

Date of Meeting: March 15, 2013

**BOARD OF SUPERVISORS
TRANSPORTATION/LAND USE COMMITTEE
INFORMATION ITEM**

3

SUBJECT: Presentation – “Determining Speed Limits on Arterial Roads & the Acceptance of Speed Limits & Stop Signs into the VDOT System”

ELECTION DISTRICT: Countywide

STAFF CONTACTS: William B. King, Transportation and Capital Infrastructure
Rick Conner, Transportation and Capital Infrastructure

BACKGROUND:

During the September 18, 2012 Board meeting, the Department of Transportation and Capital Infrastructure (DTCI) staff was directed to work with VDOT to investigate options available to change speed limits on arterial roads adjacent to residential developments. Staff was also asked to investigate the ability to maintain existing stop signs and speed limits during the acceptance process when a road is transferred from a developer to VDOT. In response to these requests, DTCI staff has prepared a presentation for the Transportation and Land Use Committee which addresses these topics by explaining:

- VDOT’s street acceptance process for speed limits and stop signs.
- How speed limits and all-way-stops are determined.
- The process to change the posted speed limit.

As part of the Virginia Department of Transportation (VDOT) street acceptance process, developers must ensure that streets conform to the Manual on Uniform Traffic Control Devices (MUTCD) standards. Developers sometimes install traffic control devices that are not in conformance with the MUTCD. Ensuring the traffic control devices are in conformance may require traffic control devices to be removed or altered. Sometimes, there is a period of several years between a street opening and being accepted into the VDOT street system. This results in driver confusion and a public perception that streets are being made less safe. Common examples of this include:

- Speed limits on sections of road that are inconsistent with the rest of the road and must be raised or lowered.
 - Davis Drive (VDOT is currently in process of modifying speed limit for consistency)
- All-way-stop signs that have been installed by the developer but must be removed.
 - Greenstone Drive and Mineral Springs Circle (scheduled to be removed but was granted an exception by VDOT to remain)

Because Loudoun County has many roads that have yet to be built or accepted into the VDOT system, this problem is likely to continue. Public outcry will also continue since it is perceived that residential areas are being made less safe when speed limits are raised or stop signs are removed.

As part of the VDOT street acceptance process all traffic control devices must conform to the MUTCD. In the instance of All-Way-Stop signs, a warrant analysis must be completed and approved by VDOT prior to installation. However, HOA's may initiate the installation of All-Way-Stops on local streets through the Loudoun County Traffic Calming Program. This avenue may also be used to keep an All-Way-Stop that has been placed by the developer but has not met the requirements as determined by VDOT to remain in place during the street acceptance process.

In regards to speed limits, all local streets should be posted at 25 mph. For collector and arterial roadways, the initial posted speed limit is based on the approved roadway plans. As part of the VDOT street acceptance process for collector and arterial roadways, a speed study is required to determine the 85th percentile speed. The posted speed limit on these streets may then be modified based on the results of the speed study. In order to change an existing posted speed limit on a state-maintained roadway, a locality must first make a request to the local VDOT manager. If the location is deemed suitable, the local VDOT manager will request an engineering investigation be performed by the Regional Traffic Section. If the study determines that a change is warranted, the results will be provided to the Regional Traffic Engineer for approval. Once the Regional Traffic Engineer approves the change, the Regional Traffic Section will then post the new speed limit.

ATTACHMENT:

1. Presentation Outline



DETERMINING SPEED LIMITS ON ARTERIAL ROADS AND THE ACCEPTANCE OF SPEED LIMITS & STOP SIGNS INTO THE VDOT SYSTEM

Presented to:
Transportation & Land Use Committee

March 15, 2013

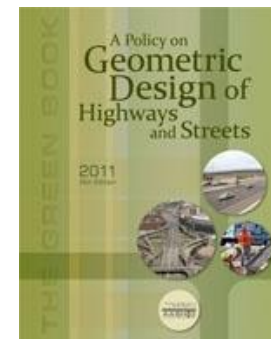
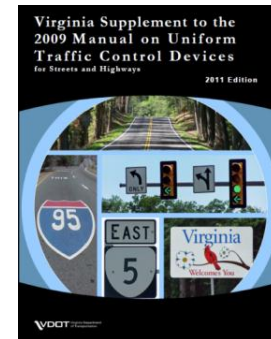
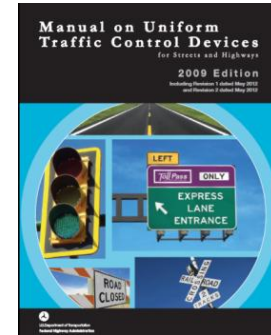
William B. King, P.E., PTOE

