MULTI-MODAL TRANSPORTATION BOARD
THURSDAY, SEPTEMBER 7, 2017
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 August 3, 2017
5. S. Eton Rd. Corridor – Yosemite Blvd. to 14 Mile Rd.
6. Oakland Ave. & Lawndale Ave. STOP Sign Study
7. Crosswalk Materials Study
8. Meeting Open to the Public for items not on the Agenda
9. Miscellaneous Communications
10. Next Meeting October 5, 2017
11. 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, AUGUST 3, 2017
City Commission Room
151 Martin Street, Birmingham, Michigan

Minutes of the regular meeting of the City of Birmingham Multi-Modal Transportation Board held Thursday, August 3, 2017.

Chairperson Vionna Adams convened the meeting at 6:;04 p.m.

1. ROLL CALL

Present: Chairperson Vionna Adams; Board Members Lara Edwards, Amy Folberg, Vice-Chairperson Johanna Slanga; Alternate Member Katie Schaefer (arrived at 6:10 p.m.)

Absent: Board Members Andy Lawson, Daniel Rontal, Michael Surnow; Alternate Member Daniel Isaksen

Administration: Lauren Chapman, Asst. Planner
Jana Ecker, Planning Director
Austin Fletcher, Asst. City Engineer
Mark Clemence, Police Chief
Paul O'Meara, City Engineer

Also Present: Mike Labadie from Fleis & Vandenbrink ("F&V"),Transportation Engineering Consultants

2. INTRODUCTIONS (none)

3. REVIEW AGENDA (no change)

4. APPROVAL OF MINUTES, MEETING OF July 20, 2017

Motion by Ms. Edwards
Seconded by Ms. Folberg to approve the Minutes of July 20, 2017 as presented.

Motion carried, 4-0.

VOICE VOTE
Yeas: Edwards, Folberg, Adams, Slanga
Nays: None
Absent: Lawson, Rontal, Surnow, Schaefer

5. MULTI-MODAL TRANSPORTATION CONSULTING SERVICES REQUEST FOR PROPOSALS Ms. Ecker recalled that in 2014, the City issued a Request for Proposals ("RFP") seeking traffic engineering services, supplemented with knowledge and understanding of designing and advising for multi-modal transportation concepts, particularly in an urban setting.

In September 2014, the firm of Fleis and Vandenbrink ("F&V") was selected as the City's traffic consultant, and has acted as a multi-modal transportation consultant to the MMTB and the City Commission. However, this contract has now expired. On July 24, 2017, the City Commission directed staff to issue an RFP to seek qualified consulting firms, and extended the previous contract with Fleis and Vandenbrink for six months to allow staff time to go through the RFP process.

Accordingly, the City will again be issuing an RFP to solicit multi-modal transportation consulting services to assist the MMTB and the City Commission in reviewing all transportation related projects. The revised RFP includes bringing in some broader planning perspectives and making sure that pedestrians, bicycles and vehicles are included. Ms. Ecker asked the MMTB to review and comment on the draft RFP. Ultimately it will be up to the City Commission to determine whether to direct this board to issue the RFP. The RFP will go out to bid and then there will be a response time for respondents to submit their proposals. Interviews will be done by the MMTB and the top one or two will be sent to the City Commission who again makes the final decision on which consultant they would like to pick.

It was discussed that the interviews will be televised, as this is a public meeting. However, the competitors will not be allowed to watch the interviews of their fellow consultants.

As a general statement, board members talked about encouraging creativity, innovation, and best practices in the RFP in order to prepare Birmingham to be a city of the future. It was noted that firms could partner with other firms if they didn't have a certain knowledge on their staff.

It was discussed that if Chairperson Adams' firm is interested in submitting she should have a discussion with the City Attorney regarding a potential conflict of interest.

General consensus was that the draft RFP should lose the italics on headings.
Also, Change advise to advice.

Motion by Ms. Slanga
Seconded by Ms. Folberg to recommend that the RFP for professional multi-modal transportation consulting services be forwarded to the City Commission with the text revisions discussed.

Motion carried, 5-0.

VOICE VOTE
Yeas: Slanga, Folberg, Adams, Edwards, Schaefer
Nays: None
Absent: Lawson, Rontal, Surnow

6. CROSSWALK MATERIALS STUDY

Ms. Chapman explained that at the February 27, 2017 meeting the City Commission voted to adopt the following standard policy for the design of all future crosswalk pavement markings in the City of Birmingham:

> All new painted crosswalks installed shall be of the continental style, as outlined on MDOT Detail Sheet PAVE-945-C, Sheet 3 of 3, with the exception that all painted bars shall be 24 in. wide spaced as close to 24 in. apart as possible. Crosswalk widths shall be installed as follows:
>
> On Major Streets within the Central Business District, Triangle District, Rail District, or Adjacent to Schools:
> ● Total width of the crosswalk shall be 12 to 14 ft. wide. Crosswalks at the upper width limit may be installed when traffic signals are present.
> ● The following shall be considered Major Streets (within the specific districts noted) for the purposes of this standard: Woodward Ave., Old Woodward Ave., Maple Rd., Southfield Rd., Adams Rd., Oakland Blvd., Chester St., Brown St., S. Eton Rd., E. Lincoln Ave.
>
> On Local Streets within the Central Business District, Triangle District, Rail District, or Adjacent to Schools:
> ● Total width of the crosswalk shall be 8 ft. wide, unless the adjacent sidewalk main walking path is wider, at which point it shall be widened to match the main walking path width.
>
> At All Other Locations:
> ● Total width of the crosswalk shall be 6 ft. wide.

Pavement markings on roads consist of centerline stripes, lane lines, appropriate striping of no passing zones on two-lane highways, and pavement edge striping. Other pavement markings may supplement the above activities, such as pavement width transitions, approach to obstructions, turn markings, stop and crosswalk lines, and various word and symbol markings. Longitudinal pavement markings are the most widely implemented traffic control devices. A marking material can be selected based upon: durability, workability, drying time or non-track time, accommodation of heavy traffic volumes, and replacement methods considering environmental concerns.

The advantages and disadvantages of various pavement marking materials were discussed.

Ms. Chapman explained polyurea is a plastic that can be sprayed or extruded similar to thermoplastics. Presently, the City uses mostly paint on all streets except major streets where polyurea is recommended. Ms. Ecker clarified that polyurea is also recommended for streets adjacent to schools. She added the City has tried several options in the past and now wants to establish a set standard.

Ms. Slanga observed other cities use thermoplastics which look to be less expensive than polyurea and have longer life on high volume roads along with good night time visibility. It was noted that the recommendation for polyurea came from PK Contracting, the City's current contractor.

Discussion followed and Ms. Ecker summarized that the board would like to know what advantage polyurea has that makes it so much better that it costs so much more. Also, staff will compare polyurea to thermoplastics. She agreed to provide more information for the next meeting. There was consensus that paint is fine for localroads but not around schools.

7. MOPED PARKING POLICY

Chief Clemence reported that the City of Birmingham has recently updated the parking systems for on-street and structure parking. Some people have chosen to drive mopeds and have questioned where such vehicles should be parked. A moped is defined by Michigan law as a two or three wheeled motor vehicle that has a 100cc or smaller engine and a top speed of 30 mph. The City of Birmingham parking structures prohibit motorcycle and moped parking. Some moped drivers have been parking at bike racks in the shopping district. State law and City ordinance prohibits the operation of a motor vehicle on a sidewalk. Furthermore, 257.674 of the Michigan Motor Vehicle Code states the following:

> A vehicle shall not be parked, except if necessary to avoid conflict with other traffic or in compliance with the law or the directions of a police officer or traffic-control device, in any of the following places: (a) On a sidewalk.

Staff contacted other cities to determine how they were handling moped parking. Currently the Birmingham Police Dept. has taken the same approach as Royal Oak and Ferndale and has chosen to take no action against a moped parked at a bike rack.

Therefore, rather than having a set policy that says where a moped can or cannot park, they think a common sense approach should be taken. As long as people are not riding the moped on the sidewalk it could be secured on a bike rack along with the other bicycles.

Motion by Ms. Edwards
Seconded by Ms. Slanga to recommend to the City Commission that moped parkng be permitted as follows:

1. On a paved surface on private property;
2. In any legal vehicle public parking space (on street or in surface parking lots, but not within public parking decks);
3. On public property in alleys, in a manner and location that will not block vehicular service traffic access; and
4. At temporary and permanent bicycle parking racks, provided that mopeds are not permitted to be driven on public sidewalks, and must be walked on the sidewalk to access bicycle parking on or adjacent to the City sidewalk.

Motion carried, 5-0.

VOICE VOTE
Yeas: Edwards, Slanga, Adams, Folberg, Slanga
Nays: None
Absent: Lawson, Rontal, Surnow

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

9. MISCELLANEOUS COMMUNICATIONS(none)

10. NEXT MEETING SEPTEMBER 7, 2017at 6 p.m.

11. ADJOURNMENT

No further business being evident, the board members adjourned at 6:52 p.m.

Jana Ecker, Planning Director

Paul O'Meara, City Engineer

City of Birmingham
A Walkable Community

MEMORANDUM

Engineering Dept.

DATE: **September 1, 2017**

TO: **Multi-Modal Transportation Board**

FROM: **Paul T. O'Meara, City Engineer**

SUBJECT: **S. Eton Rd. Corridor – Maple Rd. to 14 Mile Rd.**

As you know, the Multi-Modal Transportation Board has been studying various multi-modal improvements to S. Eton Rd. from Maple Rd. to Lincoln Ave. Recommendations for this section were sent to the City Commission for review. At the August 14, 2017 meeting, the Commission focused on the recommendations at the Maple Rd. intersection in particular, given the impending completion of the Whole Foods Market just east of this intersection. The discussion included a field visit at the site, and a demonstration of how much room it takes to turn a WB-62 truck both coming from the east and the west. In the end, the Commission did not feel ready to make a recommendation. It was noted that changes to the traffic signal timing and traffic patterns (with the grocery store opening) will be coming to the intersection in the near future. It was decided to allow these changes to occur, and then study the area further before finalizing a decision. In the meantime, the MMTB can take this opportunity to study the rest of the corridor, that being S. Eton Rd. from Lincoln Ave. to 14 Mile Rd.

Attached are new improved plans of the entire mile long corridor that help provide the Board with the options discussed before (north of Lincoln Ave.), and new options south of Lincoln Ave. When reviewing the various options, the following should be considered:

1. The official City of Royal Oak bike route map has been attached to this report, to help clarify how the S. Eton Rd. corridor will connect bikes best with Royal Oak's system to the south. An existing Bike Route that runs parts of this road currently directs southbound bikes to use Melton Rd. instead of S. Eton Rd., and then directs them to turn east on 14 Mile Rd. Since the traffic signal provides a safer opportunity to negotiate streets to the south and east, these signs promoting Melton Rd. would be removed if an improved bike facility is proposed for this section of S. Eton Rd.
2. The drawings include various suggested improvements such as bumpouts and crosswalks, and handicap ramps. The specific size of each improvement will need further refinement before final construction drawings are prepared.
3. At the July, 2017 meeting, the Board made various recommendations for the S. Eton Rd. corridor, including the block between Yosemite Blvd. and Villa Ave. While preparing the report for the City Commission, staff noted that the dimensions on this block did not reflect existing conditions. The proposed cross-section was adjusted to reflect the actual space available on this block. The two options now being presented for this block represent these adjusted dimensions.
4. Given the need to collect more data in the future at Maple Rd., no improvements are being shown for the pedestrian island on this plan. This is not to imply that the

pedestrian island has been rejected, but rather, that this area is not currently being studied.

Many more details can be found in the attached report from F&V. A suggested recommendation follows:

SUGGESTED RECOMMENDATION:

To recommend Option ____ to the City Commission for the Multi-Modal Transportation conceptual plan for the S. Eton Rd. corridor, from Yosemite Blvd. to 14 Mile Rd.

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

MEMO

VIA EMAIL

To:	**Mr. Paul O'Meara, City Engineer, City of Birmingham** **Ms. Jana Ecker, Planning Director, City of Birmingham**
From:	**Rick Stout, LLA, LEED AP BD+C** **Michael J. Labadie, PE** **Julie M. Kroll, PE, PTOE** **Fleis & VandenBrink Engineering**
Date:	**August 31, 2017**
Re:	**S. Eton Street Multi-Modal Improvements Evaluation**

Fleis & VandenBrink (F&V) staff are pleased to present several options for the Multi-Modal Transportation Board (MMTB) consideration for the S. Eton Street corridor. We have included for consideration the geometry as previously recommended by the MMTB in addition to a few additional options as summarized herein and provided on the drawings included with this submittal. These recommendations are based on guidance from the *NACTO Urban Bikeway Design Guid*e, the *NACTO Urban Street Design Guid*e and the recommendations from the City of Birmingham Multi-Modal Transportation Plan, with additional support from the Ad Hoc Rail Committee study.

BACKGROUND

The MMTB previously recommended to the City Commission the bi-directional cycle track, to be located on the east side of S. Eton Street, between Villa Road and Lincoln Street. This recommendation was then sent to the City Commission for review; however, this was tabled at the meeting. The City Planning and Engineering Departments then requested that while the section north of Lincoln was being further considered, the section between 14 Mile and Lincoln should be evaluated by F&V. To provide a cohesive and context sensitive design for the corridor we considered the corridor as a whole, from Maple to 14 Mile and have presented the following options for consideration by the MMTB.

SECTION 1: 14 MILE ROAD TO LINCOLN STREET

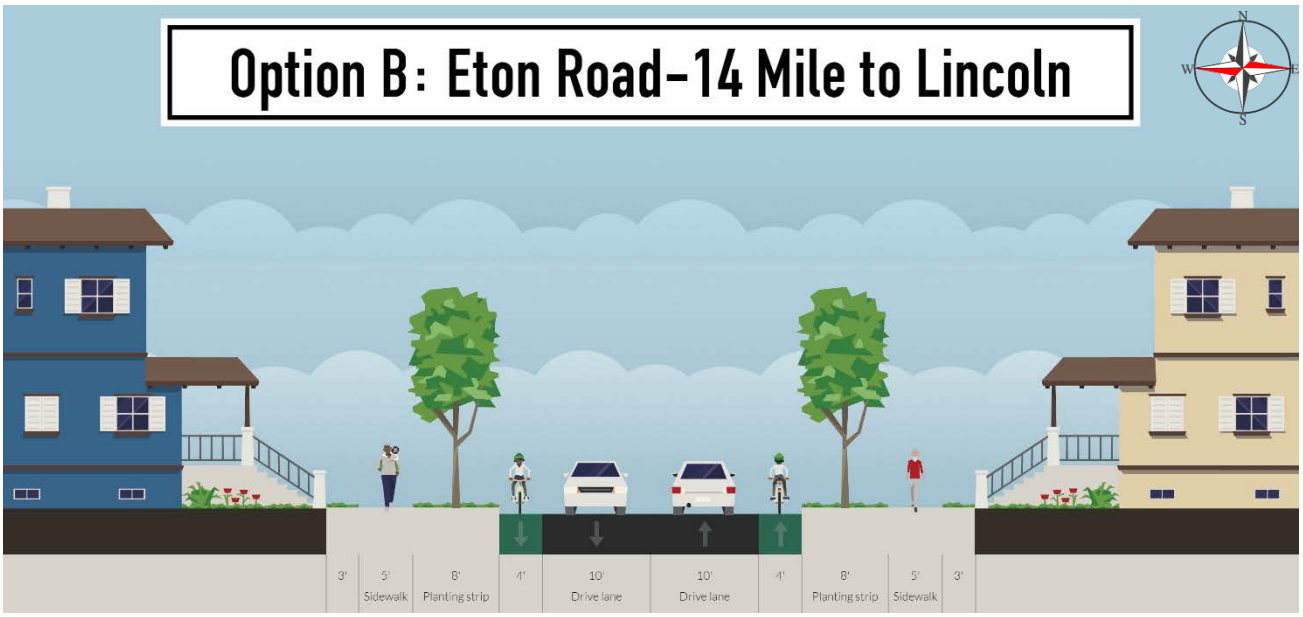
Option A: Sharrows Only (Multi-Modal Transportation Plan Recommendation)

The Multi-Modal Transportation Plan (MMTP) recommendation for this section of S. Eton Street is sharrows from 14 Mile Road to Lincoln Street. This is also consistent with the City of Royal Oak's multi-modal plan, which shows sharrows on Cooper Ave. (Eton Street) south of 14 Mile Road. In addition, this option also allows for bump-outs at the locations on both the east and west sides of S. Eton Street as identified in the Multi-Modal Transportation Plan (MMTP) and in the Ad Hoc Rail Committee study recommendations.

27725 Stansbury Boulevard, Suite 150
Farmington Hills, MI 48334
P: 248.536.0080
F: 248.536.0079
www.fveng.com

Option B: Directional Bike Lanes (Alternative)

This option is provided as an alternative for consideration. This option will provide continuous directional bike lanes through this section. To provide the bike lanes, on-street parking will be prohibited and bumpouts on S. Eton Street will not be feasible.



Summary

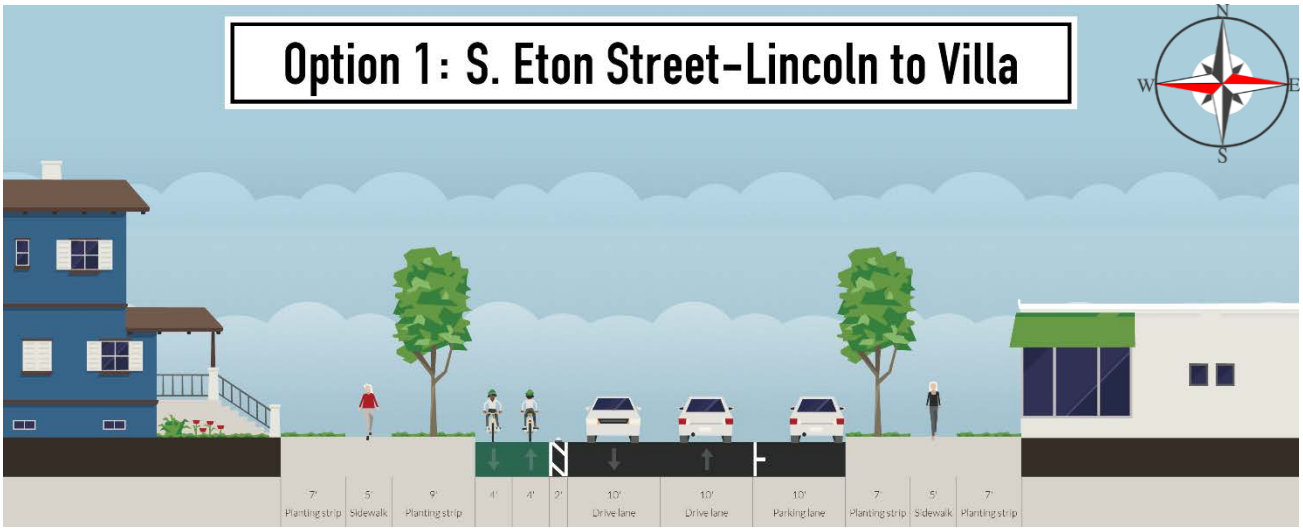
	Section 1: 14 Mile to Lincoln	
	Option A	Option B
Road User	*NB and SB Sharrows (MMTP Recommended)*	*Directional Bike Lanes*
Pedestrians	Bumpouts on both east and west sides	Bike lane as buffer from traveled way
Bicycles	Sharrows	Dedicated directional bike lanes
Vehicles	Bumpouts, visual road narrowing	No Parking, visual road narrowing

SECTION 2: LINCOLN STREET TO VILLA ROAD

Option 1: Cycle Track (MMTB Recommendation)

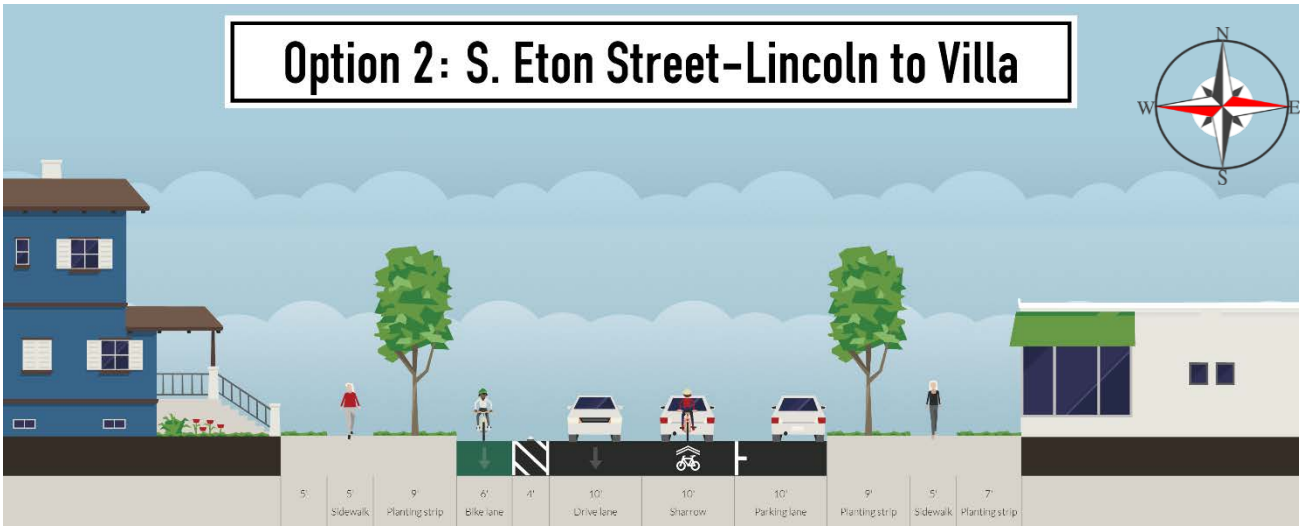
This option was the recommended geometry from the MMTB that was presented to the City Commission. The existing pavement through this area provides 10-ft concrete parking lanes with 10-ft asphalt drive lanes. As a recommended practice, the pavement joint lines should align with the lane widths and pavement markings.

This option also allows for bump-outs at the locations on the east side of S. Eton Street identified in the MMTP and in the Ad Hoc Rail Committee study recommendations.



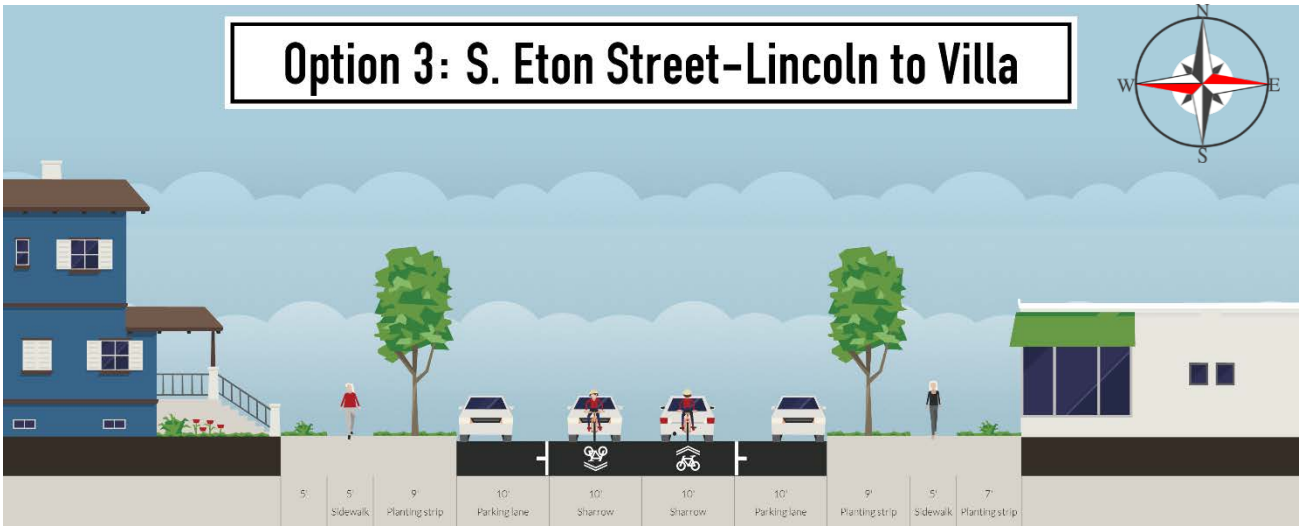
Option 2: Bike Lane and Sharrows (MMTP Recommendation)

This option is shown in the MMTP as the recommended geometry for this section of S. Eton. This maintains the existing 10-ft drive lanes with parking on the east side, with a directional southbound bike lane on the west side. This option also allows for bump-outs at the locations on the east side of S. Eton Street identified in the MMTP and in the Ad Hoc Rail Committee study recommendations.



Option 3: Sharrows Only (Ad Hoc Rail Committee Recommended)

This option was recommended by the Ad Hoc Rail Committee for this section of S. Eton Road for consideration This option will allow the existing on-street parking to remain on both sides of S. Eton Street. In addition, this option also allows for bump-outs at the locations on both the east and west sides of S. Eton Street as identified in the MMTP and in the Ad Hoc Rail Committee study recommendations.



