# Traffic Calming-- Some Definitions

- *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.*

- *Traffic calming involves altering of motorist behavior on a street or on a street network. It also includes traffic management, which involves changing traffic routes or flows within a neighborhood.*

- *Traffic calming consists of operational measures such as enhanced police enforcement, speed displays, and a community speed watch program, as well as such physical measures as edgelines, chokers, chicanes, traffic circles, speed humps and raised crosswalks.*

# History-European

- European traffic calming began as a grassroots movement in the late 1960s. Angry residents of the Dutch City of Delft fought cut-through traffic by turning their streets into woonerven, or "living yards."

- This was followed by the development of European slow streets (designed for 20 mph) in late 1970s;

# European History continued..

- The application of traffic calming principles to intercity highways through small Danish and German towns in the 1980s;
- And the treatment of urban arterials in area wide schemes, principally in Germany and France, also in the 1980s.

# History - America

- In the U.S., a version of traffic calming was practiced as early as the late 1960s and early 1970s in such places as Berkeley, CA, Seattle, WA and Eugene,OR.

# History-America Continued

- The first national study of traffic calming was completed circa 1980. It explored residential preferences related to traffic, collected performance data on speed humps, and reviewed legal issues.

# Benefits of Traffic Calming

- Lower traffic speeds increase safety(high speeds are responsible for many pedestrian fatalities)
- Quieter streets & increased ease of crossing enhance the pedestrian environment
- Parents will be more likely to let their children walk or ride a bike in a neighborhood if the streets are made safer
- Reduced speeds & volumes allow bikes & vehicles to share roadway.
- Crime prevention

# Effective techniques

Effective traffic calming techniques rely on the following 3 principles:

- The street design allows drivers to drive at, but no more than, the desired speed;
- The street design allows local access, while discouraging through traffic; and
- Traffic calming works best when roads are properly designed to begin with.

# Proper Hierarchy for Streets

- Local streets should carry local traffic at slow speeds; bikes share the road and pedestrians cross freely;

- Collector streets should carry traffic to and from local streets and arterials, at moderate speed. Bikes share road or have own lanes. Pedestrians have buffered sidewalks and frequent crossing opportunities.

# Street hierarchy continued

- Arterials should carry mostly through traffic. Bikes should have bike lanes. Pedestrians should have buffered sidewalks and be offered reasonably spaced crossing opportunities.

# Types of Traffic Calming

- Traffic calming measures can be separated into two groups based on the main impact intended.

- **Volume control measures** are primarily used to address cut-through traffic problems by blocking certain movements, thereby diverting traffic to streets better able to handle it.

# Types Continued

- **Speed control measures** are primarily used to address speeding problems by changing vertical alignment, changing horizontal alignment, or narrowing the roadway.

# Speed control measures

- Speed Humps
- Raised X walks
- Textured Pavements
- Roundabouts
- Chicanes
- Neckdowns
- Others
- Speed Tables
- Raised Intersections
- Speed Cushions
- Traffic Circles
- Chokers
- Center Island narrowings

# Volume Control Measures

- Full Closures
- Diverters
- Lateral Shift
- Half Closures
- Median Barriers
- Others

- The distinction between speed and volume measures is often blurred.

# Speed Humps

12’ speed hump (FL)

14’ speed hump (Portland)

Speed Humps are good for locations where very low speeds are desired and reasonable, and noise and fumes are not a major concern.

22’ speed hump (Fl)

## Advantages:

- Speed Humps are relatively inexpensive
- They are relatively easy for bicycles to cross if designed appropriately
- They are very effective in slowing travel speeds.

## Disadvantages:

- They cause a "rough ride" for all drivers, and can cause severe pain for people with certain skeletal disabilities
- They force large vehicles, such as emergency vehicles and those with rigid suspensions, to travel at slower speeds
- They may increase noise and air pollution
- They have questionable aesthetics.

# Speed Tables

Speed tables are good for locations where low speeds are desired but a somewhat smooth ride is needed for larger vehicles.

Speed table serving as crosswalk

22’ speed table

**Advantages:**

- They are smoother on large vehicles (such as fire trucks and school buses) than speed humps.
- They are effective in reducing speeds, though not to the extent of speed humps.

**Disadvantages:**

- They have questionable aesthetics, if no textured materials are used;
- Textured materials, if used, can be expensive; and
- They may increase noise and air pollution.

# Traffic Circles & Roundabouts

**Traffic Circles** are good for calming intersections, especially within neighborhoods, where large vehicle traffic is not a major concern but speeds, volumes, and safety are problems.

**Roundabouts,** unlike Traffic Circles, are used on higher volume streets to allocate right-of-way between competing movements.

