

USLIMITS 2.0: A Web-Based Tool for Setting Speed Limits

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Federal Highway Administration

 **Safe Roads for a Safer Future**
Investment in roadway safety saves lives
<http://safety.fhwa.dot.gov>

Overview of Presentation

- Background
- Benefits and limitations
- Decision rules and logic
- Recent updates
- Walk through
- Additional information
- Questions

Guidance for Setting Speed Limits

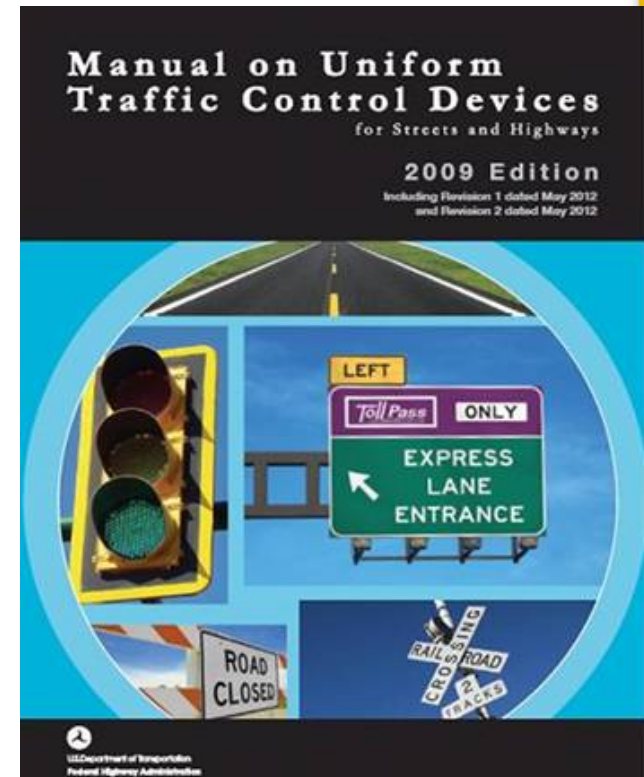
MUTCD Speed Zone Guidance

Standard

- Based on traffic study
- Analysis of free-flow operating speeds

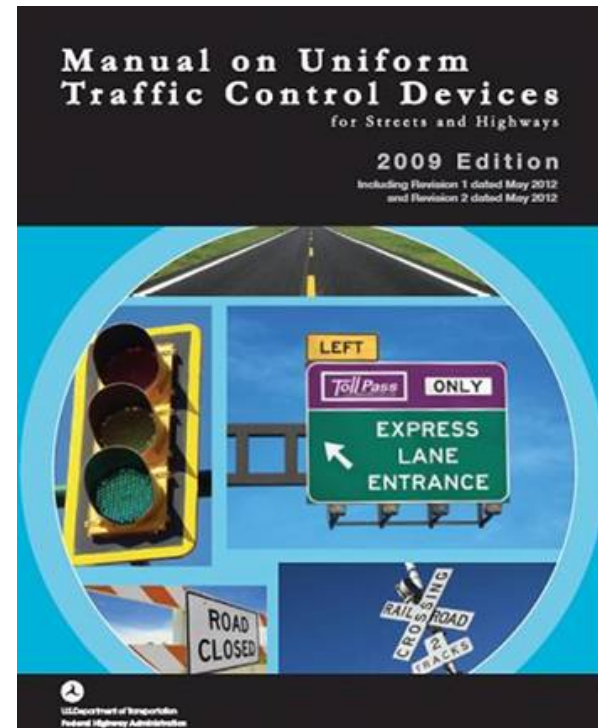
Recommended Practice

- Within 5 mph of the 85th percentile speed of free-flowing traffic



MUTCD Speed Zone Guidance

- Optional factors
 - ✓ Road characteristics
 - ✓ Pace speed
 - ✓ Roadside development
 - ✓ Parking practices
 - ✓ Ped/bike activity
 - ✓ Crash statistics



Need for an Expert System

- TRB Special Report 254: Managing Speed: Review of Current Practice for Setting and Enforcing Speed Limits
- Knowledge-based expert system can improve the decision making process
 - Mimic an expert's thought process
 - Reduce subjectivity
 - More explicit consideration of roadway and other factors, e.g. Ped/bike activity

The Result...

- **USLIMITS2**: A web-based tool designed to help practitioners set reasonable, safe, and consistent speed limits for specific segments of roads.
- Based on Australian expert system
- 2017 NTSB Safety Study includes recommendation to revise MUTCD to “...require that an expert system such as USLIMITS2 be used as a validation tool...”

