

# *Traffic Calming State of the Practice*

## Slide Seminar

*Prepared by*

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*for*

Institute of Transportation Engineers  
*with funding from*  
Federal Highway Administration

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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

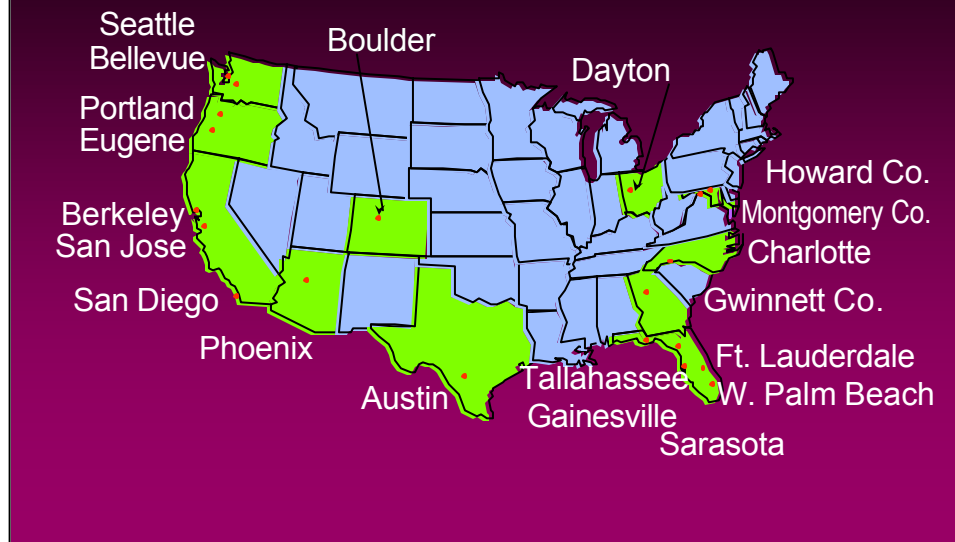
Chapter numbers at the beginning of the notes for each slide refer to SOP report. Page numbers within in the notes section also refer to the SOP report.

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).

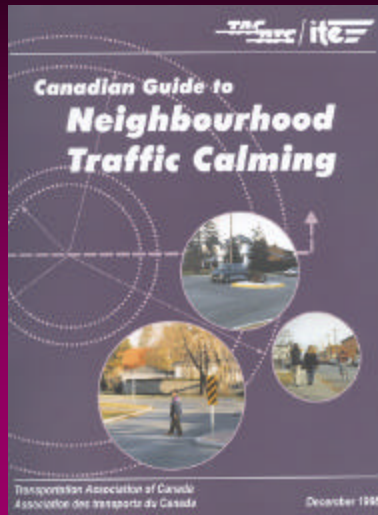
## Communities Featured in Report



### 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>

## Companion Canadian *Guide*



### 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



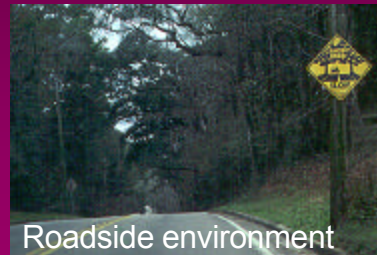
As defined for the purposes of this seminar, traffic calming involves changes in street alignment, installation of barriers, and other physical measures to reduce traffic speeds and/or cut-through volumes in the interest of street safety, livability, and other public purposes.

### 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



## Measures Not Covered in Definition of Traffic Calming



### 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



## Naglee Park Neighborhood (San Jose, CA)



### 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)

## Five Oaks Neighborhood (Dayton, OH)



### 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

## Northwood Road (West Palm Beach, FL)



### 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

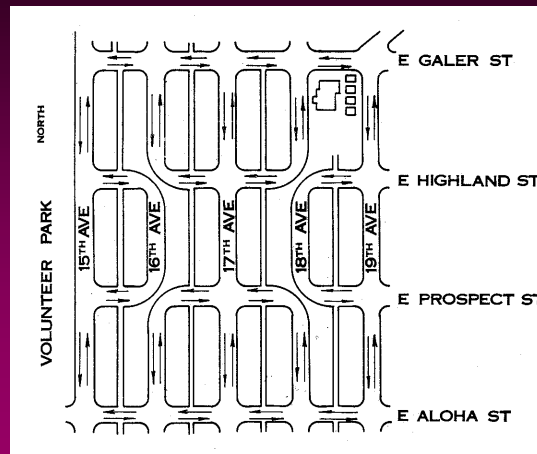
The section in the SOP report on international origins of traffic calming is felt to be too detailed for a one-day seminar

