Gateway Signs

Description: Sign reminding drivers of the need to drive slowly
Issues addressed: speeding
Cautions/Limitations:

Advantages

- Increased motorist awareness of the neighborhood character
- Provides goal for traffic calming efforts
- Inexpensive to install

Disadvantages

- Voluntary compliance
- Contributes to sign clutter
- Requires ongoing police enforcement to be truly effective
- Expensive to enforce

Application:

- Minor streets
- Emergency routes
- Bus routes

Typical Cost: $200 each

Bots Dots

Description: Used to keep drivers on the road, also useful on curves
Issues addressed: speeding
Variation: rumble strips
Cautions/Limitations:

Advantages

- Reduces speed on turns
- Provides noticeable vibration to motorists when wheels cross over them

Disadvantages

- Increase in noise
- Special care in design needed to not obstruct bicyclists' or motorcyclists' path

Application:

- Major streets
- Bus routes
- Emergency routes

Typical Cost: $500

Coordinated Signal Timing

Description: Existing signals can be timed at 25 miles per hour so that drivers traveling above this speed gain no advantage
Issues addressed: speeding
Cautions/Limitations:

Advantages

- Keeps traffic at set speed

Disadvantages

- Could affect other signal coordination systems

Application:

- Major streets, emergency routes, bus routes
- Streets with existing signals spaced approximately 500'-1000'

Typical Costs:
$11,000 - $13,000

Pace Program

Description: Educational bumper stickers to promote pace driving vehicles who pledge to always drive the speed limit.
Issues addressed: speeding
Cautions/Limitations:

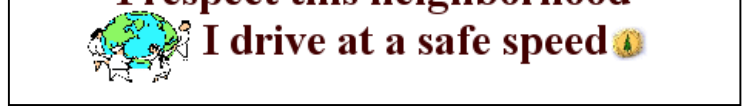
Advantages	Disadvantages
♦ Educational tool ♦ Inexpensive	♦ Depends on level of participation

Application:

- ♦ Major/minor streets
- ♦ Emergency routes
- ♦ Bus routes

Typical Cost:
$6,500-$8,500

Sample Bumper sticker



Speed Radar Trailer/Sign

Description: Portable trailer equipped with a radar unit detects speeds of passing vehicles and displays it on a reader board
Issues addressed: speeding
Cautions/Limitations:

Advantages

- Educational tool
- Good public relations
- Effective for temporary speed reduction measures

Disadvantages

- Not self-enforcing
- Duration of effectiveness may be limited
- Not effective on multi-lane roadways having significant traffic volumes (too many approaching vehicles)

Application:

- Major/minor streets
- Emergency routes
- Bus routes

Typical Cost:
$25,000-$32,000 trailer
$ 8,000 -sign

Targeted Enforcement

Description: Increased enforcement by Alameda Police Department Traffic Division
Issues addressed: speeding
Cautions/Limitations:

Advantages

- Effective while officers are monitoring speeds
- Flexible

Disadvantages

- Not self enforcing
- Expensive – fines do not typically cover cost of enforcement

Application:

- Major/minor streets
- Emergency routes
- Bus routes

Typical Cost: $90/hour

Pedestrian Crossing Signs

Description: Sign alerting drivers to pedestrian crossing ahead at near crosswalk
Issues addressed: pedestrian crossing
Cautions/Limitations:

Advantages

- Alerts motorists to yield to pedestrians
- Inexpensive to install

Disadvantages

- Voluntary compliance
- Requires ongoing police enforcement to be truly effective
- Expensive to enforce

Application:

- Major/minor streets
- Emergency routes
- Bus routes

Typical Cost:
$200 each

No Left/Right Turn Signs

Description: Signs prohibiting turns into a roadway
Issues addressed: cut-through traffic, traffic operations
Cautions/Limitations:

Advantages

- Reduces cut-through traffic
- Redirects traffic to main streets
- When used on main streets, left turn prohibition can improve traffic flow and reduce collisions
- Inexpensive to install

Disadvantages

- Voluntary compliance
- Requires ongoing police enforcement
- May increase trip length for drivers
- May divert traffic to parallel streets without turn restrictions

Application:

- Major/minor streets
- Emergency routes
- Bus routes

Typical Cost: $200 each

Narrowing Lanes

Description: Restriping travel lanes to reduce lane width, usually through use of bike lane or shoulder stripe
Issues addressed: speeding
Cautions/Limitations:

Advantages

- Increases pedestrian and bicyclist safety
- Reduces speed
- Self enforcing

Disadvantages

- May not be appropriate on 2-lane roads that are truck and bus routes

Application:

- Major/minor streets
- Emergency routes
- Bus routes

Typical Cost:
$2.00-$2.50 per linear foot of road

Centerline Striping (installation/removal)

Description: Installation defines left edge of travel lane, making the lane appear smaller in width and tracking around horizontal curves. On very low volume streets, removal of striping can slow vehicle speeds since both directions of traffic will utilize the same undefined space.
Issues addressed: speeding
Cautions/Limitations:

Installation of centerline

Advantages	Disadvantages
♦ Can reduce sideswipe accidents ♦ Guides traffic ♦ Can combine with edge stripe or bike lane to create narrow lane	

Removal of centerline

Advantages	Disadvantages
♦ Can reduce sideswipe accidents ♦ Guides traffic ♦ Can combine with edge stripe or bike lane to create narrow lane	

Application:

- Major/minor streets
- Emergency routes
- Bus routes

Typical Cost:
Installation - $2-$8 per linear foot of road
Removal - $1.25 per linear foot of road

High-Visibility Crosswalks

Description: Variety of measures to alert drivers to presence of crosswalk and pedestrians – includes installation of signs, beacons, in-pavement lights, colored/textured crosswalks, pedestrian bollards, and other options
Issues addressed: awareness, pedestrian crossing
Cautions/Limitations:

Advantages

- Pedestrians' actions are more predictable for motorists

Disadvantages

- Pedestrians may assume motorists will see them and yield

Application:

- Major/minor streets
- Emergency routes
- Bus routes
- Particularly effective in conjunction with raised crosswalks

Typical Cost:
$2,000-$30,000

Portable Delineators

Description: Vertical markers about 36" high, usually orange and made of reflective plastic, does not damage impacting vehicles when struck
Issues addressed: speeding
Cautions/Limitations:

Advantages

- Reduces speed of turning vehicles
- Provides awareness to motorists

Disadvantages

- Parking may be eliminated

Application:

- Major/minor streets
- Emergency routes
- Bus routes

Typical Cost:
$12-$20 each

Neighborhood Speed Watch

Description: Residents check out and use radar units to record speeding vehicles; police department send warnings to violators to encourage adherence to posted speeds
Issues addressed: speeding
Cautions/Limitations:

Advantages

- Discourages excessive speeding

Disadvantages

- Requires a lot of time and training
- Expensive due to high staff costs

Application:

- Major/minor streets
- Emergency routes
- Bus routes

Typical Cost:
$250-$750 each

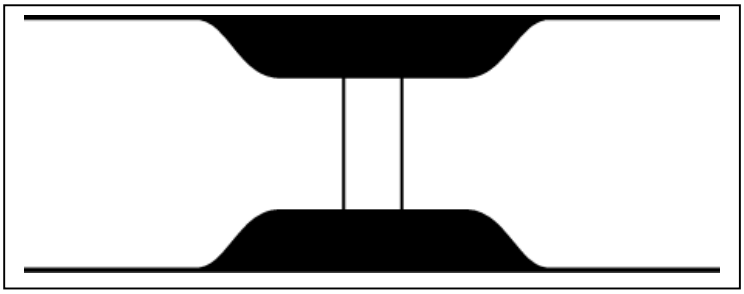
Curb Extensions/Bulbouts

Description: Curb extensions/bulbouts extend the sidewalk or curb line into the parking lane, reducing the street width, and providing visual breaks in the streetscape.
Issues addressed: pedestrian crossings, speeding
Variations: Bus bulbs
Cautions/Limitations: on-street parking must be present, special design attention is needed when bus routes make right-turns and when bike lanes are present