USLIMITS2 Benefits

- Free and easy to use web-based tool for speed limit setting
- Decision rule expert system
- Applicable to wide range of streets and highways
- Ped/bike activity, crash history, roadside hazards, and access density explicitly considered
- Consistent, credible, enforceable speed limits

USLIMITS2 Limitations

- Not applicable for special situations:
 - School Zones,
 - Work Zones, and
 - Variable Speed Limits
- Does not capture subjective measures that might be included in a narrative in a speed study (i.e., specific problem areas)
- Does not allow for the higher speed limits found in some Western States

Examples of Input Variables

- Operating Speed (85th percentile and 50th percentile)
- Traffic volume
- Presence/absence of adverse alignment
- Is this a transition section?
- Number of interchanges in section
- Roadside hazard rating
- Number of lanes
- Presence of median
- Specific area/development type
- Number of Intersections/Access Points/Signals per Mile
- Presence/use of on-street parking
- Extent of pedestrian/bicycle activity
- Crash statistics (if available)

Decision Rules: Route Types

- Limited Access Freeway
- Road Section in Undeveloped Area
- Road Section in Developed Area

Full Decision Rules are available at

<https://safety.fhwa.dot.gov/uslimits/documents/aappendixk.pdf>

2017 Updates

- Added features to make the site more user friendly
- Provided better definitions of what was expected in each field
- Added “Current Speed Limit” field to project information page
- Added a summary page of all input for review and edit before final submission

Case Study: Maine DOT

- Looked at several speed zones with USLIMITS2 to find an alternative to the Excel spreadsheet that they have used for two decades.
- Occasionally the USLIMITS2 recommendation is slightly higher than what would be applicable. This is a good thing!
 - Allows them to use engineering judgement and set it below the recommendation if necessary.
 - If the speed recommendation is lower than appropriate, it is difficult to defend the higher posting without the analysis backing it.

Maine DOT Recommendations

- Need to account for more rural scenarios where roads have very few houses and there isn't a lot of traffic.
- Include additional input of “engineering judgment” when there is less than 350-500 AADT.

Case Study: Alabama DOT

- Reference USLIMITS2 in their State Speed Management Manual as a tool used to verify or supplement an engineering study used to make a decision on speed limits.
- In Montgomery found that USLIMITS2 was giving them a speed considerably lower than what they expected.
 - Discovered that adjusting a few of the factors – such as if there is improvements that can be made to a route to improve crashes - it gives a more expected speed limit.

User comments

- “It’s nice to have another data point to either confirm what we are already deciding to do or to give us pause to look at things more closely if the program recommends something different than what we were thinking.”
- “A good tool to use to determine speed limits and not solely rely on engineering judgement.”
- “Useful especially for local agencies who have limited tools and resources.”
- “It’s helpful to have all information accessible in a report that can be saved in the project file.”

USLIMITS2 Example: Speed Limit Recheck on Rural Two-Lane Roadway

- 3.3-mile two-lane rural roadway
- Existing speed limit: 45 mph
- 85th percentile: 54 mph
- 50th percentile: 49 mph
- Statutory speed limit: 55 mph
- AADT 8,000
- The terrain is transitional with both horizontal and vertical curve changes
- 5 years of crash data
- 104 crashes, 5 were either an injury or fatality
- Similar sections have a crash rate of 126 crashes per 100 million vehicle miles, and an average injury rate of 44 injuries per 100 million vehicle miles.

Question: Is the existing maximum 45 mph speed limit appropriate? If not, what should it be?

NEW PROJECT ENTRY

****On all forms use the Tab key or mouse to navigate between the data input fields - do not use the Enter key.****

Fields marked with an asterisk * are required. Select state, county and city first.

State * ▾

County * ▾

City/Area * ▾

Place Name

Your Name *

Route/Street Name *

Study Segment Start [More Info](#)

Study Segment End [More Info](#)

New or Existing Route * ▾ [More Info](#)

Existing Speed Limit (mph) [More Info](#)

USLIMITS2

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ROAD SECTION IN UNDEVELOPED AREA

Project Name - Route 218

Route Name - Route 218

From -

To -

Roadway Data - Fields marked with an asterisk * are required

85th Percentile Speed (mph)* (maximum of 99 mph) [More Info](#)

50th Percentile Speed (mph)* [More Info](#)

Section Length in Miles *

Annual Average Daily Traffic *

Adverse Alignment * [More Info](#)

Statutory Speed Limit for this Type of Road * [More Info](#)

Transition Zone * [More Info](#)

Roadside Rating * [More Info](#)

Divided/Undivided * [More Info](#)

Number of Through Lanes (both directions) * [More Info](#)

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ROAD SECTION IN UNDEVELOPED AREA

Project Name - Route 218

Route Name - Route 218

From -

To -

Fields marked with an asterisk * are required

Do you have crash data for this site? Yes No [More Info](#)
*

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CRASH MODULE 1

Project Name - Route 218

Route Name - Route 218

From -

To -

Fields marked with an asterisk * are required

Enter the crash history duration *

Enter the Average *Daily* Traffic (ADT) [More Info](#)
for this period (veh/day) *

Enter the Total Number of Crashes [More Info](#)
for this period *

Total Number of Injury and Fatal [More Info](#)
Crashes for this period *

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CRASH MODULE 2

Project Name - Route 218**Route Name** - Route 218**From** -**To** -**Crash Rate For This Section**

The crash rate for the section is 216 per 100 million vehicle miles.