Roundabout

Neighborhood Traffic Circle

# Traffic Circles

**Advantages:**

- Traffic Circles are very effective in moderating speeds and improving safety
- If designed well, they can have positive aesthetic value
- Placed at an intersection, they can calm two streets at once

# Traffic Circles

**Disadvantages:**

- They are difficult for large vehicles (such as fire trucks) to circumnavigate
- They must be designed so that the circulating lane does not encroach on the crosswalks
- They may require the elimination of some on-street parking
- Landscaping must be maintained, either by the residents or by the municipality

# Roundabouts

**Advantages:**

- Roundabouts can moderate traffic speeds on an arterial
- They are generally aesthetically pleasing if well landscaped
- They enhanced safety compared to traffic signals
- They can minimize queuing at the approaches to the intersection
- They are less expensive to operate than traffic signals

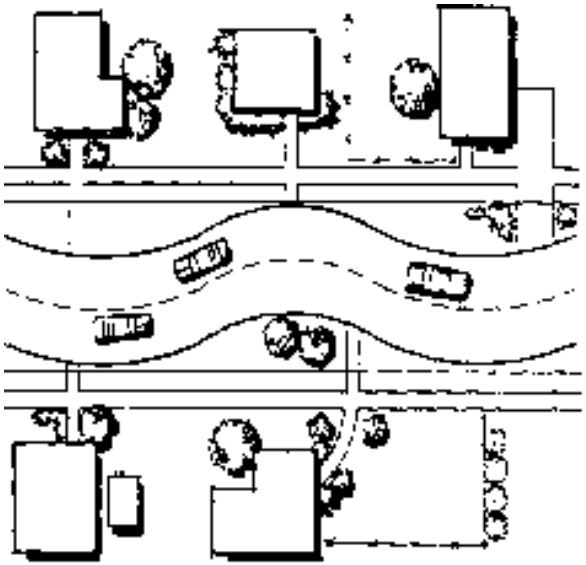
# Roundabouts

**Disadvantages:**

- They may be difficult for large vehicles (such as fire trucks) to circumnavigate
- They must be designed so that the circulating lane does not encroach on the crosswalks
- They may require the elimination of some on-street parking
- Landscaping must be maintained, either by the residents or by the municipality

# Chicanes

Good for locations where speeds are a problem but noise associated with Speed Humps and related measures would be unacceptable.



**Advantages:**

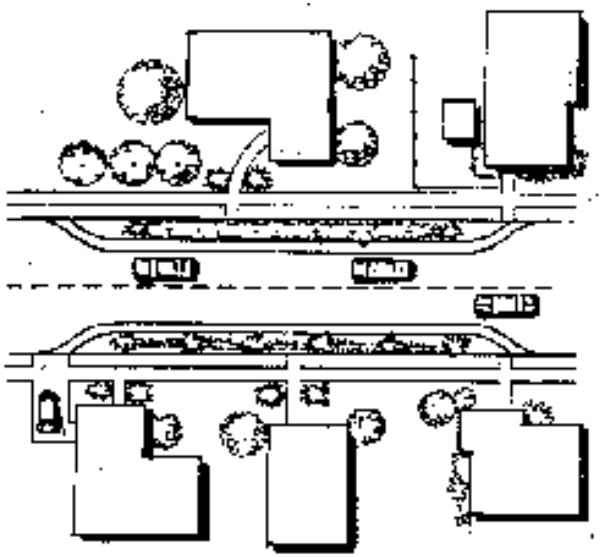
- Chicanes discourage high speeds by forcing horizontal deflection
- They are easily negotiable by large vehicles (such as fire trucks) except under heavy traffic conditions

**Disadvantages:**

- They must be designed carefully to discourage drivers from deviating out of the appropriate lane
- Curb realignment and landscaping can be costly, especially if there are drainage issues
- They may require the elimination of some on-street parking

# Chokers, Pinch Points etc.

They are good for areas with substantial speed problems and no on-street parking shortage.



**Advantages:**

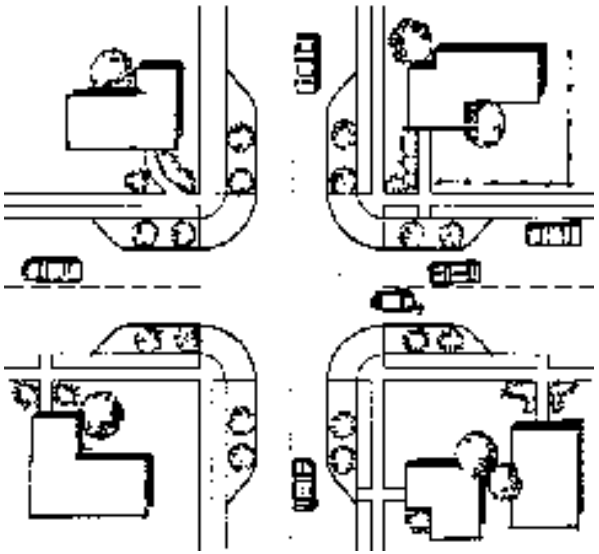
- Chokers are easily negotiable by large vehicles (such as fire trucks)
- If designed well, they can have positive aesthetic value
- They reduce both speeds and volumes

