# Establishing Safe and <br> Realistic Speed Limits 



Lt. Gary Megge
Michigan State Police
Traffic Services Section
michigan.gov/msp-traffic

## Our Goal is to Reduce the Number of Fatal and Serious Injury Crashes



1940-2008 Michigan Fatality Rate / 100 Million Vehicle Miles Traveled


## How are Speed Limits Established?

- A speed study is completed (85 ${ }^{\text {th }}$ percentile speed determined)
- Traffic crash data is analyzed (number/rate and types of crashes)
- Roadside environment is assessed (residential, commercial, rural, etc.)
- Roadway configuration is considered (number of lanes, length of road, etc.)
- All other factors that influence traffic and pedestrian movement are included in the "Engineering and Traffic Investigation"


## How is a Speed Study Completed?

- 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 tube counters


## What is "85th Percentile Speed"?

- The speed that 85 percent of the vehicles are traveling at or below
- Ideal speed to set as the maximum limit:
- Provides the lowest speed variance between vehicles, and thus provides the lowest crash numbers
- Provides optimum enforceability
- The SAFEST speed limit


## What is "Variance"?

- A statistical indicator of the overall uniformity of the data set
- In the case of a speed study, variance provides a measure of the uniformity of traffic flow
- Proportional to speed differentials and resulting conflicts between vehicles
- Minimum variance = greatest uniformity and maximum orderly traffic flow


## What is "Average Speed"?

- The sum total of the speeds in the sample divided by the number of speed data points in the sample
- Not particularly relevant for speed limit setting, but a conventional measure that people are comfortable with


## Crash Involvement vs. Speed



Figure B-2 Crash involvement rate by deviation from average traffic speed (Solomon 1964; Cirillo 1968 in Stuster and Coffman 1997, 4). 1 $\mathrm{mph}=1.609 \mathrm{~km} / \mathrm{h}$.

## Six Lane Urban Freeway



SPEED STUDY, FREEWAY

| Speed | Number of Vehicles | Additional |
| :---: | :---: | :---: |
| 55 < | \|IIIIIIIIIIIIIIIII |  |
| 56 | IIIIIII |  |
| 57 | IIIIIIIII |  |
| 58 | IIIIIIIIIIIIIIIIIIII |  |
| 59 | \|IIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 60 | \|||||||||||||||||||||||||||||||||||||||||| |  |
| 61 | \|||||||||||||||||||||||||||||||||| |  |
| 62 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 63 | \|||||||||||||||||||||||||||||||||||||||||||||| |  |
| 64 | \|||||||||||||||||||||||||||||||||||||||||||||| |  |
| 65 |  |  |
| 66 | \|||||||||||||||||||||||||||||||||||| |  |
| 67 | \|||||||||||||||||||||||||||| |  |
| 68 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 69 | \||I|||||||||||||||||||| |  |
| 70 | \|||||||||||||||||||||||||||| |  |
| 71 |  |  |
| 72 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 73 | \||||||||||||||||||||| |  |
| 74 | \|||||||||||||||||||||||||||||| |  |
| 75 | IIIIIIIIIIIIIIIIII |  |
| 76 | IIIIIIIIIIIII |  |
| 77 | IIIIIIIII |  |
| 78 | IIIIIII |  |
| 79 | IIIIII |  |
| 80 | IIIIIIIIII |  |
| 81 | II |  |
| 82 |  |  |
| 83 | I |  |
| 84 + | II |  |

658 Vehicles, 17 minute study

SPEED STUDY, FREEWAY

| Speed | Number of Vehicles | Additional |
| :---: | :---: | :---: |
| 55 < | \|IIIIIIIIIIIIIIIII | Speed Limit (2.4\%) |
| 56 | IIIIIII |  |
| 57 | IIIIIIIII |  |
| 58 | IIIIIIIIIIIIIIIIIIII |  |
| 59 | \|||||||||||||||||||||||||| |  |
| 60 | \||I||||||||||||||||||||||||||||||||||||||||| |  |
| 61 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 62 | \||I|I||||||||||||||||||||||| |  |
| 63 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 64 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 65 | \|IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 66 | \|||||||||||||||||||||||||||||||||||| |  |
| 67 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 68 | \||||||||||||||||||||||||||||||||||| |  |
| 69 | \||||||||||||||||||||||| |  |
| 70 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 71 |  |  |
| 72 | \|||||||||||||||||||||||||| |  |
| 73 | IIIIIIIIIIIIIIIIIIIIIII |  |
| 74 | \|IIIIIIIIIIIIIII||||||||||||||||| |  |
| 75 | \|IIIIIIIIIIIIIIII |  |
| 76 | IIIIIIIIIIIII |  |
| 77 | IIIIIIIII |  |
| 78 | IIIIIII |  |
| 79 | IIIIIII |  |
| 80 | IIIIIIIIII |  |
| 81 | II |  |
| 82 |  |  |
| 83 | I |  |
| 84 + | II |  |

