



## CITY of NOVI CITY COUNCIL

Agenda Item C  
October 11, 2010

**SUBJECT:** Approval of 1) Traffic Control Order 10-39 for the implementation of a 35 mph speed limit on Meadowbrook Road between 12 Mile Road and 13 Mile Road, 2) Traffic Control Order 10-48 to rescind existing Traffic Control Order 98-12 for a permanent 25 mph speed limit adjacent to Meadowbrook Elementary School, and 3) Traffic Control Order 10-40 for the implementation of a 25 mph school speed limit on Meadowbrook Road from 500 feet north of the Meadowbrook Elementary School driveway to 200 feet south of the Meadowbrook Elementary School driveway on school days only during the periods of 8:27 AM to 8:57 AM and 3:45 PM to 4:30 PM.

**SUBMITTING DEPARTMENT:** Department of Public Services, Engineering Division *BTC*

**CITY MANAGER APPROVAL:** *[Signature]* *RJA*

**BACKGROUND INFORMATION:**

A recommendation to revise the speed limit on Meadowbrook Road from 12 Mile Road to 13 Mile Road was discussed at the August 23, 2010 City Council meeting and was postponed so that additional information regarding pedestrians could be provided. Additional study of pedestrian safety as it relates to the proposed increase in the posted speed limits was conducted by the City's traffic consultants, Birchler Arroyo. The report (see Birchler's September 20, 2010 report, attached) confirms the original recommendation to increase the posted speed limit.

As discussed in the attached September 29, 2010 memo, the majority of the pedestrians along Meadowbrook Road are students that are walking to and from school. There is a marked crosswalk on Meadowbrook Road at Meadowbrook Elementary and a crossing guard is present during school arrival and dismissal times. The existing 25 mph speed limit near the school was established in 1998 at the request of the Superintendent of Schools at the time with the intent that it be in effect during school hours. However, the posted sign and the traffic control order did not reference specific hours and is in effect all day, every day (see Birchler Arroyo report, attached). A review of the school zone was included in the speed study and the report continues to recommend a 25 mph zone (the minimum allowed by statute) adjacent to the school, during school hours. Staff has discussed the proposed school speed zones with Walled Lake Schools and the Superintendent has provided the enclosed August 16, 2010 letter.

The review of the speed limit was initiated when a recent audit of the City's traffic control sign inventory identified a number of posted speed limits that lack traffic control orders for enforcement of the speed. The Uniform Traffic Code requires that traffic control orders, as issued by the traffic engineer and approved by the City Council, be on file for the enforcement of traffic control signs. As such, an engineering study was performed to establish a legal speed limit as required by the Michigan Manual of Uniform Traffic Control Devices (MMUTCD) (see Birchler Arroyo study dated May 3, 2010). Speed limits are generally set using the 85th percentile speed, which is the speed at or below which 85

percent of the motorists drive on a given road when unaffected by slower traffic or poor weather.

A key underlying principle in the establishment of a speed limit is that motorists will tend to drive at the speeds they feel comfortable regardless of the posted speed limit. The most effective way to decrease the observed speeds is to change the physical characteristics of the road (i.e. lane width, geometry, design speed, road side environment, traffic calming measures, etc.) to prompt a change in driver behavior. The collected data indicates that drivers on this section of Meadowbrook Road feel comfortable driving at 35 mph based on the design of the road.

The posted speed limit on Meadowbrook Road between 12 Mile Road and 13 Mile Road is currently 25 mph between Meadowbrook Elementary and 13 Mile Road and 30 mph south of the school to 12 Mile Road. There is not a traffic control order on file for the 30 mph posted speed on Meadowbrook Road between 12 Mile Road and Meadowbrook Elementary. A speed limit of 35 mph is proposed to represent existing driver behavior on this segment as demonstrated by the measured 85<sup>th</sup> percentile speeds and shown in the following table.

<b>Segment</b>	<b>Current Posted Speed Limit</b>	<b>85<sup>th</sup> Percentile Speed</b>	<b>Recommended Posted Speed Limit</b>
12 Mile Road to Meadowbrook Elem	30	36	35
13 Mile Road to Meadowbrook Elem	25	36	35

The existing 25 mph speed limit near the school was established in 1998 at the request of the Superintendent of Schools at the time with the intent that it be in effect during school hours. However, the posted sign and the traffic control order did not reference specific hours and is in effect all day, every day (see Birchler Arroyo report, attached). A review of the school zone was included in the speed study and the report continues to recommend a 25 mph zone (the minimum allowed by statute) adjacent to the school, during school hours. Staff has discussed the proposed school speed zones with Walled Lake Schools and the Superintendent has provided the enclosed August 16, 2010 letter.

As discussed in the attached August 10, 2010 and September 29, 2010 memos regarding the proposed speed limit changes, an increase in the posted speed to match the 85<sup>th</sup> percentile speed does not significantly increase the 85<sup>th</sup> percentile speed when the posted speed limit is increased. In reviewing the segments on which the speed limits were increased in 2009, the 85<sup>th</sup> percentile speed increased an average of 0.8 mph. In accordance with Department of Public Service's standard procedures, within one year after implementation of new speed limits, staff will collect speed samples to verify that the new posted speed limit continues to reflect the 85<sup>th</sup> percentile speed.

The new speed limit signs would meet the federal retroreflectivity requirements and would be funded by the Traffic Control Sign Replacement Program as approved in the FY2010-11 budget.

**RECOMMENDED ACTION:** Approval of 1) Traffic Control Order 10-39 for the implementation of a 35 mph speed limit on Meadowbrook Road between 12 Mile Road and 13 Mile Road, 2) Traffic Control Order 10-48 to rescind existing Traffic Control Order 98-12 for a permanent 25 mph speed limit adjacent to Meadowbrook Elementary School, and 3) Traffic Control Order 10-40 for the implementation of a 25 mph school speed limit on Meadowbrook Road from 500 feet north of the Meadowbrook Elementary School driveway to 200 feet south of the Meadowbrook Elementary School driveway on school days only during the periods of 8:27 AM to 8:57 AM and 3:45 PM to 4:30 PM.

	1	2	Y	N
Mayor Landry				
Mayor Pro Tem Gatt				
Council Member Crawford				
Council Member Fischer				

	1	2	Y	N
Council Member Margolis				
Council Member Mutch				
Council Member Staudt				

**CITY OF NOVI  
TRAFFIC CONTROL ORDER**

  X   SPEED  
       PARKING  
       OTHER

DATE OF ORDER: October 4, 2010

CONTROL NUMBER: 10-39

PURSUANT TO CHAPTER NO. 33 OF THE CODE OF ORDINANCES OF THE CITY OF NOVI, MICHIGAN, SAME BEING THE UNIFORM TRAFFIC CODE FOR CITIES, TOWNSHIPS AND VILLAGES OF MICHIGAN AND IN THE INTEREST OF PUBLIC SAFETY AND CONVENIENCE THE FOLLOWING TRAFFIC CONTROL ORDER IS HEREBY ISSUED BY BRIAN COBURN, SENIOR CIVIL ENGINEER, DULY AUTHORIZED AS TRAFFIC ENGINEER, BY SEC. 33.141 OF THE AFORESAID CHAPTER.

ISSUANCE OF THIS TRAFFIC CONTROL ORDER WAS PRECEDED BY STUDY AND INVESTIGATION OF TRAFFIC CONDITIONS ON THE FOLLOWING PUBLIC ROAD OR ROADS IN THE CITY OF NOVI, MICHIGAN.

**MEADOWBROOK ROAD**

AND AFTER SAID INVESTIGATION, IT IS HEREBY ORDERED AND DIRECTED THAT THE DEPARTMENT OF PUBLIC SERVICES ERECT AND MAINTAIN THE SPEED LIMIT SIGN (S) IN ACCORDANCE WITH THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES AS REQUIRED BY SEC. 33.217 OF THE AFORESAID CHAPTER, SAID SIGNS TO GIVE NOTICE OF THE FOLLOWING DETERMINATION:

**SPEED LIMIT FOR MEADOWBROOK ROAD BETWEEN 12 MILE ROAD AND 13 MILE ROAD TO BE 35 MPH EXCEPT FOR THE SCHOOL SPEED ZONE AS ESTABLISHED BY TCO 10-40.**



\_\_\_\_\_  
Brian Coburn, P.E. - Traffic Engineer

Dated: October 4, 2010

**APPROVED BY CITY COUNCIL**

TRAFFIC CONTROL ORDER NUMBER 10-39 HAVING BEEN PRESENTED TO THE COUNCIL OF THE CITY OF NOVI, MICHIGAN FOR STUDY AND APPROVAL, IS HEREBY APPROVED AND IT IS HEREBY ORDERED AND DIRECTED THAT THIS ORDER BE FILED IN THE OFFICE OF THE CITY CLERK AND A COPY THEREOF IN THE OFFICE OF THE CHIEF OF POLICE OF SAID CITY.

IT IS FURTHER ORDERED AND DIRECTED THAT THIS ORDER SHALL BECOME EFFECTIVE UPON BEING FILED WITH THE CLERK AND UPON ERECTION OF ADEQUATE SIGNS GIVING NOTICE OF THE EXISTENCE OF AFORESAID.

**SPEED LIMIT FOR MEADOWBROOK ROAD BETWEEN 12 MILE ROAD AND 13 MILE ROAD TO BE 35 MPH EXCEPT FOR THE SCHOOL SPEED ZONE AS ESTABLISHED BY TCO 10-40.**

ADOPTED AT THE REGULAR MEETING OF  
CITY COUNCIL ON October 11, 2010.

By: \_\_\_\_\_  
David Landry, Mayor

By: \_\_\_\_\_  
Maryanne Cornelius, Clerk



**CITY OF NOVI  
TRAFFIC CONTROL ORDER**

  X   SPEED  
       PARKING  
       OTHER

DATE OF ORDER:   October 4, 2010  

CONTROL NUMBER:   10-48  

PURSUANT TO CHAPTER NO. 33 OF THE CODE OF ORDINANCES OF THE CITY OF NOVI, MICHIGAN, SAME BEING THE UNIFORM TRAFFIC CODE FOR CITIES, TOWNSHIPS AND VILLAGES OF MICHIGAN AND IN THE INTEREST OF PUBLIC SAFETY AND CONVENIENCE THE FOLLOWING TRAFFIC CONTROL ORDER IS HEREBY ISSUED BY BRIAN COBURN, SENIOR CIVIL ENGINEER, DULY AUTHORIZED AS TRAFFIC ENGINEER, BY SEC. 33.141 OF THE AFORESAID CHAPTER.

ISSUANCE OF THIS TRAFFIC CONTROL ORDER WAS PRECEDED BY STUDY AND INVESTIGATION OF TRAFFIC CONDITIONS ON THE FOLLOWING PUBLIC ROAD OR ROADS IN THE CITY OF NOVI, MICHIGAN.

**MEADOWBROOK ROAD**

AND AFTER SAID INVESTIGATION, IT IS HEREBY ORDERED AND DIRECTED THAT THE DEPARTMENT OF PUBLIC SERVICES ERECT AND MAINTAIN THE SPEED LIMIT SIGN (S) IN ACCORDANCE WITH THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES AS REQUIRED BY SEC. 33.217 OF THE AFORESAID CHAPTER, SAID SIGNS TO GIVE NOTICE OF THE FOLLOWING DETERMINATION:

**TO RESCIND TRAFFIC CONTROL ORDER 98-12 FOR 25 MPH SPEED LIMIT ON MEADOWBROOK RD BETWEEN 13 MILE ROAD AND A POINT 1/2 MILE SOUTH OF MEADOWBROOK ELEMENTARY SCHOOL**

  
\_\_\_\_\_  
Brian Coburn, P.E. - Traffic Engineer

Dated:   October 4, 2010  

**APPROVED BY CITY COUNCIL**

TRAFFIC CONTROL ORDER NUMBER 10-48 HAVING BEEN PRESENTED TO THE COUNCIL OF THE CITY OF NOVI, MICHIGAN FOR STUDY AND APPROVAL, IS HEREBY APPROVED AND IT IS HEREBY ORDERED AND DIRECTED THAT THIS ORDER BE FILED IN THE OFFICE OF THE CITY CLERK AND A COPY THEREOF IN THE OFFICE OF THE CHIEF OF POLICE OF SAID CITY.