Advantages	Disadvantages
Curb extensions/bulbouts:	
♦ Reduces crossing distance for pedestrians	♦ Possible maintenance and drainage issues
♦ Interrupts straight curb lines and slows traffic, especially when used in series.	♦ Reduces number of on-street parking spaces.
♦ Provides landscaping opportunity – low plants only, so as not to impede sight distance.	♦ Utilities may require relocation
♦ Makes pedestrian crossing and pedestrians more visible to motorists.	♦ Large vehicles may need to cross into adjacent travel lanes to negotiate turns
♦ Reduces turning radii, slowing turning traffic	♦ Must not protrude into bike lane or otherwise inhibit bike travel
Bus bulbs:	
♦ On two lane streets, cars could not pass buses stopped at bus bulb	On two lane street, cars could not pass bus stopped at bus bulb, increasing delay for motorists
♦ May improve traffic flow and safety, as motorists are less tempted to unsafely pass a stopped bus	*Other disadvantages same as for curb extensions.*
♦ Additional space at bus stops permits more passenger amenities	
♦ Reduces disruption of sidewalk users by bus passengers	

Application:
- ♦ Major/minor streets, bus routes, emergency routes
- ♦ Crosswalks
- ♦ Long, straight and flat roadway sections
- ♦ Locations with high pedestrian use
- ♦ Mid-block or intersections
- ♦ Bus routes

Typical Cost:
$5,000-$20,000 each



Curb Radius Reduction

Description: Reconstruct the turning radius to a tighter turn to reduce vehicle turning speeds, shorten the crossing distance for pedestrians, and improve sight distance between pedestrians and motorists

Issues addressed:

Cautions/Limitations:

Advantages

Reduces crossing distance for pedestrians

Improves visibility

Provides additional space for accessible curb ramps

Shorter crossing distances shortens crossing time for pedestrians and can lead to improved signal timing

Disadvantages

Careful design needed to account for bicyclists

Application:

- May not be appropriate on bus or truck routes

Typical Cost:

$5,500 - $6,500

Median-Pedestrian Refuge

Description: A raised long pedestrian refuge island located near the center portion of the street. It provides a refuge for pedestrian and bicyclists that cross a street mid-block or at intersections.
Issues addressed: pedestrian crossings, speeding
Variations: see pages 17 and 18
Cautions/Limitations:

Advantages

- Provides refuge for pedestrians when crossing a street moderate to heavy traffic volumes
- Increases motorist awareness of presence of crosswalk
- Can be designed to prohibit left-turns thereby reducing cut-through traffic
- Can be designed to provide left turn pockets
- Provides landscaping opportunity

Disadvantages

- May require removal of on-street parking
- Restricts access to driveways in one direction
- Speeds may increase due to lack of left turning traffic

Application:

- Major/minor streets, bus routes, emergency routes
- Can be used with curb extensions
- For entire roadway, intersections, or mid-block

Typical Cost:
$4000 for 6 ft by 20 ft with no landscaping

Median-midblock

Description: A raised island located near the center portion of the street. It provides a visual line-if sight interruption to slow speedsas well as a place to install traffic calming signs and /or trees.
Issues addressed:, speeding
Variations: see pages 16 and 18
Cautions/Limitations: maintain lane width adedquate to accommodate bicycle travel

Advantages

- Decreases the perevied width of the street resulting in slower traffic
- Increases motorist awareness of
- Provides place for gateway and other signs
- Provides landscaping opportunity
-

Disadvantages

- May require removal of on-street parking
- May restrict access to driveways in one direction

cc

Application:

- Major/minor streets, bus routes, emergency routes
- Can be used with curb extensions
- For entire roadway, intersections, or mid-block

Typical Cost:
$3000 with no landscaping for 6 ft by 20 ft median

Median – Continuous and/or across minor intersections

Description: An elevated median located on the centerline of a two-way roadway through an intersection, which prevents left turns and/or through movements to and from the intersecting minor roadway
Issues addressed: cut-through traffic, pedestrian crossings
Variations: no left- turns and limited turns, also see pages 16 and 17
Cautions/Limitations: Although physically placed on the major or minor street, the access restriction is for the intersecting minor street; special design attention to accommodate bicycles and emergency vehicles

