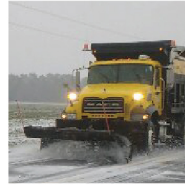


# NORTH CAROLINA

Department of Transportation




## Speed Limits in North Carolina

Kevin Lacy, PE, CPM  
State Traffic Engineer

July 20, 2021

# Ordinance Authority

Ordinance Authority is Subdelegated to the State Traffic Engineer from the Secretary of Transportation.




STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
P.O. BOX 25201, RALEIGH, NC 27611-6201

**CERTIFICATION OF RULEMAKING**

Certifying Agency: Department of Transportation			
Action:	<input checked="" type="checkbox"/> Adoption	<input type="checkbox"/> Repeal	
Statutory Authority: 136-18, 20-141.1, 20-141.			
Public Hearing Not Required For This Action Under: GS 150B.			
Rule Summary: No Parking, Municipal Speed Zones, Rural Speed Zones, Speed Limit in School Zones, School Speed Zone - Rural, Statutory Speed Limits - (Verification).			
Division: 2, 3, 4, 5, 7, 8, 9, 10, 11, 12			
Circumstances Requiring Rule Adoption, Repeal: Necessary for public safety and welfare.			
Effective Date: June 25, 2021			

June 24, 2021  
DATE

  
 OFFICER SIGNATURE  
 James. K. Lacy, P.E.  
 TYPED NAME  
 State Traffic Engineer  
 TITLE

## 1.2 Ordinance Authority

In general, the North Carolina Department of Transportation (NCDOT) has the authority to "make rules, regulations and ordinances for the use of, and to police traffic on, the State highways, and to prevent their abuse" ([§136-18, 5](#)). The Board of Transportation (BOT) has the power and duty to "promulgate rules, regulations, and ordinances concerning all transportation functions assigned to the Department" ([§143B-350, f, g](#)). The BOT has delegated to the Secretary of Transportation the authority to "adopt all necessary rules for the use of and to police traffic on state highways" ([19A:4A.0104, a](#)). The Secretary of Transportation has sub-delegated to the State Traffic Engineer (STE) the authority to "adopt all necessary rules for the use of and to police traffic on state highways, and to set, change or extend route numbers on the Primary highway system of North Carolina" ([19A:4A.0104, b](#)).

# Traditional Methods

\* Engineering and Traffic Investigations

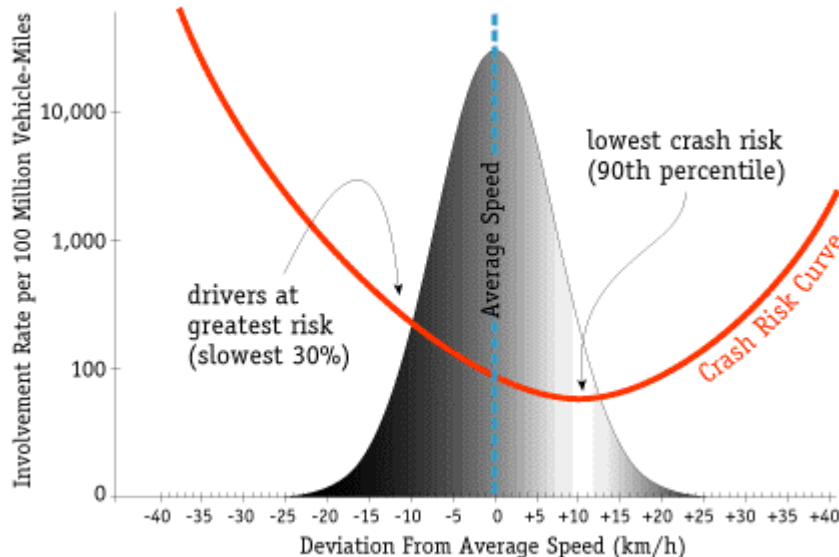
In the determination of proper numerical speed limits to be posted on any section of roadway it is the policy to consider several topographic and traffic characteristics with their relation to probable effect on safe and reasonable speeds. Among these characteristics are:

- a. The 85th percentile speed of prevailing traffic in the area under study.
- b. Condition and type of roadway surface.
- c. Roadway type, width, and number of traffic lanes.
- d. Shoulder width, condition and type.
- e. Horizontal and vertical alignment of the roadway.
- f. Roadside development: amount, type, and proximity to the travel way.
- g. Composition of the traffic using the roadway.
- h. Numbers and types of intersections, including private driveways and roads.