IT IS FURTHER ORDERED AND DIRECTED THAT THIS ORDER SHALL BECOME EFFECTIVE UPON BEING FILED WITH THE CLERK AND UPON ERECTION OF ADEQUATE SIGNS GIVING NOTICE OF THE EXISTENCE OF AFORESAID,

**TO RESCIND TRAFFIC CONTROL ORDER 98-12 FOR 25 MPH SPEED LIMIT ON MEADOWBROOK RD BETWEEN 13 MILE ROAD AND A POINT 1/2 MILE SOUTH OF THE ELEMENTARY SCHOOL**

ADOPTED AT THE REGULAR MEETING OF  
CITY COUNCIL ON   October 11, 2010  .

By: \_\_\_\_\_  
David Landry, Mayor

By: \_\_\_\_\_  
Maryanne Cornelius, Clerk

**CITY OF NOVI  
TRAFFIC CONTROL ORDER**

  X   SPEED  
       PARKING  
       OTHER

DATE OF ORDER: October 4, 2010  
CONTROL NUMBER: 10-40

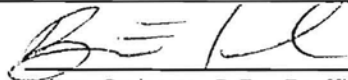
PURSUANT TO CHAPTER NO. 33 OF THE CODE OF ORDINANCES OF THE CITY OF NOVI, MICHIGAN, SAME BEING THE UNIFORM TRAFFIC CODE FOR CITIES, TOWNSHIPS AND VILLAGES OF MICHIGAN AND IN THE INTEREST OF PUBLIC SAFETY AND CONVENIENCE THE FOLLOWING TRAFFIC CONTROL ORDER IS HEREBY ISSUED BY BRIAN COBURN, SENIOR CIVIL ENGINEER, DULY AUTHORIZED AS TRAFFIC ENGINEER, BY SEC. 33.141 OF THE AFORESAID CHAPTER.

ISSUANCE OF THIS TRAFFIC CONTROL ORDER WAS PRECEDED BY STUDY AND INVESTIGATION OF TRAFFIC CONDITIONS ON THE FOLLOWING PUBLIC ROAD OR ROADS IN THE CITY OF NOVI, MICHIGAN.

**MEADOWBROOK ROAD**

AND AFTER SAID INVESTIGATION, IT IS HEREBY ORDERED AND DIRECTED THAT THE DEPARTMENT OF PUBLIC SERVICES ERECT AND MAINTAIN THE SPEED LIMIT SIGN (S) IN ACCORDANCE WITH THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES AS REQUIRED BY SEC. 33.217 OF THE AFORESAID CHAPTER, SAID SIGNS TO GIVE NOTICE OF THE FOLLOWING DETERMINATION:

**SCHOOL SPEED LIMIT ON MEADOWBROOK FROM 500 FEET NORTH OF THE MEADOWBROOK ELEMENTARY SCHOOL DRIVEWAY TO 200 FEET SOUTH OF SAID DRIVEWAY ON SCHOOL DAYS ONLY DURING THE PERIOD OF 8:27 AM TO 8:57 PM AND 3:45 PM TO 4:30 PM.**

  
\_\_\_\_\_  
Brian Coburn, P.E. - Traffic Engineer  
Dated: October 4, 2010

**APPROVED BY CITY COUNCIL**

TRAFFIC CONTROL ORDER NUMBER 10-40 HAVING BEEN PRESENTED TO THE COUNCIL OF THE CITY OF NOVI, MICHIGAN FOR STUDY AND APPROVAL, IS HEREBY APPROVED AND IT IS HEREBY ORDERED AND DIRECTED THAT THIS ORDER BE FILED IN THE OFFICE OF THE CITY CLERK AND A COPY THEREOF IN THE OFFICE OF THE CHIEF OF POLICE OF SAID CITY.

IT IS FURTHER ORDERED AND DIRECTED THAT THIS ORDER SHALL BECOME EFFECTIVE UPON BEING FILED WITH THE CLERK AND UPON ERECTION OF ADEQUATE SIGNS GIVING NOTICE OF THE EXISTENCE OF AFORESAID,

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ADOPTED AT THE REGULAR MEETING OF  
CITY COUNCIL ON October 11, 2010.

By: \_\_\_\_\_  
David Landry, Mayor

By: \_\_\_\_\_  
Maryanne Cornelius, Clerk



## Walled Lake Consolidated Schools

William A. Hamilton, Ed.D.  
Superintendent of Schools

Educational Services Center  
850 Ladd Road, Building D  
Walled Lake, MI 48390  
Phone: 248/956-2000  
Fax: 248/956-2123

August 16, 2010

Brian T. Coburn, P.E.  
Engineering Division, Department of Public Services  
City of Novi  
26300 Delwal Drive  
Novi, MI 48375  
[bcoburn@cityofnovi.org](mailto:bcoburn@cityofnovi.org)

**Subject: School Speed Zone on Meadowbrook Road, 12 Mile Road to 13 Mile Road**

Dear Mr. Coburn,

We have been advised of the proposed speed limit changes on Meadowbrook Road between 12 and 13 Mile Roads, which includes the portion of roadway in front of Meadowbrook Elementary School.

We request a 25 mph school speed zone be designated on that portion of roadway in front of Meadowbrook Elementary School and that signage be installed to properly designate this school speed zone.

Thank you for your assistance and please contact me with any additional questions.

Sincerely,

A handwritten signature in cursive script that reads 'William A. Hamilton'.

William A. Hamilton, Ed.D.  
Superintendent of Schools



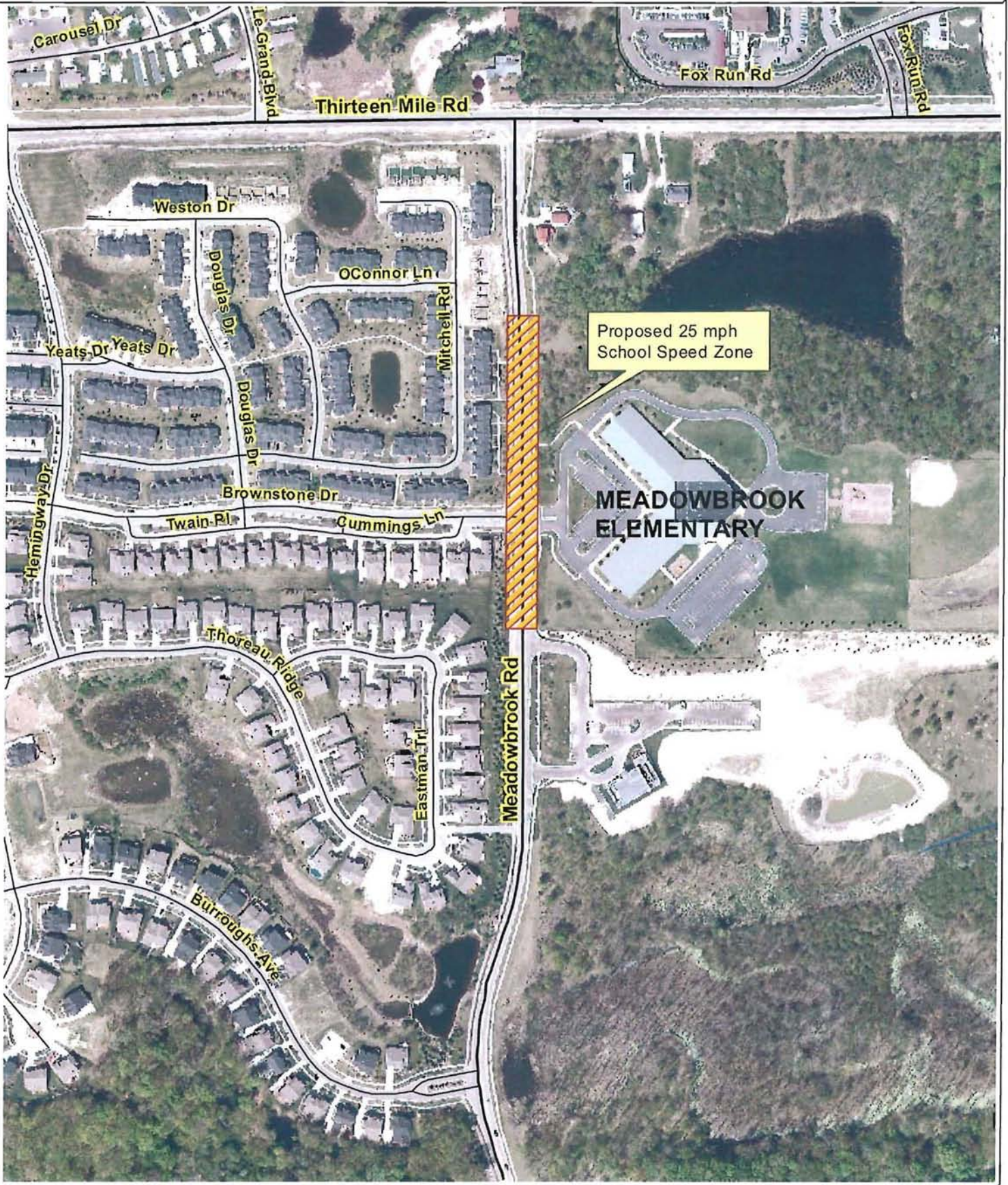
**MAP INTERPRETATION NOTICE**

Map information depicted is not intended to replace or substitute for any official or primary source. This map was intended to meet National Map Accuracy Standards and use the most recent, accurate sources available to the people of the City of Novi. Boundary measurements and area calculations are approximate and should not be construed as survey measurements performed by a licensed Michigan Surveyor as defined in Michigan Public Act 132 of 1970 as amended. Please contact the City GIS Manager to confirm source and accuracy information related to this map.

# City of Novi



## Meadowbrook School Speed Zone





## MEMORANDUM



TO: ROB HAYES, P.E.; DIRECTOR OF PUBLIC SERVICES  
FROM: BRIAN COBURN, P.E.; ENGINEERING MANAGER *BIC*  
SUBJECT: PROPOSED SPEED LIMIT CHANGES  
MEADOWBROOK ROAD AND NOVI ROAD NEAR SCHOOLS  
DATE: SEPTEMBER 29, 2010

*9/30/10*  
*To Hayes 10/1/10*  
*Conrad Coburn*

*File*  
*[Signature]*

This memo is to provide additional information regarding the proposed speed limits for Novi Road between 12 Mile Road and 14 Mile Road and Meadowbrook Road between 12 Mile Road and 13 Mile Road. The proposed speed limits for these segments were discussed during the August 23, 2010 City Council meeting and additional information was requested regarding pedestrians in these areas. Specifically, we requested that our traffic consultant, Birchler Arroyo, review pedestrian safety as it relates to an increase in the posted speed limits. The enclosed report, dated September 20, 2010, provides additional detail.

