TRAFFIC COMMITTEE AGENDA

February 20, 2019 – 7:30 P.M.

Lower Level Conference Room – Troy City Hall, 500 West Big Beaver Road

1. Roll Call
2. Minutes – January 16, 2019

PUBLIC HEARINGS

3. No Public Hearings

REGULAR BUSINESS

4. Request for Traffic Control – Caswell at Hampton
5. Request for Traffic Control – Wendover at Chelsea and Tothill
6. Request for Traffic Control – Plum at Starr
7. Election of Officers
8. Public Comment
9. Other Business
10. Adjourn

cc: Item 4: Properties within 300'

Item 5: Properties within 300'

Item 6: Properties within 300'

Traffic Committee Members
Captain Robert Redmond & Sgt. Mike Szuminski, Police Department
Lt. Eric Caloia, Fire Department
William J. Huotari, City Engineer/Traffic Engineer

TRAFFIC COMMITTEE

MESSAGE TO VISITORS, DELEGATIONS AND CITIZENS

The Traffic Committee is composed of seven Troy citizens who have volunteered their time to the City to be involved in traffic and safety concerns. The stated role of this Committee is:

a. To give first hearing to citizens' requests and obtain their input.

b. To make recommendations to the City Council based on technical considerations, traffic surveys, established standards, and evaluation of citizen input.

c. To identify hazardous locations and recommend improvements to reduce the potential for traffic crashes.

Final decisions on sidewalk waivers will be made by the Committee at this meeting.

The recommendations and conclusions arrived at on regular items this evening will be forwarded to the City Council for their final action. Any citizen can discuss these recommendations before City Council. The items discussed at the Traffic Committee meeting will be placed on the City Council Agenda by the City Manager. The earliest date these items might be considered by City Council would normally be 10 days to 2 weeks from the Traffic Committee meeting. If you are interested, you may wish to contact the City Manager's Office in order to determine when a particular item is on the Agenda.

Persons wishing to speak before this Committee should attempt to hold their remarks to no more than 5 minutes. Please try to keep your remarks relevant to the subject at hand. Please speak only when recognized by the Chair. These comments are made to keep this meeting moving along. Anyone wishing to be heard will be heard; we are here to listen and help in solving or resolving your particular concerns.

PUBLIC HEARING

3. No Public Hearings

REGULAR BUSINESS

4. Request for Traffic Control – Caswell at Hampton

Traffic Committee members requested that the intersection of Caswell at Hampton be reviewed for purposes of traffic control.

The intersection is YIELD controlled on Caswell Drive and uncontrolled on Hampton Lane.

SUGGESTED RESOLUTIONS:

a. RESOLVED, that the intersection of Caswell Drive at Hampton Lane be **MODIFIED** from a YIELD sign on the Caswell Drive approach to the intersection to a STOP sign on the Caswell Drive approach to the intersection.

b. RESOLVED, that **NO CHANGE** be made at the intersection of Caswell Drive at Hampton Lane.

5. Request for Traffic Control – Wendover at Chelsea and Tothill

Traffic Committee members requested that the intersection of Wendover at Chelsea and Tothill be reviewed for purposes of traffic control.

The subject intersection is a 3-legged, skewed T-intersection, located approximately 1,800 feet east of Adams Road and 1,700 feet north of Big Beaver Road. A short connection between Tothill Drive and Chelsea Lane exists just east of Wendover Street, separated by a landscaped island.

SUGGESTED RESOLUTIONS:

a. RESOLVED, that the intersection of Wendover Street at Chelsea Lane and Tothill Drive be **MODIFIED** from no traffic control to YIELD signs on the Chelsea Lane and Tothill Drive approaches to the intersection.

b. RESOLVED, that the intersection of Wendover Street at Chelsea Lane and Tothill Drive be **MODIFIED** from no traffic control to STOP signs on the Chelsea Lane and Tothill Drive approaches to the intersection.

c. RESOLVED, that **NO CHANGE** be made at the intersection of Wendover Street at Chelsea Lane and Tothill Drive.

6. Request for Traffic Control – Plum at Starr

Traffic Committee members requested that the intersection of Plum at Starr be reviewed for

purposes of traffic control.

The subject intersection is a 3-leg, T-intersection located approximately 1,500 feet east of Livernois Road and 3,200 feet north of Maple Road.

SUGGESTED RESOLUTIONS:

a. RESOLVED, that the intersection of Plum Drive at Starr Drive be **MODIFIED** from no traffic control to a STOP sign on the Plum Drive approach to the intersection.

b. RESOLVED, that **NO CHANGE** be made at the intersection of Plum Drive at Starr Drive.

7. Election of Officers

In accordance with the By-Laws of the City of Troy Traffic Committee, Article III, nomination of officers shall be made from the floor on the third Wednesday of February of each year for the purpose of electing a Chairperson and a Vice-Chairperson.

A candidate receiving a majority vote of the members present at the meeting shall be declared elected and shall serve for one year or until his or her successor shall take office. Vacancies in offices shall be filled immediately by regular election procedure.

Article II of the By-Laws speaks to the Officers and Their Duties, which states:

Section 1 - The officers of the Traffic Committee shall consist of a Chairperson and a Vice-Chairperson.

Section 2 - The Chairperson shall preside at all meetings of the Traffic Committee and shall have the duties normally conferred by parliamentary usage on such officers.

Section 3 - The Chairperson shall be one of the citizen members of the Committee and shall have the priviledge of discussing all matters before the Committee and voting thereon.

Section 4 - The Vice-Chairperson shall act for the Chairperson in his or her absence. The Vice-Chairperson shall be a citizen member of the Committee, with the rights and privileges of the Chairperson.

8. Public Comment

9. Other Business

10. Adjourn

A regular meeting of the Troy Traffic Committee was held Wednesday, January 16, 2019 in the Lower Level Conference Room at Troy City Hall. Pete Ziegenfelder called the meeting to order at 7:30 p.m.

1. Roll Call

Present: Don Johnson
Richard Kilmer
Cindy Nurak
Al Petrulis
Sunil Sivaraman
Cynthia Wilsher
Pete Ziegenfelder
Marvin Jiang, Student Representative

Absent: None

Also present: Sgt. Mike Szuminski, Police Department
Bill Huotari, City Engineer/Traffic Engineer

2. Minutes – November 14, 2018

Resolution # 2019-01-01
Moved by Kilmer
Seconded by Johnson

To approve the minutes as printed.

Yes: Johnson, Kilmer, Nurak, Petrulis, Sivaraman, Wilsher, Ziegenfelder
No: None
Absent: None

MOTION CARRIED

PUBLIC HEARINGS

3. No Public Hearings

REGULAR BUSINESS

4. Request for Traffic Control – Hampton at Wendover

Tricia Young of 3278 Wendover states that the lack of traffic control at the intersection of Hampton and Wendover creates a hazardous condition.

Traffic Engineering received five (5) emails and one (1) phone call in support of Stop signs at this location.

Tricia Young of 3278 Wendover was present at the meeting and discussed traffic that comes from Big Beaver and uses Kingsley or Caswell as access to the subdivision. The approach from Hamptom to Wendover is wider allowing drivers to make the turn at higher rates of speed. Many drivers don't realize they are approaching a T-intersection because of the geometry of the intersection. There has been an increase in Somerset Collection traffic cutting through this area. Traffic can travel nearly one mile through this area and there is a single stop sign on the route. Ms. Young believes it is a combination of many things in this area that leads to a hazardous situation. She highly recommends that a Stop sign be installed.

Tony Ross of 2528 Hampton discussed that the study is very analytical. The existing Yield sign at the intersection of Caswell and Hampton does not do anything. A lot of people walk on the streets. He has lived in this area since 2012. Drivers are distracted and he has even witnessed cars rolling through stop signs, so a yield sign would do nothing.

Lori Salyer of 2508 Chelsea spoke about the intersection being the school bus stop. She has talked with the Troy School District to see if they would change the bus route/stop, but there has been no change. The area is very dark while kids wait for the bus and she is very concerned about the safety of the children. She supports a Stop sign.

Nora Salyer of 2508 Chelsea spoke about the dangers of walking on the road with cars that do not stop for pedestrians. She also spoke about students waiting for the school bus in the dark and the potential dangers of this.

Jack Salyer of 2508 Chelsea reiterated that the intersection is dangerous. Children wait for the bus at 7:20 AM and it is very dark out so a Stop sign would help.

Tracy Gaulzetti of 3237 Wendover discussed that this is also a bus stop for Birmingham schools. Kids stand along the road in the morning waiting for the bus. Cars travel fast through the intersection. Her mailbox has been hit twice. There are a lot of kids in the neighborhood. She supports a Stop sign.

Gordon Schaeffler of 3174 Wendover stated that the intersection needs a stop sign. There are eight (8) children at the properties immediately adjacent to the intersection and 30+ children in the immediate vicinity of the intersection. There is a lot of cut through traffic from Big Beaver to Adams and vice-versa. A stop sign would be a good start.

Tim Crawford of 3155 Caswell wanted to represent the runners and bikers in this area. He has almost been hit several times while running in this area. There are a lot of children in this area. He supports a stop sign at the intersection.

Mr. Ziegenfelder stated that he supports Stop signs rather than Yield signs.

Mr. Petrulis disagrees with All-Way Stop control at this intersection.

Resolution # 2019-01-02
Moved by Sivaraman
Seconded by Kilmer

RESOLVED, that the intersection of Hampton Lane at Wendover Street be **MODIFIED** from no traffic control to ALL-WAY STOP control.

Yes: Johnson, Kilmer, Nurak, Sivaraman, Wilsher, Ziegenfelder
No: Petrulis
Absent: None

MOTION CARRIED

5. Request for Traffic Control – Hartshorn at Cherry

Kryssi Bird of 101 Arthur states that the lack of traffic control at the intersection of Hartshorn and Cherry creates a hazardous condition.

Traffic Engineering received two (2) emails and one (1) phone call in support of Stop signs at this location.

John Makarewicz of 2208 Hartshorn discussed cut through traffic from Livernois and Maple. There are many children in the neighborhood. Morse Elementary is just to the east of Hartshorn. He believes the intersection is dangerous without a stop sign. The high school and middle school bus stop is at Plum and Cherry.

Mr. Ziegenfelder stated that he supports Stop signs rather than Yield signs.

Mr. Kilmer lives in this area and agrees there is a lot of traffic that passes through this residential area.

Mr. Petrulis asked for clarification on which way traffic cuts through. It is in both directions as people cut through from Livernois and Maple.

Ms. Wilsher drives this area frequently as she lives on Maple, south and to the east of the subject intersection. She has personally almost been hit twice at the intersection. People walk in the road in areas where there are no sidewalks.

Mr. Sivaraman questioned whether an ALL-WAY STOP would be more appropriate as traffic cuts through from both directions.

Ms. Nurak noted that all of the streets intersecting with Cherry have Stop signs, except for Hartshorn. There is an existing ALL-WAY STOP at Kirkton and Cherry.

Marge Krofchok of 184 Cherry stated that she does not see the need for an ALL-WAY STOP at the intersection of Hartshorn and Cherry.

Resolution # 2019-01-03
Moved by Kilmer
Seconded by Sivaraman

RESOLVED, that the intersection of Hartshorn Avenue at Cherry Avenue be **MODIFIED** from no traffic control to ALL-WAY STOP control.

