Chapter 2

Pedestrian and Accessibility Design

The General Plan was comprehensively updated by unanimous vote of the City Council in 2008. The Plan states that land use and street design recommendations that benefit pedestrians also help promote use of alternatives to automobile travel and contribute to the overall quality, vitality, and sense of community of our neighborhoods. Policies designed to support walking and pedestrians are also intended to benefit overall accessibility.

The policies in the latest General Plan address safety, accessibility, connectivity, and walkability goals. These policies encourage collaboration with appropriate community groups and other interested private and public sector groups or individuals to design and implement safe pedestrian routes to schools, transit, and other highly frequented destinations. They also require City streets to have adequate sidewalk widths and clear paths of travel, and bike facilities.

There have been numerous studies that demonstrate a strong link between public health and the built environment, with the healthiest communities exhibiting many of the same types of features that are central to the City of Villages strategy.

The City of Villages strategy calls for a convenient, efficient, and attractive multimodal transportation system in which pedestrians, bicycles, and transit vehicles are accommodated in addition to automobiles. This system should improve mobility for San Diegans by providing competitive—even preferred—alternatives to the automobile for many trips in the region. The strategy, as a policy, recommends: *Promote pedestrian, cycling, and transit-friendly design of City streets.*

In addition to the General Plan, there is also the Pedestrian Master Plan that includes a comprehensive analysis of community's existing pedestrian conditions and needs. The Plan identifies pedestrian routes to activity centers and infrastructure improvement projects along these routes. The plan is a key resource when considering pedestrian projects that promote pedestrian safety, walkability, mobility, and neighborhood quality.

Who Are Pedestrians?

Pedestrian is used throughout these guidelines to include people who walk, sit, stand in public spaces, or use a wheelchair—be they children, teens, adults, elderly, people with disabilities, workers, residents, shoppers, or people-watchers. **Pedestrian-oriented design is accessible design for all people**.

The principal issue in the design of a pedestrian-supportive street is how to allocate its space (e.g., How much space is required to satisfy the needs of pedestrians? How much space is required to create active public space for deliveries? How much space is required to provide for parking, bicycles, and vehicular movement?).

The sections that follow discuss the pedestrian experience at street level, including:

- Creating a Pedestrian Realm;
- Street Design;
- Intersection Design and Operations;
- Pedestrian Crossings (including residential street crossings and mid-block crosswalks);
- Island Passageways;
- Sight Distance; and
- Sidewalks for Overpasses, Underpasses, and Highway On/Off Ramps).

2.1. Understanding ADA and Designing for Various Disabilities and Ages

The following discussion focuses on the accessibility needs and requirements as defined by both federal and state (California Title 24) accessibility standards.

Millions of persons in the United States have some sort of permanent or temporary disability caused by injury, age, or illness. The Americans with Disabilities Act (ADA) was signed into law on July 26, 1990. This civil rights law assures that a person with disabilities will have full access to all public facilities—primarily to public transit, public buildings and facilities, and along public rights-of-way.

It is essential, however, that the design of pedestrian facilities take into account the abilities and disabilities of **all** pedestrians. Mobility impairment is but one classification of disability; others are sensory deficits (the sight and hearing impaired) and cognitive impairments (those with diminished ability to process information, including language barriers).

Since 1971, the State of California has mandated within its Health and Safety Codes Section 19956.5 that sidewalks and walks shall be made accessible to and usable by persons with disabilities. The *CA Unruh Civil Rights Act* (Civil Code Section 51) says, "A violation of the right of any individual under the ADA shall constitute a violation of this act."

2.1.1 Grades

The following considerations are to be made for grades:

1. There should be enough sidewalk cross slope for adequate drainage. The maximum cross slope shall be 1.5 percent, per the City of San Diego Standard Drawings.
2. Along walkways, pedestrian ways, and shared pedestrian/bikeway facilities, long, steep grades should have level areas every 400 feet for the pedestrian to stop and rest. In areas where it is impossible to avoid steep grades, an alternative route should be provided.

2.1.2 Sidewalks

The following considerations are to be made for sidewalks:

1. Minimum unobstructed sidewalk width shall be 5 feet (including 6-inch top of curb). Exceptions may be made by the City Engineer to reduce sidewalk to a minimum of 3.5 feet because of right-of-way (ROW) restrictions, natural barriers, or other existing conditions. The minimum width should be expanded when there is either a vertical barrier fronting the sidewalk or a vehicle travel lane.
2. Sidewalks with continuous gradients shall have resting areas 5 feet in length at intervals of 400 feet maximum. The resting area shall be at least as wide as the walk. The slope of the resting area in all directions not to exceed 1.5 percent.
3. If the clear width of the sidewalk is less than 4 feet, level passing spaces shall be provided at intervals of 200 feet maximum. Passing spaces shall be either:
    a. A space 60 inches minimum x 60 inches minimum, or
    b. An intersection of two walking surfaces providing a T-shaped* space, where the base and arms of the T-shaped space extend 48 inches minimum beyond the intersection. See Figure 2–1 for illustration of T-shaped space.

