Traffic Calming State of the Practice
Slide Seminar

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for
Institute of Transportation Engineers
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This slide show contains the visual aids and instructor notes for a 1-day seminar on Traffic Calming. The slide show is based on a companion report, Traffic Calming State of the Practice (SOP) prepared by the Institute of Transportation Engineers (ITE) with funding from the Federal Highway Administration (FHWA). The seminar material was developed for Local Technical Assistance Program Centers and other transportation professionals interested in educating others on traffic calming.
This slide show consists of close to 250 slides divided into 8 topics or sessions. The topics covered in the slide show are discussed in much greater detail in the companion report, *Traffic Calming State of the Practice* (SOP). In a few areas, additional material has been incorporated into the slide show that is not contained in the report.

Before the seminar, determine the time allocation for each topic and tailor it to the local area. While a range of slides illustrating various traffic calming measures and practices are included, you are encouraged to supplement or replace some of the pictures with ones from your own area.
Contents of *Traffic Calming State-of-the-Practice*

1. Introduction
2. Brief History of Traffic Calming
3. Toolbox of Traffic Calming Measures
4. Engineering and Aesthetic Issues
5. Traffic Calming Impacts
6. Legal Authority and Liability
7. Emergency Response and Other Agency Concerns
8. Warrants, Project Selection Procedures, and Public Involvement
9. Beyond Residential Traffic Calming
10. Traffic Calming in New Developments

Chapter numbers at the beginning of the notes for each slide refer to SOP report. Page numbers within in the notes section also refer to the SOP report. Additional material supplementing these notes can found in the SOP report.

Organization of seminar roughly follows SOP report, though Chapters 1, 2 and 10 are included in Seminar Session 1 (Introduction) and geometric design information from Chapter IV has been incorporated into Seminar Session II (Toolbox of Measures).

The approximately 250-page SOP report is available from the ITE Bookstore at 202-554-8050 (130).
SOP Preface and Chapter 1

• SOP report aimed at practitioners, and written with help of practitioners from 20 featured communities

• 20 communities selected on basis of broad objectives, number and types of traffic calming measures, interesting institutional issues, availability of performance data. Please note that the states that these featured communities are located in are not listed throughout the slide show.

• For more information, visit web site following links from ITE Traffic Calming Home Page at http://www.ite.org/traffic/tcresources.htm
SOP Chapter 1

• Companion project by Transportation Association of Canada and Canadian Institute of Transportation Engineers

• Document is available through the ITE Bookstore or as a .pdf file on the ITE Traffic calming web site

• Outlines a recommended process of public involvement, provides guidelines for the selection of traffic calming measures, and proposes standards for geometrics, signing, and marking of different measures

• Goal is a degree of standardization across Canada

• Some standard Canadian designs are presented in Seminar Session 2, Toolbox of Different Measures
Elusive Definition of Traffic Calming

As defined for the purposes of this seminar, traffic calming involves changes in street alignment, installation of barriers, and other physical measures to reduce traffic speeds and/or cut-through volumes in the interest of street safety, livability, and other public purposes.

SOP Chapter 1

• Scope of traffic calming covered in this seminar and the SOP report is narrower than some, broader than others
• Covers only engineered measures that are self-enforcing
• References both means (changes in alignment), immediate ends (reduction in speeds), and ultimate ends (safety and livability)
• Includes street closures and other volume control measures, as well as humps and other speed control measures
• Excludes educational and enforcement activities (the other 2 Es, along with engineering) and streetscape improvements (though complementary to traffic calming)
• Chapter 5 of SOP report reviews performance data for different measures -- only engineered measures have a proven track record in reducing traffic speeds and volumes
SOP Chapter 5
Measures excluded from the SOP report definition
• Upper left - all-way stops
• Upper right - strict speed enforcement
• Lower left - restriping that visually narrows lanes
• Lower right - tree canopy that encloses street space
Multiple Purposes of Traffic Calming

Neighborhood Livability -- San Jose, CA

Crime Prevention -- Dayton, OH

Urban Redevelopment -- West Palm Beach, FL

And Others

SOP Chapter 1

• In general, the purpose of traffic calming is to reduce the speed and/or volume of traffic

• Ultimate purposes of traffic calming are as varied as the programs that pursue them

Three very different traffic calming treatments, for very different purposes, are provided as examples -- San Jose, Dayton, and West Palm Beach

Details provided in the following slides
SOP Chapter 1
San Jose’s first neighborhood-wide traffic calming project
• Serious cut-through traffic problem due to university on western border of neighborhood
  • Treatment consists of median chokers (like the one pictured), half closures, and an assortment of other measures
  • Collisions dropped from 47 in nine months before treatment to 27 in nine months after
  • Quality of life in neighborhood perceived to improve (see attitudinal survey in Table 1.1 in SOP report)
SOP Chapter 1