Yes: Johnson, Kilmer, Nurak, Petrulis, Sivaraman, Wilsher, Ziegenfelder
No: None
Absent: None

MOTION CARRIED

6. Request for Traffic Control – Hurst and Lesdale at Montclair

David Walters of 232 Booth states that the lack of traffic control at the intersections of Hurst and Lesdale at Montclair creates a hazardous condition.

Traffic Engineering received one (1) email in support of Yield signs but not Stop signs.

Anthony Branham of 6604 Montclair has lived here for 30 years and does not believe that traffic control is warranted at these intersections. Traffic is light turning at the intersection. Yield signs are ineffective and does not think putting them up will solve anything. He discussed cut-through traffic from Livernois that uses Montclair to travel to South Boulevard. Why not just put a Stop sign on every corner?

Larry Jonas of 473 Hurst supported the notion that Montclair is used as a cut-through route during peak hours. He does not believe that signs are needed at the intersection. People don't pay attention while they are driving.

Mr. Jiang discussed speed control measures in residential areas.

Mr. Petrulis does not believe that traffic control is warranted at this intersection and does not want to install a sign just to install a sign. The concern, from residents at the meeting, is regarding cut through traffic using Montclair.

Mr. Johnson noted that he observed minimal traffic in this area when he reviewed the request. He believes it may be better to schedule the radar trailer for this area in the spring.

Mr. Sivaraman noted that the recommendation is for a Yield sign, but believes that Stop signs impact drivers more.

Ms. Nurak also reviewed the area and made note that there is minimal traffic using these intersections and does not see a need for traffic control. She discussed that Stop signs have been typically approved in residential areas when other intersections also have stop signs and the committee wants to be consistent in how an individual area is treated (i.e. don't mix Stop and Yield signs).

Sgt. Szuminski stated that there has only been one (1) crash in this area in the past five (5) years and was a reckless driver. Traffic control at the intersection would not have prevented the crash. Sgt. Szuminski discussed a Yield sign versus a Stop sign. A yield sign does, in most cases, require a judgment call from an officer. A Stop sign is clear as a driver either

stops or they don't. A Stop sign is less of a judgment call.

Resolution # 2019-01-04
Moved by Kilmer
Seconded by Sivaraman

RESOLVED, that the intersections of Hurst Street and Lesdale Drive with Montclair Drive be **MODIFIED** from no traffic control to a STOP sign on the Hurst Street and Lesdale Drive approach to the intersection.

Yes: Kilmer, Sivaraman
No: Johnson, Nurak, Petrulis, Wilsher, Ziegenfelder
Absent: None

MOTION FAILED

7. Public Comment

There was no public comment at the meeting.

8. Other Business

Traffic Committee members discussed the following items related to items on the agenda that they would like reviewed and brought forward at a future meeting:

- Intersection study requested for Caswell at Hampton for purposes of replacing Yield sign with a Stop sign.
    - Review vision obstruction at the intersection of Caswell and Hampton. There are large bushes at 2455 Hampton that obstruct a driver's vision.
- Intersection study requested for Chelsea/Tothill at Wendover for purposes of traffic control.
- Request that traffic safety unit send units out to provide direct enforcement in the Hampton/Wendover area.
- Intersection study requested for Plum at Starr for purposes of traffic control.

9. Adjourn

The meeting adjourned at 8:38 p.m.

Pete Ziegenfelder, Chairperson

Bill Huotari, City Engineer/Traffic Engineer

TRAFFIC COMMITTEE REPORT

February 6, 2019

TO: Traffic Committee

FROM: Bill Huotari, City Engineer/ Traffic Engineer

SUBJECT: Request for Traffic Control
Caswell at Hampton

Background:

Traffic Committee members requested that the intersection of Caswell at Hampton be reviewed for purposes of traffic control.

The intersection is YIELD controlled on Caswell Drive and uncontrolled on Hampton Lane.

There were no crashes in the past five (5) years at the intersection.

The posted speed limit on both streets is 25 mph.

Caswell Drive is currently YIELD controlled and would be considered the minor road at the intersection, while Hampton Lane would be considered the major road as it continues through the intersection, despite coming to a dead end as it becomes Newport Court east of Beach Road.

The major potential sight distance obstructions at the intersection is the house corner located at the southeast quadrant of the intersection and the evergreen tree located at the southwest quadrant of the intersection.

The safe approach speed was found to be 16.1 mph for a vehicle traveling on northbound Caswell Drive as a result of the sight obstruction from the northwest house corner on the southeast quadrant of the intersection, therefore a YIELD sign is the recommended treatment.

The city requested that OHM review the intersection and provide their findings and recommendations (copy attached).

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OHM Advancing Communities®

February 5, 2019

Mr. William Huotari, PE
City Engineer
City of Troy
500 W. Big Beaver Rd
Troy, MI 48084

RE: Traffic Control Recommendation for Caswell Drive at Hampton Lane
OHM JN: 0128-19-0010

Dear Mr. Huotari:

As requested, we have reviewed the intersection of Caswell Drive at Hampton Lane to determine the proper traffic control. The subject intersection is a 3-leg T-intersection located in the City of Troy approximately 2,250 feet east of Adams Road and 1,320 feet north of Big Beaver Road. The speed limit on both streets is 25 mph. The intersection is YIELD controlled on Caswell Drive and uncontrolled on Hampton Lane. Reference the attachments for aerial and intersection photos.

Types of Roadways
Both Caswell Drive and Hampton Lane are considered local streets. Caswell Drive runs north / south, providing access to / from the local neighborhood and Big Beaver Road (principal arterial) via Hampton Lane. Hampton Lane runs east / west, providing indirect access to single family residences via Caswell Drive to / from Big Beaver Road to the south and via Beach Road to / from Wattles Road (minor arterial) at the north.

The surrounding land use is entirely single-family residential. On-street parking is permitted on the north side of Hampton Lane and on the west side of Caswell Drive in the vicinity of the intersection. Caswell Drive is currently YIELD controlled and would be considered the minor road at the intersection, while Hampton Lane would be considered the major road as it continues through the intersection, despite coming to a dead end as it becomes Newport Court east of Beach Road.

The ensuing traffic control analysis adheres to the guidance presented in the Michigan Manual on Uniform Traffic Control Devices (MMUTCD). A reference document explaining the background behind the analysis is attached to this memo.

Crash Analysis
Based on information obtained through the Traffic Improvement Association of Michigan, there were no crashes recorded in the past five (5) years at the intersection of Caswell Drive and Hampton Lane. The crash data does not constitute a compelling case for modifying the existing controls.

OHM Advisors
34000 PLYMOUTH ROAD
LIVONIA, MICHIGAN 48150
T 734.522.6711
F 734.522.6427
OHM-Advisors.com

Traffic Volumes
Traffic counts were not collected in the vicinity of the intersection. Traffic volumes in residential areas are predominantly driven by the number of single family residential homes in the neighborhood. Based on the residential nature and the number of homes in the surrounding area, as well as the fact that Hampton Lane dead-ends as it becomes Newport Court just east of the intersection, it is highly improbable that this location would satisfy any of the minimum volume warrants for an all-way STOP. Further explanation within the context of the minimum volume constraints is provided next.

It is extremely unlikely that Hampton Lane meets and sustains the 300 vehicles per hour threshold for a minimum of 8 hours. The combined vehicular, pedestrian, and bicycle volumes entering from Caswell Drive is similarly unlikely to average at least 200 units for any 8 hours. Additionally, since the posted speed limit is only 25 mph, it is reasonable to assume that the 85th percentile approach speed does not exceed 40 mph on either road; thus, the minimum vehicular volume warrants cannot be discounted to 70 percent of the values described previously. Finally, the study intersection is likely to fall significantly shy even of the reduced 80 percent volumes, based on expected trip generation for this neighborhood. Therefore, the minimum volume criteria for an all-way STOP has not been met.

Approach Speeds
The approach speed limit on both streets is 25 mph. Speed limits alone cannot be used in this case to determine which direction of traffic should be assigned the right-of-way.

Sight Distance
The major potential sight distance obstructions at the intersection is the house corner located at the southeast quadrant of the intersection and the evergreen tree located at the southwest quadrant of the intersection. Reference the attachments for intersection photos. These obstructions come into play when determining the safe approach speeds for the intersection. The safe approach speed is the speed at which a vehicle can approach an intersection and still stop in time to avoid a collision with a vehicle on the cross street. Safe approach speeds are determined through calculations.

While we acknowledge that the large bush located near the southeast corner of the intersection is a limiting sight distance obstruction, the calculated stopping sight distance on the Caswell Drive approach with respect to a conflicting westbound vehicle is 109 feet. Thus, the decision to either stop or yield at the intersection needs to be made well in advance of the location of the bush, approximately at the location of the driveway for the residence at the southeast quadrant of the intersection, at which point the northwest house corner is the primary visual obstruction. Once a vehicle has yielded, it may be necessary to roll forward to view an approaching westbound vehicle around the bush. This behavior falls within the intention of a YIELD sign, as presently exists on the Caswell Drive approach.

When the safe approach speed is found to be more than 10 mph, a YIELD sign is recommended. In this case, the safe approach speed was found to be 16.1 mph for a vehicle traveling on northbound Caswell Drive as a result of the sight obstruction from the northwest house corner on the southeast quadrant of the intersection, therefore a YIELD sign is the recommended treatment. The safe approach speed calculation spreadsheet is attached for your reference.

Recommendation
OHM recommends to retain the YIELD sign on the Caswell Drive approach to the intersection. The intersection should continue to be monitored if traffic volumes increase or crashes begin to occur.

Sincerely,
Orchard, Hiltz & McCliment, Inc.