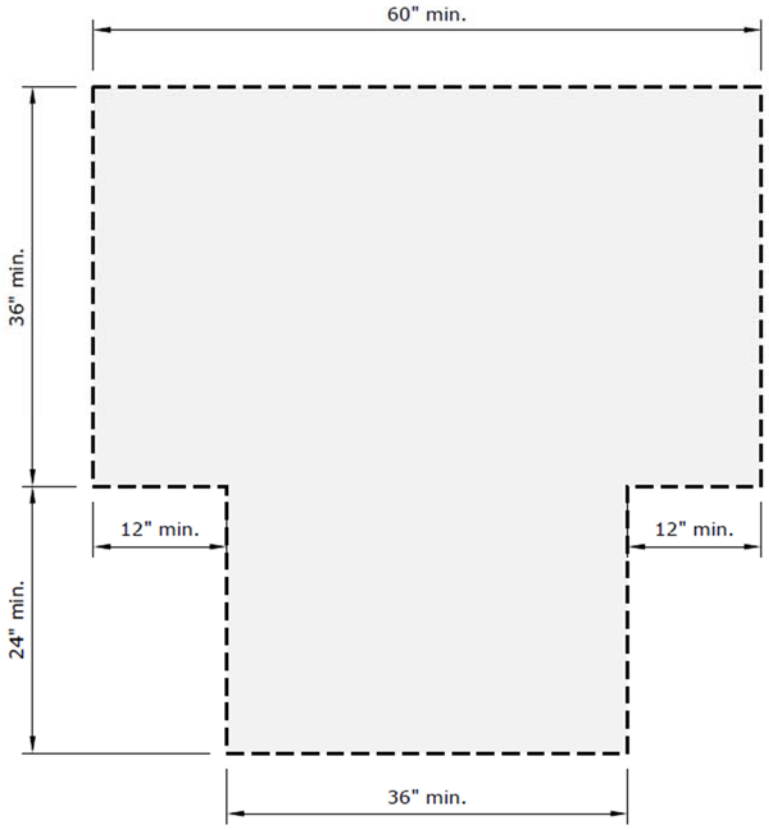

FIGURE 2-1. T-SHAPED TURNING SPACE

c. The turning space shall be a T-shaped space within a 60 inch square minimum with arms and base 36 inches wide minimum. Each arm of the T shall be clear of obstructions 12 inches minimum in each direction and the base shall be clear of obstructions 24 inches minimum. The space shall be permitted to include knee and toe clearance complying with accessibility regulations only at the end of either the base or one arm.

4. Warning Curbs: A 6-inch high warning or concrete curb shall be provided along the sidewalk monolithic curb edge where there is an abrupt change in elevation exceeding 4 inches in a vertical dimension along adjacent surfaces. A warning curb is not required between a sidewalk and an adjacent street or driveway or when a guardrail or handrail is provided with a guiderail centered 2 inches minimum and 4 inches maximum above the surface of the sidewalk.

2.1.3 Curb Ramps at Intersections

The following considerations are to be made for curb ramps at intersections:

1. At new intersections, curb ramp shall be in line with the direction of crosswalks, with two curb ramps per corner to be considered to the maximum extent feasible unless existing constraints, conditions, or other extraneous circumstances deemed appropriate by the City Engineer prevent two-curb ramp design. If a single curb ramp is allowed, it must be placed in the center to allow pedestrian access to either direction of the sidewalks.If crossing is allowed for only one direction, a single direction curb ramp can be installed.
2. Curb ramps shall be installed in accordance with the City of San Diego Standard Drawings.
3. Curb ramps or full cut-throughs 60 inches in width minimum with truncated domes should be provided at the channelization and island passageways. Refer to the City of San Diego Standard Drawings for additional information.
4. Storm drainage inlets should be placed on the uphill side of the curb ramps to prevent standing water at corner.
5. Directional Curb Ramp: Where a Type B and Type D curb ramp cannot be used at corners with bigger radius and the pedestrian travel way is directional, a modified directional curb ramp shall be used at these areas. See Figure 2–2 and incorporate the following requirements on improvement plans:
   a. Prior to design, analyze the drainage pattern at the corner to ensure ponding will not occur at the bottom landing.
   b. Provide an enlarged detail on the plans.
   c. Indicate the slopes along the top and bottom landings.
6. Curb ramps shall be installed at all legal crosswalks (marked or unmarked) at all intersections unless technically infeasible.