**Disadvantages:**

- Their effect on vehicle speeds is limited by the absence of any vertical or horizontal deflection
- They may require bicyclists to briefly merge with vehicular traffic
- They may require the elimination of some on-street parking

# Neckdowns, Bulbouts, etc.

They are good for intersections with substantial pedestrian activity and areas where vertical traffic calming measures would be unacceptable because of noise considerations



Neckdown with raised crosswalk

## Advantages:

- Neckdowns improve pedestrian circulation and space
- Through and left-turn movements are easily negotiable by large vehicles
- They create protected on-street parking bays
- They reduce speeds, especially for right-turning vehicles

## Disadvantages:

- Effectiveness is limited by the absence of vertical or horizontal deflection
- They may slow right-turning emergency vehicles
- They may require the elimination of some on-street parking near the intersection
- They may require bicyclists to briefly merge with vehicular traffic

# Center Island Narrowings

Center Island Narrowings are good for entrances to residential areas, and wide streets where pedestrians need to cross.

Center islands are even more pedestrian-friendly when combined with crosswalks and divided to provide a crossing entirely at street level

## Advantages:

- Center Island Narrowings increase pedestrian safety
- If designed well, they can have positive aesthetic value
- They reduce traffic volumes

## Disadvantages:

- Their speed-reduction effect is somewhat limited by the absence of any vertical or horizontal deflection
- They may require elimination of some on-street parking

# Speed Cushions

**Speed cushions effectively slow cars down. However, the wider axle of emergency vehicles allows them to pass without slowing down.**


**In addition, speed cushions are more affordable then speed humps or tables since they require less material.**

# Speed Between Slow Points

| | No. Sites | Speed After | Change in Speed | Percent Change |
|---|---|---|---|---|
| 12' Humps | 179 | 27.4 mph | -7.6 mph | -22% |
| 14' Humps | 15 | 25.6 | -7.7 | -23 |
| 22' Tables | 58 | 30.1 | -6.6 | -18 |
| Circles | 45 | 30.3 | -3.9 | -11 |
| Narrowings | 7 | 32.3 | -2.6 | - 4 |
| Half Closures | 16 | 26.3 | -6.0 | -19 |
| Diverters | 10 | 27.9 | -1.4 | - 4 |

# Volume Impacts of Traffic Calming Measures

| | No. Sites | Average Change in Volume | Percent Change |
|---|---|---|---|
| 12' Humps | 143 | -355 | -18% |
| 14' Humps | 15 | -529 | -22 |
| 22' Tables | 46 | -415 | -12 |
| Circles | 49 | -293 | -5 |
| Narrowings | 11 | -263 | -10 |
| Half Closures | 53 | -1611 | -42 |
| Diverters | 19 | -501 | -35 |

# Safety Impacts of Traffic Calming Measures (U.S. Experience)

| Measure | No. Sites | Avg. Annual Collisions Before | After | Change | Sig. Level |
|---|---|---|---|---|---|
| 12'Humps | 50 | 2.6 | 2.3 | ***-13%*** | .40 |
| 14' Humps | 5 | 4.4 | 2.6 | ***-40%*** | .18 |
| 22' Tables | 8 | 6.7 | 3.7 | ***-45%*** | <.01 |
| Circles w/o Seattle | 17 | 5.9 | 4.2 | ***-28%*** | .04 |
| All Circles | 130 | 2.2 | 0.6 | ***-71%*** | <.01 |
| *Overall* | *163* | *2.5* | *1.2* | ***-51%*** | *<.01* |
| *exclude Seattle* | *80* | *3.8* | *2.7* | ***-25%*** | *<.01* |

# Safety Impacts of Traffic Calming After Adjusting for Traffic Diversion

| | No. Sites | % Change | Sig. Level |
|---|---|---|---|
| Accidents | 55 | ***-27%*** | <.01 |
| Accident Rate | 55 | ***- 4%*** | 0.65 |

# Standard Cost Estimates

| | Portland | Sarasota | Seattle |
|---|---|---|---|
| speed humps | $2-2,500 | $2,000 | $2,000 |
| speed tables | | 2,500 | |
| raised intersections | | 12,500 | |
| traffic circles | 10-15,000 | 3,500 | 6,000 |
| chicanes | | | 14,000 |
| chokers | 7-10,000 | | |
| center islands | 8-15,000 | 5,000 | |
| median barriers | 10-20,000 | | |
| half closures | 40,000 | | 35,000 |
| diagonal diverters | | | 85,000 |
| full closures | | | 120,000 |