The enclosed report confirms the original recommendation to increase the posted speed limit to meet the observed 85<sup>th</sup> percentile speed (i.e. the speed at which or below 85 percent of the vehicles are currently traveling). The original report recommended that the school speed zone be in effect between 8:27 AM and 8:57 AM for arrival and 4:00 PM and 4:30 PM for dismissal. The enclosed report recommends a modification in the school speed zone times to account for the early dismissal of walking students at 3:45 PM and recommends that the school speed zone being effect between the hours of 3:45 PM and 4:15 PM for dismissal.

Some highlights from the additional study are as follows:

- The American Association of State Highway and Transportation Officials (AASHTO) in its 2004 publication titled, *Guide for the Planning, Design, and Operation of Pedestrian Facilities* states that "motorists will tend to drive at the speeds they feel comfortable...regardless of the posted speed limit." The most effective way to decrease the observed speed is to change the physical characteristics of the road (i.e. lane width, geometry, design speed, roadside environment, traffic calming, etc.) to prompt a change in driver behavior that makes them drive at slower speeds.
- \* The crosswalk at Hickory Woods (Novi Road) is signalized and functions seven days a week between the hours of 6 AM and 9 PM to facilitate pedestrian crossing of Novi Road.
- X The proposed school speed zone on Novi Road should result in decreased speeds during arrival and dismissal times for Hickory Woods Elementary School and would maintain the existing posted speed during arrival and dismissal at Meadowbrook Elementary School.
- X There is currently sufficient signage to warn of pedestrians at the marked crosswalks in these locations.
- X Sidewalks and pathways along these segments are largely located at a distance greater than the minimum recommended distance from the road.
- The crash history was reviewed and no crashes were found to involve sidewalks, pathways, or crosswalks.

→

- There was a limited amount of pedestrian activity observed outside of school hours (2 to 4 per hour per direction and 3 to 5 per hour per direction on Meadowbrook Road and Novi Road, respectively).
- The existing safety provisions (signalized crosswalk, walks located a safe distance from road, signage, etc.) along with the proposed school speed zones and existing crossing guards provide an adequate level of protection for pedestrian traffic during school hours.

The report concludes that recommended speed limits for Meadowbrook Road and Novi Road are not expected to result in significant increases in the prevailing speed. This conclusion is supported by the data presented in our August 10, 2010 memo (attached) that demonstrates that the observed 85<sup>th</sup> percentile speed on Cabot Drive, Lewis Drive, Beck Road, and Eleven Mile Road increased an average of 0.8 miles per hour after the posted speed limit was increased to meet the observed 85<sup>th</sup> percentile speed. The report also concludes that while there is a limited amount of pedestrian activity observed outside of school hours, those pedestrians can safely and comfortably use the pathways adjacent to these roads.

We propose to present the traffic control orders for the speed limit recommendations for consideration by City Council on an upcoming agenda.

cc: David Molloy, Director of Public Safety/Chief of Police



September 20, 2010

Brian T. Coburn, P.E.  
Engineering Div., Dept. of Public Services  
City of Novi  
26300 Delwal Drive  
Novi, MI 48375  
[bcoburn@cityofnovi.org](mailto:bcoburn@cityofnovi.org)



**Subject: Pedestrian Considerations Relative to Speed Limits on Novi and Meadowbrook Roads**

Dear Mr. Coburn:

As you know, we completed separate speed studies for Meadowbrook Road between 12 and 13 Mile, and Novi Road between 12 and 14 Mile, on May 3, 2010 and May 13, 2010, respectively. In each study report, we cited – among "other factors that may be considered" (per the *Michigan Manual of Uniform Traffic Control Devices*) – "parking and pedestrian activity."

Pedestrian activity was not, however, specifically addressed in either study. A City Council member has asked that it be addressed prior to taking action on the recommended speed limit increases. At your request, we conducted the additional study documented herein.

#### **Recommendations**

1. The recommendations in our May 3 and May 13 speed studies should be followed.
2. To adhere to MMUTCD guidelines, no additional pedestrian-related signage should be installed.
3. The school speed zones during dismissal times should apply from 3:45-4:30 p.m.

#### **Data Collection and Analysis**

Per our August 25 proposal, the additional study consisted of:

- A literature search on pedestrian safety as a function of sidewalk location and the speed of traffic.
- An inventory of the width, location, and condition of existing sidewalks, safety paths, and crosswalks.
- A reexamination of the accident history to identify any incidents involving pedestrians or bicycles.
- Observations during the afternoon and evening to determine existing sidewalk and crosswalk use.

Results relative to each of the above subject areas are discussed in the following sections.

**Pedestrian Safety as a Function of Sidewalk Offset from Road** – A brief literature search was made relative to pedestrian safety as a function of sidewalk location and the speed of nearby traffic. Key findings are summarized as follows:

- The Institute of Transportation Engineers, in its 1984 publication entitled *Guidelines for Urban Major Street Design*, states that "The placement of the sidewalk in the right-of-way will also affect the design width. Normally, sidewalks are located near the property line...[but] sometimes the sidewalk is

placed next to the curb. If so, the walk should be widened [typically by at least two feet] to afford more safety to the pedestrian." Continuing on page 55, "Curb walks are not a good practice in terms of pedestrian safety and comfort. To the degree practical, a walk setback of at least 5 feet and desirably 10 feet... is needed to:

- 1) Reduce "splashing" of pedestrians.
  - 2) Minimize hazard of stumbling or being pushed (as by children in play).
  - 3) Provide clearance from snow windrows in northern climates.
  - 4) Reduce step-down at driveways.
  - 5) Provide space for utilities and traffic signs.
- The Federal Highway Administration, in its 1992 publication entitled *Safety Effectiveness of Highway Design Features – Volume VI: Pedestrians and Bicyclists*, identifies 13 distinct pedestrian accident types reflected in large research data bases. Most pedestrian accidents in urban and suburban areas involve pedestrians walking in or across the roadway. Only one type appears potentially related to sidewalk location: "Walking Along the Roadway" – defined as a "pedestrian struck while walking along the edge of the highway or on the shoulder, and representing only 1% of all pedestrian accidents. No mention is made of pedestrian hazard as a function of the lateral offset from moving traffic, with or without a curb. Later (on page 11), it is noted that 1988 survey results from 48 state and local highway agencies placed the following condition at the top of the list of conditions where sidewalks are considered most beneficial: "Suburban streets, particularly those with moderate to high pedestrian volumes or with high traffic volumes or speeds" (high speed is defined as 50 mph and above).
- The American Association of State Highway and Transportation Officials, in its 2004 publication entitled *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, reminds us that "Motorists will tend to drive at the speeds they feel comfortable... regardless of the posted speed limit." Also (on page 50), "Lowering the posted speed limit below the 85<sup>th</sup> percentile speed... will only increase the number of speed limit violations, with little or no effect on the actual prevailing speeds..." And, "If the anticipated 85<sup>th</sup> percentile speed... is inconsistent with the anticipated level of pedestrian activity or other factors in the roadway environment, then an effective method to reduce prevailing speeds may be to reduce the roadway design speed and modify the roadway geometrics accordingly" (by reducing lane widths or implementing other traffic calming actions). Finally (on page 59), AASHTO states that "In areas where there is no on-street parking or bike lane, the 'ideal' width of planting strip [for separating pedestrians from traffic] is 6 ft." This latter guidance appears inconsistent, however, with the urban arterial section of the 2004 AASHTO "Green Book" (*A Policy on Geometric Design of Highways and Streets*), which states (on page 479) that "the minimum border [between road and sidewalk] should be 8 ft wide and preferably 12 ft or more."

In summary, no data were found indicating the degree of pedestrian hazard, let alone pedestrian comfort, resulting from alternative sidewalk setbacks from the traveled way. While maximizing sidewalk setback is ideal – at least away from intersections – it appears that practical minimum setbacks of 6-12 ft are typical for suburban roads with typical suburban arterial speeds (i.e., 35-50 mph).

**Sidewalk Inventory** – Based on spot samples collected on-foot along the three miles of road, the width, setback, and condition of existing sidewalks and safety paths were inventoried. The inventory for Meadowbrook Road is summarized in Table 1, and the inventory for Novi Road is summarized in Table 2. Highlights are as follows:



**Table 1. Sidewalk / Safety Path Inventory for Meadowbrook Road, 12-13 Mile Roads**

Location (listed north to south)	West Side of Road			East Side of Road		
	Width (ft)	Setback (ft) <sup>1</sup>	Pavement <sup>2</sup> / Condition	Width (ft)	Setback (ft) <sup>1</sup>	Pavement <sup>2</sup> / Condition
13 Mile to school drive	8	6	Asphalt / Fair	5	Variable, 5½ +	Concrete / Fair
Church frontage	8	5½	Asphalt / Fair	5	18 <sup>3</sup>	Concrete / Good
Vicinity of Burroughs Ave.	8	6½	Asphalt / Fair	5	6½	Concrete / Fair
Top of hill south of Burroughs Ave.	8	6	Asphalt / Good	5	6	Concrete / Good
Field North of Agr. Exper. Stn. (AES)	8	19	Asphalt / Good	5	5½	Concrete / Good
Adjacent to north parking lot of AES	8	6	Asphalt / Good	5	5½	Concrete / Good
By rail-equipped AES boardwalk	8	3½ - 4½	Wood / Fair	5	5½	Concrete / Good
Adjacent to AES wetland	8	6	Asphalt / Good	5	5½	Concrete / Good

<sup>1</sup> From face of roadway curb to near edge of walk or path.

<sup>2</sup> Asphalt = asphaltic concrete and Concrete = Portland cement concrete

<sup>3</sup> Original walk nearer road, shown in Figure 3 of the May 3, 2010 speed study report, was replaced (with a walk having a greater setback) when road was widened to extend center left-turn lane further south to serve church driveway.

- ❑ A continuous 8-ft-wide asphalt safety path is found along the west side of Meadowbrook Road, and a continuous 5-ft concrete sidewalk is found along the east side of that road. The predominant path setback from the traveled way is 6 ft (plus or minus ½ ft), although 18-19 ft setbacks exist on the immediate frontages of the church and agricultural experiment station field. Based on the literature search cited above – as well as engineering judgment – a nominal sidewalk setback of 6 ft appears to be an acceptable minimum for a two-lane minor arterial such as Meadowbrook, given its relatively low speeds (35 mph or less) and relatively low traffic volumes (less than 4,000 vehicles per day).
- ❑ An 8-ft-wide asphalt safety path is found along the west side of Novi Road between 12 Mile and Old Novi Roads, and between 13 Mile and 14 Mile Roads. Along the intermediate section on the west side, and on all of the east side, there is a 5-ft wide concrete sidewalk. The predominant path setback from the traveled way is 9-10 ft, although setbacks as large as 20-22 ft exist in places. Based on the above review, these setbacks slightly to significantly exceed the 8-12-ft setbacks considered desirable along an “urban arterial” (i.e., a multi-lane road serving moderate volumes at moderate speeds of generally less than 50 mph).
- ❑ Well-marked crosswalks exist on Meadowbrook Road at 12 Mile, Meadowbrook Elementary, and 13 Mile, and on Novi Road at 12 Mile, Old Novi / Sandstone, 13 Mile, Hickory Woods Elementary, and 14 Mile. All but the crossing at Meadowbrook Elementary are aided by signals, and the one at that school is aided by a crossing guard during the school's arrival and dismissal times.