658 Vehicles, 17 minute study

SPEED STUDY, FREEWAY

| Speed | Number of Vehicles | Additional |
| :---: | :---: | :---: |
| 55 < | \|IIIIIIIIIIIIIIIII | Speed Limit (2.4\%) |
| 56 | IIIIIII |  |
| 57 | IIIIIIIII |  |
| 58 | IIIIIIIIIIIIIIIIIIII |  |
| 59 | \|||||||||||||||||||||||||| |  |
| 60 | \||I||||||||||||||||||||||||||||||||||||||||| |  |
| 61 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 62 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 63 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 64 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 65 | \||||||||||||||||||||||||||||||||||||||||||| |  |
| 66 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | $50^{\text {th }}$ Percentile |
| 67 | \||I|||||||||||||||||||||||| |  |
| 68 | \||||||||||||||||||||||||||||||||||| |  |
| 69 | \||||||||||||||||||||||| |  |
| 70 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 71 |  |  |
| 72 | \||||||||||||||||||||||||| |  |
| 73 | IIIIIIIIIIIIIIIIIIIIIII | $85^{\text {th }}$ Percentile |
| 74 | \||||||||||||||||||||||||||||| |  |
| 75 | \|IIIIIIIIIIIIIIII |  |
| 76 | IIIIIIIIIIIII |  |
| 77 | IIIIIIIII |  |
| 78 | IIIIIII |  |
| 79 | IIIIIII |  |
| 80 | IIIIIIIIII | 2.1\% @ 80+ mph |
| 81 | II |  |
| 82 |  |  |
| 83 | I |  |
| 84 + | II |  |

658 Vehicles, 17 minute study

SPEED STUDY, FREEWAY

| Speed | Number of Vehicles | Additional |
| :---: | :---: | :---: |
| $55<$ | III |  |
| 56 | II |  |
| 57 | IIIIIIIII |  |
| 58 | \|IIIIIIIIIIIIIII |  |
| 59 | IIIIIIIIII |  |
| 60 | \||||||||||||||||||||||||||||| |  |
| 61 | \||I||||||||||||||||||| |  |
| 62 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 63 | \|||||||||||||||||||||||||||| |  |
| 64 | \||||||||||||||||||||||||||||||||||||||||||||||||||||||||||| |  |
| 65 |  |  |
| 66 |  |  |
| 67 | \||||||||||||||||||||||||||||||||||||| |  |
| 68 |  |  |
| 69 | \||||||||||||||||||||||||||||||||||||||||||||||||||||||||| |  |
| 70 | \|||||||||||||||||||||||||||||||||||||||||||||||||||||| |  |
| 71 | \||||||||||||||||||||||||||||||||||||||||||||||||||||||| |  |
| 72 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 73 | \||||||||||||||||||||||||||||||| |  |
| 74 | \|III|||||||||||||||| |  |
| 75 | IIIIIIIII |  |
| 76 | IIIIIIIIIIIII |  |
| 77 | IIIIIIIIIIIIIII |  |
| 78 | IIIIII |  |
| 79 | IIIIIIIII |  |
| 80 | II |  |
| 81 | I |  |
| 82 |  |  |
| 83 | I |  |
| 84 + | IIII |  |

721 Vehicles, 18 minute study

SPEED STUDY, FREEWAY

| Speed | Number of Vehicles | Additional |
| :---: | :---: | :---: |
| $55<$ | III |  |
| 56 | II |  |
| 57 | IIIIIIII |  |
| 58 | \|IIIIIIIIIIIIIII |  |
| 59 | IIIIIIIIII |  |
| 60 | \||||||||||||||||||||||||||||| |  |
| 61 | \||I||||||||||||||||||| |  |
| 62 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 63 | \|||||||||||||||||||||||||||| |  |
| 64 | \||||||||||||||||||||||||||||||||||||||||||||||||||||||||||| |  |
| 65 |  |  |
| 66 |  |  |
| 67 | \||||||||||||||||||||||||||||||||||||| |  |
| 68 |  |  |
| 69 | \||||||||||||||||||||||||||||||||||||||||||||||||||||||||| |  |
| 70 | \|||||||||||||||||||||||||||||||||||||||||||||||||||||| | Speed Limit |
| 71 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 72 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 73 | \||||||||||||||||||||||||||||||| |  |
| 74 | \|III|||||||||||||||| |  |
| 75 | IIIIIIIII |  |
| 76 | IIIIIIIIIIIII |  |
| 77 | IIIIIIIIIIIIIII |  |
| 78 | IIIIII |  |
| 79 | IIIIIIIII |  |
| 80 | II |  |
| 81 | I |  |
| 82 |  |  |
| 83 | 1 |  |
| 84 + | IIII |  |

