

TRAFFIC MANAGEMENT DEVICES/MEASURES

(Not in priority order)

PAGE NO.	TRAFFIC MANAGEMENT DEVICE/MEASURE	SPEED REDUCTION	TRAFFIC REDUCTION	FUEL CONSUMPTION	AIR/NOISE POLLUTION	COST	EMERGENCY SERVICES	TEST VS. PERMANENT	OTHER
B-4	Speed Hump	Probable	Possible	Small Increase	Small Increase	Low	Possible Increased Response Time	Test Installation Possible	Not used on Collector and Arterial Streets
B-5	Speed Table	Probable	Possible	Small Increase	Small Increase	Low	Possible Increased Response Time	Test Installation Possible	Not used on Collector and Arterial Streets
B-6	Raised Crosswalk	Possible	Possible	Small Increase	Small Increase	Low	Possible Increased Response Time	Test Installation Possible	Not used on Collector and Arterial Streets
B-7	Raised Intersection	Probable	Possible	Small Increase	Small Increase	Medium to High	Possible Increased Response Time	Permanent Installation Only	Possible Drainage Problem
B-8	Textured Pavement	Possible	No Effect	No Change	Minimal Effect	Low to Medium	Minimal Impact	Permanent Installation Only	Increased Maintenance
B-9	Center Island Narrowings	Possible	Possible	No Effect	No Effect	Medium	Minimal Impact	Test Installation Possible	
B-10	Neckdowns	Possible	Possible	Small Increase	Small Increase	Medium to High	Minimal Impact	Test Installation Possible	
B-11	Gateway Treatment	Possible	Possible	No Change	Small Decrease	Medium to High	Minimal Impact	Permanent Installation Only	Increased Maintenance
B-12	Choker	Probable	Possible	Small Increase	Small Increase	Medium	Minimal Impact	Test Installation Possible	
B-13	Chicane	Probable	Possible	Slight Increase	Slight Increase	Medium to High	Minimal Impact	Test Installation Possible	Not used on Collector and Arterial Streets
B-14	Realigned Intersection	Varies	Varies	Small Decrease	Small Decrease	High	Varies	Permanent Installation Only	

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B-15	Traffic Circle	Possible	Possible	Slight Increase	Small Increase	Medium	Possible Increased Response Time	Test Installation Possible	Not used on Collector and Arterial Streets
B-16	Roundabout	Probable	Possible	No Effect	Slight Increase	Medium to High	Possible Increased Response Time	Permanent Installation Only	Increased Maintenance
B-17	Diagonal Road Closures	Probable	Probable	Small Increase	Small Increase	Low to Medium	Varies	Test Installation Possible	Not used on Collector and Arterial Streets
B-18	Partial Street Closure	Possible	Probable	Small Increase	Small Increase	Medium	Minimal Impact	Test Installation Possible	Not used on Collector and Arterial Streets
B-19	Cul-de-sac	Probable	Yes	Small Increase	Small Increase	High	Possible Increased Response Time	Test Installation Possible	Not used on Collector and Arterial Streets
B-20	Median Barriers	Small Possibility	Possible	No Effect	No Effect	Varies	Possible Increased Response Time	Test Installation Possible	
B-21	Forced Turn Islands	Possible	Possible	Small Increase	Small Increase	Low to Medium	Possible Increased Response Time	Test Installation Possible	Not used on Collector and Arterial Streets
B-22	Targeted Police Enforcement	Depends on Amount	Possible	No Effect	No Effect	High	No Effect	Temporary	
B-23	Radar Speed Units	Probable	No Effect	No Effect	No Effect	Low	No Effect	Temporary or Permanent	
B-24	Neighborhood Traffic Safety Campaigns	Possible	No Effect	No Effect	No Effect	Low	No Effect	Temporary or Permanent	
B-25	Stop Sign	Varies (may increase)	Varies	Small Increase	Small Increase	Low	Possible Increased Response Time	Temporary or Permanent	

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B-26	Turn Restrictions	Varies	Yes	Small Increase	No Effect	Low	No Effect	Temporary or Permanent	
B-27	One-Way Streets	No	Possible	Small Decrease	Small Decrease	Low	Varies	Temporary or Permanent	
B-28	Traffic Signal ("Rest on Red" and "Rest on Green")	Possible	Varies	Varies	Varies	High	No Effect	Temporary or Permanent	
B-29	Pavement Striping	Possible	No Effect	No Effect	No Effect	Low	No Effect	Permanent Installation Only	

Definition: Speed humps are wave-shaped paved humps in the street. The height of the speed hump determines how fast it may be navigated without causing discomfort to the driver or damage to the vehicle. Discomfort increases as speed over the hump increases. Typically speed humps are placed in a series rather than singularly. (Road humps, undulations.)

Description:

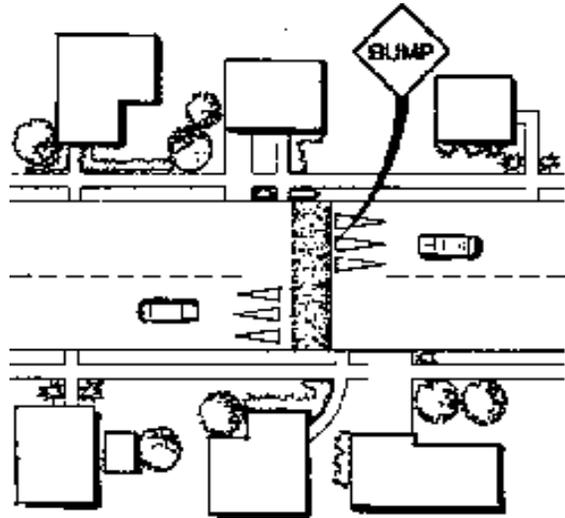
- Rounded raised areas of pavement typically 12 to 14 feet in length.
- Often placed in a series (typically spaced 300 to 600 feet apart).
- Sometimes called road humps or undulations.

Applications:

- Residential, local streets.
- Not allowed on collector and arterial streets.
- Midblock placement, not at an intersection.
- Not on grades greater than 5 percent.
- Work well with neckdowns.

Design/Installation Issues:

- Typically 12 to 14 feet in length; other lengths (10, 22, and 30 feet).
- Speed hump shapes include parabolic, circular, and sinusoidal.
- Hump heights range between 3 and 4 inches with trend toward 3 - 3 ½ inches maximum.
- Difficult to construct precisely; may need to specify a construction tolerance (e.g. ± 1/8 inch) on height.
- Often have signage (advance warning sign before first hump in series and warning sign or object marker at hump).
- Typically have pavement markings (zigzag, shark's tooth, chevron, zebra).
- Taper edge near curb to allow gap for drainage.
- Some have speed advisories.
- Bicyclists prefer that it not cover or cross a bike lane.

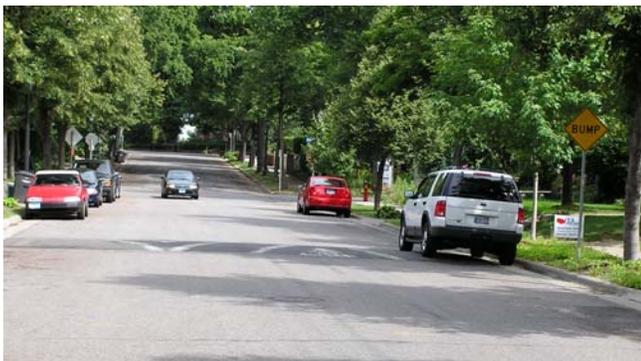


Advantages:

- Effective speed control/reduction at the installation.
- May reduce traffic volumes.
- Does not impact parking.
- Works well with curb extensions.

