Chapter Three

Neighborhood Traffic Management Toolbox

The following Chapter contains the Stage One and Stage Two Tools as well as the Usage Guide for each stage. The Usage Guides serve as a quick reference for all tools in the Toolbox. The Guide gives information as to what type of road to use the tool for based on width and road classification. It also explains which tools are good for which problems. Speeding, Cut-Through/Volume, and Pedestrian Safety are being addressed with this toolbox. Focus is also given on whether a tool can be used on an emergency response route. This is a critical issue to consider when devising a traffic management scheme. The last issue that the Usage guide addresses is the potential impacts of each tool. Although each tool does have positive impacts on the surrounding community, there are many negative impacts that must be considered and weighed out before proceeding with the installation of any of the traffic management tools.

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Stage One Usage Guide

STAGE ONE TOOLS: USAGE GUIDE

STAGE ONE TOOLS	Roadway Width		Roadway Classification			EMS/Bus Routes		Desired Results			Potential Impacts				Page
	Under 26'	Over 26'	Local	Collector	Arterial	Not Considered for Primary Routes	Needs PSC Approval to be used on EMS route?	Speed Reduction	Volume Reduction	Ped/Bicylcle Safety	Loss of Parking	Access Restrictions	Increase EMS Response Time	Noise/Pollution	
Speed Limit Signs *	✔	✔	✔	✔	✔										11-12
Stop Signs**	✔	✔	✔	✔						✔	✔		✔	✔	11-12
Warning Signs	✔	✔	✔	✔	✔										11-12
Neighborhood Signs	✔	✔	✔	✔	✔										12
Striping	✔	✔	✔	✔	✔					✔	✔				12
Radar Speed Trailer	✔	✔	✔	✔	✔										13
Traditional Enforcement	✔	✔	✔	✔	✔										13
Operational Improvements	✔	✔	✔	✔	✔				✔			✔			13

✔ = *Available Option*
* = *Speed limits are determined by an engineering survey*
** = *Installation of stop sign is based on traffic engineering standards and warrants*

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Stage One Tools

The above graph illustrates the "speed spiking" phenomena.

Standard Signs

It is a common misconception that stop signs are a form of traffic calming. However, stops signs are a traffic control device. Their purpose is to assign the right-of-way between motorists, pedestrians and cyclists at an intersection. Although many citizens believe that stop signs help reduce speeds on their street, studies have shown that mid-block speeds are as great or greater than those locations without stop signs. Drivers feel that they can make up for lost time by accelerating to higher speeds in between stop locations causing the increase in mid-block speeds. This phenomena is known as speed spiking. Stop signs also cause an increase in noise and pollution. This can be especially aggravating to those living directly adjacent to the intersection. Stop signs can be advantageous if used at locations where they are warranted. The Manual on Uniform Traffic Control Devices and the Caltrans Traffic Manual set forth guidelines for the installation of stop signs. The Caltrans Traffic Manual specifically states that "Stop Signs should not be used for speed control."

An example of a warranted location is one that has had five or more accidents within a 12-month period that would be susceptible to correction if a stop sign was installed. The installation of a stop sign(s) would potentially decrease the number of broadside and head-on type accidents, but may increase rear-end type accidents. This is generally acceptable because rear-end type accidents are usually at lower speeds and have less severe injuries associated with them compared with broadside or head-on accidents.

All-way stops can be beneficial when used at locations that are warranted.

Other standard signs include warning signs, speed limit signs, and No Parking signs. Depending on the given circumstance, these signs could help make drivers aware of their surroundings. Many people do not recognize when they enter

into a residential area from a major road. This is especially prevalent in areas that transition from a business district to residential on the same block. By installing “25 mph” signs, drivers can be notified that they are in a residential area. “No Parking” signs can also help in traffic management. These can be used for safety reasons, such as poor site distance at intersections. “School Zone” signs can be installed at the appropriate locations to remind drivers that there is a school with children in the immediate vicinity.

The above street has a painted edge stripe. Visually reducing the width of the road may help slow down some driver. This is an example of a non-physical improvement.

Roadway Striping Alterations

Changing the appearance of the roadway can have an affect on driver behavior. For example, by removing the centerline of a road and adding edge striping 20 feet apart, drivers may assert more caution, thus driving slower. Two-way traffic is sharing a visually narrowed roadway. This can make drivers slow down and proceed more cautiously than if they had their own demarcated lane. Adding bikes lanes to a roadway or coloring existing bike lanes may also have an affect on driver behavior. In general, vehicles will not travel in a designated bike lane. Therefore, adding bike lanes narrows the vehicular travel lanes. By coloring existing bike lanes, attention is focused on the lanes. This can help increase bicycle safety. Another aspect of roadway striping is to add delineators. Delineators give striping a vertical component, making a the lines more visible to drivers.