721 Vehicles, 18 minute study

SPEED STUDY, FREEWAY

| Speed | Number of Vehicles | Additional |
| :---: | :---: | :---: |
| $55<$ | III |  |
| 56 | II |  |
| 57 | IIIIIIII |  |
| 58 | \|IIIIIIIIIIIIIII |  |
| 59 | IIIIIIIIII |  |
| 60 | \||||||||||||||||||||||||||||| |  |
| 61 | \|||||||||||||||||||||| |  |
| 62 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 63 | \|||||||||||||||||||||||||||| |  |
| 64 | \||||||||||||||||||||||||||||||||||||||||||||||||||||||||||| |  |
| 65 |  |  |
| 66 |  |  |
| 67 | \|||||||||||||||||||||||||||||||||||| |  |
| 68 | \||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||| | $50^{\text {th }}$ Percentile |
| 69 | \||||||||||||||||||||||||||||||||||||||||||||||||||||||||| |  |
| 70 | \|||||||||||||||||||||||||||||||||||||||||||||||||||||| | Speed Limit |
| 71 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 72 | \||||||||||||||||||||||||||||||||||||||||||| | $85^{\text {th }}$ Percentile |
| 73 | \||||||||||||||||||||||||||||||| |  |
| 74 | \|III|||||||||||||||| |  |
| 75 | IIIIIIIII |  |
| 76 | IIIIIIIIIIIII |  |
| 77 | IIIIIIIIIIIIIII |  |
| 78 | IIIIII |  |
| 79 | IIIIIIIII |  |
| 80 | II | 1.1\% @ 80+ mph |
| 81 | I |  |
| 82 |  |  |
| 83 | I |  |
| 84 + | IIII |  |

721 Vehicles, 18 minute study

## Speed Studies of Same Road with 55mph Speed Limit and 70mph Speed Limit

## Average $=\mathbf{6 6 . 4 m p h}$ Variance $=36.1$

Average $=\mathbf{6 7 . 7} \mathbf{m p h}$ Variance $=27.8$ (-33\%)

SPEED STUDY, FREEWAY

| Speed | Number of Vehicles | Additional |
| :---: | :---: | :---: |
| 55 < | \|IIIIIIIIIIIIIIIII | Speed Limit (2.4\%) |
| 56 | IIIIIII |  |
| 57 | IIIIIIII |  |
| 58 | IIIIIIIIIIIIIIIIIIII |  |
| 59 | \|||||||||||||||||||||||||| |  |
| 60 | \||I||||||||||||||||||||||||||||||||||||||||| |  |
| 61 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 62 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 63 |  |  |
| 64 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 65 | I\|I|||||||||||||||||||||||||||||||||||||||| |  |
| 66 | \||||||||||||||||||||||||||||||||||| | $50^{\text {th }}$ Percentile |
| 67 | \||||||||||||||||||||||||||| |  |
| 68 | \|||||||||||||||||||||||||||||||||| |  |
| 69 | \||IIIIIIIIIIIIIIIIIIIIIII |  |
| 70 | I\|I||||||||||||||||||||||||| |  |
| 71 | I\|||||||||||||||||||||||||||||||| |  |
| 72 | \|||1|||||||||||||||||||||| |  |
| 73 | IIIIIIIIIIIIIIIIIIIIIII | $85^{\text {th }}$ Percentile |
| 74 | \||||||||||||||||||||||||||||| |  |
| 75 | IIIIIIIIIIIIIIII |  |
| 76 | IIIIIIIIIIII |  |
| 77 | IIIIIIIII |  |
| 78 | IIIIIII |  |
| 79 | IIIIII |  |
| 80 | IIIIIIIIII | 2.1\% @ 80+ mph |
| 81 | II |  |
| 82 |  |  |
| 83 | I |  |
| $84+$ | II |  |