\*From 1995 NCDOT Guidelines

- Emphasized 85<sup>th</sup> Percentile Speed
- Included Guidance for Evaluating Roadside Development
- Considered Other Roadway and Traffic Factors

# Where did the 85<sup>th</sup> Percentile come from?



Solomon, David (July 1964). "Accidents on main rural highways related to speed, driver, and vehicle". Technical report, U.S. Department of Commerce/Bureau of Public Roads (precursor to Federal Highway Administration).

Based on Rural Highways in the late 1950's.

Validated by later studies on Rural Highways. 1968 and 1970's

Research in the 2000's show that on roads with speed limits of 50mph or greater crash risk increases with higher speeds above speed limits and crash risk is lower for lower speeds.

Hap Crowe's explanation – "Reasonable people are traveling at or below the 85<sup>th</sup> percentile and those above are in the **Lunatic Fringe**"

# What Affects the 85<sup>th</sup> Percentile?

The 85<sup>th</sup> percentile is similar to an individual's "vote" on what is a reasonable speed limit for a segment of highway. This would be true if the speed selection was not a circular decision. Studies have shown that drivers select their speeds based upon:

- Roadway – how fast can I go and still stay on the road and not hit anyone
- Posted Speed limit – circular reference
- The perceived enforcement tolerance – the higher the tolerance the higher the speeds above the speed limit
- Their perception of the level of enforcement – the chances of getting caught, higher the level of enforcement to closer the speed selection is to the speed limit or perceived tolerance
- Their severity of the penalty – Drivers who are insurance points weary select 9 mph above the speed limit, those who riskier select 14 hoping to please to 9 over, and the riskiest blow the doors off every trip.
- Their perception of penalty will be received – If the driver knows that they can get away with speeding even if caught, this affects their decisions as well