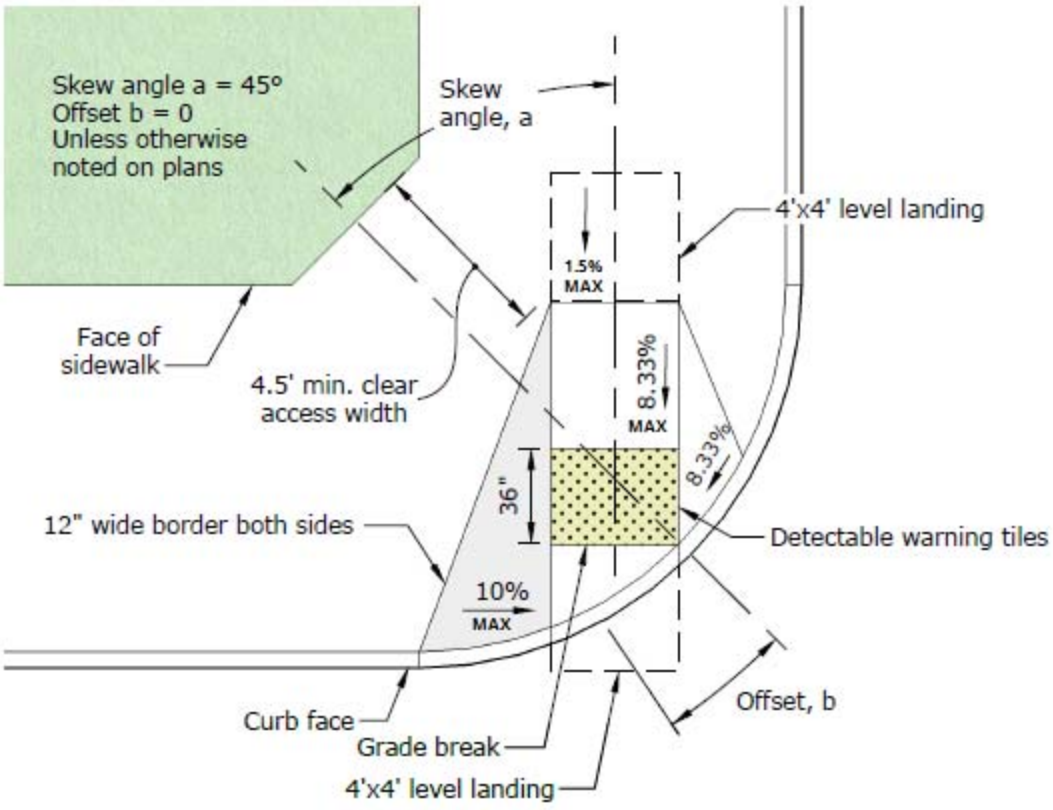

FIGURE 2-2. DIRECTIONAL CURB RAMP

2.1.4 Surfaces

The following considerations are to be made for surfaces:

1. All surfaces should be stable, firm, and slip resistant with a minimum static coefficient of friction of 0.5.
2. Surface treatments that include irregular surfaces (e.g., cobblestone) can be difficult to navigate and should be avoided within the primary walkway area. Low profile textured surfaces are acceptable.
3. Surfaces along accessible routes shall be free of gratings whenever possible. For gratings located in the surface of any of these areas, grid openings in gratings shall be limited to 0.5 inches in the direction of pedestrian traffic flow.

2.2. Creating a Pedestrian Realm

Safe and direct sidewalk connections are of key importance to creating a pedestrian-friendly environment. Sidewalks should support activities that will occur in the area and provide a comfortable place for pedestrians to take part in various activities. However, creating a high-quality pedestrian realm that supports and encourages walking takes much more than simply providing sidewalks.

The design of the sidewalk and the elements within it and the location and design of buildings are just some of the additional considerations of creating a pedestrian-supportive environment. Furthermore, walking provides more opportunities to observe details than any other form of transport. Landscape and architectural details are therefore necessary to sustain interest for pedestrians as well as to provide a safe, comfortable experience.

2.2.1 Sidewalk Design

Sidewalks are not merely thoroughfares for pedestrians. They are also important social spaces where people interact and walk together, catch a bus, window shop, or have a cup of coffee at a café. Sidewalks must be wide enough to accommodate movement in addition to amenities (such as seating) that facilitate social interaction. This makes sidewalks more comfortable and appealing, which can encourage uses that increase security.

2.2.2 Issues to Consider

The following are general issues to consider when creating a pedestrian realm:

- When additional ROW is available, widening sidewalks, public gathering places and on-street parking, both of which significantly improve the pedestrian experience should be considered.
- Increased buffering between vehicular traffic and abutting properties created by wider sidewalks or local access lanes makes the street more attractive for buildings to front directly onto the street.
- Appropriate sidewalk widths should be provided given the use and amount of activity that is expected.
- Materials should be selected with consideration for maintenance and long-term appearance.
- Obstructions and conflict points should be minimized.

2.2.3 New Development versus Retrofit

The following considerations should be made for new or retrofitted sidewalks:

- Dimensions of an existing sidewalk can be increased either through the acquisition of additional ROW, zoning a setback requirement for new development to create additional pedestrian space, or through a reduction in curb-to-curb roadway width where applicable. Another alternative to reducing roadway width in these cases could be to revise the parking from parallel to diagonal, which slows speeds and creates opportunities for an improved pedestrian environment.
- New streets must balance the needs of all users in determining ROW width.

