MULTI-MODAL TRANSPORTATION BOARD
THURSDAY, MARCH 7, 2019
6:00 PM
CITY COMMISSION ROOM
151 MARTIN STREET, BIRMINGHAM

1. Roll Call
2. Introductions
3. Review of the Agenda
4. Approval of Minutes, Meeting of **February 7, 2019**
5. **Maple Road / S. Eton – Pedestrian Improvements**
6. **Lakeside & Millrace – Request for Stop Sign**
7. Meeting Open to the Public for items not on the Agenda
8. Miscellaneous Communications
9. Next Meeting – **April 4, 2019**
10. Adjournment

Notice: Due to Building Security, public entrance during non-business hours is through the Police Department—Pierce St. Entrance only. Individuals with disabilities requiring assistance to enter the building should request aid via the intercom system at the parking lot entrance gate on Henrietta St.

Persons with disabilities that may require assistance for effective participation in this public meeting should contact the City Clerk's Office at the number (248) 530-1880, or (248) 644-5115 (for the hearing impaired) at least one day before the meeting to request help in mobility, visual, hearing, or other assistance.

Las personas con incapacidad que requieren algún tipo de ayuda para la participación en esta sesión pública deben ponerse en contacto con la oficina del escribano de la ciudad en el número (248) 530-1800 o al (248) 644-5115 (para enos un dia antes de la reunión para solicitar ayuda a la movilidad, visual, auditiva, o de otras asistencias. (Title VI of the Civil Rights Act of 1964).

CITY OF BIRMINGHAM MULTI-MODAL TRANSPORTATION BOARD THURSDAY, FEBRUARY 7, 2019
City Commission Room
151 Martin Street, Birmingham, Michigan

Minutes of the regular meeting of the City of Birmingham Multi-Modal Transportation Board held Thursday, February 7, 2019.

Chairperson Johanna Slanga convened the meeting at 6:02 p.m.

1. ROLL CALL

Present: Chairperson Johanna Slanga, Vice-Chairperson Lara Edwards, Amy Folberg, Daniel Rontal, Katie Schafer (arrived 6:10 p.m.), Joe Zane (arrived 6:06 p.m.); Alternate Board Member Daniel Isaksen

Absent: Board Member Doug White; Student Representative Alex Lindstrom

Administration: Jana Ecker, Planning Director
Scott Grewe, Police Commander
Paul O'Meara, City Engineer
Laura Eichenhorn, Transcriptionist

Fleis & Vanderbrink ("F&V"):
Julie Kroll

2. INTRODUCTIONS (none)

3. REVIEW AGENDA (no change)

4. APPROVAL OF MINUTES, MMTB MEETING OF JANUARY 3, 2019

Motion by Mr. Isaksen
Seconded by Ms. Folberg to approve the MMTB Minutes of January 3, 2019 as presented.

Motion carried, 5-0.

VOICE VOTE

Yeas: Isaksen, Folberg, Rontal, Slanga, Edwards
Abstain: None
Nays: None
Absent: Zane, Schafer, White

5. MAPLE ROAD / N. ETON – SIGNAL TIMING

Planning Director Ecker reviewed the previous information and discussion on the item.

City Engineer O'Meara then invited Ms. Kroll from F&V to continue with the item.

Ms. Kroll explained F&V did some additional field investigation at the intersection, creating two different timing plans: one for the period between 4:00 p.m. - 6:00 p.m., and one outside the period of 4:00 p.m. - 6:00 p.m. She continued:

- At this signal there is a 130-second cycle length, whereas the cycle length at the intersections to the east is 120 seconds. The intersections to the west run a 90-second cycle length. With the 130-second cycle length the timing was not going to work. A 90-second cycle length was too short for the offset intersections, so the option of running a 120-second cycle length was recommended.
- Outside of the 4:00 p.m. - 6:00 p.m. time period, there were significant queues on S. Eton, particularly around 3:30 p.m.

Vice-Chairperson Edwards noted that school lets out at 3:30 p.m.

Ms. Kroll continued her presentation, adding:

- The long queues on S. Eton around 3:30 p.m. were caused by the protected left turn going into the Whole Foods parking lot. F&V looked at the possibility of eliminating the protected left turn and replacing it with permissive left turns which operate between 4:00 p.m. - 6:00 p.m.
- Southbound right turns on N. Eton have a green arrow during two periods each cycel: once as an overlap phase with adjacent signals when S. Eton is running, and once during the 17 seconds the intersection allows for the Whole Foods approach. The right-turn arrow times ended up totalling approximately seventy seconds per cycle. Eliminating the 17 second leg still left about 50 seconds of southbound right turns, allowing for the clearance of southbound right turns.
- As a result, F&V recommends turning off the southbound right-turns at the same time the northbound lefts are exiting the Whole Foods approach. This eliminates the conflict beneath the bridge.

Chairperson Slanga reminded the Board that at the N. Eton intersection the only concerns were the two turning lanes. The table of alternatives shared at the Board's January 3, 2019 meeting had Alternatives 1 & 2 with permissive turns which feature flashing lights that allowed both lanes to turn together. Alternative 3 would allow each lane an opportunity to turn. The change being proposed is a revised cost and a recommendation to look at Alternative 3.

Ms. Kroll explained to Chairperson Slanga that Alternative 2 is only different from Alternative 1 in that it provides a short amount of time for protected turns. Alternative 3, in contrast, turns off the southbound right turns because F&V found the right-turn lane already had enough time during the 120-second cycle length to clear. The northbound left turns only have

17 seconds, so F&V wanted to make sure that all 17 seconds were given to the Whole Foods approach in order to allow the Whole Foods approach to clear those vehicles and to avoid the southbound turns filling up the queue space under the bridge.

Ms. Kroll confirmed for Mr. Rontal there will be a red right arrow shown to the southbound right turn lane during the 17 seconds allotted for northbound right turns.

Vice-Chairperson Edwards said Alternative 3 would not improve the efficiency of the traffic flow at the intersection, but would make the intersection safer. She said drivers heading southbound into the intersection and attempting to turn right encounter a lower level of service. She also confirmed that she understood why Alternative 3 was being suggested, but that some people driving the intersection might be displeased with the change.

Mr. Isaksen pointed out that the level of service for the southbound right turn is still one of the highest on the table, and suggested that as a result the southbound right turns will be least negatively impacted by a small loss in level of service.

Vice-Chairperson Edwards agreed with Mr. Isaksen, just saying that some of the neighbors of the intersection are grumbling about the possible change.

Ms. Kroll noted the southbound right turns are still ranked 'C' for level of service in Alternative 3, which is adequate and only causes an additional 10-12 second wait for the turn. She also explained she used the recommendations from Alternative 3 as the baseline conditions to evaluate all the alternatives listed for Maple Road / S. Eton – Pedestrian Improvements, in order to clarify their compatibility.

The Board was then shown modelling of the existing conditions as well as Alternative 3.

Dr. Rontal explained that the westbound left-turn out of Whole Foods would be synchronized with the eastbound left-hand turn out of N. Eton. The southbound N. Eton traffic turning left to go eastbound onto Maple is synchronized with northbound left-turn going westbound into Whole Foods.

Ms. Kroll confirmed, adding the southbound left is permissive between 4:00 - 6:00 p.m., causing cars to yield to any traffic leaving the Whole Foods driveway.

Vice-Chairperson Edwards expressed concern that when parents go to pick up their children from Pembroke School around 3:50 p.m. the intersection gets overwhelmed with cars heading south and trying to make a left.

Mr. Isaksen suggested that maybe there should be another time of day where the signal operation is different to address the school traffic.

Ms. Kroll said that during school drop-offs northbound right turns back up under the bridge due to a westbound protected left turn occurring at the same time. Alternative 3 proposes to create a permissive westbound left turn outside the hours of 4:00 p.m. - 6:00 p.m. in order to allow the northbound right turns to flow more freely.

Motion by Mr. Isaksen
Seconded by Mr. Rontal to recommend approval of Alternate 3 referenced in the F&V report dated January 26, 2019, creating a protected left turn phase for northbound vehicles turning left from the Whole Foods approach, at an estimated cost of $8,550.

Motion carried, 7-0.

VOICE VOTE
Yeas: Isaksen, Rontal, Schafer, Zane, Slanga, Edwards, Folberg
Nays: None
Absent: White

6. MAPLE ROAD / S. ETON – PEDESTRIAN IMPROVEMENTS
City Engineer O'Meara introduced the item and Ms. Kroll presented the item.

Ms. Kroll clarified that the largest truck going through this intersection regularly is a 53' semi-trailer, also known as a WB 65. No alternatives are being offered as part of this item that require trucks to drive over parts of the pedestrian islands. The schematics do not include trucks making the northbound-to-eastbound right turn because the trucks would hit the bridge.

City Engineer O'Meara noted F&V recommended Alternatives 1 or 6, and said it would be worth inviting an outside safety expert to review Alternative 6 if it was chosen to make sure pedestrians would be sufficiently visible to motorists even if a pedestrian crossed at the wrong time.

Dr. Rontal said Alternative 6 could feel like a daunting cross for a pedestrian.

Ms. Schafer said there may be impeded sightlines for westbound motorists, as well.

Planning Director Ecker acknowledged the difficulties, confirming it is just an overall difficult intersection for crossing. She also explained that the City Commission had previously turned down the Board's recommendation because they wanted to wait until Whole Foods was opened and the patterns of traffic and crossing at this intersection were more established.

City Engineer O'Meara confirmed the west sidewalk is to be widened to 8', per a City Commission decision from 2018. He added that the proposed pedestrian island in both Alternatives 1 and 6 would be landscaped with a small green space.

Ms. Kroll confirmed and said the current drawing is concept, whereas a final plan would be surveyed and to scale with inclusion of the 8' width of the west sidewalk.

Vice-Chairperson Edwards said Alternative 5 seemed like it would feel the safest to a pedestrian even though the option is likely cost-prohibitive. She noted that people cross north-south frequently at this intersection because narrower east-west crossings are possible at various points along Eton.

Planning Director Ecker said Alternative 5 makes the intersection much larger than it is today, even though the pedestrian island is also much larger. As a result, it is unlikely a pedestrian would necessarily feel any safer with the island as proposed in Alternative 5. In addition the City would have to go to a property owner for the right-of-way and add in a retaining wall because of the grade for Alternative 5. With Alternative 6, the crosswalk is significantly reduced in length versus the current length, likely allowing for increased feelings of pedestrian safety.

Mr. Zane said there are two issues: does it feel safe to cross east-west, and should the City move the crosswalk.

Planning Director Ecker said the east-west crosswalk is an improvement, and the Board can decide whether to keep the north-south crosswalk where it is or move it over, noting the north-south crosswalk will be technically safer if relocated to the east side of the intersection. That said, she also acknowledged there are other factors to consider including sight issues caused by the hill and the bridge, and having to cross in order to go north.

Mr. Isaksen said he was uncomfortable with the possibility in Alternative 6 that a car coming westbound under the bridge may not see a pedestrian in time to stop if the pedestrian was going northbound and jaywalking against the light.

Dr. Rontal said Alternatives 1 & 6 seem to be the best options, acknowledging that there seemed to be no perfect option.

Ms. Kroll said the only tables included in the report were ones reflecting a change in operations of the intersection.

Vice-Chairperson Edwards said the proposed alternatives could give more definition to the intersection, make the intersection feel safer, and encourage cars to move slower.

Chairperson Slanga noted people who avoid the back-up on S. Eton and intend to turn right sometimes move over into the actual turn lane. A splitter island would, in contrast, force those drivers into one lane and encourage turns that stay closer to the corner.

Chairperson Slanga asked the Board to recommend moving forward with discussion of Alternatives 1 and 6, with the understanding that Alternative 6 would require further discussion of the location of the north-south crosswalk and an evaluation by an outside safety consultant.

The Board confirmed.

Ms. Kroll told Chairperson Slanga that the cost difference between Alternatives 1 and 6 reflect the necessity of moving the traffic signal and the pedestrian push button if the crosswalk is moved.

7. WIMBLETON NEIGHBORHOOD INTERSECTION EVALUATION

Police Commander Grewe presented the item.

In response to Board questions, Police Commander Grewe added:

- A 'traffic control device' is anything that affects the flow of traffic, such as a stop sign, yield sign, or traffic light.
- The red areas in the images provided were inserted to highlight objects which obstructed

the field of view.

- Two four-way intersections on Henley had no traffic control devices. Those were the most complained about intersections, and the rest were T-intersections with some problems, but fewer.
- Warwick and Oxford would be the non-yielding traffic streets.
- This resolution only includes proposed yield signs, not the yield signs already existing throughout the neighborhood.
- This is a minor enough change that a public hearing would not be necessary.

Planning Director Ecker confirmed for Dr. Rontal that the neighborhood residents have been in touch with Police Commander Grewe requesting traffic control devices for some time now.

City Engineer O'Meara confirmed that #6 in the resolution should have listed a stop sign and not a yield sign due to visibility issues.

Motion by Mr. Rontal
Seconded by Vice-Chairperson Edwards to install YIELD signs at the following intersections:
1. On Henley at Abbey
2. On Henley at Oxford
3. On Henley at Warwick
4. On Henley at Tottenham
5. On Tottenham at Warwick

And a STOP sign on Oakdale at Rivenoak.

Motion carried, 7-0.

VOICE VOTE
Yeas: Isaksen, Rontal, Schafer, Zane, Slanga, Edwards, Folberg
Nays: None
Absent: White

8. MEETING OPEN TO THE PUBLIC FOR ITEMS NOT ON THE AGENDA
(no public)

9. MISCELLANEOUS COMMUNICATIONS (none)

10. NEXT MEETING MARCH 7, 2019 at 6 p.m.

11. ADJOURNMENT
No further business being evident, the board members adjourned at 7:21 p.m.
Jana Ecker, Planning Director Paul O'Meara, City Engineer

MEMORANDUM

Engineering Dept.
Planning Dept.
Police Dept.

DATE: March 1, 2019

TO: Multi-Modal Transportation Board

FROM: Jana Ecker, Planning Director
Scott Grewe, Police Commander
Paul T. O'Meara, City Engineer

SUBJECT: Maple Rd. & S. Eton Rd. Intersection – Signal Timing

---

Recent issues that have been raised about the operation of the traffic signal at Maple and N. Eton were discussed at the January meeting of the Multi-Modal Transportation Board (MMTB). After discussions with the Board and input from the public, both F&V and the MMTB agreed that the Maple and N. Eton intersection should be reviewed in conjunction with the Maple and S. Eton intersections to ensure that both signals worked well together and congestion was minimized. Thus, the MMTB requested F & V to study both intersections fully and come back to the board with recommendations for each. The previous agenda item addressed the proposed recommendations for the Maple and N. Eton intersection. A detailed study of options by F & V for improvements to the Maple and S. Eton intersection is attached to this report.

In addition to ensuring that both the N. Eton and S. Eton intersections work together to improve congestion, F & V also considered numerous options to improve the pedestrian environment at the Maple and S. Eton intersection. The attached letter dated January 30, 2019 outlines all options considered by F & V, and recommends both vehicular and pedestrian improvements at S. Eton that work in conjunction with the improvements recommended at N. Eton. F&V will be prepared to demonstrate the options considered, including the recommended option(s) using computer modeling.

After this further analysis, Option 6 that recommends adding a splitter island and relocating the N-S crosswalk to the east leg of the intersection was identified as the best option.

On February 7, 2019, the MMTB reviewed the proposed options and the traffic analysis. After much discussion, the MMTB determined that their preferred options were options 1 and 6. A majority of MMTB members stated that option 6 was the preferred option, with the only concern being whether or not to relocate the north – south crosswalk from the western leg of the intersection to the eastern leg of the intersection. The board directed F & V to send the proposed plans to a safety expert for review and comment, and to bring the matter back to the MMTB at the next meeting.

F & V forwarded the proposed plans to Ms. Carissa McQuiston, Non-Motorized Safety Engineering Specialist with MDOT's Safety Programs Unit in Lansing, MI. Ms. McQuiston's comments and recommendations are summarized in the attached letter dated March 1, 2019 from F & V. Based on the safety analysis, and information provided by the Birmingham Police Department, F & V continues to recommend Option 6 – Splitter Island Pedestrian Crossing, which includes the north-south crosswalk relocated to the east side of the intersection. Staff has asked F & V to conduct a field visit during the PM peak hours on March 4 -6, 2019 to ensure the intersection is performing in accordance with the data provided. An update will be provided at the MMTB meeting on March 7, 2019 to report any inconsistencies.

SUGGESTED RESOLUTION:

To recommend approval of Option 6 – Splitter Island Pedestrian Crossing as noted in F & V's report dated March 1, 2019 to add a pedestrian refuge island to shorten the length of the E-W crosswalk and to relocate the N-S crosswalk to the east, at an approximate cost of $25,000 – $50,000.

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

March 1, 2019

Mr. Paul O'Meara
City Engineer
City of Birmingham
151 Martin Street
Birmingham, MI 48012

VIA EMAIL

**RE: Maple Road & S. Eton Street
Pedestrian Improvements Summary**

Dear Mr. O'Meara:

The purpose of this letter is to provide additional information regarding the pedestrian improvements for consideration at the Maple Road & S. Eton Street intersection. F&V previously performed an analysis and review for this intersection as summarized in our letter dated February 1, 2019. F&V presented the findings to the Multi-Modal Transportation Board (MMTB) at the February 7, 2019 meeting and the MMTB requested a further analysis to consider:

- Safety review of the pedestrian crossing location in Option 6 by a pedestrian safety expert.

Included herein is a summary of the additional analysis performed to consider these items as noted by the MMTB.

PROJECT BACKGROUND

The preferred recommendation from the MMTB was ***Option 6: Splitter Island Pedestrian Crossing***.