Average Crash Rate Per 100 Million Vehicle Miles

If you have data on crash rates for similar sections in your jurisdiction during the same time period please enter the rate below. Otherwise, an average taken from [HSIS](#) will be used. Because the use of HSIS data may under- or overestimate crash rates, it is recommended that data specific to your jurisdiction is used when available. The HSIS average for this type of road and traffic volume is 126 per 100 million vehicle miles. If you leave the box blank the average taken from HSIS will be used.

[More Info](#)**Injury Rate For This Section**

The rate of injury crashes for the section is 71 per 100 million vehicle miles.

Average Injury Rate Per 100 Million Vehicles Miles

If you have data on average injury and fatal rates for similar sections in your jurisdiction during the same time period please enter the rate below. Otherwise, an average taken from [HSIS](#) will be used. Because the use of HSIS data may under- or overestimate injury rates, it is recommended that data specific to your jurisdiction is used when available. The HSIS average for this type of road and traffic volume is 44 per 100 million vehicle miles. If you leave the box blank the average taken from HSIS will be used.

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CRASH MODULE 3 - RESULTS

Project Name - Route 218**Route Name** - Route 218**From** -**To** -**Crash Rate Computations**

The crash rate for this section is 216 per 100 million vehicle miles.

The Crash Rate in this section is 72% higher than the average of similar sections.

The Critical Crash Rate is 153 per 100 million vehicle miles.

Injury Rate Computations

The rate of injury crashes for this section is 71 per 100 million vehicle miles.

The Rate of Injury and Fatal Crashes for this section is 60% higher than the average rate of similar sections.

The Critical Injury Rate is 61 per 100 million vehicle miles.

The section crash rate of 216 per 100 MVM is above the critical rate (153). The injury crash rate for the section of 71 per 100 MVM is above the critical rate (61). A comprehensive crash study should be undertaken to identify engineering and traffic control deficiencies and appropriate corrective actions. The speed limit should only be reduced as a last measure after all other treatments have either been tried or ruled out.

Can traffic control and/or geometric treatments reduce the crash/injury rate in this section? *

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PROJECT REVIEW

General Information

Project Name - Route 218
State - Virginia
County - Stafford County
City/Area - Stafford
Your Name - Douglas Cobb
Route Name - Route 218
Study Segment Start -
Study Segment End -
Route Status - Existing
Route Type - Road Section in Undeveloped Area
Existing Speed Limit - 45
Project Date - 05-08-2018
Project Number -
Project Description -

[Edit](#)

Roadway Data

85th Percentile Speed - 54
50th Percentile Speed - 49
Section Length in Miles - 3.3
Annual Average Daily Traffic - 8000
Adverse Alignment - Yes
Statutory Speed Limit - 55
Roadside Rating - 4
Transition Zone - No
Divided/Undivided - Undivided
Number of Through Lanes - 2

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Crash Data

Number of Years of Crash Data - 5
Number of Months of Crash Data - 0

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ROAD SECTION IN UNDEVELOPED AREA

User Name - Douglas Cobb**Project Name** - Route 218**State** - Virginia**County** - Stafford County**City** - Stafford**Route Name** - Route 218**Termini From** -**Termini To** -**Recommended Speed Limit:**

Note: Sections with adverse alignments may need specific 'advisory speed warnings' which may be different from the general speed limit for the section. See [Procedures for Setting Advisory Speeds on Curves](#), Publication No. FHWA-SA-11-22, June 2011, for more guidance.

Note: The section crash rate of 216 per 100 MVM is above the critical rate (153). The injury crash rate for the section of 71 per 100 MVM is above the critical rate (61). A comprehensive crash study should be undertaken to identify engineering and traffic control deficiencies and appropriate corrective actions. The speed limit should only be reduced as a last measure after all other treatments have either been tried or ruled out.

Disclaimer: The U.S. Government assumes no liability for the use of the information contained in this report. This report does not constitute a standard, specification, or regulation.

Add Additional Comments[Save Project File](#)[More Info](#)

Coming Soon

- Update HSIS data used in tool
- Case studies
- Notable practices

Additional Information

- <http://safety.fhwa.dot.gov/USLIMITS/>
 - USLIMITS2 expert speed zone tool
 - Project Report from NCHRP 3-67
 - User Guide
 - Decision Rules
 - Frequently Asked Questions
 - Technical Support or for Free Webinar Training:
help@uslimits.org
- Office of Safety Speed Management Program
safety.fhwa.dot.gov/speedmgt/

Questions

- FHWA Speed Management Team
 - Guan Xu (Office of Safety)
 - 202-366-5892, guan.xu@dot.gov
- USLIMITS2 Updates, Maintenance, and Technical Assistance Contractor
 - Bryan Katz (ToXcel)
 - 703-754-0248, bryan.katz@toxcel.com