“Keep Kids Alive, Drive 25” can serve as a reminder that the street is in a residential area.

Neighborhood Signage Programs

Neighborhood signs are used in much the same way as the Radar Speed Trailer. These devices encourage safe driving through the neighborhood. They serve as a reminder to drivers that they are entering a neighborhood and that there are children in the area.

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Stage One Tools

Radar Speed Trailer

Radar speed trailers are generally used to educate drivers of their speed as they travel on residential streets. Similar to enforcement, they are useful as an initial attempt to reduce speeds. However, the effectiveness of the device is usually temporary and does not modify driver behavior in the long term.

Enforcement

Enforcement entails the presence of a Sheriff to monitor speeds and issue citations. The type of enforcement may vary from area to area, depending on roadway characteristics or what may be enforceable. Enforcement is used as an initial attempt to reduce speeds on streets with documented speeding problems. However, its influence on driver behavior typically does not last unless the Sheriff maintains a presence in the area. Based on the cost versus the benefit, physical measures may be more effective and less expensive in the long term.

Operational Improvements

Street signs can be used to restrict cut through traffic. Turn Restrictions, such as "No Right Turn", can discourage drivers from taking residential streets to avoid congested areas. This type of improvement relies on enforcement to make sure drivers obey the restriction.

This right-turn restriction on Hwy 101 helps discourage drivers from cutting through the neighborhood.

Chapter Three

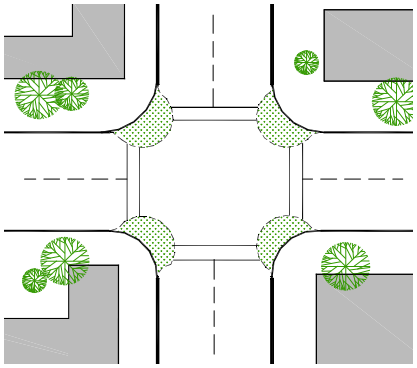
Stage Two Usage Guide

STAGE TWO TOOLS: USAGE GUIDE															
	Roadway Width		Roadway Classification			EMS/Bus Routes		Desired Results			Potential Impacts				
STAGE TWO TOOLS	Under 26'	Over 26'	Local	Collector	Arterial	Not Considered for Primary Routes	Needs Public Safety Commission Approval?	Speed Reduction	Volume Reduction	Ped/Bicylcle Safety	Loss of Parking	Access Restrictions	Increase EMS Response Time	Noise/Pollution	Page
ROADWAY NARROWING TOOLS															
Bulbouts/Curb Extensions		✔	✔	✔	✔			✔		✔	✔				15
Chicanes	✔	✔	✔	✔			✔	✔			✔		✔		16
Angled Slow Points		✔	✔	✔		✔		✔	✔		✔	✔	✔	✔	17
Chokers	✔	✔	✔	✔	✔			✔		✔	✔				18
MEDIAN TOOLS															
Median Barrier		✔	✔	✔		✔			✔			✔	✔		19
Refuge		✔	✔	✔						✔	✔				20
Median on Curve		✔	✔	✔	✔			✔			✔				21
Short Intersection Median		✔	✔	✔				✔		✔	✔				22
VERTICAL DEFLECTION TOOLS															
Speed Humps	✔		✔			✔		✔			✔	✔	✔	✔	23
Speed Table	✔	✔	✔	✔		✔		✔			✔		✔	✔	24
Raised Crosswalk		✔	✔	✔		✔		✔		✔			✔		25
Intersection	✔	✔	✔	✔		✔		✔	✔	✔			✔	✔	26
DIVERSION TOOLS															
Partial Street Closures	✔	✔	✔	✔					✔			✔	✔		27
Full Street Closure/Cul-De-Sac	✔	✔	✔			✔			✔			✔	✔		28
Diagonal Diverters	✔	✔	✔			✔			✔			✔	✔		29
OTHER TOOLS															
Curb Radius Reduction	✔	✔	✔	✔	✔			✔	✔	✔			✔		30
Right-In/Right-Out Island		✔	✔												31
Traffic Circles	✔	✔	✔												32
Modified T-Intersection	✔	✔	✔	✔				✔			✔				33
Gateway/Entrance Treatment		✔	✔	✔				✔	✔	✔	✔				34

✔ = *Available Option*

Chapter Three

Roadway Narrowing Tools: Bulbouts/Curb Extensions



Bulbouts, also know as Curb Extensions, narrow the width of a street at intersection locations by extending the curb into the parking and travel lanes. This creates a shorter crossing distance, decreasing a pedestrian's exposure time to oncoming vehicles. Bulbouts also may slow vehicles making right turns, as the curb radius is greatly reduced. By placing the pedestrian on the edge of the travel lane, both the pedestrian and driver have a better view of each other.