2.2.4 Relation to Transit

The following should be considered in relation to transit:

- The “footprint” of and access to transit facilities such as bus shelters must be considered in the design of sidewalks.

- Sidewalks must connect transit facilities with the adjacent uses within walking distance of the station or bus stop.
- Review MTS publication, "Designing for Transit" as well as these guidelines in relation to pedestrian access to transit facilities.

2.2.5 Establishing "Zones"

The Sidewalk Corridor is typically located within the street ROW between the curb and building face and/or property line. The sidewalk corridor is composed of four distinct zones (see Figure 2–3 for illustration):

- the Edge Zone
- the Furnishings Zone
- the Throughway Zone
- the Frontage Zone

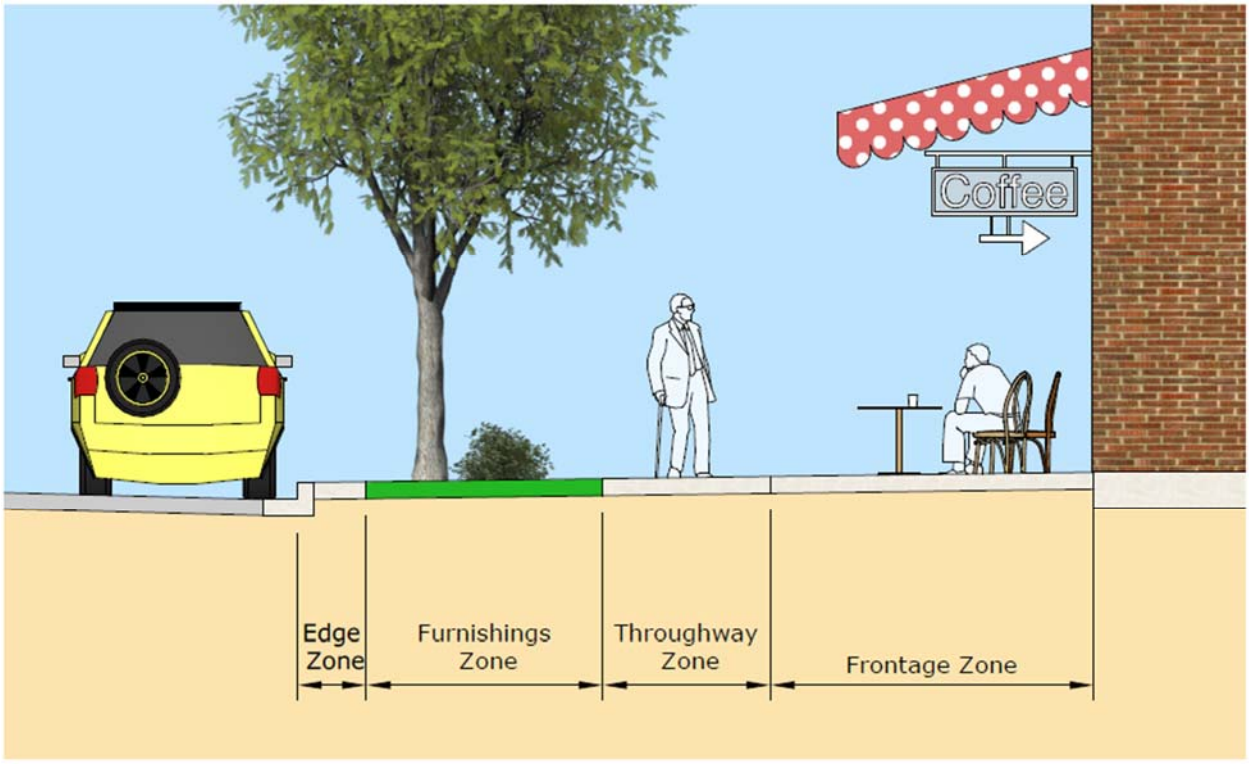

FIGURE 2-3. PEDESTRIAN SIDEWALK ZONES

2.2.5.1 Edge Zone

The Edge Zone (sometimes referred to as the "Curb Zone") is the interface between the roadway and the sidewalk. At a minimum, this zone includes the 6-inch wide curb. In more active, mixed-use areas with on-street parking, this zone should be a minimum of 1 foot 6 inches to accommodate the door swing of a parked car to prevent conflict with elements within the Furnishing Zone.

At transit stops with shelters, this zone should be widened to 5 feet to provide wheelchair access to the shelter. (In constrained conditions, transit shelters are available with partially open sides, allowing the Edge Zone to be reduced to 2 feet, 6 inches.) Providing a pop-out for the entire length of the transit stop is also an effective way to increase Edge Zone width.

2.2.5.2 Furnishings Zone

The Furnishings Zone also accommodates street trees and landscaping. It is the zone that provides the buffer between the active pedestrian walking area, the Throughway Zone, and street traffic. Street trees, street furniture, utility poles, parking meters, fire hydrants, bicycle racks, and the like are consolidated in this zone to keep them from being obstacles in the Throughway Zone.