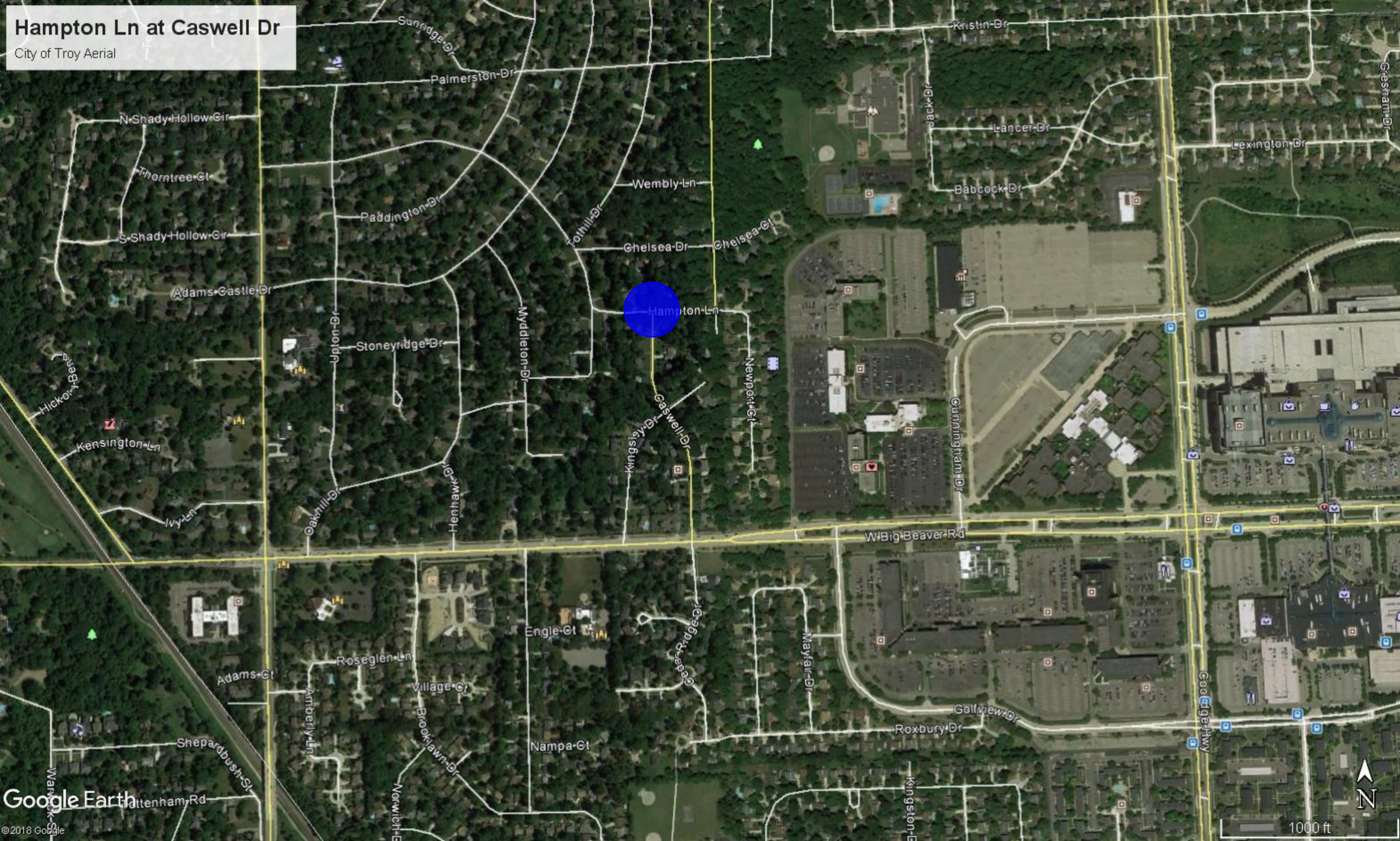
Matt Clark, EIT
Engineer

Sara Merrill, PE, PTOE
Traffic Project Manager

Attachments:
- Aerial Photo
- Safe Approach Speed Calculation Spreadsheet
- Intersection Photos
- Traffic Control Determination Reference Guide

Hampton Ln at Caswell Dr

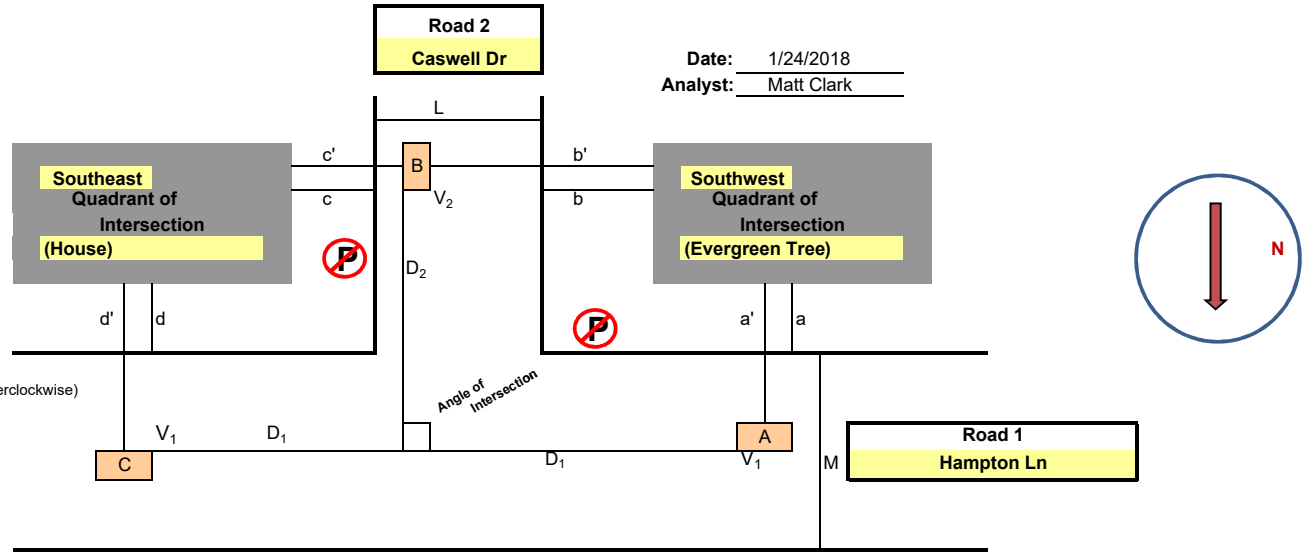
City of Troy Aerial



Safe Approach Speed Calculation

Hampton Ln and Caswell Dr
City of Troy

Date: 1/24/2018
Analyst: Matt Clark



Measured:

Width of Roads
- Road 1 = 22 (ft)
- Road 2 = 21 (ft)

Distance to Obstruction
- a = 76 (ft)
- b = 39 (ft)
- c = 42 (ft)
- d = 74 (ft)

Angle of Intersection
- Delta = 90 (degrees, measure counterclockwise)

Road 1 Posted
- Speed Limit = 25 (mph)

Assumed:

Speed of Vehicle A = Speed of Vehicle C
= Posted Speed Limit on Road 1
- \+ 5 (mph)
- V_1 = 30 (mph)

Perception / Reaction Time (AASHTO)
- t = 2.5 (sec)

Deceleration rate (AASHTO)
- A = 11.20

Clearance distance in excess of safe stopping distance (AAA)
- EC = 0 (ft)

Intermediate Calculations:

D_1 =	196	a' =	82
D_{2A} =	109	b' =	48
D_{2C} =	83.9	c' =	48
		d' =	84

Based On $D_1 = (1.075\ V_1^{\ 2} / A) + 1.4667\ V_1\ t + EC$

$D_{2A} = \frac{a' * D_1}{(D_1 - b')}$ or $D_{2C} = \frac{c' * D_1}{(D_1 - d')}$

Calculated Safe Approach Speed for Vehicle B
Approaching on Road 2

TRUE		19.6	(mph) [Based on Veh. A]
FALSE	or V_2 =	16.1	(mph) [Based on Veh. C]

Notes:
- Enter field measurements in yellow highlighted area.
- Blue fields are std. default values; change only for cause.
- Calculated by spreadsheet

Threshold of Safe Approach Speed (AAA, FHWA & NSC)
- to Recommend STOP Control 10.0 (mph)
- to Recommend YIELD Control 25.0 (mph)
- Otherwise Recommends NO CONTROL.

Recommended ROW control for Road 2
based on safe approach speed : YIELD SIGN

Photograph No. 1: Caswell Drive – Heading North
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 2: Caswell Drive - Heading North and Looking Left
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 3: Caswell Drive - Heading North and Looking Right
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 4: Caswell Drive - Looking South
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 5: Hampton Drive – Heading East
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 6: Hampton Drive – Heading East and Looking Right
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 7: Hampton Drive - Heading West
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 8: Hampton Drive - Heading West and Looking Left
Date: 1/24/2019 **Photographer:** Matt Clark

Reference Guide on Traffic Control Determination in the State of Michigan

Background

This document is intended to be used as a reference guide for the intersection traffic control studies performed in the City of Troy. The document explains the procedure and requirements necessary to implement traffic control at an intersection as stipulated by the Michigan Manual on Uniform Traffic Control Devices (MMUTCD). After gathering the required geometric and traffic data, an intersection traffic control study typically begins with an evaluation of the all-way STOP warrants. If the all-way STOP warrants are not met, a subsequent analysis is performed to determine whether two-way STOP or YIELD control is most appropriate based on right-of-way assignment and other criteria, as described below.

Evaluation of All-Way STOP Traffic Control

Based on the MMUTCD there are four conditions where **all-way** STOP signs may be warranted:

A. *Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.*
B. *Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.*
C. *Minimum volumes:*
    1. *The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day; and*
    2. *The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour; but*
    3. *If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1 and 2.*
D. *Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.*

STOP Traffic Control Guidance

Based on the MMUTCD there are four conditions where STOP signs may be warranted:

- At the intersection of a less important road with a main road where application of the normal right-of-way rule is unduly hazardous.
- On a street entering a through highway or street.
- At an unsignalized intersection in a signalized area.
- At other intersections where a combination of high speed, restricted view, or crash records indicate a need for control by the STOP sign.

Many times STOP signs are installed where they may not be warranted. Traffic experts agree that unnecessary STOP signs:

- Cause accidents they are designed to prevent.
- Breed contempt for other necessary STOP signs.
- Waste millions of gallons of gasoline annually.
- Create added noise and air pollution.

- Increase, rather than decrease, speeds between intersections.

There is also an explicit restriction in the MMUTCD that STOP signs are not to be used for speed control, in Section 2B.04.

YIELD Traffic Control Guidance

The use of a YIELD sign is intended to assign the right-of-way at intersections where it is not usually necessary to stop before proceeding into the intersection. Conversely, the STOP sign is intended for use where it is usually necessary to stop before proceeding into the intersection.

The following conditions should be fully evaluated to determine how the right-of-way should be assigned:

- Traffic Volumes: Normally, the heavier volume of traffic should be given the right-of-way.
- Approach Speeds: The higher speed traffic should normally be given the right-of-way.
- Types of Highways: When a minor highway intersects a major highway, it is usually desirable to control the minor highway.
- Sight Distance: Sight distance across the corners of the intersection is the most important factor and is critical in determining safe approach speeds.

TRAFFIC COMMITTEE REPORT

February 6, 2019

TO: Traffic Committee

FROM: Bill Huotari, City Engineer/ Traffic Engineer

SUBJECT: Request for Traffic Control
Wendover at Chelsea and Tothill

Background:

Traffic Committee members requested that the intersection of Wendover at Chelsea and Tothill be reviewed for purposes of traffic control.

The subject intersection is a 3-legged, skewed T-intersection, located approximately 1,800 feet east of Adams Road and 1,700 feet north of Big Beaver Road. A short connection between Tothill Drive and Chelsea Lane exists just east of Wendover Street, separated by a landscaped island.

There were no crashes in the past five (5) years at the intersection. The posted speed limit on all streets is 25 mph.

Wendover Street is currently uncontrolled and would be considered the major road as it continues through the intersection, while Chelsea Lane and Tothill Drive would be considered the minor roads as they terminate at Wendover Street.

The major potential sight distance obstructions at the intersection of Chelsea Lane at Wendover Street is the northwest house corner at the southeast quadrant of the intersection and the southwest house corner at the northeast quadrant of the intersection. The major potential sight distance obstructions at the intersection of Tothill Drive at Wendover Street is the vegetation abutting the northwest corner of the house at the southeast quadrant of the intersection and the dense grouping of vegetation at the northeast quadrant of the intersection.

The safe approach speed was found to be 22.1 mph for a vehicle traveling westbound on Chelsea Lane as a result of the sight obstruction from the house at the southeast quadrant of the intersection, therefore a YIELD sign is the recommended treatment on Chelsea Lane.

The safe approach speed was found to be 9.6 mph for vehicle traveling on westbound Tothill Drive as a result of the vegetation at the northeast quadrant of the intersection. If the vegetation were trimmed per City ordinance, a YIELD sign is the recommended treatment. If the vegetation is to remain, then a STOP sign is the recommended treatment.

The city requested that OHM review the intersection and provide their findings and recommendations (copy attached).