Summary

Road User	Section 2: Lincoln to Villa		
	Option 1	Option 2	Option 3
	Cycle Track West Side (MMTB Recommended)	*SB Bike Lane, NB Sharrow (MMTP Recommended)*	*NB and SB Sharrows (Ad Hoc Rail Committee Recommended)*
Pedestrians	Bumpouts on east side only	Bumpouts on east side only	Bumpouts on both east and west sides
Bicycles	Dedicated and protected bikeway for both NB and SB	Dedicated and protected bikeway for SB Only	Sharrows
Vehicles	No Parking West Side	No Parking West Side	Bumpouts, visual road narrowing

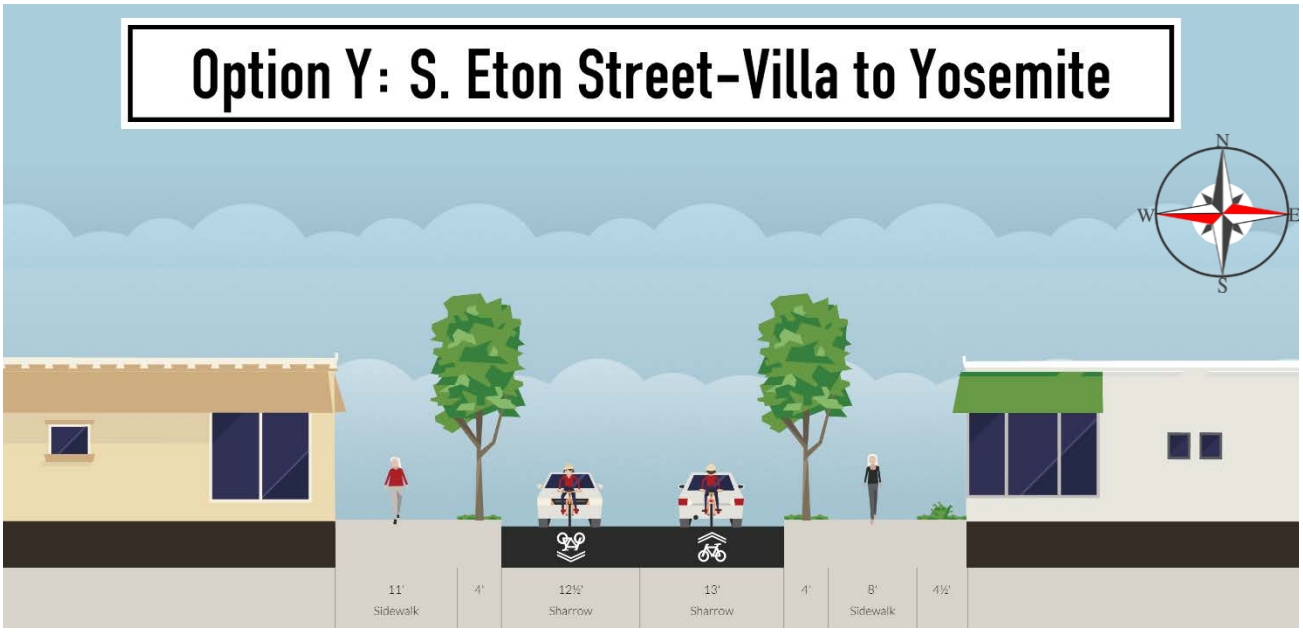
SECTION 3: VILLA ROAD TO YOSEMITE BLVD.

Option X: Sharrows Only-Landscape Buffers

This option includes minor modifications to the existing cross-section and was presented to the City Commission. This short block has sidewalks adjacent to the traveled way on the east side and a parking lane on the west side. The improvements include providing a 4-ft landscaped buffer between the traveled way and the existing sidewalk. This would eliminate parking on the west side of this block. The width is too narrow for continuous bike lanes without pavement improvements. Sharrows would be provided in the roadway for bicycle accommodations.

Option Y: Sharrows Only-Widened Sidewalks (MMTB Recommended)

This option is the recommended improvement from the MMTB and includes both widening the 5-ft sidewalks to 8-ft sidewalks and providing a 4-ft landscaped buffer between the traveled way and the sidewalk. This would eliminate parking on the west side of this block. The width is too narrow for continuous bike lanes without pavement improvements. Sharrows would be provided in the roadway for bicycle accommodations.



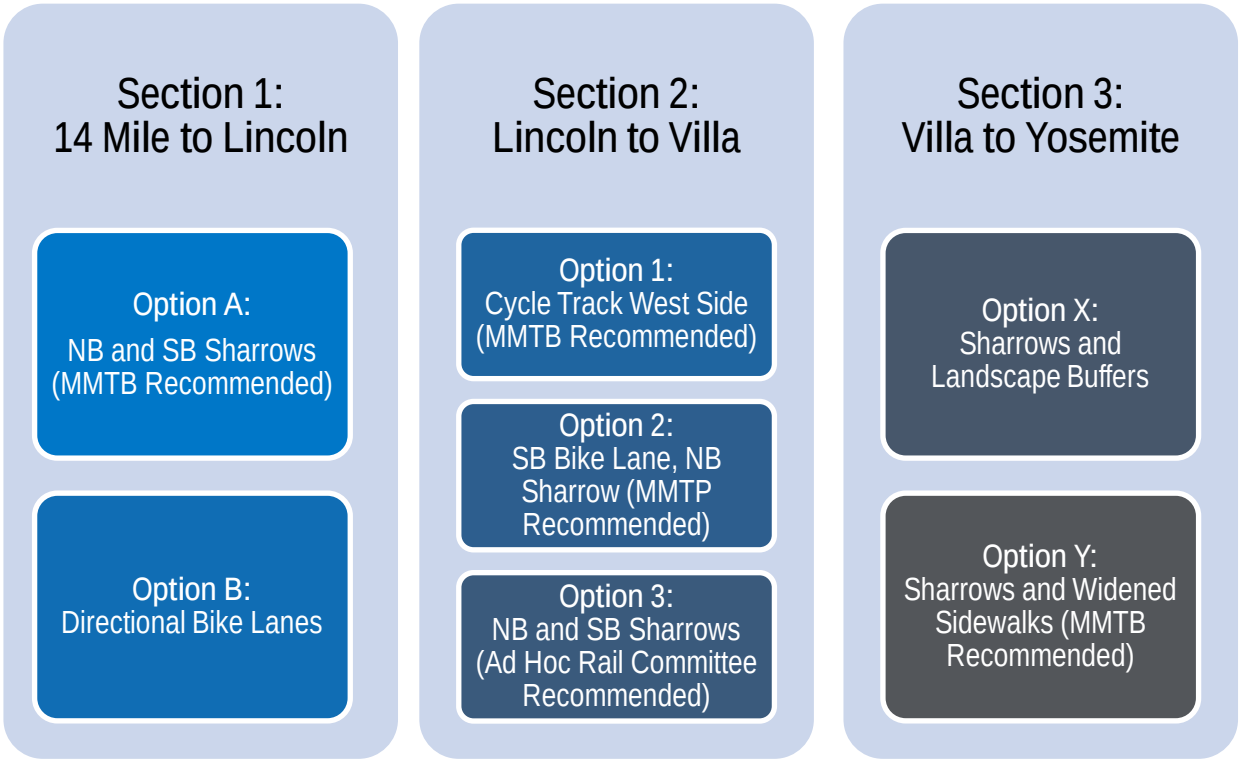
Summary

For Section 3, considering the existing roadway conditions (asphalt and concrete pavement) there is are two recommended options for this section of S. Eton Street. Option X includes maintaining the existing sidewalks and adding landscape buffers to provide wider lane widths for the bicycles and vehicles. Option Y provides widened sidewalks from 5-ft to 8-ft. The alternative would be to maintain existing conditions through this area. The benefits for each road user with this improvement are summarized below.

Road User	Section 3: Villa to Yosemite	
	Option X	Option Y
	Sharrows and Pedestrian Facility Improvements	*Sharrows and Pedestrian Facility Improvements (MMTB Recommended)*
Pedestrians	Add landscape buffers	Widened Sidewalk from 5' to 8', Added landscape buffers
Bicycles	Sharrows	Sharrows
Vehicles	No Parking Visual road narrowing	No Parking Visual road narrowing

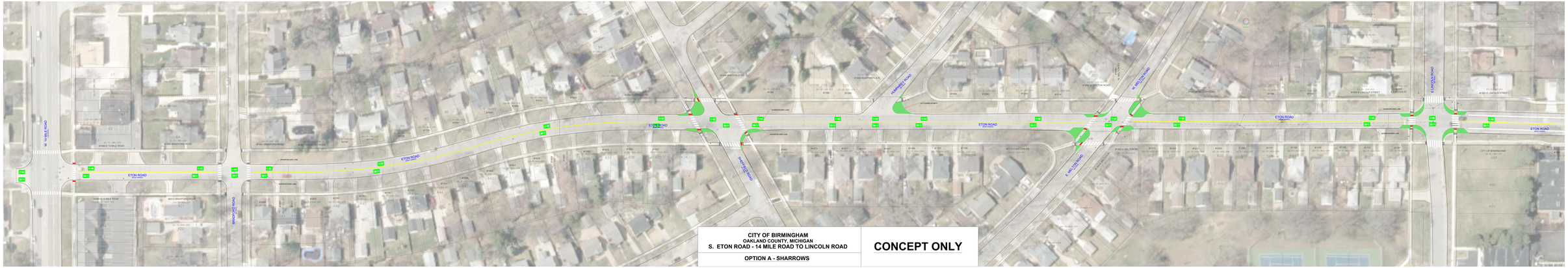
CONCLUSIONS

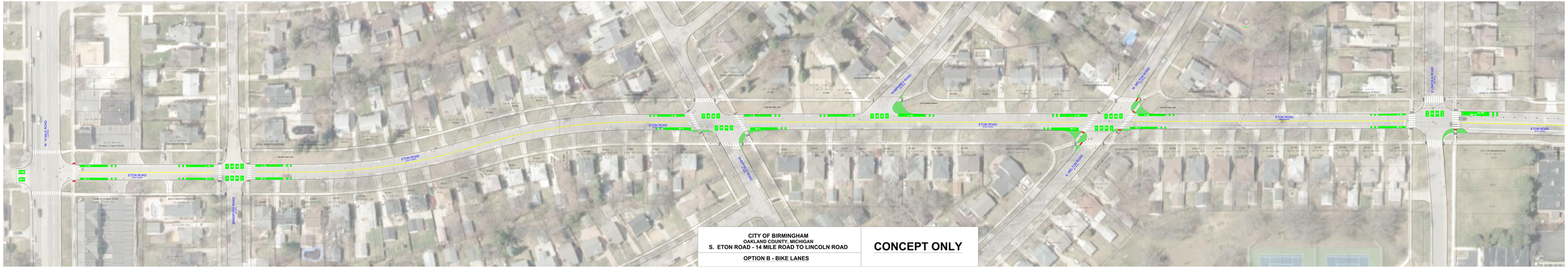
In summary, there are six different roadway configurations for consideration on S. Eton Street. The options for Section 1 (A and B) and Section 2 (1, 2 and 3) and Section 3 (X and Y) can be combined in 12 different ways, each with different benefits for the individual road user. The MMTP recommendation for S. Eton Street is Option A-2-X; the MMTB has recommended Option 1-Y at this point. This additional information is for their use in making a determination regarding Section 1 and the overall design of the S. Eton Street Corridor.

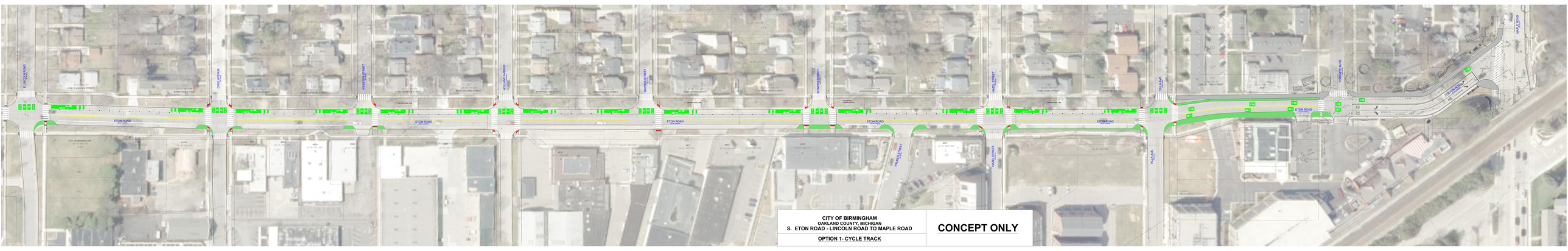


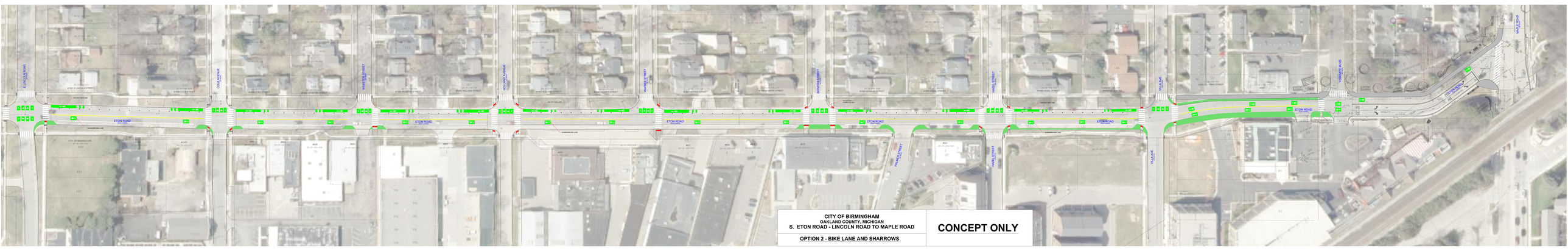
ATTACHMENTS

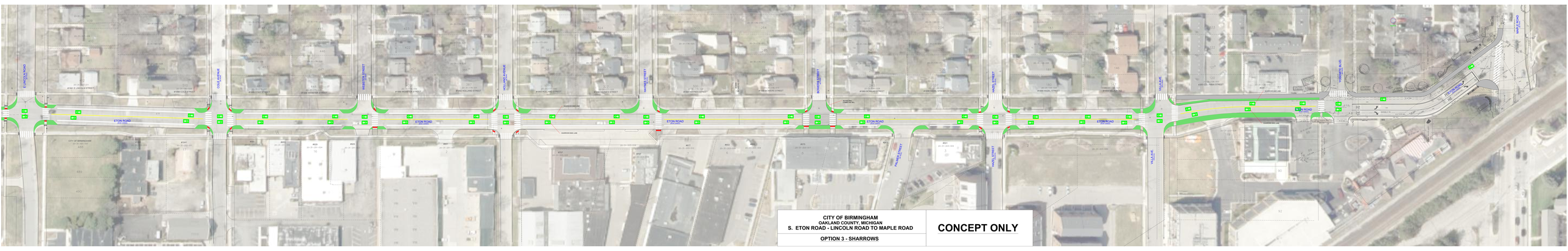
Section 1: Option A and B
Sections 2 & 3: Options 1, 2 and 3 (X & Y shown in concept)


W. 14 MILE ROAD
ETON ROAD
BRADFORD ROAD
HAWKINS AVE.
WOODWARD AVE.
E. MAPLE ROAD
N. ETON ROAD
LINCOLN ROAD
CITY OF BIRMINGHAM
CITY OF BIRMINGHAM
OAKLAND COUNTY, MICHIGAN
S. ETON ROAD - 14 MILE ROAD TO LINCOLN ROAD
OPTION A - SHARROWS
CONCEPT ONLY

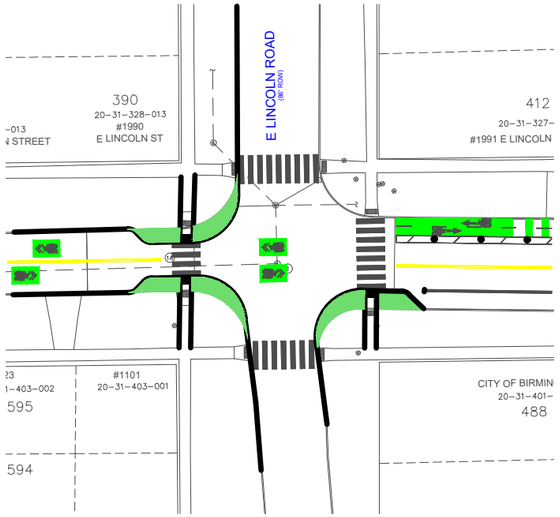

W. 14 MILE ROAD
ETON ROAD
BRADFORD ROAD
HAWKINS ROAD
MAPLE ROAD
N. MAPLE ROAD
E. MAPLE ROAD
LINCOLN ROAD
CITY OF BIRMINGHAM
CITY OF BIRMINGHAM
OAKLAND COUNTY, MICHIGAN
S. ETON ROAD - 14 MILE ROAD TO LINCOLN ROAD
OPTION B - BIKE LANES
CONCEPT ONLY


E LINCOLN ROAD
COLE AVENUE
WORTH STREET
HOLLAND AVENUE
HAYNES STREET
BOWERS STREET
HAZEL STREET
VILLAGE
GREENWOOD
MAPLE ROAD
ETON ROAD
CITY OF BIRMINGHAM
OAKLAND COUNTY, MICHIGAN
S. ETON ROAD - LINCOLN ROAD TO MAPLE ROAD
OPTION 1- CYCLE TRACK
CONCEPT ONLY

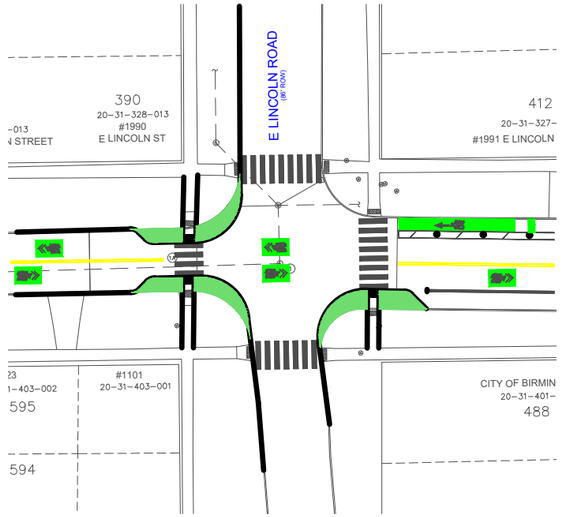

E LINCOLN ROAD
COLE AVENUE
WEBSTER STREET
HOLLAND AVENUE
HAYNES STREET
BOWERS STREET
HAZEL STREET
VILLAGE
CHESTNUT BLVD
MAPLE ROAD
ETON ROAD
PALMER STREET
CITY OF BIRMINGHAM
OAKLAND COUNTY, MICHIGAN
S. ETON ROAD - LINCOLN ROAD TO MAPLE ROAD
OPTION 2 - BIKE LANE AND SHARROWS
CONCEPT ONLY


E LINCOLN ROAD
COLE AVENUE
WORTH STREET
HOLLAND AVENUE
HAYNES STREET
BOWERS STREET
HAZEL STREET
VILLAGE
CHESTER STREET
ETON ROAD
ETON ROAD
ETON ROAD
ETON ROAD
ETON ROAD
ETON ROAD
ETON ROAD
ETON ROAD
CITY OF BIRMINGHAM
OAKLAND COUNTY, MICHIGAN
S. ETON ROAD - LINCOLN ROAD TO MAPLE ROAD
OPTION 3 - SHARROWS
CONCEPT ONLY

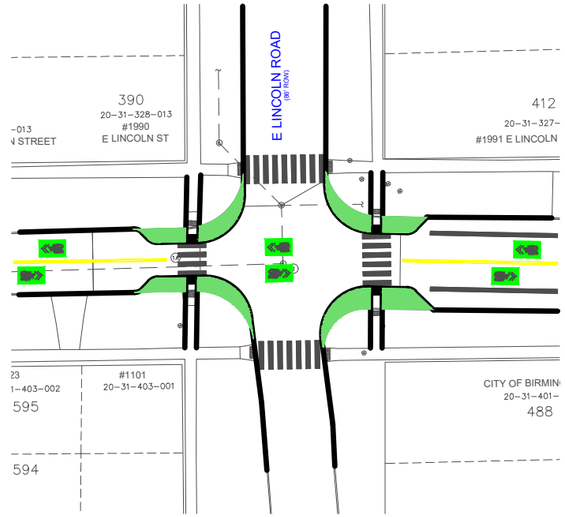
NORTH



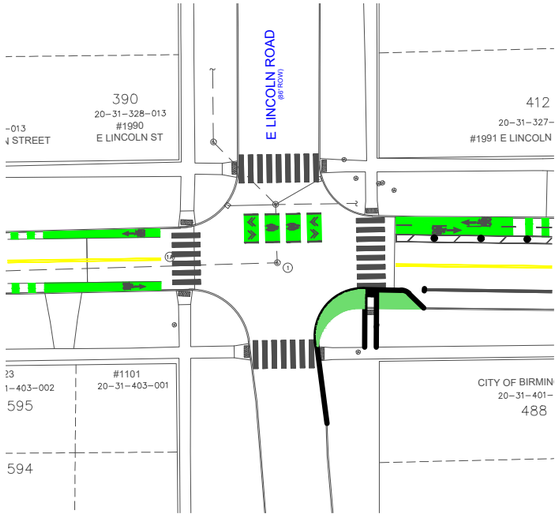
OPTION A - 1



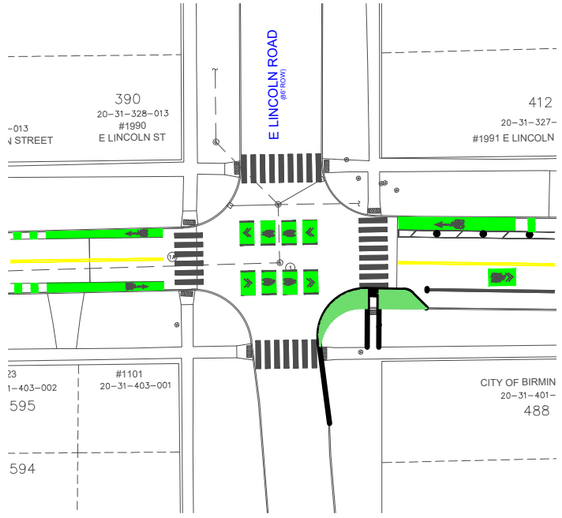
OPTION A - 2



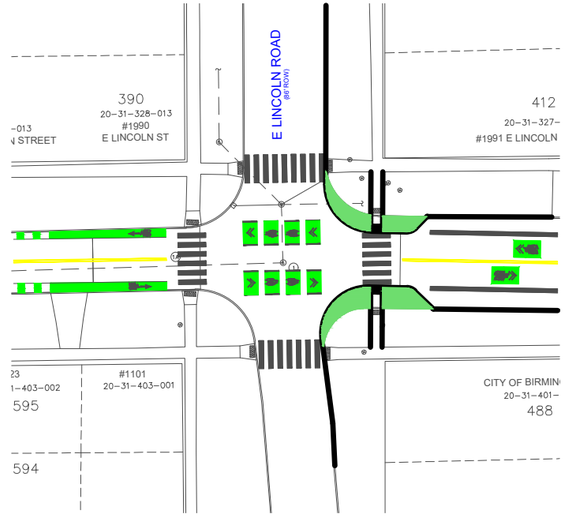
OPTION A - 3



OPTION B - 1



OPTION B - 2



OPTION B - 3

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.
27725 Stansbury Blvd, Suite #150
Farmington Hills, MI 48334
P: 248.536.0080
F: 248.536.0079

REVISION:

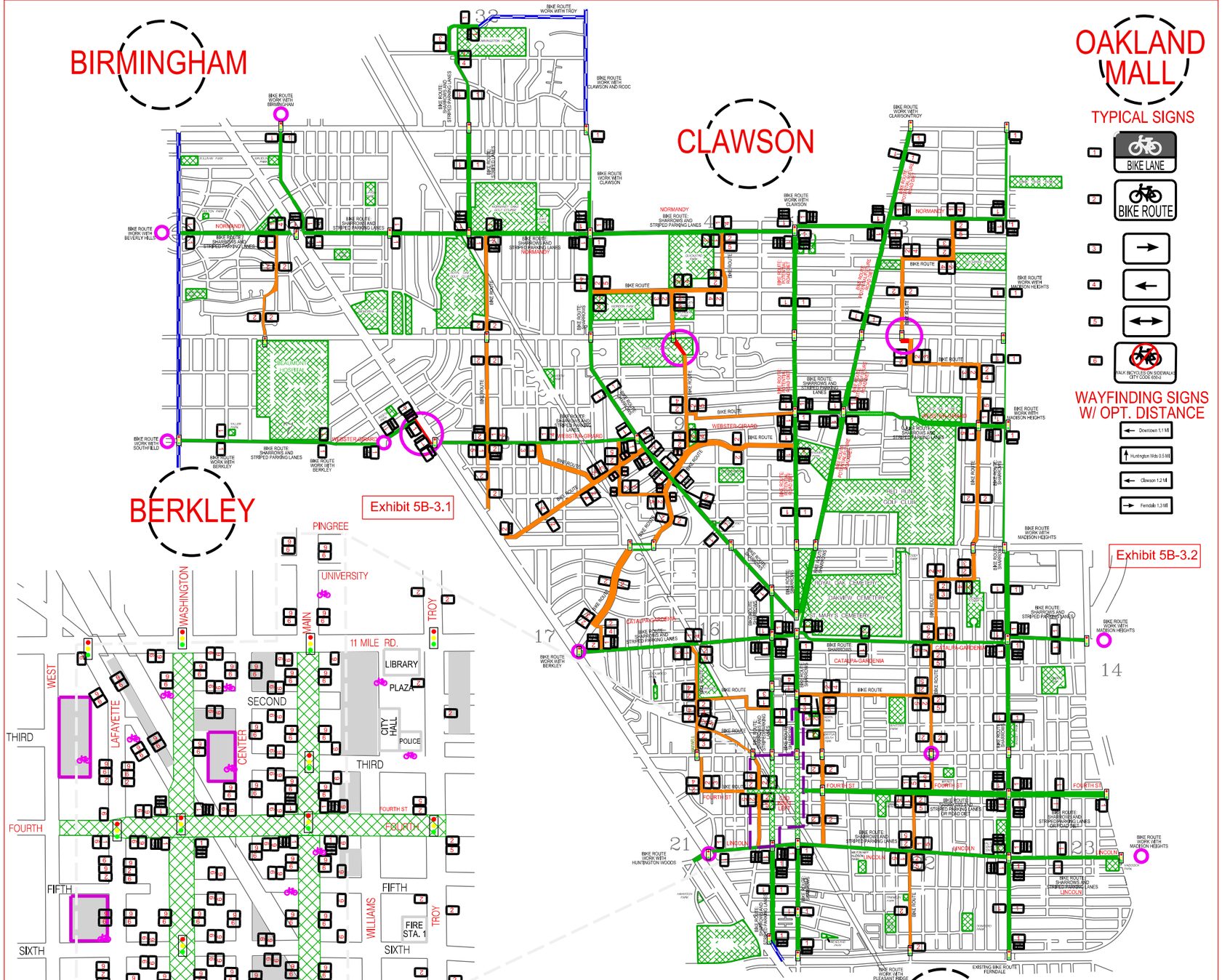
CITY OF BIRMINGHAM
OAKLAND COUNTY, MICHIGAN
S. ETON ROAD - MAPLE ROAD TO 14 MILE ROAD
BIKE PATH - LINCOLN INTERSECTION

DESIGN TEAM:
XXX, XXX
CHECK BY:

DRAWING INFORMATION:
823801 Lincoln intersection
090117 rayi

F&V PROJECT NO.
823801

1


BIRMINGHAM
CLAWSON
OAKLAND MALL
BERKLEY
PLEASANT RIDGE
FERNDALE
TYPICAL SIGNS
BIKE LANE
BIKE ROUTE
WALK BICYCLES ON SIDEWALKS CITY CODE 655-J
WAYFINDING SIGNS W/ OPT. DISTANCE
Downtown 1.1 MI
Huntington Wds 0.5 MI
Clawson 1.2 MI
Ferndale 1.3 MI
Exhibit 5B-3.1
Exhibit 5B-3.2
Exhibit 5B-3.3
Exhibit 5B-3.4
NORMANDY
WEBSTER-GIRARD
CATALPA-GARDENIA
LINCOLN
PINGREE
UNIVERSITY
11 MILE RD.
WASHINGTON
MAIN
TROY
WEST
LAFAYETTE
CENTER
WILLIAMS
LIBRARY
PLAZA
CITY HALL
POLICE
FIRE STA. 1
SECOND
THIRD
FOURTH
FIFTH
SIXTH
SEVENTH
CANADIAN
CENTRAL BUSINESS DISTRICT
CITY OF ROYAL OAK
BIKE ROUTE SIGNAGE MASTER PLAN
DRAFT 3/14/13

City of Birmingham
A Walkable Community

MEMORANDUM

Engineering Dept.

