Establishing Realistic Speed Limits and Installation of Speed Limit Signs

Alonso Uzcategui, PE
Traffic Signing Engineer
Basic Speed Law (257.627(1))

(1) A person operating a vehicle on a highway shall operate that vehicle at a careful and prudent speed not greater than nor less than is reasonable and proper, having due regard to the traffic, surface, and width of the highway and of any other condition existing at the time. A person shall not operate a vehicle upon a highway at a speed greater than that which will permit a stop within the assured, clear distance ahead.
Advisory Speed

- Speed recommended by roadway agency
- Below the posted legal speed limit
- Used at curves and special situations
- Used with warning signs
- Not enforceable except with basic speed law
Why do Speed Limits Change?

- Legislation
- Request from local government
- Change in traffic pattern or alignment

All proposed speed limit changes should have input from all affected local units of government.
Authority to Establish Speed Limits

- State Trunkline
  - MDOT
  - MSP
  - MVC 257.628 (3)

- County Roads
  - County Road Engineer/Manager
  - Township Supervisor
  - MSP
  - MVC 257.628 (1)
(3) The state transportation department and the department of state police shall jointly determine any modified maximum or minimum speed limits on limited access freeways or trunk line highways consistent with the requirements of this section. A public record of a traffic control order establishing a modified speed limit authorized under this subsection shall be filed at the office of the county clerk of the county in which the limited access freeway or trunk line highway is located, and a certified copy of a traffic control order shall be evidence in every court of this state of the authority for the issuance of that traffic control order.
If the county road commission, the township board, and the department of state police unanimously determine upon the basis of an engineering and traffic investigation that the speed of vehicular traffic on a county highway is greater or less than is reasonable or safe under the conditions found to exist upon any part of the highway, then acting unanimously they may establish a reasonable and safe maximum or minimum speed limit on that county highway that is effective at the times determined when appropriate signs giving notice of the speed limit are erected on the highway.
General Speed Limits, Section 257.627

- “Limited Access Freeway General Speed Limit” (8)
  - 70 MPH, minimum 55 MPH

- “General Speed Limit” (9)
  - All non-freeway trunkline and county highways 55 MPH
General Speed Limits, Section 257.627

- **Truck Speed (4)**
  - School bus, semi tractor trailer (10,000 lb GVW)
  - Where the posted speed limit is greater than 65 MPH, these vehicles shall not exceed 65 MPH

- **“General Gravel Road Speed Limit” (10)**
  - 55 MPH
  - Municipality may request 45 MPH without a speed study
Legislative Speed Zones
Wait a minute!

- Public Act 445 of 2016 required prior to Jan 5, 2018
  - At least 600 miles of freeway raised to 75 mph
  - At least 900 miles of trunkline non-freeway raised to 65 mph
  - If supported by an engineering/safety study and 85th supporting under ideal conditions.
Speed Limit Increases on Michigan Freeways and Non-freeways in 2017

Map Explanation
NON-FREeway CORRIDOR
SPEED LIMIT INCREASED TO 65 MPH

FREEWAY CORRIDOR
SPEED LIMIT INCREASED TO 75 MPH

EATON
COUNTRY LINE AND NAME

INTERSTATE ROUTE

INTERSTATE BUSINESS
LOOP OR SPUR

U.S. ROUTE OR B.R.
(S.R. - BUSINESS ROUTE)

STATE ROUTE OR B.R.
(S.R. - BUSINESS ROUTE)

Map current as of August 2017.
School Speed Zones (257.627a)

- **What is a school?**
  - Student body must not be transported in a motor vehicle
  - Does not include in residence institutions

- **Two type of school speed zones**
  - Along school property
  - Students crossing a state trunkline or county roadway
School Speed Zones (257.627a)

- Along school property
  - Speed limit may be reduced up to 20 MPH but cannot be less than 25 MPH
  - In effect not more than 30 minutes before and after regularly scheduled school session
  - Up to 1,000 ft from school property line

- Crossing a state trunkline or county roadway
  - If students cross a highway posted 35 MPH or more, superintendent may request a school speed zone
  - Superintendent must have completed a School Route Plan
Business District Speed Zones

- Falls under 257.627 (2)(b) and 257.5
  - 25 mph
- Minimum 600 feet in length with 50 percent or more of building frontage on both sides of road
Work Speed Zones

- Falls under 257.627 (6)
  - Zone must meet 257.79d(a)

- Lane or part of the lane closed due to highway construction, maintenance, or surveying activities

- 45 miles per hour unless a different speed limit is determined on accepted engineering practice
Hospital Speed Zones

• Falls under 257.627 (7)
  • Speed can be reduced by up to 10 mph from posted speed upon request from hospital
  
  • On state trunkline, posted must be at least 50 MPH and have 2 or fewer travel lanes in each direction

  • Zone can not extend more than 1,000 ft from hospital property along state trunkline in municipality
Other Speed Zones