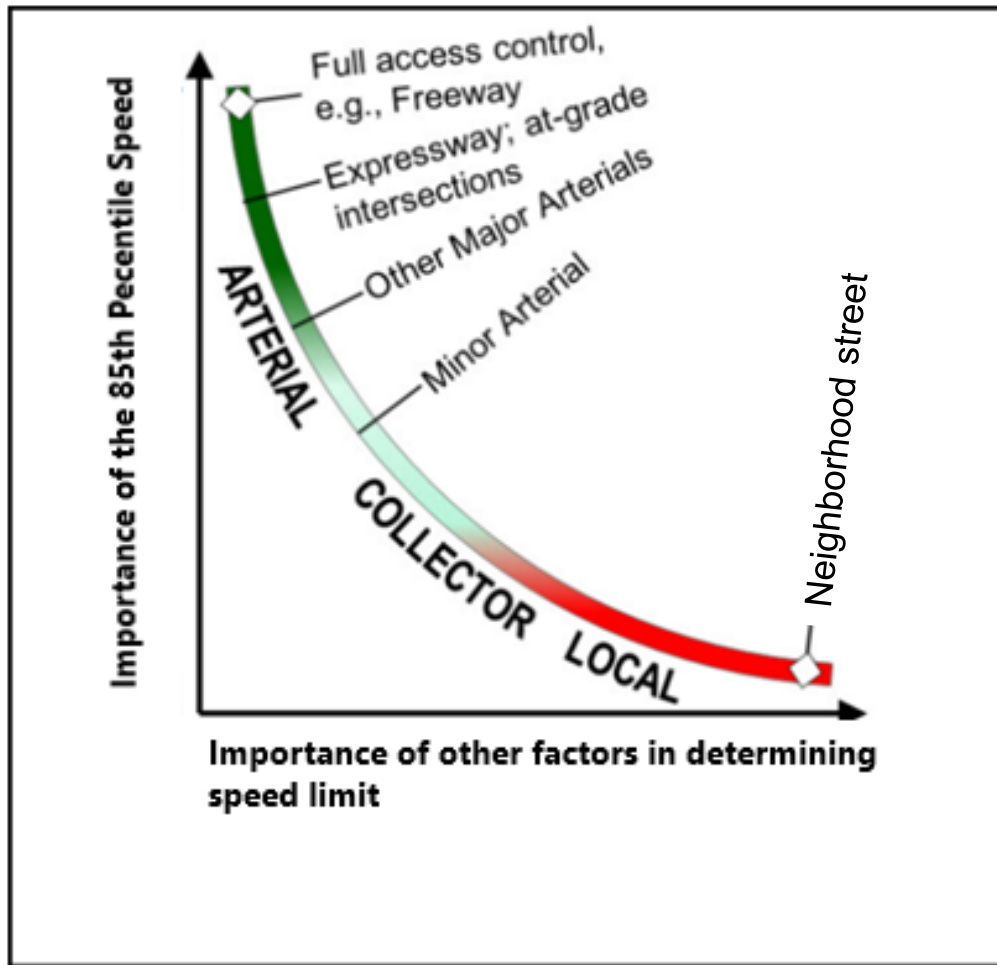
# Current Recommended Practice

Clarified in FHWA 2015 Guidance Memorandum



- Engineering Approach may consider 85<sup>th</sup> percentile free-flow speed, design speed or other initial conditions to establish an initial baseline
- Adjustments are then made based on traffic and roadway characteristics, development, bike and pedestrian activity, crash history and other factors
- A two-step process that is comparable to traditional methods, but the strict adherence to the 85<sup>th</sup> percentile is de-emphasized and other factors are more fully evaluated and considered

# Direction on the Use of the 85<sup>th</sup> Percentile



Modified figure from J Gattis 2013

# Developing Guidelines and Documentation of Engineering Studies for Establishing North Carolina Speed Limits



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Brian Thomas  
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Bucky Galloway  
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Joe Hummer  
Shantray Dickens  
Ernest Morrison

September 27, 2017



# Objectives



- To provide more defined guidelines to the NCDOT on how its engineers should conduct speed limit studies for various roadway settings.
- To recommend ways by which the NCDOT can document those studies.



# SPEED LIMIT REVIEW DOCUMENTATION FORM

Three Components:

1. Office Worksheet
2. Field Worksheet
3. Assessment Worksheet

The form is 5 pages of mostly electronically fillable fields and checkboxes.

There are fields for notes and other items as needed

[Reset All Pages](#)

**NCDOT Speed Limit Review - Data Collection OFFICE Worksheet**

Date: \_\_\_\_\_ Reference #: \_\_\_\_\_ Completed By: \_\_\_\_\_

County: \_\_\_\_\_ Municipality: \_\_\_\_\_ NCDOT Route ID: \_\_\_\_\_

Study Road: \_\_\_\_\_ Length: \_\_\_\_\_ miles Study Motivation: \_\_\_\_\_

Study Segment Begins \_\_\_\_\_ of \_\_\_\_\_  
(distance) (units) (direction) (reference road)

Study Segment Ends \_\_\_\_\_ of \_\_\_\_\_  
(distance) (units) (direction) (reference road)

Current Speed Limit: \_\_\_\_\_ mph  Statutory  Ordinance # \_\_\_\_\_ Terrain: **Select One**

Speed Limit Upstream of Starting Point: \_\_\_\_\_ mph  Statutory  Ordinance # \_\_\_\_\_

Speed Limit Downstream of Ending Point: \_\_\_\_\_ mph  Statutory  Ordinance # \_\_\_\_\_