**Table 2. Sidewalk / Safety Path Inventory for Novi Road, 12-14 Mile Roads**

Location (listed north to south)	West Side of Road			East Side of Road		
	Width (ft)	Setback (ft) <sup>1</sup>	Pavement <sup>2</sup> / Condition	Width (ft)	Setback (ft) <sup>1</sup>	Pavement <sup>2</sup> / Condition
Shopping center frontage	8	10	Asphalt / Fair	5	10 - 21½	Concrete / Good
Shopping center to school	8	9 - 10	Asphalt / Fair	5	10	Concrete / Fair to Good
School frontage	8	9	Asphalt / Fair	5	10	Concrete / Fair to Good
Just south of school	8	10½	Asphalt / Fair	5	10	Concrete / Fair to Good
From Wimbledon to Berkshire	8	29	Asphalt / Good	5	9	Concrete / Fair to Good
First few hundred ft north of 13 Mile	8	Several feet behind guardrail	Asphalt / Good	5	Several feet behind guardrail	Concrete / Fair to Good
First few hundred ft south of 13 Mile	5 <sup>3</sup>	Approx. 20	Concrete / Good	5	Approx. 20	Concrete / Good
By Fitzgerald & opposing wetland	5 <sup>3</sup>	21½	Concrete / Good	5	10	Concrete / Good
Near Alcott Circle	5 <sup>3</sup>	22	Concrete / Fair	5	21½	Concrete / Good
Just north of Old Novi / Sandstone	5 <sup>3</sup>	10½	Concrete / Fair to Good	5	21½	Concrete / Fair to Good
At 12½ Mile Rd	8	8½	Asphalt / Fair	5	10 - 20	Concrete / Fair
Several hundred ft south of 12½ Mile	8	Several feet behind guardrail	Asphalt / Fair	5	10	Concrete / Fair
Near north cemetery driveway	8	7½	Asphalt / Fair	5	10	Concrete / Fair
Several hundred ft north of gas station	8	Several feet behind guardrail	Asphalt / Fair	5	9+	Concrete / Good
Gas station frontage	8	8	Asphalt / Fair	5	2½ <sup>4</sup>	Concrete / Good

<sup>1</sup> From face of roadway curb to near edge of walk or path

<sup>2</sup> Asphalt = asphaltic concrete and Concrete = Portland cement concrete

<sup>3</sup> Per the City's Bicycle & Pedestrian Master Plan, the 8-ft-wide path follows Old Novi and 13 Mile rather than this section of Novi Road

<sup>4</sup> Less than 100 lineal feet along cemetery entrance area, immediately north of 12 Mile Road



**Crash History** – The crash histories presented in our prior reports for Meadowbrook and Novi Roads were reviewed again to identify any incidents involving pedestrians or bicycles. It was found that:

- ❑ The five-year (2005-2009) crash history for Meadowbrook Road included a total of seven crashes. None involved a pedestrian or bicycle.
- ❑ The three-year (2007-2009) crash history for Novi Road included a total of 17 crashes. Only one, occurring in on April 28, 2008 near the north cemetery entrance, involved a pedestrian or bicycle. The UD-10 police report was retrieved, and it was found that in this particular situation, four bicyclists were riding in the northbound curb lane. A 19-year-old car driver approached from the rear, and despite the daylight, fair-weather conditions, did not respond early enough to successfully avoid the bicyclists. Luckily, however, the severe braking accomplished by the car resulted in only one bicycle being damaged and no one even being injured.

In summary, none of the reported crashes – on either road – involved the use of sidewalks, safety paths, or crosswalks. With respect to the one on-road bicycle accident, it appears likely that driver inattentiveness played a larger causal role than the speed chosen by the driver.

**Observed Pedestrian and Bicycle Activity** – On two very pleasant days about a week after school began this fall, Birchler Arroyo staff observed and counted pedestrian and bicycle movements in the vicinity of each school. Observations began at 3:45 p.m., nominally 15 minutes before dismissal, and ended at 7:45 p.m., the approximate time of sunset. Tables 3 and 4 summarize the counts. Key findings were as follows:

- ❑ At Meadowbrook Elementary (Figure 1 and Table 3), a total of 45 pedestrians and bicyclists crossed to the west side of the road via the marked crosswalk and crossing guard, all associated with school dismissal. A very similar number used the north path from the school to the road, in order to continue north toward 13 Mile Road. There was a distinct lull in activity once school departures ended but before nearby residents began their evening outings. Between 4:15 and 7:45 p.m., those outings on any particular section of path were relatively few, typically averaging only 2-4 per hour per direction on the west side of the road, generally associated with the Tollgate Ravines community. Notably fewer people used the sidewalk on the east side of the road, and no one was observed going to or from the play area behind the school.
- ❑ At Hickory Woods Elementary (Figure 2 and Table 4), the predominant movement was from the school to the east side of the Novi Road via the marked crosswalk that is served by both a signal and a crossing guard (22 people between 3:45 and 4:15 p.m.). As above, there was a distinct lull in activity once school departures ended but before nearby residents began their evening outings. Between 4:15 and 7:45 p.m., those outings were slightly more numerous than those observed along Meadowbrook Road (above), typically averaging 3-5 per hour per direction on both sides of the road. The slightly greater numbers using the path south of the school on the west side of the road (especially after 6:30 p.m.) were likely due to people visiting the school playground in the southwest corner of the site. Although not counted, there appeared to be more people visiting the rear of the school (presumably the playground) via motor vehicle than on foot or by bicycle.

Path users near both schools appeared to be relaxed and not adversely affected by the speeds or volumes of passing vehicular traffic. Many were walking dogs, chatting on cell phones, or chatting with a companion. There were also a few joggers. Interestingly, where a choice exists between two parallel paths on the same side of the road (Figure 2), only 2 out of 36 people used the asphalt path further from the road.



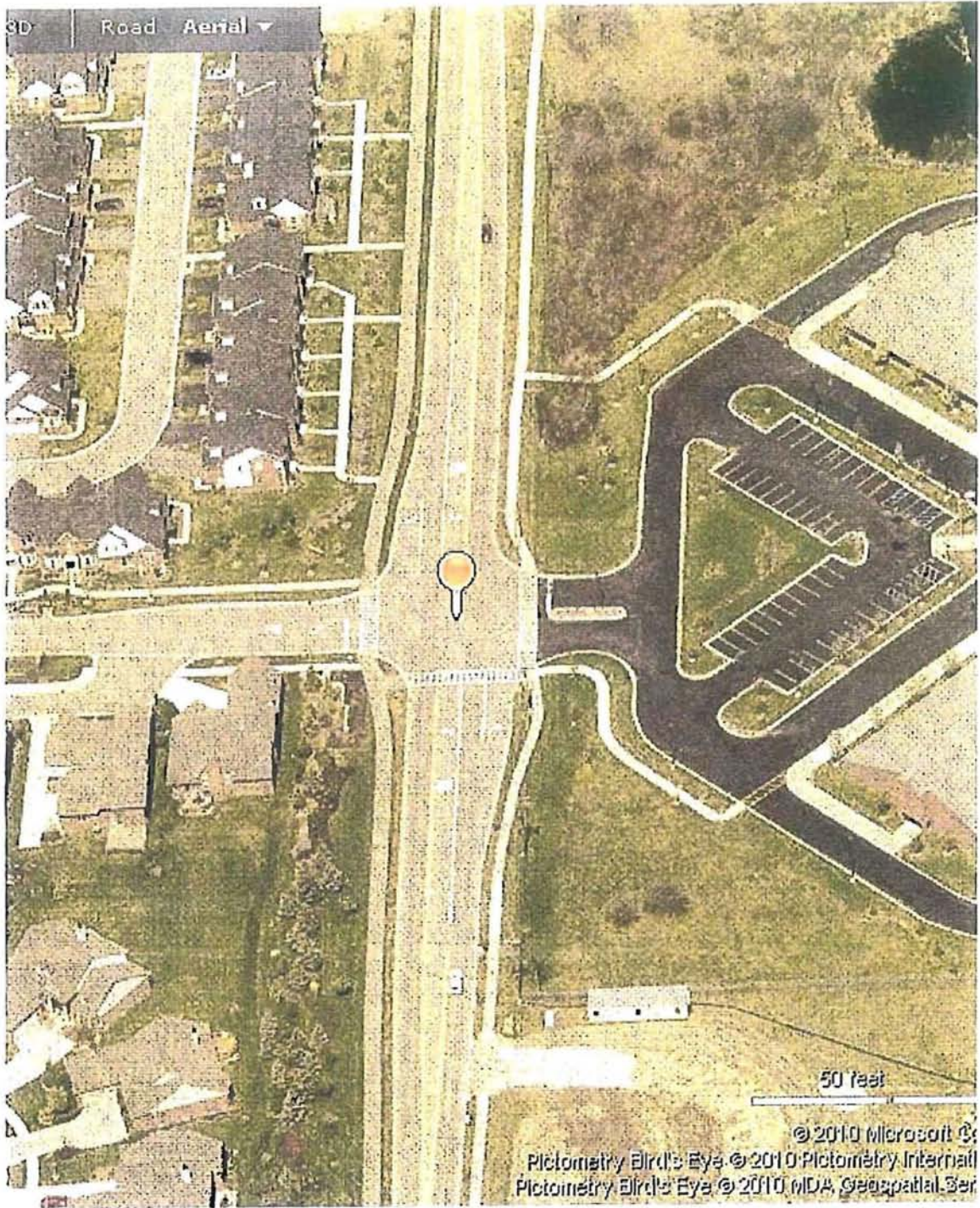


Figure 1. Paths Near Meadowbrook Elementary





**Table 3. Pedestrian and Bicycle Activity Along Meadowbrook Road Near Meadowbrook Elementary<sup>1</sup>**

15 Minutes Ending	On Paths South of School				In Marked Crosswalk		On Paths Just North of School Driveway				On North Path To/From School	
	East Side		West Side		EB	WB	East Side		West Side		EB	WB
	NB	SB	NB	SB			NB	SB	NB	SB		
4:00	0	0	2	1	13	2	0	0	0	1	4	25
4:15	0	0	0	1	0	41	1	1	5	0	0	16
4:30	0	0	1	3	0	2	0	0	0	1	0	0
4:45	0	0	0	0	0	0	0	0	0	0	0	0
5:00	1	0	0	0	0	0	0	0	0	0	0	0
5:15	2	0	1	1	0	0	0	0	1	0	0	0
5:30	0	0	2	0	0	0	0	0	2	0	0	0
5:45	1	0	0	0	0	0	1	0	0	1	0	0
6:00	0	0	0	3	0	0	0	0	0	0	0	0
6:15	0	0	1	4	0	0	0	0	1	2	0	0
6:30	2	0	0	0	0	0	0	0	1	0	0	0
6:45	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	1	1	0	0	0	0	0	1	0	0	0
7:15	0	0	1	0	0	0	0	0	1	0	0	0
7:30	0	0	0	3	0	0	0	0	0	1	0	0
7:45	0	0	0	0	0	0	0	0	0	1	0	0
4-Hr Total	6	1	9	16	13	45	2	1	12	7	4	41
After 4:15	6	1	7	14	0	2	1	0	7	6	0	0
Per Hour	1.7	0.3	2.0	4.0	0.0	0.6	0.3	0.0	2.0	1.7	0.0	0.0

<sup>2</sup> On Wednesday, 9-15-10. Weather was sunny and warm. School dismissal was at 4:00 pm (per shaded row); however, quite a few left via north school path 5-10 minutes before that time. No distinction was made between pedestrians and bikes. Bicyclists riding in the road were not counted. People passing the school were counted twice, as they approached and as they departed.