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February 5, 2019

Mr. William Huotari, PE
City Engineer
City of Troy
500 W. Big Beaver Rd
Troy, MI 48084

RE: Traffic Control Recommendation for
Chelsea Lane at Wendover Street and Tothill Drive at Wendover Street
OHM JN: 0128-19-0010

Dear Mr. Huotari:

As requested, we have reviewed the intersections of Chelsea Lane at Wendover Street and Tothill Drive at Wendover Street to determine the proper traffic control. The subject intersections are 3-legged, skewed T-intersections located in the City of Troy approximately 1,810 feet east of Adams Road and 1,720 feet north of Big Beaver Road. A short connection between Tothill Drive and Chelsea Lane exists just east of Wendover Street, separated by a landscaped island. The speed limit on each street is 25 mph. The intersections are uncontrolled on every approach. Reference the attachments for aerial and intersection photos.

Types of Roadways

Wendover Street, Chelsea Lane, and Tothill Drive are all considered local streets. Wendover Street runs northwest / southeast near the intersections, while running east / west near Adams Road (principal arterial) and Myddleton Drive. Wendover Street provides access to / from the local neighborhood and Adams Road (principal arterial) via Upton Drive, Paddington Drive, Newgate Drive, Tothill Drive, Chelsea Drive, Hampton Lane and Myddleton Drive. Tothill Drive runs northeast / southwest, providing indirect access to single family residences via Palmerston Drive and Wendover Street to / from Adams Road to the west. Chelsea Drive runs east / west, and provides indirect access to local residents via Wendover Street to / from Adams Road and via Beach Road to / from Wattles Road (minor arterial) at the north. Chelsea Lane ends at a cul-de-sac approximately 1,200 feet east of Wendover Street with a connection to a pathway providing access to the Schroeder Elementary School.

The surrounding land use is entirely single-family residential. On-street parking is permitted on the north side of Chelsea Lane, the south side of Tothill Drive, and on the east side of Wendover Street in the vicinity of the intersections. Wendover Street is currently uncontrolled and would be considered the major road as it continues through the intersection, while Chelsea Lane and Tothill Drive would be considered the minor roads as they terminate at Wendover Street.

OHM Advisors
34000 PLYMOUTH ROAD
LIVONIA, MICHIGAN 48150
T 734.522.6711
F 734.522.6427
OHM-Advisors.com

The ensuing traffic control analysis adheres to the guidance presented in the Michigan Manual on Uniform Traffic Control Devices (MMUTCD). A reference document explaining the background behind the analysis is attached to this memo.

Crash Analysis
Based on information obtained through the Traffic Improvement Association of Michigan, there were no crashes recorded in the past five (5) years at the intersections of Chelsea Lane and Tothill Drive at Wendover Street. The crash data does not constitute a compelling case for modifying the existing controls.

Traffic Volumes
Traffic counts were not collected in the vicinity of the intersections. Traffic volumes in residential areas are predominantly driven by the number of single family residential homes in the neighborhood. Based on the residential nature and the number of homes in the surrounding area, as well as the fact that Chelsea Lane dead ends approximately 1,200' east of the intersection, it is highly improbable that this location would satisfy any of the minimum volume warrants for an all-way STOP. Further explanation within the context of the minimum volume constraints is provided next.

It is extremely unlikely that Wendover Street meets and sustains the 300 vehicles per hour threshold for a minimum of 8 hours. The combined vehicular, pedestrian, and bicycle volumes entering from either Tothill Drive or Chelsea Drive is similarly unlikely to average at least 200 units for any 8 hours. Additionally, since the posted speed limit is only 25 mph on each street, it is reasonable to assume that the 85th percentile approach speed does not exceed 40 mph on either road; thus, the minimum vehicular volume warrants cannot be discounted to 70 percent of the values described previously. Finally, the study intersection is likely to fall significantly shy even of the reduced 80 percent volumes, based on expected trip generation for this neighborhood. Therefore, the minimum volume criteria for an all-way STOP has not been met.

Approach Speeds
The approach speed limit on both streets is 25 mph. Speed limits alone cannot be used in this case to determine which direction of traffic should be assigned the right-of-way.

Sight Distance
The major potential sight distance obstructions at the intersection of Chelsea Lane at Wendover Street is the northwest house corner at the southeast quadrant of the intersection and the southwest house corner at the northeast quadrant of the intersection. The major potential sight distance obstructions at the intersection of Tothill Drive at Wendover Street is the vegetation abutting the northwest corner of the house at the southeast quadrant of the intersection and the dense grouping of vegetation at the northeast quadrant of the intersection. Reference the attachments for intersection photos. These obstructions come into play when determining the safe approach speeds for the intersection. The safe approach speed is the speed at which a vehicle can approach an intersection and still stop in time to avoid a collision with a vehicle on the cross street. Safe approach speeds are determined through calculations.

When the safe approach speed is found to be less than 10 mph, a STOP sign is recommended. When the safe approach speed is found to be more than 10 mph, a YIELD sign is recommended. In this case, the safe approach speed was found to be 22.1 mph for a vehicle traveling on westbound Chelsea Lane as

a result of the sight obstruction from the house corner at the southeast quadrant of the intersection, therefore a YIELD sign is the recommended treatment on Chelsea Lane.

The safe approach speed was found to be 9.6 mph for a vehicle traveling on westbound Tothill Drive as a result of the vegetation at the northeast quadrant of the intersection. However, the City of Troy's Zoning Ordinance Chapter 28 Section 11 *Corner Clearance* states that, "*All shrubs and bushes located on the triangle formed by two (2) right-of way lines at the intersection of two (2) streets and extending for a distance of twenty-five (25) feet each way from the intersection of the right-of-way lines on any corner lot within the city, shall not be permitted to grow to a height of more than thirty (30) inches from the established street grade, in order that the view of the driver of a vehicle approaching a street intersection shall not be obstructed.*" If the vegetation on the northeast quadrant were to be trimmed to a height which would not obstruct the vision of an approaching vehicle (thirty inches or less), the sight distance obstruction would then become the southwest house corner on the property. Using the house corner as the limiting sight distance obstruction results in a calculated safe approach speed of 23.0 mph, which would facilitate the installation of a YIELD sign, as opposed to a STOP sign (if the vegetation were to remain). The safe approach speed calculation spreadsheets for each intersection, as well as for each sight distance scenario at Wendover Street and Tothill Drive, are attached for your reference.

Recommendation
OHM recommends that the City requires the vegetation be trimmed at the northeast quadrant of the intersection of Tothill Drive at Wendover Street to allow consistent posting of a YIELD sign on both of the Tothill Drive and Chelsea Lane approaches to Wendover Street. The intersection should be reevaluated if traffic volumes increase or crashes begin to occur.

When these roads are eventually reconstructed, OHM recommends that the City consider constructing a roundabout at this location.

Sincerely,
Orchard, Hiltz & McCliment, Inc.

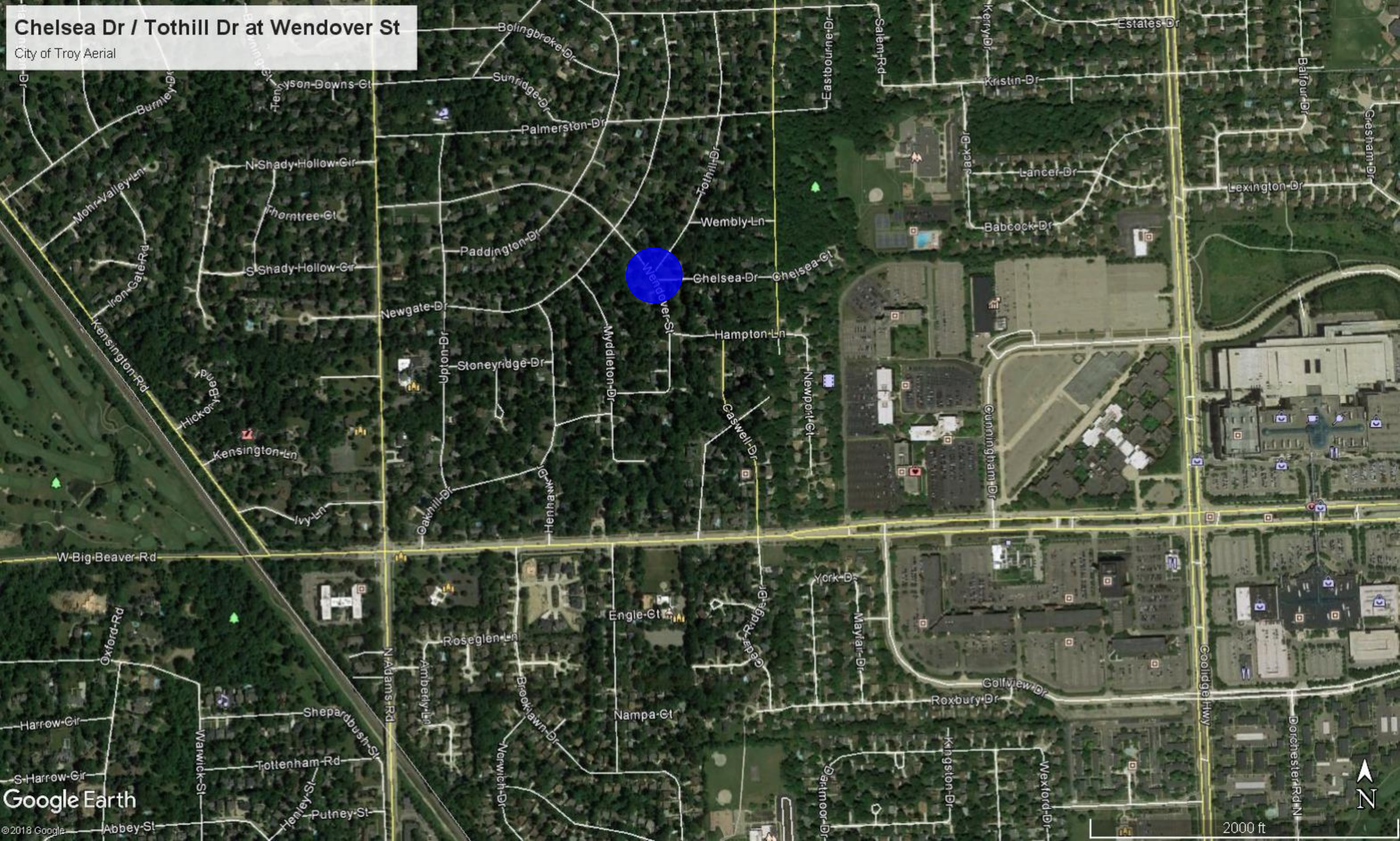
Matt Clark, EIT
Engineer

Sara Merrill, PE, PTOE
Traffic Project Manager

Attachments:
- Aerial Photo
- Safe Approach Speed Calculation Spreadsheet
- Intersection Photos
- Traffic Control Determination Reference Guide