Advantages

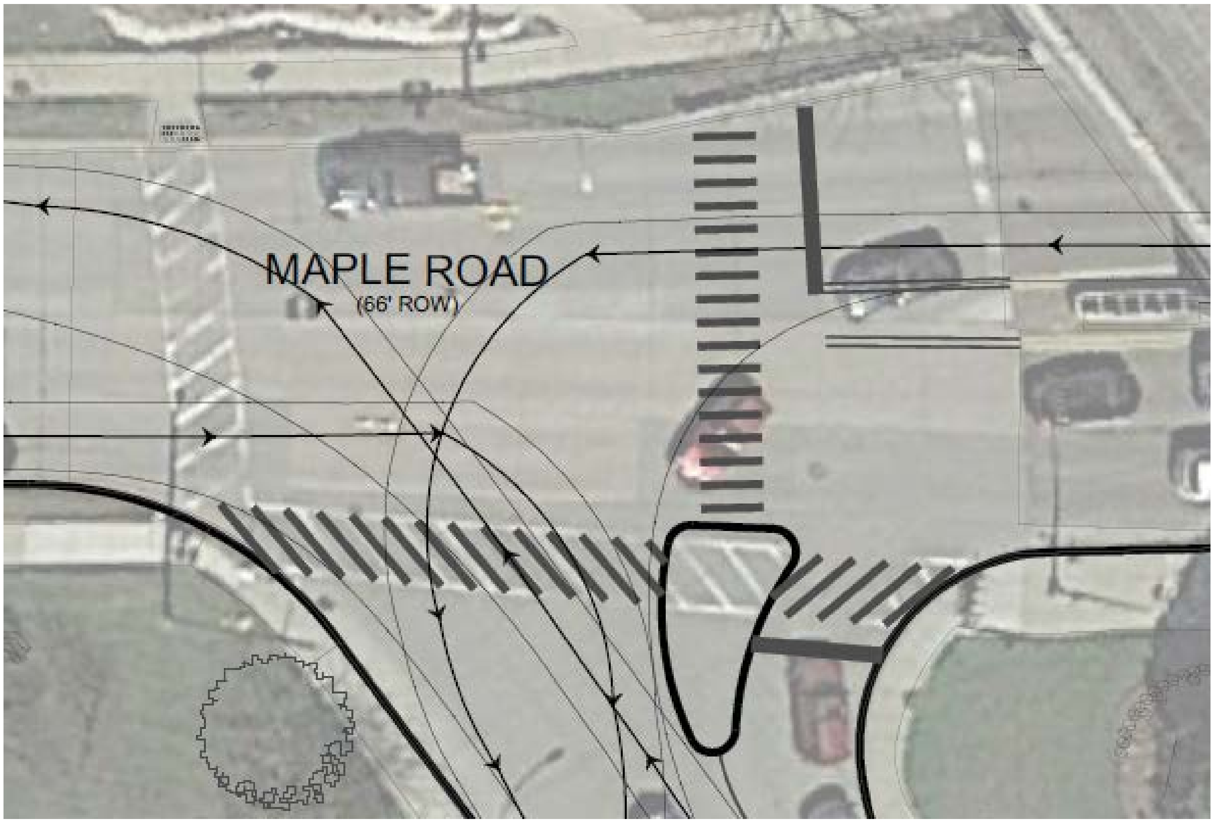
- Splitter island large enough to accommodate waiting pedestrians and provide the necessary level landing space for ADA.
- The N-S pedestrian crossing across Maple Road can be relocated to the east side of the intersection, thus eliminating pedestrian conflicts with turning traffic.
- The island provides approximately 325 square feet of raised area. This is enough to maintain a small planting area.
- The total crosswalk distance is comprised of two shorter crossings of 53-feet and 18-feet, with a 13-foot pedestrian refuge. This is a 17-ft reduction in pedestrian crossing distance over the existing 88-foot crosswalk length.
- The stop-bar on S. Eton Street for the right-turn lane is able to move closer to the intersection, providing an additional queuing space (1-2 vehicles) and improved visibility for pedestrians at the intersection.

27725 Stansbury Boulevard, Suite 195
Farmington Hills, MI 48334
P: 248.536.0080
F: 248.536.0079
www.fveng.com

Concerns

- The existing guardrail on the north side of the intersection will need to be adjusted to accommodate pedestrian crosswalk on the east side of the intersection.
- The sight distance for the crosswalk for westbound vehicles on Maple Road would be limited by the grade differences and railroad bridge obstructing a clear line of sight.

Option 6: Splitter Island Pedestrian Crossing



MDOT SAFETY REVIEW

F&V contacted MDOT Traffic and Safety Division in Lansing, Michigan to obtain an expert opinion on the safety of locating the crosswalk on the east side of the intersection as shown above in Option 6. Specifically associated with the following concerns of the MMTB which were provided to MDOT for evaluation:

- *Is there a concern with relocating the crossing to the east side of the intersection given the location of the bridge pier?*
- *What if pedestrians are crossing during a red phase (illegal crossings), they may be hit by a westbound driver who can't see the pedestrian because of the bridge obstructing the sight distance.*

Carissa McQuiston, PE, *MDOT Non-Motorized Safety Engineering Specialist* reviewed the proposed Option 6 and in particular, the proposed crosswalk location. She provided the following comments regarding the MMTB concerns.

Illegal crossings shouldn't be the focus of the proposed pedestrian operations, unless there is an existing issue with pedestrians crossing illegally at this intersection. If there is an existing issue then it looks like there would be a sight distance issue. Other items to consider:

1. *Do drivers tend to run the light so they don't have to store under the bridge (it looks like there is minimum storage under the bridge between the two signals)?*
2. *Are there noted issues (illegal crossings) with the current crossing location and westbound through traffic? If so, those would likely increase if the crossing is moved to the east side of the intersection.*

3. *I would assume that the timing of the signal would be made to serve both the pedestrians and the vehicles, so hopefully illegal crossings would not be an issue.*

4. *Also, make sure the area is well lit at night to eliminate shadows from the bridge.*

ADDITIONAL ANALYSIS

From the MDOT review, several items were identified that we further evaluated.

1. *Do drivers tend to run the light so they don't have to store under the bridge (it looks like there is minimum storage under the bridge between the two signals)?*

The Birmingham Police Department provided information regarding this intersection and vehicle violations. There is no substantiated history of red-light running at this intersection; however, the BPD does not have enough violation data at this intersection to conclusively say that red light running is not a concern. The City has requested that F&V perform a field review between March 4-6, 2019 to provide additional feedback regarding red light running at this intersection. Additional information from the field reviews will be provided to the MMTB at the March 7, 2019 meeting.

2. *Are there noted issues (illegal crossings) with the current crossing location and westbound through traffic? If so, those would likely increase if the crossing is moved to the east side of the intersection.*

The Birmingham Police Department provided information regarding pedestrian crashes at this intersection. There has been only one pedestrian crash at this intersection in the last 10 years that occurred in 2011. If there were higher occurrences of illegal crossings, we would expect this number to be higher. Therefore, there is no substantiated history of illegal crossings at this intersection.

3. *I would assume that the timing of the signal would be made to serve both the pedestrians and the vehicles, so hopefully illegal crossings would not be an issue.*

The proposed crossing location would be pedestrian activated, there-by serving the pedestrians as-needed at this intersection.

4. *Also, make sure the area is well lit at night to eliminate shadows from the bridge.*

There is intersection lighting; however, there is currently no lighting under the bridge. The intersection lighting should be reviewed as part of a design phase with this project.

SUMMARY

The primary concerns from MDOT with the crosswalk location on the east side of the intersection were:

- Is there a lot of red-light running?
- Is there an issue with the existing crossing location and pedestrians crossing illegally?

We have determined that the answer to both of these questions is no. Therefore, there is no safety or operational concern with relocating the crosswalk to the east side of the intersection. Other items that should be addressed in the design phase for this project is to insure there is adequate intersection lighting, and potentially add lighting under the bridge.

We hope that this information provides adequate clarification to address the questions of the City. If you have any questions or concerns, please contact our office.

Sincerely,
FLEIS & VANDENBRINK

Julie M. Kroll

Julie M. Kroll, PE, PTOE
Sr. Project Manager

JMK:jmk

Engineering Countermeasures to Reduce Red-Light Running

6 ISSUE BRIEFS

Red-Light Running Defined

There is no simple or single reason to explain why drivers run red lights, but beginning with a definition will provide a framework for discussion. The simplest definition of red-light running (RLR) is the act of entering, and proceeding through, a signalized intersection after the traffic signal has turned red. According to the Uniform Vehicle Code (UVC)[1], a motorist "...facing a steady circular red signal shall stop at a clearly marked stop line, but if none, before entering the crosswalk on the near side of the intersection, or if none, then before entering the intersection and shall remain standing until an indication to proceed is shown..." (§11-202). An intersection is defined in the UVC as "... the area embraced within the prolongation or connection of the lateral curb lines, or if none, then the lateral boundary lines of the roadways of two highways which join one another at, or approximately at right angles, or the area within which vehicles traveling upon different highways joining at any other angle may come in conflict" (§1-132). See Figure 1.

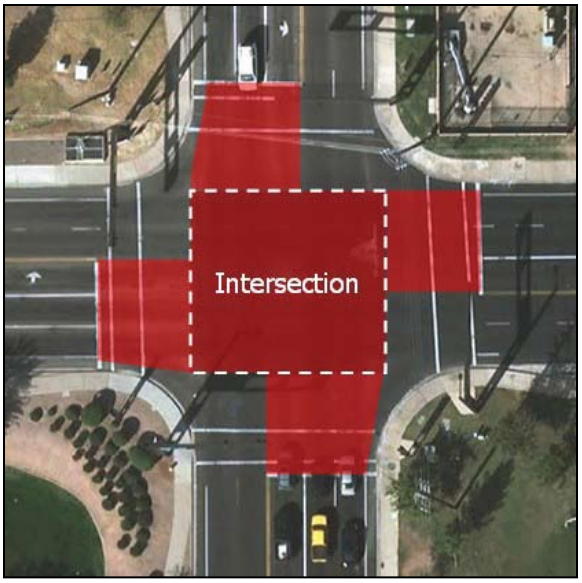


Figure 1: Diagram of UVC definition of an intersection

Red-Light Running Fatalities

FHWA identified the following four elements from the Fatality Analysis Reporting System that provide a consistent definition of red-light running fatalities.

- The crash occurred at an intersection or was intersection-related;
- The intersection was controlled by an active traffic signal;
- A driver was charged with either failing to stop for a red signal or failing to obey a traffic control device; and
- A driver was going straight at the time of collision.

On average, during the 2000 to 2007 period, 916 annual RLR fatalities have resulted. In 2007, 883 RLR fatalities have occurred. This represents a reduction of 33 RLR fatalities or approximately 3.5 percent as compared to the most recent five-year average. A chart illustrating the RLR fatalities between 2000 and 2007 is shown in Figure 2.

1. National Committee on Uniform Traffic Laws and Ordinances (NCUTLO). *Uniform Vehicle Code*. 2000.

U.S.Department of Transportation
Federal Highway Administration

Safe Roads for a Safer Future
Investment in roadway safety saves lives

FHWA-SA-10-005

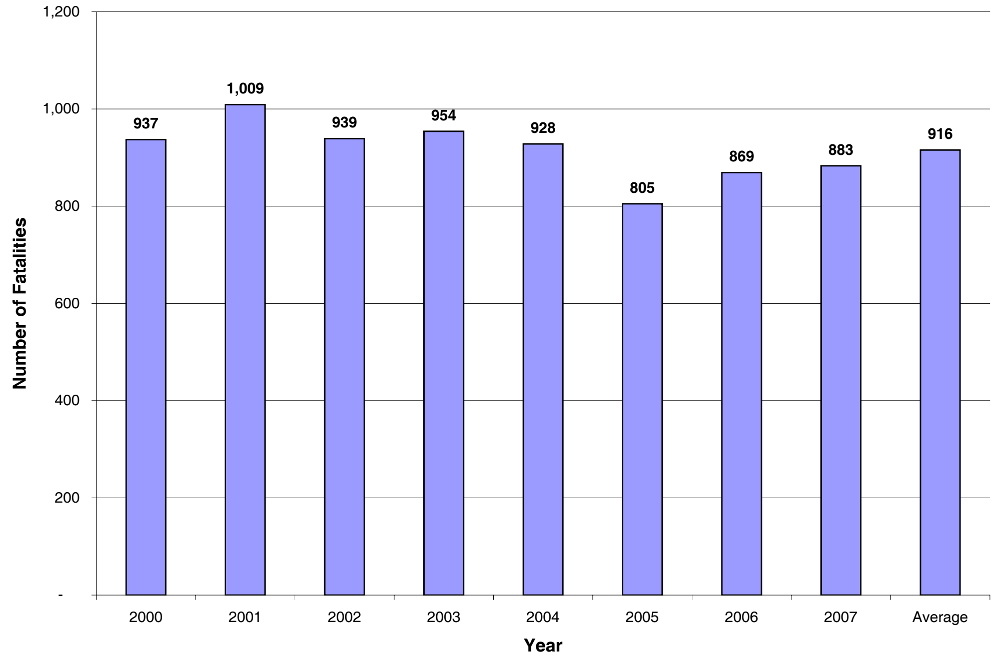


Figure 2: Red Light Running Fatalities Year 2000 to 2007

Factors Affecting Red-Light Running

Overview

A number of intersection and human factors influence RLR. How these factors interact to increase or decrease the risk of RLR will assist in identifying the varied reasons behind RLR. Red-light runners can be categorized into intentional and unintentional violators. In general, engineering countermeasures should help address the unintentional violations, and enforcement countermeasures should help address the intentional violations.

An example of an intentional reason would be, "I was in a hurry and I thought I could beat the yellow light." Examples of an unintentional reason for running a red light would be, "I could not see the signal, the sun was in my eyes or I tried to slow down but I was caught in the dilemma zone when the light turned red." Research has found that more than 50% of red-light violations happen within the first 0.5-seconds of the red signal indication and 94.2% of red-light violations occur within the 2.0-seconds of the red-light onset.[2] Engineers must look at each of these reasons, conduct field surveys of the intersections and subsequently recommend targeted engineering, enforcement, and education countermeasure programs to reduce the RLR problem. Prior to the discussion of engineering causes and countermeasures, this brief will describe several of the legal, demographic, human behavioral factors, vehicular, and intersection characteristics related to RLR.

Meaning of Yellow Indication

The meaning of the yellow indication is different in legal codes of the states. The law as stated in the UVC and the Manual on Uniform Traffic Control Devices (MUTCD) is considered a permissive yellow law, meaning that the driver can enter the intersection during the entire yellow interval and be in the intersection during the red indication as long as he/she entered the intersection during the yellow interval. As of 2009, permissive yellow rules were followed by at least half of the states.[3] However, in other states there are two types of restrictive yellow laws that apply, namely:

- Vehicles can neither enter the intersection nor be in the intersection on red; or
- Vehicles must stop upon receiving the yellow indication, unless it is not possible to do so safely.

This will need to be considered in combination with the definition of an intersection when developing a plan to address red-light running. Any public information and education campaign would need to incorporate a learning objective regarding the meaning of the yellow indication.

Demographic Characteristics

The demographics category includes the age, gender and vehicle occupancy characteristics of the red-light runner. It also includes whether or not the red-light runner was wearing a seat belt and looks at his/her driving record.

Age. Younger drivers between the

2. RITA, John A. Volpe National Transportation Systems Center, *Analysis of Red Light Violation Data Collected from Intersections Equipped with Red Light Photo Enforcement Cameras*, DOT-VNTSC-NHTSA-05-01. Washington, DC, 2006.

3. Interim Report: NCHRP Project 03-95 Guidelines for Timing Yellow and All-Red Intervals at Signalized Intersection. Prepared by Vanasse Hangen Brustlin for the Transportation Research Board, September 2009.

ages of 18 to 25 years old are more likely to run red lights compared to other age groups.[4]

Gender. Red-light runners are more likely than non-runners to be male.[5]

Occupancy. Drivers have a higher probability of running red lights when driving alone compared to when passengers are in their vehicles.[6]

Seat Belts. Red-light runners are less likely to wear safety belts.[7]

Driving Record. Drivers with poor driving records and driving smaller and older cars have a higher tendency to run red lights.[8] Red-light runners are more likely than non-runners to be driving with suspended or revoked driver's licenses.

Human Behavioral Factors

Driver Inattention. Many common distractions that cause drivers to reduce their focus on the task of driving include:

- Drowsiness;
- Conversing with passengers;
- Manipulating radio and/or GPS devices;
- Eating; and
- The use of a cellular phone or other electronic devices.

4. Porter, B.E. and Berry, T.D. A Nationwide Survey of Self-Reported Red Light Running: Measuring Prevalence, Predictors, and Perceived Consequences. *Accident Analysis and Prevention*, 33, 735-741. 2001.
5. Retting, R.A. et al. Evaluation of Red Light Camera Enforcement in Oxnard, California. *Accident Analysis and Prevention*, 31, 169-174. 1999.
6. Porter, B.E. and Berry, T.D. 2001.
7. Retting, R. A. and Williams A.F. Characteristics of Red Light Violators: Results of a Field Investigation. *Journal of Safety Research*, 27(1), 9-15. 1996.
8. Ibid.

Speeding. Motorists may:

- Accelerate when anticipating a change in signal indication, in order to make it through the intersection on the yellow. If a motorist misjudges the time of the signal change, he or she will enter the intersection against the red signal indication; and/or
- Drive above the posted speed limit or drive too fast for conditions, increasing the distance available to react to a change in the traffic signal indication.[9]

Aggressive Driving Headway. Drivers that follow closely (headway of less than two seconds) are more likely to run a red light.[10]

Vehicular Chacteristics

Larger-sized vehicles. There is a significant statistical difference between the rates of RLR for following a passenger car and for following a larger-size vehicle with higher rates of RLR for driving behind a larger-size vehicle due to vertical visibility blockage of the traffic signal pole.[11]

Intersection Characteristics

Traffic Volumes. The RLR frequency increases as the approach traffic volume at intersections increases.[12]

Time-of-Day Characteristics. The average red-light violations are higher during AM and PM peak hours compared to other times of the day.[13,14]

Approach Grade. Drivers on downgrades are less likely to stop than drivers on level or upgrade approaches.

Frequency of Signal Cycles. Many researchers recognize a correlation between the frequency of signal changes and red light running.[15,16,17] If the cycle length increases, the hourly frequency of signal changes decreases, which should reduce the exposure of drivers to potential red-light running situations.[18]

Type of Signal Control. The type of signal control plays a role in the exposure of drivers to red-light running situations. Highway corridors with vehicle-actuated traffic control tend to produce more compact vehicle platoon configurations than pretimed

9. Retting, R.A. et al., 1999.
10. Bonneson, et. al. *Engineering Countermeasures to Reduce Red-Light-Running*. Report No. FHWA/TX-03/4027-2. Texas Department of Transportation, Austin, TX. 2002.
11. Radwan, E. et al. "Red-Light Running and Limited Visibility Due to LTVs Using the UCF Driving Simulator." Orlando, FL: Center for Advanced Transportation Systems Simulation, University of Central Florida, Florida Department of Transportation. 2005.
12. Brewer et al. Engineering Countermeasures to Red-Light-Running. *Proceeding of the ITE 2002 Spring Conference and Exhibit* (CD-ROM). Washington, DC: Institute of Transportation Engineers. 2002.
13. Retting et al. Red-Light Running and Sensible Countermeasures: Summary of Research Findings. Transportation Research Record 1640, 23-26. Transportation Research Board, Washington, DC. 1998.
14. Lum, K.M. and Wong, Y.D. Impacts of Red Light Camera on Violation Characteristics. *Journal of Transportation Engineering*, November/December, 648-656. 2003.
15. Porter, B.E. and England, K.J. Predicting Red-Light Running Behavior: A Traffic Study in Three Urban Settings. *Journal of Safety Research*, 31(1),1-8. 2000.
16. Baguley, C. Running the Red at Signals on High-Speed Roads. *Traffic Engineering & Control*, 29, 7-8. 1988.
17. Van der Horst, R. and Wilmick A. Drivers' Decision-Making at Signalized Intersections: An Optimization of the Yellow Timing. *Traffic Engineering & Control*, December, 615-622. 1986.
18. Cesar Quiroga, Edgar Kraus, Ida van Schalkwyk, and James Bonneson, CTS-02/150206-1: Red Light Running, A Policy Review, Texas Transportation Institute, Center for Transportation Safety, March, 2003, Page 4.