Bulbouts are best used in locations with high pedestrian volumes, such as downtown areas and near schools.

Advantages

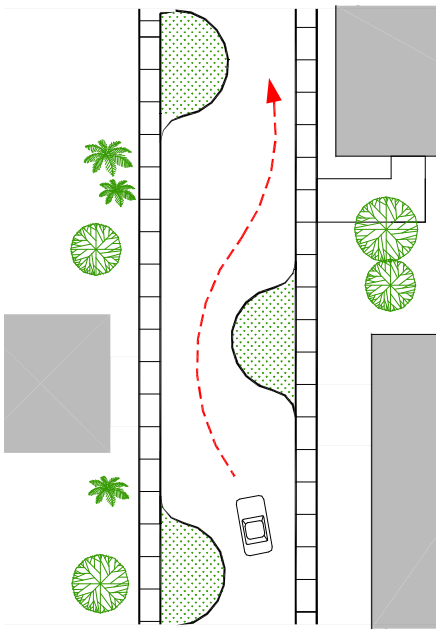
- Shorten crossing distance for pedestrians
- Better pedestrian visibility
- Possible landscaping opportunity
- Potential for speed reduction

Disadvantages

- Loss of parking
- Increased maintenance

Photo Courtesy of: http://www.pedbikeimages.org / Michael King

Roadway Narrowing Tools: Chicanes



Chicanes are created by installing a series of two or more curb extensions, alternating from one side of the roadway to the other. This creates a S-shaped path for vehicles. To reduce speeds, chicanes rely on a curvilinear path and potential conflict between opposing traffic. Chicanes can either one or two lane. One lane chicanes should only be used on roads with low traffic volumes. This tool is best used on long, straight street with low volume due to the single lane of travel through the chicane. Careful consideration must go into the design to make sure that drivers are not able to drive directly down the center without any horizontal deflection. This tool should be avoided on roads that have significant horizontal and/or vertical curves.

Advantages

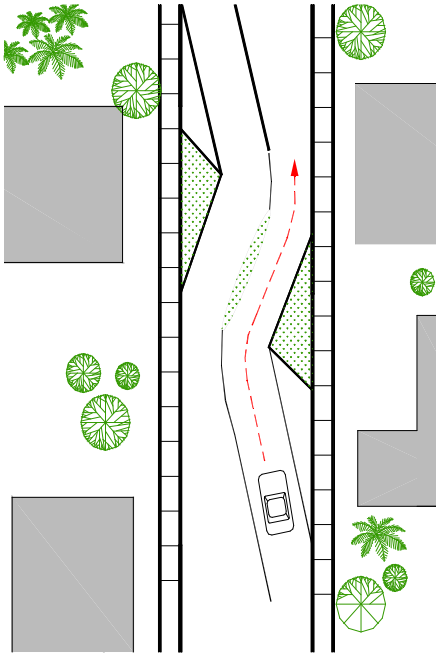
- Potential for speed reduction
- Possible landscaping opportunity

Disadvantages

- Loss of parking
- Increased maintenance

Photo Courtesy of: http://www.pedbikeimages.org / Peter Lagerwey

Roadway Narrowing Tools: Angled Slow Point



Angled Slow Points are created by constructing triangular medians on either side of the road. This creates a narrow travel path between the medians that is directed at a different angle than the approaching lanes. This tool can either be two-lane or single lane. On a two-lane slow point, a short median is constructed between the travel lanes. To negotiate this device, drivers must slow to maneuver through the curve created by the islands. For single-lane angled slow points, drivers must yield to oncoming traffic.

Advantages

- Potential for speed reduction
- Possible landscaping opportunity

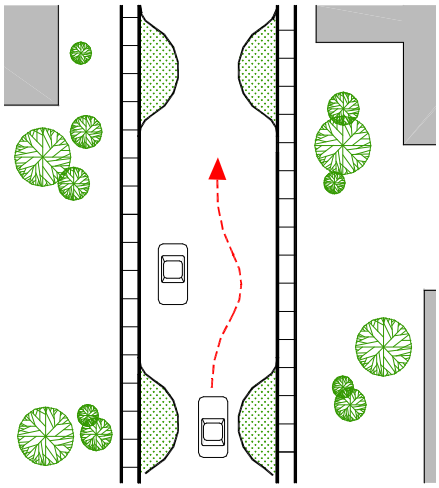
Disadvantages

- Loss of parking
- Increased maintenance
- Difficult access for larger vehicles

Photo Courtesy of: http://www.pedbikeimages.org / Michael King

Chapter Three

Roadway Narrowing Tools: Chokers



Chokers are created by installing bulbouts at a single point on both side of a roadway. This narrows the road, but still maintains two-way traffic. This form of traffic management works best at mid-block locations that have sufficient enough volumes so that opposing traffic would be passing the choker at or near the same point in time. This discourages drivers from traveling down the center of the roadway to avoid any impacts of the chokers. To accommodate bicyclists, bike lanes can be maintained next to the curb, behind the choker.