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

## Original Traffic Calming Demonstration (Stevens Neighborhood)



Source: Traffic and Transportation Division, "A Study in Traffic Diversion in the Stevens Neighborhood." City of Seattle, WA, 1974

### SOP Chapter 2

Seattle first to systematically calm traffic in areawide program

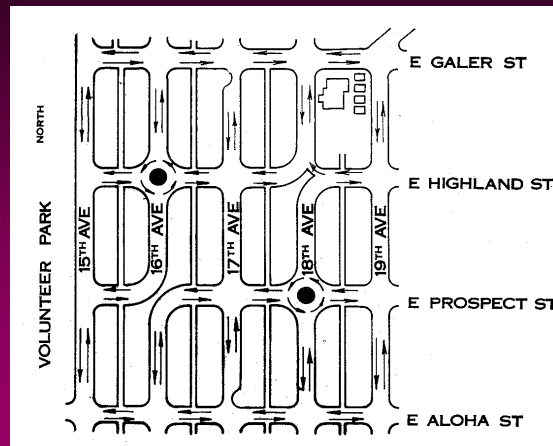
Stevens Neighborhood Demonstration illustrates many lessons from SOP report

Tested diagonal diverters at four intersections

Case of overkill -- residents inconvenienced and fire response hampered

(See next slide for more on demonstration)

## Permanent Installation (Stevens Neighborhood)



Source: Traffic and Transportation Division, "A Study in Traffic Diversion in the Stevens Neighborhood." City of Seattle, WA, 1974

### 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

## Seattle's First Application of Its Now Favorite Measures



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

<b>Austin, TX</b>	<b>1986</b>
<b>Bellevue, WA</b>	<b>1985</b>
<b>Berkeley, CA</b>	<b>1975</b>
<b>Boulder, CO</b>	<b>1984</b>
<b>Charlotte, NC</b>	<b>1978</b>
<b>Eugene, OR</b>	<b>1974</b>
<b>Gainesville, FL</b>	<b>1984</b>
<b>Montgomery County, MD</b>	<b>1978</b>
<b>Portland, OR</b>	<b>1984</b>
<b>San Jose, CA</b>	<b>1978</b>

### 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

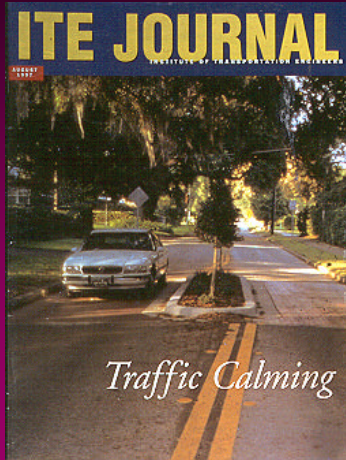
### Prevalence of Selected Measures (ITE District 6 Survey)

Measure	Number of Jurisdictions
Speed Humps	79
Diverter/Closures	67
Traffic Circles	46
Engineering Measures	110
Responses	153

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

## Growing Professional Interest



### SOP Chapter 1

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

## Also Growing Controversy



- Austin, TX
- Boulder, CO
- Ft. Lauderdale, FL
- Howard County, MD
- Gwinnett County, GA
- Montgomery County, MD
- Portland, OR
- San Diego, CA
- San Jose, CA
- Sarasota, FL

### 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*

## Future of Traffic Calming -- Trends

From Simple to **Diverse Programs**

From Volume to **Speed Controls**

From Wrong to **Right Spacing** of Slow Points

From Spot to **Areawide Treatments**

From Retrofits to **New Developments**

SOP Chapter 3

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”



## From Simple to Diverse Programs







### SOP Chapter 3

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				
				
<b>Bellevue</b>		+		+
<b>Boulder</b>	+		+	
<b>Eugene</b>		+	+	
<b>Montgomery Co.</b>	+		+	
<b>Portland</b>		+	+	
<b>Sarasota</b>	+		+	
<b>Seattle</b>		+		+
<b>Tallahassee</b>		+	+	
<b>West Palm Beach</b>	+	+		

### 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.

## Example -- Speed Table Combined with a Choker



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

## From Volume to Speed Controls



### 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)

## Speed Controls in a Curvilinear Network



Source: Transportation Department, City of Bellevue

### 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

## From Wrong to Right Spacing of Slow Points



### 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

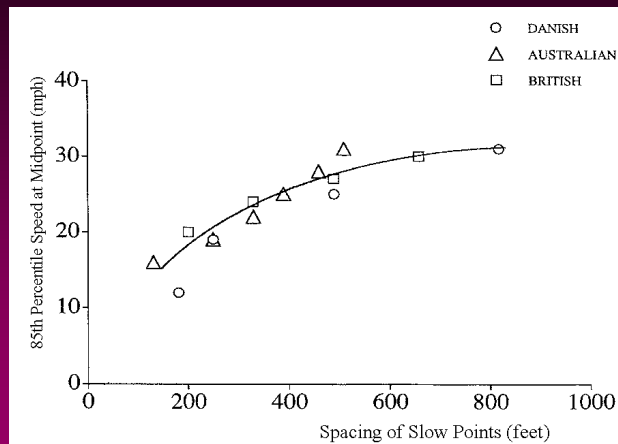
Motorists would accelerate between slow points to higher speeds than pre-traffic calming, as if to make up time