Planting in this zone must comply with the standards and guidelines in this manual and the Landscape Technical Manual, particularly in the case of street tree well dimensions. The placement of the aforementioned elements must comply with the Land Development Code, San Diego Municipal Code, and applicable Council policies. Generally, any landscaping installed within the right-of-way is to be maintained by a Maintenance Assessment District or the adjacent property owner.

Installing pedestrian pop-outs is an effective way to increase sidewalk space for street furniture and other features. The dimension of the Furnishings Zone must consider the speed of traffic and whether street parking is provided (an effective buffer).

2.2.5.3 Throughway Zone

The Throughway Zone is intended for pedestrian travel only and should be entirely clear of obstacles, including driveway aprons. This zone should be at least 5 feet wide. For high pedestrian volume areas, additional width should be provided. “Overhanging” elements such as awnings, store signage, bay windows, etc. may occupy this zone as long as there is a clear distance under them of at least 8 feet.

2.2.5.4 Frontage Zone

The Frontage Zone is the area adjacent to the property line that may be defined by a building façade, landscaping, or a fence. Generally, pedestrians do not feel comfortable moving at a full pace directly along a wall; because of this, the minimum frontage zone should be 1 foot 6 inches in these situations. This is also the zone where pedestrians slow down and window-shop and enter and exit buildings. Adjacent businesses may use this zone for outdoor displays and seating, and municipalities must ensure there is adequate space to accommodate these uses without impeding the Throughway Zone.

Architectural elements that encroach into the street (e.g., awnings, stairs, front stoops, artistic elements, planters, marquees, etc.) may also occupy this zone. These elements add vitality and visual interest to the street but nevertheless must comply with local, state, and federal regulations.

Where no Furnishing Zone exists, elements that would normally be sited there (e.g., benches, light poles, signals, trash cans, etc.) may occupy the Frontage Zone in order to keep the Throughway Zone clear and maintain at least minimum ADA requirements.

Where the sidewalk passes a parking lot, there should be some type of buffer (e.g., a hedge or low wall) in order to maintain a more aesthetic frontage along the sidewalk and prevent parked vehicles from overhanging onto the Frontage Zone

2.3. Street Design

At a site and detail design level, the design of streets must consider the mobility and safety of the pedestrian. Maximizing traffic capacity and speeds are not the dominant consideration in street design, particularly in pedestrian-oriented areas.

2.3.1 Issues to Consider

The following are general issues that should be considered in street design:

- A prevailing condition in much of the San Diego region is the location of buildings set back from the street, which can result in a built environment that encourages traffic to travel at higher speeds.
- While it can be important to buffer residential neighborhoods from adjacent busy and noisy streets, the need to buffer should be balanced with the need for pedestrians to easily get from the neighborhood to transit or uses along busy streets.
- Wide lanes encourage higher speeds on streets that can then divide a community.
- Frequent curb cuts along a street both impede traffic flow and create more conflict points between autos and pedestrians, thus reducing the effectiveness of sidewalks as a pedestrian realm.
- Throughout the San Diego region, there are canyons and mesas that make pedestrian connections difficult to achieve.
- The warm, mild climate of San Diego throughout most of the year creates opportunities to make pedestrian travel a realistic option for many people.
- For new road design, all rules, regulations, standards, and City policies apply. When a new roadway creates a new intersection with an existing road, the intersection and the curb ramps must be designed and built to all accessibility design standards to allow for smooth transitions to adjoining sidewalks as well as ensuring proper drainage is provided.

2.3.2 ADA Accessibility

Pedestrian facilities must comply with ADA standards and California Title 24 accessibility regulations and take into account the entire range of disability categories. These regulations create a better pedestrian environment, particularly for seniors and persons with disabilities.

2.3.3 New Development versus Retrofit

These guidelines and standards describe the minimum desirable improvements in most cases within new developments; in many cases, discussions of tradeoffs between different needs are discussed to help the reader identify the compromises that may be necessary in the retrofitting of existing streets and developments.

- Improvements to accessibility should be considered on both sides of the street.
- Neighborhoods evolve over time and the public ROW configuration has an influence as to what type of development occurs.

- Prior to improvements to an existing street, utilities (e.g., lighting, electrical, and storm drains) should be identified and either incorporated into the design or relocated to provide access as required by the ADA and California Title 24 regulations.

2.3.4 Relation to Transit

The following considerations are to be made in relation to transit:

- All streets that are directly served by transit should also be designed or retrofitted to serve pedestrians because there must be adequate facilities to access transit.
- Streets, sites, and buildings within an area that is walkable to transit stops should be designed or retrofitted to serve pedestrians.
- Transit stops must be served with curb ramps at both sides of the bus stops at the adjacent intersections as required by the ADA and California Title 24 regulations.