658 Vehicles, 17 minute study

SPEED STUDY, FREEWAY

| Speed | Number of Vehicles | Additional |
| :---: | :---: | :---: |
| 55 < | III |  |
| 56 | II |  |
| 57 | IIIIIIIII |  |
| 58 | IIIIIIIIIIIIIIIII |  |
| 59 | IIIIIIIIII |  |
| 60 | \|IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 61 | IIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 62 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 63 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 64 |  |  |
| 65 | \||I||||||||||||||||||||||||||||||||||||||| |  |
| 66 | \||||||||||||||||||||||||||||||| |  |
| 67 | \||1|||||||||||||||||||||||||||||||| |  |
| 68 | \|||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||| | $50^{\text {th }}$ Percentile |
| 69 |  |  |
| 70 | \||||||||||||||||||||||||||||||||||||||||||||||||||||||| | Speed Limit |
| 71 | \|IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 72 | \||||||||||||||||||||||||||||||||||||||||| | $85^{\text {th }}$ Percentile |
| 73 | \||||||||||||||||||||||||||||||| |  |
| 74 | IIIIIIIIIIIIIIIIIIIII |  |
| 75 | IIIIIIIII |  |
| 76 | \|IIIIIIIIIII| |  |
| 77 | IIIIIIIIIIIIIII |  |
| 78 | IIIIII |  |
| 79 | IIIIIIII |  |
| 80 | II | 1.1\% @ 80+ mph |
| 81 | 1 |  |
| 82 |  |  |
| 83 | I |  |
| $84+$ | IIII |  |

## Three Lane Residential Trunk Line



## SPEED STUDY

| Speed | Number of Vehicles | Additional |
| :--- | :--- | :--- |
| $<25$ | III |  |
| 25 | I |  |
| 26 | IIIIII |  |
| 27 | IIIIIII |  |
| 28 | IIII |  |
| 29 | IIIIIIIIIIII |  |
| 30 | IIIIIIIIIIIIIIII |  |
| 31 | IIIIIIIIIIIIIIIIIII |  |
| 32 | IIIIIIIIIIIIIIIII |  |
| 33 | IIIIIIIIIIIIIII |  |
| 34 | IIIIIIIIII |  |
| 35 | IIIIIIIIII |  |
| 36 | IIIIIII |  |
| 37 | IIIIII |  |
| 38 | IIII |  |
| 39 | I |  |
| 40 |  |  |
| 41 | I |  |
| 42 |  |  |
| 43 |  |  |
| 44 |  |  |
| 45 |  |  |
| 46 |  |  |
| 47 |  |  |
| 49 |  |  |
| 50 |  |  |

155 vehicles, 15 minute study

## SPEED STUDY, POSTED 25MPH ROAD

| Speed | Number of Vehicles | Additional |
| :--- | :--- | :--- |
| $<25$ | III | Speed Limit |
| 25 | IIIIII |  |
| 26 | IIIIIII |  |
| 27 | IIII |  |
| 28 | IIIIIIIIIIII |  |
| 29 | IIIIIIIIIIIIIIII |  |
| 30 | IIIIIIIIIIIIIIIIIII |  |
| 31 | IIIIIIIIIIIIIIIII |  |
| 32 | IIIIIIIIIIIIIII |  |
| 33 | IIIIIIIII |  |
| 34 | IIIIIIIIII |  |
| 35 | IIIIIII |  |
| 36 | IIIIII |  |
| 37 | IIII |  |
| 38 | I |  |
| 39 |  |  |
| 40 | I |  |
| 41 |  |  |
| 42 |  |  |
| 43 |  |  |
| 44 |  |  |
| 45 |  |  |
| 46 |  |  |
| 48 |  |  |
| 49 |  |  |
| 50 |  |  |

155 vehicles, 15 minute study

## SPEED STUDY, POSTED 25MPH ROAD

| Speed | Number of Vehicles | Additional |
| :--- | :--- | :--- |
| $<25$ | III | Speed Limit |
| 25 | I |  |
| 26 | IIIIII |  |
| 27 | IIIIIII |  |
| 28 | IIII |  |
| 29 | IIIIIIIIIIII |  |
| 30 | IIIIIIIIIIIIIIII |  |
| 31 | IIIIIIIIIIIIIIIIIII |  |
| 32 | IIIIIIIIIIIIIIIII |  |
| 33 | IIIIIIIIIIIIIIII |  |
| 34 | IIIIIIIIII | +10 mph |
| 35 | IIIIIIIIII | $85^{\text {th }}$ Percentile |
| 36 | IIIIIII |  |
| 37 | IIIIII |  |
| 38 | IIII |  |
| 39 | I | +15 mph |
| 40 |  |  |
| 41 | I | +17 mph |
| 42 |  |  |
| 43 |  |  |
| 44 |  | +20 mph |
| 45 |  |  |
| 46 |  |  |
| 47 |  |  |
| 48 |  |  |
| 50 |  |  |

