NCHRP 17-76: Guidance for the Setting of Speed Limits

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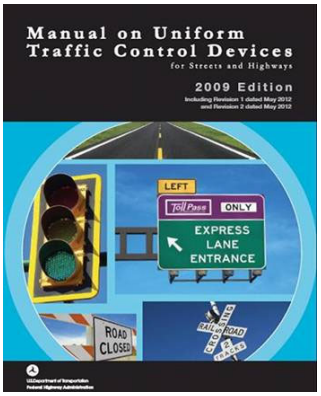
NCHRP 17-76 Objectives

- Objective:
  - Identify and describe factors that influence operating speed
    - Research report = *NCHRP Web-Only Document 291: Development of a Posted Speed Limit Setting Procedure and Tool*
  - Provide guidance (**User Guide** and **Tool**) to make informed decisions related to establishing speed limits on roadways
    - User Guide / Tool = *NCHRP Research Report 966: User Guide for Posted Speed Limit Setting Procedure and Tool*

Existing Guidance

- **MUTCD**
  - Traffic study using 85th percentile speed of free-flowing traffic along with consideration of other factors
- Several **other resources** available
  - FHWA website and reports, USLIMITS2, ITE website, state documents, NACTO, etc.



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Other Publications & Activities (After NCHRP 17-76 Started)

- **NACTO 2017** policy: "State rules or laws that set speed limits at the 85th percentile speed should be repealed"
- **National Transportation Safety Board 2017** (*Reducing Speeding-Related Crashes Involving Passenger Vehicles*) provides specific recommendations, such as removing guidance in MUTCD that speed limits should be within 5 mph of the 85th percentile speed
- Several **state initiatives**
- **City-wide** speed limits
- **NACTO 2020** report: *City Limits, Setting Safe Speed Limits on Urban Streets*

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NCUTCD Task Force on Speed Limits

- Task Force addressing recommendations from NTSB
- Key direction / suggested changes to MUTCD:
  - Keep MUTCD general (detailed procedure => guides)
  - Emphasize that other factors have a role in setting speed limits (in addition to 85th) / reorganized list of factors
  - Retain reference to 85th percentile, particularly for freeways, expressways, and rural areas

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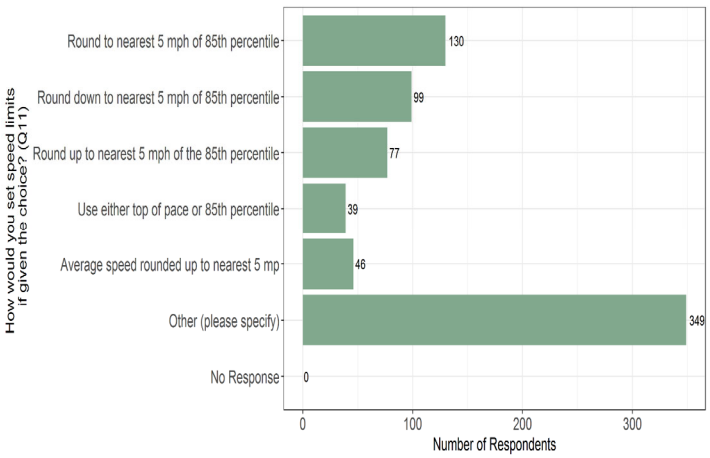
Q11: How would you set speed limits if given the choice?



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NCHRP 17-76 User Guide and Tool Guiding Principles

- Easy to explain (relatively)
- Consistent results – use of decision rules
- Defendable – demonstrate sources of decision rules
- Avoid "black box" feel
- Flexible so future knowledge can update decision rules

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Developing Guide and Tool Guiding Principles (Continued)

- Can be used for all roadway types / contexts
- Group similar roadway types / contexts
- Different set of decision rules for each roadway type / context groups

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Speed Limit Setting Groups

Context Type	Rural	Rural Town	Suburban	Urban	Urban Core
Freeways	Limited Access	Limited Access	Limited Access	Limited Access	Limited Access
Principal Arterial	Undeveloped	Developed	Developed	Developed	Full Access
Minor Arterial	Undeveloped	Developed	Developed	Developed	Full Access
Collector	Undeveloped	Full Access	Developed	Full Access	Full Access
Local	Undeveloped	Full Access	Full Access	Full Access	Full Access