Part of a “stabilization” plan for a neighborhood in decline

• Nationally recognized example of crime prevention through environmental design (CPTED)
  • Treatment consists mostly of street and alley closures -- speed humps installed on through streets
  • Violent crime dropped by 50 percent -- nonviolent by 24 percent
  • Traffic volumes, collisions, and speeds were down as well
SOP Chapters 1 and 5

Traffic calming has been used for urban redevelopment in West Palm Beach

• The treatment on the commercial road shown above consists of one raised intersection (pictured), raised crosswalks, and neckdowns at intersections (curb extensions creating protected parking bays)

• It is too soon to judge the impact of the project, but documented increases in property values have followed traffic calming and street beautification in less distressed areas of West Palm Beach (see p. 115)
Selective History of Traffic Calming

International Origins

- Dutch Woonerven and Other Experiments
- Danish Environmentally Adapted Through-Roads
- German Areawide Traffic Calming
- British Environmental Traffic Management
- Australian Local Area Traffic Management

SOP Chapter 2

The section in the SOP report on international origins of traffic calming is felt to be too detailed for a one-day seminar.

Refer seminar participants who are interested to pp. 10-14.

It is not clear which U.S. community was first to calm traffic but Seattle has taken practice the furthest. Seattle has:

- More years of experience with more measures than any other city
- Relative absence of political controversy and legal problems
- Documented high levels of public support
SOP Chapter 2
Seattle first to systematically calm traffic in areawide program
Stevens Neighborhood Demonstration illustrates many lessons from SOP report
Tested diagonal diverters at four intersections
Case of overkill -- residents inconvenienced and fire response hampered
(See next slide for more on demonstration)
SOP Chapter 2
Permanent installation -- diverters replaced by circles at one end of each street
Seattle’s first application of traffic circles and half closures, now the mainstays of its program
Fire concerns addressed with truncated diverter at one location, traversable diverter at another, and fire hydrants on both sides
Sophisticated even by today’s standards:
•Testing complex areawide treatments before implementing them permanently
•Assessing public support for the treatment
•Conducting before-and-after studies of traffic impacts
•Working with emergency services to address their concerns, and
•Opting for the most conservative design that will do the job
SOP Chapter 2

Traffic circle in upper left and half closure in lower right

These measures were less restrictive than common for their era (the early 1970s, when full closures and diagonal diverters were the norm)
Early Accommodation of Emergency Services

SOP Chapter 2
Truncated diverter in upper left and traversable diverter in lower right (with fire hydrants on both sides)
### Start Dates of Other Early U.S. Traffic Calming Initiatives

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
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<tbody>
<tr>
<td>Austin, TX</td>
<td>1986</td>
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<tr>
<td>Bellevue, WA</td>
<td>1985</td>
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<tr>
<td>Berkeley, CA</td>
<td>1975</td>
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<tr>
<td>Boulder, CO</td>
<td>1984</td>
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<tr>
<td>Charlotte, NC</td>
<td>1978</td>
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<tr>
<td>Eugene, OR</td>
<td>1974</td>
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<tr>
<td>Gainesville, FL</td>
<td>1984</td>
</tr>
<tr>
<td>Montgomery County, MD</td>
<td>1978</td>
</tr>
<tr>
<td>Portland, OR</td>
<td>1984</td>
</tr>
<tr>
<td>San Jose, CA</td>
<td>1978</td>
</tr>
</tbody>
</table>

**SOP Chapter 2**

These places have been calming traffic since the indicated dates.

Most started with an isolated treatment or two and graduated to full-blown programs when other residents demanded the same.

The original FHWA traffic calming state-of-the-art study, undertaken circa 1980, found 120 jurisdictions in North America taking some action to control speeding -- most places did not expand on their early efforts.
Overview of Current Practice

- Hundreds of Programs, Most Relatively New
- Growing Interest Among Transportation Professionals
- Controversy in Areas with the Most Ambitious Programs

SOP Chapter 1
Details provided in following slides
SOP Chapter 1 (sources for the studies referenced below are in footnotes 13 and 14 in the Chapter 1 of the SOP report)

• Some form of traffic calming (i.e., physical measures) reported in 110 of 153 cities and counties responding to ITE District 6 survey

• Experience with traffic calming in about 350 cities and counties over the past 30 years, according to a UC Berkeley literature review

<table>
<thead>
<tr>
<th>Measure</th>
<th>Number of Jurisdictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed Humps</td>
<td>79</td>
</tr>
<tr>
<td>Diverters/Closures</td>
<td>67</td>
</tr>
<tr>
<td>Traffic Circles</td>
<td>46</td>
</tr>
<tr>
<td>Engineering Measures</td>
<td>110</td>
</tr>
<tr>
<td>Responses</td>
<td>153</td>
</tr>
</tbody>
</table>
Growing Professional Interest