Background

- Developers sometimes install traffic control devices that are not in conformance with the MUTCD:
 - Posted speed limits
 - All-way-stop signs
- Time period elapses where drivers become accustomed to conditions.
- Results in driver confusion and public perception that residential areas are being made less safe when these devices are altered.
- September 18, 2012 Board meeting:
 - DoTCI staff directed to work with VDOT to investigate options available to:
 - Change speed limits on arterial roads adjacent to residential areas.
 - Keep existing stop signs and speed limits during the street acceptance process.

The Manuals

- Traffic Engineering
 - Manual on Uniform Traffic Control Devices (MUTCD)
 - FHWA Publication
 - VA Supplement to the MUTCD
 - VA Publication
- Highway Engineering
 - A Policy on Geometric Design of Highways and Streets
 - aka “The Green Book”
 - AASHTO Publication



Speed Definitions

- **Average Speed**— the summation of the instantaneous or spot-measured speeds at a specific location of vehicles divided by the number of vehicles observed.
- **Design Speed**— *a speed determined for design and correlation of the physical features of a highway that influence vehicle operation. **Not a maximum safe speed. Not a predictor of operating speeds or speed limits.***
- **85th-Percentile Speed**— *the speed at or below which 85 percent of the motor vehicles travel.*
- **Operating Speed**— a speed at which a typical vehicle or the overall traffic operates. Operating speed might be defined with speed values such as the average, pace, or 85th-percentile speeds.
- **Pace**— the 10 mph speed range representing the speeds of the largest percentage of vehicles in the traffic stream.

Speed Limit Definitions

- **Posted Speed Limit**

- The maximum (or minimum) speed established by law or regulation.
- Displayed on regulatory signs.
- Should be within 5 mph of the 85th-percentile speed of free-flowing traffic (MUTCD).
- Should also consider pedestrian activity & crash history.



- **Statutory Speed Limit**

- A speed limit established by legislative action.
- Not necessarily displayed on Speed Limit signs.

Why Correct Speed Limits are Important

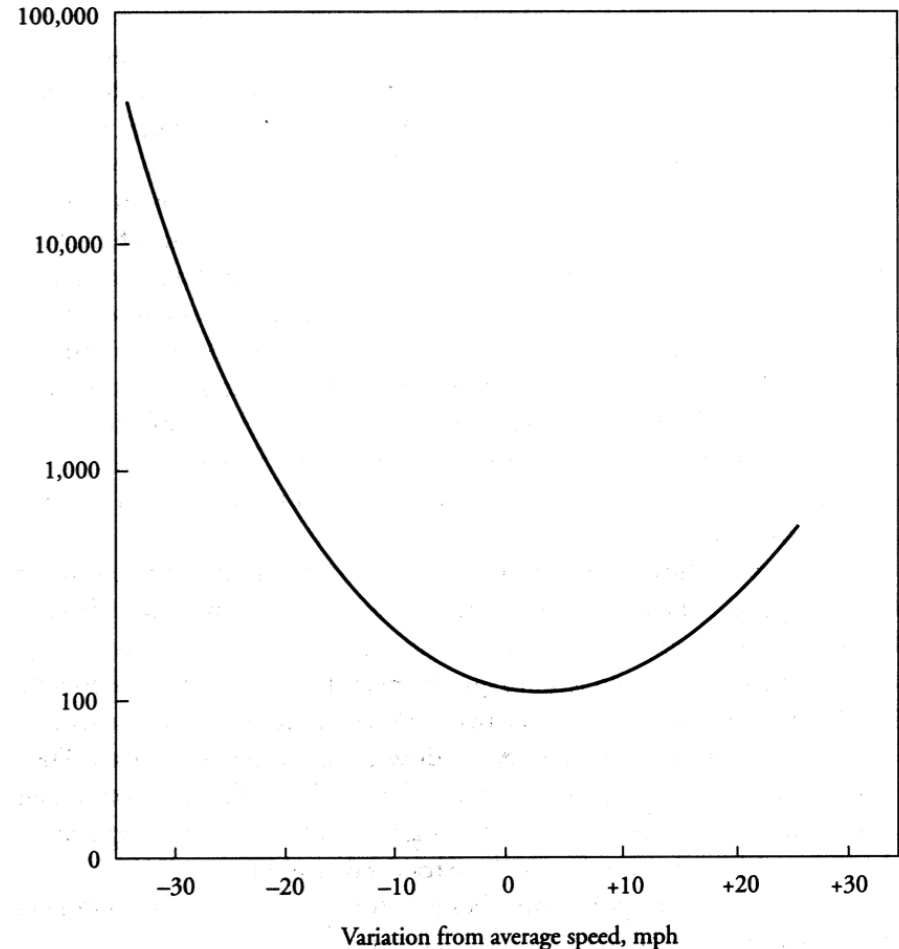
- FHWA Study, “Effects of Raising and Lowering Speed Limits on Selected Roadway Sections” (1997)
- Artificially raised speed limits by as much as 15 mph or lowered by as much as 20 mph.
- Before and after data:
 - Collected Speed & Crash Data over a 5-yr period
 - 100 Sites in 22 States
 - Rural & Urban Locations
 - Various Lengths, Speed Limits
 - Control Group
 - 83 similar sites with no speed limit changes
- Concluded that speed limit changes had little effect on 85th percentile speed.
 - Average 1 to 2 mph change
- **Vehicles will travel based on the physical limitations of the road, regardless of posted speed limits.**