Advantages

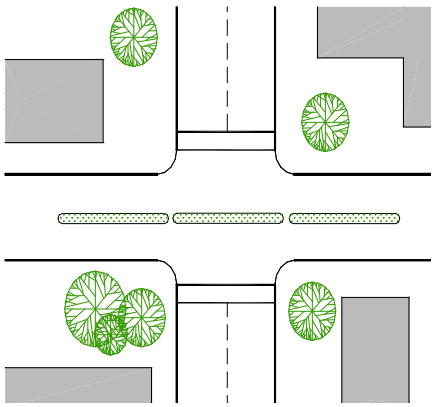
- Potential for speed reduction
- Possible landscaping opportunity
- Potential for mid-block crossing
- Does not impact EMS

Disadvantages

- Loss of parking

Photo Courtesy of: http://pedbikeimages.org / Unknown

Median Tools: Median Barrier



A Median Barrier is used to prevent cut-through traffic in residential neighborhoods. The raised median is used on the major street. This restricts traffic from continuing from one residential neighborhood across the intersection into another residential neighborhood. Right-in and right-out are the only movements allowed to and from the minor street. A Median Barrier may improve the flow of traffic on the major street. Vehicles will no longer be able to make lefts, eliminating any stacking due to this movement. Intersection safety can also be improved. Median Barriers reduce the number of conflicting movements at an intersection. This type of tool may change circulation in the surrounding area and should be used with great caution. Residents on the parallel streets may observe an increase in traffic volumes due to the limited neighborhood access.

Advantages

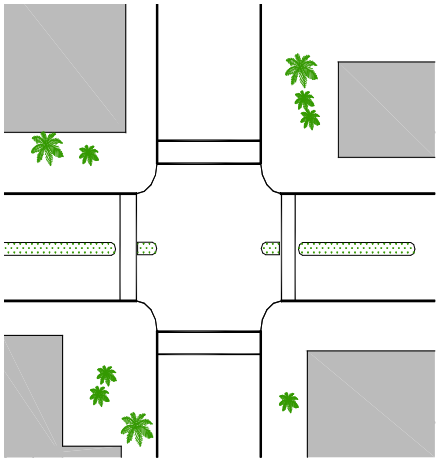
- Reduction in cut-through traffic
- Possible landscaping opportunity
- Potential pedestrian refuge
- Possible landscaping opportunity
- Improves intersection safety by reducing the number of conflicting movements

Disadvantages

- Restricted access to neighborhood
- May shift traffic to neighboring roadways
- EMS restricted access

Photo Courtesy of: http://www.pedbikeimages.org / Dan Burden

Median Tools: Raised Median/Pedestrian Refuge



Raised Medians or Pedestrian Refuges are used on wide streets to narrow the travel lanes which shortens a pedestrian's crossing distance. This also allows the pedestrian to cross one lane of traffic at a time. After a pedestrian crosses one lane of traffic, they may wait in the median area before crossing the other lane of traffic. These medians can be landscaped to break up the site line of the driver and enhance the neighborhood. Landscaping also increases the visibility of the tool.

Advantages

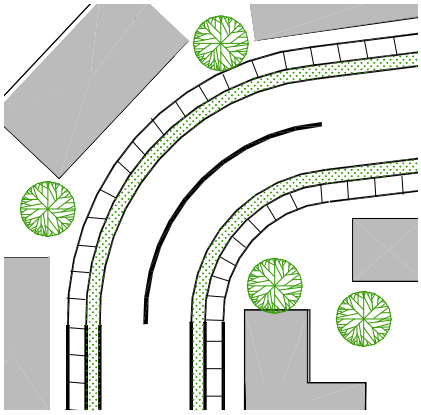
- Provides ability for a safer pedestrian crossing
- Possible landscaping opportunity

Disadvantages

- Potential loss of parking
- May block some driveway access

Photo Courtesy of: http://www.pedbikeimages.org / Dan Burden

Median Tools: Median On Curve



The main purpose for installing a median on a curve is to prevent vehicles from drifting into the opposing lane while traveling around a sharp curve. By eliminating the ability to travel into the opposing lane, speeds are generally reduced around the curve. If there are right-of-way issues eliminating the ability to install a median, raised pavement markers can be installed to have a similar effect. This tool has the potential to block driveway access. Openings may be cut in the median or the median may be mountable, to accommodate this situation.

