	A
	6.7	1.0	24.8	27.3	9.0	1.5	1.1	21.8	20.1	4.9	5.1	2.9	27.4	24.4	8.2	2.2	5.1	30.5	28.5	8.8
Huron Street and 5th Avenue (Signalized)	C	C	-	E	D	A	C	-	C	B	E	C	-	C	D	B	A	-	D	B
	28.0	21.9	-	60.1	35.8	8.5	20.2	-	29.4	18.6	73.8	31.1	-	29.5	46.0	14.1	5.9	-	46.2	19.9
Huron Street and Division Street (Signalized)	C	B	C	-	C	B	B	C	-	B	C	E	C	-	D	A	C	D	-	C
	30.8	19.5	31.8	-	28.6	19.0	16.9	23.3	-	19.7	25.7	72.4	25.2	-	41.0	9.9	31.8	45.3	-	30.9
Huron Street and State Street (Signalized)	A	B	C	D	B	A	B	C	C	B	A	B	C	C	B	C	C	C	C	C
	4.8	10.7	32.5	40.0	14.1	1.1	11.0	25.2	24.4	10.6	5.0	15.0	25.7	24.6	13.7	28.1	20.3	34.7	33.6	26.0



Intersection	AM Peak hour	Off Peak Hour	PM Peak Hour
	2019	2019	2019
	With Signal	With Signal	With Signal
Total Delay (hr)	91.2	57.8	123.9
Total Stops	9111	6125	10946
Travel Time (hr)	178.2	120.2	228.5
Ave Speed (mph)	13	14.0	12.0

**Synchro analyses for the year 2019 with signal at 3rd and chapin (5 lane enhanced with NRTOR)**

Intersection	Approach Direction														
	AM Peak Hour					OP Peak Hour					PM Peak Hour				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total
Huron Street and 3rd Street/Chapin Street (Signal)	B 10.1	A 1.0	C 30.2	C 29.4	A 8.4	A 9.6	A 5.1	C 21.8	C 21.8	A 8.5	A 7.7	A 2.3	C 31.1	C 29.1	A 6.1
Huron Street and 1st Street (Signalized)	A 7.6	A 0.6	- -	C 34.0	B 12.6	C 22.0	A 1.0	- -	C 23.9	B 15.1	A 1.4	A 1.4	- -	D 36.5	B 11.6
Huron Street and Ashley Street (Signalized)	A 1.1	A 0.6	C 30.4	- -	A 5.7	A 0.5	A 0.8	C 20.8	- -	A 4.2	A 0.5	A 2.3	C 30.0	- -	A 7.2
Huron Street and Main Street (Signalized)	A 4.1	A 9.5	C 26.7	C 29.7	B 13.6	A 1.9	A 1.6	C 23.0	C 22.8	A 9.7	A 1.4	A 3.9	D 35.9	D 35.9	B 13.4
Huron Street and 4th Avenue (Signalized)	A 3.4	A 0.7	C 24.8	C 26.7	A 7.0	A 1.1	A 0.9	C 21.0	B 19.6	A 4.6	A 1.8	A 3.6	C 25.9	C 24.7	A 7.1
Huron Street and 5th Avenue (Signalized)	B 10.4	B 18.5	- -	D 44.2	C 21.8	A 9.6	C 20.1	- -	C 25.0	B 17.8	B 12.0	A 4.4	- -	C 33.7	B 15.0
Huron Street and Division Street (Signalized)	C 26.2	A 6.6	C 32.3	- -	C 23.8	B 18.5	A 6.6	C 25.0	- -	B 16.7	A 8.1	D 42.3	D 38.6	- -	C 31.8
Huron Street and State Street (Signalized)	A 2.9	A 10.0	C 30.5	D 35.2	B 12.0	A 0.9	B 10.4	C 24.1	C 23.5	A 10.0	C 25.3	B 14.9	C 32.3	C 32.0	C 22.3

## EXHIBIT 6

## **RESOLUTION TO URGE SUPPORT FOR KEY HURON TRANSPORTATION IMPROVEMENT ELEMENTS**

Whereas, The DDA's Development Plan highlights identity, infrastructure, and transportation as overarching strategy areas, which include improving safety and economic vitality through pedestrian improvements;