When residents complain to their elected officials about speeding and cut-through traffic, elected officials turn to their engineering and planning staffs for solutions. The result is that traffic calming has become a hot topic for transportation professionals, evidenced by:

• Traffic calming being declared a priority of ITE’s International Board of Direction in 1997
• Entire tracks at ITE annual and mid-year meetings devoted to traffic calming, and those being among the best attended
• Traffic calming being made eligible for federal funding under the new Transportation and Community and System Preservation Pilot Program
• Traffic calming design manual, the nation’s first, being commissioned by the State of Delaware
• Dozens of new local programs starting each year
SOP Chapter 2

Growth of traffic calming activity has generated opposition from fire-rescue units, commuters, some traffic engineers, an occasional school district, etc.

Opposition from fire-rescue units has been by far the most debilitating to traffic calming initiatives (see Seminar Session 6)

Controversies include:

• Complete or partial moratoria in Austin, Boulder, Gwinnett County, Howard County, Montgomery County, Portland, and San Diego

• Lawsuits in Ft. Lauderdale, Montgomery County, Portland, San Jose, and Sarasota

• Adverse budgetary decisions in Boulder, Portland, and San Jose

• Anti-traffic calming petition drives in Boulder and Montgomery County

• Legislative constraints in Ft. Lauderdale, Montgomery County, and San Diego

Note that nearly all controversies have been resolved, leaving traffic calming programs in place and occasionally strengthened
Five trends in U.S. traffic calming are discussed in following slides:

- Mirror developments in Europe and Australia (though years later)
- Two additional trends are covered in the SOP report but not in this seminar:
  - “From Random to Predictable Installations”
  - “From Narrowing to Deflection”
Streets, traffic problems, and neighborhood preferences are not all alike. Traffic calming treatments must vary accordingly. Programs start with one or two favorite measures and then begin to experiment with others as limitations of favorites become obvious. West Palm Beach started with closures, added traffic circles to its toolbox, and now uses virtually every measure available, from humps to chokers to raised intersections.
Combination of Measures

<table>
<thead>
<tr>
<th>City</th>
<th>+</th>
<th>-</th>
<th>+</th>
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</thead>
<tbody>
<tr>
<td>Bellevue</td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Boulder</td>
<td>+</td>
<td></td>
<td>+</td>
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<tr>
<td>Eugene</td>
<td>+</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Montgomery Co.</td>
<td>+</td>
<td></td>
<td>+</td>
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<tr>
<td>Portland</td>
<td>+</td>
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<td>+</td>
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<tr>
<td>Sarasota</td>
<td>+</td>
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<tr>
<td>Seattle</td>
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<td>+</td>
<td>+</td>
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<tr>
<td>Tallahassee</td>
<td></td>
<td>+</td>
<td>+</td>
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<tr>
<td>West Palm Beach</td>
<td>+</td>
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<td>+</td>
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</tbody>
</table>

SOP Chapter 3

Trend toward diversification includes use of multiple measures on a single street or even at a single slow point

Bellevue: speed humps and chokers
Boulder: speed tables and chicanes
Eugene: center island and neckdown
Montgomery Co.: center islands and humps
Portland: center islands and chokers
Sarasota: center island and speed table
Seattle: circles and neckdowns
Tallahassee: center island and chokers
West Palm Beach: raised crosswalks and chokers

Above list refers to combinations of measures at single slow points

Other examples of combinations along single streets include: Milvia Street in Berkeley; Norwood Avenue in Boulder; Huntington Parkway in Montgomery County; Northwood Road in West Palm Beach; SW 155th Avenue in Beaverton, OR; Berkshire Street in Cambridge, MA; and Balliol Street in Toronto, Ontario, Canada.
No reference in SOP report
This illustrates synergistic effect of combining measures
Hart Road in Beaverton, OR
• Collector with fronting residences carrying over 10,000 vpd
• One of few cases where synergistic effect is documented
• When curb extensions were added to existing speed tables, it had a modest effect on 85th percentile speeds but clipped very highest speeds
SOP Chapter 3

Early traffic calming programs relied almost exclusively on closures, diverters, and other volume control measures.

Now nearly all programs rely primarily on humps, circles, and other speed control measures.

Communities are now expressing their interest in:
- Avoiding diversion of traffic problems from one local street to another
- Calming higher order streets, where speed controls are acceptable but volume controls would not be.