Chelsea Dr / Tothill Dr at Wendover St

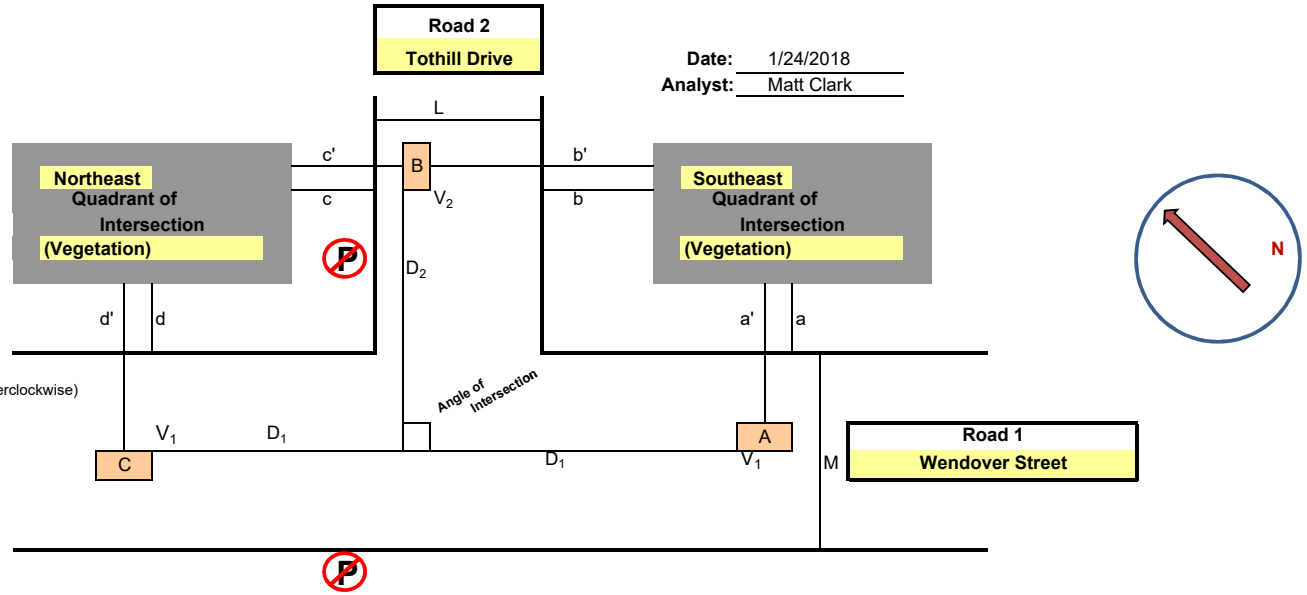
City of Troy Aerial



Safe Approach Speed Calculation

Wendover Street and Tothill Drive
City of Troy

Date: 1/24/2018
Analyst: Matt Clark



Measured:

Width of Roads

Road 1 =	22	(ft)
Road 2 =	22	(ft)

Distance to Obstruction

a =	116	(ft)
b =	37	(ft)
c =	28	(ft)
d =	23	(ft)

Angle of Intersection

Delta =	110	(degrees, measure counterclockwise)

Road 1 Posted

Speed Limit =	25	(mph)

Assumed:

Speed of Vehicle A = Speed of Vehicle C
= Posted Speed Limit on Road 1

+	5	(mph)
V_1 =	30	(mph)

Perception / Reaction Time (AASHTO)

t =	2.5	(sec)

Deceleration rate (AASHTO)

A =	11.20	

Clearance distance in excess of safe stopping distance (AAA)

EC =	0	(ft)

Intermediate Calculations:

D_1 =	196	a' =	122
D_{2A} =	174	b' =	47
D_{2C} =	44.1	c' =	34
		d' =	33

Based On $D_1 = (1.075\ V_1^{\ 2} / A) + 1.4667\ V_1\ t + EC$

$D_{2A} = \frac{a' * D_1}{(D_1 - b')}$ or $D_{2C} = \frac{c' * D_1}{(D_1 - d')}$

Calculated Safe Approach Speed for Vehicle B
Approaching on Road 2

FALSE		27.6	(mph) [Based on Veh. A]
FALSE	or V_2 =	9.6	(mph) [Based on Veh. C]

Notes: Enter field measurements in yellow highlighted area.
Blue fields are std. default values; change only for cause.
Calculated by spreadsheet

Threshold of Safe Approach Speed (AAA, FHWA & NSC)

to Recommend STOP Control	10.0	(mph)
to Recommend YIELD Control	25.0	(mph)

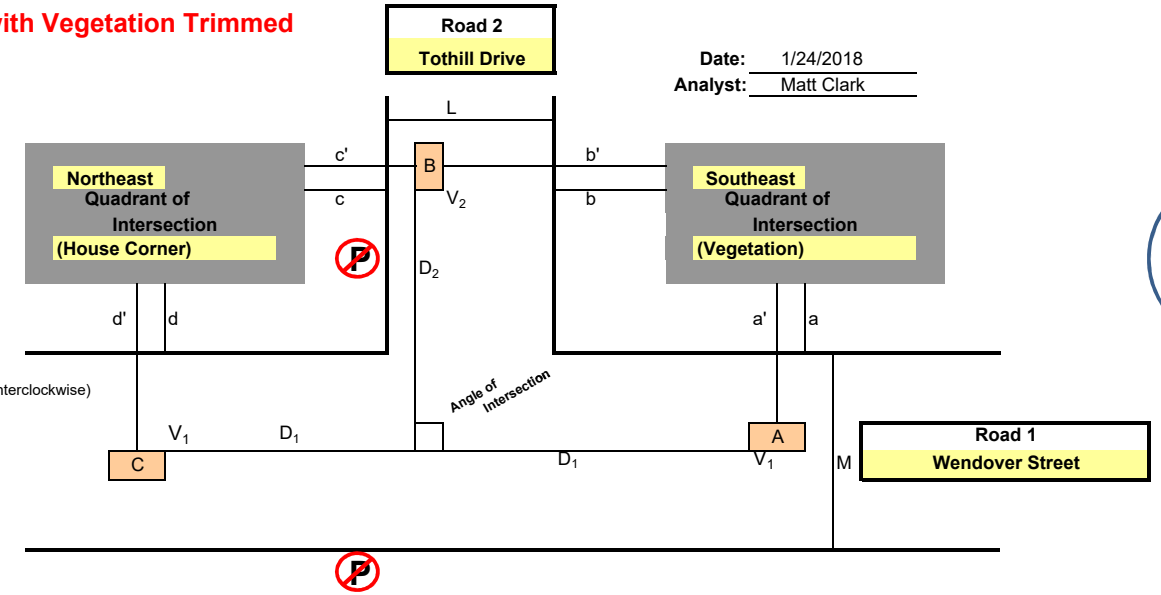
Otherwise Recommends NO CONTROL.

Recommended ROW control for Road 2
based on safe approach speed : **STOP Sign**

Safe Approach Speed Calculation - with Vegetation Trimmed

Wendover Street and Tothill Drive
City of Troy

Date: 1/24/2018
Analyst: Matt Clark



Measured:

Width of Roads
- Road 1 = 22 (ft)
- Road 2 = 22 (ft)

Distance to Obstruction
- a = 116 (ft)
- b = 37 (ft)
- c = 64 (ft)
- d = 73 (ft)

Angle of Intersection
- Delta = 110 (degrees, measure counterclockwise)

Road 1 Posted
- Speed Limit = 25 (mph)

Assumed:

Speed of Vehicle A = Speed of Vehicle C
= Posted Speed Limit on Road 1
- \+ 5 (mph)
- V_1 = 30 (mph)

Perception / Reaction Time (AASHTO)
- t = 2.5 (sec)

Deceleration rate (AASHTO)
- A = 11.20

Clearance distance in excess of safe stopping distance (AAA)
- EC = 0 (ft)

Intermediate Calculations:

D_1 =	196	a' =	122
D_{2A} =	174	b' =	47
D_{2C} =	135.4	c' =	70
		d' =	83

Based On $D_1 = (1.075\ V_1^{\ 2} / A) + 1.4667\ V_1\ t + EC$

$D_{2A} = \frac{a' * D_1}{(D_1 - b')}$ or $D_{2C} = \frac{c' * D_1}{(D_1 - d')}$

Calculated Safe Approach Speed for Vehicle B
Approaching on Road 2

27.6 (mph) [Based on Veh. A]
or V_2 = 23.0 (mph) [Based on Veh. C]

Notes:
- Enter field measurements in yellow highlighted area.
- Blue fields are std. default values; change only for cause.
- Calculated by spreadsheet

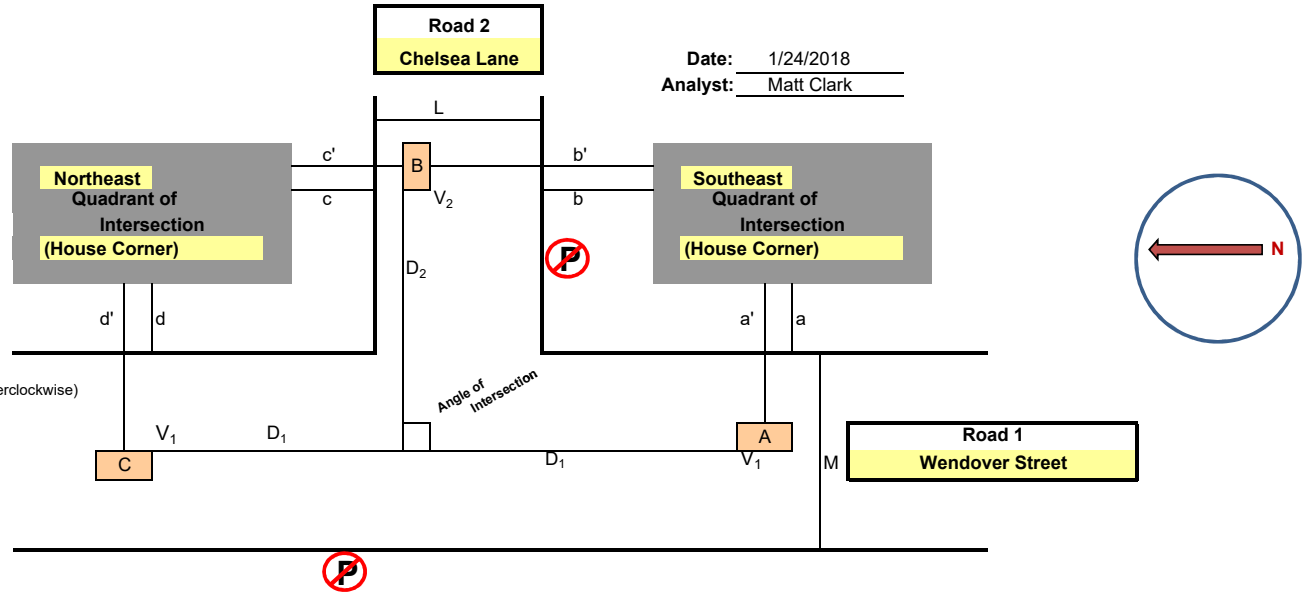
Threshold of Safe Approach Speed (AAA, FHWA & NSC)
- to Recommend STOP Control 10.0 (mph)
- to Recommend YIELD Control 25.0 (mph)
- Otherwise Recommends NO CONTROL.

Recommended ROW control for Road 2
based on safe approach speed : **YIELD SIGN**

Safe Approach Speed Calculation

Wendover Street and Chelsea Lane
City of Troy

Date: 1/24/2018
Analyst: Matt Clark



Measured:

Width of Roads

Road 1 =	22	(ft)
Road 2 =	21	(ft)

Distance to Obstruction

a =	71	(ft)
b =	57	(ft)
c =	58	(ft)
d =	113	(ft)

Angle of Intersection

Delta =	70	(degrees, measure counterclockwise)

Road 1 Posted

Speed Limit =	25	(mph)

Assumed:

Speed of Vehicle A = Speed of Vehicle C
= Posted Speed Limit on Road 1

+	5	(mph)
V_1 =	30	(mph)

Perception / Reaction Time (AASHTO)

t =	2.5	(sec)

Deceleration rate (AASHTO)

A =	11.20	

Clearance distance in excess of safe stopping distance (AAA)

EC =	0	(ft)

Intermediate Calculations:

D_1 =	196	a' =	77
D_{2A} =	128	b' =	66
D_{2C} =	204.2	c' =	64
		d' =	123

Based On $D_1 = (1.075\ V_1^{\ 2} / A) + 1.4667\ V_1\ t + EC$

$D_{2A} = \frac{a' * D_1}{(D_1 - b')}$ or $D_{2C} = \frac{c' * D_1}{(D_1 - d')}$

Calculated Safe Approach Speed for Vehicle B
Approaching on Road 2

TRUE		22.1	(mph) [Based on Veh. A]
FALSE	or V_2 =	30.8	(mph) [Based on Veh. C]

Notes: Enter field measurements in yellow highlighted area.
Blue fields are std. default values; change only for cause.
Calculated by spreadsheet

Threshold of Safe Approach Speed (AAA, FHWA & NSC)

to Recommend STOP Control	10.0	(mph)
to Recommend YIELD Control	25.0	(mph)

Otherwise Recommends NO CONTROL.