Why Correct Speed Limits are Important

- Studies have shown that crash rates increase with speed differential.
- Posting speed limits near the 85th-percentile speed reduces speed differentials, thereby reducing crash rates.

Figure 8-1. *Deviation from Average Speed vs. the Collision Rate (Solomon Curve)*

Collision rate (per 100 million vehicle miles)



Source: Solomon (1964).

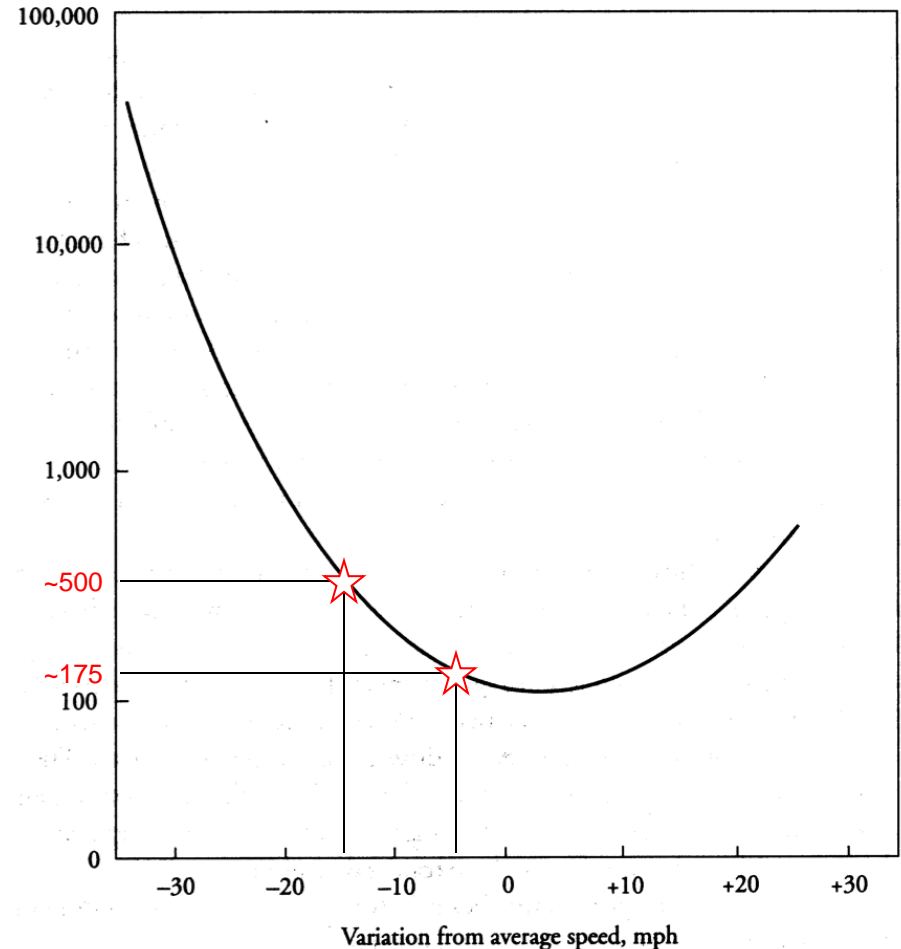
Why Correct Speed Limits are Important

- Example:

- 45 mph posted speed.
- 85th percentile speed is 50 mph.
 - Delta = 5 mph for drivers who obey the posted speed limit.
- Posted speed limit is lowered to 35 mph.
- For drivers who obey the new posted speed limit, the delta is increased from 5 mph to 15 mph, increasing collision rate.

Figure 8-1. *Deviation from Average Speed vs. the Collision Rate (Solomon Curve)*

Collision rate (per 100 million vehicle miles)



Source: Solomon (1964).

Who Sets the Posted Speed Limit?

- Virginia's General Assembly has granted authority to:
 - Commonwealth Transportation Commissioner or designee (VDOT Regional Traffic Engineer)
 - Cities and certain counties and towns.
- The General Assembly retains authority for establishing statewide maximum limits.

Statutory Speed Limits in VA

- Most business and residential areas:
 - 25 mph (§46.2-874)
- Rural Rustic Roads:
 - 35 mph (§46.2-873.1)
- Non-limited access highways within a city or town:
 - 35 mph (§46.2-875)
- Secondary roads (numbered 600 and above):
 - 55 mph and 45 mph (for trucks) (§46.2-870)
- Rural Interstate Highways:
 - 65 mph (§46.2-870)

Determining Design Speeds

- According to the Countywide Transportation Plan:
 - 25 mph design speeds will be used for new local subdivision streets wherever possible.
 - Primary function of local road is to provide access to property.
- Appendix 1: Planning Guidelines for Major Roadways
 - Interim and ultimate condition design speeds on collector and arterial roadways either predetermined or TBD by Loudoun County, VDOT, and applicable towns.
 - Primary functions of collector road is to provide combination of through movement and access to property.
 - Primary function of arterial road is to provide through movement of traffic.