155 vehicles, 15 minute study

## SPEED STUDY

| Speed | Number of Vehicles | Additional |
| :--- | :--- | :--- |
| $<25$ | III |  |
| 25 | I |  |
| 26 | IIIIII |  |
| 27 | IIIII |  |
| 28 | II |  |
| 29 | IIIIIIIIIII |  |
| 30 | IIIIIIIIII |  |
| 31 | IIIIIIIIIIIIIIIIIII |  |
| 32 | IIIIIIIIIIIIIIIIIIII |  |
| 33 | IIIIIIIIIIIIIIIIIII |  |
| 34 | IIIIIIIIIIIIIIII |  |
| 35 | IIIIIIIIIIII |  |
| 36 | IIIIIIIIII |  |
| 37 | IIIIIII |  |
| 38 | II |  |
| 39 | III |  |
| 40 | I |  |
| 41 | I |  |
| 42 |  |  |
| 43 |  |  |
| 44 |  |  |
| 45 |  |  |
| 46 | 4 |  |
| 48 |  |  |
| 49 |  |  |
| 50 |  |  |

168 vehicles, 12 minute study

## SPEED STUDY, POSTED 35MPH ROAD

| Speed |  | Number of Vehicles |
| :--- | :--- | :--- |
| $<25$ | III | Additional |
| 25 | I |  |
| 26 | IIIII |  |
| 27 | IIIII |  |
| 28 | II |  |
| 29 | IIIIIIIIIII |  |
| 30 | IIIIIIIIII |  |
| 31 | IIIIIIIIIIIIIIIIII |  |
| 32 | IIIIIIIIIIIIIIIIIIIIII |  |
| 33 | IIIIIIIIIIIIIIIIIII |  |
| 34 | IIIIIIIIIIIIIIII |  |
| 35 | IIIIIIIIIIII | Speed Limit |
| 36 | IIIIIIIIII |  |
| 37 | IIIIIIII |  |
| 38 | II |  |
| 39 | IIII |  |
| 40 | I |  |
| 41 | I |  |
| 42 |  |  |
| 43 |  |  |
| 44 |  |  |
| 45 |  |  |
| 46 |  |  |
| 47 |  |  |
| 48 |  |  |
| 50 |  |  |

168 vehicles, 12 minute study

## SPEED STUDY, POSTED 35MPH ROAD

| Speed | Number of Vehicle | Additional |
| :---: | :---: | :---: |
| <25 | III |  |
| 25 | I |  |
| 26 | IIIII |  |
| 27 | IIIII |  |
| 28 | II |  |
| 29 | IIIIIIIIIIII |  |
| 30 | IIIIIIIIIIII |  |
| 31 | IIIIIIIIIIIIIIIIIIIII |  |
| 32 | IIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 33 | IIIIIIIIIIIIIIIIIIIIIIIII |  |
| 34 | IIIIIIIIIIIIIIIIIIIII |  |
| 35 | IIIIIIIIIIIIIIII | Speed Limit |
| 36 | IIIIIIIIIII | $85^{\text {th }}$ Percentile |
| 37 | IIIIIIII |  |
| 38 | II |  |
| 39 | III |  |
| 40 | 1 | +5mph |
| 41 |  |  |
| 42 | 1 | +7mph |
| 43 |  |  |
| 44 |  |  |
| 45 | I | +10mph |
| 46 |  |  |
| 47 |  |  |
| 48 |  |  |
| 49 |  |  |
| 50 |  |  |

168 vehicles, 12 minute study

## Speed Studies of Same Road with 25mph Speed Limit and 35mph Speed Limit

Average $=32.8 \mathrm{mph}$ Variance $=10.9$

SPEED STUDY, POSTED 25MPH ROAD

| Speed | Number of Vehicles | Additional |
| :--- | :--- | :--- |
| $<25$ | III | Speed Limit |
| 25 | I |  |
| 26 | IIIIIII |  |
| 27 | IIIIII |  |
| 28 | IIIIIIIIIIII |  |
| 29 | IIIIIIIIIIIIIIIII |  |
| 30 | IIIIIIIIIIIIIIIIII |  |
| 31 | IIIIIIIIIIIIIIIII |  |
| 32 | IIIIIIIIIIIIIIIII |  |
| 33 | IIIIIIIIII | +10 mph |
| 34 | IIIIIIIIII | $85^{\text {hh }}$ Percentile |
| 35 | IIIIIII |  |
| 36 | IIIIII |  |
| 37 | IIII | +15 mph |
| 38 | I |  |
| 39 |  | +17 mph |
| 40 |  |  |
| 41 |  | +20 mph |
| 42 |  |  |
| 43 |  |  |
| 44 |  |  |
| 45 |  |  |
| 46 |  |  |
| 48 |  |  |
| 49 |  |  |
| 50 |  |  |