DATE: **September 1, 2017**

TO: **Multi-Modal Transportation Board**

FROM: **Paul T. O'Meara, City Engineer**

SUBJECT: **Oakland Ave. & Lawndale Ave.**
STOP Sign Study

As you may recall, the City is planning to reconstruct the short block of Lawndale Ave. between Oakland Ave. and Woodward Ave. The Multi-Modal Transportation Board (MMTB) endorsed staff recommendations to rebuild Lawndale Ave. narrower than it is presently, at 20 ft. wide. That recommendation was approved by the City Commission. However, it was noted at that time that the handicap ramp placement at the Oakland Ave. intersection was problematic in that the ramp at the southeast corner directed pedestrians out into the middle of the intersection, with no connection on the north side of Oakland Ave.

Staff studied the issue further, and made recommendations at the July 10, 2017 City Commission meeting. While the Commission endorsed the changes to the ramps, it was now noted that relocating the Oakland Ave. crosswalk to the east may introduce a safety hazard, since northbound Lawndale Ave. traffic does not currently have to stop at the intersection. Staff then requested F&V to conduct a full scale STOP sign study for the intersection.

Traffic counts were taken. Based on the new information, new recommendations relative to the STOP sign placement have been provided by F&V, as described on the attached report.

Also, since this issue was last reviewed by the Board, we have confirmed that MDOT will relocate the northbound Woodward Ave. crosswalk at Oakland Ave., as shown. Since this crossing is also a part of the now being implemented Neighborhood Connector Route, a widened shared use sidewalk is being proposed from Woodward Ave. to Lawndale Ave., as shown on these drawings. The Connector Route plan will be discussed in more detail at the meeting.

In consideration of the findings within, the recommendation below is provided for the Board:

SUGGESTED RECOMMENDATION:

To recommend the relocation of the STOP sign for the Oakland Ave. & Lawndale Ave. intersection from its current westbound Oakland Ave. location, to northbound Lawndale Ave. Further, to recommend pedestrian and bike facility improvements to Oakland Ave. between Woodward Ave. and Lawndale Ave., as described in Option ____.

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

MEMO

VIA EMAIL

To:	**Mr. Paul O'Meara, City Engineer, City of Birmingham** **Ms. Jana Ecker, Planning Director, City of Birmingham**
From:	**Michael J. Labadie, P.E.** **Julie M. Kroll, P.E., PTOE** **Steven J. Russo, P.E.** **Fleis & VandenBrink**
Date:	**September 1, 2017**
Re:	**Oakland Avenue & Lawndale Street** **City of Birmingham, Michigan** **Multi-Way Stop Warrant Analysis**

INTRODUCTION

This memorandum presents the methodologies, analyses, and results of the Multi-Way Stop Warrant Analysis at the intersection of Oakland Avenue & Lawndale Street in the City of Birmingham, Michigan. Oakland Avenue is an east / west roadway that runs between Worth Street and Old Woodward Avenue. Oakland Avenue between Woodward Avenue and Lawndale Street operates as a one-way in the westbound travel direction. Lawndale Street is north /south roadway that operates with a one-way northbound approach and a one-way southbound approach at its intersection with Oakland Avenue. The Oakland Avenue & Lawndale Street intersection is currently stop-controlled on the southbound and westbound approaches and is free-flow on the northbound approach.

The City of Birmingham has requested a Multi-Way Stop Warrant Analysis to determine if stop control is warranted and recommended on the northbound Lawndale Street approach at the Oakland Avenue intersection. This memo summarizes the results and recommendations of the Multi-Way Stop Warrant Analysis conducted using the methodologies published in the *Michigan Manual on Uniform Traffic Control Devices* (MMUTCD).

DATA COLLECTION

The existing weekday directional approach volumes were provided by the City of Birmingham. The data was collected at the Oakland Avenue & Lawndale Street intersection by Traffic Data Collection, Inc. (TDC) between Tuesday, July 25, 2017 and Thursday, July 27, 2017. The traffic volume data are attached.

MULTI-WAY STOP WARRANT ANALYSIS

The applicable multi-way stop warrants, published in the MMUTCD, were evaluated per *Section 2B.07: Multi-Way Stop Applications*. This analysis evaluated the existing hourly approach traffic volumes and the crash history at this intersection. The existing approach volumes summarized in Table 1 are the highest eight hours for an average day. The major street approach volumes did not meet the volume warrant threshold of 300 vehicles per hour during any hour, nor did the average minor street approach volume meet the volume warrant threshold of 200 vehicles per hour during any hour. Therefore, the volume criterion is not met.

A crash review was also completed for the Oakland Avenue & Lawndale Street intersection. Historical crash data for the most recent available four years (January 2014 – August 2017) were obtained from the Traffic Improvement Association (TIA) Traffic Crash Analysis Tool. The results of the crash analysis indicate that zero crashes occurred at the intersection in the past four years.

27725 Stansbury Boulevard, Suite 150
Farmington Hills, MI 48334
P: 248.536.0080
F: 248.536.0079
www.fveng.com

Table 1: Major and Minor Approach Volume for Highest Eight Hours

Rank	Time	Lawndale Street NB/SB (Major) Approach Volumes (vph)	Oakland Avenue WB (Minor) Approach Volumes (vph)
1	11:00 AM	82	24
2	12:00 PM	71	29
3	1:00 PM	87	24
4	2:00 PM	75	38
5	3:00 PM	93	58
6	4:00 PM	102	40
7	5:00 PM	137	40
8	6:00 PM	98	26
Average		**93**	**35**
Warrant Threshold		*300*	*200*
Meets Volume Warrants		**No**	**No**

PEDESTRIAN FACILITY IMPROVEMENTS

The City is also evaluating pedestrian facility improvements at the intersections of Oakland Avenue with Woodward Avenue (M-1) and Lawndale Street.

Woodward Avenue (M-1) and Oakland Avenue

At the intersection of northbound M-1 and Oakland Avenue, the existing crosswalk along northbound M-1 creates a conflict between pedestrians and bicyclists with right turning vehicles from Oakland Avenue. Mitigation measures are recommended at this location to provide a safer crossing for pedestrians.

- Relocate the existing crosswalk across SB Woodward Ave. to the south side of the Oakland Ave. intersection.
- Provide a new crosswalk and ADA ramps across Oakland Avenue and connect to the proposed shared use pathway located along the south side of Oakland Avenue between SB Woodward Ave. and Lawndale Street.

A review of existing traffic volumes at the intersection of Oakland Avenue & Lawndale Street indicates that the westbound Oakland Avenue approach at its intersection with M-1 has a daily traffic volume of approximately 500 vehicles per day. As such the existing dual right turn lane configuration may be modified to provide only one right turn lane. This will provide a shorter crossing distance for pedestrians crossing Oakland Avenue, making it more pedestrian friendly. Attached to this memorandum are the following three options regarding the potential lane configuration for the westbound approach for consideration:

1. Leave the existing dual right-turn lane configuration as is.
2. Modify the existing dual right-turn lane configuration to provide a single right-turn lane by using pavement marking cross-hatching.
3. Modify the existing dual right-turn lane configuration to provide a single right-turn lane by extending the curb out.

Oakland Avenue and Lawndale Street

As part of the Multi-way Stop warrant study, additional information was obtained and further evaluated at this intersection. In accordance with MMUTCD recommended guidelines, stop signs at an intersection are typically installed on the roadway carrying the lowest traffic volume. The intersection of Oakland Avenue & Lawndale Street is currently in compliance with these guidelines with the lower volume southbound and westbound approaches stop controlled and the northbound approach operating as a free flow movement. However, the following are two circumstances that a stop sign may be considered on the higher volume approach as outlined in Section 2B.04 of the MMUTCD:

A. Controlling the direction that conflicts the most with established pedestrian crossing activity or school walking routes;

B. Controlled the direction that has the best sight distance from a controlled position to observe conflicting traffic.

Through this analysis, it was determined that changes in the operations could be implemented to improve the safety for pedestrians and bicycles at this location. This can be accomplished through the following recommendations:

- Provide Stop control for northbound Lawndale Street at Oakland Ave. The turning movements at this intersection will have conflicts with pedestrians and providing a stop at this approach will effectively control the existing free flow movement without causing undue delay to traffic. Additionally, there is more sight distance available for the northbound approach as compared to the westbound approach.
- Remove the existing stop bar and stop sign located on the westbound approach of Oakland Ave. at Lawndale Street.
- Provide a crosswalk and ramp across Oakland Ave., at the east side of the Lawndale Street intersection. (Note: The previously proposed location for the crosswalk was along the east side of the north leg-adjacent to the Stop controlled approach on Oakland Ave. However, this location is offset approximately 40 feet east of the northbound approach which would place the crosswalk outside the field of vision for the free-flow northbound right turning vehicles, creating a safety hazard for pedestrians.)
- Provide crosswalks and ADA ramps crossing Lawndale Street on both the north and south sides of the intersection at Oakland Ave.

Conclusions

The conclusions of this Multi-Way Stop Warrant Analysis are as follows:

1. The multi-way stop warrant does not meet the volume or crash experience criteria.
2. With the proposed pedestrian facility improvements, the existing stop bar and stop sign located on the westbound approach of the intersection should be removed and a new stop bar and stop signs should be installed along the northbound approach.
3. The existing dual right-turn lane configuration along the westbound approach of M-1 & Oakland Avenue may be modified to provide a single right-turn lane.

Any questions related to this memorandum, study, or results should be addressed to Fleis & VandenBrink.

Attached: Traffic Volume Data
Pedestrian Facilities Improvements – Options 1-3

Traffic Data Collection (TDC)

tdccounts.com
Phone (586) 786-5407

Traffic Study Performed For:

Birmingham Police Department

Project: Birmingham Traffic Study
Count Type: 72 Hr. ATR Approach Volume Count
Weather: Pt. Sunny, 80's Degs.
Count By: M.Matich Pav't : Asphalt 2 Lanes

ATR_1 Lawndale_Oakland_SB
Lawndale Street
(175' North of Oakland St.)
Station ID: Southbound
Site Code: ATR 1 SB
Date Start: Monday, July 24, 2017

Start Time	Mon Monday, Jul	Tue	Wed	Thu	Fri	Average Day	Sat	Sun	Week Average
12:00 AM	*	0	0	0	**4**	1	*	*	1
01:00	*	0	1	1	2	1	*	*	1
02:00	*	0	0	0	0	0	*	*	0
03:00	*	0	0	0	0	0	*	*	0
04:00	*	0	1	0	0	0	*	*	0
05:00	*	1	1	1	0	1	*	*	1
06:00	*	0	0	1	0	0	*	*	0
07:00	*	6	2	1	4	3	*	*	3
08:00	*	7	1	1	0	2	*	*	2
09:00	*	4	1	**3**	3	3	*	*	3
10:00	*	1	**6**	1	*	3	*	*	3
11:00	*	**9**	6	2	*	**6**	*	*	**6**
12:00 PM	*	**6**	4	2	*	4	*	*	4
01:00	*	5	**6**	1	*	4	*	*	4
02:00	*	6	5	3	*	5	*	*	5
03:00	*	5	5	4	*	5	*	*	5
04:00	0	5	2	1	*	2	*	*	2
05:00	**7**	4	5	**6**	*	**6**	*	*	**6**
06:00	3	2	4	3	*	3	*	*	3
07:00	3	3	4	5	*	4	*	*	4
08:00	2	1	0	5	*	2	*	*	2
09:00	2	1	0	0	*	1	*	*	1
10:00	1	2	0	2	*	1	*	*	1
11:00	1	0	1	2	*	1	*	*	1
Total	19	68	55	45	13	58	0	0	58
% Avg. WkDay	32.8%	117.2%	94.8%	77.6%	22.4%	100.0%			
% Avg. Week	32.8%	117.2%	94.8%	77.6%	22.4%	100.0%	0.0%	0.0%	
AM Peak	-	11:00	10:00	09:00	00:00	- 11:00	-	-	- - 11:00 - -
Vol.	-	9	6	3	4	- 6	-	-	- - 6 - -
PM Peak	17:00	12:00	13:00	17:00	-	- 17:00	-	-	- - 17:00 - -
Vol.	7	6	6	6	-	- 6	-	-	- - 6 - -
Total	19	68	55	45	13	58	0	0	58

ADT ADT 56 AADT 56

Traffic Data Collection (TDC)

tdccounts.com
Phone (586) 786-5407

Traffic Study Performed For:

Birmingham Police Department

Project: Birmingham Traffic Study
Count Type: 72 Hr. ATR Approach Volume Count
Weather: Pt. Sunny, 80's Degs.
Count By: M.Matich Pav't : Concrete 2 Lanes

ATR_2 Lawndale_Oakland_NB
Lawndale Street
(100' South of Oakland St.)
Station ID: Northbound
Site Code: ATR 2 NB
Date Start: Monday, July 24, 2017

Start Time	Mon Monday, Jul	Tue	Wed	Thu	Fri	Average Day	Sat	Sun	Week Average
12:00 AM	*	7	8	8	11	8	*	*	8
01:00	*	2	2	2	2	2	*	*	2
02:00	*	0	1	1	1	1	*	*	1
03:00	*	1	2	0	1	1	*	*	1
04:00	*	0	0	2	1	1	*	*	1
05:00	*	4	2	2	2	2	*	*	2
06:00	*	7	8	9	7	8	*	*	8
07:00	*	39	33	40	31	36	*	*	36
08:00	*	85	71	**66**	51	68	*	*	68
09:00	*	59	**75**	52	**69**	64	*	*	64
10:00	*	95	53	56	*	68	*	*	68
11:00	*	**97**	73	58	*	**76**	*	*	**76**
12:00 PM	*	79	44	77	*	67	*	*	67
01:00	*	89	81	80	*	83	*	*	83
02:00	*	62	71	77	*	70	*	*	70
03:00	*	85	92	88	*	88	*	*	88
04:00	84	103	103	110	*	100	*	*	100
05:00	**118**	**136**	**122**	**149**	*	**131**	*	*	**131**
06:00	77	109	96	98	*	95	*	*	95
07:00	51	52	47	70	*	55	*	*	55
08:00	46	51	48	52	*	49	*	*	49
09:00	42	51	36	39	*	42	*	*	42
10:00	26	21	22	25	*	24	*	*	24
11:00	7	6	11	8	*	8	*	*	8
Total	451	1240	1101	1169	176	1147	0	0	1147
% Avg. WkDay	39.3%	108.1%	96.0%	101.9%	15.3%	100.0%			
% Avg. Week	39.3%	108.1%	96.0%	101.9%	15.3%	100.0%	0.0%	0.0%	
AM Peak	-	11:00	09:00	08:00	09:00	- 11:00	-	-	- - 11:00 - -
Vol.	-	97	75	66	69	- 76	-	-	- - 76 - -
PM Peak	17:00	17:00	17:00	17:00	-	- 17:00	-	-	- - 17:00 - -
Vol.	118	136	122	149	-	- 131	-	-	- - 131 - -
Total	451	1240	1101	1169	176	1147	0	0	1147

ADT ADT 1,142 AADT 1,142

Traffic Data Collection (TDC)

tdccounts.com
Phone (586) 786-5407

Traffic Study Performed For:

Birmingham Police Department

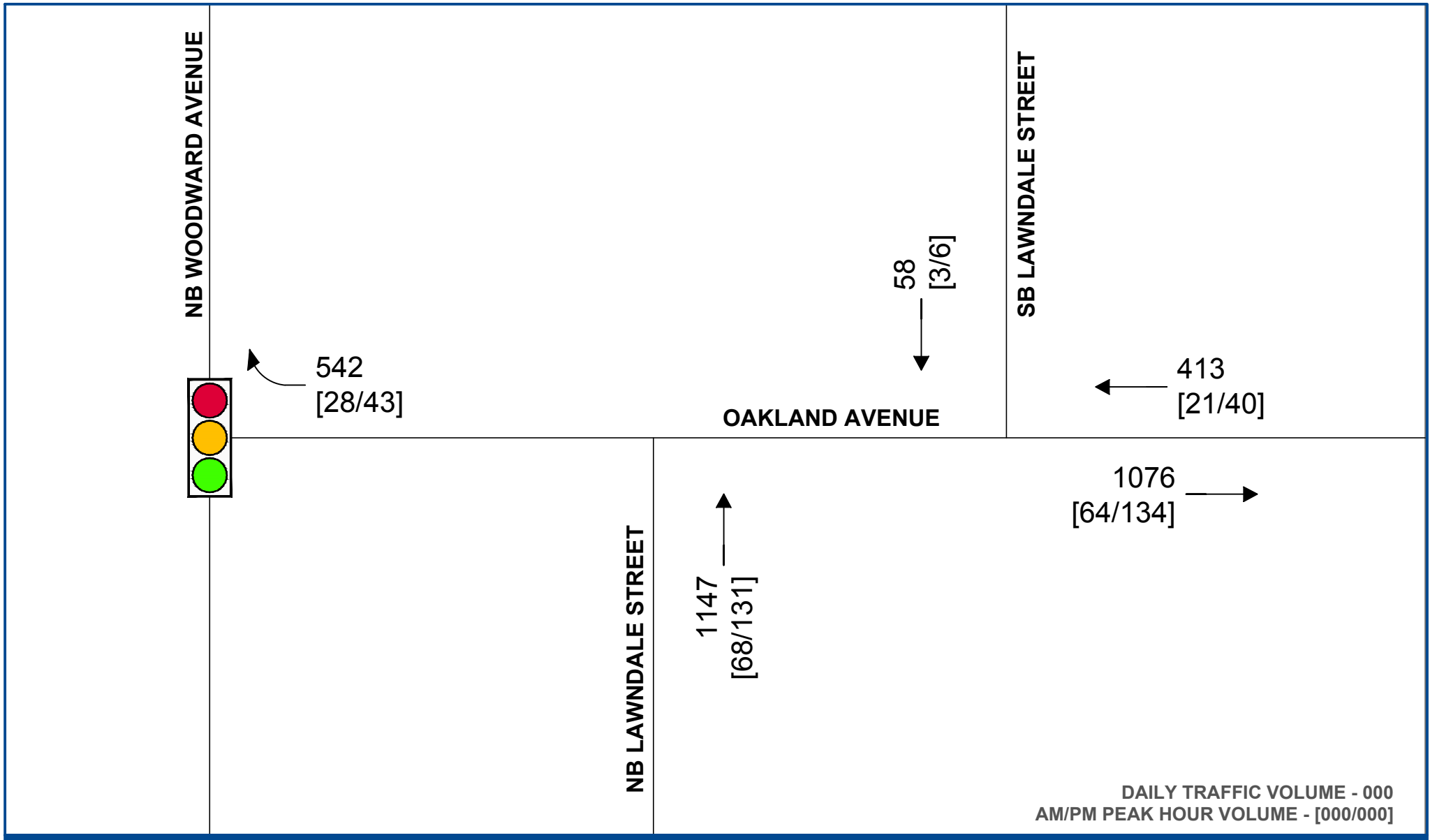
Project: Birmingham Traffic Study
Count Type: 72 Hr. ATR Volume Count
Weather: Pt. Sunny, 80's Degs.
Count By: M.Matich Pav't : Asphalt 2 Lanes

ATR_3 Lawndale_Oakland_WB
Oakland Street
(100' East of Lawndale St.)
Station ID: 2-Way Volume Count
Site Code: ATR 3
Date Start: Monday, July 24, 2017

Start	Monday, July 24, 2017		Tuesday, July 25, 2017		Wednesday, July 26, 2017		Thursday, July 27, 2017		Friday, July 28, 2017		Weekday Average		Saturday, July 29, 2017		Sunday, July 30, 2017	
Time	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	*	*	5	0	6	1	5	1	10	3	6	1	*	*	*	*
01:00	*	*	1	0	3	0	0	0	2	1	2	0	*	*	*	*
02:00	*	*	0	0	1	0	1	1	1	2	1	1	*	*	*	*
03:00	*	*	1	0	1	0	0	0	1	0	1	0	*	*	*	*
04:00	*	*	0	0	0	1	2	0	1	0	1	0	*	*	*	*
05:00	*	*	4	1	2	0	1	0	5	0	3	0	*	*	*	*
06:00	*	*	7	4	11	5	9	4	6	3	8	4	*	*	*	*
07:00	*	*	38	16	28	9	24	8	29	10	30	11	*	*	*	*
08:00	*	*	75	21	65	24	**60**	14	55	**24**	64	21	*	*	*	*
09:00	*	*	57	26	64	**38**	53	**24**	**66**	11	60	**25**	*	*	*	*
10:00	*	*	93	**33**	48	16	54	15	23	7	54	18	*	*	*	*
11:00	*	*	**96**	33	**68**	20	55	20	*	*	**73**	24	*	*	*	*
12:00 PM	*	*	79	38	44	28	79	21	*	*	67	29	*	*	*	*
01:00	*	*	82	16	78	31	74	24	*	*	78	24	*	*	*	*
02:00	*	*	26	66	68	17	77	30	*	*	57	38	*	*	*	*
03:00	*	*	34	**96**	92	39	86	40	*	*	71	**58**	*	*	*	*
04:00	81	33	106	34	102	**53**	110	**41**	*	*	100	40	*	*	*	*
05:00	**119**	**36**	**141**	43	**122**	50	**153**	30	*	*	**134**	40	*	*	*	*
06:00	71	23	106	25	94	36	95	22	*	*	92	26	*	*	*	*
07:00	49	17	52	13	47	15	70	24	*	*	54	17	*	*	*	*
08:00	46	9	52	15	46	10	53	28	*	*	49	16	*	*	*	*
09:00	43	6	51	9	33	17	36	5	*	*	41	9	*	*	*	*
10:00	26	7	17	10	21	6	23	6	*	*	22	7	*	*	*	*
11:00	7	6	6	3	11	5	6	4	*	*	8	4	*	*	*	*
Total	442	137	1129	502	1055	421	1126	362	199	61	1076	413	0	0	0	0
Day	579		1631		1476		1488		260		1489		0		0	
AM Peak	-	-	11:00	10:00	11:00	09:00	08:00	09:00	09:00	08:00	11:00	09:00	-	-	-	-
Vol.	-	-	96	33	68	38	60	24	66	24	73	25	-	-	-	-
PM Peak	17:00	17:00	17:00	15:00	17:00	16:00	17:00	16:00	-	-	17:00	15:00	-	-	-	-
Vol.	119	36	141	96	122	53	153	41	-	-	134	58	-	-	-	-