2.3.5 Guidelines

The following guidelines should be followed for street design:

1. Parallel routes serving all forms of traffic should be considered when resulting curb-to-curb width may not accommodate all other forms of traffic (e.g., a dedicated bicycle or transit lane, a parking lane, or a travel lane).
2. The number of pedestrian crossings should be maximized in order to prevent a street from becoming a barrier in the community.
3. More frequent intersections along arterial roads (even if they only provide right-in and right-out access for cars, couple with an overall interconnected system of roads within the grid of arterial streets should be built in new development. This will allow better transit coverage and pedestrian access as well as improved overall circulation and community aesthetics.
4. Access Control Plans should be developed for new and existing streets that consolidate access points to adjacent properties, either through local access lanes, shared easements, or establishment of access via less-busy cross streets.
5. For retrofitting or improving existing ROWs, sidewalks should be constructed. Where the existing ROW is too narrow to accommodate sidewalk construction, additional ROW or public walkway easement should be acquired or the existing roadway narrowed but maintained in accordance with established minimum roadway standards.

2.4. Intersection Design and Operations

The word *intersection* means more than just the meeting of two or more streets. It can also mean the intersection of two different modes of travel. It is where multi modes of transportation (bike, pedestrian, auto, transit) converge, sometimes in conflict. It is because of this that intersections are often the most vital areas along a street. They are the point of most conflicts between vehicles, pedestrians, and bicycles.

Intersections must be designed with pedestrian safety and accessibility in mind. If pedestrians are either prohibited from crossing or discouraged from crossing, walking as a mode of travel is

hampered. The spacing of intersections or crossing points is also an important element in the creation of a supportive pedestrian environment.

This section describes how intersections can be made more pedestrian-friendly by reducing crossing distances and improving visibility for both pedestrians and drivers. Detailed discussion of specific crossing designs and elements is included in Section 2.5, "Pedestrian Crossings."

2.4.1 Issues to Consider

The following are general issues that should be considered for intersection design:

- Pedestrians should be made as visible as possible because multiple conflict points for vehicles and pedestrians exist at intersections.
- Intersections that minimize pedestrain crossing distance and crossing time reduce the exposure to traffic and pedestrian/vehicular conflicts.
- Drivers traveling at a slower rate of speed have more time to process and react to pedestrian conflicts at intersections.

2.4.2 ADA Accessibility

Pedestrian facilities (including curb ramps, signal equipment, etc.) must comply with ADA standards and California Title 24 regulations and take into account the entire range of disability categories.

2.4.3 New Development versus Retrofit

- Prior to improvements to an existing intersection, utilities (e.g., lighting, electrical, and storm drains) should be identified and either incorporated into the design or relocated.
- New intersections provide the opportunity to clarify new forms of traffic control that may create a more pedestrian-friendly setting.

2.4.4 Relation to Transit

The location and design of transit stops at intersections should consider the access needs of adjacent land uses that generate pedestrian demand for transit as well as pedestrian and traffic safety issues at the intersection.

2.5. Pedestrian Crossings

One of the most effective means of turning an important corridor into a community "spine" or "seam" rather than a community "divider" is providing for safe street crossings. Guidelines for installation of marked crosswalks at uncontrolled intersections and mid-block crossings are contained in Council Policy 200-07, "Marked Crosswalk Criteria at Uncontrolled Locations".

2.5.1 Issues to Consider

The following are general issues that should be considered for pedestrian crossings, including residential street crossings and mid-block crosswalks:

- The width of the street, the geometry of the intersection, the timing of signalization, and the frequency of crossing opportunities all play important roles in achieving a pedestrian-friendly environment.
- Crossing opportunities should be provided at regular and convenient intervals.
- Marked crosswalks are useful in channelizing pedestrian crossing activity at specified locations.
- Marked crosswalks identify appropriate crossing locations for pedestrians and alert drivers to the possible presence of pedestrians.
- The use of marked crosswalks is generally considered appropriate at signalized intersections where pedestrian activity occurs.
- Street width and traffic speed can be mitigated with the use of sidewalk pop-outs.
- Some pedestrians may become overconfident or be less aware of vehicles when crossing in a marked crosswalk; therefore, marked crosswalks should not be used indiscriminately.

2.5.2 Accessibility

Appropriate curb ramps must be provided at all pedestrian crossings and island passageways.

2.5.3 Relation to Transit

All transit stops require that pedestrians be able to cross the street safely and within proximity to the stop.

2.5.4 Guidelines

The following guidelines should be followed for pedestrian crossings:

1. The width of all crosswalks shall be a minimum of 10 feet wide or per dimensions specified by the ADA and California Title 24 regulations. Unless small-scale intersection conditions dictate otherwise, widths shall be increased where there is greater pedestrian activity.
2. Adequate lighting at the levels specified in Chapter 4, “Street Lighting”, should be present.
3. The installation of crosswalks shall conform to Council Policy 200-07 and in accordance with CA MUTCD.
4. Marked crosswalks should be provided at all signalized intersections where pedestrian crossing is allowed.
5. Curb ramps shall be provided at all crosswalks. If a raised median extends into the crosswalk, the median nose should be relocated out of the crosswalk or an island passageway with truncated domes must be provided through the median.