Average $=\mathbf{3 2 . 4} \mathbf{m p h}$ Variance $=11.2$

SPEED STUDY, POSTED 35MPH ROAD


| 49 |  | 0 |
| :---: | :---: | :---: |
| 50 | II | 2 |
| 51 | IIIIIII | 7 |
| 52 | IIIII | 5 |
| 53 | IIIIIIIIIIIIII | 14 |
| 54 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | 34 |
| 55 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII Current Speed Limit | 59 |
| 56 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | 93 |
| 57 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | 110 |
| 58 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | 169 |
| 59 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | 210 |
| 60 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | 212 |
| 61 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | 207 |
| 62 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | 190 |
| 63 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | 165 |
| 64 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | 108 |
| 65 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | 87 |
| 66 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | 62 |
| 67 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | 40 |
| 68 | IIIIIIIIIIIIIIIIIIIIIIIIIIIII | 29 |
| 69 | IIIIIIIIIIIIIIIIIIIIIIIIII | 26 |
| 70 | IIIIIIIIIIIIIIII | 16 |
| 71 | IIIIIIIIIIIIIII | 15 |
| 72 | IIIIIIIIIIIIIII | 15 |
| 73 | IIIIIIIIII | 10 |
| 74 | IIIIII | 6 |
| 75 | III | 3 |
| 76 | IIIII | 5 |
| 77 |  | 0 |
| 78 | II | 2 |
| 79 | I | 1 |
| 80 |  | 1867 |

US-127 speed study totals, July 16, 2007
Start 11:00am - Stop 3:15pm (actual 2 hours 38 minutes)
8 locations, approximately 1,867 vehicles

| 55 mph or less | 60mph or less | 65mph or less | 70mph or less | 71 mph or more | Total |
| :--- | :--- | :--- | :--- | :--- | :--- |
| 117 vehicles | 867 vehicles | 1649 vehicles | $\mathbf{1 8 1 0}$ vehicles | 57 vehicles | $\mathbf{1 , 8 6 7}$ |
| 6.3 percent | 46.4 percent | 88.3 percent | 97.0 percent | $\mathbf{3 . 0 \text { percent }}$ |  |

## A Proper Speed Limit

- 5 lane roadway
- Mixed business with some residential
- Traffic Control Order for 45 miles per hour was implemented in 1963


## Five Lane Urban County Road



SPEED STUDY
Waverly south of Michigan
Speed

| 30 | III | Number of Vehicles |
| :--- | :--- | :--- |
| 31 | IIII |  |
| 32 | IIIIIIII |  |
| 33 | IIIIIIIIII |  |
| 34 | IIIIIIIIIIIII |  |
| 35 | IIIIIIIIIIIIIIIIIII |  |
| 36 | IIIIIIIIIIIIIIIIIII |  |
| 37 | IIIIIIIIIIIIIIIIIII |  |
| 38 | IIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 39 | IIIIIIIIIIIIIIIIIIIIIII |  |
| 40 | IIIIIIIIIIIIIIIII |  |
| 41 | IIIIIIIIIIII | Speed Limit |
| 42 | IIIIIIIIIIIII |  |
| 43 | IIIIIIIIIIIII |  |
| 44 | IIIIIII |  |
| 45 | IIIIII |  |
| 46 | III |  |
| 47 | II |  |
| 48 | III |  |
| 49 |  |  |
| 50 | I |  |
| 51 | IIII |  |
| 52 |  |  |
| 53 |  |  |
| 54 |  |  |
| 55 | $I$ |  |
| 56 |  |  |

258 vehicles, 20 minute study
(OVER CAST/DRY ROAD)

## Public Perception

- Perception is that a higher speed limit will make the roadway less safe, because the public falsely thinks the actual travel speeds will increase
- Similarly, perception is that a lower speed limit will make the roadway safer, because the public falsely thinks the actual travel speeds will decrease


## Reality

- The perception of the roadway becoming less safe is the only thing that changes significantly, Travel speeds don't change
- That perception of reduced safety can actually enhance safety by causing users to reduce risk taking behavior


## Jolly Road @ 55mph

Jolly Road at West Driveway
Posted 55 mph

| Speed | Number of Vehicles | Additional |
| :--- | :--- | :--- |
| 35 | I |  |
| 36 | I |  |
| 37 | II |  |
| 38 | IIIIII |  |
| 39 | IIIIIIII |  |
| 40 | IIIIII |  |
| 41 | IIIIIIIIII |  |
| 42 | IIIIIIIIIIIII |  |
| 43 | IIIIIIIIIIIIIIIIII |  |
| 44 | IIIIIIIIIIIIIII |  |
| 45 | IIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 46 | IIIIIIIIIIIIIIIIIIIIII |  |
| 47 | IIIIIIIIIIIIIIIIIIIIIIII |  |
| 48 | IIIIIIIIIIIIIIII |  |
| 49 | IIIIIIIIIIIIIII |  |
| 50 | IIIIIIIIIII |  |
| 51 | IIIIII |  |
| 52 | IIIIIII |  |
| 53 | IIII |  |
| 54 | IIIIII |  |
| 55 |  |  |
| 56 |  |  |
| 57 |  |  |
| 58 |  |  |
| 59 |  |  |
| 60 |  |  |
| 61 |  |  |