Table 1: Summary of Engineering Countermeasures to Reduce Red-Light Running

Improve Signal Visibility/ Conspicuity	Increase the Likelihood for Stopping	Remove Reasons for Intentional Violations	Eliminate the Need to Stop
Signal for Each Approach Through Lane	Install Signal Ahead Signs	Adjust Yellow Change Interval	Coordinate Signal Operation
Install Backplates	Install Transverse Rumble Strips	Provide or Adjust All-Red Clearance Interval	Remove Unwarranted Signals
Modify Placement of Signal Heads	Install Activated Advance Warning Flashers	Adjust Signal Cycle Length	Construct a Roundabout
Increase Size of Signal Displays	Improve Pavement Surface Condition	Provide Dilemma Zone Protection	
Install Programmable Signal/ Visors or Louvers			
Install LED Signal Lenses			

traffic control.[19] The result is an increase in the number of drivers who may be exposed to the yellow and/or red indications during "max out" phase terminations in the operation of the system and a reduction in the probability of stopping before the stop line after the light changes to yellow as long the approach is occupied. If the approach is unoccupied for a period of time, the green may reach its maximum limit and "gap out" forcing the green phase to end regardless of whether the approach is occupied. There is a greater potential for RLR as the frequency of max out increases.

Yellow interval duration. Both long yellow intervals which can violate driver expectancy and short yellow intervals (intervals shorter than the Institute of Transportation Engineers (ITE)-suggested values[20]) have resulted in a high number of RLR violations.

Engineering Countermeasures To Reduce Red Light Running

Overview

ITE and the Federal Highway Administration (FHWA) developed a publication titled *Making Intersections Safer: A Toolbox of Engineering Countermeasures to Reduce Red-Light Running: An Informational Report.*[21]

Similar work has been completed by Bonneson, Brewer, and Zimmerman. The principal objectives of these publications are to identify engineering design and operational features of an intersection that could be upgraded to reduce RLR. The engineering countermeasures can be grouped into four distinct areas:

- Improving signal visibility/ conspicuity;
- Increasing the likelihood of stopping;
- Removing the reasons for intentional violations; and
- Eliminating the need to stop.

Table 1 summarizes the countermeasures that can be considered under each of the countermeasure groupings identified above. These engineering countermeasures are based on a driver characteristic called the "unintentional violator." This type of driver may be incapable of stopping or may be inattentive while approaching the intersection due to poor judgment by the driver or in the design or operation of the intersection. A second type of driver characteristic is the "intentional violator" who, based on his/her judgment, knows they may violate the signal yet proceeds through the intersection anyway. This type of driver is most affected by enforcement countermeasures, while unintentional red-light runners are most affected by engineering countermeasures.

Increase Signal Visibility/ Conspicuity

Signal for Each Approach Through Lane. Section 4D.15 of the MUTCD only requires that "a minimum of two signal faces shall be provided for the major movement on the approach..." Under this standard, it would be acceptable to have only two signals on an approach with three or more through lanes. When a signal is positioned such that it is over the middle of the lane, it is in the center of the motorist's cone of vision, thereby increasing its visibility. The additional signal head further increases the likelihood that a motorist will see the signal display for the approach. Placement of a primary signal head over each through lane has been demonstrated to have the lowest incidence of crashes.

Install Backplates. Backplates are used to improve the signal visibility by providing a background around the signals, thereby enhancing the contrast. They are particularly useful in complex visual environments, in east-west directions, and against bright sky backgrounds, but many agencies use backplates on all signals because of the conspicuity they provide. A retroreflective yellow border strip around the

19. Van der Horst, R. Driver Decision Making at Traffic Signals. *Transportation Research Record* 1172, 93-97. 1998.
20. *Traffic Engineering Handbook*, Washington, DC. ITE. 1999.
21. *Making Intersections Safer: A Toolbox of Engineering Countermeasures to Reduce Red-Light Running*: An Informational Report, ITE. 2003 http://safety.fhwa.dot.gov/intersection/redlight/rlr_report/)/.

Figure 3: Example of backplates on a multilane arterial intersection

outside perimeter of signal backplates has also been found to significantly reduce nighttime crashes at signals and also helps drivers identify an intersection as signalized during a power failure.

Modify Placement of Signal Heads. Overhead-signal displays help to overcome the three most significant obstacles posed by locations that have only pole-mounted signal heads, which are: (1) they generally do not provide good conspicuity, (2) mounting locations may not provide a display with clear meaning and (3) motorists' line-of-sight blockage to the signal head due to other vehicles, particularly trucks, in the traffic stream. Studies have shown significant reduction in crashes attributed to the replacement of pole-mounted signal heads with overhead-signal heads. However, even with overhead signals, pole-mounted supplemental signal faces should be considered to further enhance signal visibility and conspicuity.

Increase Size of Signal Displays. 12-inch signal lenses should be considered for all signals, and especially those displaying red indications, to increase signal visibility. The MUTCD requires 12-inch-diameter signal lenses for approaches where speeds are greater than 40 mph and for some other circumstances. Yet many road authorities have made it their policy to use 12-inch-diameter lenses universally for new installations, regardless of the approach speed. Studies in Michigan, North Carolina, and elsewhere have shown the safety benefits of using 12-inch lenses, even in low-speed situations.

Install Programmable Lens Signals/ Visors or Louvers. Optically programmed or visibility-limited signals limit the field of view of a signal. They allow greater definition and accuracy of the field of view. The MUTCD speaks of visibility-limited signals mostly with regard to left-turning traffic at an intersection. The MUTCD permits the use of visibility limited signal faces in situations where the road user could be misdirected, particularly at skewed or closely-spaced intersections when the road user sees the signal indications intended for other approaches before seeing the signal indications for their own approach. Because the field of view is restricted and requires specific alignment, the signals require rigid mounting instead of suspension on overhead wires. There is some concern associated with glare and the limitations of seeing the signal. Signal visibility alignment requires attention both in design and in field maintenance.

Install LED Signal Lenses. LED units are used for three main reasons: they are very energy efficient, are brighter than incandescent bulbs, and have a longer life increasing the replacement interval. LED signals may be noticeably brighter and more conspicuous than an adjacent signal with the incandescent bulb. LED traffic signal modules have a service life of 6 to 10 years compared to incandescent bulbs that have a life expectancy of only 12 to 15 months. There is a belief that LEDs are brighter and last longer and therefore would provide safety benefits but this has not been quantified. Some studies have found that LED units tend to lose brightness over time instead of exhibiting an immediate failure.

Increase the Likelihood for Stopping

Install Signal Ahead Signs. The MUTCD (Section 2C.29) requires an advance traffic control warning sign when "the primary traffic-control device is not visible from a sufficient distance to permit the road user to respond to the device." In addition to the normal symbolic SIGNAL AHEAD warning sign, a sign with the legend BE PREPARED TO STOP (W3-4) can be used.

Install Transverse Rumble Strips. Rumble strips are a series of intermittent, narrow, transverse areas of rough-textured, slightly raised or depressed road surface. The rumble strips provide an audible and a vibrotactile warning to the driver. When coupled with the SIGNAL AHEAD warning sign and also the pavement marking word message— SIGNAL AHEAD—the rumble strips can be effective in alerting drivers of a signal with limited sight distance. There are no known studies reporting on how this treatment can reduce red-light violations or the resulting crashes; hence their use should be restricted to special situations. If used, they should be limited to lower-speed facilities (less than 40 mph) and be reserved for locations where other treatments have not been effective. Rumble strips should not be installed if there will be excessive noise for adjacent residential areas or there are numerous bicyclists using the facility.

Install Activated Advance Warning Flashers. The purpose of an activated advance-warning flasher (AAWF) is to forewarn the driver when a traffic signal on his/her approach is about to change to the yellow and then the red phase. This type of treatment provides a specific warning of an impending traffic signal change ahead. AAWFs inform drivers of the status of a downstream signal. Yellow flashing beacons with the sign are activated or an otherwise blank changeable message such as “Red Signal Ahead” is illuminated for several seconds. The sign and the flashers are placed a certain distance from the stop line as determined by the speed limit on the approach.

Improve Pavement Surface Condition. As a vehicle approaches a signalized intersection and slows to stop for a red light, it may be unable to stop due to poor pavement friction and as a result, proceed into the intersection. Countermeasures to improve skid resistance include asphalt mixture (type and gradation of aggregate as well as asphalt content), pavement overlays, and pavement grooving. Additionally, countermeasures can be considered such as the use of a SLIPPERY WHEN WET sign with a supplemental Advisory Speed Plate for a lower advisory speed.

Remove Reasons for Intentional Violations

Adjust Yellow Change Interval. MUTCD (Section 4D.10) provides guidance regarding the duration of yellow change interval. It indicates that the duration of the yellow change interval should be approximately 3 to 6 seconds, with longer intervals reserved for high-speed approaches. The MUTCD does not provide guidance regarding the calculation of clearance interval durations other than to provide ranges of acceptable values. ITE prepared a formula to calculate the yellow change interval that uses a number of operational parameters including perception-reaction time, deceleration rate, approach speed and grade.[22]

There is a correlation between the duration of the yellow interval and red light running events. Van der Horst observed a substantial reduction in the number of red-light running events after increasing the duration of the yellow interval from 3 to 4 seconds (in urban areas) and from 4 to 5 seconds (in rural areas).[23] A small adjustment was observed in the drivers’ stopping behavior, which was attributed to the relatively low increase in the duration of the yellow interval.[24]

ITE suggests that a long change interval may encourage drivers to use it as part of the green interval and therefore maximum care should be used when exceeding five seconds. If the calculated or selected yellow change interval length exceeds 5 seconds, it may be the choice of the local jurisdiction to handle the additional time with a red clearance interval. Furthermore, using a yellow change interval length less than 3 seconds may violate driver expectancy and result in frequent entry on red indications. If the interval is too short, rear-end crashes may result.

ITE is in the process of preparing *Guidelines for Determining Traffic Signal Change Intervals: a Recommended Practice* (RP). In 1985 ITE published a Proposed Recommended Practice titled *Determining Vehicle Change Intervals* that was not ratified to become an recommended practice. Later, in 2001, ITE published the informational report *A History of the Yellow and All-Red Intervals for Traffic Signals*.

ITE plans to prepare the RP to reflect the current state-of-the-practice and to provide the user with a broader overview of key considerations to determine yellow change and red clearance intervals for traffic signals and their application. A separate effort is underway by the National Cooperative Highway Research Program (NCHRP Project 03-95) to prepare a document titled *Guidelines for Timing Yellow and All-Red Intervals at Traffic Signals.* This project will have a longer time horizon because it will incorporate new primary data into the research.

Provide or Adjust All-Red Clearance Interval. An all-red clearance interval is an optional portion of a traffic signal cycle that can follow a yellow change interval and precede the next conflicting green interval. The purpose of the all-red interval is to allow time for vehicles that entered the intersection during the yellow-change interval to clear the intersection before the traffic-signal display for the conflicting approaches turns to green. Engineering formulas should be used to calculate whether this extra clearance interval is needed and what its duration should be based on the speeds, intersection widths and other factors. The all-red clearance interval may also be useful in mitigating the “go” decision by a motorist in the amber dilemma zone when there is not enough time to clear the intersection, particularly at high speed locations. Generally, the duration of the all-red clearance interval is from 0.5 to 3.0 seconds. The MUTCD provides guidance that the all-red clearance interval should not exceed 6 seconds (Section 4D.10).

Adjust Signal Cycle Length. Proper timing of signal-cycle lengths can reduce driver frustration that might result from unjustified short or long cycle lengths. Longer cycle lengths mean fewer cycles per hour and therefore fewer yellow-change intervals per hour and thus can reduce the number of opportunities for traffic-signal violations. On the other hand, signal cycles that are excessively long can encourage RLR because drivers do not want to have to wait several minutes for the next green interval.

Provide Dilemma Zone Protection. The “dilemma zone” has been defined recently to be the area in which it may be difficult for a driver to decide whether to stop or proceed through an intersection at the onset of the yellow-signal indication. It is also referred to as the “option zone” or the “zone of

22. *Determining Vehicle Signal Change and Clearance Intervals*, Washington, DC: ITE, 1994.

23. Van der Horst, R. 1998.
24. Cesar Quiroga, Edgar Kraus, Ida van Schalkwyk, and James Bonneson, CTS-02/150206-1: Red Light Running, A Policy Review, Texas Transportation Institute, Center for Transportation Safety, March, 2003, Page 5.

indecision." One potential countermeasure to reduce red-light running is to reduce the likelihood that a vehicle will be in the dilemma zone at the onset of the yellow interval. This can be accomplished by placing vehicle detectors at the dilemma zone. They detect if a car is at the dilemma zone immediately before the onset of the yellow interval. If a vehicle is there, the green interval can be extended so that the vehicle can travel through the dilemma zone and prevent the onset of the yellow while in the dilemma zone.

Eliminate the Need to Stop

Coordinate Signal Operation. Interconnected signal systems provide coordination between adjacent signals and are proven to reduce stops, reduce delays, decrease accidents, increase average travel speeds, and decrease emissions. An efficient signal system is also one of the most cost-effective methods for increasing the capacity of a road. With reduced stops, the opportunity to run red lights is also reduced. In addition, if drivers are given the best signal coordination practical, they may not be as compelled to beat or run a red signal.

Remove Unwarranted Signals. If there is a high incidence of RLR violations, this may be because the traffic signal is perceived as being not necessary and does not command the respect of the motoring public. Sometimes signals are installed for reasons that dissipate over time. For instance, traffic volume may decrease due to changing land-use patterns or the creation of alternative routes. The removal of a traffic signal should be based on an engineering study. Factors to be considered are included in ITE's *Traffic Control Devices Handbook.* If a signal is eliminated, the traffic engineer must continue to monitor the intersection for any potential increase in crashes.

Construct a Roundabout. When a roundabout replaces a signalized intersection, the RLR problem is obviously eliminated. Single-lane roundabouts and other roundabouts have been shown to have significantly less crashes (and less severe crashes) than signalized intersections. Readers should consult *NCHRP 572: Roundabouts in the United States*[25] and FHWA's *Roundabouts: An Informational Guide*.[26]

Figure 4: Example of entry to multi-lane roundabout

Intersection Field Assessment Form

The following intersection field inspection form sheet is provided and can be downloaded online at http://safety.fhwa.dot.gov/intersection/redlight/redl_reports/fieldinspfrm.cfm.

The field inspection form should be used to identify the extent to which an intersection approach may exhibit traffic operational or engineering design issues that could have an effect on red-light running. A separate field assessment sheet should be completed for each intersection approach. The form shows the types of information that an engineer or an engineering technician should evaluate to determine if a red-light running problem exists at a specific location. Based on the data, the transportation engineering professional can identify if the RLR problems are due to intentional or unintentional (traffic operational or engineering and design) reasons and can suggest engineering countermeasures as a first step prior to consideration of the placement of automated red light cameras at an intersection.

---

25. http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_572.pdf.
26. Robinson, B. W., L. Rodegerdts, W. Scarbrough, W. Kittelson, R. Troutbeck, W. Brilon, L. Bondzio, K. Courage, M. Kyte, J. Mason, A. Flannery, E. Myers, J. Bunker, and G. Jacquemart. *Roundabouts: An Informational Guide*. Report FHWA-RD-00-067. FHWA, U.S. Department of Transportation, June 2000. (This document is being updated, with publication likely in 2010.)

INTERSECTION FIELD INSPECTION FORM

LOCATION INFORMATION

Intersection Identification:____________________________________with____

Approach Name:____ Direction Heading:_____________

PART 1. CHECK SIGNAL VISIBILITY

Type of Signal Mounting: **Span Wire** **Mast Arm** **Pole** **Structure** Sight Distance to the Signal: _______*feet*

Requires Advance Warning Sign? **Y** **N** Advance Signal Warning Sign Present: **Y** **N**

Is anything blocking the view of the signals? **Y** **N** If yes, describe____

Can signal faces on other approaches be seen? **Y** **N** If yes, do these signals have visors, shields, or programmable lenses? **Y** **N**

PART 2. CHECK SIGNAL CONSPICUITY

Could visual clutter detract from the signal? **Y** **N**

Are the signal indications confusing? **Y** **N**

If yes, explain:__________________________________

____

Are backplates present? **Y** **N**

Are backplates necessary? **Y** **N**

Are other glare-reducing steps needed? **Y** **N**

Signal lens type: **Incandescent** **LEDs**

Signal Lens Size Adequate?:

- Red signal lens size: 8 inch 12 inch
- Distance from stop line to signal: _______*feet*
- Near side signal? **Y** **N**
- Is existing size adequate? **Y** **N**

Number of Signal Heads Adequate?

- Total number of signal heads for major movement: ______
- Total number of lanes for major movement: ______
- Is existing number adequate? **Y** **N**

Signal Heads Placement Adequate? **Y** **N**

PART 3. CHECK SIGNAL CONTROL PARAMETERS

Grade (as decimal) g =____________(uphill is positive)

Approach speed V =_____________*mph*

Cross street width W =____________*feet*

Calculate the needed change period *(CP)* for this approach using agency practice or the following equation:

$$CP = \overbrace{1.0 + \frac{1.47 * V}{(20 + 64.4g)}}^{\text{Yellow}} + \overbrace{\frac{W + 20}{1.47 * V}}^{\text{All-red}}$$

	Actual Value	Calculated Value	Is Existing Adequate?
Yellow Interval	____________	____________	**Y** **N**
All Red Interval	____________	____________	**Y** **N**

PART 4. CHECK OTHER FACTORS

Is horizontal location adequate? **Y** **N** Pavement condition on approach: **Adequate** **Polished** **Severely Rutted**

Should signal warranting study be conducted? **Y** **N** Other concerns:____

PART 5. IDENTIFY PROMISING COUNTERMEASURES

Visibility Deficiency

____ Install additional signals on near side
____ Change signal mounting
____ Install SIGNAL AHEAD sign
____ Install Advance Warning Flashers
____ Remove/relocate sight obstruction
____ Install programmable lenses
____ Install shields and visors
Other____

Conspicuity Deficiency

____ Add signals to achieve one per lane
____ Replace with LED lens type
____ Replace with 12" signal head
____ Install double red signal
____ Install/enhance backplates
____ Install rumble strips on approach
____ Install near side signal

Signal Timing Operation Deficiency

____ Change yellow interval
____ Add/change all-red interval

Other Measures

____ Determine if signal is warranted
____ Consider roundabout or innovative design
____ Improve pavement condition

Inspection By: ____ Date:_______________

Figure 5: FHWA Intersection Field Inspection Form

Resources

FHWA. *Field Guide for Inspecting Signalized Intersections to Reduce Red Light Running*. FHWA-SA-05-008. Washington, DC. 2005.

http://safety.fhwa.dot.gov/intersection/redlight/redl_reports/fguide_isirlr/
(HTML)

http://safety.fhwa.dot.gov/intersection/redlight/redl_reports/fieldinspfrm.cfm.
(Field Inspection Form plus downloadable .pdf form)

Federal Highway Administration, National Highway Traffic Safety Administration, *Red Light Camera Systems Operational Guidelines*, Washington, DC. January 2005.

Red Light Camera Systems Operational Guidelines, January 2005 (HTML)

http://safety.fhwa.dot.gov/intersection/redlight/fhwasa05002/fhwasa05002.pdf.

FHWA, Research, Development, and Technology, Turner-Fairbank Highway Research Center, *Association of Selected Intersection Factors with Red-Light Running Crashes*, FHWA-RD-00-112. Washington, DC. 2000.

http://www.hsisinfo.org/pdf/00-112.pdf

Institute of Transportation of Engineers. *A History of the Yellow and All-Red Intervals for Traffic Signals*. Washington, DC: ITE. 2001.