Disadvantages:

- May increase noise (braking and acceleration).
- May impact drainage.
- Not appropriate for grades greater than 5 percent.
- May shift traffic to parallel streets.
- Tend to reduce air quality and increase energy consumption.
- May increase speeds between humps.
- May cause bus passengers discomfort.
- Not appropriate on some horizontal/vertical curves.
- Requires signage that may be considered unsightly.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Probable	Possible	Small Increase	Small Increase	Low	Possible Increased Response Time	Test Installation Possible	Not Used on Collector and Arterial Streets

Definition: Trapezoidal shaped speed humps in the street, similar to regular speed humps. (Trapezoidal humps, speed platforms.)

Description:

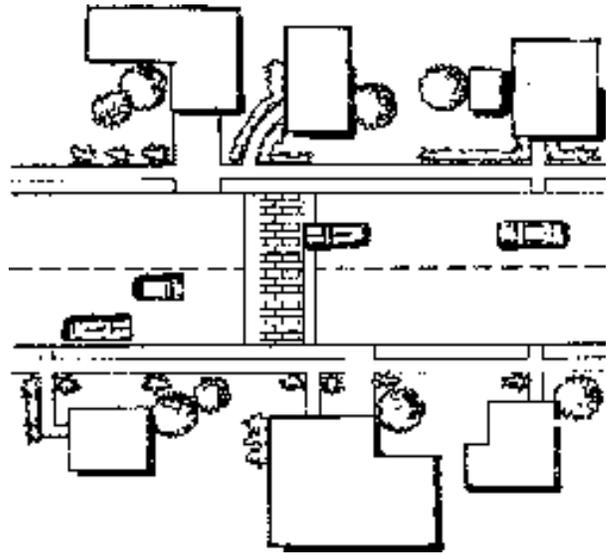
- Long raised speed humps with a flat section in the middle and ramps on the ends; sometimes constructed with brick or other textured materials on the flat section.

Applications:

- Residential, local streets.
- Not allowed on collector and arterial streets.
- Typically long enough for the entire wheelbase of a passenger car to rest on top.
- Midblock placement or at an intersection.
- Not on grades greater than 5 percent.
- Work well with neckdowns.

Design/Installation Issues:

- Typically 22 feet in the direction of travel with 6 foot ramps on each end and a 10 foot flat section in the middle; other lengths (32 and 48 feet).
- Most common height is between 3 and 4 inches (as high as 6 inches).
- Ramps are typically 6 feet long (up to 10 feet long) and are either parabolic or linear.



Advantages:

- Effective speed control/reduction at the installation.
- Designed to be aesthetically pleasing.
- May reduce traffic volumes.
- Typically does not impact parking.
- Typically preferred by fire department over speed hump.

Disadvantages:

- May increase noise (braking and acceleration).
- May impact drainage.
- Not appropriate for grades greater than 5 percent.
- May shift traffic to parallel streets.
- May increase speeds between tables.
- May cause bus passengers discomfort.
- Not appropriate on some curves.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Probable	Possible	Small Increase	Small Increase	Low	Possible Increased Response Time	Test Installation Possible	Not Used on Collector and Arterial Streets

Definition: A speed table designed as a pedestrian crossing, generally used at mid-block locations. (Raised crossings, sidewalk extensions.)

Description:

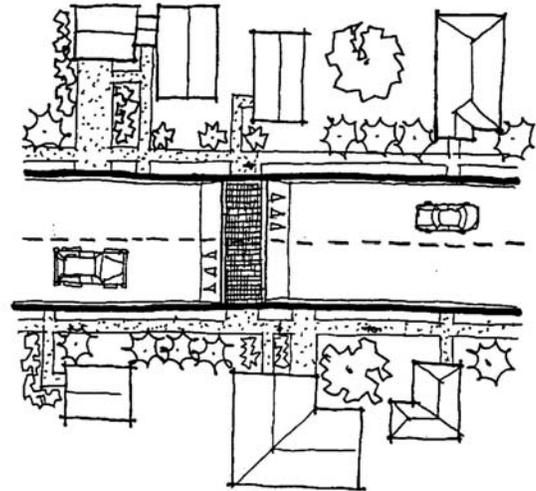
- Speed Table with flat area to accommodate pedestrian traffic.

Applications:

- Local streets.
- Not allowed on collector and arterial streets.
- Midblock placement or at an intersection.
- Not on grades greater than 5 percent.
- Works well in combination with curb extensions and curb radius reductions.

Design/Installation Issues:

- Typically 22 feet in the direction of travel with 6 foot ramps on each end and a 10 foot flat section in the middle; other lengths (32 and 48 feet) reported in U.S. practice.
- Most common height is between 3 and 4 inches (as high as 6 inches).
- Ramps are typically 6 feet long (up to 10 feet long) and are either parabolic or linear.

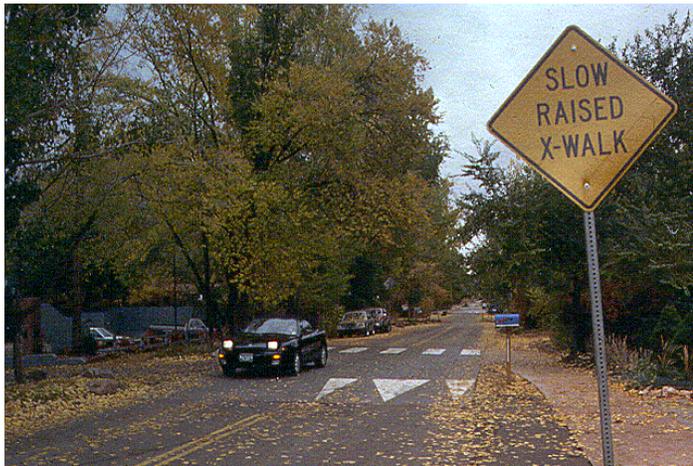


Advantages:

- Effective speed control/reduction at the installation.
- Effective pedestrian amenity.
- May be designed to be aesthetically pleasing.
- May reduce traffic volumes.
- Increases pedestrian visibility and likelihood that driver yields to pedestrian.

Disadvantages:

- May increase noise (braking and acceleration).
- May impact drainage.
- Not appropriate for grades greater than 5 percent.
- May shift traffic to parallel streets.
- May cause bus passengers discomfort.
- Not appropriate on some curves.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Possible	Possible	Small Increase	Small Increase	Low	Possible Increased Response Time	Permanent Installation Only	Not Used on Collector and Arterial Streets

Definition: A raised plateau where roads intersect. The plateau is generally 4 inches above the surrounding street. (Raised junctions, intersection humps, plateaus.)