264 vehicles
$85 \%$ Speed $=52 \mathrm{mph}$
Low Speed $=35 \mathrm{mph}$
High Speed = 61 mph
Patrol Car Speed = 52 mph
Compliance Rate $=95 \%$

## Jolly Road @ 45mph

Jolly Road at West Driveway
Posted 45 mph

| Speed | Number of Vehicles | Additional |
| :--- | :--- | :--- |
| 35 | II |  |
| 36 | II |  |
| 37 | IIII |  |
| 38 | I |  |
| 39 | IIIIIIII |  |
| 40 | IIIIIII |  |
| 41 | IIIIIIIIIIIIIIIII |  |
| 42 | IIIIIIIIIIIIIIIIIIIII |  |
| 43 | IIIIIIIIIIIIIIIIIIIIII |  |
| 44 | IIIIIIIIIIIIIIIIIIIIIIIIII | Speed Limit |
| 45 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 46 | IIIIIIIIIIIIIIIIIIIIIII |  |
| 47 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 48 | IIIIIIIIIIIIIIIIII |  |
| 49 | IIIIIIIIIIIIIIIII |  |
| 50 | IIIIIIIIIII | $85 \%$ Patrol Car |
| 51 | IIIIIII |  |
| 52 | IIIIIIII |  |
| 53 | IIIIII |  |
| 54 | II |  |
| 55 | III |  |
| 56 | I |  |
| 57 |  |  |
| 58 | $I$ |  |
| 59 |  |  |
| 60 |  |  |
| 61 |  |  |

330 vehicles
$85 \%$ Speed $=51 \mathrm{mph}$
Low Speed $=36 \mathrm{mph}$
High Speed $=60 \mathrm{mph}$
Patrol Car Speed = 51 mph
Compliance Rate $=37 \%$

## Improper Change

| Speed | Jolly Road at West Drivew Posted 55 mph Number of Vehicles | Additional |  Jolly Road at West Driveway <br> Posted 45 mph <br> Number of Vehicles   Additional <br> Speed     |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 35 | 1 |  | 35 |  |  |
| 36 |  |  | 36 | II |  |
| 37 | I |  | 37 | II |  |
| 38 | II |  | 38 | III |  |
| 39 | IIIII |  | 39 | 1 |  |
| 40 | IIIIIIIII |  | 40 | IIIIIIII |  |
| 41 | IIIIII |  | 41 | IIIIIII |  |
| 42 | IIIIIIIIIIII |  | 42 | IIIIIIIIIIIIIIIIIII |  |
| 43 | IIIIIIIIIIIIIII |  | 43 | IIIIIIIIIIIIIIIIIIIIIII |  |
| 44 | IIIIIIIIIIIIIIIIIII |  | 44 | IIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 45 | IIIIIIIIIIIIIIIIII |  | 45 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | Speed Limit |
| 46 | IIIIIIIIIIIIIIIIII |  | 46 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 47 | IIIIIIIIIIIIIIIIIIIIIIIII |  | 47 | IIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 48 | IIIIIIIIIIIIIIIIIIIIIIIIII |  | 48 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 49 | IIIIIIIIIIIIIIIIIIIIIIIIIIII |  | 49 | IIIIIIIIIIIIIIIIIIIIIIIIIIIIII |  |
| 50 | IIIIIIIIIIIIIIIIIIIII |  | 50 | IIIIIIIIIIIIIIIIIIIII |  |
| 51 | IIIIIIIIIIIIIIII |  | 51 | IIIIIIIIIIIIIIIIIIII | 85\% Patrol Car |
| 52 | IIIIIIIII | 85\% Patrol Car | 52 | IIIIIIIIIIII |  |
| 53 | IIIIIIIIII |  | 53 | IIIIIII |  |
| 54 | IIIIII |  | 54 | IIIIIIIIII |  |
| 55 | IIIIIIII | Speed Limit | 55 | IIIIII |  |
| 56 | IIII |  | 56 | II |  |
| 57 | IIIII |  | 57 | II |  |
| 58 |  |  | 58 | 1 |  |
| 59 |  |  | 59 |  |  |
| 60 |  |  | 60 | 1 |  |
| 61 | I |  | 61 |  |  |
| 264 vehicles <br> $85 \%$ Speed $=52 \mathrm{mph}$ <br> Low Speed $=35 \mathrm{mph}$ <br> High Speed $=61 \mathrm{mph}$ <br> Patrol Car Speed $=52 \mathrm{mph}$ <br> Compliance Rate $=95 \%$ |  |  |  | 330 vehicles <br> $85 \%$ Speed $=51 \mathrm{mph}$ <br> Low Speed $=36 \mathrm{mph}$ <br> High Speed $=60 \mathrm{mph}$ <br> Patrol Car Speed $=51 \mathrm{mph}$ <br> Compliance Rate $=37 \%$ |  |