- Vehicular Access Points (257.627 (2))
  - 25 – 45 mph
  - Depends on number of access points within ½ mile

- Mobile Home Park (257.627 (2)(a))
  - 15 mph within boundaries
Other Speed Zones

- Public Parks (257.627 (2)(c))
  - State and County 25 mph, and Local 15 mph
  - Adjacent roads are 25 mph

- Residential Subdivision (257.627 (2)(d))
  - 25 mph within boundaries
Establishing a Modified Speed Limit
(5) A speed limit established under this section shall be determined by an engineering and safety study and by the eighty-fifth percentile speed of free-flowing traffic under ideal conditions of a section of highway rounded to the nearest multiple of 5 miles per hour....
(5) ...A speed limit established under this act shall not be posted at less than the fiftieth percentile speed of free-flowing traffic under optimal conditions on the fastest portion of the highway segment for which the speed limit is being posted.
Factors to Consider in a Speed Study

- Traffic crash data
  - Number, rate and types of crashes

- Roadside environment
  - Residential, commercial, rural

- Roadway configuration
  - Alignment, number of lanes, length of road, number of signals, grade crossings, etc.

- Non-motorists such as pedestrians, bicyclists

- 85th percentile speed
Michigan’s Fatalities and Fatality Rate

Michigan Motor Vehicle Fatalities (1915-2017)
Roadside Environment
Roadway Configuration
Speed Study

• Completed by MSP and roadway agency
• Conducted during ideal driving conditions
  • *Dry roads with free flow traffic*
• Vehicle speeds are recorded away from influencing factors
  • *Railroad crossings, signalized intersections, curves in the roadway, etc.*
• Completed using a LIDAR (laser) in an unmarked vehicle parked in an inconspicuous location, or with automated traffic counters
• Rule of thumb
  • *100 vehicles or 1 hour*
### Speed Studies of Same Road with 55mph Speed Limit and 70mph Speed Limit

#### Average = 66.4mph  Variance = 36.1
**Speed Limit 55 mph**

<table>
<thead>
<tr>
<th>Speed</th>
<th>Number of Vehicles</th>
<th>Additional</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td></td>
<td>Speed Limit (2.4%)</td>
</tr>
<tr>
<td>56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td></td>
<td>50th Percentile</td>
</tr>
<tr>
<td>67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>73</td>
<td></td>
<td>85th Percentile</td>
</tr>
<tr>
<td>74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td></td>
<td>2.1% @ 80+ mph</td>
</tr>
<tr>
<td>81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>84+</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SPEED STUDY, FREEWAY**

658 Vehicles, 17 minute study

#### Average = 67.7mph  Variance = 27.8 (-33%)
**Speed Limit 70 mph**

<table>
<thead>
<tr>
<th>Speed</th>
<th>Number of Vehicles</th>
<th>Additional</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>56</td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>Speed Limit</td>
</tr>
<tr>
<td>61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>II</td>
<td>1.1% @ 80+ mph</td>
</tr>
<tr>
<td>81</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>83</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>84+</td>
<td>III</td>
<td></td>
</tr>
</tbody>
</table>

**SPEED STUDY, FREEWAY**

721 Vehicles, 18 minute study
85th Percentile Speed

- Uniformity increases safety and reduces the risks of crashes.
- Deviation from a standard speed increases potential for crashes.
  - Slow car in a rear end collision
  - Fast car completing lane changes through slower traffic.
- Setting the speed limit as close to the 85th percentile speed achieves uniformity and increases safety.

Source: "Speed Zoning on Texas Highways" State Department of Highways and Public Transportation, Austin, Texas, October 1990 Figure 2
Installation of Speed Zone

- Traffic Control Order (TCO) prepared, signed, and sent to county clerk.

- Signs installed reflecting the speed change.

TRAFFIC CONTROL ORDER

ORDER No. SP-83-072-17

Effective August 8, 2017

In accordance with Act 300 of 1949, as amended, we hereby order a traffic engineering investigation of traffic conditions on state trunk line highway M-37 in the Counties of Lake and Wexford, and as a result of said investigation do hereby direct the maximum speed limit on state trunk line highway M-37 shall be as follows:

A speed limit of sixty-five (65) miles per hour from north junction of US-16 in Lake County to one half (0.5) mile south of Carnahan Drive and;
Sixty (60) miles per hour from one half (0.5) mile south of Carnahan Drive to Carnahan Drive in Lake County and;
Sixty-five (65) miles per hour from Carnahan Drive to M-115 in Wexford County.

This traffic control order shall be filed in the offices of the Lake and Wexford Clerk.

MICHIGAN
DEPARTMENT OF STATE POLICE

Director

Date: August 8, 2017

MICHIGAN
DEPARTMENT OF TRANSPORTATION

Director

Date: Aug 7, 2017
The MDOT Process
The MDOT Process
Request from Local Agency

Upon Request MDOT:
Acknowledge receipt with memo
Requests formal resolution
April 16, 2007

Judy A. Guenther, City Clerk
City of Perry
203 W. Polly Street
Perry, MI 48872-9503

Dear Ms. Guenther,

The Michigan Department of Transportation (MDOT) has received your request to initiate a speed study on M-52 and Lansing Road within the City of Perry in Shiawassee County.