Institute of Transportation Engineers, *Making Intersections Safer: A Toolbox of Engineering Countermeasures to Reduce Red-Light Running*. An Informational Report. Washington, DC. 2003.

http://safety.fhwa.dot.gov/intersection/redlight/rlr_report/rlrbook.pdf

Texas Transportation Institute. *Engineering Countermeasures to Reduce Red-Light Running*. Report 4027-2, College Station, TX. August 2002.

http://tcd.tamu.edu/Documents/4027-2.pdf

Texas Transportation Institute. *Evaluation of Enforcement Issues and Safety Statistics Related to Red Light Running*. Research Report 4196-1. College Station, TX. September 2003.

http://tcd.tamu.edu/Documents/4196-1.pdf

6 ISSUE BRIEFS

U.S.Department of Transportation
Federal Highway Administration

Safe Roads for a Safer Future
Investment in roadway safety saves lives

ENGINEERING COUNTERMEASURES TO REDUCE RED-LIGHT RUNNING

November 2009

FHWA-SA-10-005

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

February 1, 2019

Mr. Paul O'Meara
City Engineer
City of Birmingham
151 Martin Street
Birmingham, MI 48012

VIA EMAIL

RE: Maple Road & S. Eton Street
Pedestrian Improvements Summary

Dear Mr. O'Meara:

The purpose of this letter is to provide a summary of the pedestrian improvements for consideration at the Maple Road & S. Eton Street intersection. Included herein is project background information, improvements previously evaluated and new improvements for consideration.

PROJECT BACKGROUND

The Ad Hoc Rail District Committee prepared a report (dated November 2016) that provided recommendations for the future of the Rail District along S. Eton Street. The report includes several items for consideration at the S.Eton Street & Maple Road intersection. There are two recommendations at this intersection that would reduce the overall crossing length. The two concepts from the Ad Hoc Rail District Committee Report include:

1. Splitter Island

The Committee recommended a pork chop shaped pedestrian island to, *"channel drivers to slow down and gives pedestrians the ability to wait on it instead of having to rush across the street during a short traffic light interval."*

Exhibit from Ad Hoc Rail Committee Report

27725 Stansbury Boulevard, Suite 195
Farmington Hills, MI 48334
P: 248.536.0080
F: 248.536.0079
www.fveng.com

2. Bump-Out (Southeast Corner)

The Committee recommended a bump out to, *"give motorists better visibility of pedestrians attempting to cross and to shorten the length of road crossings for pedestrians."*

Exhibit from Ad Hoc Rail Committee Report

VEHICULAR AND PEDESTRIAN VOLUMES

The existing (2018) vehicular and pedestrian traffic volumes were compared to historic (2015) volumes at the Maple Road & Eton Street intersections. The historic (2015) data collection was performed during the weekday AM (7-9AM) and PM (4-6PM) peak periods prior to the Whole Foods construction. The existing count data was conducted in September 2018 after Whole Foods had been open for several months, but prior to the holiday shopping season. The results of the count data comparison are summarized in the tables and charts below, and the detailed count data comparison is attached.

Table 1: Traffic Volume Comparison

Intersection	Approach	AM Peak Hour Traffic Volumes (vph)			PM Peak Hour Traffic Volumes (vph)		
		8-9AM			5-6PM		
		2015 AM	2018 AM	Difference	2015 PM	2018 PM	Difference
S. Eton Street & Maple Road	EB	744	650	-94	884	890	6
	WB	965	1,120	155	1,198	1,210	12
	NB	326	386	60	497	498	1
	Total	2,035	2,156	121	2,579	2,598	19
N. Eton Street/Whole Foods & Maple Road	EB	964	947	-17	1,225	1,178	-47
	WB	774	843	69	1,053	913	-140
	NB	4	23	19	8	94	86
	SB	254	339	85	235	359	124
	Total	1,996	2,152	156	2,521	2,544	23

Chart 1: Traffic Volume Comparison

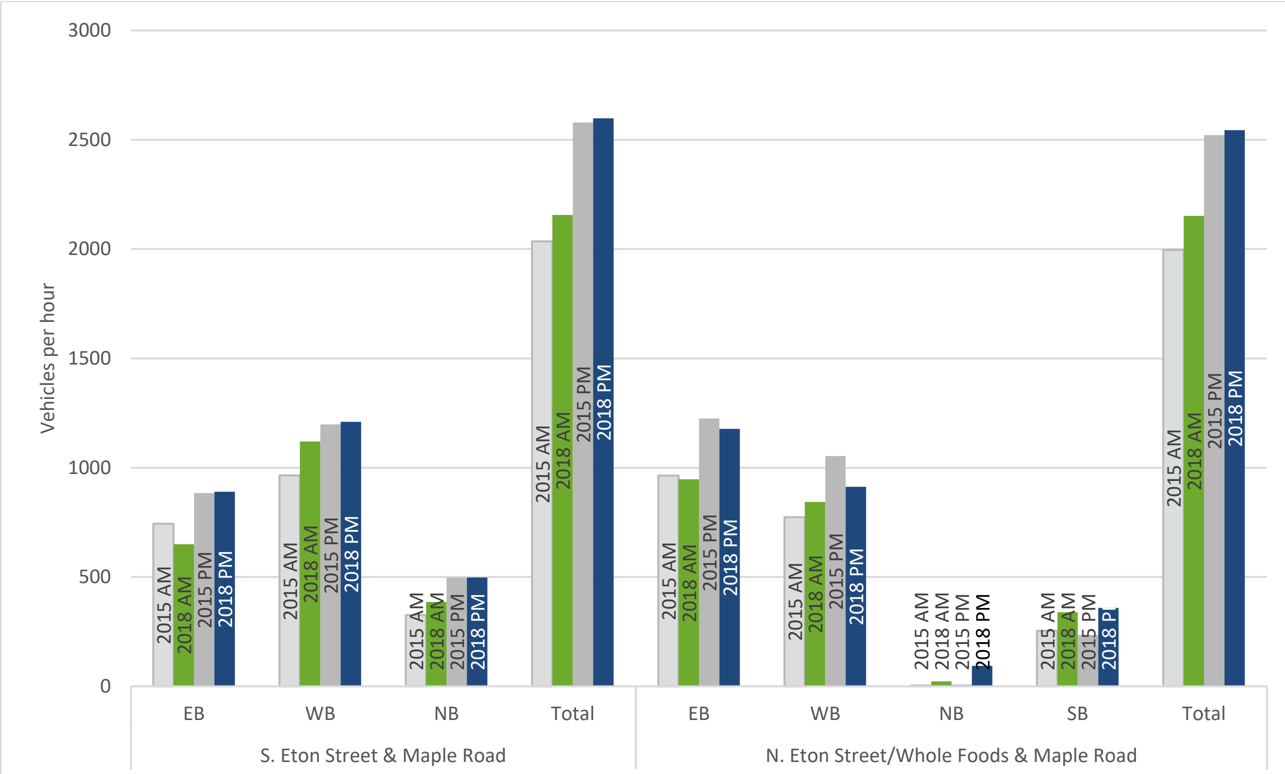


Table 1: Pedestrian Volume Comparison

Intersection	AM Peak Period Pedestrian Volumes 7-9AM			PM Peak Period Pedestrian Volumes 4-6PM		
	2015 AM	2018 AM	Difference	2015 PM	2018 PM	Difference
S. Eton Street & Maple Road	5	13	8	10	16	6
N. Eton Street/Whole Foods & Maple Road	11	26	15	22	35	13

Chart 2: Pedestrian Volume Comparison

Key Findings

- The overall difference in vehicular traffic from 2015 to 2018 at the Maple Road & Eton Street intersections is minimal. The larger increase in traffic occurred at the intersections during the AM peak period. Of particular interest are the increases during the AM peak hour of SB right-turns on N. Eton Street and WB through traffic on Maple Road at S. Eton Street.
- There was a noticeable increase in pedestrian activity, especially at the N. Eton Street intersection where pedestrian volumes doubled post Whole Foods opening.

Alternatives Analysis

The Ad Hoc Rail District Committee requested that F&V evaluate the feasibility of the two alternatives: 1) Splitter Island and 2) Bumpout (SE Corner). In addition, F&V also developed several other alternatives that were also evaluated for consideration. The analysis for each alternative evaluated is summarized herein.

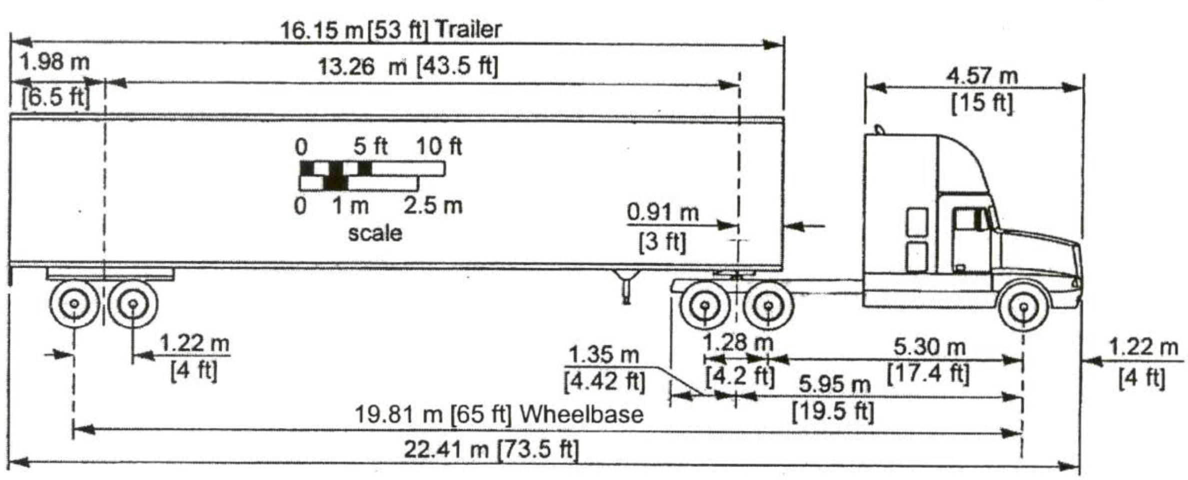
1. Splitter Island

The proposed raised splitter island initially proposed in the Ad Hoc Rail Committee Report was further evaluated. The splitter island would be located between the northbound left- and right-turning vehicles. This type of pedestrian improvement is generally applied at locations where speeds and volumes make crossings prohibitive, or where three or more lanes of traffic make pedestrians feel exposed or unsafe in the intersection. The existing pedestrian crossing on the south leg of the intersection Maple Road & S. Eton intersection is approximately 88 feet due to the skew of the intersection. According to the *AASHTO Guide for Planning, Design, and Operation of Pedestrian Facilities* a pedestrian refuge should be considered when crossing distance exceeds 60 feet.

The splitter island would improve pedestrian safety by reducing the area for pedestrian conflicts, decreasing vehicle speeds approaching the intersection, and provide a greater awareness of pedestrian activity at the intersection. The *Urban Street Design Guide*, published by the National Association of City Transportation Officials (NACTO) recommends that the raised island be at least 6 feet wide, with a preferred width of 8–10 feet for pedestrian comfort and safety.

Since the splitter island is located at an intersection, the design should include a "nose" which extends past the crosswalk. This protects people waiting on the median and slows turning drivers. In addition, the island should include curbs, bollards, or other features to protect people waiting.

S. Eton Street provides access for several developments that ship and receive via semi-trailers, including a lumberyard and a vehicle storage facility. The only available truck access for these commercial developments is via the Maple Road & S. Eton Street intersection, since trucks are not permitted on S. Eton Street south of Lincoln Street, nor on any of the cross-streets. Therefore, in order to accommodate these commercial developments, it was determined that the design concept for the raised island be developed using a WB-65 truck turning template.



The design of the splitter island considered both the recommendations of NACTO and the necessary truck accommodations. The signalized pedestrian walk time on the east-west approaches can accommodate pedestrians across the intersection without the need for a pedestrian refuge. However, if the island is proposed it is anticipated that many pedestrians will use the island as a refuge to make a two-stage crossing. Therefore, it is recommended that the design the island include design features to ensure the safety of pedestrians who might use the island as a refuge. Considering all these factors the proposed design of the splitter island is shown on the attached **Option 1**.

Key Findings

- The stop-bar on S. Eton Street for the right-turn lane is able to move closer to the intersection, providing an additional queuing space (1-2 vehicles) and improved visibility for pedestrians at the intersection.
- The total crosswalk distance is comprised of two shorter crossings of 53-feet and 18-feet, with a 13-foot pedestrian refuge. This is a 17-ft reduction in pedestrian crossing distance over the existing 88-foot crosswalk length.
- The island provides approximately 325-square feet of raised area. This is enough to maintain a small planting area.

2. Bumpout (SE Corner)

A bumpout on the southeast corner was further evaluated. This bumpout was originally proposed as in the Ad Hoc Rail Committee Report. The bumpout was designed to accommodate a box truck turning radius since articulated trucks do not have the ability make a northbound right-turn at this intersection due to the railroad bridge center abutment. The proposed design for this bumpout is shown on the attached **Option 2**. This bump-out would reduce the radius on the southeast corner from the existing 26-feet to 10-feet. The bumpout would also reduce the existing 88-foot crosswalk distance to 68 feet. A bumpout on this approach would also encourage slower turning speeds due to the smaller curb radius.

Key Findings

- The stop bar on S. Eton Street needs to remain to accommodate the truck turning movements from Maple Road.
- The total crosswalk distance is reduced from 88-feet to 68-feet. Although this is a good reduction, the crossing distance remains higher than is recommended without a pedestrian refuge. A pedestrian refuge was also considered with this bump-out, however due to left-turning truck movements from the west Maple Road only a very small island can be provided and is less than the recommended 6 feet, therefore a pedestrian island is not recommended in conjunction with this bumpout.
- Drainage modifications, including a new drainage structure, would be required to accommodate a bump-out on the southeast corner.

3. Bumpout (SW Corner)

A bumpout on the southwest corner was considered. The bumpout was designed to accommodate a WB-65 truck-turning radius since trucks have the ability make a right-turn at this intersection from eastbound Maple Road. The proposed design for this bumpout is shown on the attached **Option 3**. This bump-out would reduce the radius on the southwest corner from the existing 47-feet to 15-feet. The bumpout would also reduce the existing 88-foot crosswalk distance to 75 feet. A bumpout on this approach would also encourage slower turning speeds due to the smaller curb radius.

Key Findings

- The stop bar on S. Eton Street needs to remain to accommodate the truck turning movements from Maple Road.
- The total crosswalk distance is reduced from 88-feet to 75-feet. Although this is a good reduction, the crossing distance remains higher than is recommended without a pedestrian refuge. A pedestrian refuge was also considered with this bump-out, however due to left-turning truck movements from the west Maple Road a pedestrian refuge cannot be accommodated.

- Drainage modifications, including a new drainage structure, would be required to accommodate a bump-out on the southwest corner.

4. Median Island

A median island was considered for the S. Eton Street approach and would be located between the northbound and southbound traffic. Similar to the splitter island, a median island would also improve pedestrian safety by reducing the area for pedestrian conflicts, decreasing vehicle speeds approaching the intersection, and provide a greater awareness of pedestrian activity at the intersection. According to NACTO the raised island be at least 6 feet wide, with a preferred width of 8–10 feet. In addition, since the median island is located at an intersection, the design should include a "nose" which extends past the crosswalk. This protects people waiting on the median and slows turning drivers. In addition, the island should include curbs, bollards, or other features to protect people waiting. The City of Birmingham has several locations within the City that provide median islands, including two locations on W. Maple Road.

The design of the median island considered both the recommendations of NACTO and the necessary truck accommodations. The signalized pedestrian walk time on the east-west approaches can accommodate pedestrians across the intersection without the need for a pedestrian refuge. However, if the island is proposed it is anticipated that many pedestrians will use the island as a refuge to make a two-stage crossing. Therefore, it is recommended that the design the island include design features to ensure the safety of pedestrians who might use the island as a refuge. Considering all these factors the proposed design of the splitter island is shown on the attached **Option 4**.

Key Findings

- The stop-bars on S. Eton Street for the left- and right-turn lanes are able to move closer to the intersection, providing an additional queuing space (1-2 vehicles) and improved visibility for pedestrians at the intersection.
- The total crosswalk distance is comprised of two shorter crossings of 50-feet and 30-feet, with a 7-foot pedestrian refuge. This is a 8-ft reduction in pedestrian crossing distance over the existing 88-foot crosswalk length.
- The island provides approximately 260-square feet of raised area. This is enough to maintain a small planting area.

5. Slip Lane

A slip lane would provide a channelized approach for northbound right-turning vehicles on S. Eton Street. Since the intersection is skewed, this channelization would create an opportunity to provide a right-turn lane that intersects Maple Road at a 90-degree angle. In addition, the channelization would create a large median island for pedestrians, significantly reducing the crosswalk distance from a long 88-feet to two shorter crossings of 53-feet and 15-feet. The large median island also provides the opportunity to relocate the existing N-S crossing from the west side of the intersection to the east side of the intersection. The pedestrian crossing would be in-between the northbound left and right-turning vehicles, therefore eliminating any pedestrian-vehicle conflicts. The proposed design of the slip lane is shown on the attached **Option 5**.

Key Findings

- This alternative will require ROW acquisition on the southeast corner of the S. Eton Street & Maple Road intersection.
- The existing guardrail on the north side of the intersection will need to be adjusted to accommodate pedestrian crosswalk on the east side of the intersection.
- A retaining wall may be necessary on the southeast corner of the S. Eton Street & Maple Road intersection due to significant grades adjacent to the railroad tracks.
- The signal at the S. Eton Street & Maple Road intersection would need to be redesigned to accommodate the proposed lane geometry and pedestrian crossing.
- The stop-bar on S. Eton Street for the right-turn lane is able to move closer to the intersection, providing an additional queuing space (1-2 vehicles) and improved visibility for pedestrians at the intersection.

Due to truck turning movements, no changes can be made to the stop bar location for the northbound left-turn.

- The total crosswalk distance is comprised of two shorter crossings of 53-feet and 15-feet, with a 47-foot pedestrian refuge. This is a significant reduction in pedestrian crossing distance over the existing 88-foot crosswalk length.
- The N-S pedestrian crossing across Maple Road can be relocated to the east side of the intersection, thus eliminating pedestrian conflicts with turning traffic.

6. Splitter Island Pedestrian Crossing

This alternative combines the N-S pedestrian crossing from Alternative 5 and the splitter island from Alternative 1. The N-S pedestrian crossing is moved from the west side of the intersection to the east side of the intersection. Pedestrians would use the splitter island as the landing point to cross Maple Road. This alternative eliminates the pedestrian-vehicle conflicts. In order to provide a crossing at this location the splitter island needs to be large enough to accommodate waiting pedestrians and provide the necessary level landing space for ADA compliance. To provide the required design of the splitter island, additional lane width is need on the southwest corner to accommodate the truck turning movements. The proposed design of the splitter island with the pedestrian crossing is shown on the attached **Option 6**.