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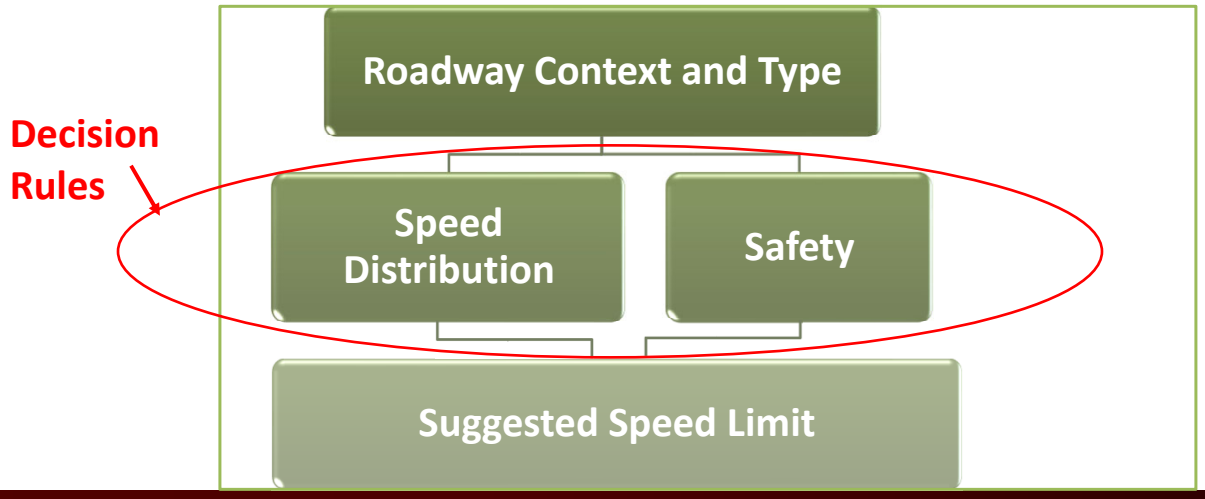
Speed Limit Setting Procedure



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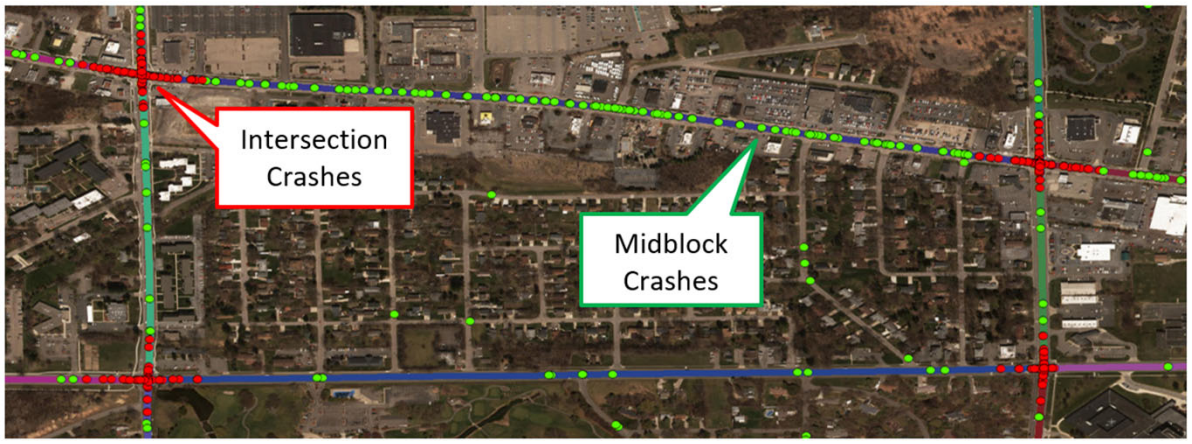
Developing Decision Rules in 17-76

- Findings from the **literature**
- Guidance from **key reference documents** such as the *Green Book* and the *Highway Safety Manual*
- Research efforts in 17-76 using data from **Austin, TX and Washtenaw County, MI**
- **Research Team** expert opinions
- Feedback from **experts**, including the **project panel**

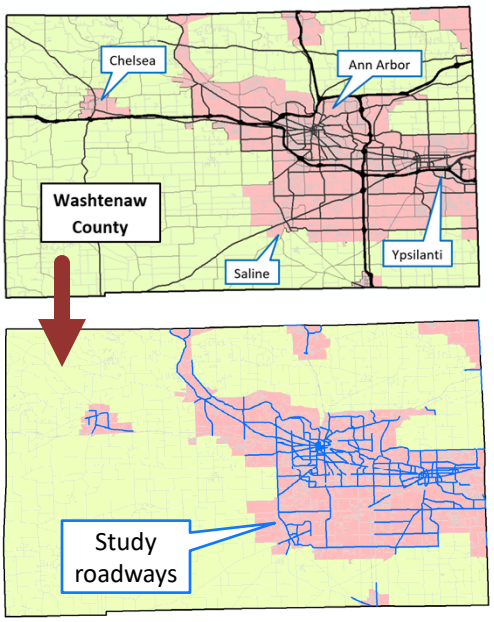
17-76 Research Efforts
Crash Data – Non-Intersection



Washtenaw County Michigan Roadway Inventory Data

- Approximately **313 miles** out of ~3,000 miles of public roadway selected for safety analysis which **met criteria for inclusion**