Description:

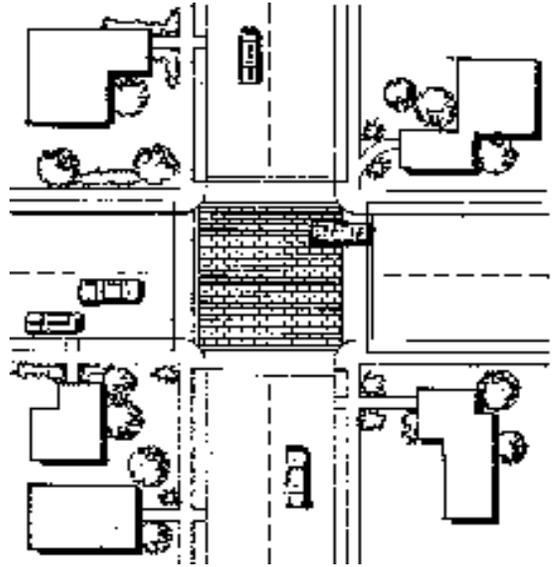
- Flat raised areas covering entire intersections, with ramps on all approaches and often with brick or other textured materials on the flat section and ramps.

Applications:

- Local streets.
- Allowed on collector and arterial streets at all-way stop controlled intersection only.
- Works well with curb extensions and textured crosswalks.
- Often part of an area wide traffic calming scheme involving both intersecting streets.

Design/Installation Issues:

- Storm drainage modifications may be necessary.
- Typically rise to sidewalk level.
- May require bollards to define edge of roadway
- Installations typically have gentle 1:40 slopes on ramps.
- Not typically used in densely developed urban areas where loss of parking would be unacceptable.



Advantages:

- Reduction in through movement speeds at intersection.
- No effect on access.
- Makes entire intersections more pedestrian-friendly.
- Designed to be aesthetically pleasing.

Disadvantages:

- May slow emergency vehicles to approximately 15 miles per hour.
- May impact drainage.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Probable	Possible	Small Increase	Small Increase	Medium to High	Possible Increased Response Time	Permanent Installation Only	Possible Drainage Problem

Definition: A change in pavement texture (e.g., asphalt road to brick crossing) that helps to make drivers aware of a change in the driving environment.

Description:

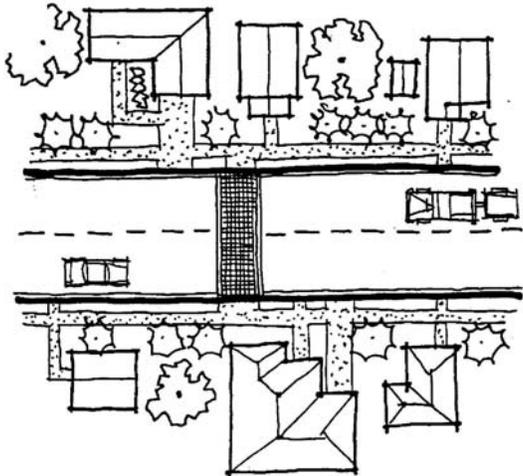
- An area within in the roadway set off from the typical pavement (e.g. bituminous and concrete) by using cobble stones, stamped concrete, etc.

Applications:

- Used as community enhancement and/or as a gateway treatment.
- Works well with raised crosswalk and intersection applications.

Design/Installation Issues:

- In some cases, not preferred by bicyclists due to rough surface.



Advantages:

- Designed to be aesthetically pleasing.
- May be used to define pedestrian crossing.
- May reduce speeds.

Disadvantages:

- Increased Maintenance.
- May increase noise.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Possible	No Effect	No Change	Minimal Effect	Low to Medium	Minimal Impact	Permanent Installation Only	

Definition: An island or barrier in the center of a street that serves to segregate traffic. (Midblock medians, median slowpoints, median chokers, central islands.)

Description:

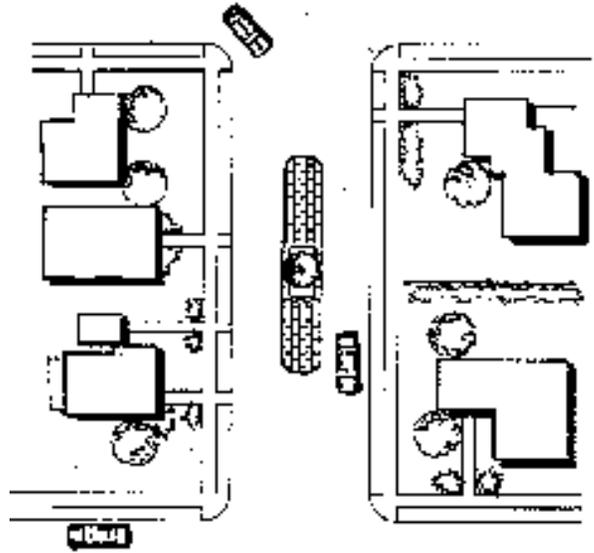
- Raised islands located along the centerline of a street that narrow the travel lanes at that location.

Applications:

- Are often nicely landscaped to provide visual amenity and neighborhood identity.
- Can help pedestrianize streets by providing a mid-point refuge for pedestrians crossings.
- Sometimes used on wide streets to narrow travel lanes.
- Works well when combined with crosswalks.

Design/Installation Issues:

- Bicyclists prefer not to have the travel way narrowed into path of motor vehicles.
- Islands need to be wide enough to allow signs to mark them.
- Driving lanes in each direction should be 12 feet plus gutter width.
- Driveways, alleys, and snowplow operations should be considered.
- Should not be used where on-street parking needs are extensive.



Advantages:

- Reduces pedestrian crossing width.
- Provides a refuge for pedestrians and cyclists.
- Provides barrier between lanes of traffic.
- May produce a limited reduction in vehicle speeds.
- May visually enhance the street through landscaping.
- May prevent passing of turning vehicles.
- Preferred by fire department/emergency response agencies to most other traffic calming measures.
- May reduce traffic volumes.
- Self-enforcing.

Disadvantages:

- May reduce parking and driveway access.
- May reduce separation for bicycles and pedestrians.
- May limit visibility of pedestrian crossings.
- May reduce driver sightlines if over-landscaped.
- Increased maintenance.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Possible	Possible	No Effect	No Effect	Medium	Minimal Impact	Test Installation Possible	Increased Maintenance

Definition: Physical curb reduction of road width at intersections. Similar to lane narrowing but used at intersection(s). Widening of street corners at intersections to discourage cut-through traffic, to improve pedestrian access and to help define neighborhoods. (Nubs, bulb-outs, knuckles, intersection narrowings, corner bulges, safe crosses.)

Description:

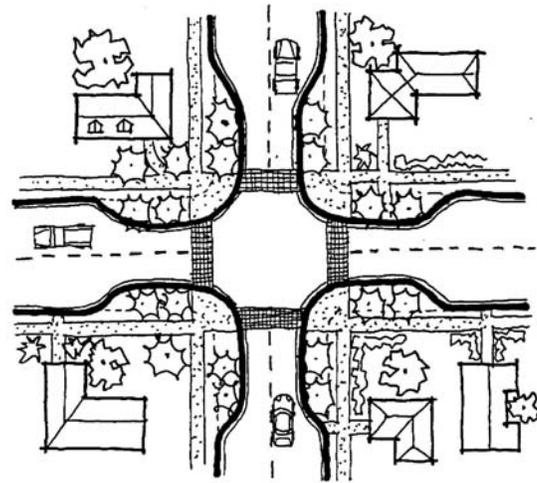
- Realignment of curb, reducing street width at intersections.