Recommended ROW control for Road 2
based on safe approach speed : **YIELD SIGN**

Photograph No. 1: Chelsea Lane – Heading West
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 2: Chelsea Lane - Heading West and Looking Left
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 3: Chelsea Lane - Heading West and Looking Right
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 4: Chelsea Lane - Looking East
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 5: Tothill Drive – Heading West
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 6: Tothill Drive – Heading West and Looking Right
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 7: Tothill Drive - Heading West and Looking Left
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 8: Wendover Street at Chelsea Drive - Heading North
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 9: Wendover Street at Chelsea Drive - Heading North and Looking Right
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 10: Wendover Street at Tothill Drive - Heading South
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 11: Wendover Street at Tothill Drive - Heading South and Looking Left
Date: 1/24/2019 **Photographer:** Matt Clark

Reference Guide on Traffic Control Determination in the State of Michigan

Background

This document is intended to be used as a reference guide for the intersection traffic control studies performed in the City of Troy. The document explains the procedure and requirements necessary to implement traffic control at an intersection as stipulated by the Michigan Manual on Uniform Traffic Control Devices (MMUTCD). After gathering the required geometric and traffic data, an intersection traffic control study typically begins with an evaluation of the all-way STOP warrants. If the all-way STOP warrants are not met, a subsequent analysis is performed to determine whether two-way STOP or YIELD control is most appropriate based on right-of-way assignment and other criteria, as described below.

Evaluation of All-Way STOP Traffic Control

Based on the MMUTCD there are four conditions where **all-way** STOP signs may be warranted:

A. *Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.*
B. *Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.*
C. *Minimum volumes:*
    1. *The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day; and*
    2. *The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour; but*
    3. *If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1 and 2.*
D. *Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.*

STOP Traffic Control Guidance

Based on the MMUTCD there are four conditions where STOP signs may be warranted:

- At the intersection of a less important road with a main road where application of the normal right-of-way rule is unduly hazardous.
- On a street entering a through highway or street.
- At an unsignalized intersection in a signalized area.
- At other intersections where a combination of high speed, restricted view, or crash records indicate a need for control by the STOP sign.

Many times STOP signs are installed where they may not be warranted. Traffic experts agree that unnecessary STOP signs:

- Cause accidents they are designed to prevent.
- Breed contempt for other necessary STOP signs.
- Waste millions of gallons of gasoline annually.
- Create added noise and air pollution.

- Increase, rather than decrease, speeds between intersections.

There is also an explicit restriction in the MMUTCD that STOP signs are not to be used for speed control, in Section 2B.04.

YIELD Traffic Control Guidance

The use of a YIELD sign is intended to assign the right-of-way at intersections where it is not usually necessary to stop before proceeding into the intersection. Conversely, the STOP sign is intended for use where it is usually necessary to stop before proceeding into the intersection.

The following conditions should be fully evaluated to determine how the right-of-way should be assigned:

- Traffic Volumes: Normally, the heavier volume of traffic should be given the right-of-way.
- Approach Speeds: The higher speed traffic should normally be given the right-of-way.
- Types of Highways: When a minor highway intersects a major highway, it is usually desirable to control the minor highway.
- Sight Distance: Sight distance across the corners of the intersection is the most important factor and is critical in determining safe approach speeds.

TRAFFIC COMMITTEE REPORT

February 6, 2019

TO: Traffic Committee

FROM: Bill Huotari, City Engineer/ Traffic Engineer

SUBJECT: Request for Traffic Control
Plum at Starr

Background:

Traffic Committee members requested that the intersection of Plum at Starr be reviewed for purposes of traffic control.

The subject intersection is a 3-leg, T-intersection located approximately 1,500 feet east of Livernois Road and 3,200 feet north of Maple Road.

There was one (1) crash recorded in the past five (5) years at the intersection.

The posted speed limit on both streets is 25 mph.

Plum Drive is currently uncontrolled and would be considered the minor road at the intersection, while Start Drive would be considered the major road as it continues through the intersection, despite coming to a dead end east of Kirkton Drive.

The major potential sight distance obstructions at the intersection is the vegetation, predominantly the evergreen tree, abutting the northwest corner of the house at the southeast quadrant of the intersection and the northeast corner of the house at the southwest quadrant of the intersection.

The safe approach speed was found to be 8.7 mph for a vehicle traveling on northbound Plum Drive as a result of the sight obstruction from the vegetation at the southeast quadrant of the intersection, therefore a STOP sign is the recommended treatment.

The city requested that OHM review the intersection and provide their findings and recommendations (copy attached).

ARCHITECTS. ENGINEERS. PLANNERS.

OHM Advancing Communities®

February 5, 2019

Mr. William Huotari, PE
City Engineer
City of Troy
500 W. Big Beaver Rd
Troy, MI 48084

RE: Traffic Control Recommendation for Plum Drive at Starr Drive
OHM JN: 0128-19-0010

Dear Mr. Huotari:

As requested, we have reviewed the intersection of Plum Drive at Starr Drive to determine the proper traffic control. The subject intersection is a 3-leg T-intersection located in the City of Troy approximately 1,515 feet east of Livernois Road and 3,185 feet north of Maple Road. The speed limit on both streets is 25 mph. The intersection is uncontrolled on both Plum Drive and Starr Drive. Reference the attachments for aerial and intersection photos.

Types of Roadways
Both Plum Drive and Starr Drive are considered local streets. Starr Drive runs east / west, providing access to / from the local neighborhood and Livernois Road (minor arterial) via Plum Drive and Kirkton Drive. Plum Drive runs north / south, providing indirect access to Morse Elementary school to the east and Livernois Road to the west via Starr Drive, Hickory Drive and Cherry Drive.

The surrounding land use is entirely single-family residential. On-street parking is permitted on the south side of Starr Drive and on the west side of Plum Drive in the vicinity of the intersection. Plum Drive is currently uncontrolled and would be considered the minor road at the intersection, while Starr Drive would be considered the major road as it continues through the intersection, despite coming to a dead end east of Kirkton Drive.

The ensuing traffic control analysis adheres to the guidance presented in the Michigan Manual on Uniform Traffic Control Devices (MMUTCD). A reference document explaining the background behind the analysis is attached to this memo.

Crash Analysis
Based on information obtained through the Traffic Improvement Association of Michigan, there was one (1) crash recorded in the past five (5) years at the intersection of Plum Drive and Starr Drive. According to the UD-10 report attached to the end of this document, a vehicle parked in the vicinity of 266 Starr Drive was struck by an unknown vehicle at an unknown time between May 9, 2014 and May 11, 2014. The crash data does not constitute a compelling case for modifying the existing controls.

OHM Advisors
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F 734.522.6427
OHM-Advisors.com

Traffic Volumes
Traffic counts were not collected in the vicinity of the intersection. Traffic volumes in residential areas are predominantly driven by the number of single family residential homes in the neighborhood. Based on the residential nature and the number of homes in the surrounding area, as well as the fact that Starr Drive is a dead-end street, it is highly improbable that this location would satisfy any of the minimum volume warrants for an all-way STOP. Further explanation within the context of the minimum volume constraints is provided next.

It is extremely unlikely that Starr Drive meets and sustains the 300 vehicles per hour threshold for a minimum of 8 hours. The combined vehicular, pedestrian, and bicycle volumes entering from Plum Drive is similarly unlikely to average at least 200 units for any 8 hours. Additionally, since the posted speed limit is only 25 mph, it is reasonable to assume that the 85th percentile approach speed does not exceed 40 mph on either road; thus, the minimum vehicular volume warrants cannot be discounted to 70 percent of the values described previously. Finally, the study intersection is likely to fall significantly shy even of the reduced 80 percent volumes, based on expected trip generation for this neighborhood. Therefore, the minimum volume criteria for an all-way STOP has not been met.

Approach Speeds
The approach speed limit on both streets is 25 mph. Speed limits alone cannot be used in this case to determine which direction of traffic should be assigned the right-of-way.

Sight Distance
The major potential sight distance obstructions at the intersection is the vegetation, predominately the evergreen tree, abutting the northwest corner of the house at the southeast quadrant of the intersection and the northeast corner of the house at the southwest quadrant of the intersection. Reference the attachments for intersection photos. These obstructions come into play when determining the safe approach speeds for the intersection. The safe approach speed is the speed at which a vehicle can approach an intersection and still stop in time to avoid a collision with a vehicle on the cross street. Safe approach speeds are determined through calculations.

When the safe approach speed is found to be less than 10 mph, a STOP sign is recommended. In this case, the safe approach speed was found to be 8.7 mph for a vehicle traveling on northbound Plum Drive as a result of the sight obstruction from the vegetation at the southeast quadrant of the intersection, therefore a STOP sign is the recommended treatment. The safe approach speed calculation spreadsheet is attached for your reference.

Recommendation
OHM recommends to install a STOP sign on the Plum Drive approach to the intersection. The intersection should continue to be monitored if traffic volumes increase or crashes begin to occur.

Sincerely,
Orchard, Hiltz & McCliment, Inc.