Whereas, In July 2016 the DDA began work on Huron Street improvements and in November, 2017, finalized the project boundaries as Third Street to Division Street;

Whereas, Public input has called attention to concerns, including fast moving traffic and an uncomfortable and unprotected experience walking along and crossing the corridor;

Whereas, Transportation options have been studied to address these concerns, further informed by best practice solutions, crash and speed analysis, and discussions with City and MDOT staff;

Whereas, Recommended transportation elements have been formulated to include:

- Non-rush hour parking to provide a substantial buffer for pedestrians on Huron Street sidewalks.
- A permissive/protected left turn phasing for the westbound left turn at the Huron and Fifth Avenue intersection to reduce conflicts between left turning vehicles and pedestrians crossing the street.
- Restricted right turns on red along the corridor to prevent vehicles encroaching into the crosswalk before turning.
- A fully signalized intersection at Third and Chapin to provide clarity for pedestrians and motorists using the intersection, addressing concerns from vulnerable users at the YMCA and Lurie Terrace and implementing near term Treeline Trail elements.
- Overall signal timing adjustments to ensure adequate pedestrian walk time and visibility.

Whereas, Huron Street is owned by the Michigan Department of Transportation (MDOT), which has asked for a resolution of support from the Ann Arbor City Council in order to consider approving these changes;

Whereas, MDOT will need additional time to review these elements ahead of the development of the final Huron Street design, which is why this matter is being considered at this time;

Whereas, The DDA Capital Improvements Committee recommends that these transportation elements be supported;

Resolved, The DDA Board supports these recommendations and urges the City Transportation Commission and Ann Arbor City Council to convey strong local support for these changes to MDOT;



Resolved, The DDA staff will continue to meet with the community, city staff, and key stakeholders to assemble a streetscape design with these elements included;

**A vote on the resolution showed:**

**AYES: Guenzel, Klopf, Lazarus, Letaw, Narayan, Splitt, Weiss**

**NAYS: none**

**ABSENT: Lowenstein, McKinnon, Mouat, Orr**

**The resolution was approved.**

## **RESOLUTION TO RECOMMEND CITY COUNCIL SUPPORT FOR KEY HURON STREET TRANSPORTATION IMPROVEMENT ELEMENTS**

Whereas, In October 2016, the Ann Arbor Downtown Development Authority (DDA) began a collaborative design process with the Michigan Department of Transportation and the City of Ann Arbor for Huron Street improvements, from Third Street to Division Street;

Whereas, Public input has called attention to concerns, including fast moving traffic and an uncomfortable and unprotected experience walking along and crossing the corridor;

Whereas, Transportation options have been studied to address these concerns, further informed by best practice solutions, crash and speed analysis, and discussions with City and MDOT staff;

Whereas, Recommended transportation elements have been formulated to include:

- Non-rush hour parking to provide a substantial buffer for pedestrians on Huron Street sidewalks from Third Street to Division Street, with a possible extension to State Street.
- A permissive/protected left turn phasing for the westbound left turn at the Huron and Fifth Avenue intersection to reduce conflicts between left turning vehicles and pedestrians crossing the street.
- Restricted right turns on red along the corridor to prevent vehicles encroaching into the crosswalk before turning.
- A fully signalized intersection at Third and Chapin to provide clarity for pedestrians and motorists using the intersection, addressing concerns from vulnerable users at the YMCA and Lurie Terrace and implementing near term Treeline Trail elements.
- Overall signal timing adjustments to ensure adequate pedestrian walk time and visibility.

Whereas, Huron Street is owned by the Michigan Department of Transportation (MDOT), which has asked for a resolution of support from the Ann Arbor City Council in order to consider approving these changes;

Whereas, MDOT will need additional time to review these elements ahead of the development of the final Huron Street design, which is why this matter is being considered at this time;

Whereas, The DDA Board and Capital Improvements Committee recommends that these transportation elements be supported;

Resolved, The City Transportation Commission supports the recommended transportation elements as identified above and urges the Ann Arbor City Council to convey strong local support for these changes to MDOT;

Resolved, The DDA staff will continue to meet with the community, city staff, and key stakeholders to refine a streetscape design with these elements included.