2.5.5 Residential Street Crossings

2.5.5.1 Issues to consider

- Enhanced pedestrian crossings in residential neighborhoods are a key component of pedestrian-oriented street design and lead to both improved pedestrian safety and the livability of the neighborhood.
- Residential street crossings are often combined with traffic-calming measures that are designed to maintain low vehicle speeds, such as raised crosswalks, chicanes, and gateway narrowings (see Chapter 3, "Traffic Calming").
- Enhanced pedestrian crossings in residential neighborhoods may not be used if traffic volumes are low enough that pedestrians are comfortable crossing at any location.

2.5.5.2 Guidelines

- Enhanced pedestrian crossing measures should be considered in residential neighborhoods where a demonstrated crossing demand exists.
- On residential streets that experience excessive vehicle speeds, enhanced pedestrian crossings should be combined with traffic-calming measures such as pop-outs.

2.5.6 Mid-Block Crosswalks

2.5.6.1 Issues to consider

- Mid-block crosswalks provide convenient crossing locations for pedestrians when other crossing opportunities are distant or where there is a presence of concentrated mid-block pedestrian crossing demand.
- Guildelines for installation of mid-block crossings are contained in the Council Policy 200-07, "Marked Crosswalk Criteria at Uncontrolled Locations."

2.5.6.2 Guidelines

1. Crosswalks at uncontrolled intersections and mid-block crosswalks shall be installed in accordance with Council Policy 200-07.
2. Mid-block crosswalks shall be well illuminated (refer to Chapter 4, "Street Lighting").
3. A curb ramp shall be provided at each end of the crosswalk.
4. Curb extensions may be considered at the crosswalk to enhance pedestrian crossing visibility and reduce crossing distance.
5. If mid-block crosswalks are signalized, accessible pedestrian signals and devices shall be installed.
6. On streets that experience excessive vehicle speeds, enhanced pedestrian crossings should be combined with traffic calming measures such as raised crosswalks or curb extensions.

2.6. Island Passageways

Island passageways in wide or busy streets improve safety for pedestrians and vehicles. They are defined as areas within an intersection or between lanes of traffic where pedestrians may safely walk until vehicular traffic clears, allowing them to cross a street. Another benefit to pedestrians is that it can significantly reduce delay in crossing unsignalized intersections because pedestrians need only search for vehicles in one direction at a time.

2.6.1 Issues to Consider

In general, island passageways work best on wider streets with long pedestrian crossing times and exposure to vehicular traffic or on streets with speeds higher than 35 mph.

2.6.2 Accessibility

Island passageways are particularly useful for slower pedestrians such as the very young, the elderly, or those with mobility disabilities. Where it is not possible to include ramps and waiting pads that meet accessibility requirements waiting areas should be at-grade with the roadway (channels).

2.6.3 New Development versus Retrofit

Island passageways may be installed at intersections or mid-block locations deemed appropriate through engineering studies. They should be considered from the outset of design for intersections that are either complex, irregular in shape, excessively wide, or in areas where children and the elderly are expected to cross frequently.

2.6.4 Relation to Transit

The use of island passageways should be considered where transit is “running” with the street ROW, particularly in station areas.

2.6.5 Guidelines

The following guidelines should be followed for island passageways:

1. Island passageways with truncated domes shall be designed per the City of San Diego Standard Drawings.
2. Pedestrian island passageways should be well illuminated.

2.7. Sight Distance

More often than not, sight distance is discussed only from the standpoint of the driver, not the pedestrian. This is of particular concern at crosswalk locations where parked cars, utility poles, street furnishings, or landscapes can obstruct the line of sight for pedestrians.

2.7.1 Issues to Consider

Streets that support pedestrian movements allow for the placement of elements such as trees and medians with landscaping. The presence of such elements creates a slower speed environment that is more conducive to pedestrian travel. These elements shall be placed in such a way that adequate sight distance is provided for all users of the public ROW.

All pedestrian crossing facilities in the City shall take into consideration Council Policy 200-07, "Marked Crosswalk Criteria at Uncontrolled Locations."

2.7.2 Relation to Current Standards and Practices

- AASHTO Green Book recommends a 90-degree angle of roadways whenever possible.
- The CalTrans Highway Design Manual defines stopping sight distance requirements based on the approaching speed of vehicles (Section 201.3). These standards range from 125 feet for speeds of 20 mph to 360 feet for speeds of 45 mph on flat terrain.

2.7.3 Guidelines

The following guidelines should be followed for sight distance:

1. Parking restrictions near crosswalks should be considered to remove potential obstructions to the pedestrian's line of sight, particularly for young children and those in wheelchairs.
2. When street furnishings or other objects that obstruct view cannot be relocated, curb extension or other treatments should be considered.

2.8. Sidewalks for Overpasses, Underpasses, and Highway On/Off Ramps

Access on an overpass across a highway is often along a narrow sidewalk where the pedestrian is against a wall or guardrail and is highly exposed and vulnerable to speeding traffic. The unappealing environment of underpasses is often exacerbated by poor lighting and obscured sightlines. Pedestrian access across on- and off-ramps can also be difficult because drivers are preoccupied with making the transition between the highway and the street network.