Key Findings

- The pedestrian signal at the S. Eton Street & Maple Road intersection would need to be redesigned to accommodate the proposed pedestrian crossing.
- The existing guardrail on the north side of the intersection will need to be adjusted to accommodate pedestrian crosswalk on the east side of the intersection.
- The N-S pedestrian crossing across Maple Road can be relocated to the east side of the intersection, thus eliminating pedestrian conflicts with turning traffic.
- The stop-bar on S. Eton Street for the right-turn lane is able to move closer to the intersection, providing an additional queuing space (1-2 vehicles) and improved visibility for pedestrians at the intersection.
- The total crosswalk distance is comprised of two shorter crossings of 53-feet and 18-feet, with a 13-foot pedestrian refuge. This is a 17-ft reduction in pedestrian crossing distance over the existing 88-foot crosswalk length.
- The island provides approximately 325 square feet of raised area. This is enough to maintain a small planting area.

7. Narrow Roadway

This alternative considered narrowing S. Eton Street at the intersection. The approach with Maple Road currently provides two lanes northbound (separate left- and right- turn lanes) and one southbound through lane, for a total of three lanes across the S. Eton Street approach. The skew of this approach makes the crossing extended from a typical 36-feet across to the 88-feet that is provided for pedestrian crossing. By narrowing the roadway the intersection approach can be realigned within the existing ROW. The intersection approach is then a typical T-intersection; with one lane in each direction on the S. Eton Street approach. The proposed design is shown on the attached **Option 7.**

The primary concern with this alternative is the operational impacts of eliminating the exclusive left- and right-turn lanes and providing one shared lane. A analysis was performed to determine the measure-of-effectiveness (MOE) of this alternative as compared to existing operations. The MOE summary is provided in **Table 1**. The results of the analysis shows that the high volume of southbound right-turns warrants an exclusive right-turn lane. Eliminating this exclusive movement increased both the vehicle delay (LOS) and the vehicle queueing.

Table 1: Alternative 7-S.Eton Street MOE Summary

Intersection	Peak Period	Approach	Existing Conditions (Exclusive RT & LT)		Proposed Conditions (Shared LT/RT)		Difference	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
Maple Road & S. Eton Street	AM	EB	52.8	D	52.8	D	0.0	-
		WB	1.7	A	1.7	A	0.0	-
		NBL	48.6	D	100.2	F	51.6	D > F
		NBR	19.7	B			80.5	B > F
		Overall	21.2	C	34.7	C	13.5	-
	PM	EB	54.5	D	54.5	D	0.0	-
		WB	1.5	A	1.5	A	0.0	-
		NBL	65.5	E	791.4	F	725.9	E > F
		NBR	26.4	C			765.0	C > F
		Overall	25.5	C	169.9	F	144.4	C > F
Maple Road & N. Eton Street / Whole Foods Drive	AM	EB	2.0	A	5.4	A	3.4	-
		WBL	0.0*	A	0.0*	A	0.0	-
		WBTR	46.0	D	46.0	D	0.0	-
		NBL	46.9	D	46.9	D	0.0	-
		NBT	45.1	D	45.1	D	0.0	-
		SBL	55.4	E	55.4	E	0.0	-
		SBR	31.5	C	31.5	C	0.0	-
		Overall	25.2	C	26.7	C	1.5	-
	PM	EB	1.6	A	5.6	A	4.0	-
		WBL	30.7	C	30.7	C	0.0	-
		WBTR	59.0	E	59.0	E	0.0	-
		NBL	65.1	E	65.1	D	0.0	-
		NBT	51.8	D	51.8	D	0.0	-
		SBL	73.5	E	73.5	D	0.0	-
		SBR	27.5	C	27.5	C	0.0	-
		Overall	28.8	C	30.7	C	1.9	-

* Indicates No Volume Present

Intersection	Peak Period	Approach	Existing Conditions (Exclusive RT & LT)		Proposed Conditions (Shared LT/RT)		Difference	
			Average (ft)	95th % (ft)	Average (ft)	95th % (ft)	Average (ft)	95th % (ft)
Maple Road & S. Eton Street	AM	EBT	228	343	223	323	-5	-20
		EBTR	250	370	234	336	-16	-34
		WBL	67	119	61	115	-6	-4
		WBT	14	59	11	54	-3	-5
		NBL	32	73	378	615	346	542
		NBR	82	152			296	463
	PM	EBT	291	404	331	514	40	110
		EBTR	321	437	358	543	37	106
		WBL	97	141	96	142	-1	1
		WBT	30	91	29	86	-1	-5
		NBL	51	107	486	505	435	398
		NBR	122	211			364	294
Maple Road & N. Eton Street / Whole Foods Drive	AM	EBL	13	41	27	69	14	28
		EBTR	64	64	40	83	-24	19
		WBL	0*	0*	0*	0*	0	0
		WBT	241	375	256	405	15	30
		WBTR	227	362	236	381	9	19
		NBL	13	38	12	37	-1	-1
		NBT	1	11	1	9	0	-2
		SBL	65	159	46	127	-19	-32
		SBR	172	271	164	256	-8	-15
	PM	EBL	21	57	16	56	-5	-1
		EBTR	17	55	19	59	2	4
		WBL	20	125	16	105	-4	-20
		WBT	292	482	266	430	-26	-52
		WBTR	259	454	237	396	-22	-58
		NBL	41	88	43	98	2	10
		NBT	10	36	9	34	-1	-2
		SBL	65	158	66	160	1	2
		SBR	189	284	178	274	-11	-10

* Indicates No Volume Present

Key Findings

- The intersection operations would be significantly impacted by this alternative. A LOS F would be experienced on several movements and the vehicle queue lengths would extend beyond the existing conditions by 300-500 feet (12-20 vehicles).
- The stop-bar on S. Eton Street is able to move closer to the intersection, providing an additional queuing space (1-2 vehicles).
- The total crosswalk distance is reduced from 88-feet to 46-feet.
- Drainage modifications, including a new drainage structure, would be required to narrow the roadway at this approach.

8. Grade Separation

A grade separation alternative was considered for this intersection to accommodate the pedestrians on the E-W movement across N. Eton Street. The benefit of grade separation is the pedestrian is completely separated from the vehicular traffic and provides uninterrupted flow for pedestrian movements. Grade separation is most feasible and appropriate in extreme cases where pedestrians must cross roadways such as freeways and high-speed, high-volume arterials. However, studies[1] have shown that many pedestrians will not use grade separated crossings if they can cross at street level in about the same amount of time. Furthermore, any grade separation must be ADA compliant which requires the use of ramps or elevators. Extensive ramping results in long crossing distances and steep slopes that will be difficult to accommodate with the adjacent railroad bridge.

Key Findings

- The total crossing distance will likely be extended due to the ramping required.
- A pedestrian bridge would be difficult to construct adjacent to the railroad bridge.
- Pedestrians will not use a grade separated crossing if a more direct route is available.
- Lighting, drainage, graffiti removal, and security are also major concerns with underpasses.
- The cost associated with grade separation is very high, in the $1-10Mil range depending on the type of construction, design and site conditions.

9. Pedestrian Signal Timing

The signal timing at the Maple Road & Eton Street intersection overall is a complex system. The N. and S. Eton approaches are coordinated to provide efficient movement of traffic through the intersection. To reduce back-ups on Maple Road the N-S pedestrian signals are activated by push buttons. The E-W pedestrian crossing on S. Eton Street is *not* controlled by push buttons, as there is adequate time for pedestrians to cross during the normal signal phasing. There are some pedestrian safety concerns associated with the current signal operations.

- The WB left-turns on Maple Road have a permissive / protected left-turn. During the permissive phase, pedestrians are crossing S. Eton Street in conflict with the left-turning vehicles.
- The NB right-turns from S.Eton Street onto Maple Road are permitted to turn right-on-red during the pedestrian walk phase.

Signal timing changes were investigated at this intersection to determine if changes to the signal timing could be accommodated and maintain acceptable intersection operations. The signal timing alternatives and the resulting MOEs are summarized in **Table 2**.

[1] Bowman, B.L., J.J. Fruin, and C.V. Zegeer, *Planning, Design, and Maintenance of Pedestrian Facilities*, Report No. FHWA-IP-88-019, Federal Highway Administration, October 1988.

Table 2: Alternative 9-Signal Timing MOE Summary

Intersection	Peak Period	Approach	Existing Conditions		Pedestrian Phase		Difference	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
Maple Road & S. Eton Street	AM	EB	52.8	D	160.6	F	107.8	D > F
		WB	1.7	A	7.0	A	5.3	-
		NBL	48.6	D	58.7	E	10.1	D > E
		NBR	19.7	B	26.1	C	6.4	B > C
		Overall	21.2	C	58.2	E	37.0	C > E
	PM	EB	54.5	D	230.8	F	176.3	D > F
		WB	1.5	A	9.8	A	8.3	-
		NBL	65.5	E	79.9	E	14.4	-
		NBR	26.4	C	28.8	C	2.4	-
		Overall	25.5	C	90.7	F	65.2	C > F
Maple Road & N. Eton Street / Whole Foods Drive	AM	EB	2.0	A	7.8	A	5.8	-
		WBL	0.0*	A	0.0*	A	0.0	-
		WBTR	46.0	D	196.7	F	150.7	D > F
		NBL	46.9	D	54.2	D	7.3	-
		NBT	45.1	D	50.5	D	5.4	-
		SBL	55.4	E	81.1	F	25.7	E > F
		SBR	31.5	C	35.8	D	4.3	C > D
		Overall	25.2	C	85.1	F	59.9	C > F
	PM	EB	1.6	A	11.0	B	9.4	A > B
		WBL	30.7	C	59.6	E	28.9	C > E
		WBTR	59.0	E	265.4	F	206.4	E > F
		NBL	65.1	E	79.1	E	14.0	-
		NBT	51.8	D	54.3	D	2.5	-
		SBL	73.5	E	91.6	F	18.1	E > F
		SBR	27.5	C	33.2	C	5.7	-
		Overall	28.8	C	106.2	F	77.4	C > F

* Indicates No Volume Present

Intersection	Peak Period	Approach	Existing Conditions		Pedestrian Phase		Difference	
			Average (ft)	95th % (ft)	Average (ft)	95th % (ft)	Average (ft)	95th % (ft)
Maple Road & S. Eton Street	AM	EBT	228	343	664	1096	436	753
		EBTR	250	370	671	1106	421	736
		WBL	67	119	65	120	-2	1
		WBT	14	59	9	51	-5	-8
		NBL	32	73	34	77	2	4
		NBR	82	152	96	167	14	15
	PM	EBT	291	404	1934	2979	1643	2575
		EBTR	321	437	1953	2980	1632	2543
		WBL	97	141	99	139	2	-2
		WBT	30	91	34	91	4	0
		NBL	51	107	62	119	11	12
		NBR	122	211	117	212	-5	1
Maple Road & N. Eton Street / Whole Foods Drive	AM	EBL	13	41	23	63	10	22
		EBTR	64	64	33	79	-31	15
		WBL	0*	0*	0*	0*	0	0
		WBT	241	375	462	503	221	128
		WBTR	227	362	461	507	234	145
		NBL	13	38	11	32	-2	-6
		NBT	1	11	2	13	1	2
		SBL	65	159	61	157	-4	-2
		SBR	172	271	208	305	36	34
	PM	EBL	21	57	33	73	12	16
		EBTR	17	55	47	93	30	38
		WBL	20	125	41	195	21	70
		WBT	292	482	465	480	173	-2
		WBTR	259	454	464	481	205	27
		NBL	41	88	49	104	8	16
		NBT	10	36	10	38	0	2
		SBL	65	158	81	187	16	29
		SBR	189	284	231	311	42	27

* Indicates No Volume Present

Key Findings

- An exclusive pedestrian phase would provide a safer crossing that the existing condition.
- The intersection operations would be significantly impacted by this alternative. A LOS F would be experienced on several movements and the vehicle queue lengths would extend beyond the existing conditions by 200-2500 feet (8-100 vehicles).
- It is recommended an exclusive pedestrian phase is run with push button activation due to the low pedestrian volumes at this intersection.

SUMMARY

Alternative	Recommendation	Comments	Cost Estimate
1. Splitter Island	**Recommended**	• The total crosswalk distance is comprised of two shorter crossings of 53-feet and 18-feet, with a 13-foot pedestrian refuge. This is a 17-ft reduction in pedestrian crossing distance over the existing 88-foot crosswalk length.	$25,000-50,000
2. Bumpout (SE Corner)	Not Recommended	• The bumpout reduces the overall crossing distance, but a long crossing distance remains.	$25,000-50,000
3. Bumpout (SW Corner)	Not Recommended	• The bumpout reduces the overall crossing distance, but a long crossing distance remains.	$25,000-50,000
4. Median Island	Not Recommended	• The total crosswalk distance is comprised of two shorter crossings of 50-feet and 30-feet, with a 7-foot pedestrian refuge. This is a 8-ft reduction in pedestrian crossing distance over the existing 88-foot crosswalk length. • The median is only 7-ft wide. The recommended minimum is 6-ft wide. A larger pedestrian refuge associated with a different alternative is recommended.	$25,000-50,000
5. Slip Lane	**Recommended (with reservations)**	• This alternative will require ROW acquisition on the southeast corner of the S. Eton Street & Maple Road intersection. • The existing guardrail on the north side of the intersection will need to be adjusted to accommodate pedestrian crosswalk on the east side of the intersection. • A retaining wall may be necessary on the southeast corner of the S. Eton Street & Maple Road intersection due to significant grades adjacent to the railroad tracks. • The signal at the S. Eton Street & Maple Road intersection would need to be redesigned to accommodate the proposed lane geometry and pedestrian crossing	$250,000-500,000
6. Splitter Island Ped Crossing	**Recommended**	• The total crosswalk distance is comprised of two shorter crossings of 53-feet and 18-feet, with a 13-foot pedestrian refuge. This is a 17-ft reduction in pedestrian crossing distance over the existing 88-foot crosswalk length. • The pedestrian signal at the S. Eton Street & Maple Road intersection would need to be redesigned to accommodate the proposed pedestrian crossing. • The existing guardrail on the north side of the intersection will need to be adjusted to accommodate pedestrian crosswalk on the east side of the intersection. • The N-S pedestrian crossing across Maple Road can be relocated to the east side of the intersection, thus eliminating pedestrian conflicts with turning traffic.	$75,000-100,000

7.	**Narrow Roadway**	Not Recommended	• Significant impact on traffic operations	$25,000-50,000
8.	**Grade Separation**	Not Recommended	• Pedestrians will not use a grade separated crossing if a more direct route is available. • Construction would be difficult adjacent to the railroad bridge	$1Mil-$10Mil
9.	**Pedestrian Signal Timing**	Not Recommended	• Significant impact on traffic operations	$20,000

We hope that this information provides adequate clarification to address the questions of the City. If you have any questions or concerns, please contact our office.