Gainesville started with semi-diverters on local streets (upper left) and now has a host of measures, including a roundabout on a collector street (lower right).
SOP Chapter 3
Even in curvilinear street networks without cut-through traffic, speeding can be a problem on long, wide streets
Pictured network is in Bellevue
Photo is of a raised crosswalk in front of a public school -- curb extensions shorten crossing distance
SOP Chapter 3

Early traffic calming programs spaced slow points too far apart for midblock speed control -- up to 1,000 feet in some cases

Motorists would accelerate between slow points to higher speeds than pre-traffic calming, as if to make up time

Circles in the upper left (second just visible in background) are spaced 700 or 800 feet apart

Humps in lower right (four sets visible) are spaced 200 to 300 feet apart

With the latter spacing, there is less tendency to accelerate because any acceleration is followed immediately by deceleration
SOP Chapter 3
Curve fit with data from Denmark, Australia, and Britain
Based on the data above, to maintain midpoint speeds of 25 mph, slow points must be no more than 300 to 400 feet apart
### Spacing Guidelines of Featured Communities

<table>
<thead>
<tr>
<th>Community</th>
<th>Spacing (ft)</th>
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<tbody>
<tr>
<td>Bellevue</td>
<td>200-300</td>
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<tr>
<td>Berkeley</td>
<td>150-400</td>
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<tr>
<td>Boulder</td>
<td>150-800</td>
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<tr>
<td>Gwinnett County</td>
<td>350-500</td>
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<tr>
<td>Howard County</td>
<td>400-600</td>
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<tr>
<td>Montgomery County</td>
<td>400-600</td>
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<tr>
<td>Phoenix</td>
<td>&lt; 500</td>
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<tr>
<td>Portland</td>
<td>300-600</td>
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</tbody>
</table>

SOP Chapter 3
Spacing guidelines of featured communities
Most result in midpoint speeds of 25 to 30 mph
SOP Chapters 3 and 8
Even speed control measures may divert traffic from one local street to another
Traffic managers in several featured communities have therefore shifted emphasis from spot treatments of individual streets to areawide treatments of entire neighborhoods or even larger areas
Sarasota’s resident petition process for problem streets (left), while still used occasionally, has been largely superceded by areawide traffic calming (right)
Each of seven districts is being treated in turn
From Retrofits to New Developments

SOP Chapter 10

Because they spend so much time on retrofits, featured communities are becoming sensitive to the need to build traffic calming into new developments.

No featured community is more proactive than Eugene.

Photo at upper left is a raised crosswalk in the university area -- photo at lower right is the same measure in a new development, required as a condition of development approval -- this crosswalk is on an access route to a public school, barely visible in the background.
SOP Chapter 10

In 1996, Eugene adopted a Local Street Plan replacing its old hierarchy of wide streets with a new hierarchy of narrower streets.

The new hierarchy starts with access lanes 21’ wide and moves up to medium-volume residential streets 27-34’ wide.
Traffic Calming Guidelines for Old and New Streets

<table>
<thead>
<tr>
<th>TRAFFIC CALMING DEVICE</th>
<th>EXISTING STREET</th>
<th>NEW STREET</th>
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</thead>
<tbody>
<tr>
<td>TRAFFIC CIRCLES</td>
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<tr>
<td>SPEED HUMPS</td>
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<td>*</td>
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<tr>
<td>RAISED CROSSWALKS</td>
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<tr>
<td>CURB EXTENSIONS</td>
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<td>CHAIN LINKS</td>
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<tr>
<td>TRAFFIC DIVERTERS</td>
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<td>FULL DIVERTER - STREET CLOSURE</td>
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<tr>
<td>HALF DIVERTER</td>
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<tr>
<td>DIAGONAL DIVERTER</td>
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<tr>
<td>MEDIAN BARIERS</td>
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<tr>
<td>FORCED TURN CHANNELIZATION</td>
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<td>PARKING BAYS</td>
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<td>PAVEMENT SURFACE MODIFICATION</td>
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<tr>
<td>SPEED ACTUATED SHUTOFF</td>
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*New speed bumps are to be installed only at the direction of the City Traffic Engineer.

SOP Chapter 10
Eugene’s Local Street Plan also contains an entire section on traffic calming, including guidance as to which traffic calming measures are appropriate on existing streets (as retrofits) as well as new ones.
### Other Efforts to Calm Traffic in New Developments

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
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<tbody>
<tr>
<td>Howard County</td>
<td>New subdivision standards calm traffic naturally by narrowing streets, adding roundabouts at intersections, and requiring slow points at regular intervals</td>
</tr>
<tr>
<td>Phoenix</td>
<td>Subdivision regulations and design review standards discourage cut-through traffic -- guidance to developers contained in <em>Calming Phoenix Traffic</em></td>
</tr>
<tr>
<td>San Diego</td>
<td>During development review, refer to <em>Transit-Oriented Development Design Guidelines</em> prepared by a leading New Urbanist</td>
</tr>
</tbody>
</table>

SOP Chapter 10
These three initiatives are described in more detail in the SOP report
Policies of other communities are summarized in Table 10.1