Advantages

- Reduces cut-through traffic
- Provides opportunity for landscaping
- Can provide a refuge for pedestrians to shorten crossing distance
- Can accommodate bicycle through traffic

Disadvantages

- Restricts residents access as well
- May divert traffic to other minor streets
- May require removal of some on-street parking in the vicinity of the median
- Special design required for emergency vehicle access

Application:
- Minor streets
- Intersections with collectors and arterials

Typical Cost:
$150-per linear foot for 6 foot width no landscaping
Up to $300 per lf with landscaping or architectural hardscaping

Speed Hump

Description: raised area of a roadway, which deflects both the wheels and frame of a traversing vehicle
Issues addressed: speeding, cut-through traffic
Cautions/Limitations: not for use on major streets, emergency routes or bus routes

Advantages

- Reduces vehicle speeds
- Deters cut-through traffic
- One of the least expensive traffic calming devices

Disadvantages

- Traffic may be diverted to other streets
- Compromises response times for emergency vehicles
- Interferes with pavement overlays
- Possible noise increase due to braking and acceleration of vehicles
- May cause discomfort for drivers with disabilities
- Fire department concerns on vehicle damage and firefighter injuries
- Potential property damage
- Some bicyclists find them distracting
- May attract skateboarders

Application:

- Minor streets
- Preferably used in a series 300'-500' apart
- Mid-block, not at intersection
- Requires fire dept review on case by case basis

Typical Cost:
$2,000-$3000 each

Speed Cushion/Speed Lump

Description: A variation on a speed hump that can be straddled by large vehicles such as emergency vehicles and busses, but passenger vehicles are impacted in the same manner as a speed hump.
Issues addressed: speeding
Cautions/Limitations: special design attention is needed on streets with bike lanes

Advantages

- Reduces vehicle speeds
- Does not disrupt emergency or transit vehicles

Disadvantages

- May require elimination of parking to ensure that drivers can align large vehicles over the cushions
- Drivers may try to straddle the cushions on the right side of the road and impact bicyclists' travel area

Application:
- Major/minor streets, bus routes, emergency routes
- Best if used in a series
- Can be used singly as well as two or three abreast
- Can be used near medians

Typical Cost:
$4000 per installation of three

Speed Table/Raised Crosswalk

Description: longer speed hump with a flat section about ten feet wide in the middle, which may include a crosswalk; sometimes constructed with brick or other textured materials on the flat section
Issues addressed: speeding, cut-through traffic
Cautions/Limitations: not for use on major streets, emergency routes or bus routes

Advantages

- Reduces vehicle speeds
- Deters cut-through traffic
- Increases visibility of pedestrian crossings
- Easier crossings for pedestrians by avoiding dip associated with curb ramps, especially elderly and wheelchair users
-

Disadvantages

- Traffic may be diverted to other streets
- Compromises response times for emergency vehicles
- Interferes with pavement overlays
- Possible noise increase due to braking and acceleration of vehicles
- May cause discomfort for drivers with disabilities

Application:
- minor street
- intersections or mid-block crossings
- works well in combination with textured crosswalks, curb extensions, and curb radius reductions
- school crossings
- trail crossings
- requires fire dept review on case by case basis

Typical Cost:
$10,000-$15,000

Raised Intersection

Description: A raised intersection involves providing elongated ramps on each of the intersection approaches and elevating the entire intersection by approximately 6 inches.
Issues addressed: speeding, pedestrian crossings
Cautions/Limitations: requires good sight distances

Advantages

- Reduces vehicle speeds
- Can be used in conjunction with specially design pavement to enhance appearance of the intersection
- No effect on bicycles at moderate speeds
- Pedestrian crossings can be provided at curb level, which assists people with disabilities

Disadvantages

- Expensive
- May divert traffic to nearby streets
- Slows emergency vehicles as well
- Potential drainage problems
- Increases difficulty for turning vehicles

Application:

- Major/minor streets, bus routes, emergency routes
- Few large vehicle turns

Typical Cost:
$25,000-$70,000

Traffic Circle

Description: Circular island about 10 - 20' in diameter, placed in intersections of residential streets, around which traffic circulates in a counter-clockwise direction
Issues addressed: speeding, safety
Cautions/Limitations: not for use on major streets, bus routes or emergency response routes