Advantages

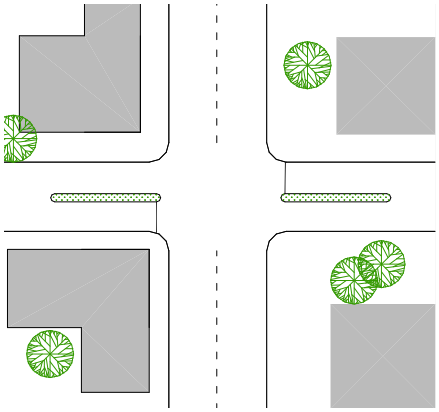
- Reduces speeds on turns
- Potential pedestrian refuge
- Possible landscaping opportunity

Disadvantages

- Potential loss of parking
- Can restrict driveway access
- Difficult for large vehicles to maneuver

Photo Courtesy of: http://pedbikeimages.org / Dan Burden

Median Tools: Short Intersection Median



Short Intersection Medians can be installed on each leg of an intersection to help slow turning vehicles and provide pedestrians with a refuge. The median forces vehicles to make a turn along a smaller radius, rather than making a higher speed turn on a larger radius. This tool may block access to some driveways. Also, it may require removing some parking. The medians may restrict some larger vehicles, such as fire trucks or moving vans, from making left turns at the intersection.

Advantages

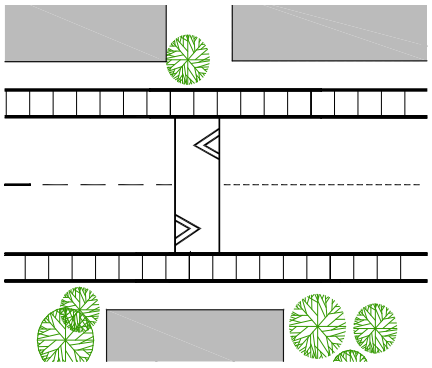
- Potential for speed reduction on left turns
- Possible landscaping opportunity
- Pedestrian refuge area

Disadvantages

- Loss of parking
- Restricts access to some driveways
- Restricts turn by large vehicles

Chapter Three

Vertical Deflection Tools: Speed Humps



Speed Humps are a devices that are approximately 3"-4" inches high, have a rounded surface, and span the width of the road. The humps are devised to encourage drivers to travel at lower speeds over them. The height causes the driver to be jolted if traveling at too high of a speed. However, due to the advance in suspension systems and the increasing number of SUV's on the roads, this device may not affect all drivers. It must be cautioned that these devices due have a severe impact on emergency response services. These devices add to response times and can create an uncomfortable situation for passengers in ambulances. Speed humps should be used with caution and only be considered where no other alternative exists. Roadway characteristics, such as grade, horizontal or vertical curve, and site distance restrictions can disqualify a road from using this tool.

Advantages

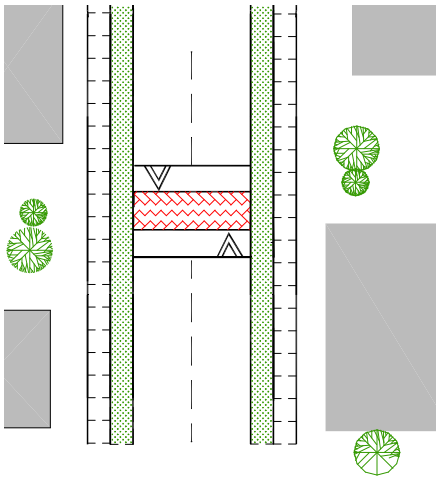
- Potential for speed reduction at speed hump

Disadvantages

- Increased EMS response times
- Increase in noise due to deceleration and acceleration at the hump
- Does not affect all vehicles
- Uncomfortable for ambulance patients
- Not visually attractive
- May shift traffic to neighboring roadways

The above Speed Hump is located on Cedros Dr in a business district.

Vertical Deflection Tools: Speed Table



Speed Tables are similar to Speed Humps in that they provide vertical deflection. However, instead of having a rounded profile, Speed Tables have ramps on either side leading to a flat top segment of road. The top can be textured to increase the effect on drivers. Changing the grade of the ramps can change the effectiveness in speed reduction. For example, a steeper grade of ramp on entry and exit will provide a higher reduction in speeds. Speed Tables are also less severe to the driver and passengers than Speed Humps.