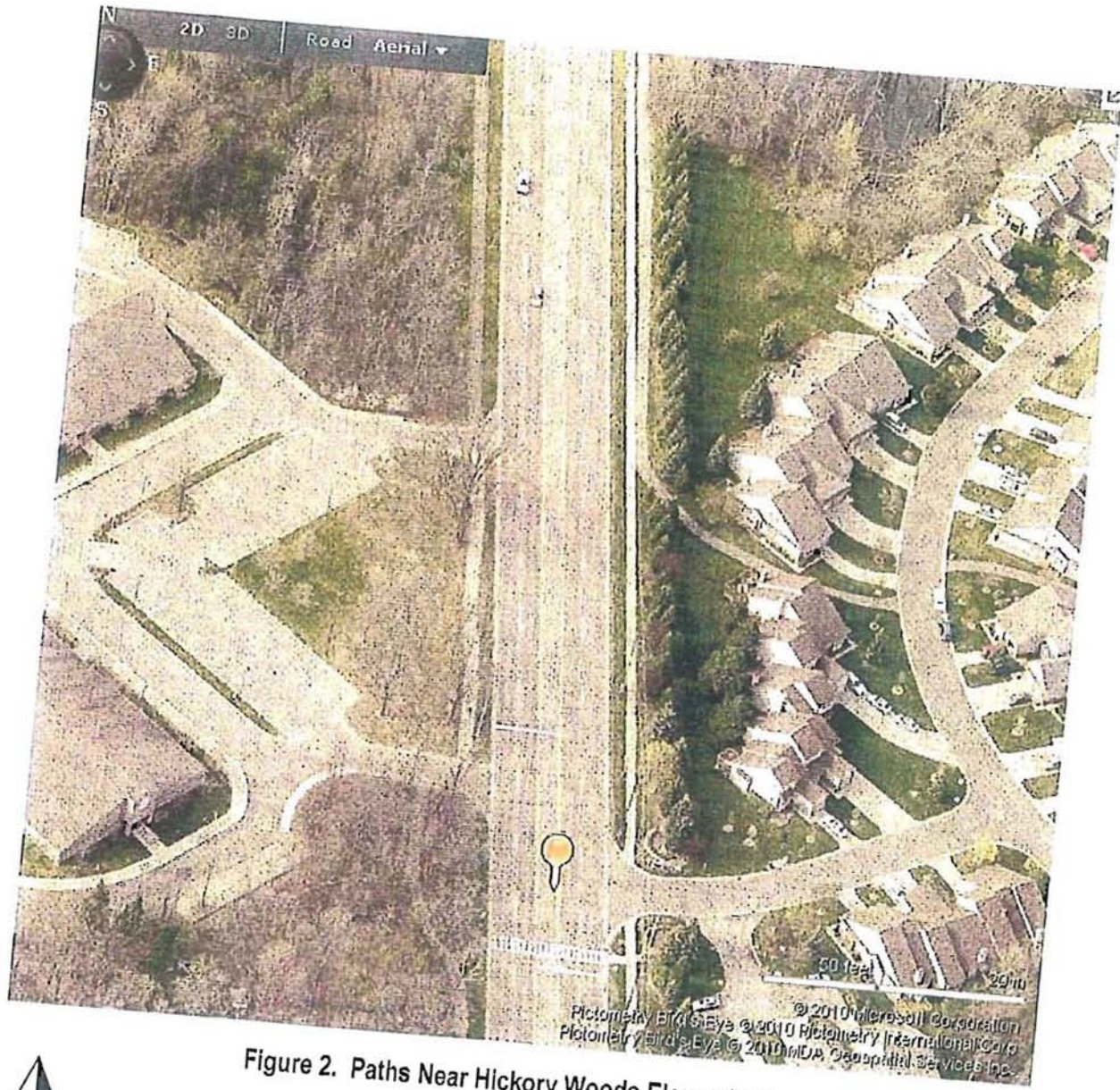


Figure 2. Paths Near Hickory Woods Elementary





**Table 4. Pedestrian and Bicycle Activity Along Novi Road Near Hickory Woods Elementary<sup>1</sup>**

15 Minutes Ending	On Paths North of School				In Marked Crosswalk		On Paths South of School			
	West Side		East Side		EB	WB	West Side		East Side	
	NB	SB	NB	SB			NB	SB	NB	SB
4:00	0	0	0	0	3	3	3	11	3	1
4:15	1	0	3	1	19	3	5	23	0	5
4:30	0	0	0	0	0	0	0	0	0	0
4:45	0	0	1	3	0	0	0	0	0	0
5:00	0	1	2	0	0	0	0	0	0	0
5:15	0	0	0	0	0	0	0	0	0	0
5:30	0	0	0	2	0	1	0	0	1	0
5:45	0	0	0	2	0	2	0	0	0	0
6:00	0	1	0	2	1	0	0	1	0	1
6:15	2	1	1	0	0	1	1	0	1	0
6:30	0	2	3	0	0	0	0	1	2	2
6:45	4	5	3	0	0	1	4	2	2	0
7:00	2	3	2	0	0	0	4	3	2	1
7:15	3	2	3	1	0	0	3	2	5	0
7:30	0	0	0	4	0	1	4	0	1	3
7:45	1	2	1	2	0	0	1	2	1	2
4-Hr Total	13	17	19	17	23	12	25	45	18	15
After 4:15	12	17	16	16	1	6	17	11	15	9
Per Hour	3.4	4.9	4.6	4.6	0.3	1.7	4.9	3.1	4.3	2.6

<sup>2</sup> On Monday, 9-13-10. Weather was sunny, warm, and breezy. School dismissal was at 4:00 pm (per shaded row); however, a few bicyclists left 5-10 minutes before that time. No distinction was made between pedestrians and bikes. Many of those counted were counted twice; for example, upon dismissal, 19 of the 23 SB on west side later used crosswalk EB.

**Signs Warning of Pedestrians** – School speed zones will be posted near both Meadowbrook and Hickory Woods Elementary Schools. This signage indirectly but clearly warns of younger pedestrians in the area.

With respect to specific pedestrian warning signs, it should be noted that:

- Such signs already exist at the Meadowbrook Road crosswalk just south of Brownstone Drive.
- No such signs exist near the signalized Novi Road crosswalk at Waverly Drive, consistent with the *Michigan Manual of Uniform Traffic Control Devices*, Section 7B.09.

**Early Dismissal** – As noted above, pedestrian and bicycle activity increased notably a few minutes before the formal school dismissal time of 4:00 p.m. Upon checking with the schools, it was learned that walkers are dismissed five minutes before the hour at Hickory Woods and six minutes before the hour at Meadowbrook. It would therefore be appropriate to make the recommended school speed zone (30 mph near Hickory Woods and 25 mph near Meadowbrook) applicable during the period of 3:45-4:30 p.m.

### Summary of Findings and Conclusions

The above results and discussion show that:

- The recommended speed limits for Meadowbrook and Novi Roads are not expected to result in significant increases in prevailing speeds. Indeed, the 30-mph speed zone near Hickory Woods Elementary should result in *decreased* speeds during the applicable times.
- Pedestrians can be expected to be reasonably comfortable using sidewalks set back 6-12 ft from the nearest travel lane, with the lower end of this range being appropriate for low speeds (35 mph and below), and the upper end of this range being appropriate for somewhat higher speeds (45-50 mph).
- Paths along both sides of Meadowbrook Road between 12 and 13 Mile have a predominate setback of about 6 ft, which by the above guidelines will be suitable for the existing and expected future operating speeds (mostly 37 mph and below).
- Paths along both sides of Novi Road between 12 and 14 Mile are set back 9-22 ft, which by the above guidelines will be suitable for the existing and expected future operating speeds (mostly 48 mph and below).
- Outside of the school dismissal period (3:54 to about 4:15 p.m.), observed pedestrian and bicycle volumes along Meadowbrook and Novi Roads near the schools were relatively light (i.e., 2-5 per hour per direction on the most-used path sections).
- No additional pedestrian-related signage is warranted, per the MMUTCD and engineering judgment.
- In the afternoon, the school speed zones should apply from 3:45-4:30 p.m.

Sincerely,  
BIRCHLER ARROYO ASSOCIATES, INC.

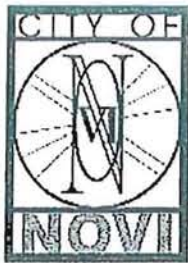


Rodney L. Arroyo, AICP  
Vice President



William A. Stimpson, P.E.  
Director of Traffic Engineering





cityofnovi.org

## MEMORANDUM

TO: ROB HAYES, P.E.; DIRECTOR OF PUBLIC SERVICES  
FROM: BRIAN COBURN, P.E.; SENIOR CIVIL ENGINEER *BCC*  
SUBJECT: PROPOSED SPEED LIMIT CHANGES  
DATE: AUGUST 10, 2010

*8/10/10  
To: Mayor & City  
Council Members*

*Early info on forthcoming  
speed limit changes to be*

This memo is a follow-up to my April 28, 2010 memo regarding speed limit evaluations. As *presented*, you may recall, I conducted an audit of the city's speed limit signs and identified a number of installed signs that lack traffic control orders. The road segments that lack traffic control orders for the posted speed are as follows:

- Novi Road (12 Mile Road to 14 Mile Road)
- Meadowbrook Road (12 Mile Road to 13 Mile Road)
- 13 Mile Road (Meadowbrook Road to Haggerty Road)
- West Park Drive (12 Mile Road to West Road)
- Town Center Drive
- Crescent Blvd
- Crowe Drive
- Ingersol Drive

*The individual studies are available at your request and will be with the agenda items.*

With the assistance of the Field Operations Division and our traffic consultant, Birchler Arroyo, we have collected speed samples and evaluated these segments to determine the appropriate speed limit. The speed studies for each segment are attached to this memo.

### Legal Requirements for Speed Limits

The Uniform Traffic Code requires that traffic control orders, as issued by the traffic engineer and approved by the City Council, be on file for the enforcement of traffic control signs. As discussed in the Detroit News article attached to the April 28 memo, tickets issued for a speed limit that lacks a traffic control order could be successfully challenged by the motorist. Speed limits are governed by the Michigan Vehicle Code (MVC) and the Michigan Manual of Traffic Control Devices (MMUTCD). The MVC provides a standard "prima facie" speed based on the number of access points on a roadway. The MVC allows the local agency to adjust the speed limit based on a traffic engineering study. The MMUTCD requires an engineering study to determine the speed limit in accordance with established traffic engineering practices.

Generally, speed limits should be set so that the majority of drivers observe them voluntarily. Studies have shown that drivers generally operate their vehicles at speeds that are reasonable and proper, regardless of the posted speeds. Nationally, this is recognized as the 85th percentile speed, which is the speed at or below which 85 percent of the motorists drive on a given road unaffected by slower traffic or poor weather. It is generally accepted that when traffic deviates from the 85th percentile speed, the probability of a traffic crash becomes greater. In addition to the 85th percentile speed, the MMUTCD recommends review of other road characteristics including pedestrian activity, road conditions, crash experience, 10 mph pace, and road side environment. Realistic speed limits should be set at no more than five miles per hour below or above the 85th percentile speed based on these mitigating factors.

Public Perception of Speed Limits

It is usually difficult for the public to understand that even though the road may be posted at one speed, a great number of drivers may actually be driving faster based on their comfort level with the road. There is also a perception that when the posted speed limit is increased that it will result in even higher speeds. For example, if a road is posted at 30 mph and the 85<sup>th</sup> percentile speed is 35 mph, there is a perception that if the posted speed limit is increased to 35 mph, drivers would increase their speed toward 40 mph. To demonstrate the impact of increasing the posted speeds, we have analyzed the speed limits that were changed in 2009. The table below compares the observed 85<sup>th</sup> percentile speed on several road segments before the new speed limit was posted with the observed 85<sup>th</sup> percentile speed after the new speed limit was posted. While there was a notable increase on two segments of Beck Road and on Lewis Drive, there was no change in 85<sup>th</sup> percentile speed for many of the segments. The average change is a 0.8 mph increase in speed.