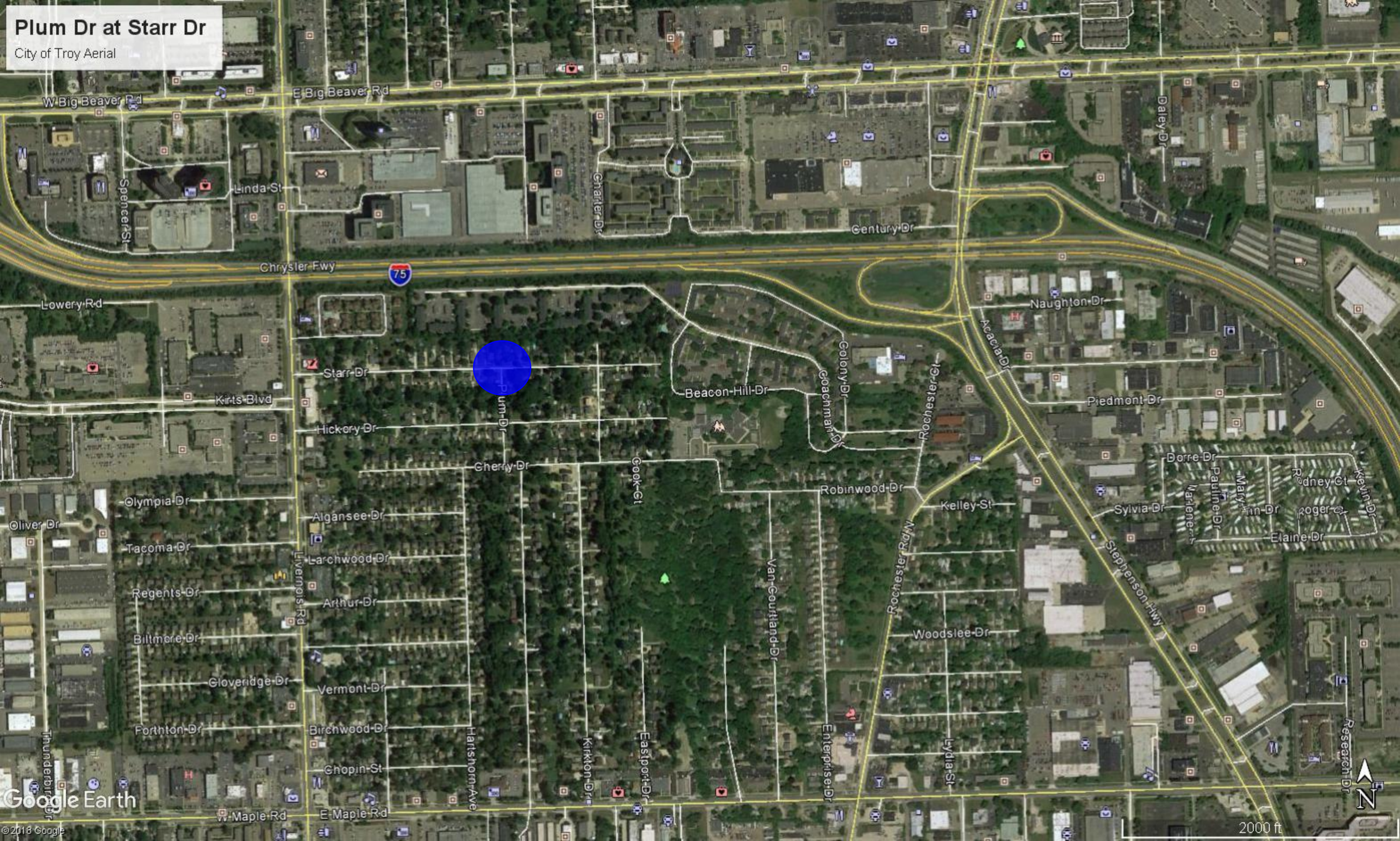
Matt Clark, EIT
Engineer

Sara Merrill, PE, PTOE
Traffic Project Manager

Attachments:
- Aerial Photo
- Safe Approach Speed Calculation Spreadsheet
- Intersection Photos
- UD-10 Crash Report
- Traffic Control Determination Reference Guide

Plum Dr at Starr Dr

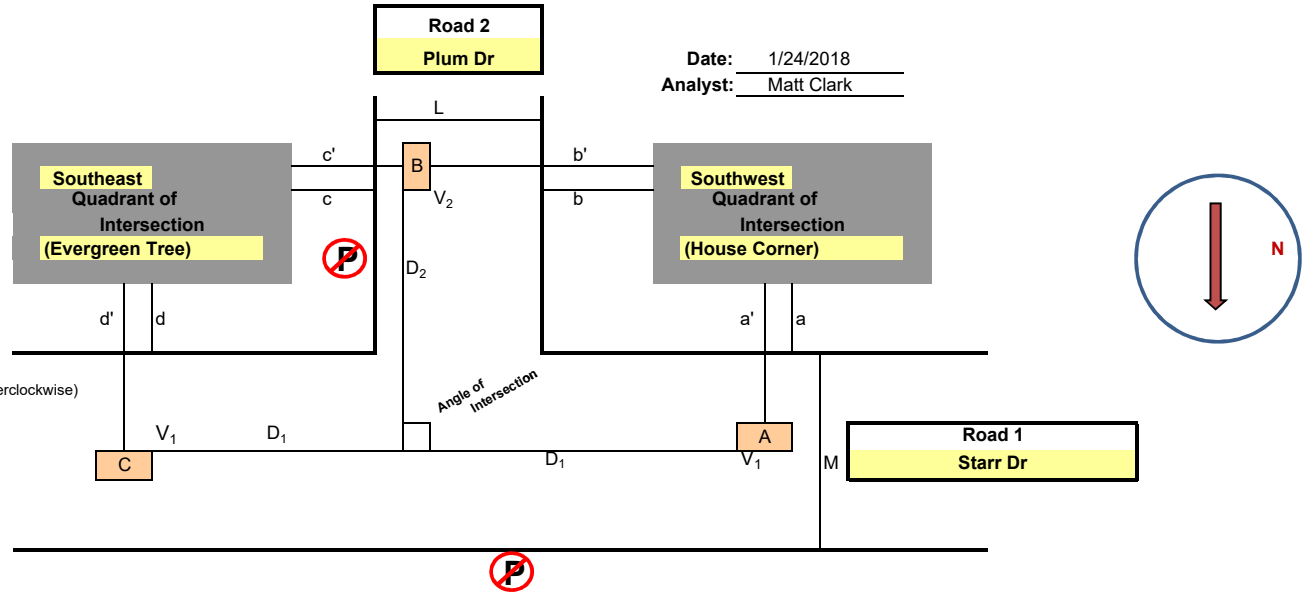
City of Troy Aerial



Safe Approach Speed Calculation

Starr Dr and Plum Dr
City of Troy

Date: 1/24/2018
Analyst: Matt Clark



Measured:

Width of Roads
- Road 1 = 22 (ft)
- Road 2 = 21 (ft)

Distance to Obstruction
- a = 52 (ft)
- b = 37 (ft)
- c = 25 (ft)
- d = 31 (ft)

Angle of Intersection
- Delta = 90 (degrees, measure counterclockwise)

Road 1 Posted
- Speed Limit = 25 (mph)

Assumed:

Speed of Vehicle A = Speed of Vehicle C
= Posted Speed Limit on Road 1
- \+ 5 (mph)
- V_1 = 30 (mph)

Perception / Reaction Time (AASHTO)
- t = 2.5 (sec)

Deceleration rate (AASHTO)
- A = 11.20

Clearance distance in excess of safe stopping distance (AAA)
- EC = 0 (ft)

Intermediate Calculations:

D_1 =	196	a' =	58
D_{2A} =	75.7	b' =	46
D_{2C} =	39.2	c' =	31
		d' =	41

Based On $D_1 = (1.075\ V_1^{\ 2} / A) + 1.4667\ V_1\ t + EC$

$D_{2A} = \frac{a' * D_1}{(D_1 - b')}$ or $D_{2C} = \frac{c' * D_1}{(D_1 - d')}$

Calculated Safe Approach Speed for Vehicle B
Approaching on Road 2

FALSE 14.9 (mph) [Based on Veh. A]
FALSE or V_2 = 8.7 (mph) [Based on Veh. C]

Threshold of Safe Approach Speed (AAA, FHWA & NSC)
- to Recommend STOP Control 10.0 (mph)
- to Recommend YIELD Control 25.0 (mph)
- Otherwise Recommends NO CONTROL.

Recommended ROW control for Road 2
based on safe approach speed : **STOP Sign**

Notes:
- Enter field measurements in yellow highlighted area.
- Blue fields are std. default values; change only for cause.
- Calculated by spreadsheet

Photograph No. 1: Plum Drive – Heading North
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 2: Plum Drive - Heading North and Looking Left
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 3: Plum Drive - Heading North and Looking Right
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 4: Plum Drive - Looking South
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 5: Starr Drive – Heading East
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 6: Starr Drive – Heading East and Looking Right
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 7: Starr Drive - Heading West
Date: 1/24/2019 **Photographer:** Matt Clark

Photograph No. 8: Starr Drive - Heading West and Looking Left
Date: 1/24/2019 **Photographer:** Matt Clark

Authority: 1949 PA 300, Sec.257.622
Compliance: Required MSP UD-10E
Penalty: $100 and/or 90 days (Rev 11/2006)

External #	Crash ID
0466360	8992591

Incident # 140018761 File Class 93001

STATE OF MICHIGAN TRAFFIC CRASH REPORT

Incident Disposition	Reviewer
Closed	JONES (118024)

ORI:	Department Name
MI 6378400	Troy Police Department

Crash Date	Crash Time	No. of Units	Crash Type	Special Circumstances	Special Checks
05/09/2014	15:00	01	Other/Unknown	○ None ○ Deer ○ School Bus ● Hit and Run ○ Fleeing Police	○ Fatal ○ Non-Traffic Area ○ ORV/Snowmobile

County	Traffic Control	Relation to Roadway	Special Study	Weather	Area
63 - Oakland	None	On Road		Other/Unknown	10 - NON-FRWY Straight roadway

City/Twsp	Construction Zone (if applicable) Type	Lane Closed	Activity	Light	Road Condition	Total Lanes	Speed Limit	Posted
84 - Troy				Other/Unknown	Other/Unknown	02	25	Yes

LOCATION

Prefix	Road Name	Road Type	Suffix	Divided Roadway
	STARR	DR		

Distance	Traffic Way	Access Control
50 Feet W	01 - Not physically divided	01 - No access control

Prefix	Intersecting Road	Road Type	Suffix	Divided Roadway
	PLUM	ST		

UNIT / DRIVER

Unit Number	Unit Known	State	Driver License Number	Date of Birth (Age)	License Type	Endorsements	Sex	Total Occupants	Hazardous Action
01	No		#############	##/##/####	○ Operator ○ Chauffer ○ Moped	○ Cycle ○ Farm ○ Recreation		00	

Unit Type	Driver Information	Injury	Position	Restraint	Hospital
MV	############################## ############################## (###) ###-####			09	NONE

Driver Condition	Interlock	Ejected	Trapped	Airbag Deployed	Ambulance
○1 ○2 ○3 ○4 ○5 ○6 ○7 ○8 ○9 ○99	No			Not Equipped	NONE

Alcohol	Test Results	Drugs	Test Results	Citation Issued
○ Yes ● No ○ Refused ○ Not offered Test Type ○ Field ○ PBT ○ Breath ○ Blood ○ Urine		○ Yes ● No Test Type ○ Blood ○ Urine		○ Hazardous ○ Other

Vehicle Registration	State	Insurance / Policy #	Towed To/By	Special Vehicles	Private Trailer Type	Vehicle Defect
###########	MI	##############################		0		

VIN	Vehicle Description Make	Model	Color	Year	Vehicle Type
#################	FORD	EXCURSION	WHITE	2002	Passenger Car

Location of Greatest Damage	First Impact	Extent of Damage	Driveable	Vehicle Direction	Vehicle Use	Action Prior
07	07	2	Yes	E	01 - Private	23 - Parked

Sequence of Events (● indicates MOST harmful event)	First	Second	Third	Fourth
	● 17 - Motor veh in transport			

PASSENGERS

Passenger Information	Date of Birth (Age)	Sex	Position	Restraint	Hospital	Injury	Airbag Deployed	Ejected	Trapped	Ambulance

TRUCK/BUS

Carrier Information	Carrier Source	GVWR	ICCMC	USDOT	MPSC

Driver's CDL Type	Endorsements	CDL Exempt	CDL Restrictions
	○H ○P ○T ○N ○S ○X	○ Farm ○ Other	○28 ○29 ○30 ○35 ○36

Interstate/Intrastate	Vehicle Type	Type & Axle Per Unit First	Second	Third	Fourth	Cargo Body Type	Medical Card	Hazardous Material	ID #	Class #
								○ Placard ○ Cargo Spill		

OWNERS

Owner Information	Owner Information
############################## ############################## #################################, ## #####-#### (###) ###-####	

