Speed on Roadway Segments

National Forum on Speeding

June 15-16, 2005

By Kay Fitzpatrick
Sources of Material for Presentation

- NCHRP Project 15-18
- FHWA Rural Highway Studies
- TxDOT Research
- Literature
Topic Areas

- Design Speed
- Posted Speed
- Operating Speed
Design Speed
Rural Highway, Horizontal Curves (128 sites, 6 states)
Suburban Arterial, Horizontal Curves (19 sites, Texas)
Posted Speed
Procedures Used to Set Speed Limits (ITE Survey)

- 85th percentile speed – predominant factor
- Roadway geometry
- Roadside development
- Crash experiences
- Political pressure
Deviations From the 85th Percentile Speed (ITE Survey)

- Politics (33%)
- Crashes (13%)
- Roadway areas (11%)
- Roadway geometry (9%)
MUTCD Guidelines

- 85th percentile speed of free-flowing traffic rounded up to nearest 5 mph
- Road characteristics
- Speed pace
- Roadside development
- Parking practices
- Reported crash experiences
**85th Speed vs Speed Limit**
(NCHRP / TxDOT / FHWA Data)

- **Rural Arterials**
- **S/U Arterials**
- **S/U Collectors**
- **S/U Local**
- **SL = 85th**

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3D Transportation Institute
## Percentile Speed Equals Posted Speed (Rural Roads)

<table>
<thead>
<tr>
<th>Source</th>
<th>Functional Class</th>
<th>Vehicle Percentile (%)</th>
<th>Sites</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>When Speed =</td>
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<tr>
<td></td>
<td></td>
<td>Posted</td>
<td>+ 5 mph</td>
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<tr>
<td>NCHRP</td>
<td>Rural, Arterial</td>
<td>37 / 48*</td>
<td>70</td>
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<tr>
<td>FHWA</td>
<td>Rural, Minor Arterial</td>
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<td>FHWA</td>
<td>Rural</td>
<td>64</td>
<td>86</td>
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</table>
Percentile Speed Equals Posted Speed (Suburban/Urban Roads)

<table>
<thead>
<tr>
<th>Source</th>
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<td>+ 5 mph</td>
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<td>Suburban/Urban Local</td>
<td>52</td>
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Operating and Posted Speed Field Studies

- Previous findings:
  - 85th %-ile speed exceeds posted
  - 50th %-ile speed near posted

- NCHRP/other studies:
  - Rural: 37 to 72% at posted speed
  - Suburban/urban: 32 to 52% at posted speed
Speed Zoning Reports

- ITE TENC Committee 97-12
- Request “speed zoning investigations your agency has recently conducted”
- 256 report received
- 128 contained both 85th percentile speed value and speed limit recommendation
Operating and Posted Speed
Speed Zone Studies

- 128 speed zone studies → 10% rounded up and 31% rounded to nearest 5 mph

Cum Freq

Dif (85th - Recom SL)
Operating and Posted Speed Comments

- 85th percentile speed is a “starting point”
- Encourage changes in how speed limits are set?
Operating Speed
FHWA Study
Rural Highways

Piezoelectric Sensor

Direction of Travel

Traffic Counter/Classifier

Texas Transportation Institute
FHWA Study - Rural Highways Speeds on Horizontal Curves
FHWA Study - Rural Highways
Limited Sight Distance Curves

85th %-ile Speed (km/h)

K-Value (m/%)

LSD- FHWA
LSD- NCHRP
FHWA Study - Rural Highways

Findings

- Horizontal Alignment
  - Radius: key variable
  - Other variables: length of curve, deflection angle, superelevation, desired speed (previous tangent speed)

- Vertical Alignment
  - K, SSD

- Combination Alignments
  - Theories
NCHRP Field Studies

- 79 tangent sites, most suburban/urban
- Sites not near signals or horizontal curves (elements known to influence operating speed)
- Free-flow speed measured with laser and counters
- Roadway and roadside characteristics
NCHRP Study
Access Density

85th %ile Speed (mph)

Access Density (pts/mi)

Local
Collectors
Arterial, C&G
Arterial, Shoulders
NCHRP Study
Parking

85th Percentile Speed (mph)

Parking (1=yes, 2=no)
NCHRP Study
Pedestrian Activity

85th Percentile Speed (mph)

Pedestrian Activity (1=low, 2=med, 3=high)

Local
Collectors
Arterial, C&G
Arterial, Shoulder
NCHRP Study
Centerline Markings

85th Percentile Speed (mph)

Local
Collectors
Arterial, C&G
Arterial, Shoulder

Centerline Markings (1=yes, 2=no)
NCHRP Study
Median Width

85th Percentile Speed (mph)

Median Width (ft)
NCHRP Study
Total Pavement Width

85th Percentile Speed (mph)

Total Pavement Width (ft)

- Local
- Collectors
- Arterial, C&G
- Arterial, Shoulder
NCHRP Study
Influence on Operating Speed

- Several variables show influences:
  - Access density
  - Pedestrian activity
  - Absence of centerline or edge line markings
  - On-street parking
  - Median presence

- Additional data needed
Summary
# Influence on Horizontal Curve Speed

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## Influence on Tangent Speed

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SL = study limited, O = may, Y = yes
Questions?