MDOT works closely with the Michigan Department of State Police (MSP) to set speed limits on trunkline highways. Speed limits are established based on nationally accepted standards using a variety of engineering and traffic data. This data includes the geometric configuration of the roadway, 85th percentile average speeds, roadside features, parking allowances, pedestrian activities, and the reported crash experience for a 12-month period. Engineering and traffic data collected will be used to determine the speed limit on M-52. This data could show the current speed limit needs to raised, stay the same, or be lowered.

MDOT conducts speed studies at the request of local government agencies. Please have the Perry City Council Council send a formal resolution from the council requesting a speed study be performed on M-52 in the City of Perry in Shiawassee County.

A template resolution which can be used by your village is included on page 2 of this letter. The last paragraph of this template resolution beginning, “Now Therefore be it Resolved…” must be included before MDOT will implement a speed study on the requested route.

If you have any questions, please contact me at 517-324-2263.

Sincerely,

Steve Shaughnessy, Traffic and Safety Engineer
Lansing Transportation Service Center

CC: L. Doyle

C.S. 76011

Resolution #12-12-25

A resolution of the City of Brandon requesting a speed study for a portion of US 12

WHEREAS, traffic on US 12 from Wayne Street to Parmalee Road has steadily increased over the past several years due to the developmental and growth of City of Brandon,

WHEREAS, this development has increased the number of access points to the state trunkline resulting in an increase in traffic congestion and the volume of turning traffic along the corridor, and

WHEREAS, it has become increasingly difficult for residents to negotiate left-hand turns, or move in and out of the flow of traffic safely due to the increased volume of traffic,

NOW, THEREFORE BE IT RESOLVED, the City Council is formally requesting the Michigan Department of Transportation (MDOT) conduct a speed study on US 12 from Wayne Street to Parmalee Road. It is understood MDOT in cooperation with the Michigan State Police (MSP) will use engineering data gathered in the speed study to make a decision which could raise, lower, or maintain the current speed limit. It is further understood City of Brandon will abide by the decision made by MDOT and MSP as a result of this speed study.

Approved this 10th day of December, 2012.

Motion by Council Member: Cole
Second by Council Member: McConn

AYES: All
NAYES: None

Thomas J. Meehan
Mayor

Karen A. Smith
Clerk
Local Government
Needs to send in two things
1. Letter requesting the speed study
2. A resolution by locals supporting the decision of the speed study

MSP & MDOT have discussions
And agree on a time & place to meet
With the local governmental unit

Meeting with Locals, MSP & MDOT talk about safety concerns and how speed limits as established

TSC Traffic & Safety Engineer sets up speed study stations for study
reviews this with MSP and proceed with the speed study

Study Completed 85th percentile determined at each station
Recommended speed limits based on study data

Meeting with Locals, MSP & MDOT talk about results and recommendations of study

Create Traffic Control Order

Traffic Control Order must be signed by the Director of MSP and MDOT

Once Traffic Control Order is signed, a copy must be mailed to the County magistrate and placed on file

Work order prepared to make the signing changes that conform to the new Traffic Control Order and signing is fabricated and erected
Post Study Meeting with Local Agency

• Inform Locals of speed study results
• Get Local Concurrence
• Vetted through Region Engineer
Myths about Speed Limits

- Lowering Speed Limit slows traffic and is safer
- Enforcement will help lower the speed limit
- Why not install stop signs, traffic signals or speed bumps to lower speeds?
Fabrication and Installation of Speed Limit Signs
Sign Overlay
Sign Installation
Installation

- A wooden “cookie” is placed in the bottom of the hole
- The sleeves are set in and plumbed
Installation

- Sleeves are aligned and held in place with an angle and locking pliers
- Spacing is determined by the size of the sign
- 1/6 from each end leaving 2/3 in the middle
- An easier way is to take the length of the sign in feet and multiply by 8 inches
installation

- Wedges installed – wedges should cover approximately 75% of the post on 2 adjacent sides.

- Tar should be applied to adhere to the post and the sleeve. Ensure the tar encapsulates the wedges.

- Sign 210 states in the Notes that the foundations should set 24 hours before the signs are installed.
installation

- Level tops of the posts.
- Drill mounting hole approximately 1” down from top of post, use level to mark and drill the second hole.
installation

- Hang sign then drill bottom holes.
- Use stainless steel bolts, nuts and washers.
- Use a nylon washer against the face of the sign.
Installation

- Place ⅛” saw cut approximately 6” below bottom of sign on traffic approach side.
- 1” deep for 4”x6” post
- 1 ½” deep for 6”x8” post
installation

- Install date tags.
- On two panel signs, make sure there is a date tag on both panels.
Questions