Road	Segment	Original Posted Speed	New Posted Speed (2009)	85 <sup>th</sup> percentile speed (mph)		Change
				Before New Posted Speed Limit	After New Posted Speed Limit	
11 Mile Road	Town Center to Meadowbrook	30	35	36	37	+1
	Meadowbrook to Seeley	30	35	39	39	0
Cabot Drive	Lewis to 13 Mile	25	35	38	38	0
	South of Lewis	25	35	37	37	0
	North of 12 Mile (curves)	25	30	34	34	0
Lewis Drive	Haggerty to Cabot	25	35	35	37	+2
	11 Mile to Grand River	40	45	47	47	0
Beck Road	10 Mile to 11 Mile	40	45	45	49	+4
	Nine Mile to 10 Mile	40	45	48	46	-2
	Eight Mile to Nine Mile	40	45	47	49	+2
	Average Change					+0.8



Proposed Speed Limits

The enclosed studies demonstrate that the speed limits that are currently posted on the subject road segments are not being observed by the majority of drivers. Further, since the posted speeds lack traffic control orders or engineering studies to support the posted speed limits, they must be reviewed to establish legal speed limits. A summary of the proposed speed limits is shown in the table below, with the justification for each recommendation included in the enclosed studies.

Road	Segment	Current Posted Speed Limit	85 <sup>th</sup> Percentile Speed	Recommended Posted Speed Limit
Novi Road	12 Mile to 1,640 feet south of 13 Mile	40	47	45
	1,640 feet south of 13 Mile to 13 Mile	35	45	45
	13 Mile Road to 14 Mile Road	40	48	45 (*)
Meadowbrook Road	12 Mile Road to Meadowbrook Elem	30	36	35
	13 Mile Road to Meadowbrook Elem	25	36	35 (**)
13 Mile Road	Meadowbrook Road to Haggerty Road	40	46	45
West Park Drive	12 Mile Road to West Road	40	47	45
Crowe Drive	Novi Road to Ingersol Drive	25	24	25
Ingersol Drive	Crescent Blvd to Crowe Drive	25	27	25
Crescent Blvd	Novi Road to Town Center Drive	25	33	30
Town Center Drive	Crescent Blvd to 11 Mile Road	25	33	30
	Grand River Ave to 11 Mile Road	25	29	30

No change

(\*)A 30 mph school speed zone is proposed for this segment during school arrival and dismissal times  
 (\*\*)A 25 mph school speed zone is proposed for this segment during school arrival and dismissal times



As noted in the table, there are two school speed zones proposed for implementation. The first is adjacent to Hickory Woods Elementary School on Novi Road. The posted speed limit is currently 40 mph at this location and there is no school speed zone at this time. The report recommends a school speed zone be set at 30 mph in the vicinity of the school property. The second school speed zone is proposed adjacent to Meadowbrook Elementary on Meadowbrook Road. The speed limit is currently set at 25 mph as a regular speed limit that is in effect all-day, every day. The report proposes the implementation of a school speed zone set at 25 mph in the vicinity of the school property. State law (MCL 257.627a) allows the speed limit to be decreased by 15 mph from the posted speed (but set at not less than 25 mph) in a school zone for a period of 30 minutes to one hour before school and 30 minutes to one hour after school, when requested by the school superintendent. We have discussed the proposed school speed zones with Walled Lake Schools. They are supportive of the recommendations and intend to request the school speed zones as proposed.

#### Public Notification

The majority of the segments being studied are located in non-residential areas. Meadowbrook Road has the largest potential impact on the residents since there are several residential units along Meadowbrook Road in the existing 25 mph speed zone. A "Speed Limit Under Review" sign (as shown at right) has been installed at the north and south ends of the Meadowbrook Road segment (12 Mile Road to 13 Mile Road) to notify residents and motorists that the speed limit is being studied. We have received a few calls from residents who were primarily concerned with the speed limit near the school. Our staff has explained that a school speed zone is proposed which calmed their concerns.



#### Implementation

We propose to prepare the traffic control orders for the speed limit recommendations from the studies for consideration by City Council on an upcoming agenda. Once approved by City Council, the new speed signs would be installed by Field Operations staff as recommended by the studies. The new signs would meet the federal retroreflectivity requirements and would be funded by the Traffic Control Sign Replacement Program as approved in the FY2010-11 budget.

cc: David Molloy, Public Safety Director/Police Chief  
Matt Wiktorowski, Field Operations Senior Manager  
Terry Whitfield, Police Department

May 3, 2010

Brian T. Coburn, P.E.  
Engineering Div., Dept. of Public Services  
City of Novi  
26300 Delwal Drive  
Novi, MI 48375  
[bcoburn@cityofnovi.org](mailto:bcoburn@cityofnovi.org)



**Subject: Speed Limit Study of Meadowbrook Road, 12 Mile Road to 13 Mile Road**

Dear Mr. Coburn:

Per your request, we have evaluated the above road segment to determine an appropriate general speed limit, a potentially different school speed limit (near Meadowbrook Elementary), and the possible need for curve warning and/or advisory speed signs. This letter reports our findings and recommendations.

### Recommendations

1. The overall speed limit for Meadowbrook between 12 Mile and 13 Mile should be set at 35 mph.
2. The Superintendent of the Walled Lake Consolidated School District should be advised of the proposed speed limit change and asked whether or not the District wishes to retain the existing 25 mph limit near Meadowbrook Elementary (with signing changes to ensure proper posting).

### Background

Prior to the first paving of this road section (Figure 1) in the summer of 1998, the City's intention was to post an overall speed limit of 30 mph. In January of that year, however, the Superintendent of the Walled Lake Consolidated Schools placed a "formal request for the speed limit on Meadowbrook Road from Thirteen Mile south past the Meadowbrook Elementary School, which we recently opened, to be changed to 25 miles per hour during school hours." In response, City Council approved Traffic Control Orders 98-11 and 98-12 (copy attached), which required the installation of 25-mph speed limit signs on Meadowbrook Road "between Thirteen Mile and a point one-half mile south of the Elementary school." No hour limitations were mentioned.

While the existing speed limit signs meet the original objectives – setting a 30-mph overall limit and a 25-mph limit near the school – the exact nature of those signs is problematic, as follows:

- Southbound from 13 Mile, there is no posted speed limit for about the first 450 ft (Figure 2). Good traffic engineering practice is to post the applicable speed limit within 100-200 ft of the corner.
- The first southbound speed limit sign has a "SCHOOL" plate above but no hours of applicability. As such, this assembly is inconsistent with the then-applicable *Michigan Manual of Uniform Traffic Control Devices* (Section 7B-11), the current *MMUTCD* (same section), and – if legally construed as a school speed limit – current State law (MCL 257.627a) as well.
- Northbound, the above non-standard assembly is located (only) at a point immediately south of the driveway for the church adjacent to the school (Figure 3). This point is clearly not "one-half mile south of the Elementary School"; if it were, it would be too far in advance to properly define a school speed zone (current law limits the advance distance to 1,000 ft).





Figure 1. Meadowbrook Road Between 12 Mile and 13 Mile





Figure 2. Meadowbrook Road, 13 Mile South to Meadowbrook Elementary





Figure 3. Meadowbrook Road, First Section South of School

## Criteria

In establishing a speed limit, it is appropriate to determine and consider (1) the prima facie limit, (2) the "speed of vehicular traffic" (typically expressed as the 85<sup>th</sup>-percentile speed), and (3) other traffic and roadway characteristics (per the *Michigan Manual of Uniform Traffic Control Devices*).

A portion of the *Michigan Vehicle Code* (MCL 257.627) establishes prima facie speed limits based on (1) whether or not the road runs through a business district, and (2) the number of access points (driveways or intersecting roadways) within each half mile of road. In a business district or where there are 60 or more access points per half mile, the prima facie limit is 25 mph. Outside a business district, the prima facie limit is 35 mph for 45-59 access points per half mile and 45 mph for 30-44 access points per half mile.

Another portion of the law (MCL 257.628) indicates that a posted speed limit different than the prima facie limit may be determined based on an "engineering and traffic investigation." Relevant guidelines for such an investigation, found in Section 2B.13 of the *MMUTCD* (approved jointly by the MDOT and the State Police), are as follows:

- "When a speed limit is to be posted, it should be within ... 5 mph of the 85<sup>th</sup>-percentile of free-flowing traffic.
- Other factors that may be considered when establishing speed limits are the following:
  - A. Road characteristics, shoulder condition, grade, alignment, and sight distance;
  - B. The pace speed;
  - C. Roadside development and environment;
  - D. Parking practices and pedestrian activity;
  - E. Reported crash experience for at least a 12-month period."

Finally, a school zone speed limit less than the regularly posted speed limit may be posted if requested by the school superintendent and within certain constraints set by law (MCL 257.627a). The reduced limit:

- May be no less than 15 mph below the regular speed limit nor less than 25 mph.
- Must be limited in its application to three specific time periods: 30-60 minutes before the first regularly scheduled school session until school commences; dismissal until 30-60 minutes after the last regularly scheduled school session; and during a lunch period is students are permitted to leave the school.

## Data Collection and Analysis

**Prima Facie Speed Limit** – Our review of recent-vintage aerial photos (Figures 1-6) found an average of 9.5 access points per half mile for Meadowbrook between 12 and 13 Mile Road. This access-point frequency is well below any of the ranges specified in MCL 257.627; hence, the prima facie speed limit is 55 mph.

**Computed Comfortable Curve Speed** – Methodology recommended by the American Association of State Highway and Transportation Officials was used to compute the safe and comfortable speed in each direction of travel on the two northerly (of the three similar) horizontal curves based on curve radius, pavement cross slope (or superelevation), and the assumed maximum comfortable lateral friction coefficient for the computed speed (per AASHTO). Curve radii and road cross slopes were estimated by Birchler Arroyo Associates. Table 1 summarizes the inputs and outputs of the curve speed computations.