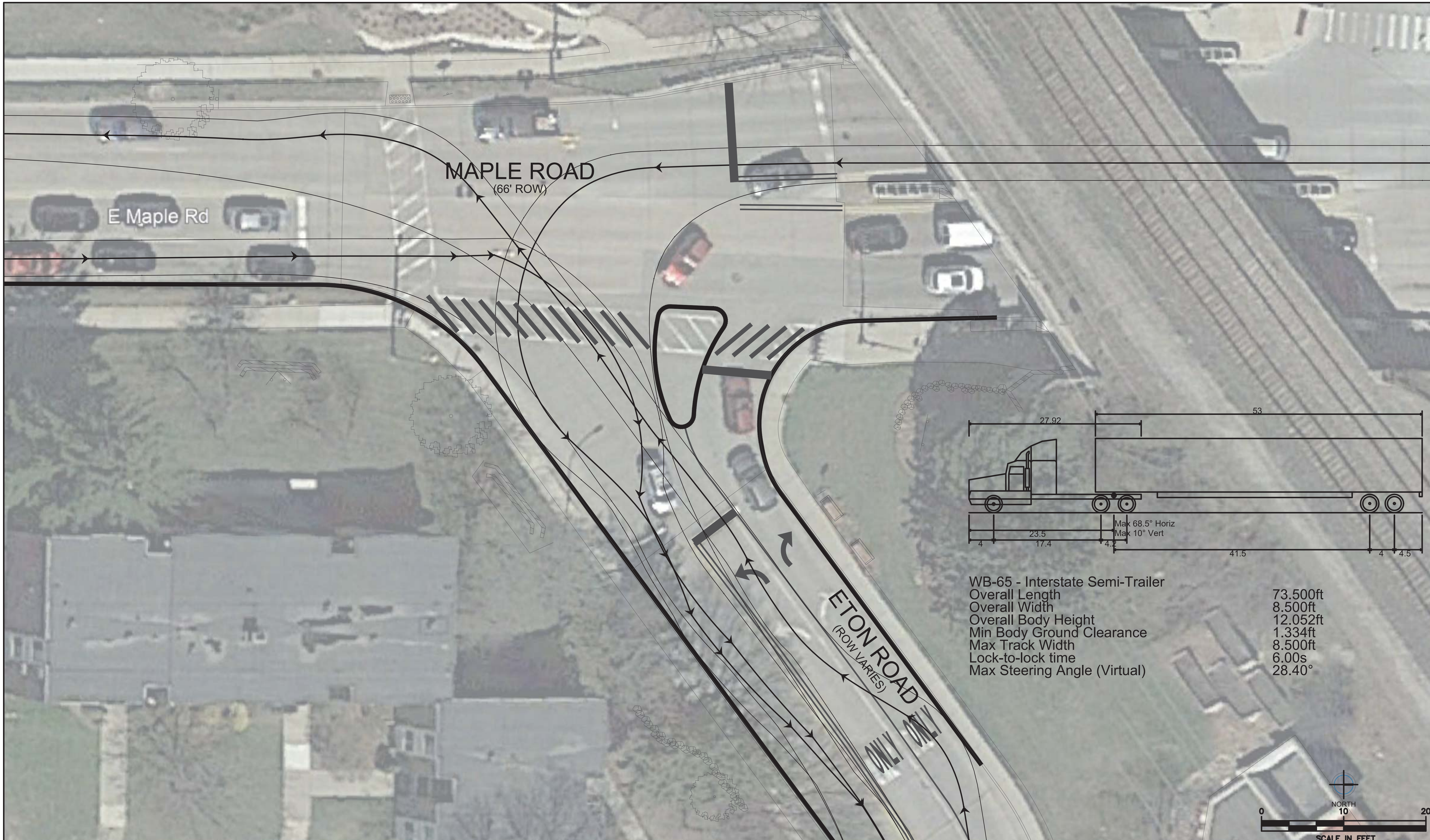
Sincerely,

FLEIS & VANDENBRINK

Julie M. Kroll

Julie M. Kroll, PE, PTOE
Sr. Project Manager

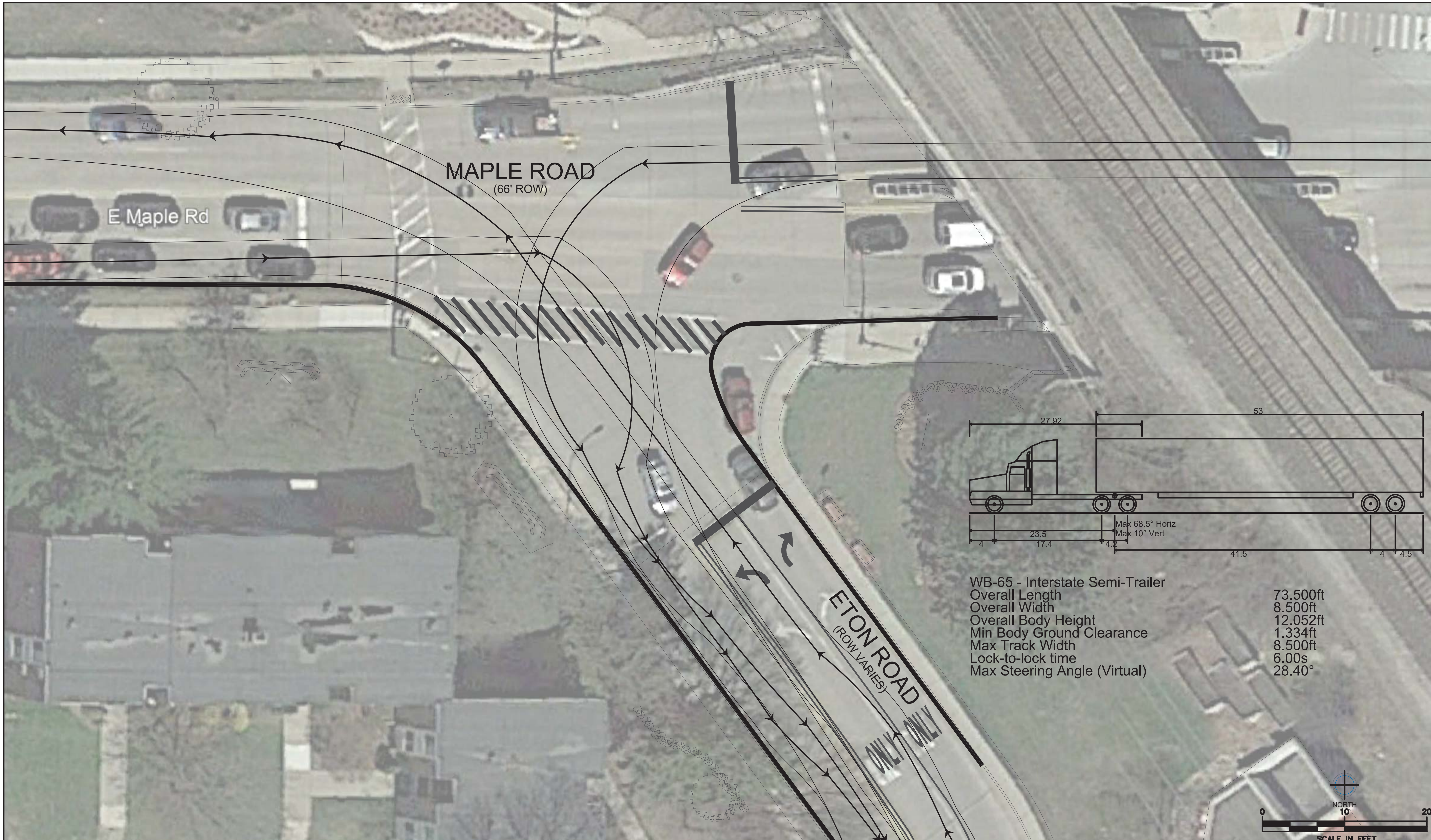
JMK:jjs



OPTION 1
SPLITTER ISLAND

CITY OF BIRMINGHAM
OAKLAND COUNTY, MICHIGAN
SOUTH ETON AVENUE AT MAPLE ROAD
IMPROVEMENT PLAN

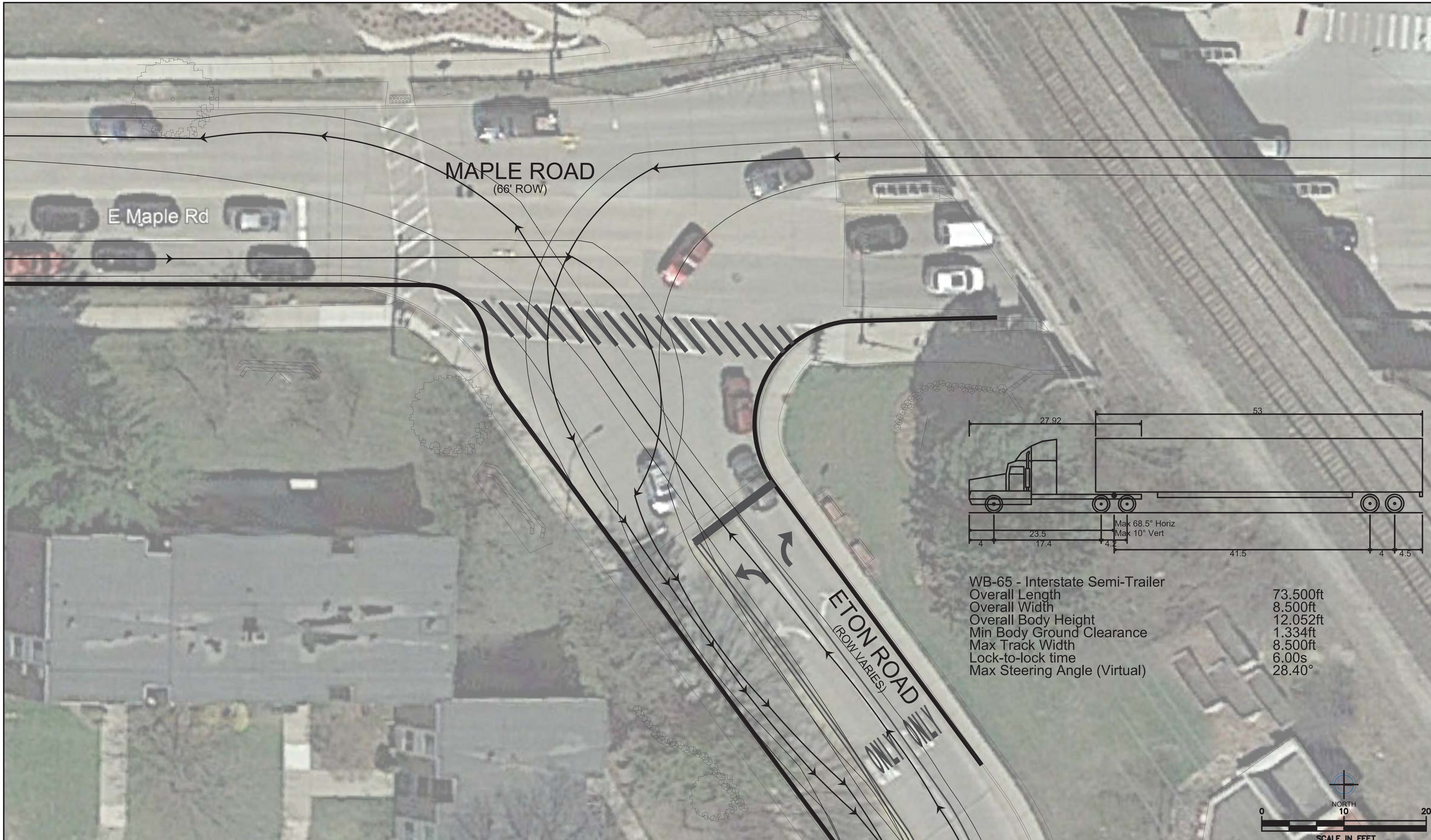
FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.



OPTION 2
BUMPOUT SE CORNER

CITY OF BIRMINGHAM
OAKLAND COUNTY, MICHIGAN
SOUTH ETON AVENUE AT MAPLE ROAD
IMPROVEMENT PLAN

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

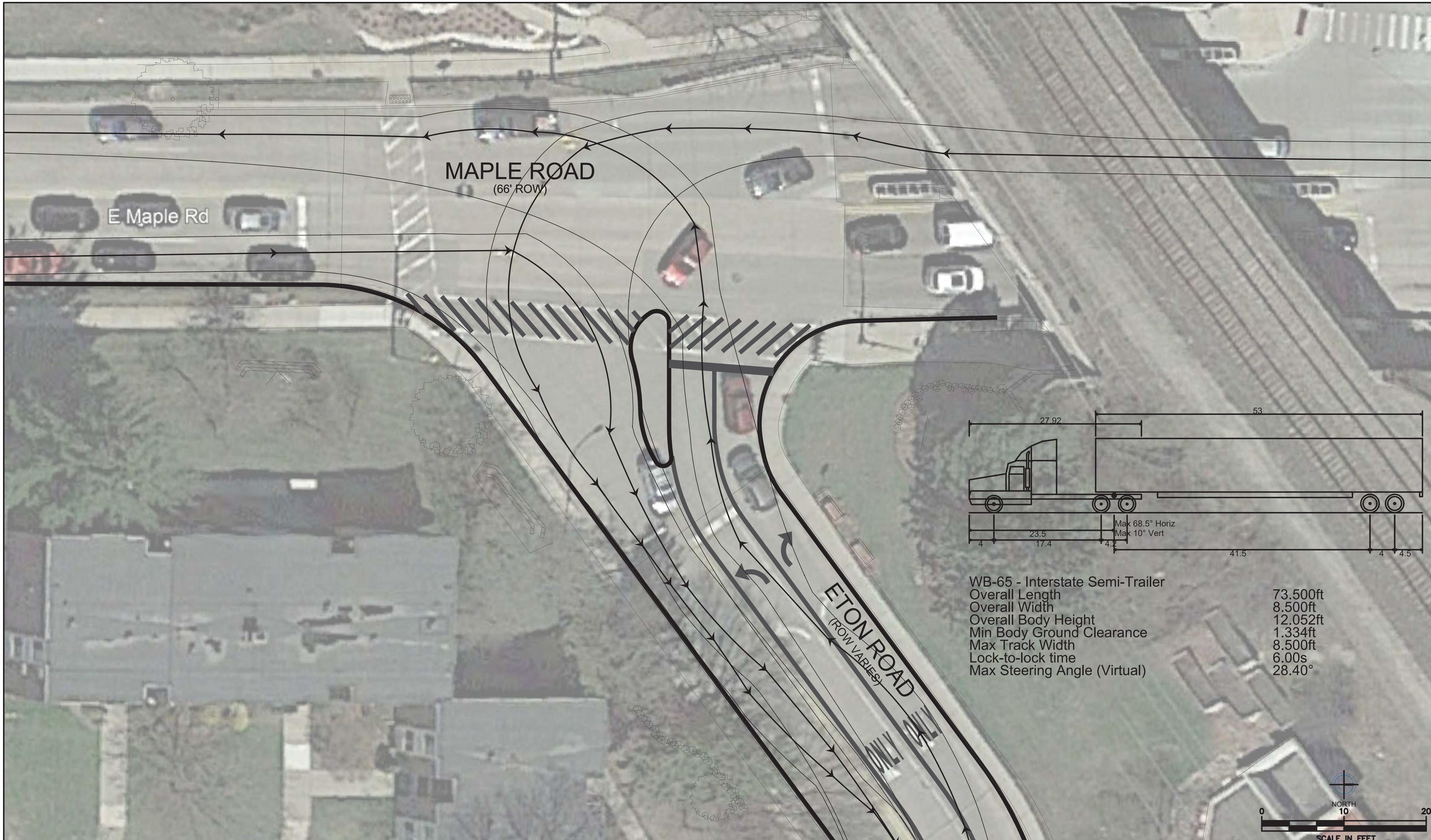


OPTION 3
BUMPOUT SW CORNER

CITY OF BIRMINGHAM
OAKLAND COUNTY, MICHIGAN
SOUTH ETON AVENUE AT MAPLE ROAD
IMPROVEMENT PLAN

F&V PROJECT NO. 823981

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

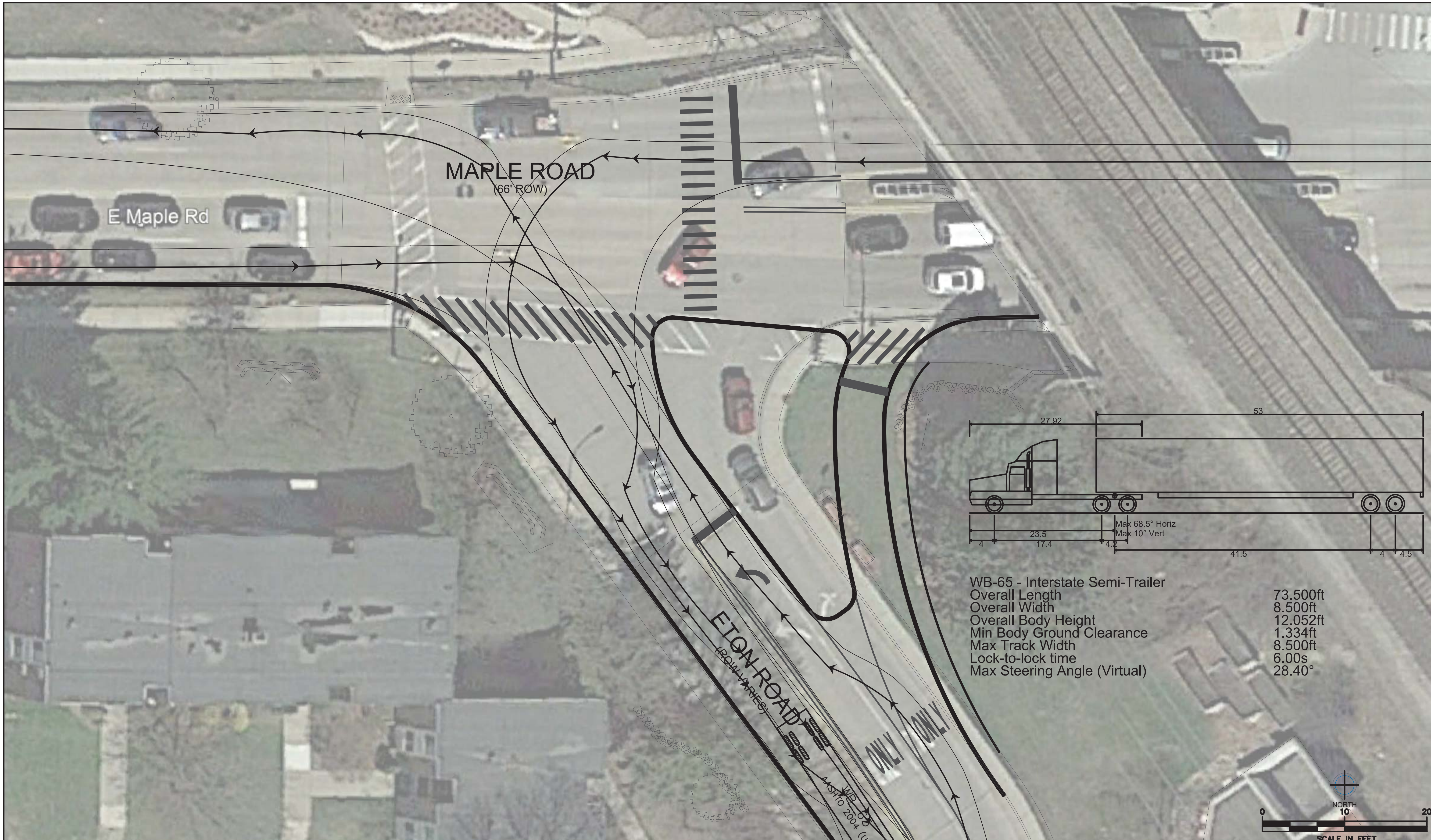


OPTION 4
MEDIAN ISLAND

CITY OF BIRMINGHAM
OAKLAND COUNTY, MICHIGAN
SOUTH ETON AVENUE AT MAPLE ROAD
IMPROVEMENT PLAN

F&V PROJECT NO. 823801

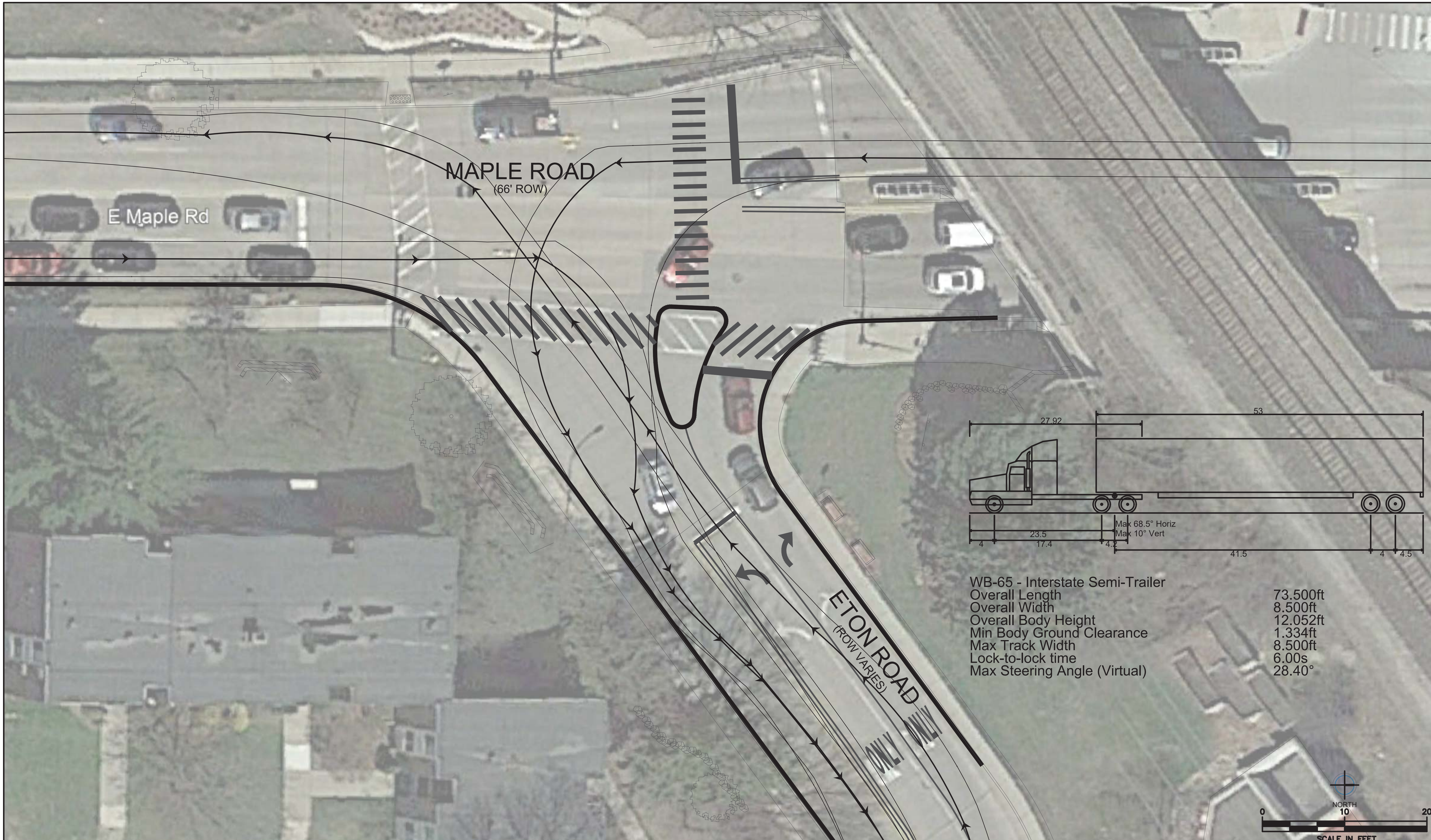
FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.



OPTION 5
SLIP LANE

CITY OF BIRMINGHAM
OAKLAND COUNTY, MICHIGAN
SOUTH ETON AVENUE AT MAPLE ROAD
IMPROVEMENT PLAN

FLEIS & VANDENBRINK
DESIGN. BUILD. OPERATE.