Advantages

- Reduces speeds through intersections
- Provides visual breaks in the street scape which reduces vehicle speeds midblock
- Reduces collisions, particularly broadside
- Provides landscaping opportunity

Disadvantages

- Maintenance costs if landscaped
- Possible removal of on-street parking, depending on design
- Learning curve when first installed

Application:

- minor streets
- especially effective when used in a series
- typically used at two-way Stop controlled intersections

Typical Cost:
$8,000-$25,000

Roundabout

Description: Circular raised island, about 10'-70' in diameter, with Yield on entry and deflector islands; the traffic flows around in a counter-clockwise direction and exits by turning right onto the desired street.
Issues addressed: speeding, traffic safety
Cautions/Limitations: careful design needed to accommodate bicyclists and pedestrians, especially pedestrians with visual impairments; special design attention to accommodate large vehicles,

Advantages

- Reduces vehicle speeds –typically designed to accommodate traffic speeds of 15 to 22 mph
- Reduces intersection collisions particularly compared to signalized intersections and 4-way Stops
- Cheaper to install and maintain than traffic signals
- Provides landscaping opportunity
- Particularly effective at multi-leg/odd shaped intersections
- Reduces problems caused by non-compliance at 4-way Stop intersections
- May increase intersection capacity depending on turning movements

Disadvantages

- Accommodating buses/large vehicles would require additional right-of-way at many Alameda intersections
- Some communities experience a learning curve when first installed
- Reduces response times for emergency vehicles

Application:

- Major/minor streets; bus routes, emergency routes
- Intersections with more than 4 legs
- 2-lane roads
- 2300 vph maximum entering volume

Typical Cost:
$60,000-$300,000

Chicane/Two-lane with Diverted Centerline

Description: Consists of a series of bulbouts or curb extensions that narrow the street and inserts curvature in an otherwise straight stretch of roadway.
Issues addressed: Speeding
Cautions/Limitations:

Advantages

- Reduces vehicle speed
- Reduce straight line of sight and enhances visual breaks in the streetscape
- Provides landscaping opportunity
- Can accommodate emergency vehicles

Disadvantages

- Removes on-street parking
- Landscaping must be designed so as not to obstruct sight lines
- Inattentive drivers may not abide by the new centerline potential impacting oncoming traffic and bicyclists
- Disrupts ability of service/delivery vehicles to find parking

Application:

- Major/minor streets, emergency routes
- Straight streets with long blocks
- Best when used in a series
- Residential streets and downtown streets with low traffic volumes

Typical Cost:
$10,000-$20,000 for set of 3

One-Lane Slow Point

Description: One-lane slow points are curb extensions that narrow a street by widening the sidewalks or planting strips, effectively creating a pinch point along the street. They can be created by bringing both curbs in, or they can be done by widening one side at a midblock location.
Issues addressed: pedestrian crossing, speeding
Cautions/Limitations: not for use on major streets, bus routes, or emergency routes

Advantages

- Reduces vehicle speeds
- Imposes minimal inconvenience to local traffic
- Reduces crossing distance for pedestrians
- Provides landscaping opportunity

Disadvantages

- Requires careful design to avoid hazards to drivers and bicyclists
- Drainage issues to resolve
- May reduce on-street parking

Application:

- Work well with speed humps, speed tables, raised intersections, curb radius reductions, and raised median islands
- Landscaping must be low and trimmed to maintain safe sight distances
- Can be applied mid-block or at intersections

Typical Cost:
$5,000 - $20,000

Modified Street Design/Woonerf

Description: "Woonerf" is a Dutch term meaning "living yard." The street is designed with physical constraints that by design limit motor vehicles to low speeds (under 10 mph). Streets can be completely redesigned from front door to front door, eliminating the separation between yard and street often with no with no curbs or sidewalks.

Issues addressed: speeding, cut-through traffic, pedestrian safety

Cautions/Limitations: not for use on major street, bus routes or emergency vehicle routes

Advantages

- Reduces vehicle speeds
- Reduces traffic volumes
- Provides a public space for social interaction and play by area children
- Provides opportunities for landscaping

Disadvantages

- Expensive

Application:

- Minor street
- Low volume streets only

Typical Cost:

$7 - $35 per square foot

Expensive if done as a retrofit, best to do this as part of initial street design.