Figure 4. Meadowbrook Road, Third Section South of 13 Mile





Figure 5. Meadowbrook Road, Fourth Section South of 13 Mile



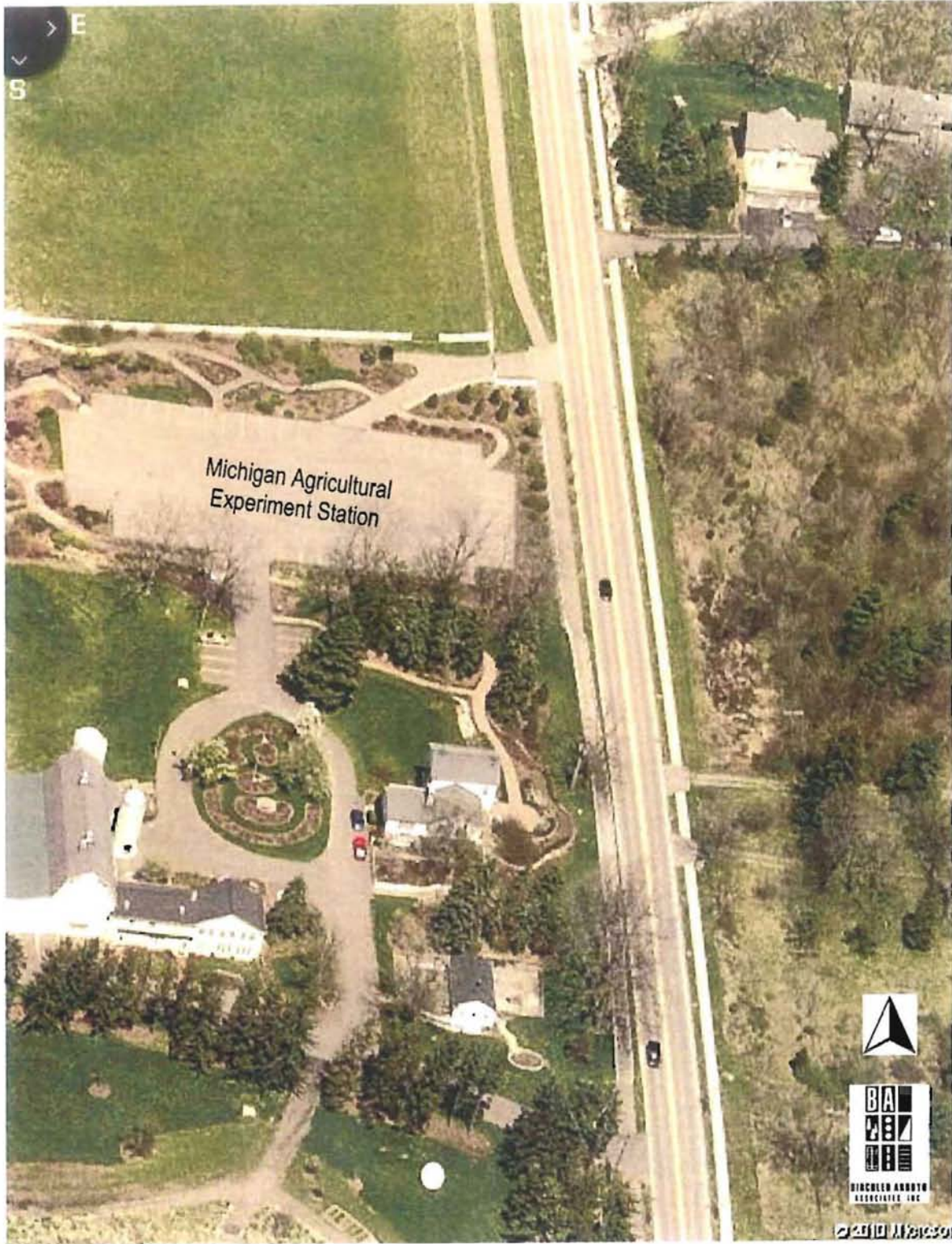


Figure 6. Meadowbrook Road, Fifth Section South of 13 Mile

**Table 1. Computed Comfortable (AASHTO) Curve Speeds for Meadowbrook Road**

Curve	West Right-of-Way Line (from Plat)			At Center of Inside and Outside Lane			Comfortable Speed (mph)
	Curve Length (ft)	Deflection	Computed Radius (ft)	Radius (ft)	Cross Slope <sup>1</sup>	Lateral Friction	
1 <sup>st</sup> South of School	192	15.88°	692	737	+ 0.015 (est.)	0.150	43
				713	- 0.015 (est.)	0.160	40
At Burroughs	255	18.99°	768	723	+ 0.012	0.155	42
				747	- 0.015	0.160	40

<sup>1</sup> The values listed here are minimal for drainage and not intended to superelevate or "bank" for driving comfort or speed maintenance purposes (indeed, there is "adverse" superelevation in the outside lane, as indicated by the minus sign). According to the American Association of State Highway and Transportation Officials, the sharpest curve "without superelevation" (of the type present here) has a 736-ft centerline radius for a design speed of 40 mph (see Exhibit 3-16 in *A Policy on Geometric Design for Highways and Streets*, AASHTO, 2004). Given the radii estimated here, it is reasonable to conclude, therefore, that the design speed for these curves – and by extension, the overall road – is effectively 40 mph.



**85<sup>th</sup>-Percentile Speed** – At our request, City personnel conducted automated speed and volume sampling over 48-hour midweek periods. The two sampling locations are marked in red on Figures 1, 4, and 5.

Table 2 summarizes the traffic statistics by location, direction, and day. Key findings are as follows:

- Traffic volumes are down sharply from previous counts. The average of the two daily volumes sampled in this study – 3,475 vehicles – is only 69% of the August 2003 volume shown in Figure 39 of the City's 2004 Master Plan.
- The average speed is 31.4 mph on the curve just north of Burroughs (location #1) and 32.0 mph on the tangent section between Burroughs and 12 Mile (location #2). Both locations now have a posted speed limit of 30 mph and are well away from the 25-mph speed zone near the school.
- The 85<sup>th</sup>-percentile speed is 35.5 mph at location #1 and 36.2 mph at location #2. Note that both speed statistics at location #1 are only 2% less than at location #2; this may reflect vehicles decelerating to or accelerating from Burroughs, rather than the presence of a curve, since that curve can be driven comfortably (per Table 1) at 40-42 mph.

**Crash Experience** – At our request, the Traffic Improvement Association searched its files for crashes occurring along Meadowbrook Road from 12-13 Mile Roads between 2005 and 2009, inclusive. Excluded were intersection crashes at the two "Mile" roads, since such crashes would likely be due primarily to factors other than the speed limit on Meadowbrook.

Detailed crash tabulations are appended to this report. Table 3 summarizes the seven crashes reported for the five-year period. Key findings are as follows:

- Three crashes involved (non-school) driveways, with one vehicle exiting and two waiting to enter.
- Three crashes involved rain/wet pavement or snow/snowy pavement.
- The seventh crash involved an animal collision after dark.

### Conclusions and Recommendations

- An overall speed limit of 35 mph is supported by the observed 85<sup>th</sup>-percentile speeds, infrequent access points, inferred design speed of 40 mph, absence of overtly speed-related crashes, and comfortable curve speeds of 40-43 mph. No curve warning signs are warranted.
- Assuming that school superintendent wishes to see the 25-mph school speed zone preserved, (1) the hours of applicability must be added to the existing sign installations (e.g., Figure 7), and (2) the southbound installation should be relocated closer to 13 Mile Road.
- The School Crosswalk signs (Figure 8) should be relocated so as to be "as close as possible" to the crosswalk (per *MMUTCD* Section 7B.09).

Sincerely,  
BIRCHLER ARROYO ASSOCIATES, INC.



Rodney L. Arroyo, AICP  
Vice President



William A. Stimpson, P.E.  
Director of Traffic Engineering

**Table 2. Summary of Speed Statistics for Meadowbrook Road, 12-13 Mile  
for April 27-29, 2010**

Sampling Location	Dir.	Date	Sample Size	Speed (mph)			
				Average	85th %tile	10-mph Pace	% in Pace
1 (North)	NB	4-27-10 (>2 pm)	1070	32.3	36.5	25-35	75.8%
		4-28-10	1682	31.8	35.8	25-35	77.4%
		4-29-10 (<2 pm)	583	31.9	36.7	25-35	72.0%
		Average Day	1668	32.0	36.2	25-35	75.9%
	SB	4-27-10 (>2 pm)	713	31.1	35.1	25-35	77.6%
		4-28-10	1606	30.5	34.6	25-35	80.6%
		4-29-10 (<2 pm)	858	30.8	34.7	25-35	81.0%
		Average Day	1589	30.7	34.7	25-35	80.0%
	Both	<b>Average Day</b>	<b>3256</b>	<b>31.4</b>	<b>35.5</b>	<b>25-35</b>	<b>77.9%</b>
	2 (South)	NB	4-27-10 (>2 pm)	1261	32.2	36.6	25-35
4-28-10			1943	31.8	35.8	25-35	80.4%
4-29-10 (<2 pm)			641	32.1	36.9	25-35	76.9%
Average Day			1923	32.0	36.2	25-35	70.9%
SB		4-27-10 (>2 pm)	779	32.8	37.3	25-35	74.5%
		4-28-10	1774	31.9	36.0	25-35	79.3%
		4-29-10 (<2 pm)	988	31.5	35.3	25-35	82.0%
		Average Day	1771	32.0	36.1	25-35	79.0%
Both		<b>Average Day</b>	<b>3693</b>	<b>32.0</b>	<b>36.2</b>	<b>25-35</b>	<b>74.8%</b>



**Table 3. 2005-2009 Crash History for Meadowbrook Road between 12 Mile and 13 Mile**

Year	Date	Hour Starting	Location	Crash Type						Crash Severity (# Persons)					Contributing Factors
				Angle	Head-On	Sideswipe		Rear-End	Single-Vehicle	Fatal	Personal Injury			Property Damage Only	
						Opposite Direction	Same Direction				A	B	C		
2009	5-21	5 pm	300 ft north of 12 Mile					SB						2	Lead vehicle probably waiting to turn left into driveway.
2008	12-23	3 pm	At Burroughs		X								1	1	SB vehicle crossed centerline on snow-covered pavement.
	11-30	2 pm	¼ mile north of 12 Mile	WB-NB										2	Vehicle pulled out of driveway on east side of snowy road.
	6-13	6 pm	At Burroughs	EB-SB										3	EB vehicle failed to yield, in rain.
	4-14	10 am	600 ft north of 12 Mile					NB						3	Lead vehicle probably waiting to turn left into driveway.
2007	No reported crashes.														
2006	1-08	7 pm	500 ft north of 12 Mile						SB						Hit animal after dark.
2005	12-15	4 pm	At Burroughs	EB-SB										2	SB "speeding" vehicle lost control on snow and hit EB stopped vehicle.
Total				3	1	0	0	2	1	0	0	0	1	13	



Figure 7. School Speed Limit with No Time Periods Specified

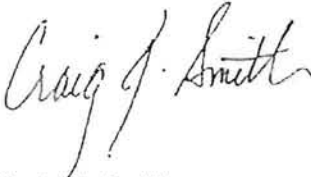


Figure 8. Southbound School Crosswalk Warning Sign Past Crosswalk



1998 TRAFFIC CONTROL ORDERS FOR  
NORTHERN HALF OF SUBJECT ROAD SECTION

BUSINESS OF THE NOVI CITY COUNCIL  
NOVI, MICHIGAN

SUBJECT	Traffic Control Orders 98-11 and 98-12		
DATE SUBMITTED	March 5, 1998	FOR AGENDA	March 16, 1998
DEPT APPROVAL	 Craig J. Smith DPW Superintendent	LEGAL APPROVAL IF REQUIRED	

EXPENDITURE REQUIRED	
AMOUNT BUDGETED	
APPROPRIATION REQUIRED	
LINE ITEM NUMBER	

BRIEF HISTORY

Dr. Geisler, Walled Lake Schools Superintendent, has requested a lower speed limit by the new Meadowbrook Elementary School on Meadowbrook Road.

RECOMMENDED ACTION

Our Traffic Engineer has recommended a 25 MPH speed limit in the school area. To accomplish the new speed limit, the original 30 MPH speed limit needs to be revoked, the original Traffic Control Order pre-dates our records

	1	2	Y	N
MAYOR McLALLEN				
MAYOR PROTEM CRAWFORD				
COUNCILMAN DEROCHE				
COUNCILMAN KRAMER				

	1	2	Y	N
COUNCILWOMAN LORENZO				
COUNCILWOMAN MUTCH				
COUNCILMAN SCHMID				

*Approved such as  
Cynthia @ 3/14/98  
C. Smith  
3/14/98*



CITY OF NOVI  
TRAFFIC CONTROL ORDER

SPEED  
 PARKING  
 OTHER

DATE OF ORDER: March 4, 1998

CONTROL NUMBER 98-12

PURSUANT TO CHAPTER NO. 33 OF THE CODE OF ORDINANCES OF THE CITY OF NOVI, MICHIGAN, SAME BEING THE UNIFORM TRAFFIC CODE FOR CITIES, TOWNSHIPS, AND VILLAGES OF MICHIGAN, AND IN THE INTEREST OF PUBLIC SAFETY AND CONVENIENCE, THE FOLLOWING TRAFFIC CONTROL ORDER IS HEREBY ISSUED BY CRAIG J. SMITH, D.P.W. SUPERINTENDENT, DULY AUTHORIZED AS TRAFFIC ENGINEER, BY SEC. 33.141 OF THE AFORESAID CHAPTER.