Applications:

- Residential, local streets.
- Should not be used in locations where turn lanes or through lanes would be lost.
- County typically does not allow neckdowns directly adjacent to county roads.
- Can be used in multiple applications or on a single segment of roadway.

Design/Installation Issues:

- Must result in a minimum intersection opening and radii to accommodate turning movements.
- Drainage issues may be significant.
- Vertical delineators or object markers are often used to make visible to snowplow operators.



Advantages:

- May be aesthetically pleasing if landscaped.
- Reduces pedestrian crossing distance.
- May reduce speeds and traffic volumes.
- Self-enforcing.
- May improve sight lines.

Disadvantages:

- Unfriendly to cyclists unless designed to accommodate them.
- Landscaping may cause sight line problems.
- Increased maintenance if landscaped.
- May impact drainage.
- May impact bicycle accommodations.
- May impact parking.
- May require signage that may be considered unsightly.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Possible	Possible	Small Increase	Small Increase	Medium to High	Minimal Impact	Test Installation Possible	

Definition: Treatment to a street that includes a sign, banner, landscaping or other structure that helps to communicate a sense of neighborhood identity.

Description:

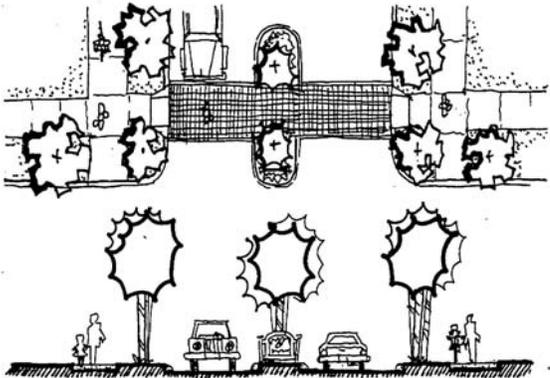
- Monument or landscaping used to denote an entrance into a neighborhood.

Applications:

- Used at entrances to residential neighborhoods typically adjacent to collector or arterial roadways.

Design/Installation Issues:

- Determination and agreement for responsibility of maintenance.
- Drainage issues may be significant.
- Must maintain proper intersection sight lines.



Advantages:

- Positive indication of a change in environment from arterial/collector roadways to residential street.
- May reduce entry speed.
- Helps give neighborhood a sense of identity.
- Allows neighborhood creativity and participation in design.

Disadvantages:

- Increased maintenance.
- Determination and agreement of maintenance responsibility.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Possible	Possible	No Change	Small Decrease	Medium to High	Minimal Impact	Permanent Installation Only	Increased Maintenance

Definition: Physical street narrowing to expand sidewalks and landscaped areas; possibly adding medians, on street parking, etc. (Pinch points, lane narrowing, midblock narrowings, midblock yield points, constrictions.)

Description:

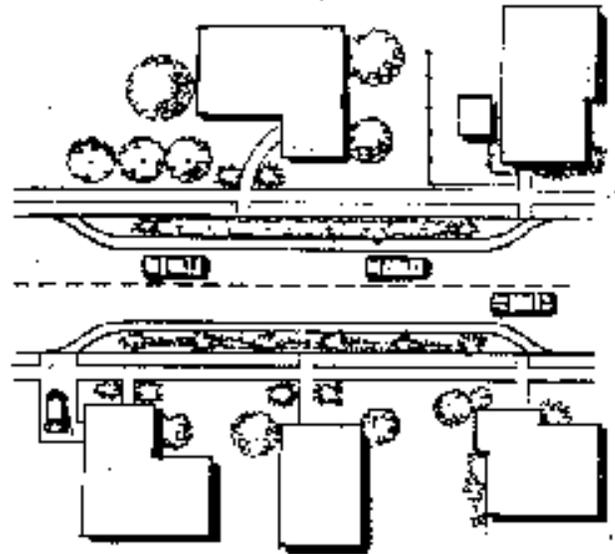
- Curb extensions at midblock that narrow a street by widening the boulevard or sidewalk area.

Applications:

- Works well with pedestrian crossings.
- Works well with speed humps, speed tables, raised intersections, textured pavement, and raised median islands.
- Some applications use an island, which allows drainage and bicyclists to continue between the choker and the original curb line.

Design/Installation Issues:

- Bicyclists prefer not to have the travelway narrowed into the path of motor vehicles.
- Typically designed to narrow road to 22 feet for two-way traffic with 1:10 tapers at the ends.
- Adequate drainage is a key consideration.
- Provides opportunity for landscaping.
- Vertical delineators, bollards or object markers are often used to make visible to snowplow operators.
- Effective when used in a series.
- Avoid narrowings of two way traffic to single lanes.
- Avoid use in locations where at the crest of a hill and on some curves.
- Parking must be restricted at the choker.



Advantages:

- Reduces pedestrian crossing width and increases visibility of pedestrian.
- May reduce speed and traffic volume
- Self-enforcing.
- Preferred by many fire department/emergency response agencies to most other traffic calming measures.

Disadvantages:

- May impact parking and driveway access.
- Unfriendly to bicyclists unless designed to accommodate them.
- May impact drainage.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Probable	Possible	Small Increase	Small Increase	Medium	Minimal Impact	Test Installation Possible	May Impact Drainage

Definition: Mainline deviations to deter the path of travel so that the street is not a straight line (by the installation of offset curb extensions). (Deviations, serpentine, reversing curves, twists.)

Description:

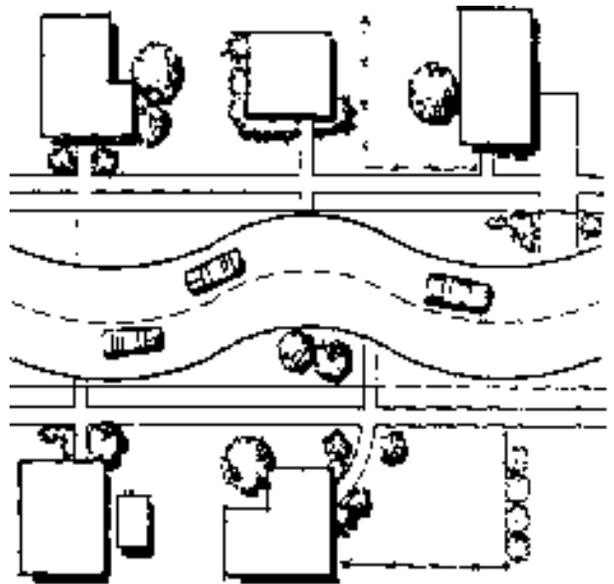
- A series of narrowings or curb extensions that alternate from one side of the street to the other forming S-shaped curves.

Applications:

- Residential, local streets.
- Not allowed on collector and arterial streets.
- Appropriate for midblock locations only.
- Most effective with equivalent volumes on both approaches.
- Typically, is a series of at least three curb extensions.
- Can use on-street parking to create chicane.
- Very effective method of changing the initial impression of the street. If designed correctly, drivers will not be able to see through. Appears as a road closure yet allows through movement.