Determining Design Speeds

- VDOT Subdivision Street Design Guide
 - Appendix to VDOT's Road Design Manual
- Design criteria intended ONLY for secondary street acceptance of new local streets.

Projected Traffic Volume (ADT)	Min Design Speed (mph)
0 < 2000	25
2000 < 4000	30*
> 4000	Follow Road Design Manual Guidelines

*Based on Collector classification design criteria

Determining Design Speeds

- VDOT Road Design Manual:
 - Geometric tables indicate **ranges** to be used.
- Should be:
 - Established during project development.
 - Logical with respect to topography, anticipated operating speed, adjacent land use, and functional classification.
 - As high as operable to attain a desired degree of safety & mobility.
 - Consistent with driver expectations. Drivers adjust their speeds to their perception of physical limitations and traffic.

Loudoun County Collector Roads

- **Selected Loudoun County Collectors Identified by the CTP:**
 - VA Route 606 - Loudoun County Parkway
 - VA Route 606 - Old Ox Road
 - VA Route 620 - Braddock Road
 - VA Route 621 - Evergreen Mills Road
 - VA Route 625 - Waxpool Road
 - VA Route 625 - Sycolin Road
 - VA Route 637 - Cascades Parkway
 - VA Route 637 - Potomac View Road
 - VA Route 643 - Shellhorn Road
 - VA Route 659 - Belmont Ridge Road
 - VA Route 659 - Gum Spring Road Relocated
 - VA Route 659 Relocated - Northstar Boulevard
 - VA Route 671 - Harpers Ferry Road
 - VA Route 672 - Lovettsville Road
 - VA Route 742 - Poland Road
 - VA Route 772 - Ashburn Village Boulevard
 - VA Route 772 - Ryan Road
 - VA Route 773 - Edwards Ferry Road
 - VA Route 773 - River Creek Parkway
 - VA Route 846 - Sterling Boulevard
 - VA Route 868 - Davis Drive
 - VA Route 901 - Claiborne Parkway
 - VA Route 1050 - George Washington Boulevard
 - VA Route 1052 - Riverside Parkway
 - VA Route 1061 - Russell Branch Parkway
 - VA Route 1320 - Evening Star Drive
 - VA Route 1570 - Countryside Boulevard
 - VA Route 1582 - Algonkian Parkway
 - VA Route 1793 - Nokes Boulevard
 - VA Route 1794 - Cascades Parkway
 - VA Route 2200 - Tall Cedars Parkway
 - VA Route 2400 - Lansdowne Boulevard
 - VA Route 2401 - Riverside Parkway