Person Advised of Damaged Traffic Control	Damaged Property	Public
Contact Name: Contact Date: Contact Time:	Owner & Phone	

UNIT / DRIVER

Unit Number	Unit Known	State Driver License Number	Date of Birth (Age)	License Type: O Operator O Chauffer O Moped	Endorsements: O Cycle O Farm O Recreation	Sex	Total Occupants	Hazardous Action

Unit Type	Driver Information	Injury	Position	Restraint	Hospital

Driver Condition: O1 O2 O3 O4 O5 O6 O7 O8 O9 O99	Interlock	Ejected	Trapped	Airbag Deployed	Ambulance

Alcohol: O Yes O No O Refused O Not offered; Test Type O Field O PBT O Breath O Blood O Urine	Test Results	Drugs: O Yes O No; Test Type O Blood O Urine	Test Results	Citation Issued: O Hazardous O Other

Vehicle Registration	State	Insurance / Policy #	Towed To/By	Special Vehicles	Private Trailer Type	Vehicle Defect

VIN	Vehicle Description	Make	Model	Color	Year	Vehicle Type

Location of Greatest Damage	First Impact	Extent of Damage	Driveable	Vehicle Direction	Vehicle Use	Action Prior

Sequence of Events (● indicates MOST harmful event)	First	Second	Third	Fourth

PASSENGERS

Passenger Information	Date of Birth (Age)	Sex	Position	Restraint	Hospital
	Injury / Airbag Deployed		Ejected	Trapped	Ambulance
Passenger Information	Date of Birth (Age)	Sex	Position	Restraint	Hospital
	Injury / Airbag Deployed		Ejected	Trapped	Ambulance
Passenger Information	Date of Birth (Age)	Sex	Position	Restraint	Hospital
	Injury / Airbag Deployed		Ejected	Trapped	Ambulance
Passenger Information	Date of Birth (Age)	Sex	Position	Restraint	Hospital
	Injury / Airbag Deployed		Ejected	Trapped	Ambulance
Passenger Information	Date of Birth (Age)	Sex	Position	Restraint	Hospital
	Injury / Airbag Deployed		Ejected	Trapped	Ambulance
Passenger Information	Date of Birth (Age)	Sex	Position	Restraint	Hospital
	Injury / Airbag Deployed		Ejected	Trapped	Ambulance

TRUCK / BUS

Carrier Information	Carrier Source	GVWR	ICCMC	USDOT	MPSC
	Driver's CDL Type	Endorsements: O H O P O T O N O S O X	CDL Exempt: O Farm O Other	CDL Restrictions: O 28 O 29 O 30 O 35 O 36	

Interstate/Intrastate	Vehicle Type	Type & Axle Per Unit: First Second Third Fourth	Cargo Body Type	Medical Card	Hazardous Material: O Placard O Cargo Spill	ID #	Class #

OWNERS

Owner Information	Owner Information

WITNESS

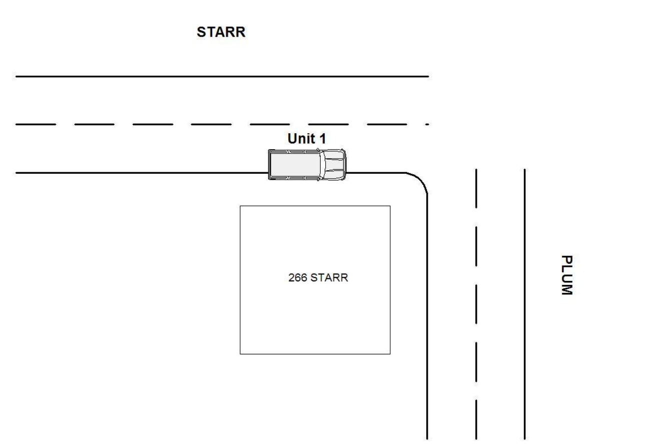
Witness Information	Witness Information

Investigated at Scene	Reported Date (Time)	1st Investigator Name (Badge)	2nd Investigator Name (Badge)	Photos By
No	06/22/2014 (15:59)	C. HUCK (85)		

Narrative

REGISTERED OWNER OF VEHICLE 1 REPORTED TO THE STATION ON TODAY'S DATE, 6/22/14, TO REPORT AN ACCIDENT THAT OCCURED SOMETIME BETWEEN 05/09/14 AND 05/11/14. REGISTERED OWNER ADVISED THAT HER VEHICLE WAS PARKED ON STARR DR AND WAS STRUCK BY AN UNKNOWN VEHICLE.

Diagram



Reference Guide on Traffic Control Determination in the State of Michigan

Background

This document is intended to be used as a reference guide for the intersection traffic control studies performed in the City of Troy. The document explains the procedure and requirements necessary to implement traffic control at an intersection as stipulated by the Michigan Manual on Uniform Traffic Control Devices (MMUTCD). After gathering the required geometric and traffic data, an intersection traffic control study typically begins with an evaluation of the all-way STOP warrants. If the all-way STOP warrants are not met, a subsequent analysis is performed to determine whether two-way STOP or YIELD control is most appropriate based on right-of-way assignment and other criteria, as described below.

Evaluation of All-Way STOP Traffic Control

Based on the MMUTCD there are four conditions where **all-way** STOP signs may be warranted:

A. *Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.*
B. *Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.*
C. *Minimum volumes:*
    1. *The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day; and*
    2. *The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour; but*
    3. *If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1 and 2.*
D. *Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.*

STOP Traffic Control Guidance

Based on the MMUTCD there are four conditions where STOP signs may be warranted:

- At the intersection of a less important road with a main road where application of the normal right-of-way rule is unduly hazardous.
- On a street entering a through highway or street.
- At an unsignalized intersection in a signalized area.
- At other intersections where a combination of high speed, restricted view, or crash records indicate a need for control by the STOP sign.

Many times STOP signs are installed where they may not be warranted. Traffic experts agree that unnecessary STOP signs:

- Cause accidents they are designed to prevent.
- Breed contempt for other necessary STOP signs.
- Waste millions of gallons of gasoline annually.
- Create added noise and air pollution.

- Increase, rather than decrease, speeds between intersections.

There is also an explicit restriction in the MMUTCD that STOP signs are not to be used for speed control, in Section 2B.04.

YIELD Traffic Control Guidance

The use of a YIELD sign is intended to assign the right-of-way at intersections where it is not usually necessary to stop before proceeding into the intersection. Conversely, the STOP sign is intended for use where it is usually necessary to stop before proceeding into the intersection.

The following conditions should be fully evaluated to determine how the right-of-way should be assigned:

- Traffic Volumes: Normally, the heavier volume of traffic should be given the right-of-way.
- Approach Speeds: The higher speed traffic should normally be given the right-of-way.
- Types of Highways: When a minor highway intersects a major highway, it is usually desirable to control the minor highway.
- Sight Distance: Sight distance across the corners of the intersection is the most important factor and is critical in determining safe approach speeds.

ITEM #7

TRAFFIC COMMITTEE REPORT

February 6, 2019

TO: Traffic Committee

FROM: Bill Huotari, City Engineer/ Traffic Engineer

SUBJECT: Election of Officers

Background:

In accordance with the By-Laws of the City of Troy Traffic Committee, Article III, nomination of officers shall be made from the floor on the third Wednesday of February of each year for the purpose of electing a Chairperson and a Vice-Chairperson.

A candidate receiving a majority vote of the members present at the meeting shall be declared elected and shall serve for one year or until his or her successor shall take office. Vacancies in offices shall be filled immediately by regular election procedure.

Article II of the By-Laws speaks to the Officers and Their Duties, which states:

Section 1 - The officers of the Traffic Committee shall consist of a Chairperson and a Vice-Chairperson.

Section 2 - The Chairperson shall preside at all meetings of the Traffic Committee and shall have the duties normally conferred by parliamentary usage on such officers.

Section 3 - The Chairperson shall be one of the citizen members of the Committee and shall have the priviledge of discussing all matters before the Committee and voting thereon.

Section 4 - The Vice-Chairperson shall act for the Chairperson in his or her absence. The Vice-Chairperson shall be a citizen member of the Committee, with the rights and privileges of the Chairperson.

BY-LAWS OF THE

CITY OF TROY TRAFFIC COMMITTEE

Article I – Objectives and Membership

The objectives and membership of the City of Troy Traffic Committee are those set forth in Chapters 35 and 106 of the Troy City Code.

The Traffic Committee is composed of seven Troy citizens who have volunteered their time to the City to be involved in traffic and safety concerns. The stated role of this Committee is:

a. To give first hearing to citizens' requests and obtain their input.

b. To make recommendations to the City Council based on technical considerations, traffic surveys, established standards, and evaluation of citizen input.

c. To identify hazardous locations and recommend improvements to reduce the potential for traffic accidents.

Final decisions on sidewalk waivers will be made by the Committee.

Article II – Officers and Their Duties

Section I The officers of the Traffic Committee shall consist of a Chairperson and a Vice-Chairperson.

Section 2 The Chairperson shall preside at all meetings of the Traffic Committee and shall have the duties normally conferred by parliamentary usage on such officers.

Section 3 The Chairperson shall be one of the citizen members of the Committee and shall have the privilege of discussing all matters before the Committee and voting thereon.

Section 4 The Vice-Chairperson shall act for the Chairperson in his or her absence. The Vice-Chairperson shall be a citizen member of the Committee, with the rights and privileges of the Chairperson.

Article III – Election of Officers

Section 1 Nomination of officers shall be made from the floor of citizen members at the annual organization meeting, which shall be held on the third Wednesday of February of each year, and the election shall follow immediately thereafter.

Section 2 A candidate receiving a majority vote of the members present at the annual organization meeting of the Traffic Committee shall be declared elected and shall serve for one year or until his or her successor shall take office.

Section 3 Vacancies in offices shall be filled immediately by regular election procedure.

Article IV – Meetings

Section 1 Regular meetings will be held on the third Wednesday of each month at 7:30 p.m. at the Troy City Hall, 500 West Big Beaver Road, Troy, Michigan.

Section 2 A majority of the voting membership of the committee shall constitute a quorum. A record of the roll call vote shall be kept as part of the minutes.

Section 3 Special meetings may be called by the Chairperson. It shall be the duty of the Chairperson to call such a meeting when requested to do so by the Traffic Engineer or by a majority of the members of the Committee. The notice of such a meeting shall specify the purposes of the meeting and no other business may be considered except by majority consent of the Committee members present. The Traffic Engineer shall notify all members of the Committee not less than 24 hours in advance of such a special meeting.

Section 4 All meetings at which official action is taken shall be open to the general public.

Section 5 The Traffic Engineer of the City of Troy shall keep the minutes and records of the Committee, prepare the agenda of regular and special meetings with the Chairperson, provide notice of the meetings to Committee members, and attend to correspondence of the Committee.

Section 6 Unless otherwise specified in these by-laws, rules of procedure for meetings will be in accordance with the most recent version of Roberts Rules of Order.

Section 7 The committee shall act to make a recommendation to City Council on any petition within three consecutive official meetings from the first presentation of any petition on the Traffic Committee Meeting agenda.

Article V – Order of Business

Roll Call
Approval of Minutes of Previous Meeting
Public Hearings
Tabled Items
Regular Business
Public Comment
Other Business
Adjourn

Article VI – Committees

Special committees may be appointed by the Chairperson or Vice-Chairperson for purposes and terms which the Committee approves.

Article VII – Amendments

These by-laws may be amended by a two-thirds vote of the entire voting membership of the Traffic Committee.