Design/Installation Issues:

- Unless well designed, chicanes may still permit speeding by drivers cutting straight paths across the center line.
- Recommend shifts in alignment of at least one lane width, deflection angles of at least 45 degrees, and center islands to prevent drivers from taking a straight "racing line" through the feature.



Advantages:

- Provides opportunity for landscaping.
- Pedestrians have reduced crossing distance.
- Imposes minimal inconveniences to local traffic.
- Accepted by public as speed control device.
- May reduce speed and traffic volumes.
- Self-enforcing.
- Emergency response typically prefer two-lane chicanes to speed humps.

Disadvantages:

- Can impact parking and driveway access.
- Street sweeping may need to be done manually.
- May impact drainage.
- Typically, not appropriate for intersections.
- Not appropriate on some curves.
- May cause problems during winter.
- Increased maintenance.
- May create head-on conflicts on narrow streets.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Probable	Possible	Slight Increase	Slight Increase	Medium to High	Minimal Impact	Test Installation Possible	Not Used on Collector and Arterial streets

Realigned Intersection

Definition: Physical realignment of intersection typically used to promote better through movements for a major roadway (vs. a minor roadway). (Modified intersections.)

Description:

- Revised street geometrics of an existing intersection that typically improves and decreases the traffic delay for the main through movement (vs. the less important road).

Applications:

- Typically used to correct and provide a non-stop condition for the legs of an existing intersection with the larger traffic volume.
- Used to help define driver’s right-of-way.

Design/Installation Issues:

- Drainage may be an issue.
- May require mitigation signage due to substandard curvature of roadway.



Advantages:

- Provides a more fluent through movement for the major roadway.
- Improves driver expectation by providing a more typical intersection.
- May better define driver’s right-of-way.
- May reduce traffic volume.

Disadvantages:

- May impact parking and driveway access.
- May impact drainage.
- May be perceived as an inconvenience by some neighbors.
- May require additional right-of-way acquisition.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Varies	Varies	Small Decrease	Small Decrease	High	Varies	Permanent Installation Only	

Definition: Circular, raised island placed within the middle of intersections, requiring vehicles to divert around them, potentially forcing drivers to slow down as they traverse around the circle. (Intersection islands, similar to roundabouts.)

Description:

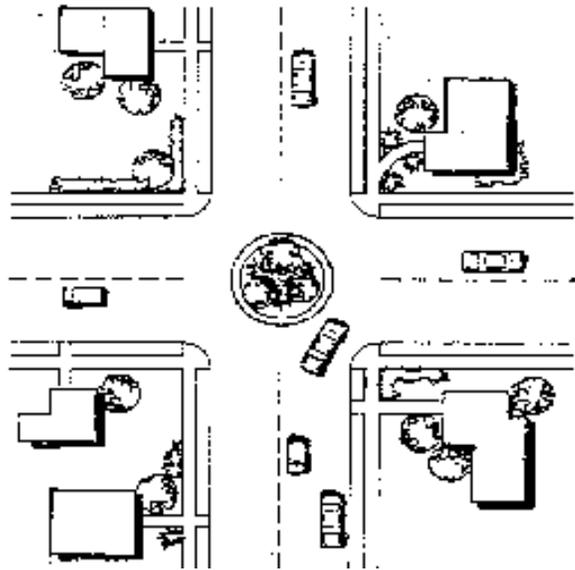
- Raised islands, placed in intersections, around which traffic circulates (this is not a roundabout).
- Motorists yield to motorists already in the intersection.
- Require drivers to slow to a speed that allows them to comfortably maneuver around them.

Applications:

- Intersections of local streets.
- Not allowed on collector and arterial streets.
- One lane each direction entering intersection.

Design/Installation Issues:

- Typically circular in shape, though not always.
- Often controlled by YIELD signs on all approaches, but many different signage approaches are used.
- Key design features are the offset distance (distance between projection of street curb and center island), lane width for circling the circle, the circle diameter, height of mountable outer ring for large vehicles such as school buses and trash trucks, and potential for pedestrian path-vehicle path conflicts.
- Usually landscaped in center islands. Quality of landscaping and its maintenance are key issues.
- Landscaping needs to be designed to allow adequate sight distance.
- Not typically used at intersections with high volume of large trucks and buses turning left.



Advantages:

- No effect on access.
- May reduce speed and traffic volumes.
- Effective in reducing intersection collisions.
- Self-enforcing.

Disadvantages:

- Can result in bicycle/auto conflicts at intersections because of narrowed travel lane.
- May require parking restrictions at intersection.
- Left turns may be confusing.
- Care must be taken to avoid routing vehicles through unmarked crosswalks on side-street approach.
- Increased maintenance.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Possible	Possible	Slight Increase	Small Increase	Medium	Possible Increased Response Time	Test Installation Possible	Not Used on Collector and Arterial streets

Definition: Raised circular areas (similar to medians) placed at intersections. Drivers travel in a counterclockwise direction around the circle. Modern roundabouts are “yield upon entry”, meaning that cars in the circle have the right of way and cars entering the circle must wait to do so until the path is clear. When a roundabout is placed in an intersection, vehicles may not travel in a straight line. (Rotaries.)

Description:

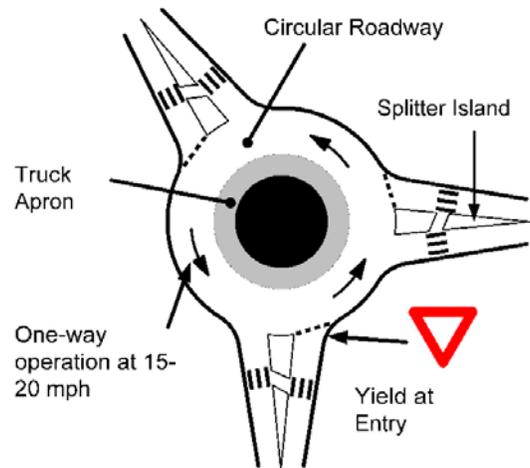
- Circular intersections with specific design and traffic control features including yield control of all entering traffic, channelized approaches, and appropriate geometric curvature to ensure travel speeds within the roundabout are less than 30 mph.

Applications:

- Intersections of local, collector and arterial streets.
- Used to improve the operation of an intersection.
- Sometimes used as community enhancement as a gateway treatment.
- Used in high crash areas where the crash type is inclined to be corrected by the use of a roundabout.

Design/Installation Issues:

- Adequate speed reduction.
- Design vehicle consideration.
- Pedestrian crossings located at least one vehicle length upstream from crossing and only across legs.
- Circulating vehicles have the right-of-way.
- All vehicles circulate in a counter-clockwise direction and pass to the right of the central island.
- Incorporate splitter islands to separate traffic, to deflect entering traffic, and to provide opportunity for pedestrians to cross in two stages.



Advantages:

- Reduces speed at intersection approach
- Longer speed reduction influence zone.
- May reduce traffic volumes.
- Effective in reducing intersection collisions.
- Self-enforcing.
- Provides space for landscaping.
- Provides a good environment for bicycles.
- Provides equal access to intersections for all drivers.
- Cheaper to maintain than a traffic signal.