Barrier-Half Street Closure

Description: A curb extension or vertical barrier extending to approximately the centerline of a roadway, effectively blocking one direction of traffic.
Issues addressed: cut-through traffic, pedestrian crossings
Variation: Can be used either to permit egress but not ingress or ingress but not egress from a street
Cautions/Limitations: consider less restrictive measures first; special design attention to accommodate bicycles

Advantages

- Reduces cut-through traffic
- Interrupts sight lines for motorists, with potential reduction in speed
- Reduces crossing distance for pedestrians
- Provides landscaping opportunity

Disadvantages

- Restricts residents access as well
- May divert traffic to other minor streets
- Can be ignored by wrong-way travel

Application:

- Minor streets
- Intersections of local streets with collectors or arterials
- Generally prohibits ingress to a street, not egress from a street

Typical Cost:
$12,000-$20,000

Barrier-Diagonal Road Closure

Description: an island built at a residential street intersection along the diagonal that turns the intersection into two L-shaped intersections, restricting certain through and turning movements.
Issues addressed: cut-through traffic
Cautions/Limitations: consider less restrictive measures first; do not consider on major streets, bus routes or primary emergency response routes; special design attention to accommodate bicycles and emergency vehicles

Advantages

- Eliminates through traffic
- Provides landscaping opportunity
- Reduces conflicts at intersection
- Can accommodate through bicycle movements

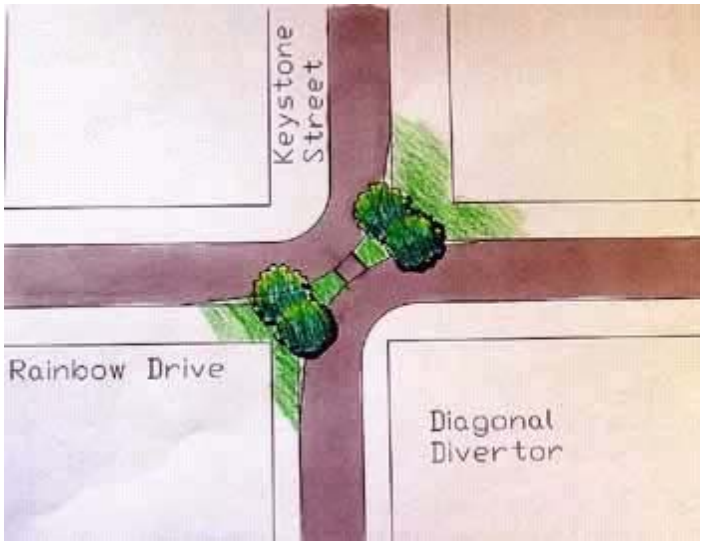
Disadvantages

- Restricts residents access as well
- May divert traffic to other minor streets
- No effect on vehicle speeds beyond intersection
- Careful design required for emergency vehicle access

Application:

- Minor streets
- Grid street pattern

Typical Cost:
$10,000-$20,000 per intersection



Barrier-Street Closure

Description: A barrier extending the entire width of a roadway, which obstructs all motor vehicle traffic movements from continuing along the roadway, essentially creating a cul de sac.
Issues addressed: cut-through traffic
Variation: closure can be built using a timer so that the street is only closed during certain hours.
Cautions/Limitations: consider less restrictive measures first, not for use on majors streets, bus routes or primary emergency response routes, special design attention to accommodate emergency vehicles and bicycles

Advantages

- Eliminates cut-through traffic,
- Reduces conflicts at intersections
- Can include cut-through for bicyclists
- Provides landscaping opportunity

Disadvantages

- Restricts residents' access as well
- May divert traffic to other minor streets
- Special design required for emergency vehicle access
- May require on-street parking prohibitions in vicinity of closure
- Causes improper turnarounds at new dead-end street

Application:

- Typically applied only when other measures have failed
- Intersection or mid-block
- May be used as part of neighborhood traffic strategy

Typical Cost:
$30,000-$100,000 for a landscaped closure