Characteristic	Criteria
Posted Speed Limit	25 to 50 miles per hour
National Functional Class	Includes Other Principal Arterial, Minor Arterial, Major Collector, Minor Collector Excludes Interstates, Other Freeways, and Local
Historical Traffic Volume	Must include recent AADT estimate
Urban Boundary	Includes roadways which fall within or extend from urban census boundary



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Austin, Texas Speed Data

- City of Austin traffic count data
  - 2016 and 2017 data
  - Most on 2-lane streets (residential or collectors)
- Sites collected as part of NCHRP 17-76
  - 2018 data
  - Arterials, typically 4 lanes

Posted Speed Limit (mph)	# Segments	Length (mi)
25	169	52
30	318	138
35	68	36
40	51	37
45	43	28
50	12	13
55	2	2
Grand Total	**663**	**305**

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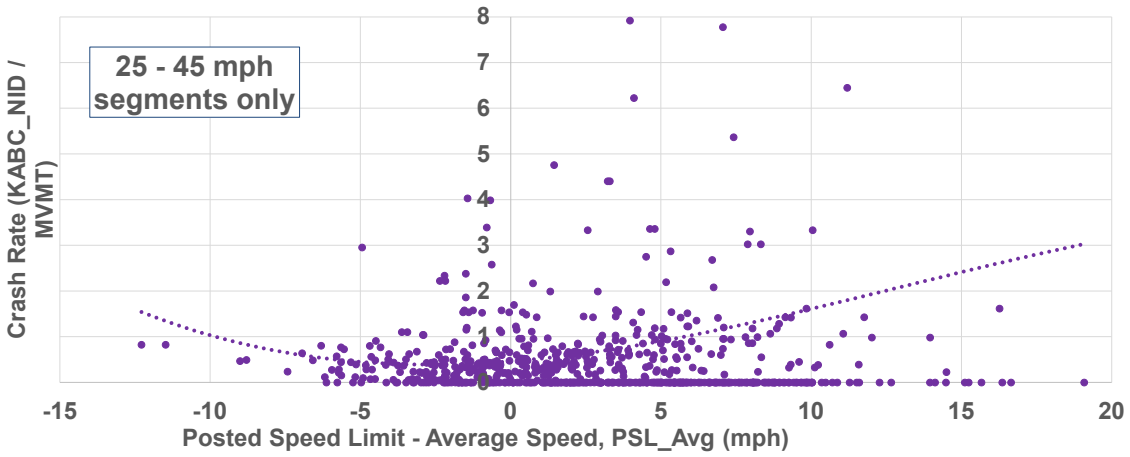
Crash Rate and PSL-Average Speed



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Impacts on Decision Rules

- Data support the inclusion of two variables which were previously included in USLIMITS2:
  - Traffic signal density
  - Access point density (with break points of 40 and 60 per mile)
- Also provides evidence for including median type and on-street parking
- Speed / crash / geometric relationship provides justification for using 50% percentile

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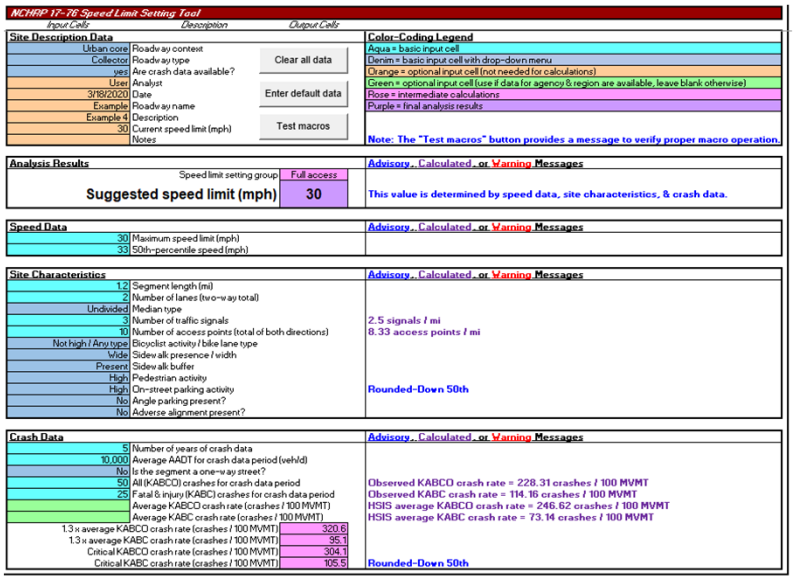
Developing Speed Limit Setting Tool (SLS-Tool) Guiding Principles for Spreadsheet

- Most or all data on one screen
- Colors to indicate what user should enter / what is being calculated, also warning / advisory notes
- Data input organized by type (e.g., site description, speed data, site characteristics, and crashes)
- Only show needed site characteristics for the particular speed limit setting group