Disadvantages:

- Requires a larger amount of right-of-way than a typical intersection.
- May require additional lighting and signing.
- Initial safety issues as drivers adjust.
- Increased maintenance responsibilities.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Probable	Possible	No Effect	Slight Increase	Medium to High	Possible Increased Response Time	Permanent Installation Only	Increased Maintenance

Definition: A barrier placed diagonally across a four-legged intersection, interrupting traffic flow across the intersection. This type of barrier may be used to create a maze-like effect in a neighborhood. (Diagonal diverter.)

Description:

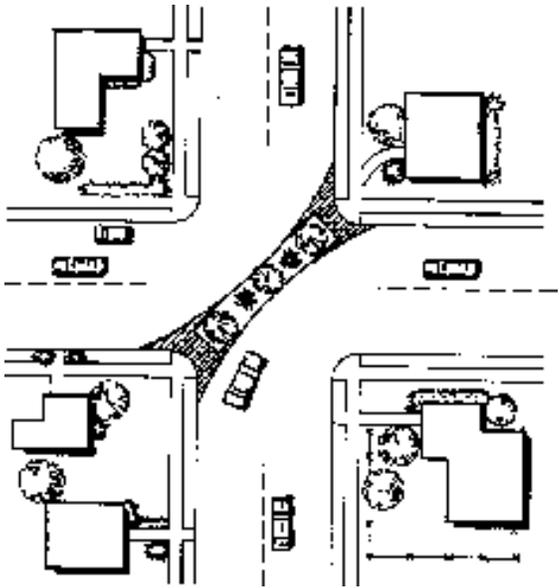
- Barriers placed diagonally across an intersection, blocking the through movement.

Applications:

- Used only on local roadways.
- Not allowed on collector and arterial streets.
- Closures are typically applied only after other measures have failed or have been determined to be inappropriate.
- Often used in sets to make travel through neighborhoods more circuitous - typically staggered internally in a neighborhood, which leaves through movement possible but less attractive than alternative (external) routes.
- Closures have been used as a crime prevention tool.

Design/Installation Issues:

- Provisions are available to make diverters passable for pedestrians and bicyclists.
- There may be legal issues associated with closing a public street.
- Barriers may consist of landscaped islands, walls, gates, side-by-side bollards, or any other obstruction that leave an opening smaller than the width of a passenger car.
- Diverter width and curvature is dependent upon the intersection roadway widths.



Advantages:

- Typically reduces traffic volumes.
- Reduces speeds at the closure area.
- Bicycles /pedestrians may not be restricted.

Disadvantages:

- May divert significant traffic volumes to parallel local streets.
- No significant effect on vehicle speeds beyond the closed block.
- Increased emergency response in most cases.
- Interrupts street network connectivity.
- May impact drainage.
- May impact parking.
- Tends to increase travel distance.
- May increase maintenance.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Probable	Probable	Small Increase	Small Increase	Low to Medium	Varies	Test Installation Possible	Not Used on Collector and Arterial streets

Definition: Physical blockage of one direction of traffic on a two-way street. The open lane of traffic is signed “One way”, and traffic from the blocked lane is not allowed to go around the barrier through the open lane. (Half closure.)

Description:

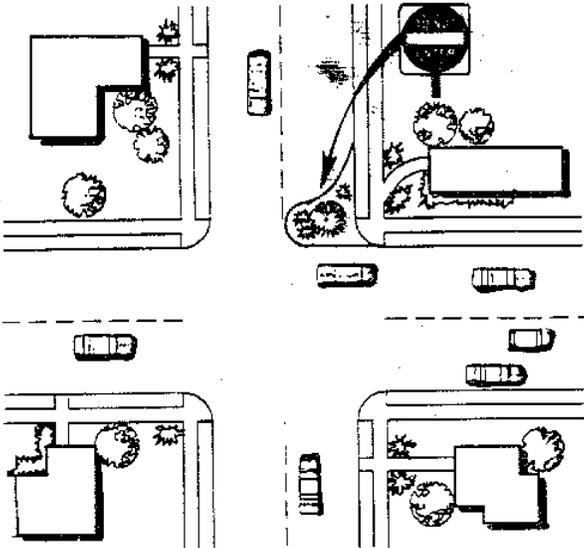
- Barriers that block travel in one direction for a short distance on otherwise two-way streets (when two half-closures are placed across from one another at an intersection, the result is a semi-diverter).

Applications:

- Not allowed on collector and arterial streets.
- Closures are typically applied only after other measures have failed or been determined to be inappropriate.
- Often used in sets to make travel through neighborhoods more circuitous - typically staggered internally in a neighborhood, which leaves through movement possible but less attractive than alternative (external) routes.
- Closures have been used as a crime prevention tool.
- Intended to reduce the through traffic in one direction without the negative access issues of one-way streets.

Design/Installation Issues:

- Partial closure must extend to centerline of the affected street.
- A minimum opening of 14 feet must be maintained.
- Provisions are available to make diverters passable for pedestrians and bicyclists.
- Barriers may consist of landscaped islands.



Advantages:

- Typically reduces traffic volumes (mostly in one direction and possibly in the other).
- Reduces speeds at the closure area.
- Allows two-way traffic in the remainder of the street.
- Shorter pedestrian crossing distance.

Disadvantages:

- May divert significant traffic volumes to parallel local streets.
- No significant effect on vehicle speeds beyond the closed block.
- Interrupts street network connectivity.
- Enforcement issues (compliance may not be 100%)
- Increased maintenance if landscaped.
- Emergency vehicles may be minimally affected (they have to drive around partial closure with care).
- Reduces access to residents.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Possible	Probable	Small Increase	Small Increase	Medium	Minimal Impact	Test Installation Possible	Not Used on Collector and Arterial streets

Definition: Physical street closure resulting in a dead end (no outlet) constructed with a circular turn-around area.

Description:

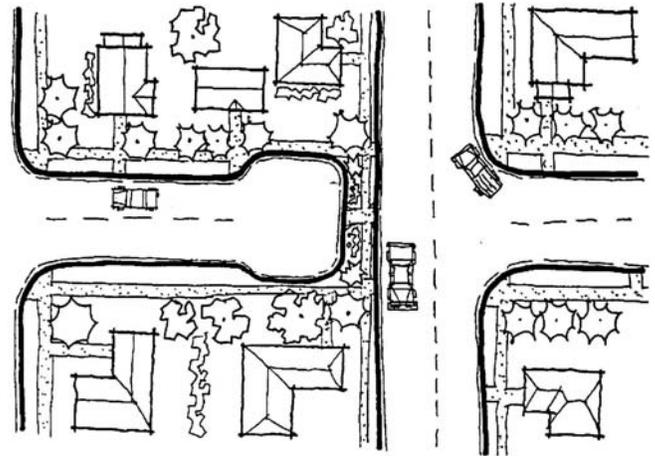
- A street with no outlet that eliminates cut-through traffic.

Applications:

- Used only on local streets.
- Not allowed on collector and arterial streets.
- Cannot be used on truck routes, bus routes, snow emergency routes, through streets, or any other major roadway.

Design/Installation Issues:

- Must be a minimum of 120 feet of right-of-way (diameter) to accommodate the minimum turn-around radius of 40 feet.
- Obtain approval of police, fire and emergency medical services.



Advantages:

- Eliminates through traffic.
- Reduces speed of the remaining vehicles.
- Improves safety for all the street users.
- Pedestrian and bike access maintained.