## Enforcement Effect

SPEED STUDY
Saginaw Hwy west of Abbott Fully Marked Patrol Car

| Speed |
| :--- |
| 30 IIII Number of Vehicles <br> Additional   <br> 31   <br> 32   <br> 33 IIIIIII  <br> 34 IIIIII  <br> 35 IIIIIII  <br> 36 IIIIIIIIII  <br> 37 IIIIIIIIIIIII  <br> 38 IIIIIIIIIIIII  <br> 39 IIIIIIIIIIIIII  <br> 40 IIIIIIIIIIII  <br> 41 IIIIIIIIIIII  <br> 42 IIIIIIIIIIII  <br> 43 IIIIII  <br> 44 IIIIII  <br> 45 III  <br> 46   <br> 47 I  <br> 48 I  <br> 49   <br> 50   <br> 51   <br> 52   <br> 53   <br> 54   <br> 55   <br> 56   |

140 vehicles, 10 minute study

SPEED STUDY
Saginaw Hwy west of Abbott

| Speed |
| :--- |
| 30 III Number of Vehicles <br> Additional   <br> 31 II  <br> 32 III  <br> 33 III  <br> 34 IIIIII  <br> 35 IIIIIII  <br> 36 IIIIIIIIIIIIIIII  <br> 37 IIIIIIIIIII  <br> 38 IIIIIIIIIIIIIIII  <br> 39 IIIIIIIIIIII  <br> 40 IIIIIIIIIII  <br> 41 IIIIIIIIIIIIIIIIIII  <br> 42 IIIIIIIIII  <br> 43 IIIIIIIII  <br> 44 II  <br> 45 IIIIII  <br> 46 III  <br> 47 III  <br> 48 II  <br> 49 I  <br> 50   <br> 51   <br> 52   <br> 53   <br> 54   <br> 55   <br> 56   |

158 vehicles, 13 minute study

## Enforcement Effect?

SPEED STUDY Saginaw Hwy west of Abbott Fully Marked Patrol Car

| Speed | Number of Vehicles | Additional |
| :---: | :---: | :---: |
| 30 | III |  |
| 31 |  |  |
| 32 |  |  |
| 33 | IIIIIII |  |
| 34 | IIIIIII |  |
| 35 | IIIIIII | Speed Limit |
| 36 | IIIIIIIIIII |  |
| 37 | IIIIIIIIIIIIIIII |  |
| 38 | IIIIIIIIIIIIIII |  |
| 39 | IIIIIIIIIIIIIIIIII |  |
| 40 | IIIIIIIIIIIIIII |  |
| 41 | \||I||||||||||| |  |
| 42 | IIIIIIIIIIIII | $85^{\text {th }}$ Percentile |
| 43 | IIIIIII |  |
| 44 | IIIIII |  |
| 45 | III |  |
| 46 |  |  |
| 47 | I |  |
| 48 | I |  |
| 49 |  |  |
| 50 |  |  |
| 51 |  |  |
| 52 |  |  |
| 53 |  |  |
| 54 |  |  |
| 55 |  |  |
| 56 |  |  |

SPEED STUDY
Saginaw Hwy west of Abbott

| Speed |  | Number of Vehicles |
| :--- | :--- | :--- |
| 30 | II |  |
| 31 | II |  |
| 32 | IIII |  |
| 33 | III |  |
| 34 | IIIIIII |  |
| 35 | IIIIIII | Speed Limit |
| 36 | IIIIIIIIIIIIIII |  |
| 37 | IIIIIIIIIIII |  |
| 38 | IIIIIIIIIIIIIIIII |  |
| 39 | IIIIIIIIIIII |  |
| 40 | IIIIIIIIIII |  |
| 41 | IIIIIIIIIIIIIIIIIIIII |  |
| 42 | IIIIIIIIII |  |
| 43 | IIIIIIIII |  |
| 44 | II |  |
| 45 | IIIIIII |  |
| 46 | III |  |
| 47 | III |  |
| 48 | II |  |
| 49 | I |  |
| 50 |  |  |
| 51 |  |  |
| 52 |  |  |
| 53 |  |  |
| 54 |  |  |
| 55 |  |  |
| 56 |  |  |

158 vehicles, 13 minute study


## Thank You


www.michigan.gov/msp-traffic