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

## Midpoint Speed vs. Spacing of Slow Points



Source: R. Ewing, *Best Development Practices*, American Planning Association (in cooperation with the Urban Land Institute), Chicago, 1996, p.64.

### 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

<b>Bellevue</b>	<b>200-300 ft</b>
<b>Berkeley</b>	<b>150-400</b>
<b>Boulder</b>	<b>150-800</b>
<b>Gwinnett County</b>	<b>350-500</b>
<b>Howard County</b>	<b>400-600</b>
<b>Montgomery County</b>	<b>400-600</b>
<b>Phoenix</b>	<b>&lt; 500</b>
<b>Portland</b>	<b>300-600</b>

SOP Chapter 3

Spacing guidelines of featured communities

Most result in midpoint speeds of 25 to 30 mph

## From Spot to Areawide Treatments

**JAYNE BACCHETTA, P.E.**  
DIRECTOR OF ENGINEERING  
CITY ENGINEER  
1425 BENDERLEAF, P.E.  
ASST. CITY ENGR-  
ASST. CITY ENGR-  
ASST. CITY ENGR-

**CITY OF SARASOTA**

**ENGINEERING DEPT**  
ROOM 100A CITY HALL  
1445 HEBB STREET  
TEL: (941) 554-4101  
FAX: (941) 554-4174  
SARASOTA, FL 34230

DATE: \_\_\_\_\_, 199\_\_

TO: CITY OF SARASOTA - ENGINEERING DEPARTMENT  
Post Office Box 1058, Sarasota, FL 34230

FROM: \_\_\_\_\_ (Neighborhood Association)  
\_\_\_\_\_, \_\_\_\_\_ (Contact Person)  
\_\_\_\_\_, \_\_\_\_\_ (Address)  
(H) \_\_\_\_\_ (W) \_\_\_\_\_ (Telephone Number)

SUBJECT: \_\_\_\_\_

We, the undersigned (see attached lists) hereby request the following Traffic Calming Measures and/or Traffic Control Signs:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

NEIGHBORHOOD SURVEY

SUPPORT	NAME	ADDRESS	SIGNATURE	DATE
YES	NO			



### 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



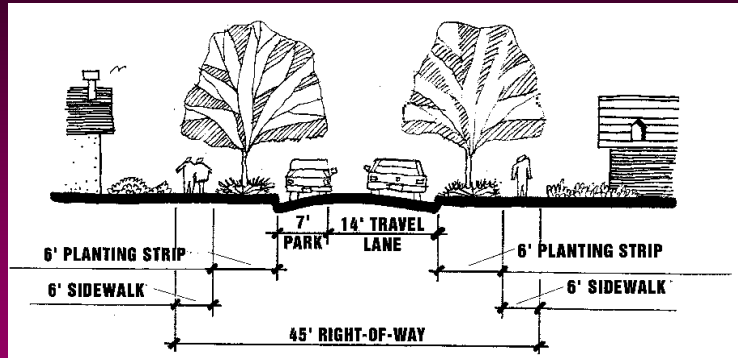
### SOP Chapter 10

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

## Low-Volume Residential Street in New Hierarchy



Source: City of Eugene, *Eugene Local Street Plan*, 1996, p. 71.

### 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

TRAFFIC CALMING DEVICE	EXISTING STREET	NEW STREET
TRAFFIC CIRCLES	■	■
SPEED HUMPS	■	■ *
RAISED CROSSWALKS	■	■
CURB EXTENSIONS	■	■
CHICANES	■	■
TRAFFIC DIVERTERS	■	
FULL DIVERTER - STREET CLOSURE		
HALF DIVERTER		
DIAGONAL DIVERTER		
MEDIAN BARRIERS	■	■
FORCED TURN CHANNELIZATION	■	■
PARKING BAYS	■	■
PAVEMENT SURFACE MODIFICATION	■	■
SPEED-ACTUATED SIGNING	■	

\* New speed humps are to be installed only at the direction of the City Traffic Engineer.

Source: City of Eugene, *Eugene Local Street Plan*, 1996, p. 71.

### 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

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

### 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