Loudoun County Arterial Roads

- Loudoun County Principal Arterials Identified by the CTP:
 - VA Route 7 – Harry Byrd Highway/Leesburg Bypass/East Market Street
 - US Route 15 – Leesburg Bypass/James Monroe Highway
 - VA Route 28 – Sully Road (Darrell Green Boulevard)
 - US Route 50 – John Mosby Highway (portions will be in ultimate condition)
 - VA Route 267 – Dulles Greenway/Dulles Airport Access Road
 - VA Route 606 - Loudoun County Parkway/Old Ox Road (portions will be in ultimate condition)
 - VA Route 607 - Loudoun County Parkway (portions will be in ultimate condition)

- Loudoun County Minor Arterials Identified by the CTP:
 - VA Route 9 – Charles Town Pike
 - US Route 15 – James Monroe Highway/South King Street
 - US Route 50 – John Mosby Highway/Washington Street
 - US 340 – Jefferson Pike
 - US Route 15/50 Connector – Howsers Branch Drive
 - VA Route 606 – Loudoun County Parkway
 - VA Route 607 – Loudoun County Parkway
 - VA Route 659 – Belmont Ridge Road
 - VA Route 659 Relocated – Northstar Boulevard
 - VA Route 846 – Sterling Boulevard
 - VA Route 1582 – Algonkian Parkway

Street Acceptance Process –



- All-Way-Stops shall be warranted (MUTCD).
- Developers shall only install All-Way-Stops after an engineering study supporting installation is approved by VDOT.
- HOA's may initiate installation of All-Way-Stops on local streets through the Loudoun County Traffic Calming Program.
 - Pending final approval by VDOT.

Street Acceptance Process –



- Northstar Blvd & Ryan Rd
- Warranted for All-Way-Stop



Street Acceptance Process –



- VDOT Secondary Street Acceptance:
 - Local streets shall be posted at the design speed.
 - <400 vpd may be posted higher than design speed.
 - Initial posted speed limits on public collector and arterial streets prior to street acceptance based on approved plan:
 - Problem when significant time elapses before street acceptance.
 - Speed study is required prior to street acceptance of collectors and arterials.
 - If the speed study supports a higher or lower speed limit, the speed limit should be modified to reflect the study findings.

Street Acceptance Process –



Design speed is determined



Road is designed and constructed based on design criteria



Initial speed limit is posted based on approved plan



Road is opened to public



Speed study is conducted as part of street acceptance process



If warranted by study, posted speed limit is modified

Changing the Speed Limit

- Section §46.2-878 of the Code of Virginia requires a traffic engineering investigation.
- The engineering investigation involves a study of:
 - Roadway Geometrics
 - Lane width, pavement type, terrain, surroundings.
 - Traffic Analysis
 - Vehicle speeds, test runs, volumes, crash data and traffic control devices.

Changing the Speed Limit

Locality contacts local VDOT manager



If suitable, local VDOT manager requests engineering investigation



Regional Traffic Section performs study



If warranted, results provided to Regional Traffic Engineer for approval



If approved, Regional Traffic Section posts new speed limit

The Three E's

- Engineering
 - Set appropriate speed limits to minimize speed differentials
 - Appropriate design for desired operating speeds
 - Traffic calming measures
 - Forthcoming Loudoun County Traffic Calming Manual
- Enforcement
 - Strict and constant presence
- Education
 - Public information to explain purpose of modifications and consequences for violations

THANK YOU!