Advantages

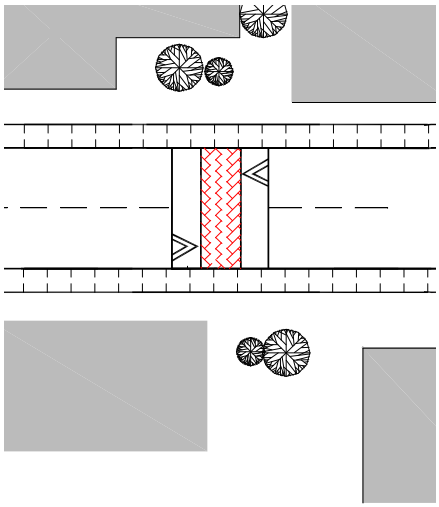
- Potential for speed reduction
- More easily traversed by large vehicles than speed humps

Disadvantages

- Potential loss of parking
- Increased EMS response time
- Creates noise from accelerating and decelerating at the Speed Table

Photo Courtesy of: http://www.pedbikeimages.org / Unknown

Vertical Deflection Tools: Raised Crosswalk



A Raised Crosswalk has the same properties as a speed table, but provides pedestrian access. This type of crossing can be a very effective tool to use at school locations and downtown districts where there is high pedestrian activity. It can also be used at midblock crossing locations that need to be high visibility. Speed Tables can be used in conjunction with Bulbouts and Chokers to shorten the pedestrian crossing distance.

Advantages

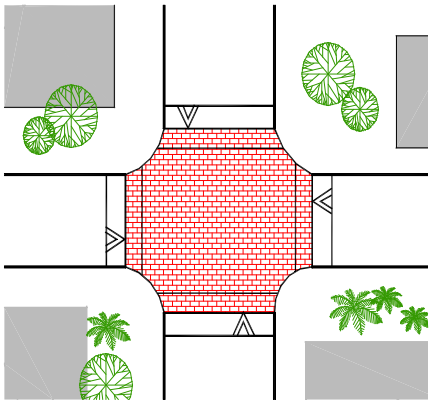
- Potential for speed reduction
- Increased visibility of pedestrians and pedestrian crossings
- More easily traversed by large vehicles than speed humps

Disadvantages

- Loss of parking
- Increased EMS response time
- Creates noise from accelerating and decelerating at the crosswalk

This raised pedestrian crosswalk is located on Cedros, just south of Lomas Santa

Vertical Deflection Tools: Intersection Table/Raised Intersection



Intersection Tables are created by raising the intersection to the level of the sidewalk. Each leg of the intersection is then ramps up to meet the new roadway surface. Vehicles are forced to slow at entry and exit. The grade of the ramps can be altered, changing the severity. The more severe grades usually have a greater impact on speeds. Often, the intersection area is textured to increase the effectiveness of the device as a whole. To differentiate between the intersection and the sidewalk, and to prevent vehicles from traveling on the sidewalk, bollards are placed around the corners. Similar to all other Vertical Deflection Tools, the emergency response service feel the impact of this device. Fire trucks and ambulances must slow to maneuver over the device.

Advantages

- Potential for speed reduction
- Increased visibility of pedestrians and pedestrian crossings
- Minimal if any loss of parking

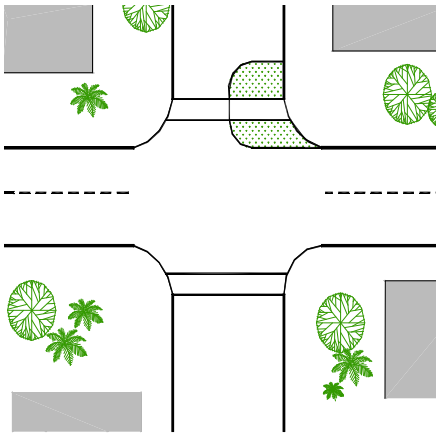
Disadvantages

- Increased EMS response time
- Creates noise from accelerating and decelerating

Photo Courtesy of: http://www.pedbikeimages.org / Unknown

Chapter Three

Diversion Tools: Partial Street Closure



A Partial closure is a physical barrier that restricts vehicles from making certain turning movements. This tool can be configured to accommodate the specific problem. One lane is blocked to restrict vehicles from leaving or entering a street. The opposite lane is left open to allow vehicle opposing movement. Two-way traffic is maintained for the rest of the block. Partial closures should be used with great care and in extreme circumstances because they create circuitous routes for those living on and accessing adjacent properties. Traffic usually increases on nearby streets because of the drastic changes in travel patterns.