Disadvantages:

- Reduces emergency vehicle access.
- Reduces access to properties for residents.
- May be perceived as an inconvenience by some neighbors and an unwarranted restriction by the general public.
- May increase trip lengths.
- May increase volumes on other streets.
- May require additional right-of-way acquisition.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Probable	Yes	Small Increase	Small Increase	High	Possible Increased Response Time	Test Installation Possible	Not Used on Collector and Arterial streets

Definition: Raised island or barrier in the center of the street that serves to segregate traffic.

Description:

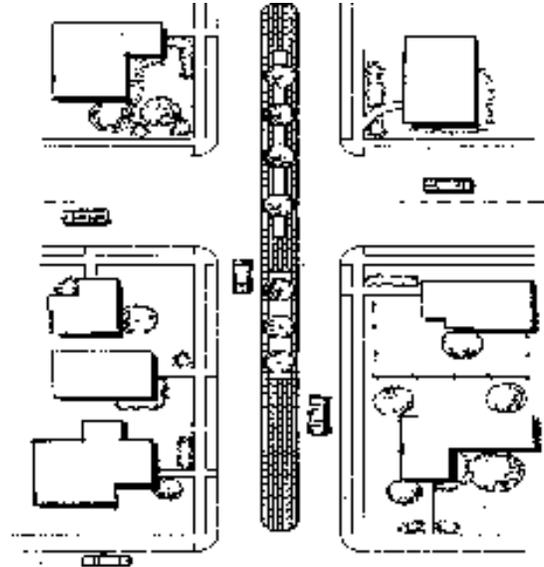
- Raised islands in the centerline of a street that continues through an intersection that blocks the left turn movement from all intersection approaches and the through movement at the cross street.

Applications:

- Median closures are typically applied only after other measures have failed or been determined to be inappropriate.
- Intended to reduce the through traffic in one direction without the negative access issues of one-way streets.

Design/Installation Issues:

- A minimum opening of 14 feet must be maintained.
- Provisions are available to make diverters passable for pedestrians and bicyclists.
- Barriers may consist of landscaped islands.



Advantages:

- Typically reduces traffic volumes (mostly in one direction and possibly in the other).
- Reduces speeds at the median area.
- Allows two-way traffic in the remainder of the street.
- Shorter pedestrian crossing distance.

Disadvantages:

- May divert significant traffic volumes to parallel local streets.
- No significant effect on vehicle speeds beyond the closed block.
- Interrupts street network connectivity.
- Enforcement issues (compliance may not be 100%)
- Increased maintenance if landscaped.
- Emergency vehicles may be minimally affected.
- Reduces access to residents.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Small Possibility	Possible	No Effect	No Effect	Varies	Possible Increased Response Time	Test Installation Possible	

Definition: Small traffic islands installed at intersections to channel turning movements. (Forced turn barriers, diverters.)

Description:

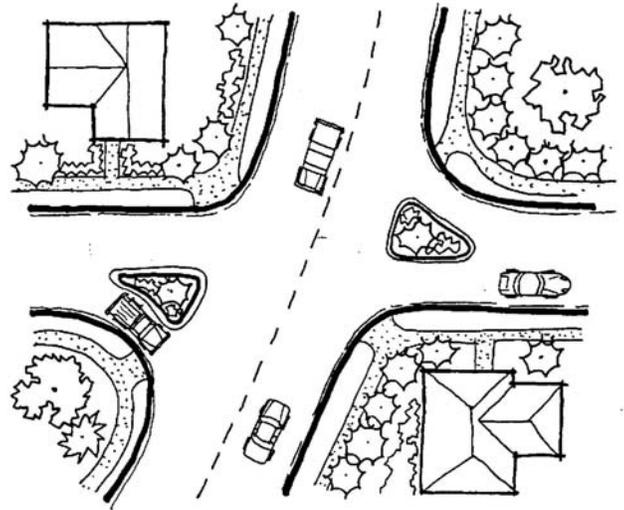
- Raised island barriers placed at intersections, typically blocking the through movement.

Applications:

- Used only on local roadways.
- Not allowed on collector and arterial streets.
- Physical barrier used to divert traffic to help prevent the temptation of drivers from making an illegal turning or through movement.
- Intended to reduce traffic volume or to prevent a turning movement due to safety constraints.
- Used for access management.

Design/Installation Issues:

- Island width and curvature is dependent upon the intersection roadway widths.
- Must design corner radii to accommodate vehicle turning movements (e.g. Trucks and buses).



Advantages:

- Typically reduces traffic volumes.
- May reduce speeds at island area.

Disadvantages:

- May divert significant traffic volumes to parallel streets.
- Emergency vehicles may be minimally affected (they have to drive around island with care).
- May interrupt street network connectivity.
- May increase travel distance.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Possible	Possible	Small Increase	Small Increase	Low to Medium	Possible Increased Response Time	Test Installation Possible	Not Used on Collector and Arterial streets

Targeted Police Enforcement

Definition: Specific monitoring of speeding and other violations by police due to observed, frequent law disobedience.

Description:

- Use of local police to enforce traffic laws appropriate to traffic problems identified in a neighborhood.

Applications:

- Should only be used when specific problems are outlined or documented.
- Can be used in conjunction with speed wagon applications.

Design/Installation Issues:

- No design needed in a physical sense.
- Due to staff time constraints, every effort should be made to clearly identify the problem (e.g. speeding, driving in the parking lane, running stop signs, etc.)
- The problem should be narrowed down to the occurrence day, time, specific location, or vehicle type.
- Follow-ups indicating the impact of enforcement are needed to determine the effectiveness.



Advantages:

- Good temporary public relations tool.
- Serves to inform public that traffic law violations are undesirable behavior for which there are consequences.
- Easy to implement.
- Can result in area-wide positive impacts.

Disadvantages:

- Effect is not permanent.
- Enforcement is an expensive tool.

Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Depends on Amount	Possible	No Effect	No Effect	High	No Effect	Temporary	

Definition: Driver feedback signs that use radar to provide motorists with an instant message, displayed on a reader board, telling them how fast they are driving. (Permanent Radar Signs.)

Description:

- Tool to help raise driver awareness.
- Displays speeds of passing vehicles on a reader board
- Used in areas with frequent speeding
- Stationary Radar Signs direct a motorist's attention to the posted speed limit and displays the speed of the driver's vehicle on a large message board.
- Purpose is to remind drivers that they are speeding to help encourage compliance.

Applications:

- The Police Department may use it as a "speed checkpoint" and have an officer present to issue citations to violators.
- Portable Radar Sign on a dolly enables residents to borrow and place on their street
- Stationary Radar Signs are used in locations that do not qualify for other physical measures, such as speed humps.

Design/Installation Issues:

- Needs power to function.



Radar Speed Trailer

Advantages:

- Heightens driver awareness of the speed limit and the speed they are traveling.

Disadvantages:

- May provide only short-term effectiveness.
- Vandalism may be an issue.



Stationary Radar Signs



Radar Dolly

Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Probable	No Effect	No Effect	No Effect	Low	No Effect	Temporary or Permanent	

Neighborhood Traffic Safety Campaigns

Definition: Educational campaign used to appeal for compliance with traffic laws.