Comb. Total	579	1631	1476	1488	260	1489	0	0

ADT ADT 1,494 AADT 1,494

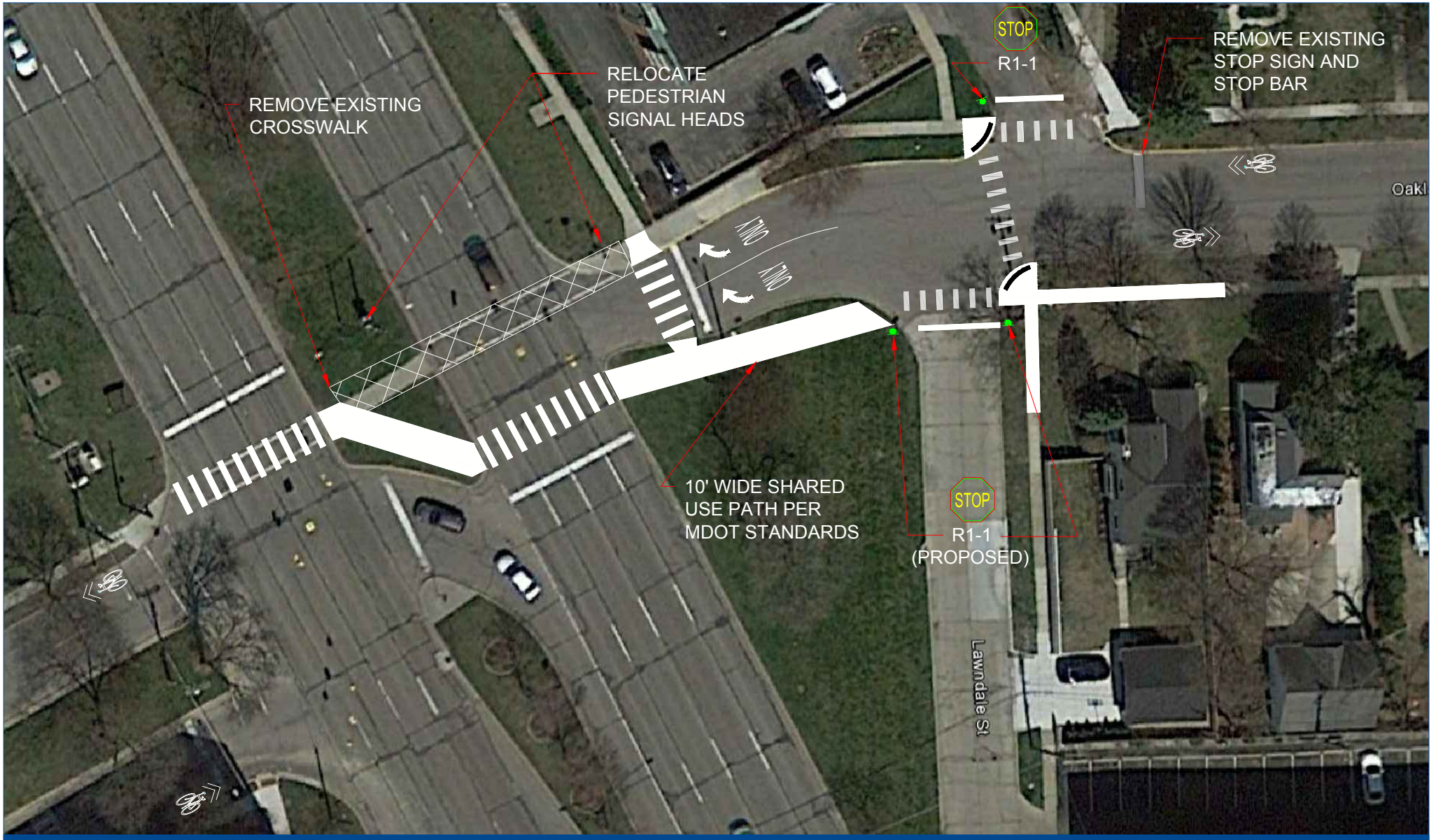


NORTH

EXISTING TRAFFIC VOLUMES

OAKLAND AVENUE / WOODWARD AVENUE / LAWNDALE STREET

BIRMINGHAM, MI



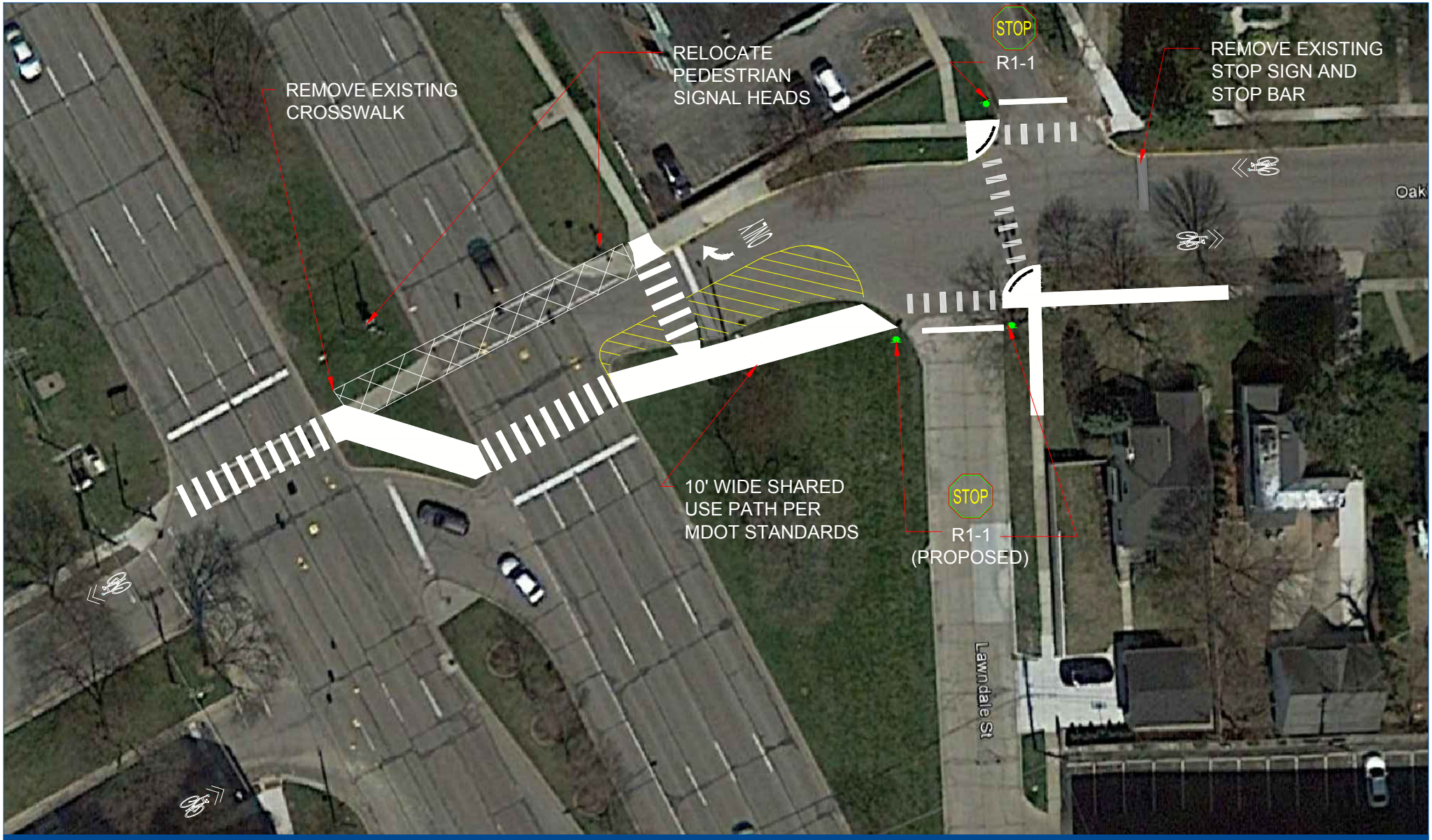
NORTH

PEDESTRIAN & BICYCLE FACILITIES IMPROVEMENTS - OPTION 1

LAWNDALE AVE PAVING - OAKLAND BLVD TO WOODWARD AVE

BIRMINGHAM, MI

F&V



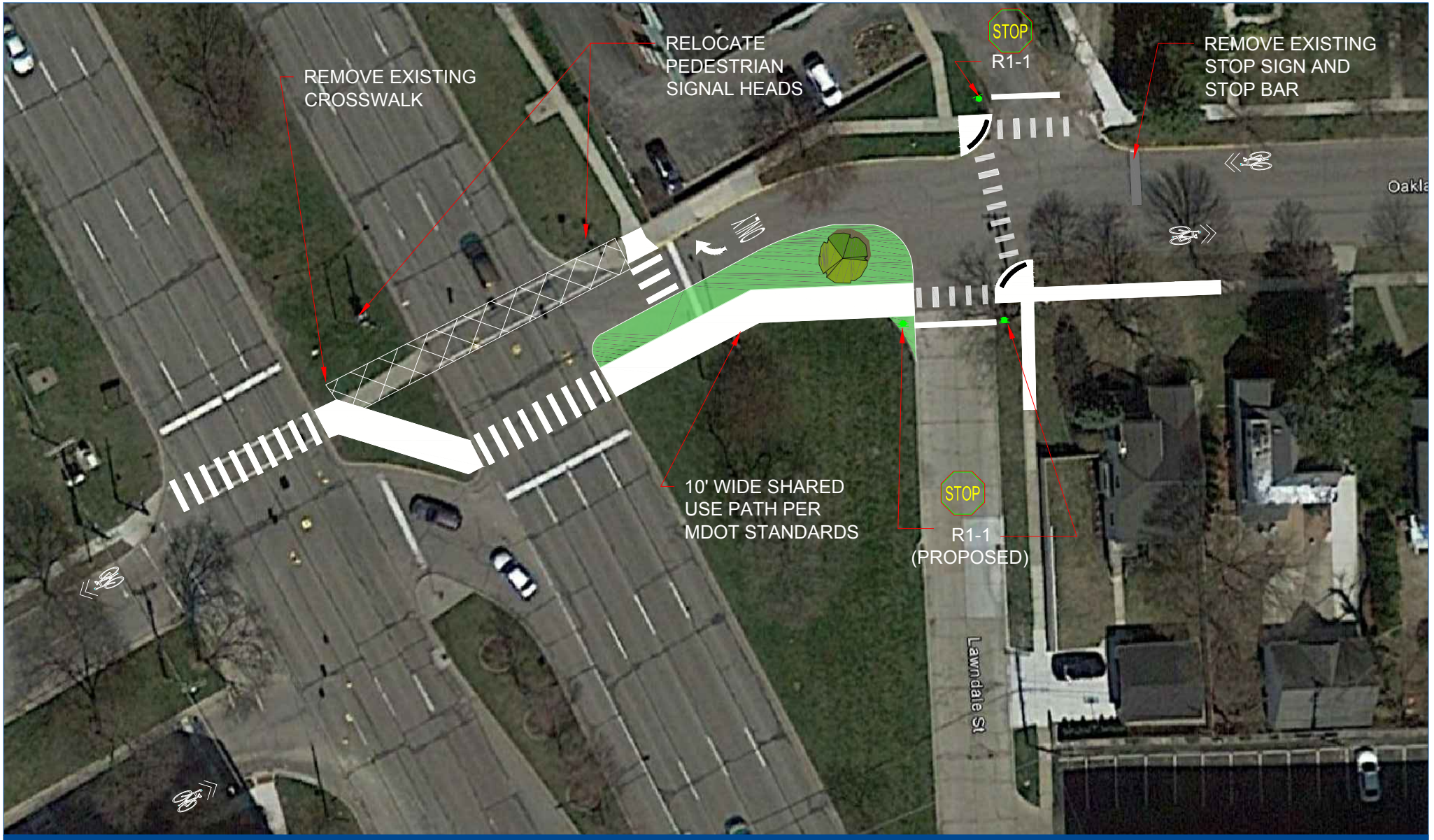
NORTH

PEDESTRIAN & BICYCLE FACILITIES IMPROVEMENTS - OPTION 2

LAWNDALE AVE PAVING - OAKLAND BLVD TO WOODWARD AVE

BIRMINGHAM, MI

F&V



NORTH

PEDESTRIAN & BICYCLE FACILITIES IMPROVEMENTS - OPTION 3

LAWNDALE AVE PAVING - OAKLAND BLVD TO WOODWARD AVE

BIRMINGHAM, MI

F&V

City of Birmingham
A Walkable Community

MEMORANDUM

Engineering Department
Planning Department
Police Department

DATE: **August 31, 2017**

TO: **Multi-Modal Transportation Board**

FROM: **Lauren Chapman, Assistant Planner**
Nicholas Dupuis, Planning Intern

APPROVED: **Jana L. Ecker, Planning Director**
Commander Scott Grewe, Police Department
Paul O'Meara, City Engineer

SUBJECT: **Crosswalk Pavement Markings**
Design Standards

At the February 27, 2017 meeting the City Commission voted to adopt the following standard policy for the design of all future crosswalk pavement markings in the City of Birmingham:

> All new painted crosswalks installed shall be of the continental style, as outlined on MDOT Detail Sheet PAVE-945-C, Sheet 3 of 3, with the exception that all painted bars shall be 24 inches wide spaced as close to 24 inches apart as possible. Crosswalk widths shall be installed as follows:
>
> **On Major Streets within the Central Business District, Triangle District, Rail District, or Adjacent to Schools:**
>
> - Total width of the crosswalk shall be 12 to 14 feet wide. Crosswalks at the upper width limit may be installed when traffic signals are present.
>
> - The following shall be considered Major Streets (within the specific districts noted) for the purposes of this standard:
>
> Woodward Ave.
> Old Woodward Ave.
> Maple Rd.
> Southfield Rd.
> Adams Rd.
> Oakland Blvd.
> Chester St.
> Brown St.
> S. Eton Rd.
> E. Lincoln Ave.

On Local Streets within the Central Business District, Triangle District, Rail District, or Adjacent to Schools:

- Total width of the crosswalk shall be 8 feet wide, unless the adjacent sidewalk main walking path is wider, at which point it shall be widened to match the main walking path width.

At All Other Locations:

- Total width of the crosswalk shall be 6 feet wide.

The City Commission has now directed the Multi-Modal Transportation Board (MMTB) to recommend the type of material to be used for new crosswalks. This memo is intended to give the board a background on the types of materials available and the advantages and disadvantages of each, as well as an attempt to outline pricing. Excerpts from sources that were used to compile this memo have been included in the agenda packet. A spreadsheet with quotes from contractors has also been included.

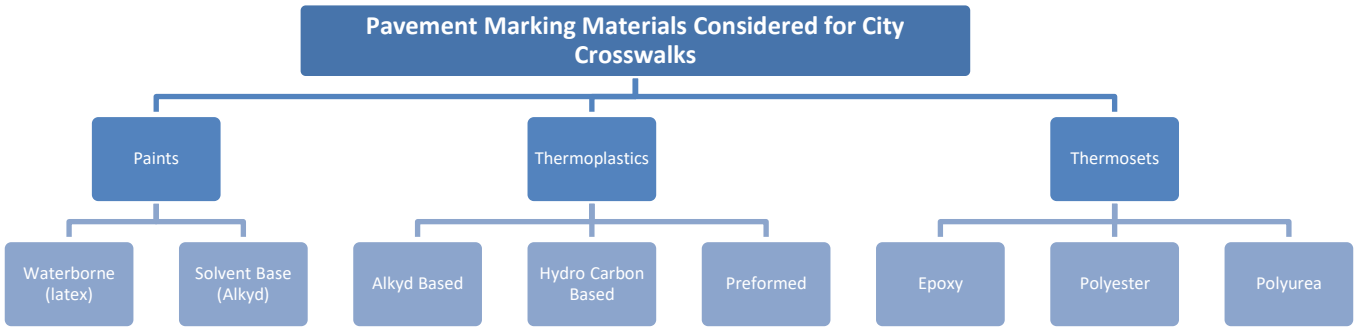
Overview

Pavement markings may be categorized into two primary groups: longitudinal markings and transverse markings. Longitudinal markings help facilitate vehicle guidance and location (i.e. centerlines, lane lines, and edge lines) while transverse markings provide warning and regulatory information to the motorist (i.e. crosswalks, crosshatching, and painted islands). A marking material can be selected based upon: durability, workability, drying time or non-track time, accommodation of heavy traffic volumes, and replacement methods considering environmental concerns.

Retroreflectivity is another evaluation criterion that may be employed when choosing pavement marking material. Retroreflectivity describes how light is reflected from a surface and returned to its original source ("retro"-reflector). Retrorefectivity is important because it helps drivers see pavement marking during nighttime conditions as well as when pavement is wet. The Federal Highway Administration (FHWA) requires a minimum level of retroreflectivity for longitudinal pavement markings (Manual on Uniform Traffic Control Devices (MUTCD) Section 3A.03). **Crosswalk markings and other transverse markings are required to be retroreflective, but are not subject to minimum levels. Despite not having a required minimum, all of the markings that are up for consideration meet the highest minimum level that is required for longitudinal markings (250 mcd/m^2/lux).**

Pavement marking materials are mainly divided into five categories: paint, thermosets, thermoplastics, tape, and Methyl Methacrylate (MMA). City staff has decided not to include information on MMA or tape in this memo. MMA pavement marking is rarely used in the United States and Canada and it is very expensive compared to other materials due to the special equipment that is needed for applying it. Preformed tape pavement marking has been used by

the City for the crosswalks that surround Shain Park. The tape has not has not held up very well. Due to the stringent application requirements and high initial cost, tape will not be considered for a City standard material.



Paint Pavement Marking

Paint pavement marking is the most widely used material in pavement markings in Canada and the United States. Paint pavement markings are divided mainly into two categories: i) solvent based paints (alkyd), and ii) waterborne paints (latex). The three main components of these paints are: binder as base material-25%, pigment for colors and reflectivity- 25%, and solvent-50%. Waterborne paint is similar to solvent based paints except that water is the solvent that is used. Solvent based and waterborne marking paints are commonly installed using large mobile truck mounted sprayers that apply paint striping. The desired level of reflectivity is achieved based on the glass beads that are either premixed with the paint or sprayed immediately on the top of the paint.

Waterborne paints are favored over solvent based paints because they are environmentally friendly, and lack heavy metals and volatile organic compounds without affecting the service life. Moreover, waterborne paints don't have a strong solvent odor that may induce respiratory complaints from users. The service life of solvent based and waterborne paint markings normally ranges between three and thirty six months depending on different factors including pavement type, traffic volume, and weather conditions. It should be noted that waterborne paints are slightly more expensive and need longer drying time than solvent based paints, especially in humid conditions.

Advantages and Disadvantages of Paints Pavement Marking: One of the major advantages of paint markings is that they are significantly cheaper than any other method; however, they can be worn away rapidly on high volume roadways, and consequently these roadways need to be restriped more than once a year.

Solvent based and waterborne paints are overwhelmingly similar. However, solvent based paints have more disadvantages than waterborne paints and will therefore not be considered for a City standard material.

Thermoplastic Pavement Marking

Thermoplastic marking materials were developed in Great Britain before World War II and contain no solvent. Thermoplastics are similar to paint, and applied as a liquid, but they require higher application temperature than that for paint to be transformed back to a liquid state. Thermoplastic markings are installed in a molten state using either an extrusion or spraying method. Typical thermoplastic marking materials consist of four basic components: binder, pigment, glass beads, and filler. In general, thermoplastics are classified based on the type of binder used: (i) alkyd-based, and (ii) hydrocarbon-based. Alkyd-based binders are used in transverse and longitudinal applications, because they have the ability to resist chemical decompositions of petroleum products (i.e. motor oil, hydrocarbon contaminants). Hydrocarbon-based binders are strictly used in longitudinal markings and not for transverse markings such as crosswalks, so it cannot be considered for a City standard material. Preformed thermoplastics are similar to tape in results and application, except that more roadway preparation is required for preformed thermoplastics. Because the City has had unsatisfactory results with tape, and preformed thermoplastics are so similar; preformed thermoplastics will not be considered for a City standard material.

Pavement surface condition is an important factor that affects thermoplastic application because old pavement may not provide a sufficient chemical bond between asphalt and the thermoplastic marking material. Thermoplastics provide excellent performance when it is applied properly. The service life of thermoplastic marking paints normally ranges between forty eight months and eighty four months depending on different factors including application procedures, pavement type, traffic volume, snowplow activity and atmospheric conditions when placed.

<u>Advantages of Alkyd-based Thermoplastic</u>

Thermoplastic has demonstrated a long service life on all traffic volume roads (low, medium, and high). They also have a high retroreflectivity level without using glass beads. In addition, thermoplastics can be applied in all weathering conditions. Finally, thermoplastic pavement markings have a very strong bond on asphalt surfaces.

<u>Disadvantages of Alkyd-based Thermoplastic</u>

Thermoplastics are considered as the most sensitive to surface preparation and atmospheric conditions during application compared to other marking materials. Thermoplastics pavement marking materials are not suitable for edge lines, centerlines or skip lines, and are mostly used for symbols. They are very sensitive to damage from sands/abrasives, and can be easily damaged from snow plowing. Most road surfaces needs coating with an epoxy primer before

thermoplastic markings is installed. The performance of a thermoplastic pavement marking on a concrete surface is most often influenced by the quality of its bond to the pavement surface and thermoplastic material formulation.

Thermosets Pavement Marking

Thermosetting materials are those in which two different components react exothermically to produce a hard and durable material. Thermosets are durable pavement marking materials that are sprayed onto the road surface with glass beads dropped on top. There are three types of thermoset pavement markings: (i) epoxy, (ii) polyester, and (iii) polyurea. Polyester is the less commonly used than epoxy and polyurea, and as a result is the one that will not be discussed in greater detail.

Epoxy

Epoxy thermosets generally consist of two materials: pigment and binder. The application of epoxy is very similar to paint marking; it is applied using large mobile truck mounted sprayers that apply paint striping. Epoxy thermosets are used most for continuous applications including centerlines, lane lines and edge lines. They are generally not used for special markings or for marking non-mountable islands and raised curbs because of problems combined with the discontinuous application. The service life of epoxy marking normally ranges between twenty four and forty eight months depending on different factors including pavement type, traffic volume, and weather conditions.

Advantages of Epoxy

Epoxy offers a longer service life on all traffic volume roads (low, medium and high), and higher retro reflectivity levels compared to paint. Epoxy is a durable, sprayable material that provides perfect adhesion to both asphalt and concrete pavements, while providing medium resistance to abrasion. Epoxy can provide up to 5 years' service live on low to mid traffic volume roadways, as shown in Table 1. Moreover, epoxy is relatively insensitive to most weather conditions during application. It has the ability to bond and set on cold and/or wet road surfaces.

Disadvantages of Epoxy

Epoxy is significantly more expensive than paint marking. The main disadvantage of epoxy is that it needs a long time to dry properly, and hence requires coning and flagging during the application. However, long drying times will not reduce the expected service life. Another disadvantage of epoxy marking is that it can be easily damaged from snow plowing. Moreover, epoxy marking may encounter color instability. Pavement surface must be cleaned and prepared.

Polyurea

Polyurea was developed by a Minnesota company and was designed to have a longer life than epoxies. Manufacturers have reported that the product has a service live of up to five years ,but

actual observed applications have a typical lifespan of three to four years. Polyurea markings are a sprayed, two-component durable pavement marking material that is relatively new to the pavement marking market. Various formulations of polyurea markings exist on the market. Polyurea pavement markings have been used by the Michigan Department of Transportation (MDOT).

Advantages of Polyurea

Polyurea materials are marketed as durable pavement markings that provide exceptional color stability, resistance to abrasion, and adhesion to all pavement surfaces. Polyurea markings appear to be less sensitive to pavement surface moisture than thermoplastics and can be applied at temperatures as low as freezing. The material is resistant to UV degradation. The material offers some advantages over epoxy in that it sets within 180 seconds, does not require any beads to be dropped on top of it, it lasts longer, has little waste and limited clean-up, and will harden when the pavement is wet.

Disadvantages of Polyurea Pavement Marking

One of the drawbacks associated with polyurea materials is that some must be applied by a special striping apparatus, which limits the number of contractors available to apply the material. Other polyurea materials, however, can be applied by a standard epoxy truck. The type of truck required is based on the resin-catalyst mix ratio. Polyurea mixes with a 2:1 mix ratio can be applied with a standard epoxy truck.

Material Selection Factors for the Pavement Marking

In the process of selecting a certain pavement marking material, there are four common factors: type of line, pavement surface, traffic volume, and type of street and highway. Material could be selected from durable materials (epoxy, polyurea, and thermoplastics) or non-durable materials (paints). Durable materials have longer service lives and cost more than non-durable materials.

Several tables are included in this memo in order to provide the board with information on the various materials that are up for consideration. Neither table 1 nor table 2 have information about polyurea because it is one of the newer materials and facts about the material were not well known at the time of publication of those tables. The tables provide information about the advantages, disadvantages, application temperature, and information about the surfaces to which the marking material would be applied. The most valuable information for the purposes of suggesting a recommendation was cost and expected service life.

Table 1

Main Category	Application Temperature	Service Life (month)	Advantages	Disadvantages
Solvent-based Paint	50 F or higher	3 to 36	– Inexpensive – Fast drying timing – Easy cleanup – Long life on low volume roads	– Short life on high volume roads – Glass bead is required – Does not adhere well to concrete – Highly flammable – Has bad smell
Waterborne Paint	32 F or higher	3 to 36	– Inexpensive – Fast drying timing – Easy cleanup – Long life on low volume roads	– Short life on high volume roads – Glass bead is required – Does not adhere well to concrete
Thermoplastic ***sprayed** ***extruded**	50 F or higher (sprayed) 32 F or higher (extruded)	48 to 84	– Longer life on high volume road – Quick set time – Good night time visibility – Excellent durability	– Sensitive to installation procedure – High initial cost – Subject to damage from snow plowing
Epoxy Paint	50 F or higher	24 to 48	– Long life on low volume roads – High retro-reflectivity – Excellent durability	– Slow drying timing – Heavy bead application required – High initial expenses – Subjected to damage from snow plowing

Table 2

	CONDITION	CROSSWALKS/STOP BARS	WORDS/SYMBOLS
ASPHALT	New	Intersection Grade Tape, Preformed Thermoplastic, Thermoplastic	Intersection Grade Tape, Preformed Plastic Tape, Preformed Thermoplastic, Thermoplastic
	Good/Fair	Preformed Thermoplastic, Thermoplastic, Methyl Methacryiate (MMA), Paint Thermoplastic,	Preformed Thermoplastic, Thermoplastic, Methyl Methacrylate (MMA), Paint Thermoplastic,
	Poor	Paint	Paint
Concrete	New	Intersection Grade Tape, Preformed Thermoplastic	Intersection Grade Tape Preformed Plastic Tape, Preformed Thermoplastic
	Good/Fair	Preformed Thermoplastic, Methyl Methacryiate (MMA), Paint	Preformed Thermoplastic, Methyl Methacrylate (MMA), Paint
	Poor	Paint	Paint

Table 3

Marking Material	Width (inches)	Range of Expected Costs ($/ft)	Expected Cost ($/ft)
Waterborne paint	4	0.05–0.18	0.12
Waterborne paint	6	0.7–0.18	0.15
Thermoplastic spray	4	0.20–0.56	0.30
Thermoplastic spray	6	0.28–0.60	0.50
Thermoplastic extruded	4	0.47–0.58	0.50
Thermoplastic extruded	6	0.70–0.85	0.75
Thermoplastic inverted profile	4	0.62–0.87	0.75
Thermoplastic inverted profile	6	1.05	1.05
MMA spray	4	0.60–1.00	0.90
MMA extrude	4	0.80–1.65	1.10
MMA profiled	4	0.75–2.60	1.50
Tape	4	1.75–3.58	2.50
Polyurea	4	0.68–1.00	0.91
Polyurea	6	0.95–1.40	1.27
Wet reflective high build paint	4	0.19	0.19
Wet reflective high build paint	6	0.24	0.24
Grooving for in-laid markings	N/A	0.40–1.40	0.75

Table 4

	Marking Material	Surface by Annual Average Daily Traffic (AADT)			
Paints	**Waterborne Paint**	**Asphalt**		**Concrete**	
		<10,000	10,000-50,000*	<10,000*	
	Initial retroreflectivity mcd/m^2/lux	275 with 8 pounds of beads per gallon of paint			
	Expected Service Life	Up to 1 year		Up to 1 year	
	Estimated cost per year of service life (per lf)	$0.08		$0.08	
Thermoplastics	**Alkyd-based Thermoplastic**	**Asphalt**		**Concrete**	
		<10,000	>10,000	<10,000*	10,000-50,000*
	Initial retroreflectivity mcd/m^2/lux	275			
	Expected Service Life	Up to 4 years	Up to 3 years	Up to 4 years	
	Estimated cost per year of service life (per lf)	$0.05	$0.07	$0.07	
Thermosets	**Polyurea**	**Asphalt**		**Concrete**	
		<10,000	>10,000	<50,000	>50,000
	Initial retroreflectivity (mcd/m^2/lux)	780 (according to a 2011 Air Force Institute of Technology study)			
	Expected Service Life	Up to 4 years	Up to 3 years	Up to 4 years	Up to 3 years
	Estimated cost per year of service life (per lf)	$0.25	$0.33	$0.25	$0.33
	Epoxy	**Asphalt**		**Concrete**	
		<10,000	>10,000	<10,000	>50,000
	Initial retroreflectivity mcd/m^2/lux	300 with 25 pounds of beads per gallon of epoxy			
	Expected Service Life	Up to 4 years	Up to 3 years	Up to 4 years	Up to 3 years
	Estimated cost per year of service life (per lf)	$0.10	$0.13	$0.10	$0.13

***** *Limited use for higher AADT* *Retroreflectivity is for white paint*
Most of the information for the above table was compiled using data from a TxDOT 2002 study

Maintenance Costs

The Services Division of the Police Dept. issues a contract each year to repaint all pavement markings in the City. All of the roads markings are currently paint (with the exception of the area around Shain Park, which is marked with tape). Two contracts are issued – one focuses on the long lane lines generally painted quickly with a large truck, while the other focuses on all of the smaller items that need to be done by hand, such as crosswalks, parking spaces, arrows,

and legends (such as "ONLY"). For the most recent year, the City spent about $18,000 repainting all the crosswalks in the City.