Advantages

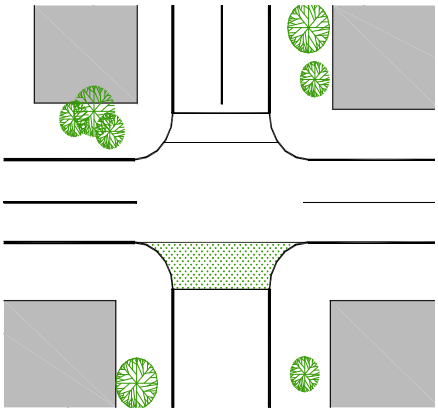
- Reduce cut-through traffic
- Possible landscaping opportunity
- Maintains direct EMS access

Disadvantages

- Can have a widespread affect on circulation
- Increase traffic on adjacent streets
- Increase trip length for many drivers
- Needs enforcement to make sure restriction is obeyed
- Is in effect at all times even if cut-through problem only exists during certain hours.
- Will shift traffic to neighboring roadways

Photo Courtesy of: http://www.pedbikeimages.org / Portland DOT

Diversion Tools: Full Street Closure/Cul-de-sac



Closing roads and creating cul-de-sacs is the most severe traffic management measure and should only be considered as a last resort. Closures prevent all access into or out of a particular street. This can have widespread impacts on the surrounding community. Closures result in increased traffic on adjacent streets. Traffic routes are generally lengthened for residents living in the area.

Advantages

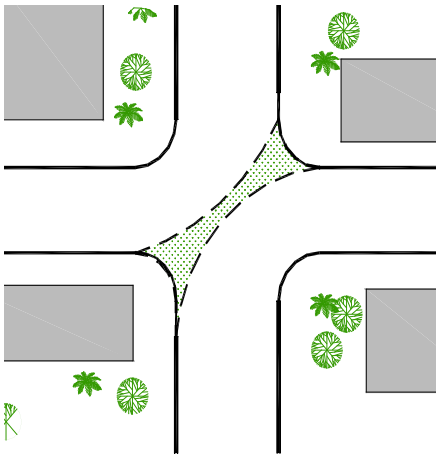
- Eliminates cut-through traffic
- Possible landscaping opportunity
- Maintains pedestrian access

Disadvantages

- Changes circulation patterns of area
- No access into or out of street
- EMS routes may change and lengthen
- Will shift traffic to neighboring roadways
- Increased travel for neighborhood residents

Photo Courtesy of: http://www.pedbikeimages.org / Dan Burden

Diversion Tools: Diagonal Diversions



A Diagonal Diverter is a raised median installed diagonally across a four legged intersection to prevent left turns or through traffic. These, like other Diversion Tools, can create circuitous routes for those accessing adjacent properties. Residents on area streets will see an increase in traffic due to the change in circulation patterns in the area. Residents on area streets will have increased travel routes. This type of tool, like all other diversion tools should be used with great care and in extreme situations.

Advantages

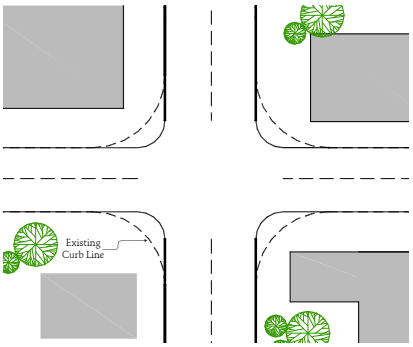
- Eliminates cut-through traffic
- Possible landscaping opportunity
- Maintains pedestrian access

Disadvantages

- Changes circulation patterns of area
- No access into or out of street
- EMS routes may change and lengthen
- Will shift traffic to neighboring roadways
- Increased travel for neighborhood residents

Photo Courtesy of: http://www.pedbikeimages.org / Portland DOT

Other Tools: Curb Radius Reduction



A curb radius reduction reconstructs intersection corners using a smaller radius. A smaller radius creates tighter right turn movements. Generally, this reduces right turn speeds. This type of tool can discourage drivers from using a particular street as a cut-through because they are forced to slow for the right turn. By having a smaller radius, the curb lines are moved further into the roadway. This creates a shorter crossing distance for pedestrians.

Advantages

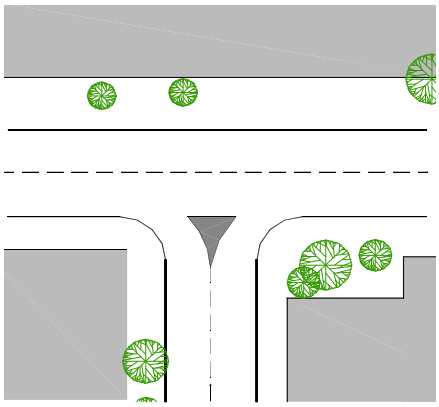
- Slows right turn speeds
- Can discourage cut-through traffic
- Shortens pedestrian crossing

Disadvantages

- More difficult for larger vehicles to turn

Photo Courtesy of: http://www.pedbikeimages.org / Peter Lagerwey

Other Tools: Right-In/Right-Out Island



Right-In/Right-Out Islands are similar to turn restrictions in that they restrict certain turning movements.. However, rather than a sign discouraging drivers to follow the restriction, it forces drivers to make the appropriate movement. A raised median channelizes vehicles, force them to the right. The island can be constructed to restrict both in and out movement, or a half island can be installed to only restrict the out movement. This device can be particularly helpful on a minor road that intersects at and uncontrolled location with major road. If the left turn out is a dangerous movement due to high speeds and/or volumes on the major road, a Right-Out Island can beneficial.