Description:

- Neighborhood traffic safety campaigns that typically consist of personalized letters or general flyers that are distributed to all residents of a neighborhood that cite statistics on speeding within the neighborhood and appeal for compliance with traffic laws.

Applications:

- Used in local residential neighborhoods.

Design/Installation Issues:

- Target all residents of an entire neighborhood (not certain individuals).



Advantages:

- Low cost.
- May reduce speeds.
- Residents may feel better after the experience despite lack of noticeable results.

Disadvantages:

- Effects may be short term.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Possible	No Effect	No Effect	No Effect	Low	No Effect	Temporary or Permanent	

Definition: A regulatory sign that gives notice to road users that traffic is required to stop. Used to assign right-of-way at an intersection. Recommended for installation only when specific warrants are met in accordance with the Minnesota Manual on Uniform Traffic Control Devices (MMUTCD). Stop signs are generally not installed to divert traffic or reduce speeding.

Description:

- An octagonal sign with a white legend and border on red background used to require traffic to stop.

Applications:

- Used at an intersection of a less important road with main road where application of the normal right-of-way rule would not be expected to provide a reasonably safe operation.
- Used at a street entering a through highway or street.
- Used at an unsignalized intersection in a signalized area.
- Used when abnormal conditions exist such as very high speeds, restricted view or crash records indicate a need for stop control.

Design/Installation Issues:

- Stop signs should not be used for speed control.
- Stop signs should be installed in manner that minimizes the numbers of vehicles having to stop.
- In most cases, the street carrying the lowest volume should be stopped. A stop sign should not be installed on the major street unless justified by a traffic engineering study.



Advantages:

- Relatively inexpensive installation cost.
- Effectively defines driver's right-of-way.
- Reduces speed at the intersection.

Disadvantages:

- When not warranted and used improperly, they typically cause negative traffic safety impacts (non-compliance with the signs and increased accidents).
- May result in increased mid-block speeding.
- Full compliance with stop control is rare.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Varies (may increase)	Varies	Small Increase	Small Increase	Low	Possible Increased Response Time	Temporary or Permanent	Must meet MMUTCD warrants

Definition: The use of regulatory signs to restrict turning movements entirely or partially (e.g. restrictions for certain time periods during peak traffic periods).

Description:

- Prohibition of turns typically regulated by signs placed where they will most be easily seen by road users who might be intending to turn.

Applications:

- Used to restrict right, left and U- turns at intersections to work in conjunction with medians, signal systems, etc.
- Used during certain time periods (peak traffic hours) to help maintain safety of certain driving situations.

Design/Installation Issues:

- Most effective when applied to peak traffic hours.
- Consideration should be given to install physical barriers (active devices) to aid in the enforcement of the regulatory sign (passive device).



Advantages:

- Low installation cost.
- May increase safety.

Disadvantages:

- High violation rates without constant enforcement or physical barriers.
- May inconvenience residents.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Varies	Yes	Small Increase	No Effect	Low	No Effect	Temporary or Permanent	

Definition: Streets that are designated for use by traffic in one direction only. Typically controlled by the use of “One-Way” regulatory signs.

Description:

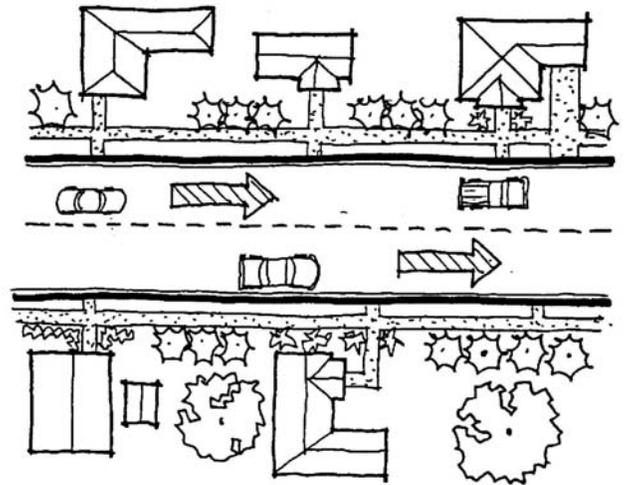
- One-way signs used to indicate streets upon which vehicular traffic is allowed to travel in one direction only.

Applications:

- Used to restrict through traffic in isolated applications or in combinations that create maze-like routes through a neighborhood.
- Used to increase street capacity and traffic flow.

Design/Installation Issues:

- Combine one-way streets in ways that force turns every block or two to avoid speeding or cut-through problems.



Advantages:

- May increase roadway capacity.
- May reduce traffic volumes.

Disadvantages:

- May inconvenience residents.
- May increase speeds.
- Enforcement issues.
- May increase volumes on other streets.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
No	Possible	Small Decrease	Small Decrease	Low	Varies	Temporary or Permanent	

Traffic Signal (“Rest on Red” and “Rest on Green”)

Definition: Semi-actuated traffic signals that are programmed to rest on green or red for the different legs of the intersection. Typically, signals are dependent upon traffic demand and maximized based upon total intersection delay with the rest on red given to the leg with the lower approach volume.

Description:

- “Rest on Red” is an application of a signal system where all approaches to an intersection face red lights. If advance loops detect an approaching vehicle moving at or below the desired speed and no other vehicle is being served at the cross street, the signal turns green. If speeding is detected, the green phase is not triggered until the vehicle comes to rest at the stop line.
- “Rest on Green” is an application of a signal system where approaches along a main street will have a green light. If the traffic on the main street is moving at or below the desired speed and no one is waiting on the side street, the light will remain green on the main street. The signal will switch to red if speeding is detected.

Applications:

- An application of a signal system used to control speed.

Design/Installation Issues:

- Should not be used on roadways with high levels of traffic due to operational concerns.
- May be used at non-peak times at some intersections.



Advantages:

- Punishes or rewards based on compliance with speed limits.
- Somewhat self-enforcing.

Disadvantages:

- May affect intersection operation if used at intersections with high levels of traffic.

Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Possible	Varies	Varies	Varies	High	No Effect	Temporary or Permanent	Other Agency Approval

Definition: Paint or thermoplastic street markings commonly placed for delineation that provides guidance and information to the road user.

Description:

- Centerline, edgeline and transverse markings on the street used to provide guidance and information to the driver.

Applications:

- Used to supplement other traffic control devices.
- Used to effectively convey regulations, guidance or warning.
- Centerlines and edgeline use may have the effect of visually narrowing the roadway.
- Used to create bicycle lanes.
- Patterns of transverse markings placed across travel paths used to help slow traffic at intersections and at horizontal curve locations.

Design/Installation Issues:

- The materials used for markings should provide the specified color throughout their useful life.
- Consideration should be given to selecting materials that will minimize tripping or loss of traction for pedestrians and bicyclists.



Advantages:

- Provide important information while allowing minimal diversion of driver attention from the roadway.
- Perception of narrowing the roadway may modestly reduce speeds.

Disadvantages:

- Visibility of markings can be limited by snow, debris and water.
- Marking durability is limited.



Evaluation Considerations

Speed Reduction	Traffic Reduction	Fuel Consumption	Air/Noise Pollution	Cost	Emergency Services	Test vs. Permanent	Other
Possible	No Effect	No Effect	No Effect	Low	No Effect	Permanent Installation Only	