Since the City elected to move to a 24 inch wide bar instead of 12 inch, about 60% more paint will be required at each location. It is important to note that just because 24 inch wide bars are the new standard that does not translate into a 60% increase in annual costs, regardless of the material. Generally, existing painted markings will remain as is until the pavement in the intersection is being removed and replaced, including resurfacing or new cape seal. The move to a 24 inch wide bar as the standard in all new locations will translate into a slow, gradual increase in costs as crosswalk markings are removed and replaced.

Community Comparison

Comparison communities were chosen based on the following criteria: walkability, income demographics, population demographics, proximity, and climate similarities. Thermoplastic was the most popular reply, with many cities citing initial and upkeep costs as the primary factor in their decision.

Table 5

Municipality	Material
Ann Arbor, MI	Polyurea/Thermoplastic/Waterborne Latex Paint
Chanhassen, MN	Epoxy Paint (Thermoset) and Thermoplastic
Detroit, MI	Thermoplastics
Ferndale, MI	Preformed Thermoplastic
Hudson, OH	Water-Based Acrylic Paint
Huntington Woods, MI	Latex Paint
MDOT	Preformed Thermoplastic/Thermoplastic/Polyurea
Northville, MI	Waterborne Latex Paint
Road Commission Oakland County	Thermoplastics
Royal Oak, MI	Waterborne Latex Paint/Thermoplastic
Troy, MI	Thermoplastic
Westport, CT	Epoxy Paint (Thermosets)
Wilmette, IL	Thermoplastic

Some interesting notes received with replies are worth mentioning. Ann Arbor uses three types of pavement marking materials for crosswalks. However, the use of latex paint is only for temporary purposes (i.e. short term-restriping). Ann Arbor prefers thermoplastic because it is easiest to maintain. After the initial installation, the city is able to use a different thermoplastic made for maintenance, and spray it on top of the existing markings. Hudson, Ohio noted that they add potter glass beads to their paint while installing the markings.

Preformed thermoplastics and polyurea, as Ferndale and some others use, are regarded as top notch in terms of reflectivity according to cities, but is costly both initially and in maintenance. In Troy, engineers use different techniques based on what the surface is made from. On asphalt local roads, Troy uses a city-owned thermoplastic machine to stripe crosswalks and intersections. On concrete local roads, Troy uses preformed tape. Many communities use recessing while striping their crosswalks. Recessing is the method of grinding down pavement to install pavement markings at or slightly below grade; recessing lengthens the lifespan of the marking, but is not absolutely necessary.

Conclusion

Thermoplastic was recommended on major streets as opposed to paint because it has a longer expected service life. The benefit of a longer expected service life is that streets will not need to be closed as often. The cost of thermoplastics is comparable to paint both in received quotes and estimated costs. Thermoplastics perform better than standard traffic paints in areas where snowplowing is common but still suffer some loss in durability depending on the number of snowplow passes. Paint was recommended on other streets because it is the cheapest material as far as quotes are concerned. Paint was not recommended on major streets because it needs to be restriped at least once a year. Also, paint can be worn away on high volume roads meaning that restriping will need to happen more often.

SUGGESTED RECOMMENDATION:

Recessing crosswalks for marking materials is not part of the suggested recommendation, but the board my wish to explicitly include it or explicitly not include it in their recommendation. City staff believes that the benefit does not compensate for the additional expense. Recessing or grooving the road surface can be a substantial cost addition to the pavement marking system. A 2007 report found that grooves can cost between $0.40/ft and $1.40/ft. Additionally, when crosswalks should be installed according to the newly established design and material standards is not included in the recommendation. City staff recommends installing crosswalks as a part of street repaving projects.

To use alkyd-based thermoplastic on major streets within the Central Business District, Triangle District, Rail District, and to use waterborne paint on all other streets. Depending on visibility needs and average daily traffic, alkyd-based thermoplastic may be used for crosswalks adjacent to schools.

- The following shall be considered Major Streets (within the specific districts noted) for the purposes of this standard:

Woodward Ave.	Oakland Blvd.
Old Woodward Ave.	Chester St.
Maple Rd.	Brown St.
Southfield Rd.	S. Eton Rd.
Adams Rd.	E. Lincoln Ave.

	PK Contracting	RS Contracting	Hart Pavement
Best Material?	Recessed Polyurea	Polyurea	Waterborne
Stop Bar	Recessed Polyurea	Polyurea	Waterborne
Stop Lettering	Recessed Polyurea	Polyurea	Waterborne
Turn Arrows	Recessed Polyurea	Polyurea	Waterborne
New Concrete	Recessed Polyurea	Polyurea/Cold Plastic	Waterborne
Old Concrete	Recessed Polyurea	Polyurea/Cold Plastic	Waterborne
New Asphalt	Recessed Polyurea	Polyurea/Cold Plastic	Waterborne
Old Asphalt	Recessed Polyurea	Polyurea/Cold Plastic	Waterborne
Contact:	Nick Shea - (248)-362-2130	Joe Valente (Cell) - (810)-217-1659	Dann Hart - (248)-673-3219
Notes: Pricing is based off of the Martin & Henrietta Intersection dimensions (stop bars & crosswalk stripes) multiplied by 10 to simulate a bulk order. Quotes were requested from each contractor based on those numbers and what material they offer.	Has had the best results with Polyurea, as long as it is recessed. The initial cost may be higher, but maintenance is not necessary with that material.	Waterborne paint is the best option because of pricing. Removing existing markings to replace w/ a new markings would be costly. Pricing depends on quantity, but waterbornes are around 1/2 to 1/3 the cost of Polyurea or Cold Plastics.	Waterborne paint is the only material they use to stripe.
Pricing:			
Waterborne Paint	$27,144	$7,680	$65,000 (with grinding)
Regular Dry Paint			
High Build Waterborne			
Alkyd Paint			
Acrylic Paint			
Preformed Thermoplastic	$47,768		
90 Mil Extrude Thermoplastic		$16,840	
40 Mil Sprayable Thermoplastic	$36,520		
Preformed Tape		$25,440	
Polyurea	$33,800	$19,880	

Table 2-8. Use of Thermoplastic Pavement Markings

-	Asphalt			Concrete			Surface treatments		
-	AADT <1,000	AADT 1,000 – 10,000	AADT >10,000	AADT <10,000	AADT 10,000 – 50,000	AADT >50,000	AADT <1,000	AADT 1,000 – 10,000	AADT >10,000
Use[2]	Y	Y	Y	L	L	N	Y	Y	Y
Material suggestions	TxDOT standard			specific concrete formulation		-	TxDOT standard		
Typical minimum thickness (new)	90 mils			90 mils	90 mils	-	100 mils		
Typical minimum thickness (restripe)	60 mils			60 mils	60 mils	-	60 mils		
Surface prep.	Clean & dry.			Clean, dry, & primer-sealer (refer to Item 678 or manufacturer recommendations).		-	Clean, dry, & remove loose stones.		
Expected Service Life	up to 4 years	up to 4 years	up to 3 years	up to 4 years	up to 4 years	-	up to 4 years	up to 4 years	up to 3 years
Approx. bid price for new surface in 2002 (per lf)	$0.20			$0.35		-	$0.20		
Estimated cost per year of service life (per lf)	$0.05	$0.05	$0.07	$0.07	$0.09	-	$0.05	$0.05	$0.07

Footnotes:

1. TxDOT Specification Thermoplastic unless noted otherwise.
2. Y = suitable for use; N = not recommended; L = limited use.

Table 2-10. Use of Paint Pavement Markings

-	Concrete			Asphalt			Surface Treatments		
-	AADT <1,000	AADT 1,000 – 10,000	AADT >10,000	AADT <10,000	AADT 10,000 – 50,000	AADT >50,000	AADT <1,000	AADT 1,000 – 10,000	AADT >10,000
Use[1]	Y	Y	L	Y	L	N	Y	L	N
Thickness	15–25 mils			15–25 mils			15–25 mils		
Surface prep.	Clean & dry.			Clean & dry.			Clean, dry, & remove loose stones.		
Expected service life	Up to 1 year			Up to 1 year			Up to 1 year[2]		
Approx. bid price (per lf)	$0.08			$0.08			$0.08		
Estimated cost per year of service life (per lf)	$0.08			$0.08			$0.08		

Footnotes:

1. Y = suitable for use; N = not recommended; L = limited use.

2. On new surface treatments, paint should only be used as a temporary marking for up to 6 months.

Table 2-11. Use of Permanent Preformed Tape Pavement Markings

-	Asphalt			Concrete			Surface Treatments		
-	AADT <1,000	AADT 1,000 – 10,000	AADT >10,000	AADT <10,000	AADT 10,000 – 50,000	AADT >50,000	AADT <1,000	AADT 1,000 – 10,000	AADT >10,000
Use[1]	N	Y	Y	N	Y	Y	N	N	N
Surface prep.	-	Remove existing markings, clean, dry, & apply adhesive		-	Remove existing markings, clean, dry, & apply adhesive		-	-	-
Expected service life	-	Up to 4 years		-	Up to 4 years		-	-	-
Approx. bid price (per lf)[2]	-	$2.57		-	$2.57		-	-	-
Estimated cost per year of service life (per lf)	-	$0.43		-	$0.43		-	-	-

Footnotes:

1. Y = suitable for use; N = not recommended.

2. Price includes required removal of existing markings.

Table 2-13. Use of Epoxy Pavement Markings

-	Asphalt			Concrete			Surface Treatments		
-	**AADT <1,000**	**AADT 1,000 – 10,000**	**AADT >10,000**	**AADT <10,000**	**AADT 10,000 – 50,000**	**AADT >50,000**	**AADT <1,000**	**AADT 1,000 – 10,000**	**AADT >10,000**
Use[2]	Y	Y	Y	Y	Y	Y	Y	Y	Y
Thickness	15–25 mils			15–25 mils			15–25 mils		
Surface prep.	Remove old mkgs, clean, & dry			Remove old mkgs, clean, & dry			Remove old mkgs, clean, & dry		
Expected service life	Up to 4 years	Up to 4 years	Up to 3 years	Up to 4 years	Up to 4 years	Up to 3 years	Up to 4 years	Up to 4 years	Up to 3 years
Approx. bid price (per lf)	$0.40			$0.40			$0.40		
Estimated cost per year of service life (per lf)	$0.10	$0.10	$0.13	$0.10	$0.10	$0.13	$0.10	$0.10	$0.13

Footnotes:

1. A wide variety of epoxy materials are currently available, possessing varying degrees of quality. The information in this table is based on the cost and performance of special formulations of epoxy that are designed for high-quality and high-durability pavement markings commonly used by state DOTs nationwide.
2. Y = suitable for use.

Table 2-14. Use of Polyurea Pavement Markings

-	Asphalt			Concrete			Surface Treatments		
-	**AADT <1,000**	**AADT 1,000 – 10,000**	**AADT >10,000**	**AADT <10,000**	**AADT 10,000 – 50,000**	**AADT >50,000**	**AADT <1,000**	**AADT 1,000 – 10,000**	**AADT >10,000**
Use[2]	Y	Y	Y	Y	Y	Y	Y	Y	Y
Thickness	15–25 mils			15–25 mils			15–25 mils		
Surface prep.	Remove existing markings, clean, & dry			Remove existing markings, clean, & dry			Remove existing markings, clean, & dry		
Expected service life	Up to 4 years	Up to 4 years	Up to 3 years	Up to 4 years	Up to 4 years	Up to 3 years	Up to 4 years	Up to 4 years	Up to 3 years
Approx. bid price (per lf)	$1.00			$1.00			$1.00		
Estimated cost per year of service life (per lf)[3]	$0.25	$0.25	$0.33	$0.25	$0.25	$0.33	$0.25	$0.25	$0.33

Footnotes:

1. The cost and performance of polyurea is based on limited experimentation both in Texas and nationwide.

2. Y = suitable for use.

3. Prices include a proprietary retroreflectivity-enhancing ceramic element embedded into the marking surface. Polyurea materials applied without the proprietary ceramic element may be less expensive.

Table 2-15. Use of Modified Urethane Pavement Markings

-	Asphalt			Concrete			Surface Treatments		
-	**AADT <1,000**	**AADT 1,000 – 10,000**	**AADT >10,000**	**AADT <10,000**	**AADT 10,000 – 50,000**	**AADT >50,000**	**AADT <1,000**	**AADT 1,000 – 10,000**	**AADT >10,000**
Use[2]	L	L	L	L	L	L	L	L	L
Thickness	Manuf. Recommendations			Manuf. Recommendations			Manuf. Recommendations		
Surface prep.	Remove Existing Markings, Clean & Dry			Remove Existing Markings, Clean & Dry			Remove Existing Markings, Clean & Dry		
Expected service life	Up to 4 years	Up to 4 years	Up to 3 years	Up to 4 years	Up to 4 years	Up to 3 years	Up to 4 years	Up to 4 years	Up to 3 years
Approx. bid price (per lf)	$0.63			$0.63			$0.63		
Estimated cost per year of service life (per lf)	$0.16	$0.16	$0.21	$0.13	$0.16	$0.21	$0.16	$0.16	$0.21

Footnotes:

1. Based on use in other states.
2. L = limited use.

Table 2-17. Use of Methyl Methacrylate (MMA) Pavement Markings									
-	Asphalt			Concrete			Surface Treatments		
-	AADT <1,000	AADT 1,000 – 10,000	AADT >10,000	AADT <10,000	AADT 10,000 – 50,000	AADT >50,000	AADT <1,000	AADT 1,000 – 10,000	AADT >10,000
Use	Limited use			Limited use			Limited use		
Thickness	40 mils			40 mils			40 mils		
Surface prep.	Remove existing markings, clean, & dry			Remove existing markings, clean, & dry			Remove existing markings, clean, & dry		
Expected service life	Up to 5 years			Up to 5 years			Up to 5 years		
Approx. bid price (per lf)	$2.50			$2.50			$2.50		
Estimated cost per year of service life (per lf)	$0.50			$0.50			$0.50		

Pavement Marking Materials

March, 2012

Ting Nahrwold, P.E.
INDOT Materials Management

Overview

- **INDOT maintains over 11,000 centerline miles of roadway.**
- **1687 people died on Indiana roadways in 2010 (NHTSA FARS data).**
- **According to FHWA 2008 “value of life” memo, the cost is $6 million per death. Saving lives more than pays for better markings.**

Overview

- **Pavement Marking Types**
  - **Paint**
  - **Thermoplastic**
  - **Multi-Component (AKA Epoxy)**
  - **Preformed Plastic**

Pavement Marking Materials

- **Paint**
  - **Typically water based**
  - **Cheapest**
  - **Most versatile**
  - **Least durable**
  - **Typical thickness 15 mils**
  - **Glass beads sprayed on top of wet paint**

Waterborne Traffic Paint

- Standard waterborne traffic paint (50F min)
  - UV resistant and non-coning in most cases
  - $11/gal, 15 wet mils, 4” width = $0.0344 /LF

- High build waterborne traffic paint (50F min)
  - More is usually better and ability to hold big beads
  - UV resistant and coning may be required
  - $12/gal, 25 wet mils, 4” width = $0.0632 / LF
  - $12/gal, 30 wet mils, 4” width = $0.075 / LF
- Cold weather waterborne traffic paint (35F min)
  - UV resistant and coning required below 50F
  - $12/gal, 15 wet mils, 4” width = $0.0375 / LF

Durable Markings

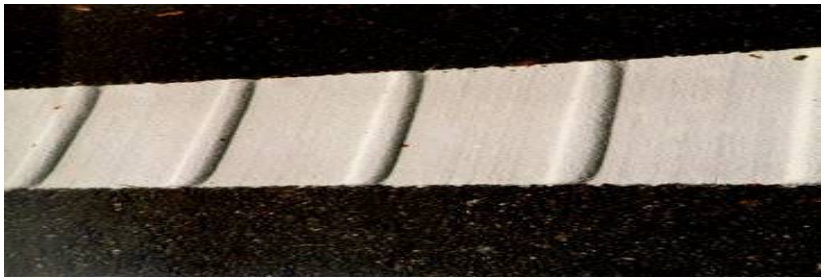
- **Term used for:**
  - **Thermoplastic**
  - **Multi-component**
  - **Preformed Plastic**

Pavement Marking Materials

- **Thermoplastic**
  - **Melted plastic**
  - **Typically used only on HMA**
  - **More expensive**
  - **Requires more specialized equipment**
  - **More durable under higher traffic**
  - **Typical thickness = 90-125 mils**
  - **Glass beads mixed in, as well as sprayed on top while still molten**

Thermoplastic

- **Alkyd thermoplastic is by far the most widely used durable road marking**
  - **Can be sprayed between 40-125 mils**
  - **Can be extruded between 60-125 mils**
  - **Can be inlaid for enhanced durability**
  - **Minimum application temperature is 50F**
  - **Can be used with big beads**
  - **Non-coning**
  - **Can be profiled**
  - **Brittles with age**



$1600/ton, 90 mils, 4” width = $0.267 /LF

Pavement Marking Materials

- **Multi-Component (AKA Epoxy)**
  - **2 components mixed just prior to application**
  - **Can be used on any pavement type, but typically only longitudinal lines**
  - **Better durability and reflectivity than paint**
  - **Typical thickness = 20 mils**
  - **2 types of glass beads typically applied (double drop)**

Epoxy Road Markings

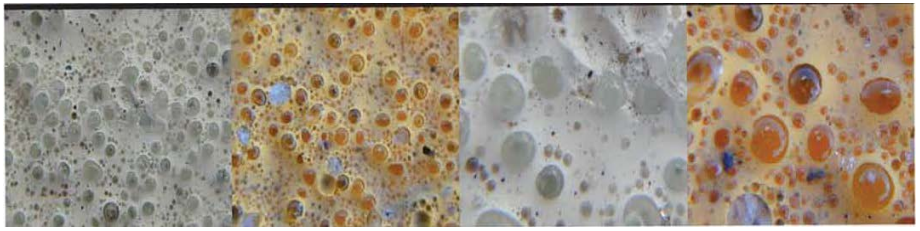
- Second most widely used durable (CO, MT, NJ, NY, OH, QB & WI to name a few)
- Epoxy comes in two variations
  - Slow dry - between 15-45 minutes (HPS 2)
  - Fast dry - less than 10 minutes (HPS 3)
  - Minimum temperature for application is 40F
  - Coning required on slow dry, variable on fast dry
- Both are 2:1 ratio products, may “yellow” a bit from UV degradation and are brittle
- May be inlaid and will hold big beads
- $23/gal, 20 mils, 4” width = $0.096 /LF

Polyurea Road Markings (HPS 5)

- Fast dry – less than 2 minutes, no coning
- Resistant to UV degradation
- Flexible film
- Minimum application temperature is 40F
- 2:1 ratio - works in existing epoxy vehicles with slight modifications
- Can be inlaid
- Will hold big beads
- Largely used in MI, IL, NC and GA
- $50/gal, 20 mils, 4” width = $0.208 /LF

Modified Urethane Road Markings (HPS 4)

- Fast dry – less than 2 minutes, no coning
- Resists UV degradation
- Flexible film
- 2:1 ratio - works in existing epoxy vehicles with no modifications
- Handles the same as epoxy
- Can be inlaid
- Will hold big beads
- 40F minimum application temperature
- Bridges the cost and performance gap between fast dry epoxy and polyurea – major use in MN & IL



$33/gal, 20 mils, 4” width = $0.1375 / LF

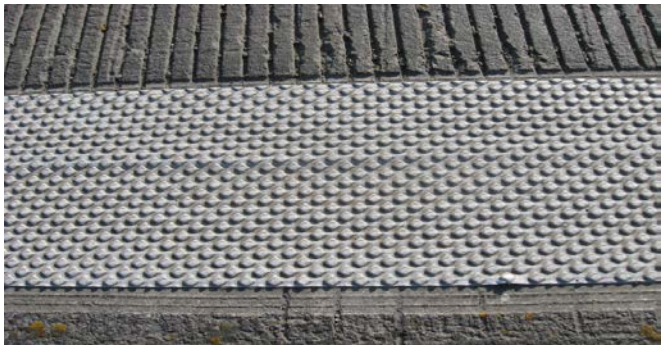
MMA Road Markings

- Very versatile in application modes, either by hand or mechanical equipment
  - HPS 6 Extrude at 60-120 mils
  - HPS 6 Spray at 40-120 mils (with and without intermix beads)
  - HPS 6 Profile up to ½" high for enhanced audible and wet/dry retro
  - HPS 7 patterned for enhanced wet/dry retro
  - (pattern usage is equivalent to 100 mils)

MMA Road Markings

- Various ratios available depending on available equipment – 4:1 or 1:1 by volume, 98:2 by weight
- Resistant to UV degradation
- Resistant to snow plow damage even at thicker films
- Can be inlaid
- Some of the variants will hold big beads
- Can be applied below 32F in some instances while normal minimum is 35F
- Major use in AK, ID, OR, WA & Canada. OR has 4 yr warranty w=150 and y=125.
- Does require coning in most cases
- $40/gal, 40 mils, 4” width = $0.333 / LF
- $40/gal, 100 mils, 4” width = $0.833 / LF

Pavement Marking Materials



- **Preformed Plastic**
  - **Applied as a tape**
  - **Can be used for permanent or temporary applications (different types)**
  - **Permanent type can have the highest durability and reflectivity (even under wet conditions)**
  - **60F minimum application temperature**
  - **Highest cost: $1.50/LF**
  - **Glass beads are manufactured into the material**

Pavement Marking Materials

Pavement Marking Materials	Thickness (mil)	Min Temperature (F)	Cost /LF (4")
Waterborne Paint	15	50	$0.03
Thermo	90	50	$0.27
Preformed Tape	90	60	$1.50
Multi-Component			
Epoxy	20	40	$0.10
Polyurea	20	40	$0.21
Modified Urethane	20	40	$0.14
MMA	100	35	$0.83

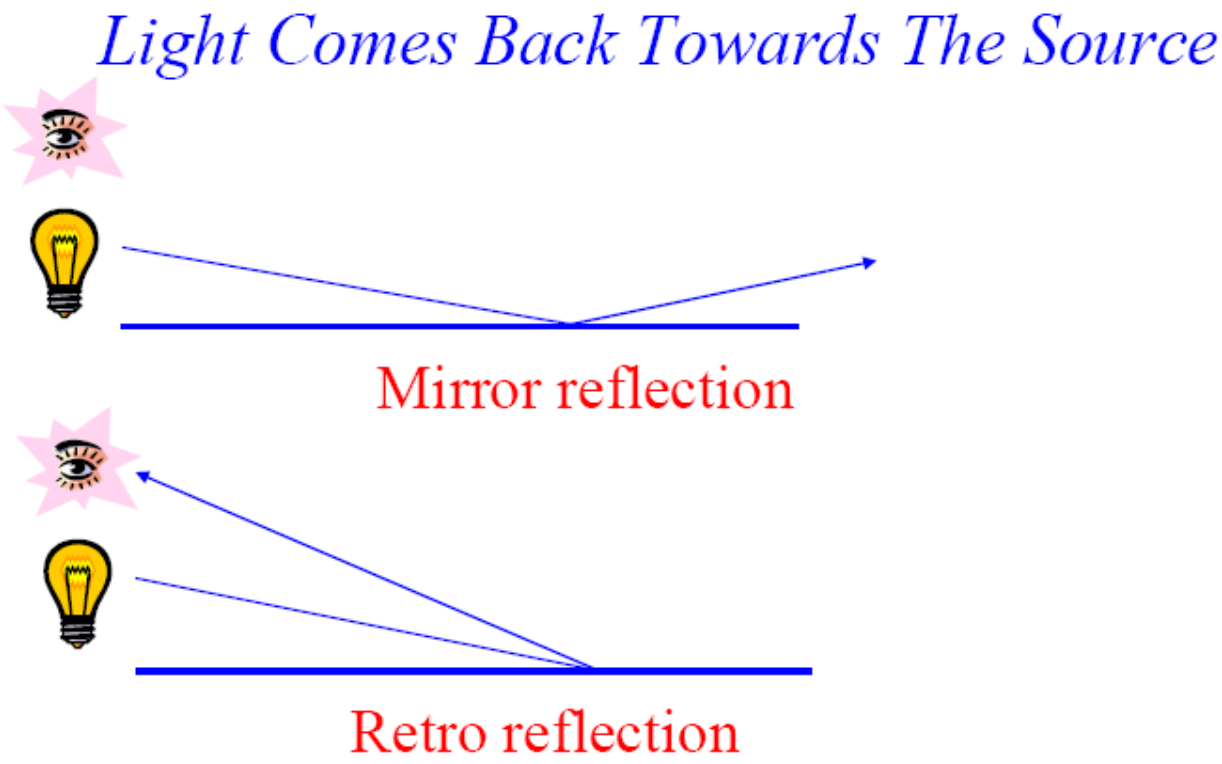
INDOT Specification 808 Pavement Markings