**Past Speed Studies**

Date: \_\_\_\_\_ Result: \_\_\_\_\_

Date: \_\_\_\_\_ Result: \_\_\_\_\_

**Road Classification & Area Type**

Functional Class: Select One \_\_\_\_\_ NCDOT Complete Street Area Type: Select One \_\_\_\_\_

AADT: \_\_\_\_\_ vehicles per day

**Driveway/Intersection/Offset**

Number of Driveways by Type: \_\_\_\_\_ Business \_\_\_\_\_ Residential \_\_\_\_\_ Other: \_\_\_\_\_

Driveway Density:  Consistent throughout segment  
 Considerable variation throughout segment

Number of Intersections by Type: \_\_\_\_\_ Signalized \_\_\_\_\_ Unsignalized

Typical Building Offset to Roadway:  Consistent \_\_\_\_\_ feet (approximate)  
 Varies from \_\_\_\_\_ to \_\_\_\_\_ feet (approximate)

**Multimodal Facilities**

Are schools present along the segment?	<input type="checkbox"/> Y <input type="checkbox"/> N	Note: _____
Are parks or recreation areas present along the segment?	<input type="checkbox"/> Y <input type="checkbox"/> N	Note: _____
Are pedestrian facilities present along the segment?	<input type="checkbox"/> Y <input type="checkbox"/> N	Note: _____
Are transit facilities designated along the segment?	<input type="checkbox"/> Y <input type="checkbox"/> N	Note: _____
Are bicycle facilities designated along the segment?	<input type="checkbox"/> Y <input type="checkbox"/> N	Note: _____
Is on-street parking designated?	<input type="checkbox"/> Y <input type="checkbox"/> N	Note: _____

**Crashes**

Date: MM / DD / YY to MM / DD / YY TEAAS Mile Post: \_\_\_\_\_ to \_\_\_\_\_

Fatal: \_\_\_\_\_ A: \_\_\_\_\_ B: \_\_\_\_\_ C: \_\_\_\_\_ PDO: \_\_\_\_\_

Total Rate: \_\_\_\_\_ per 100 million VMT State-wide rate for road type: \_\_\_\_\_ per 100 million VMT

# OFFICE WORKSHEET

One Page of Data Collected in the Office:

- Location Information
- Existing Speed Limits
- Past Speed Studies
- Road Class & Area
- Driveways, Intersections and Buildings
- Multimodal
- Crash History

**NCDOT Speed Limit Review - Data Collection FIELD Worksheet**

Date: \_\_\_\_\_ Reference #: \_\_\_\_\_ Completed By: \_\_\_\_\_

County: \_\_\_\_\_ Current Speed Limit: \_\_\_\_\_ mph

Study Road: \_\_\_\_\_ from \_\_\_\_\_ to \_\_\_\_\_

---

**Surface Treatment**

Typical Pavement Width: \_\_\_\_\_ feet

Pavement Type:  Asphalt  Concrete  Dirt/Gravel  Other: \_\_\_\_\_

Pavement Condition:  Good/Fair  Poor  None

Marking Condition:  Good/Fair  Poor  None

Median Type:  None  Traversable  Non-Traversable Width: \_\_\_\_\_ feet

Total # of Thru Lanes: \_\_\_\_\_ Typical Lane Width: \_\_\_\_\_ feet

TWLT Present?  Yes  No

---

**Shoulders**

Typical Shoulder Width: \_\_\_\_\_ feet paved  Varies from \_\_\_\_\_ to \_\_\_\_\_ feet  
 \_\_\_\_\_ feet unpaved  Varies from \_\_\_\_\_ to \_\_\_\_\_ feet

Shoulder Condition:  Good/Fair  Poor

Recoverable Shoulder:  Yes  No Comment: \_\_\_\_\_

Curb:  Vertical  Sloped  None

Typical Distance to Roadside Hazards: \_\_\_\_\_ feet  Varies from \_\_\_\_\_ to \_\_\_\_\_ feet

Roadsize Hazard Rating: \_\_\_\_\_

---

**Driving Investigation**

Conduct a driving investigation of the segment and note any areas with potentially inadequate sight distance, vertical alignment, or horizontal alignment. Include comments on locations where travel speed is constrained. Attach ball-bank study sheet if needed.

Notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Check as appropriate*

Pedestrian Activity Observed/Expected:  None  Low  Medium  High

Bicycle Activity Observed/Expected:  None  Low  Medium  High

Truck Activity Observed/Expected:  None  Low  Medium  High

---

**Operating Speed Study**

Result of current operating speed study (this may include the results from US Limits 2): \_\_\_\_\_

\_\_\_\_\_

---

**Purpose of Road**

Explain the main purpose of the road. See user guide for examples. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# FIELD WORKSHEET

Two Pages of Data Collected in the Field:

- Pavement, Markings, Cross Section
- Shoulders
- Sight Distance, Vertical Alignment, Horizontal Alignment
- Ped, Bike and Truck Activity
- Operating Speed
- Purpose of Road



**NCDOT Speed Limit Review - Speed Limit Assessment Worksheet**

Date: \_\_\_\_\_ Reference #: \_\_\_\_\_ Completed By: \_\_\_\_\_

County: \_\_\_\_\_ Current Speed Limit: \_\_\_\_\_ mph

Study Road: \_\_\_\_\_ from \_\_\_\_\_ to \_\_\_\_\_

# SPEED LIMIT ASSESSMENT

This worksheet helps to record the elements considered by the engineer when determining a speed limit. For each element, place an X in the appropriate column depending on whether the element supports increasing the speed limit, decreasing the speed limit, or maintaining the current speed limit.

In the far column, check the box if the element is critical in determining the speed limit for this road.

Element	Not Evaluated/ Not Applicable	Supports Reducing Speed Limit	Supports No Change in Speed Limit	Supports Increasing Speed Limit	Check If Element is Critical
Road Classification & Area Type					<input type="checkbox"/>
Driveways / Intersections / Offset					<input type="checkbox"/>
Multimodal Facilities					<input type="checkbox"/>
Crashes					<input type="checkbox"/>
Surface Treatment					<input type="checkbox"/>
Shoulders					<input type="checkbox"/>
Driving Investigation					<input type="checkbox"/>
Operating Speed Study					<input type="checkbox"/>
Purpose of Road					<input type="checkbox"/>
Neighborhood Petition					<input type="checkbox"/>
Statutory Speed Limit					<input type="checkbox"/>
Other:					<input type="checkbox"/>
Other:					<input type="checkbox"/>
Other:					<input type="checkbox"/>

**Recommended Speed Limit:** \_\_\_\_\_ mph

Ordinance # \_\_\_\_\_

Ordinance # \_\_\_\_\_

Ordinance # \_\_\_\_\_

Two Pages That Document the Engineer's Decision and the Elements Considered

- Identifies Elements Evaluated
- Notes Any Critical Elements
- Records Recommended Speed Limit
- Records Ordinance Numbers

## NCDOT Speed Limit Review - Speed Limit Determination Worksheet (cont.)

## Comments and Discussion

Include any additional factors which influenced the recommended speed limit. This could include observed traffic conflicts, conditions not readily apparent to the driver (e.g. hidden driveways, schools, shopping centers, seasonal generators, or generators which create unique traffic conditions), or known tourist facility. It may also include consistency with other nearby similar roads.

## SPEED LIMIT ASSESSMENT (cont'd)

Two Pages that Document the Engineer's Decision and the Elements Considered

- Records Additional Comments and Discussion on Other Factors that Influenced the Recommended Speed Limit

# Starting Points

70 mph Interstate Highways and other Full Control

55 mph Multilane Rural Roadways

45 mph Two Lane Rural Roadways

35 mph Suburban Roadways

25 mph Neighborhood, Downtown



# Questions and Comments



- Final Thoughts
- Questions and Comments
- Implementation