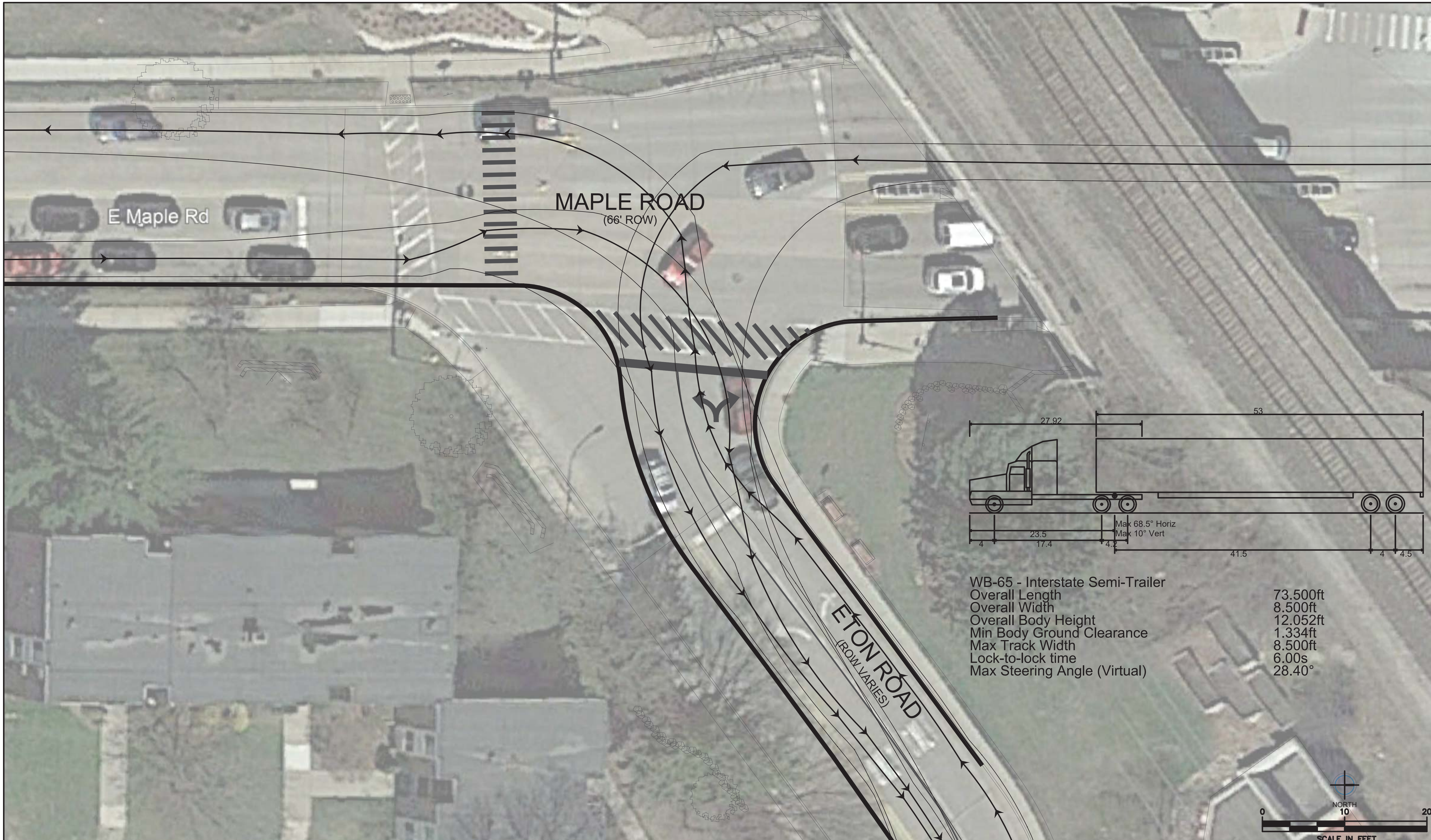


OPTION 6
SPLITTER ISLAND PED CROSSING

CITY OF BIRMINGHAM
OAKLAND COUNTY, MICHIGAN
SOUTH ETON AVENUE AT MAPLE ROAD
IMPROVEMENT PLAN

F&V PROJECT NO.

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.



OPTION 7
NARROW ROADWAY

CITY OF BIRMINGHAM
OAKLAND COUNTY, MICHIGAN
SOUTH ETON AVENUE AT MAPLE ROAD
IMPROVEMENT PLAN

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

City of Birmingham
A Walkable Community

MEMORANDUM

DATE: **February 27, 2019**

TO: **Multi-Model Transportation Board**

FROM: **Jana L. Ecker, Planning Director**
Cmdr. Scott Grewe, Police Department
Paul T. O'Meara, City Engineer

SUBJECT: **Millrace and Lakeside Intersection Review**

The City received complaints from residents that there is no traffic control at the intersection of Millrace and Lakeside. The residents advised the intersection is dangerous and advised of concerns that drivers were not yielding when turning off of Millrace onto Lakeside. They stated the area gets numerous visitors due to its proximity to the river and waterfalls. See attached emails from two residents in the area.

Traffic studies and accident date were reviewed for this area. According to the Michigan Manual on Uniform Traffic Control Devices (MMUTCD) for uncontrolled intersections the following rules apply: "Right of Way at Intersections", when two vehicles approach an intersection from different streets or highways at approximately the same times, the right-of-way rule requires the driver of the vehicle on the left to yield the right-of-way to the vehicle on the right. In addition, the use of YIELD or STOP signs should be considered at the intersection of two minor streets or local roads where the intersection has more than three approaches and where one or more of the following conditions exist:

1. The combined vehicular, bicycle and pedestrian volume entering the intersection from all approaches averages more than 2,000 units per day.
2. The ability to see conflicting traffic on an approach is not sufficient to allow a road user to stop or yield in compliance with the normal right-of-way rule if such stopping or yielding is necessary.
3. Crash records indicate that five or more crashes that involve the failure to yield the right-of-way at the intersection under the normal right-of-way rule have been reported within a 3-year period, or that three or more such crashes have been reported with in a 2-year period.

The intersection was reviewed and no accidents were reported, in the last three years. In 2016 a traffic count was conducted on Lakeside near Millrace, the highest daily total of vehicles was 522. Based on the information obtained and the complaints received, the City's engineering traffic consultants, Fleis and Vandenbrink, were contacted and asked to review the intersection. See attached report and recommendation for the installation of a Yield sign due to sight line visibility concerns.

Suggested Recommendation:
To install a YIELD sign on Millrace at Lakeside.

City of Birmingham
A Walkable Community

Scott Grewe <sgrewe@bhamgov.org>

Stop sign at Millrace and Lakeside Drive

Shawn Mobley-Sulich <smsulich@comcast.net> Tue, Feb 12, 2019 at 12:22 PM
To: sgrewe@bhamgov.org
Cc: Andrew Sulich <asulich@msn.com>, Marc Schwartz <Marcsart@msn.com>, pboutros@bhamgov.org, paomeara@bhamgov.org, Michelle Saroki <michellesaroki@yahoo.com>, marcia.lucy@aol.com, jeremywolfe@gmail.com, Mia <miawoodward@gmail.com>

Dear Commander Grewe,

I am writing with a request for your consideration of a stop sign at the intersection of Millrace and Lakeside Drive. Marc Schwartz and I met with Paul O'Meara regarding concerns about the amount of turnaround traffic that enters Millrace, to find that it is a dead end street. In frustration, motorists speed off of that street onto Lakeside without yielding to traffic or pedestrians. I have a disabled adult son who enjoys riding his bike and I fear he is going to get hit. We also have families with young children in the area and a Birmingham School bus that stops at that corner. A majority of us also have dogs and enjoy being outside with them.

We met many months ago regarding our concerns and were hoping to have some resolution on this issue. I welcome your thoughts on this issue and thank you for your careful consideration.

Respectfully,

Dr. Shawn Mobley-Sulich

Scott Grewe <sgrewe@bhamgov.org>

Stop sign at Millrace and Lakeside Drive

marcia.lucy@aol.com <marcia.lucy@aol.com> Thu, Feb 14, 2019 at 12:38 PM
To: Sgrewe@bhamgov.org, smsulich@comcast.net
Cc: asulich@msn.com, Marcsart@msn.com, pboutros@bhamgov.org, paomeara@bhamgov.org, michellesaroki@yahoo.com, jeremywolfe@gmail.com, miawoodward@gmail.com

I live on the *corner of Millrace and Lakeside* so I have a stake in this discussion. I am wondering what month/season of the year the study was done? Besides number of vehicles, there is the traffic of bicyclists, walkers, with and without dogs. **That** is a very important consideration, too. Daily, I see cars not even pausing as they come off Millrace, witnessing many a near collision of vehicles. In the warmer months, the pedestrian/canine traffic at an all-time high, it is of utmost concern to me, as cars coming around the curve on the narrow two-way street, really need to slow down and let slower moving units go by!

I think we are very very lucky that there has not been an accident, either between 2 cars or a car/walker, etc. I would like to voice my opinion that I agree there should be a sign that says YIELD or STOP. I shudder to think that it will take a loss of life or limb to stop playing cat -and -mouse at this intersection. In the meantime, I will keep my first aid kit handy by my front door, just in case! Marcy Klucznik

280 Millrace

[Quoted text hidden]

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

MEMO

VIA EMAIL

To:	**Cmdr. Scott Grewe, Operations Commander** **Birmingham Police**
From:	**Julie M. Kroll, PE, PTOE** **Jacob J. Swanson, EIT** **Fleis & VandenBrink Engineering**
Date:	**February 22, 2019**
Re:	**Millrace and Lakeside Intersection Evaluation**

Fleis & VandenBrink (F&V) staff is pleased to present this memo to the City Birmingham for your use evaluating the recommended signing for the uncontrolled intersection of Millrace Road and Lakeside Drive. This study was performed to determine if intersection control should be provided at the uncontrolled intersection.

The guidance regarding regulatory traffic measures is provided in the *Michigan Manual of Uniform Traffic Control Devices (MMUTCD)* Sections 2B.04, 2B.06, and 2B.07. Additional information is provided in the American Association of State Highway and Transportation Officials *Geometric Design of Highway and Streets (Green Book)* and the *Guidelines for Converting Stop to Yield Control at Intersections*, National Cooperative Highway Research Program (NCHRP) Report 320. F&V referenced the *MMUTCD* and additional documents to evaluate the existing intersection conditions and develop a recommendation. The results of the analysis and the recommendations are included herein.

INTERSECTION CONTROL ANALYSIS

Section 2B.04 of the *MMUTCD* provides a set of criteria to evaluate in order to determine when intersection control (YIELD or STOP) should be considered at the intersection of two local streets. The use of YIELD or STOP signs should be considered if any of the following conditions exists:

A. *The combined vehicular, bicycle, and pedestrian volume entering the intersection from all approaches exceed 2,000 vehicles per day*
B. *The ability to see conflicting traffic on an approach is not sufficient to allow a road user to stop or yield in compliance with the normal right-of-way rule if such stopping or yielding is necessary.*
C. *Crash records indicate that five or more crashes that involve the failure to yield the right-of-way at the intersection under the normal right-of-way rule have been reported within a 3-year period, or that three or more such crashes have been reported within a 2-year period.*

The Birmingham Police Department (BPD) collected traffic volume count data along Lakeside Drive in 2016 and indicated the highest daily vehicle count was **522 vehicles**. Additionally, the BPD reviewed the most recent 3-years of available crash data for the intersection of Millrace Road and Lakeside Drive; the results indicate that **zero crashes** occurred, as a result of failure to yield right-of-way, during the 3-year period. Reviewing the data collected by the BPD, it was concluded that **Condition A** and **Condition C** are not met.

Section 2B.04 MMUTCD	Criteria	Data	Condition Met
Condition A	> 2,000 veh/peds/bikes per day	522 veh	**Not Met**
Condition C	5 or more crashes	0 crashes	**Not Met**

27725 Stansbury Boulevard, Suite 195
Farmington Hills, MI 48334
P: 248.536.0080
F: 248.536.0079
www.fveng.com

To evaluate Condition B, F&V conducted an evaluation of the corner clearance for the study intersection and compared existing conditions to the requirements for corner clearance outlined in the AASHTO *Green Book*.

The intersection sight distance evaluation is shown on the attached figure. The evaluation indicates that the study intersection of Millrace Road and Lakeside Drive does not have the necessary intersection corner clearance to operate as an uncontrolled intersection, due to line of sight obstructions. Therefore, traffic control signage is recommended at the intersection of Millrace Road and Lakeside Drive. Further analysis was performed to determine whether a Yield Sign or Stop Sign is the appropriate traffic control. This analysis is summarized below.

YIELD CONTROL ANALYSIS

The *MMUTCD* recommends the use of STOP signs only when warranted. The NCHRP report recommends a wider use of YIELD signs for new intersections, where the given criteria are met. For the purpose of this evaluation, the installation of intersection control signage at a previously uncontrolled intersection functions similarly to the evaluation of intersection control for the installation of a new intersection. At many locations, the most appropriate intersection control measure will be YIELD signs or no control at all. The NCHRP report provided guidelines to use when evaluating where YIELD signs are to be used for intersection control. The criterion encompassed in these guidelines includes the evaluation of the following: Roadway Classification, Traffic Volumes, Speeds, and Crashes. The analysis is summarized below.

ROADWAY CLASSIFICATION

The major street has been designated as a through street with control along a substantial length that grants or implies right-of-way by using traffic. **Met.**

Both Millrace Road and Lakeside Drive are classified as Local Streets; therefore, the designation of which roadway is the major street cannot be determined solely on the basis of roadway classification. However, the intersection is a three-way "T-leg" intersection; this produces an underlying implication that the major roadway is designated as the through street (Lakeside Drive) and the dead-end street (Millrace Road) is the minor roadway. Therefore, it is recommended that traffic control signage be provided on **Millrace Road.**

TRAFFIC VOLUMES

The average daily traffic should be less than 1,500 vehicles per day on the major street and less than 600 vehicles per day on the minor street. **Met.**

The BPD collected traffic volume data in 2016 along Lakeside Drive of 522 vehicles per day, therefore the traffic volumes fall below the given thresholds.

SPEED DATA

The intersection(s) should be a residential street intersection with a speed limit of 25 mph or lower. **Met.**

The speed limit for Millrace Road and Lakeside Drive is 25 mph; however, people will drive the speed that they feel is "comfortable" for the roadway and is dependent on several factors (road condition, width, set-back, lane width, etc.) Therefore, engineers use the 85th percentile speed as a guide to set the speed limit to provide a safe speed and to promote uniform traffic flow along a corridor. The 85th percentile speed is the speed at or below which 85 percent of all vehicles are observed to travel under free-flowing conditions past a monitored point. There is no available speed data along the study roadways; therefore, the speed limit (25 mph) was assumed to be the 85th percentile speed.

Existing speed data was collected by the Birmingham Police Department, on Tuesday-Friday, June 21, 2016 – June 24, 2016 along Lakeside Drive between Harmon Road and Millrace Road. The speed data is summarized below, and the detailed speed data are attached.

85TH PERCENTILE SPEEDS (MPH)

Count Location	NB	SB	Combined
Lakeside Drive (Harmon Road to Millrace Road)	25	25	25

The results of the analyses show that the 85th percentile speeds are equivalent to the posted speed limit and are within the typical range for a residential neighborhood. Therefore, the evaluation was completed assuming an 85th percentile speed of 25mph.

CRASH DATA

No more than two crashes involving vehicles on the minor street have occurred over the past three years. **Met.**

The BPD performed a crash analysis for the study intersection. The results of their analysis showed that, within the most recent three years of data, **zero crashes** occurred.

SUMMARY

The results of the analysis show that intersection control should be provided for the intersection of Millrace Road and Lakeside Drive. The study indicates that traffic control should be provided on Millrace Road and that YIELD control is the recommended traffic control device. The analysis results are summarized below.

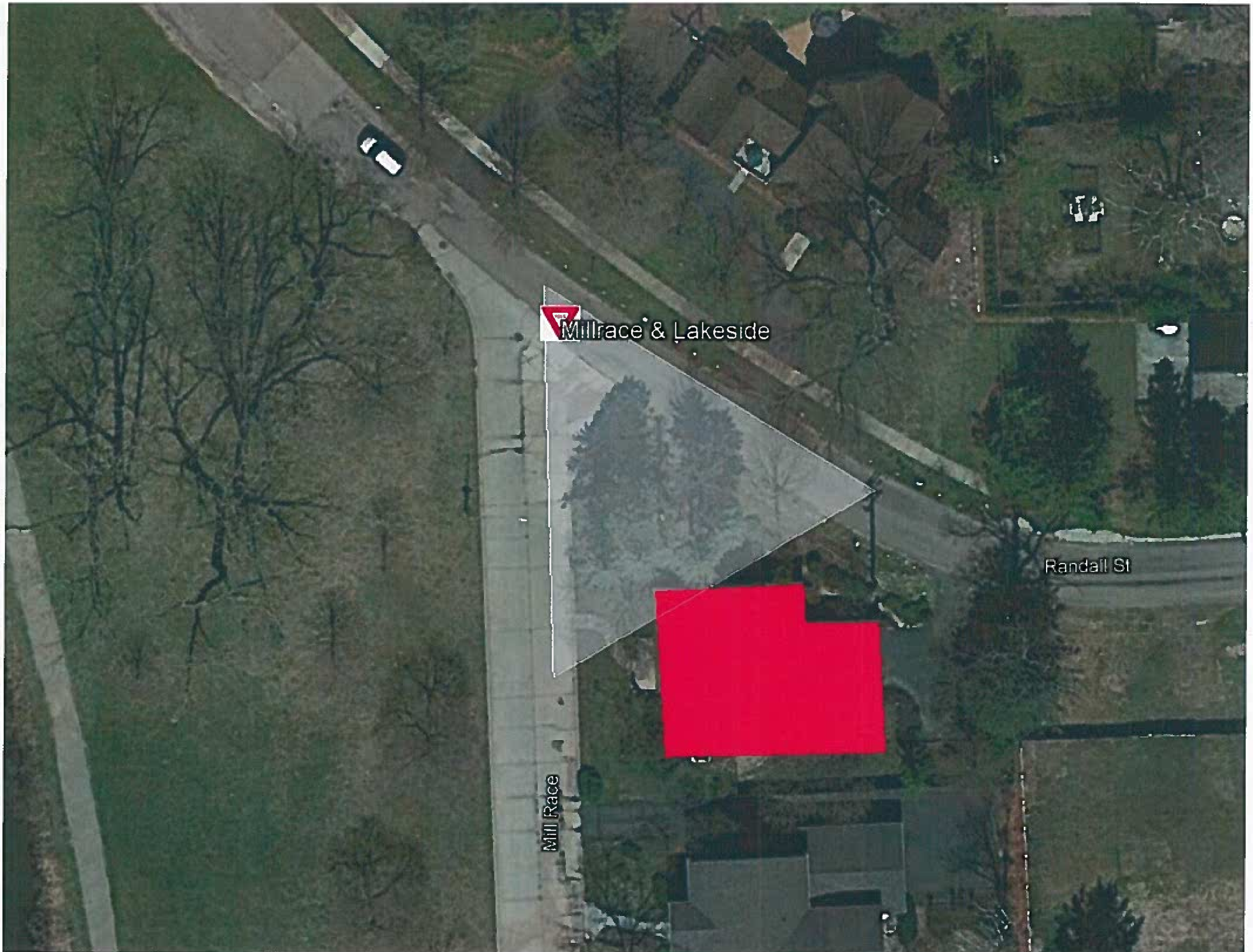
YIELD Sign Criterion (NCHRP Report, 320)		Met?
Roadway Classification	*The major street has been designated as a through street with control along a substantial length that grants or implies right-of-way by using traffic.*	Yes
Traffic Volumes	*The average daily traffic should be less than 1,500 vehicles per day on the major street and less than 600 vehicles per day on the minor street.*	Yes
Speeds	*The intersection(s) should be a residential street intersection with a speed limit of 25 mph or lower.*	Yes
Crashes	*No more than two crashes involving vehicles on the minor street have occurred over the past three years*	Yes
YIELD Control Recommended		**Yes**

RECOMMENDATIONS

1. Based on the results of this study, YIELD control is recommended on **Millrace Road** at Lakeside Drive.
2. If the conditions and crash patterns at the study intersection changes, the City should consider reevaluating the intersection to determine if changes to the traffic control measures are warranted and recommended.