Example: Full Access - Spreadsheet



NCHRP 17-76 Speed Limit Setting Tool

Input Cells | Description | Output Cells

Site Description Data		**Color-Coding Legend**
Urban core	Roadway context	Aqua = basic input cell
Collector	Roadway type	Denim = basic input cell with drop-down menu
yes	Are crash data available?	Orange = optional input cell (not needed for calculations)
User	Analyst	Green = optional input cell (use if data for agency & region are available, leave blank otherwise)
3/18/2020	Date	Rose = intermediate calculations
Example	Roadway name	Purple = final analysis results
Example 4	Description	
30	Current speed limit (mph)	Note: The "Test macros" button provides a message to verify proper macro operation.
	Notes	

Clear all data | Enter default data | Test macros

Analysis Results		**Advisory, Calculated, or Warning Messages**
	Speed limit setting group: Full access	
	Suggested speed limit (mph): 30	This value is determined by speed data, site characteristics, & crash data.

Speed Data		**Advisory, Calculated, or Warning Messages**
30	Maximum speed limit (mph)	
33	50th-percentile speed (mph)	

Site Characteristics		**Advisory, Calculated, or Warning Messages**
1.2	Segment length (mi)	
2	Number of lanes (two-way total)	
Undivided	Median type	
3	Number of traffic signals	2.5 signals / mi
10	Number of access points (total of both directions)	8.33 access points / mi
Not high / Any type	Bicyclist activity / bike lane type	
Wide	Sidewalk presence / width	
Present	Sidewalk buffer	
High	Pedestrian activity	
High	On-street parking activity	Rounded-Down 50th
No	Angle parking present?	
No	Adverse alignment present?	

Crash Data		**Advisory, Calculated, or Warning Messages**
5	Number of years of crash data	
10,000	Average AADT for crash data period (veh/d)	
No	Is the segment a one-way street?	
50	All (KABCO) crashes for crash data period	Observed KABCO crash rate = 228.31 crashes / 100 MVMT
25	Fatal & injury (KABC) crashes for crash data period	Observed KABC crash rate = 114.16 crashes / 100 MVMT
	Average KABCO crash rate (crashes / 100 MVMT)	HSIS average KABCO crash rate = 246.62 crashes / 100 MVMT
	Average KABC crash rate (crashes / 100 MVMT)	HSIS average KABC crash rate = 73.14 crashes / 100 MVMT
1.3 × average KABCO crash rate (crashes / 100 MVMT)	320.6	
1.3 × average KABC crash rate (crashes / 100 MVMT)	95.1	
Critical KABCO crash rate (crashes / 100 MVMT)	304.1	
Critical KABC crash rate (crashes / 100 MVMT)	105.5	Rounded-Down 50th

Example: Full Access - Spreadsheet

NCHRP 17-76 Speed Limit Setting Tool

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Note: The "Test macros" button provides a message to verify proper macro operation.

Analysis Results		Advisory, Calculated, or Warning Messages
Speed limit setting group	Full access	
Suggested speed limit (mph)	30	This value is determined by speed data, site characteristics, & crash data.

The basis for the suggested speed limit decision is noted here

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Example: Full Access - Spreadsheet

Variables that influence the calculated suggested speed limit are noted with advisory messages

Site Characteristics		Advisory, Calculated, or Warning Messages
1.2	Segment length (mi)	
2	Number of lanes (two-way total)	
Undivided	Median type	
3	Number of traffic signals	2.5 signals / mi
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No	Adverse alignment present?	

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Research Needs

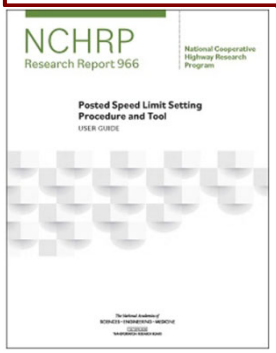
- Relationship(s) among operating speed, roadway characteristics, posted speed limit, crashes
  - More is needed
- Specific criteria for ped / bike volume, bike lane type, sidewalk characteristics
- Alternative speed limit approaches for city streets
- Speed management techniques

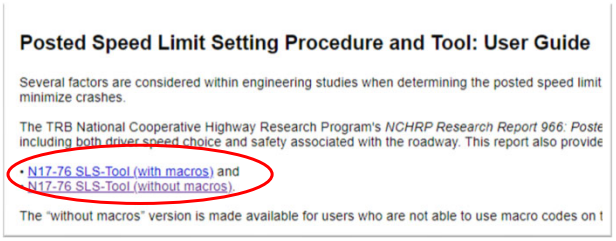
NCHRP 17-76 Deliverables

http://www.trb.org/main/blurbs/182038.aspx

Research Report

User Guide and Tool





Questions?