Advantages

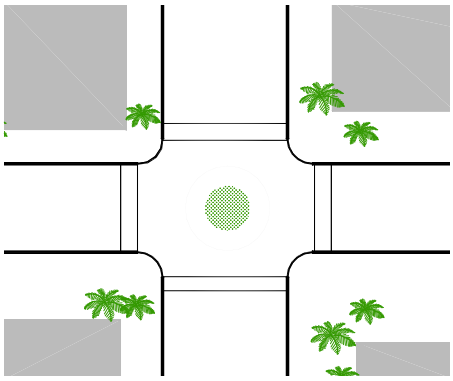
- Improve intersection safety
- Reduce cut-through some traffic
- Possible landscaping opportunity

Disadvantages

- Access restrictions
- May shift traffic to neighboring roadways
- May change neighborhood circulation

Photo Courtesy of: https://www.trafficcalming.org/toolbox

Other Tools: Traffic Circles



Traffic Circles are circular medians placed in the center of an intersection. Traffic flows counter clockwise through the intersection. Generally, the intersection is controlled by "Yield at Entry." In some instances, stop signs have been used in conjunction with the circle.

Traffic Circles can reduce speed through neighborhoods. The traffic circle in the intersection requires vehicle to maneuver around them. This horizontal deflection can have a slowing affect on most vehicles.

Advantages

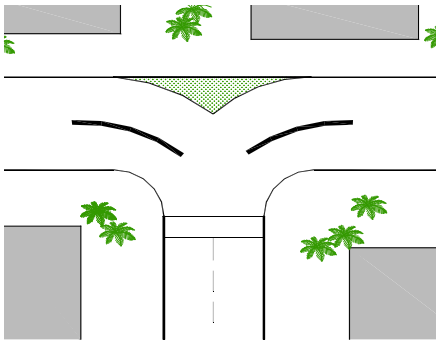
- Potential for speed reduction
- Potential for reduction in intersection crashes
- Possible landscaping opportunity
- Decrease in noise and pollution when used to replace stop signs

Disadvantages

- Loss of parking
- Restricts access to some driveways
- Restricts turn by large vehicles

Photo Courtesy of: Rhonda Darling

OtherTools: Modified T-Intersection



A Modified T-Intersection creates horizontal deflection through the intersection for the major street traffic. A bulbout is construction along the straight part of the major street. Arced medians, following the new curvature of the road, are installed on both legs of the major road. The minor street, which terminates at the tee can be controlled with a stop sign. Or, the major street can be stopped allowing the minor street the right-of-way.

Advantages

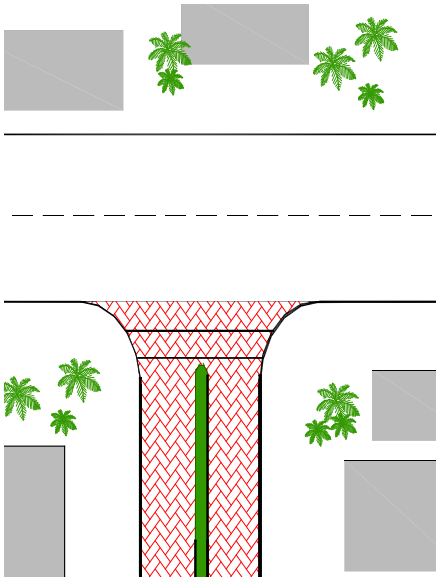
- Potential for speed reduction
- Possible landscaping opportunity

Disadvantages

- Loss of parking

Photo Cortesy of: http://www.trafficcalming.org/toolbox

Other Tools: Gateway/Entrance Treatment



Gateways include a variety of options at the entrance to a neighborhood. Gateways alert the driver that they are entering an different place, such as a neighborhood or downtown. One form of a gateway is a intersection median with a specimen tree or a sign locates in it. The roadway surface can be textured to create a physical sensation, alerting the driver of the new surroundings. This tool can help reduce speeds, especially if used in conjunction with other tools. It can also eliminate some cut-through traffic due to the necessity to slow down to make the turn.

Advantages

- Potential for speed reduction
- Possible landscaping opportunity
- Potential cut-through reduction
- Distinguishes a residential neighborhood from an arterial/commercial zone

Disadvantages

- Potential loss of parking
- Difficulty for larger vehicle to turn into neighborhood

Photo Courtesy of: http://www.pedbikeimages.org / Dan Burden