If you have any questions or concerns regarding this engineering analysis, please contact our office.

JJS: JMK



Millrace & Lakeside
Randall St
Mill Race

BIRMINGHAM POLICE DEPARTMENT
151 MARTIN ST.
BIRMINGHAM, MI 48009

Lakeside
Harmon/Mill Race

Lane1

Date\Speed (MPH)	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	>65	Total
6/21/2016	0	10	21	53	75	24	3	0	0	0	0	0	0	1	187
6/22/2016	0	4	31	58	72	21	12	0	0	0	0	0	0	4	202
6/23/2016	0	1	24	73	101	20	8	0	0	0	0	0	0	2	229
6/24/2016	0	1	1	2	6	3	0	0	0	0	0	0	0	0	13
Lane1 Total	0	16	77	186	254	68	23	0	0	0	0	0	0	7	631

85 percentile = 25

Lane2

Date\Speed (MPH)	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	>65	Total
6/21/2016	0	5	45	87	92	40	3	1	0	0	0	0	0	0	273
6/22/2016	0	12	50	76	71	34	4	0	0	0	0	0	0	2	249
6/23/2016	0	4	51	94	100	40	3	0	0	0	0	0	0	1	293
6/24/2016	0	0	3	4	6	9	1	0	0	0	0	0	0	0	23
Lane2 Total	0	21	149	261	269	123	11	1	0	0	0	0	0	3	838

85 percentile = 25

Combined

Date\Speed (MPH)	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	>65	Total
6/21/2016	0	15	66	140	167	64	6	1	0	0	0	0	0	1	460
6/22/2016	0	16	81	134	143	55	16	0	0	0	0	0	0	6	451
6/23/2016	0	5	75	167	201	60	11	0	0	0	0	0	0	3	522
6/24/2016	0	1	4	6	12	12	1	0	0	0	0	0	0	0	36
Combined Total	0	37	226	447	523	191	34	1	0	0	0	0	0	10	1469

85 percentile = 25

A smarter transit system is a few clicks away . . .

SMART PATH

SMART needs your help in finding ways to improve our transit system. Please take 5-10 minutes to give us your opinion by completing an interactive survey. The results of the survey will be used to help formulate recommendations for improving the **SMART** system. Your feedback will help us align your needs with these improvements. Go to the link below or scan the QR code to the left to access the survey.

smartpath.metroquest.com

For additional information, please visit **smartpathplan.org**

PSQ (/publicsquare)

Clarendon, Virginia, a place with good congestion. Photo courtesy of Torti Gallas + Partners.

POLICY (/PUBLICSQUARE/CATEGORY/POLICY)

Good congestion, bad congestion

Our model for traffic congestion is flawed. We need to make the crucial distinction between good and bad congestion and plan our transportation systems accordingly.

ROBERT STEUTEVILLE (/node/538) FEB. 6, 2019

(http://www.facebook.com/sharer/sharer.php?u=https%3A//www.cnu.org/node/7336&title=Good%20congestion%2C%20bad%20congestion)

(http://twitter.com/intent/tweet?status=Good%20congestion%2C%20bad%20congestion%2Bhttps%3A//www.cnu.org/node/7336)

(http://www.linkedin.com/shareArticle?mini=1&url=https%3A//www.cnu.org/node/7336&title=Good%20congestion%2C%20bad%20congestion&source=https%3A//www.cnu.or

(mailto:?subject=Check%20out%20Good%20congestion%2C%20bad%20congestion&body=https%3A//www.cnu.orgpublicsquare/2019/02/06/g
congestion-bad-congestion)

A few years ago, after taking a blood test, my doctor told me I had a cholesterol problem. I wasn't in immediate danger, but I started running regularly. After a year I returned for tests, and he told me the good news: My life expectancy had risen *eight years*. That was my best checkup ever. What had happened?

There are two kinds of cholesterol—high-density lipoprotein (HDL), known as *good* cholesterol, and low-density lipoprotein (LDL), known as *bad* cholesterol. My bad cholesterol levels had not changed. But my HDL, the good cholesterol, had significantly risen since I started exercising more. My overall cholesterol rose, and I became way healthier. It was then that I realized the huge importance of good cholesterol.

I can remember when doctors thought that *all* high cholesterol was bad. For the sake of the health of millions of people and for my lifestyle, thank goodness they made that distinction.

It seems, however, that traffic engineers and transportation planners are behind the curve. A few years back, former CNU president and CEO John Norquist wrote an article (https://www.citylab.com/transportation/2011/12/case-congestion/717/) about "good congestion" and "bad congestion." For more than a half century, the US and state governments have been waging a war against traffic congestion in general, spending billions of dollars to fight it through road widenings and new highways. This is fueled by an annual report, published by the Texas Transportation Institute (TTI) at Texas A&M, which generates a "congestion index" for each metro area. According to TTI, congestion is always bad, and it always costs money. When the TTI report comes out, it generates nationwide media coverage, and congestion is uniformly portrayed as bad.

Yet as Norquist reasonably points out, this assessment flies in the face of reality. Places that are healthy economically, that attract a lot of people, are often crowded. Cities that are dying economically—think Detroit in 2010—have very little congestion. A study (https://www.cnu.org/publicsquare/2018/06/06/congestion-can-be-good-study-reports) last year by University of Colorado and Florida Atlantic University researchers found that, if anything, congestion has a positive impact on the health of cities. "Our findings suggest that a region's economy is not significantly impacted by traffic congestion. In fact, the results even suggest a positive association between traffic congestion and economic productivity as well as jobs," explain authors Wes Marshall and Eric Dumbaugh.

The bottom line is we are terribly confused about congestion, kinda like doctors were confused about cholesterol, but the subject makes a lot more sense when you consider Norquist's model. In this article I'll take a closer look at bad congestion and good congestion, how to tell the difference between the two, and why our current efforts to fight congestion are failing.

Good congestion is a place where everybody wants to *be*. A beautiful main street or lively downtown are examples—and that place is typically full of people—pedestrians, cyclists, drivers, transit riders. You find *good* congestion in a *great* destination.

Bad congestion is a place that where you only want to get through—but you can't get through fast enough because of the congestion. Bad congestion often occurs in miserable places to be—like a beltway or major arterial road lined with strips malls and big box stores.

One easy way to tell the difference between good congestion and bad is to look around. Are there lots of people on foot? Do you see bicyclists on the street? Is the transit service frequent and mode share high? Then you probably have good congestion, because good congestion involves people outside of cars. The best congestion can be found when people are hardly moving at all. People are so happy to be in a particular location they are hanging around for the joy of it. Well-occupied outdoor café tables and park benches are top indicators of good congestion. People talk, buy food from a vender, maybe somebody plays guitar on the side of the best congested streets. The faces your see have purpose and animation—which means they are making connections, doing something meaningful in their lives.

Conversely, if the street is full of cars but nobody is around outside of cars, you've got bad congestion. Bad congestion is a joyless condition. Faces are resigned, frustrated, frowning. Hands gripping steering wheels.

Congestion: Telling the difference

Do you have?	Good congestion	Bad congestion
Pedestrians	Yes	No
Bicyclists	Yes	No
Good transit service	Yes	No
Outdoor cafe tables	Yes	No
Too many cars	Probably	Yes

Where good congestion is needed

There are two really important points here. One is that, like cholesterol, it is just as important for a city to increase its good congestion as it is to lower its bad congestion. If anything, it is more important to do the former. Second, there are places where you expect to find good congestion. If your downtown has no congestion, your city is in serious trouble. Neighborhood commercial centers also need a certain amount of good congestion to be healthy. If you are looking to eliminate congestion in either of these places, you are working at cross-purposes with the health of your city or town.

The last item on the table above is a sticking point—too many cars. Bad congestion definitely has too many cars because without that, the place wouldn't be congested at all. Good congestion *probably* has too many cars—at least at certain times during the day—because that's the world we live in. If people are attracted to a great place—if there are jobs, lots of residents, and visitors seeking shopping, entertainment, and a unique experience—a certain number of people will drive.

In the case of good congestion, the answer is not to widen the street and bring more cars through at a higher rate of speed. That would only decrease the good congestion and turn it into bad congestion. When you have a cholesterol problem, the last thing you want to do is to lower the good cholesterol. Similarly, the first reaction a city should have to good congestion is to appreciate it. Never do anything to decrease the good congestion. If your city has a good balance of cars and people downtown, that's good. But there are some things your city can do to simultaneously boost the good congestion and deal with an excess of cars:

1) Make sure your city has good connectivity in the street network. The more connectivity, the more choices that drivers have to get around traffic bottlenecks at busy times during the day. Good connectivity will disperse traffic rather than concentrate it. It also allows for smaller streets, which reduce traffic speeds and makes streets safer. Slow-speed traffic is compatible with good congestion. Turning one-way streets into two-way streets when possible will increase connectivity. Whenever you do that, you double the connections and choices.

2) Put a lid on off-street parking. The conventional way to deal with traffic downtown is to use it to justify more parking. This is wrong. More parking will add to traffic, and if it is designed poorly, it will lower good congestion by damaging streetscapes. The first step is to eliminate minimum off-street parking requirements. Some cities are going further and adopting parking maximums.

3) Reduce traffic signals where possible, especially multiphase signals. Multi-phase traffic signals make drivers sit in traffic, causing frustration and making them more inclined to hit the gas harder when the light is green. Multiphase signals add to the volume of cars operating in an urban place. Roundabouts are a good tool to eliminate traffic signals, allowing traffic to proceed slowly and steadily through a place with good congestion. Sometimes, traffic signals are not justified by the volume of traffic, and can be replaced with four-way stop signs, which are good for pedestrians and, often, drivers as well.

4) Consider restricting Uber and Lyft in certain parts of cities, putting a maximum on the number of drivers in given areas. No cities have tried this, but I don't see why they shouldn't. Private Internet-based taxi services are significantly adding to congestion, and not in a good way, in major city downtowns. These services also reduce transit

ridership. They are currently operating at a loss, trying to maximize their share of the transportation pie. Cities should consider restricting Uber and Lyft to levels that do not add to traffic congestion, a policy that would promote more transit use, walking, and bicycling. That would increase the *good* congestion. Seriously, what harm would it do to restrict Uber and Lyft in places where people already have a wide range of transportation choices?

5) Improve the transit system. More opportunities for frequent transit will give people a choice in how to get around, and they won't have to be stuck in traffic, even if there are too many cars.

6) Consider congestion pricing in the busiest downtowns by charging a fee for drivers to enter downtown at the busiest times of the day.

Notice that all of these strategies tend to support people outside of cars—even as they mitigate the impact of cars on the road.

What to do about bad congestion

Bad congestion is entirely different from good congestion, and it is *always* a problem. The conventional traffic engineering wisdom is to add to road capacity. But that's not the only strategy, and it may not be the best one.

Another strategy is to turn that bad congestion into good congestion—or, as I found out with my cholesterol, simply raise the level of good congestion. Take a miserable place where nobody gets out of their cars and make it walkable and appealing. Here are some strategies for turning bad congestion into good congestion:

1) Pick your battles. Bad congestion is endemic to many metro areas, and there is no way to turn it all into good congestion—nor would you want to try. Where, in the metro area, do the comprehensive plans say that an automobile-oriented place should become a walkable place? That's where the bad congestion has to turn into good congestion.

2) Improve the connections in the street network. A root cause of bad congestion is that traffic in suburban places is funneled on to a few arterial roads. When that is the case, new connections are needed and that can be accomplished by breaking up superblocks into smaller blocks that can disperse traffic.

3) Use roundabouts to eliminate traffic signals and slow down traffic. When converting bad congestion to good congestion, this tactic is a win-win. In order to make a place appealing and safe for pedestrians, traffic must slow down. But if traffic can move steadily without lengthy delays due to multi-phase traffic signals, the frustration of drivers goes way down.

4) Narrow the travel lanes. That's another win-win. Most places with bad congestion have wide travel lanes, often at or exceeding 12 feet, which is the standard for Interstate highways. This width encourages fast-moving traffic (when the traffic can move at all), which is deadly for pedestrians. Lanes of 10 feet can handle the same amount of traffic at safer speeds, while providing more room for pedestrians and bicyclists.

5) Change the land-use regulations to allow flexible-use urban buildings on both sides of the thoroughfare. That will narrow the perceived width of the roadway, slowing down traffic, and also bring in more pedestrians.

6) Get creative. Sometimes reducing redundant asphalt (https://www.cnu.org/publicsquare/2019/02/01/busy-roadway-public-square) and changing the geometries of intersections can improve the pedestrian experience without negatively affecting traffic flow.

7) Improve the transit service. Many places that have bad congestion have little or no transit service. If this is a place that is intended to be walkable, transit service will provide an alternative.

8) Only in places that are never intended to be walkable should we consider widening roads and building highways. Even in these places another, perhaps better, option is to first improve connectivity to disperse traffic.

All of these steps are not necessary in every city, rather these are menu lists of potential techniques—kinda like diet changes, exercise, and drugs for cholesterol. The particular prescription should be unique to every city, addressing the type of congestion.

Our current understanding of traffic congestion is primitive and crude, and doesn't allow for accurate diagnosis of the problem. We are spending tens of billions of dollars annually to cure a problem that we cannot diagnose in the first place, guaranteeing that we are going to waste a good deal of that money.

The main idea is to understand the problem. Congestion is not inherently bad. Some of it is bad, but some of it is absolutely necessary for the health of cities. We need to communicate the difference between good and bad congestion to the public. The TTI congestion index needs to be reformed, or taken with a big grain of salt. We need to accurately identify the two kinds of congestion within metro areas. Simply saying a metro area is congested does very little good. Finally, we need to employ the appropriate strategies to deal with each kind of congestion—the good and the bad—and take that opportunity to spend our transportation dollars more wisely.

TRAFFIC CONGESTION (/PUBLICSQUARE/350)

(/publicsquare/author/robert-steuteville)

Robert Steuteville is editor of Public Square: A CNU Journal and senior communications adviser for the Congress for the New Urbanism.

John Stimson • 3 days ago

be careful with roundabouts on certain roads. Unlike traffic lights they don't create platooning of cars which provides spaces for pedestrians to cross mid block.

hcat • 8 days ago

I think people want through auto traffic to be confined to major streets, leaving the smaller streets pedestrian. They would, however, be willing to see cul de sacs become through routes for pedestrians and bicycles. Irvine, California, has a lot of these.

dave schutz • 13 days ago

connect
commercial real estate

DAILY EDITIONS YOUR REGION YOUR TOPICS CONFERENCES AWARDS CONNECT CREATIVE
MEDIA GUIDE GET CONNECT NEWS

BREAKING NEWS: Amazon Scraps Plans for NYC HQ2

Paramount Completes $227M Acquisition of Historic San Francisco Building

Malls Aren't Dead, In Fact, Retail Growth Forecast, Omnichannel Strategies a Priority

February 6, 2019

Countering the notion that the retail sector is suffering a prolonged death are a trio of reports suggesting otherwise. To be sure, shopping malls are undergoing a significant transformation.

But, to suggest they are dying would be incorrect, notes commercial real estate economist Jim Costello of Real Capital Analytics (RCA). He writes, "Despite these death proclamations, sales involving malls was where the action was in 2018. How can one square the fact that mall deal volume was up 846% in 2018, with the mantra that malls are dead?"

Costello points out a challenge that investors have when trying to understand the mall market is that the data on property sales often only covers assets trading out at the bottom of the market. "Indeed, looking at the distribution of mall pricing in 2018, there were three distinct pricing stories for the year," he writes. The story here, Costello notes, is that the mall sector is not dead and there is a great disparity in pricing.

In fact, the National Retail Federation (NRF) is forecasting retail sales during 2019 will increase between 3.8% and 4.4% to more than $3.8 trillion, despite threats from an ongoing trade war, the volatile stock market and the effects of the government shutdown.

NRF's Matthew Shay says, "We believe the underlying state of the economy is sound. More people are working, they're making more money, their taxes are lower and their confidence remains high."

Preliminary estimates show that retail sales during 2018 grew 4.6% over 2017 to $3.68 trillion, exceeding NRF's forecast of at least 4.5% growth. The number includes online and other non-store sales, which were up 10.4% at $682.8 billion. That met NRF's forecast of 10-12% online growth, and online is expected to grow in the same 10-12% range again this year.

That growth aligns well with retailers' strategies, too. According to Shopgate, Inc.'s 2019 omnichannel report, 67% of retailers say omnichannel retailing will be a priority in 2019. The top benefits driving retailers to invest in omnichannel capabilities revolve around the customer, cost efficiencies, revenue and competitive advantage.

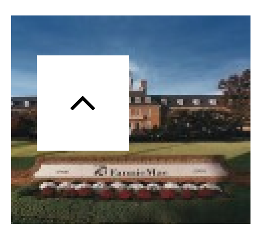
The five "power plays" for omnichannel retailing suggested by Shopgate include:
– Bridge the online and offline experience gap through mobile
– Create up-selling opportunities through buy online, pick up in-store model

National News

Renters No More? Millennials Look to Ownership

Is SoftBank Overpaying for Tech-Firm Commitments?

CBRE's Hana Offering to Debut at PwC Tower in Dallas



Fannie Mae Sees Slower

(BOPIS) and the buy online, return in-store model (BORIS)

– Create a single, cohesive view of each customer with clienteling

– Create better efficiency through omnichannel fulfillment

– Target customers better at the right time and place through geofencing.

CONNECT WITH RCA'S COSTELLO

CONNECT WITH NATIONAL RETAIL FEDERATION'S SHAY

CONNECT WITH SHOPGATE

GET CRE NEWS IN 150 WORDS

For comments, questions or concerns, please contact Dennis Kaiser

Tags: Research, Retail, Technology

GDP Growth This Year

More News

NATIONAL NEWS

Top Stories
West
Southwest
Midwest
Northeast
Southeast

CALIFORNIA NEWS

Top Stories
Los Angeles
Orange County
Inland Empire
Bay Area
San Diego

TEXAS NEWS

Top Stories
Dallas – Fort Worth
Houston – Galveston
Austin
San Antonio
Texas – Other

NEW YORK NEWS

Top Stories
Downtown
Midtown
Uptown/Bronx
Outer Boroughs
Tri-State Area

CHICAGO N

T ries
Downtown
Greater Chicagoland