- 808 has been re-written as a performance based specification
- Took effect for contracts let after 9/1/10.
- Performance based specifications have much fewer details/requirements as to materials and application methods
  - INDOT specifies what we want, contractor figures out how to do it
  - Performance requirements have to be specific and measurable

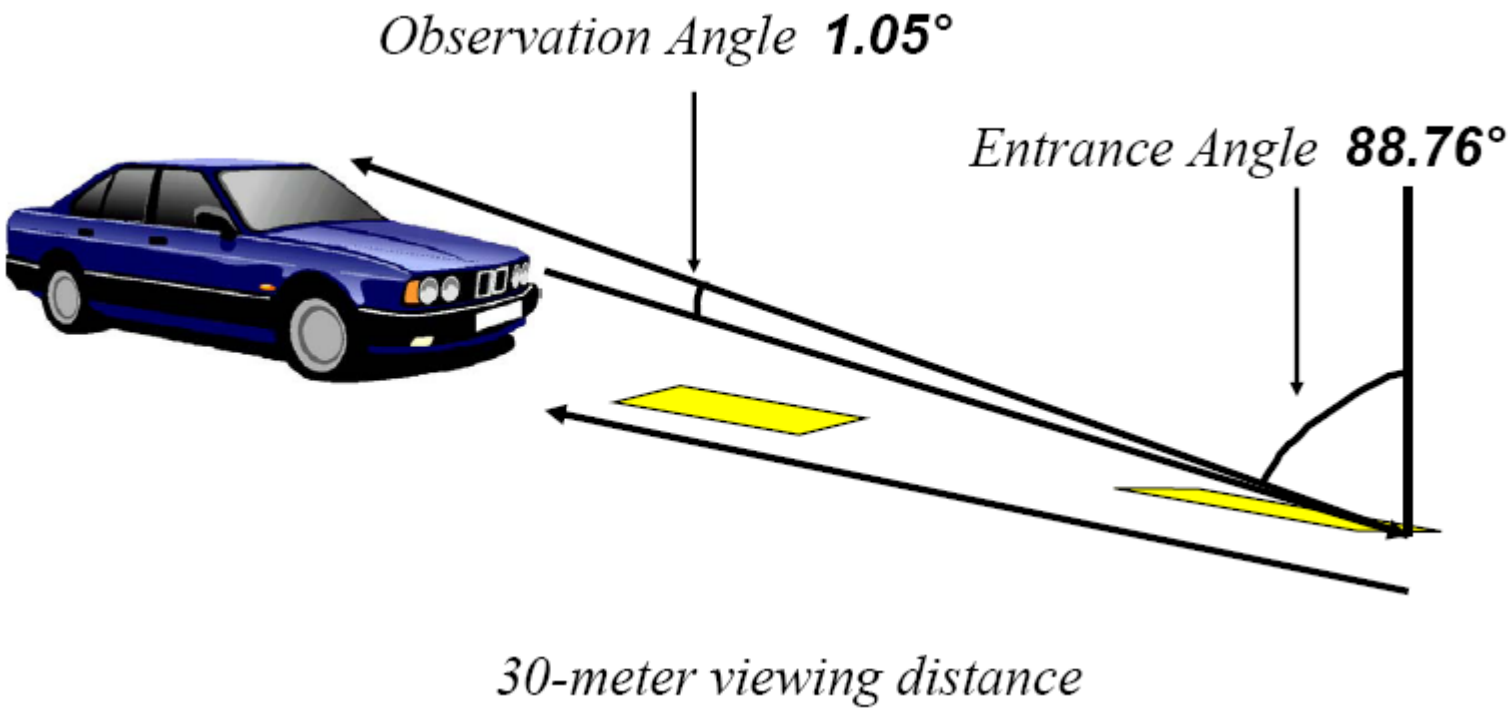
New 808 Requirements

- **Performance Requirements:**
  - **Color**
    - **ASTM D 6628, ASTM E 811 and ASTM E 1349**
  - **Durability**
    - **ASTM D 913**
  - **Retro-reflectivity**
    - **ITM 931 – millicandelas per m^2 per lux**
- **Quality Adjustments ONLY apply to retro-reflectivity**

Retroreflection



Measuring Retroreflectivity with 30 Meter Geometry



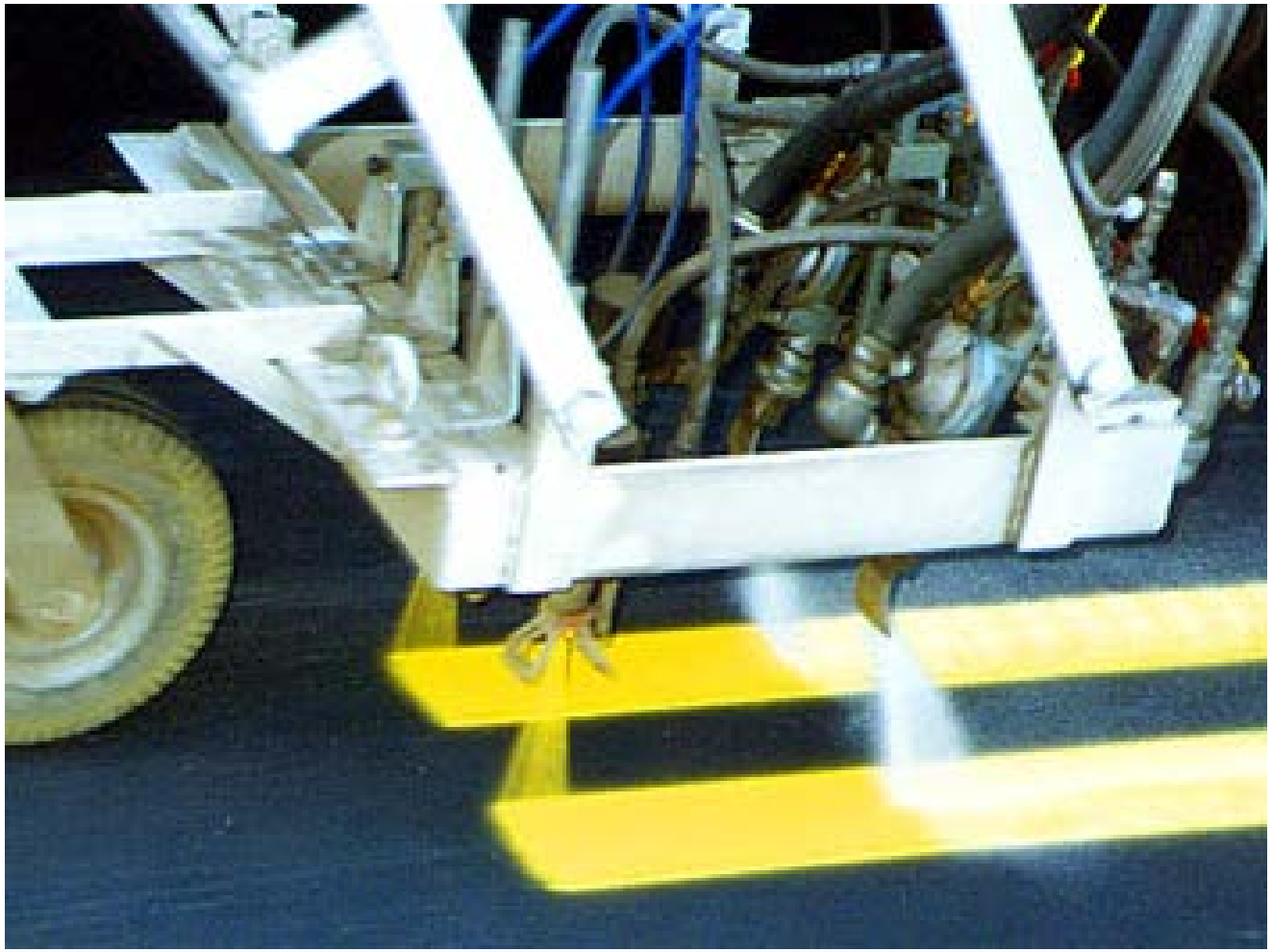
INDOT's RETRO MINIMUMS

Material (retained time)	Initial White	Initial Yellow	Retained White	Retained Yellow
Paint (90 days)	250	175		
Thermoplastic (180 days)	300	200	200	150
Multi-Component (180 days)	300	200	200	150
Preformed Plastic (180 days)	300	200	200	150
Extended Preformed Plastic (inlaid) (1 yr/2yr)	650	450	400/300	300/200

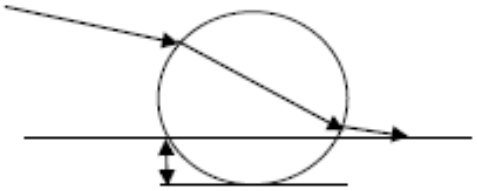
FACTORS THAT EFFECT RETROREFLECTIVITY AND DURABILITY

Coatings	Roundness of Bead	Bead Size	Application Temperature
Bead Coverage	Binder Quality	Refractive Index	Application Speed
Gradation	Bead Embedment	Road Surface	Weather
Color and Clarity of Bead	Binder Viscosity	Bead Rate	Binder Temperature

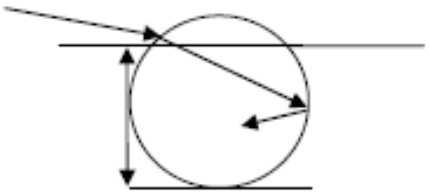
Beading and Retro



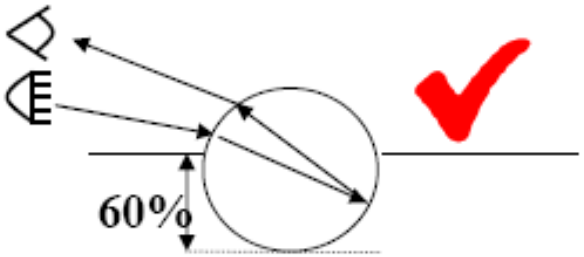
Glass Beads - Embedment



High Embedment (<40%), Poor



Low Embedment (>60%), Poor



60% Embedment, Good

NTPEP

National Transportation Product Evaluation Program (NTPEP) is a major resource for comprehensive pavement marking evaluations performed at the national level.

The lead agency collects lab and field performance data for products included in the evaluation and compiles them into a report.

Data are furnished within the report, no approval, disapproval, or endorsements of products are made per NTPEP/AASHTO policy.

NTPEP TEST SITE

- Traffic is moderate (minimum AADT 5,000)
- No intersections or access points (excessive braking or turning movements) with full exposure to the sun throughout daylight hours
- Good drainage
- On both Portland cement concrete and bituminous concrete surfaces
- Open to traffic at least one (1) year
- Minimal cracking and/or pavement deterioration

NTPEP TEST DECK

PAINT LINES

EPOXY LINES

NTPEP TEST DECK

THERMOPLASTICS

NTPEP TEST DECK

PREFORMED TAPES

NTPEP REPORT-WATERBORNE PAINT

Reflectivity & Durability

Interval (months)	Date	Retroreflectivity				Durability	
		Skip	Left Wheel	R, Wheel - Wet	R, Wheel - Dry	Skip	Wheel
0	7/28/2008	394	445			10	10
1	8/26/2008	373	323			10	10
2	9/30/2008	408	318			10	10
3	10/27/2008	385	311			10	10
9	4/28/2009	212	102			9	8
10	5/19/2009	200	85			9	8
11	7/9/2009	181	86			9	8
12	7/28/2009	204	77			9	8
15	10/26/2009	203	85			9	8
21	4/19/2010	140	43			9	8
24	7/21/2010	163	40			9	8
27	11/26/2010	150	38			9	8
33	5/24/2011	112	32			9	8
36	7/14/2011	123	22			8	7

NTPEP REPORT-THERMOPLASTIC

Reflectivity & Durability

Interval (months)	Date	Retroreflectivity				Durability	
		Skip	Left Wheel	R, Wheel - Wet	R, Wheel - Dry	Skip	Wheel
0	7/28/2008	289	393			10	10
1	8/26/2008	286	182	76		10	10
2	9/30/2008	295	121	16		10	10
3	10/27/2008	234	117	8		10	10
9	4/28/2009	173	124	14		9	9
10	5/19/2009	196	127	6		9	9
11	7/9/2009	225	131	3		9	9
12	7/28/2009	246	134	4		9	9
15	10/26/2009	277	147	12		9	9
21	4/19/2010	232	103	6		9	9
24	7/21/2010	259	126	5		9	9
27	11/26/2010	274	137	9		9	9
33	5/24/2011	241	104	13		8	8
36	7/14/2011	247	85	8		8	7

NTPEP REPORT-METHYL METHACRYLATE

Reflectivity & Durability

Interval (months)	Date	Retroreflectivity				Durability	
		Skip	Left Wheel	R, Wheel - Wet	R, Wheel - Dry	Skip	Wheel
0	7/28/2008	576	546			10	10
1	8/26/2008	585	567	52		10	10
2	9/30/2008	679	648	82		10	10
3	10/27/2008	673	611	56		10	10
9	4/28/2009	515	194	24		9	10
10	5/19/2009	573	213	25		9	9
11	7/9/2009	506	161	24		9	9
12	7/28/2009	551	138	29		9	9
15	10/26/2009	569	133	35		9	9
21	4/19/2010	302	84	6		9	9
24	7/21/2010	333	82	4		9	9
27	11/26/2010	320	85	2		9	9
33	5/24/2011	227	82	3		9	9
36	7/14/2011	193	65	9		9	9

NTPEP REPORT-EPOXY

Reflectivity & Durability

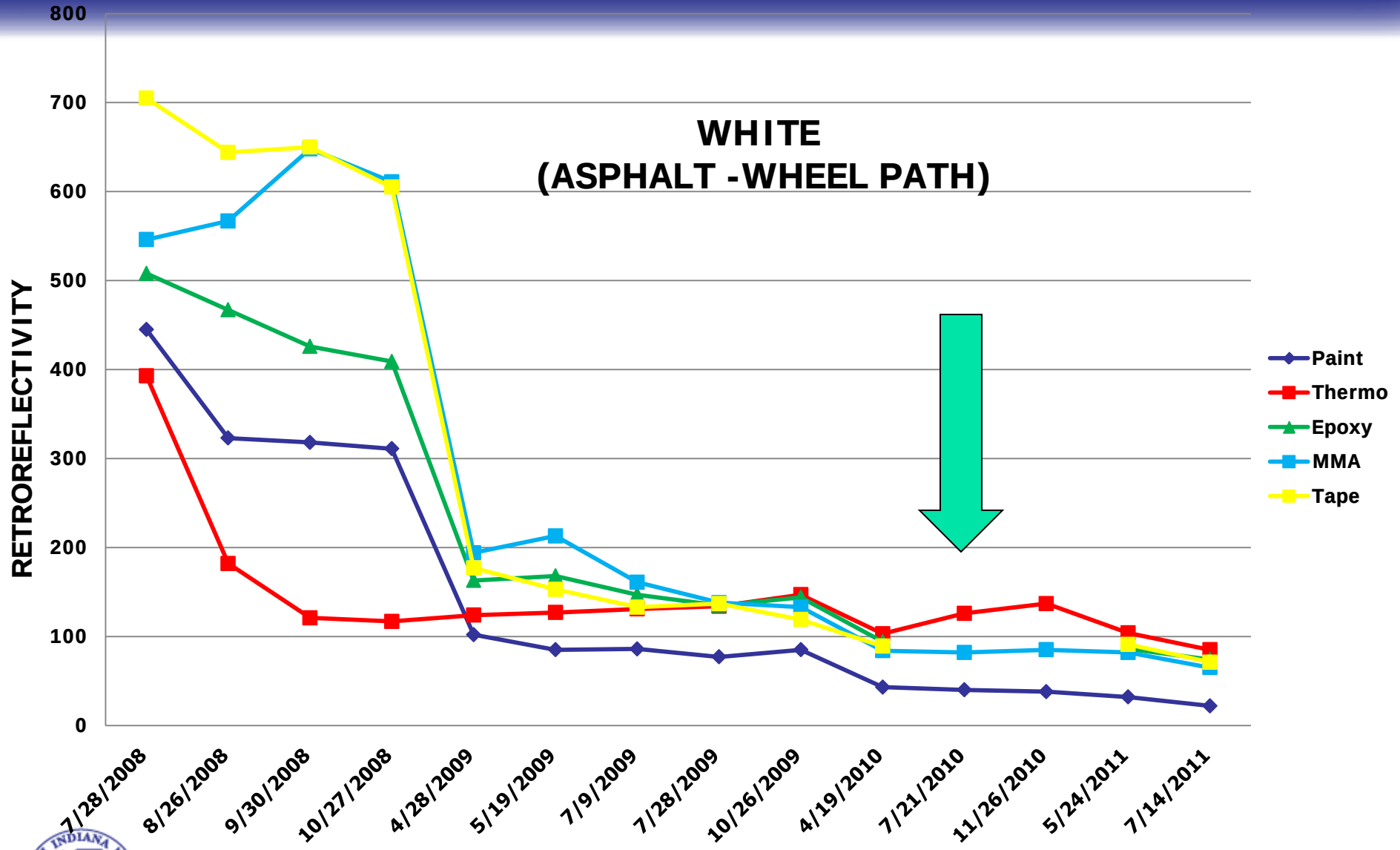
Interval (months)	Date	Retroreflectivity				Durability	
		Skip	Left Wheel	R, Wheel - Wet	R, Wheel - Dry	Skip	Wheel
0	7/28/2008	490	508			10	10
1	8/26/2008	465	467			10	10
2	9/30/2008	529	426			10	10
3	10/27/2008	523	409			10	10
9	4/28/2009	338	163			10	9
10	5/19/2009	345	168			9	9
11	7/9/2009	340	147			9	9
12	7/28/2009	344	135			9	9
15	10/26/2009	347	144			9	9
21	4/19/2010	263	94			9	9
33	5/24/2011	264	86			9	9
36	7/14/2011	243	74			9	9

NTPEP REPORT-DURABLE TAPE

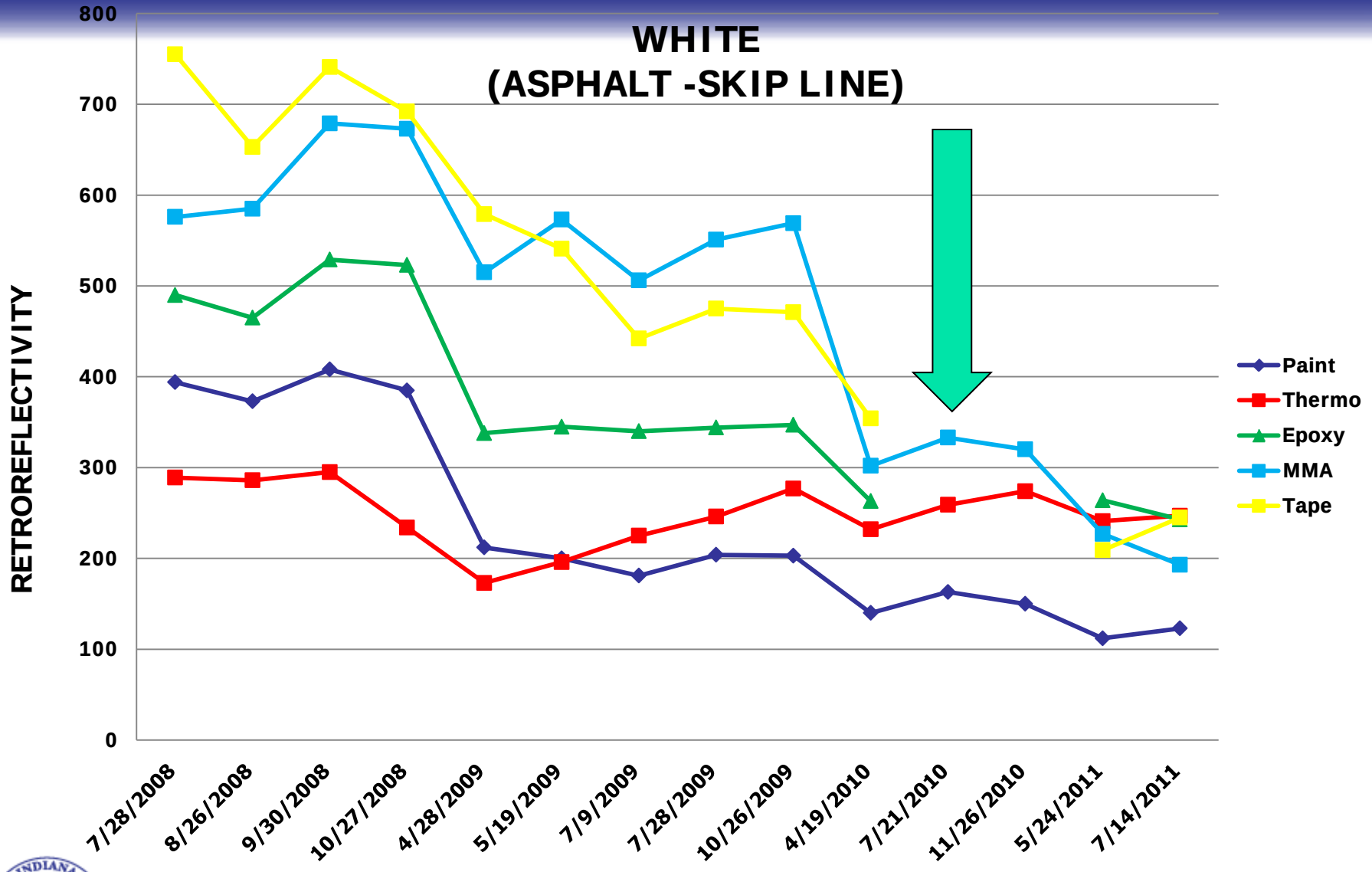
Reflectivity & Durability

Interval (months)	Date	Retroreflectivity				Durability	
		Skip	Left Wheel	R, Wheel - Wet	R, Wheel - Dry	Skip	Wheel
0	7/28/2008	755	705			10	10
1	8/26/2008	653	644			10	10
2	9/30/2008	741	650			10	10
3	10/27/2008	692	605			10	10
9	4/28/2009	579	177			9	10
10	5/19/2009	541	153			9	10
11	7/9/2009	442	133			9	9
12	7/28/2009	475	137			9	9
15	10/26/2009	471	119			9	9
21	4/19/2010	354	89			9	9
33	5/24/2011	209	91			9	9
36	7/14/2011	245	71			9	9

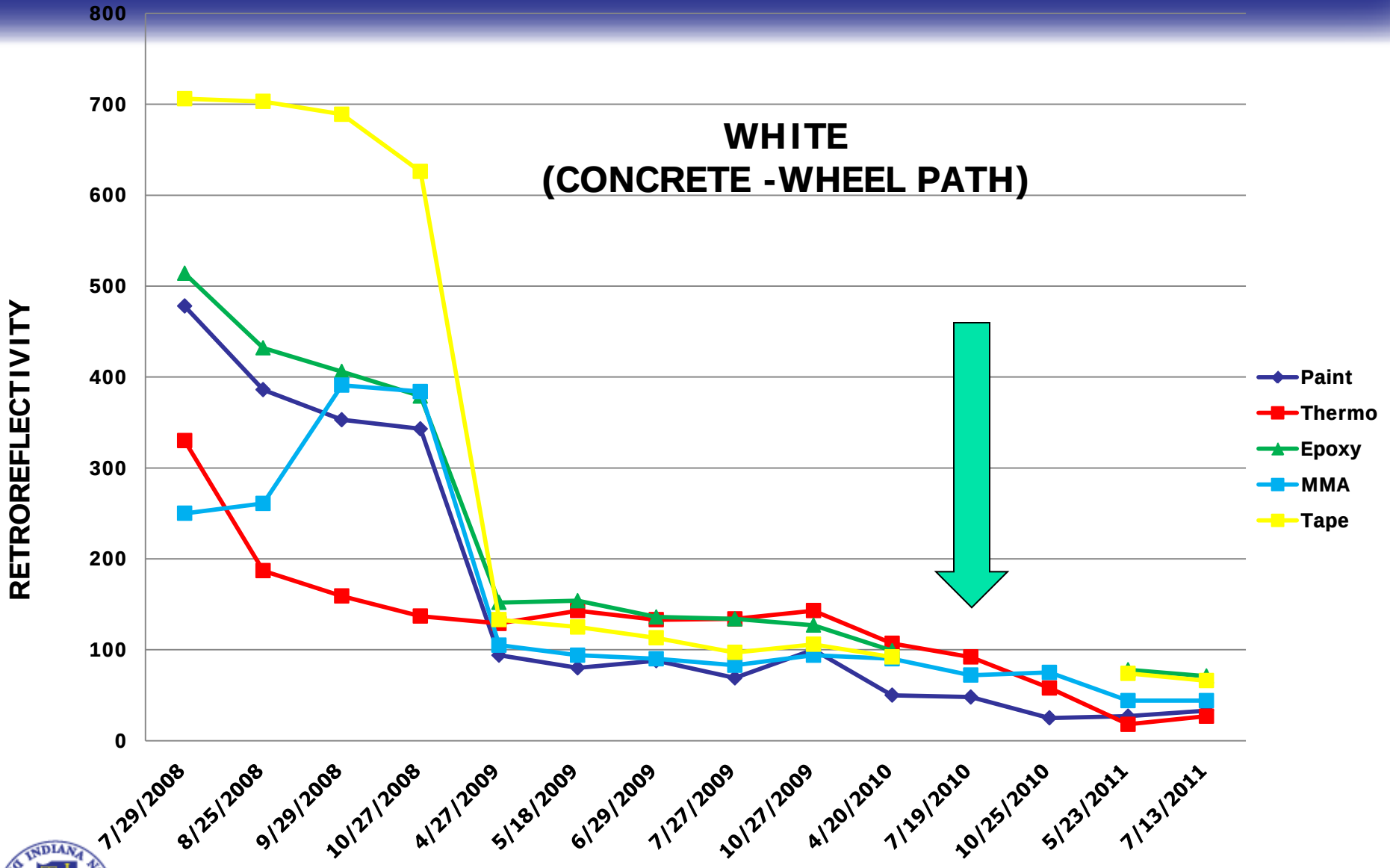
NTPEP RETROREFLECTIVITY:



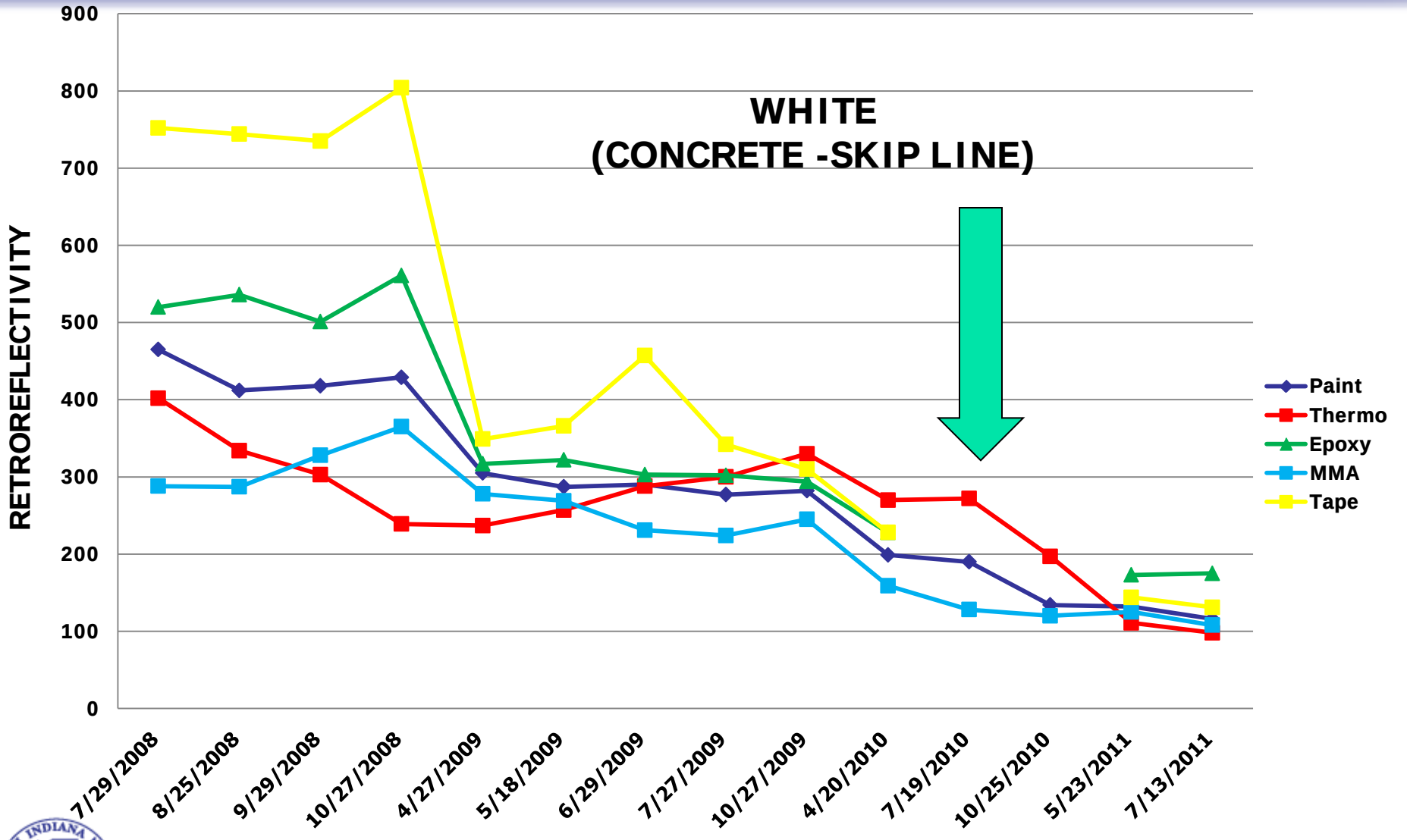
NTPEP RETROREFLECTIVITY:



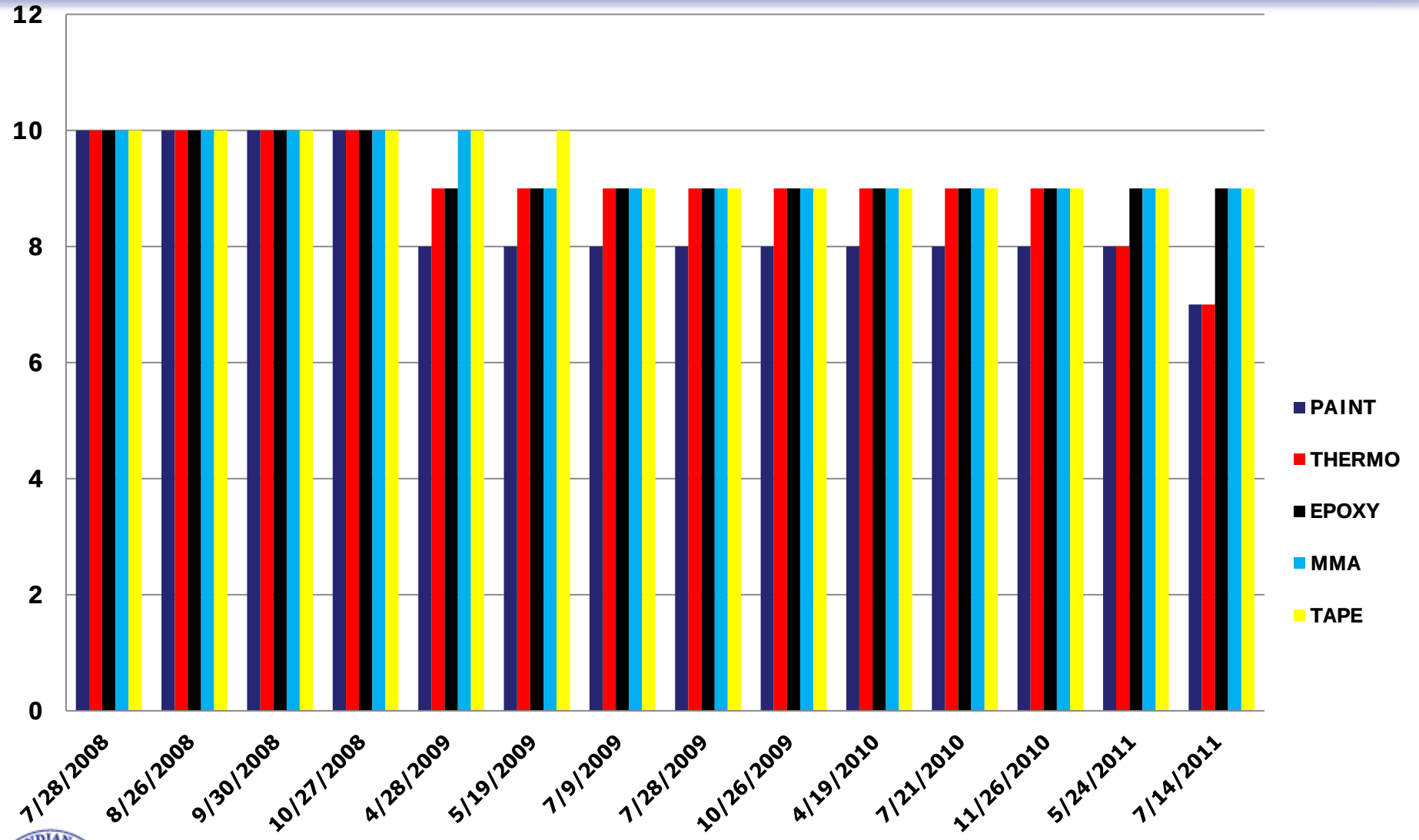
NTPEP RETROREFLECTIVITY:



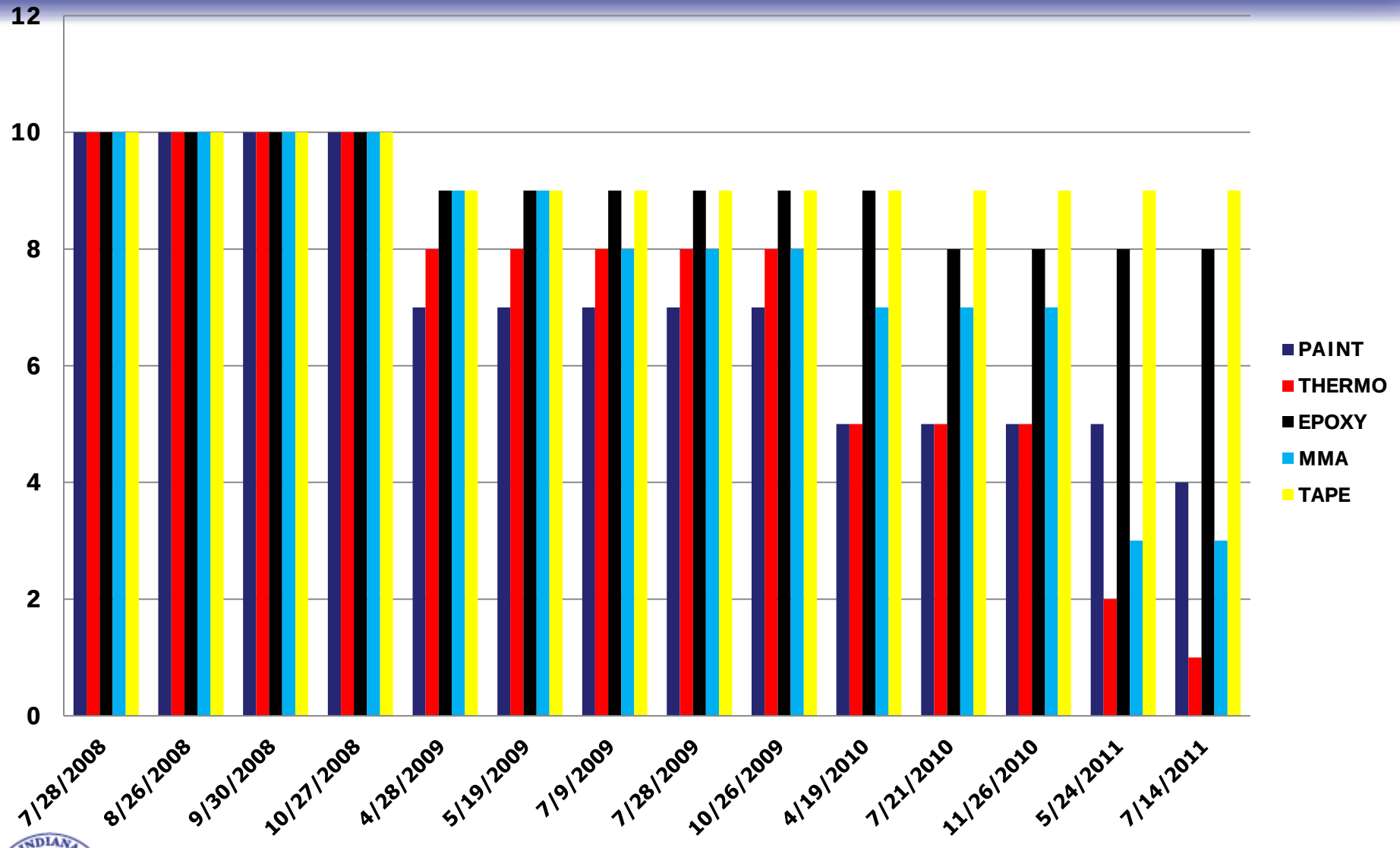
NTPEP RETROREFLECTIVITY:



NTPEP DURABILITY - ASPHALT:



NTPEP DURABILITY -CONCRETE:



INDOT CONTRACTED COSTS

AVERAGE BID UNIT PRICE (4" Solid Line)				
Material	Cost/LF (2010)		Cost/LF (2011)	
	White	Yellow	White	Yellow
Paint	$0.82	$0.76	$0.88	$0.54
Thermoplastic	$1.54	$1.54	$1.63	$1.63
Epoxy	$0.66	$0.81	$0.30	$0.30
Preformed Tape	$1.71	$2.58	$2.09	$1.94
Multi-component	$1.37	$0.85	$1.34	$1.55

Installation Methods

- **Surface Apply (all materials)**
- **Inlay (Durable Markings)**

Installation Methods

- **Surface Apply**

Installation Methods

- **Inlay-rolling in**
  - For preformed tape only, material is placed on the hot asphalt surface, prior to the last roller pass. This causes the material to be slightly depressed, shielding it from snowplow damage.

Installation Methods

- **Grooved - in**

  a slight depression is ground into the finished pavement surface

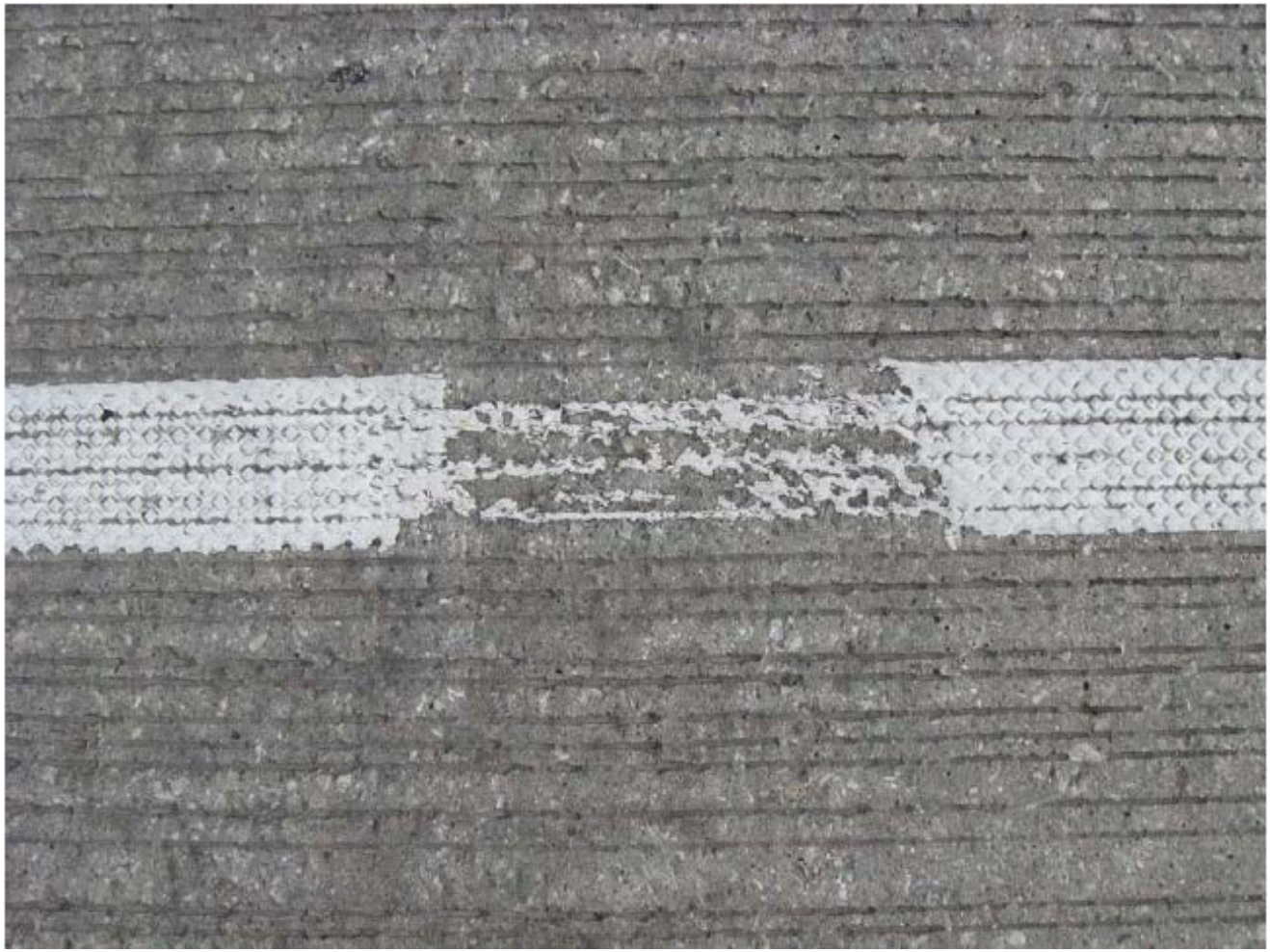
INDOT Evaluations (Preformed Tape)

- Dual-lane divided highway
- Should not have extensive crack sealing or patching during the evaluation period
- Average traffic over 17,500 in the two lanes
- Generally free of horizontal and vertical curves
- Speed limit generally 40 mph or higher. (65km/hr)
- Easy access for traffic control (lane closure)

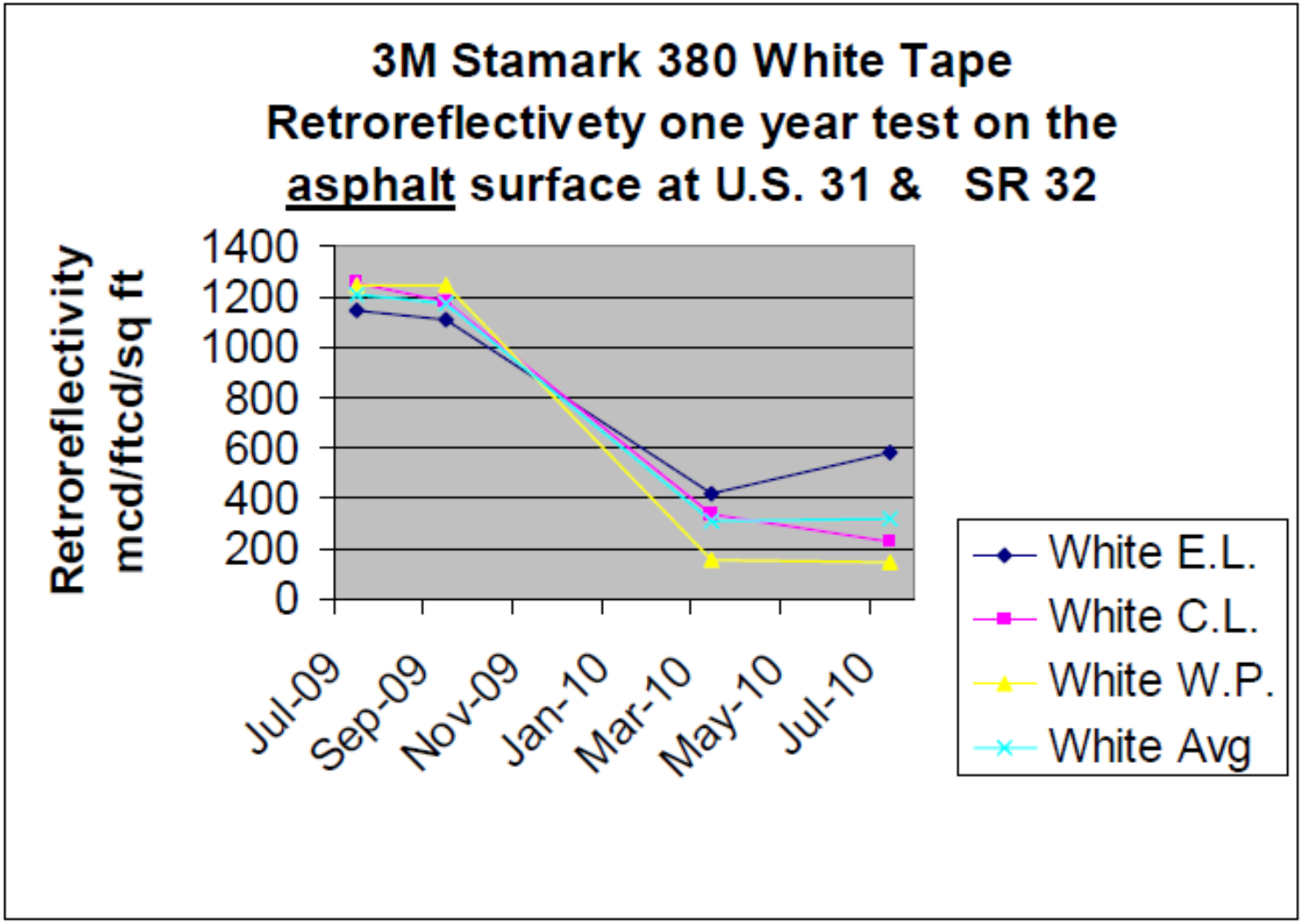
Surface Applied Preformed Tape

Surface Applied Preformed Tape

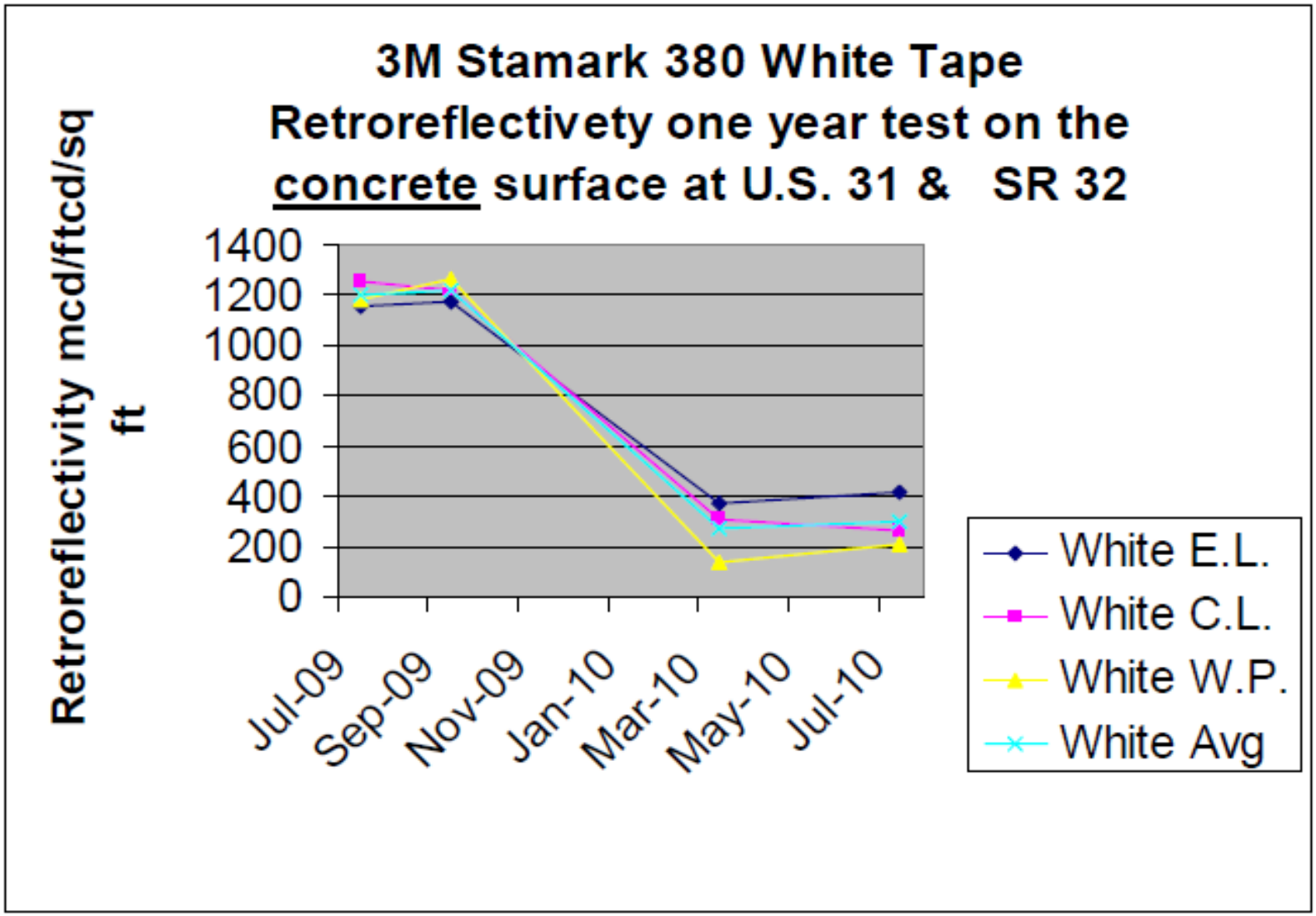
Surface Applied Preformed Tape



INDOT RETROREFLECTIVITY:



INDOT RETROREFLECTIVITY:



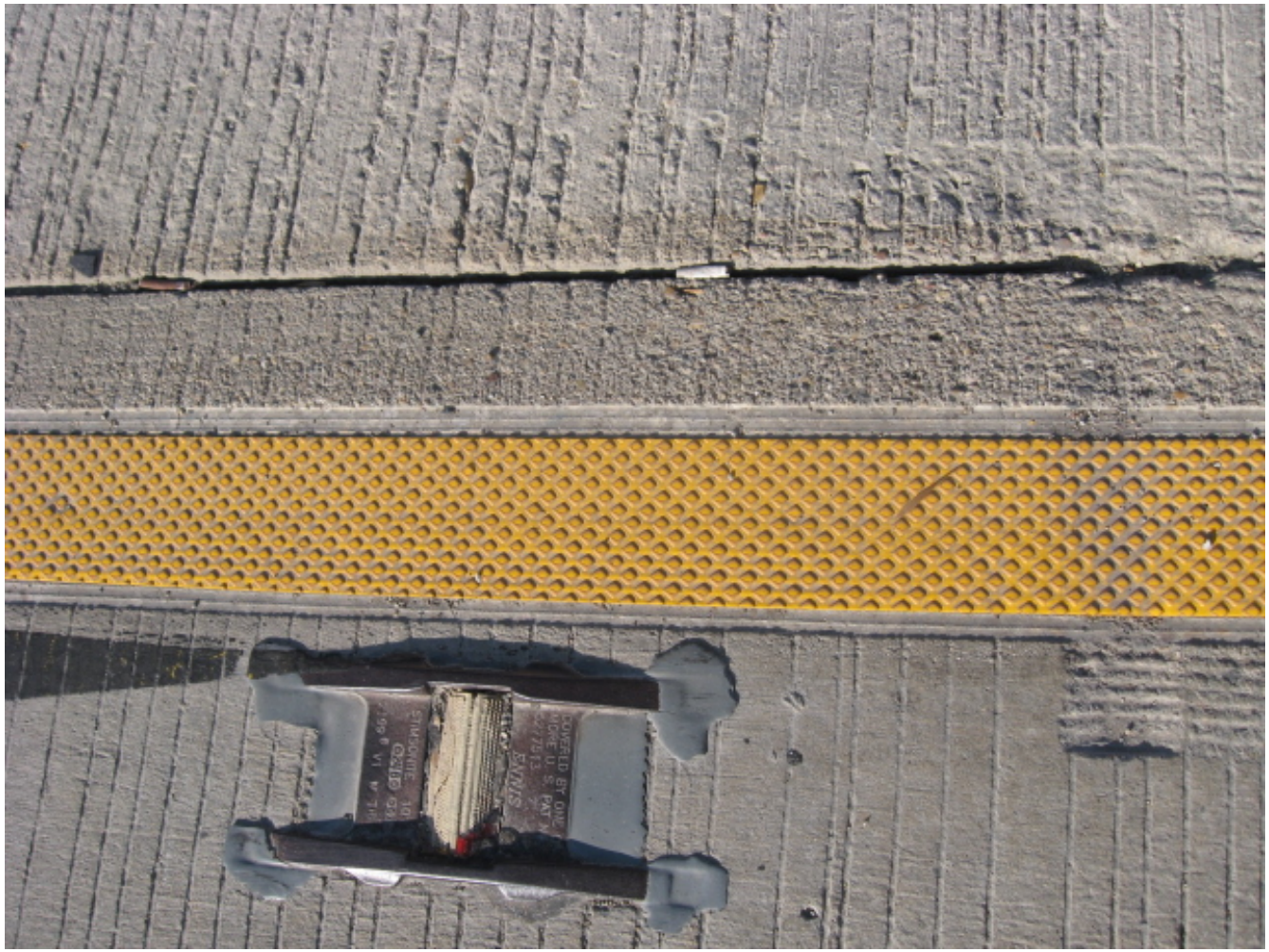
Grooved-in Installation

Grooved-in Installation

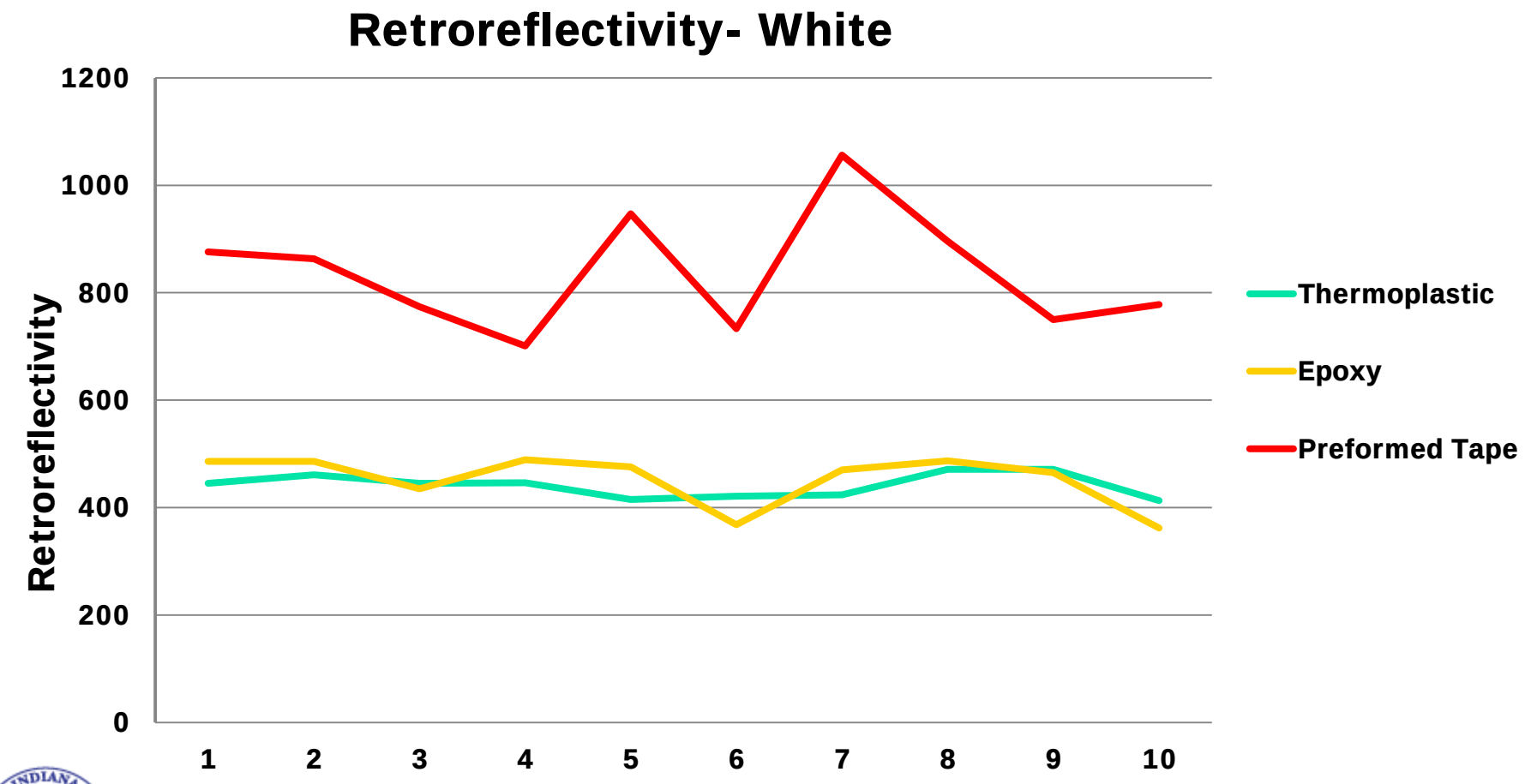
Grooved-in Thermo

Grooved-in Epoxy

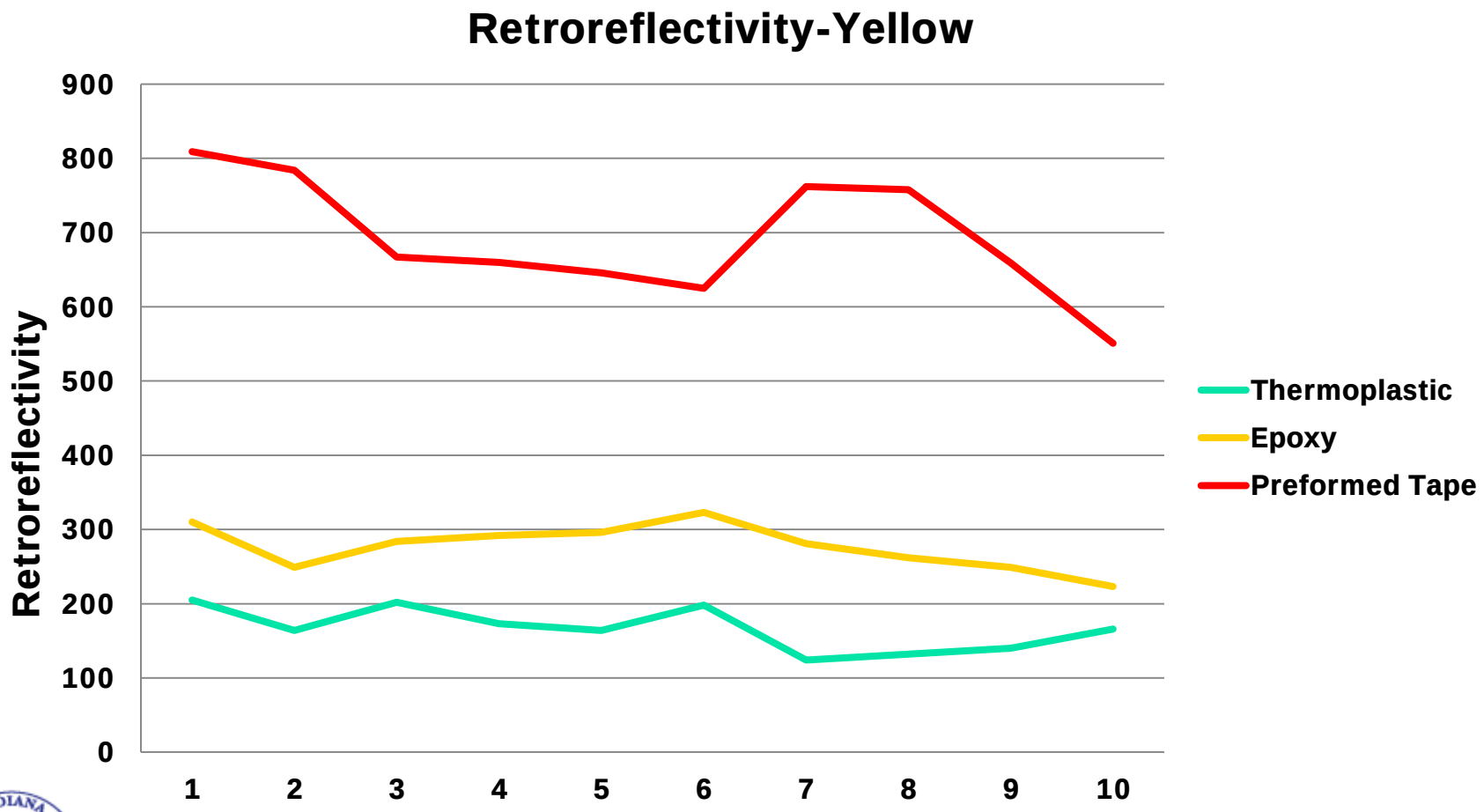
Grooved-in Preformed Tape



INDOT Durable Marking Retroreflectivity



INDOT Durable Marking Retroreflectivity



Questions???

Ting Nahrwold, PE
tnahrwold@indot.IN.gov
(317) 610-7251 ex.292

PK CONTRACTING

MAIN OFFICE
1965 Barrett Drive
Troy, MI 48084-5372
PHONE 248-362-2130
FAX 248-362-4969

To:	_ESTIMATING DEPARTMENT_	**Contact:**	
Address:	-	**Phone:**	
		Fax:	(248) 362-4969
Project Name:	BIRMINGHAM SPECIAL MARKINGS	**Bid Number:**	17-6749
Project Location:	BIRMINGHAM	**Bid Date:**	6/14/2017

Line #	Item #	Item Description	Estimated Quantity	Unit	Unit Price	Total Price
OPTION 1						
Pavement Markings						
1		Pavt Mrkg, Waterborne, 18 Inch, Stop Bar	480.00	LF	$3.8000	$1,824.00
2		Pavt Mrkg, Waterborne, 24 Inch, Crosswalk	2,240.00	LF	$5.5000	$12,320.00
3		Recessing Pavement Markings, Transv	5,200.00	SF	$2.5000	$13,000.00
					Total Price for above Pavement Markings Items:	**$27,144.00**
					Total Price for above OPTION 1 Items:	**$27,144.00**
OPTION 2						
Pavement Markings						
4		Pavt Mrkg, Thermopl, 18 inch, Stop Bar	480.00	LF	$7.0000	$3,360.00
5		Pavt Mrkg, Thermopl, 24 Inch, Crosswalk	2,240.00	LF	$9.0000	$20,160.00
6		Recessing Pavement Markings, Transv	5,200.00	SF	$2.5000	$13,000.00
					Total Price for above Pavement Markings Items:	**$36,520.00**
					Total Price for above OPTION 2 Items:	**$36,520.00**
OPTION 3						
Pavement Markings						
7		Pavt Mrkg, Polyurea, 18 inch, Stop Bar	480.00	LF	$6.0000	$2,880.00
8		Pavt Mrkg, Polyurea, 24 Inch, Crosswalk	2,240.00	LF	$8.0000	$17,920.00
9		Recessing Pavement Markings, Transv	5,200.00	SF	$2.5000	$13,000.00
					Total Price for above Pavement Markings Items:	**$33,800.00**
					Total Price for above OPTION 3 Items:	**$33,800.00**
OPTION 4						
Pavement Markings						
10		Pavt Mrkg, Preformed Thermoplastic, 18 Inch, Stop Bar	480.00	LF	$9.2000	$4,416.00
11		Pavt Mrkg, Preformed Thermoplastic, 24 Inch, Crosswalk	2,240.00	LF	$13.5500	$30,352.00
12		Recessing Pavement Markings, Transv	5,200.00	SF	$2.5000	$13,000.00
					Total Price for above Pavement Markings Items:	**$47,768.00**
					Total Price for above OPTION 4 Items:	**$47,768.00**

Notes:

- **QUOTE IS BASED ON ONE MOVE-IN FOR FINAL MARKINGS.**
- **WORK TO BE DONE IN ACCORDANCE WITH MDOT SPECIFIED APPLICATION RATES INCLUDING GLASS BEADS.**
- **PAYMENT TO BE MADE BASED ON QUOTED UNIT PRICES.**

PK CONTRACTING

MAIN OFFICE
1965 Barrett Drive
Troy, MI 48084-5372
PHONE 248-362-2130
FAX 248-362-4969

To:	_ESTIMATING DEPARTMENT_	**Contact:**	
Address:	-	**Phone:**	
		Fax:	(248) 362-4969
Project Name:	BIRMINGHAM SPECIAL MARKINGS	**Bid Number:**	17-6749
Project Location:	BIRMINGHAM	**Bid Date:**	6/14/2017

ACCEPTED: The above prices, specifications and conditions are satisfactory and are hereby accepted. **Buyer:** _____ **Signature:** _____ **Date of Acceptance:** _____	**CONFIRMED:** **PK CONTRACTING, INC.** **Authorized Signature:** _____ **Estimator:**

********* QUOTATION *********

Hart Pavement Striping

P.O. Box 300998, Waterford, MI 48330
(248) 673-3503 Fax: (248) 673-3438
www.hartpavement.com

Nicholas J. Dupuis
Intern, Planning Department

Email: ndupuis@bhamgov.org
Office: 248-530-1856
Cell: 248-320-1287

Location: City of Birmingham (172 different locations)

SERVICES INCLUDE: Waterborne paint only.

To grind old crosswalks as needed to install 2240 feet of crosswalk (10 intersections) and paint 8 foot by 2 foot, 2 foot skip continental block crosswalks and stripe 480 of stop bar. The price is $$65,000.00.

TOTAL FOR SERVICES LISTED ABOVE: see above

Pricing is for items listed above only. All other items will be charged at an additional cost.
Hart Pavement must approve any additions to or subtractions (including bonds and dues) from the original bid.

All materials are guaranteed to be as specified. All signs are guaranteed to meet standard specifications and MDOT specifications when warranted. All work is to be completed in a workmanlike manner according to standard practices. Any alterations or deviations from specifications, involving extra costs will be executed only upon written order, and will become an extra charge over and above the estimate. All agreements are contingent upon strikes, accidents, acts of God or delays beyond our control. It is assumed the owner to carry fire, tornado, or necessary insurance. We carry, and our workers are fully covered by Worker's Comp and Commercial General Liability Insurance. Any permits, bonds, or dues, if required, are not included unless stated above. Terms are net 20 days. After 20 days-upon completion of the services, a monthly service charge of 1.5% on the unpaid balance will be assessed, unless other written arrangements have been made between both parties involved. Minimum striping charge per trip is $200.00. Due to weather conditions, no guarantee is given on work performed after October 15 and before April 1 of the following year. This bid is null and void after 60 days.

As Submitted by: Dann Hart Date: June 20, 2017

Please send back with P.O. # or Signature: _____

Date: _____

Quotation must be signed & sent back for us to perform work. Faxed copies are acceptable.

R.S. CONTRACTING INC.
PAVEMENT MARKING SPECIALIST

QUOTE: Pavement Marking

JOB DESCRIPTION: City of Birmingham

LINE #	PAY ITEM	QUANTITY	UNIT	UNIT PRICE	$AMOUNT
10	W/B 24" C.W.	2,240.00	FT	$ 3.00	$ 6,720.00
20	W/B 18" S.B.	480.00	FT	$ 2.00	$ 960.00
					$ -
30	EXTRUDE H/P 24" C.W.	2,240.00	FT	$ 6.50	$ 14,560.00
40	EXTRUDE H/P 18" S.B.	480.00	FT	$ 4.75	$ 2,280.00
					$ -
50	P/U 24" C.W.	2,240.00	FT	$ 7.75	$ 17,360.00
60	P/U 18" S.B.	480.00	FT	$ 5.25	$ 2,520.00
					$ -
70	C/P 24" C.W.	2,240.00	FT	$ 9.75	$ 21,840.00
80	C/P 18" S.B.	480.00	FT	$ 7.50	$ 3,600.00
					$ -
					$ -
					$ -
					$ -
	We couldn't start the work untill after 9/15/2017				$ -
					$ -
	The work would only take 2 to 4 days to complete				$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -

TOTAL BID $ 69,840.00

City of Birmingham
A Walkable Community

Jana Ecker <jecker@bhamgov.org>

Fwd: Walk bike on sidewalk signs

1 message

Joe Valentine <jvalentine@bhamgov.org> Fri, Aug 18, 2017 at 3:10 PM
To: Jana Ecker <Jecker@bhamgov.org>
Cc: Paul O'Meara <Pomeara@bhamgov.org>, Scott Grewe <Sgrewe@bhamgov.org>, Mark Clemence <Mclemence@bhamgov.org>, Mark Nickita <mnickita@bhamgov.org>

Jana,

Have the MMTB review this and provide a recommendation for application of use.

Thanks,
Joe
---------- Forwarded message ----------
From: **Mark Nickita** <markforbham@yahoo.com>
Date: Fri, Aug 18, 2017 at 1:28 PM
Subject: Walk bike on sidewalk signs
To: Joe Valentine <jvalentine@bhamgov.org>

J

I saw this in royal oak Today. It is another example of a way that we cAn consider to get the message across regarding the concern of bike riding in our walkable, urban districts and downtown.

I think that this is a tasteful and effective approach. We should consider this as an option in addition to our existing stickers on the black bike loops.

Mark


PEDESTRIAN ZONE
WALK YOUR WHEELS

Mark Nickita, FAIA, CNU, APA
Mayor
City of Birmingham, MI

Like me on Facebook
Mark Nickita

Twitter
@MarkNickita

--
Joseph A. Valentine
City Manager
City of Birmingham
151 Martin Street
Birmingham, MI 48009
(248) 530-1809 Office Direct
(248) 530-1109 Fax
jvalentine@bhamgov.org
Twitter: @JoeValentine151

To get the latest information regarding the City of Birmingham, please sign up for our communication tools by clicking here www.bit.ly/bhamnews.

The 85th Percentile Rule Is Killing Us

By Angie Schmitt | Aug 11, 2017 | 21

Photo: Anthony Quintano/Flickr

Traffic deaths in the U.S. are mounting, reaching more than 40,000 last year, and, according to a recent draft report by the National Transportation Safety Board, speed is *the* overlooked factor.

The NTSB reported that speeding accounts for about 10,000 deaths a year — as many as drunk driving. One of the agency's key recommendation was to change the way streets are designed by reforming the "85th percentile rule," a laissez faire approach that seeks to accommodate motorist behavior instead of engineering streets for safety.

It's an argument that Randy LoBasso at the Bicycle Coalition of Greater Philadelphia has been making for a long time. Now the NTSB report is vindicating advocates' critique of the 85th percentile rule, he writes:

The 85th Percentile idea, based on the 1964 "Solomon Curve" says speed limits should be set at what 85 percent of drivers think is healthy. It was created back when the highway system was still young, cars didn't approach speeds as quickly as they do today, and we didn't have the sort of statistics and research on traffic dangers we do today.

I have long trashed the 85th Percentile speed approach as outdated and never meant for cities. That hasn't stopped some — who feel motor vehicle users should be able to drive as fast as they want — from lashing out at the Bicycle Coalition's rational attempts to curb speed and make streets safer for everyone.

Among [the NTSB's] specific recommendations: "Revise traditional speed-setting standards to balance 85 percentile approaches with safe systems approach that better incorporates crash history, safety of pedestrians, bicyclists."

"In general, there is not strong evidence that the 85th percentile speed within a given traffic flow equates to the speed with the lowest crash involvement rate," the NTSB says. "Alternative approaches and expert systems for setting speed limits are available, which incorporate factors such as crash history and the presence of vulnerable road users such as pedestrians."

More recommended reading today: Pricetags shares some insight from transportation economist Todd Litman about the under-appreciated transportation costs of buying a house in the suburbs. Greater Greater Washington considers the potential drawbacks of diverting cut-through car traffic away from residents streets. And the Raleigh Connoisseur reports that a major increase in bus service goes into effect this week in Wake County, following a November vote to increase the local sales tax half a cent.

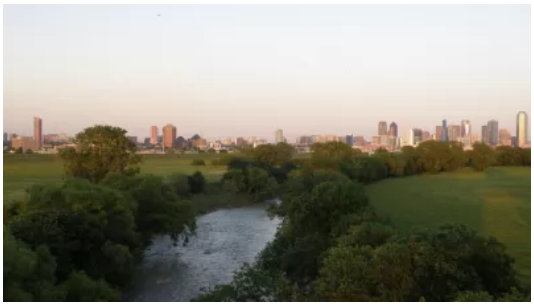
Filed Under: Around the Block, Speed, Promoted

MOST RECENT

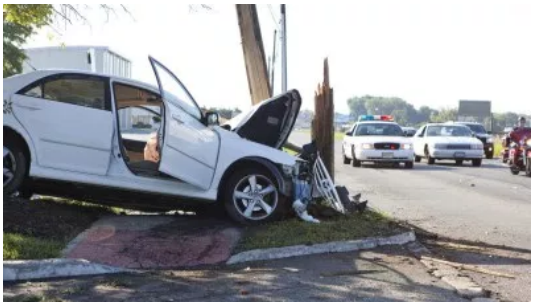
The Summer Heat Can't Melt This Famous Philly "Sneckdown" — It's Here to Stay

These State Lawmakers Indulged the Violent Fantasy of Ramming Protesters With a Car

Today's Headlines



The Woman Who Led a Highway Revolt in Dallas — and Won



The 85th Percentile Rule Is Killing Us

Why doctors support bike lanes: they're healthier for everyone

'Cycling is very effective in promoting good physical and mental health, and it's infrastructure like protected lanes that makes widespread bike use possible.'

Cyclists ride westbound on the Bloor St. cycling lane in Toronto. (BERNARD WEIL / TORONTO STAR) | ORDER THIS PHOTO

By **PETER SAKULS**
SAMANTHA GREEN
Fri., Aug. 11, 2017

Recent polling from the Angus Reid Forum shows an impressive 80 per cent of Torontonians support the construction of a "safe network of bicycle lanes." As physicians, we are not at all surprised by bike lanes' huge popularity. Cycling is very effective in promoting good physical and mental health, and it's precisely infrastructure like protected lanes that makes widespread bike use possible.

In the absence of these lanes, many folks don't feel bicycles are safe. But when we build the lanes, bike ridership soars. In the weeks following the launch of the Bloor Street bike lane, for example, the number of people cycling on the street rose 36 per cent – from 3,300 per day to 4,500, according to data from the City of Toronto.

The claim that bike lanes make cycling safer isn't just anecdotal. It's also backed by solid science. In 2014 Toronto Public Health released its "Healthy Streets Evidence Review," which summarized some of the research in this area. Among its findings:

- A 2009 paper published in the journal Environmental Health compared the risk to cyclists of riding in various places including sidewalks, major roads, and routes with "bicycle facilities" such as bike lanes. Its conclusion: "The presence of bicycle facilities … was associated with the lowest risk."

- A study published in the journal Injury Prevention in 2011 compared injury rates of cyclists on streets with and without cycle tracks (protected bike lanes). Its conclusion: the streets with "cycle tracks had a 28-per-cent lower injury rate."

- A study published in the American Journal of Public Health in 2012 looked at cyclists' injury risks on a variety of routes in Toronto and Vancouver. Conclusion: "Of 14 route types, cycle tracks had the lowest risk … about one-ninth the risk of the reference: major streets with parked cars and no bike infrastructure."

More recently, our organization, Doctors for Safe Cycling, reviewed the very latest research and found it consistent with Toronto Public Health's findings. For instance, a December 2016 paper in the American Journal of Public Health, "Safer Cycling Through Improved Infrastructure," examined cycling in the U.S. and concluded that bike-network expansion is associated with a 25-75 per cent decrease in the number of crashes and a 43-79 per cent reduction in fatalities and severe injuries.

Importantly, the authors note that cyclists are safest when protected from cars by a physical barrier: "It is not simply a matter of expanding bicycle infrastructure… The specific type of bicycle infrastructure matters. Several studies show the crucial importance of physical separation of cycling facilities from motor vehicle traffic on heavily traveled roads."

As physicians, we want to see Toronto build its cycling network right across the city. But that means more than just painting lines on the pavement. It means creating lanes in which cyclists are physically separated from automobiles by "flexi-posts," raised curbs or planters.

Cycling is beneficial to many aspects of health. A study published in the prestigious British Medical Journal in April 2017 showed some remarkable outcomes: people who cycle to work have a much lower risk of getting heart disease (by 50 per cent), of getting cancer (by 40 per cent) and of dying of any cause (by 40 per cent). Other studies have reached similar conclusions.

Of course the benefits are not restricted to cyclists themselves. As we move folks from four wheels to two we also improve air quality and tackle climate change – which is a boon to everyone.

But in order to attain these marvelous outcomes we need to get residents – in increasing numbers – to make cycling a part of their everyday routine. And that means instituting changes in our road system – including reducing speed limits and building separated cycle tracks – so that getting on a bike doesn't mean risking your life.

*Dr. **Peter Sakuls** and Dr. **Samantha Green** are Toronto physicians and co-founders of Doctors for Safe Cycling.*