ISSUANCE OF THIS TRAFFIC CONTROL ORDER WAS PRECEDED BY STUDY AND INVESTIGATION OF TRAFFIC CONDITIONS ON THE FOLLOWING PUBLIC ROAD OR ROADS IN THE CITY OF NOVI, MICHIGAN.

Meadowbrook Road - Thirteen Mile and to a point one-half mile south of the Elementary School.

AND AFTER SAID INVESTIGATION, IT IS HEREBY ORDERED AND DIRECTED THAT THE DEPARTMENT OF PUBLIC WORKS ERECT AND MAINTAIN THE 25 MPH SIGNS IN ACCORDANCE WITH THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES AS REQUIRED BY SEC. 33.217 OF THE AFORESAID CHAPTER, SAID SIGNS TO GIVE NOTICE OF THE FOLLOWING DETERMINATION:

A 25 MPH Speed Limit signs on Meadowbrook Road - Between Thirteen Mile and a point one-half a mile south of the Elementary School.



CRAIG J. SMITH  
TRAFFIC ENGINEER

DATED: March 4, 1998

APPROVED BY CITY COUNCIL

TRAFFIC CONTROL ORDER NUMBER 98-12 HAVING BEEN PRESENTED TO THE COUNCIL OF THE CITY OF NOVI, MICHIGAN FOR STUDY AND APPROVAL, IS HEREBY APPROVED AND IT IS HEREBY ORDERED AND DIRECTED THAT THIS ORDER BE FILED IN THE OFFICE OF THE CITY CLERK AND A COPY THEREOF IN THE OFFICE OF THE CHIEF OF POLICE OF SAID CITY.

IT IS FURTHER ORDERED AND DIRECTED THAT THIS ORDER SHALL BECOME EFFECTIVE UPON BEING FILED WITH THE CLERK AND UPON ERECTION OF ADEQUATE SIGNS GIVING NOTICE OF THE EXISTENCE OF AFORESAID,

A 25 MPH Speed Limit signs on Meadowbrook Road - Between Thirteen Mile and a point one-half a mile south of the Elementary School.

ADOPTED AT THE REGULAR MEETING  
OF COUNCIL ON \_\_\_\_\_

BY: \_\_\_\_\_  
MAYOR - Kathleen McLallen

\_\_\_\_\_  
CITY CLERK - Tonni Bartholomew

2005-2009 CRASH DATA





Traffic Improvement Association

**Crash Report Meadowbrook Rd 12 Mile to 13 Mile**

Request #: 0003643 Printed By: Dominique Match Printed On: 3/29/2010

FROM\_DATE: 1/1/2005  
 TO\_DATE: 12/31/2009

PR/MP PR 656706 FROM MP 4.005 TO MP 5.001  
 [Meadowbrook Rd & W 12 Mile Rd to Meadowbrook Rd & W 13 Mile Rd]

#1 Location: MEADOWBROOK RD (4.53) 2494 feet S of W 13 MILE RD Crash ID: 6231045  
 Crash Date: 12/15/2005 Day: Thu Hour: 4pm Weather: snow Roadway: snowy Light: day  
 Injuries K: 0 Inj A: 0 Inj B: 0 Inj C: 0 Inj 0: 2 How: angle  
 CVT: Novi Area: curved HBD: N Drugs: N Complaint No: 0568725

Unit No	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	S	go straight	loss of control	veh in transpt	none	none	speeding	car	ctrfront
2	E	stop on road	veh in transpt	none	none	none	none	pickup	lftfront

UD-10: 055762380

#2 Location: MEADOWBROOK RD (4.08) 500 feet N of 12 MILE RD Crash ID: 6238313  
 Crash Date: 01/08/2006 Day: Sun Hour: 7pm Weather: cloudy Roadway: dry Light: dark/unltd  
 Injuries K: 0 Inj A: 0 Inj B: 0 Inj C: 0 Inj 0: 1 How: single  
 CVT: Novi Area: straight HBD: N Drugs: N Complaint No: 061975

Unit No	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	S	go straight	animal	none	none	none	none	car	rtfront

UD-10: 061004145

#3 Location: MEADOWBROK (4.12) 600 feet N of 12 MILE Crash ID: 6984694  
 Crash Date: 04/14/2008 Day: Mon Hour: 10am Weather: clear Roadway: dry Light: day  
 Injuries K: 0 Inj A: 0 Inj B: 0 Inj C: 0 Inj 0: 3 How: rr-end  
 CVT: Novi Area: straight HBD: N Drugs: N Complaint No: 80017412

Unit No	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	N	go straight	veh in transpt	none	none	none	unable to stop	car	ctrfront
2	N	slow/stop on rd	veh in transpt	none	none	none	unknown	pickup	ctrrear

UD-10: 080205270

#4 Location: MEADOWBROOK RD (4.54) 1 feet S of BURROUGHS AVE Crash ID: 7029320  
 Crash Date: 06/13/2008 Day: Fri Hour: 6pm Weather: rain Roadway: wet Light: day  
 Injuries K: 0 Inj A: 0 Inj B: 0 Inj C: 0 Inj 0: 3 How: angle  
 CVT: Novi Area: curved HBD: N Drugs: N Complaint No: 80028674

Unit No	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	E	left turn	veh in transpt	none	none	none	failed to yeild	car	lftfront
2	S	go straight	veh in transpt	none	none	none	none	car	rtfront

UD-10: 080300496

#5 Location: MEADOWBROOK RD (4.26) 1320 feet N of 12 MILE RD Crash ID: 7170113  
 Crash Date: 11/30/2008 Day: Sun Hour: 2pm Weather: snow Roadway: snowy Light: day  
 Injuries K: 0 Inj A: 0 Inj B: 0 Inj C: 0 Inj 0: 2 How: angle  
 CVT: Novi Area: driveway HBD: N Drugs: N Complaint No: 800065661

Unit No	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	W	enter rdwy	veh in transpt	none	none	none	other	car	ctrfront
2	N	go straight	veh in transpt	none	none	none	none	car	rtside

UD-10: 080606266

#6 Location: MEADOWBROOK RD (4.53) 10 feet S of BURROUGHS AVE Crash ID: 7202917  
 Crash Date: 12/23/2008 Day: Tue Hour: 3pm Weather: snow Roadway: snowy Light: day  
 Injuries K: 0 Inj A: 0 Inj B: 0 Inj C: 1 Inj 0: 1 How: head-on  
 CVT: Novi Area: curved HBD: N Drugs: N Complaint No: 80070245

Unit No	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	S	go straight	loss of control	cross ctrline/med	veh in transpt	none	speeding	pickup	ctrfront
2	N	slow/stop on rd	veh in transpt	none	none	none	none	car	lftfront

UD-10: 080674093

#7 Location: MEADOWBROOK (4.06) 300 feet N of 12 MILE Crash ID: 7323204  
 Crash Date: 05/21/2009 Day: Thu Hour: 5pm Weather: clear Roadway: dry Light: day  
 Injuries K: 0 Inj A: 0 Inj B: 0 Inj C: 0 Inj 0: 2 How: rr-end  
 CVT: Novi Area: straight HBD: N Drugs: N Complaint No: 90032419

Unit No	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	S	go straight	veh in transpt	none	none	none	unable to stop	car	ctrfront
2	S	stop on road	veh in transpt	none	none	none	none	car	clrrear

UD-10: 090247207



**Crash Type**

Count	Type
0	uncoded
1	single
1	head-on
0	head-on/lt
3	angle
2	rr-end
0	rr-end/lt
0	rr-end/rt
0	ss-same
0	ss-opp
0	unknown
<b>Totals: 7</b>	

**Light Conditions**

Count	Type
0	uncoded
6	day
0	dawn
0	dusk
0	dark/lt
1	dark/unltd
0	unknown
<b>Totals: 7</b>	

**Weather**

Count	Type
0	uncoded
2	clear
1	cloudy
0	fog/smoke
1	rain
3	snow
0	wind
0	sleel/hail
0	unknown
<b>Totals: 7</b>	

**Road Condition**

Count	Type
0	uncoded
3	dry
1	wet
0	icy
3	snowy
0	muddy
0	slushy
0	debris
0	unknown
<b>Totals: 7</b>	

**Vehicle Type**

Count	Type
0	uncoded
10	car
0	other
0	truck/bus
0	van
3	pickup
0	sm truck
0	motorcycle
0	moped
0	go-cart
0	snowmobile
0	off-rd veh
<b>Totals: 13</b>	

**Crashes By Month**

Count	Type
1	January
0	February
0	March
1	April
1	May
1	June
0	July
0	August
0	September
0	October
1	November
2	December
<b>Totals: 7</b>	

**Hazardous Action**

Count	Type
6	none
2	speeding
0	imprp/no signal
0	imprp backing
2	unable to stop
1	other
1	unknown
0	reckls driving
0	negl driving
0	spd too slow
1	failed to yeild
0	disrgd traffic cntrl
0	wrong way
0	left of center
0	imprp passing
0	imprp lane use
0	imprp turn
<b>Totals: 13</b>	

**Unit Type**

Count	Type
0	uncoded
13	vehicle
0	pedestrian
0	bicyclist
0	engineer
<b>Totals: 13</b>	

Crash Severity

	FATAL	A	B	C	No Inj	Total
Persons	0	0	0	1	14	15
Crashes	0	0	0	1	6	7

Alcohol in Crashes

	FATAL	PI	PD	Total
Drinking	0	0	0	0
Not Drinking	0	1	6	7
Total	0	1	6	7

Crashes per Hour by Day

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Unknown	Total
12a - 1a	0	0	0	0	0	0	0	0	0
1a - 2a	0	0	0	0	0	0	0	0	0
2a - 3a	0	0	0	0	0	0	0	0	0
3a - 4a	0	0	0	0	0	0	0	0	0
4a - 5a	0	0	0	0	0	0	0	0	0
5a - 6a	0	0	0	0	0	0	0	0	0
6a - 7a	0	0	0	0	0	0	0	0	0
7a - 8a	0	0	0	0	0	0	0	0	0
8a - 9a	0	0	0	0	0	0	0	0	0
9a - 10a	0	0	0	0	0	0	0	0	0
10a - 11a	0	1	0	0	0	0	0	0	1
11a - 12p	0	0	0	0	0	0	0	0	0
12p - 1p	0	0	0	0	0	0	0	0	0
1p - 2p	0	0	0	0	0	0	0	0	0
2p - 3p	1	0	0	0	0	0	0	0	1
3p - 4p	0	0	1	0	0	0	0	0	1
4p - 5p	0	0	0	0	1	0	0	0	1
5p - 6p	0	0	0	0	1	0	0	0	1
6p - 7p	0	0	0	0	0	1	0	0	1
7p - 8p	1	0	0	0	0	0	0	0	1
8p - 9p	0	0	0	0	0	0	0	0	0
9p - 10p	0	0	0	0	0	0	0	0	0
10p - 11p	0	0	0	0	0	0	0	0	0
11p - 12a	0	0	0	0	0	0	0	0	0
Unknown Time	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>7</b>