The overpass discussion is applicable to all bridges with pedestrian access, and the overpass and underpass discussions are applicable to grade-separated railroad crossings.

2.8.1 Overpasses and Underpasses

2.8.1.1 Issues to Consider

Overpasses and underpasses are required to be accessible. Pedestrian ramps or elevators may be incorporated as part of the access elements. Pedestrian ramps may require a considerable amount of land for installation and elevators may have potential security and maintenance issues.

2.8.1.2 New Development versus Retrofit

Seek opportunities to widen sidewalks when retrofits occur.

2.8.1.3 Guidelines

The following guidelines should be followed:

1. Minimum widths for walkways on over and underpasses should follow the guidelines for sidewalk width.
2. Underpasses should have a daytime illuminance minimum of 10 footcandles achievable through artificial and/or natural light provided through an open gap to sky between the two sets of highway lanes and a nighttime level of 4 footcandles.
3. Consider acoustics measures within underpasses to reduce noise impacts to pedestrians and bicyclists.

2.8.2 Highway On/Off Ramps

2.8.2.1 Issues to Consider

Pedestrian safety measures should be considered where drivers are in the process of "transitioning" from high-speed highways to local streets.

2.8.2.2 New Development versus Retrofit

- Many existing highway access points have been designed with limited provision for pedestrian access along the local streets and the resulting situations often leave little space for retrofit.
- New highway access improvements such as reducing the turning radii should be considered to address pedestrian and bicycle safety and access issues.

2.8.2.3 Guidelines

The following guidelines should be followed:

1. Free-flowing highway entrance and exit ramps shall not be constructed in areas where pedestrians are expected.
2. A right angle intersection should be provided where the highway on/off ramp meets the cross street to improve visibility for both motorists and pedestrians as well as to reduce the pedestrian crossing distance.

Chapter 3

Traffic Calming

This chapter is intended to provide design options for traffic calming on new streets and streets being considered for retrofit. Some general design specifications are provided to assist designers in developing comprehensive streetscape plans for proposed development and redevelopment projects.

3.1. Overview

Traffic calming involves the use of various geometric features designed to reduce vehicle speeds or discourage shortcutting traffic. To achieve the desired effect of traffic calming, the effectiveness of such measures and their impacts should be evaluated on an area-wide basis.

Landscaping, street trees, street lighting, and street furniture are other methods of traffic calming that also create distinctive and pleasing streetscapes that encourage sidewalk activity. These improvements may involve consideration of irrigation and long-term maintenance to be provided by maintenance assessment districts or other agreements with the City.

Traffic calming is appropriate along circulation element roads as well as commercial and residential local streets. Local streets should be designed to function efficiently and safely, yet minimize the need for extensive traffic regulation, control devices, and enforcement. The function of the local street should be readily apparent to the user through its appearance and design.

3.2. General Guidelines

The following general guidelines should be considered in traffic calming installations:

- Traffic calming installations must meet State and Federal accessibility requirements.
- Traffic calming devices and landscaping shall be developed so that they do not conflict with water, sewer, or City of San Diego fiber optic facilities. Proposals to relocate utility facilities or review alternative designs shall be coordinated with the Water and Sewer Development Section.
- Delays to emergency vehicles should be minimized by the appropriate placement and design of traffic calming devices. In some cases, certain traffic calming devices may not be appropriate.
- Traffic calming installations should not divert traffic to other local residential streets. Traffic calming installations should support the street classifications established in community plans. Traffic may be diverted from residential streets to classified through streets, such as collector

street or major streets. The potential impacts of traffic diversion should be evaluated for all traffic calming installations.

- Traffic calming devices on designated transit routes should be limited to those that permit the efficient movement of transit vehicles.
- Traffic calming should not impair the mobility of non-motorized users on the street.
- Traffic calming installations must address drainage, sight distance, and location of underground utilities.
- All traffic calming installations are encouraged to have a landscape element that includes trees and shrubs consistent with the Landscape Standards. Installations are contingent upon having maintenance responsibilities being identified. If traffic calming devices include decorative pavement, it shall comply with the Design Standards in Section 6.2.4 of this Manual.

3.3. Traffic Calming Techniques

Traffic calming strategies generally fall into the following categories:

- Horizontal deflections (e.g., chicanes, traffic circles, median slow points/chokers)
- Vertical deflections (e.g., road lumps, speed tables, and raised crosswalks)
- Intersection pop-outs
- Traffic diverters (e.g., semi-diverters)
- Channelization

Enhancing the streetscape environment should have the same level of priority in the design scheme as traffic calming impacts. A general discussion of these categories follows along with more specific details and design guidelines for various traffic calming techniques.

Traffic calming features such as median slow points or chokers, chicanes, traffic circles, and intersection pop-outs may be provided in accordance with this design manual. Road lumps or speed tables may be installed by the City on existing streets under some circumstances. For other tools and detailed information on traffic calming features, refer to the City of San Diego Traffic Calming Program Handbook, maintained by the Transportation Storm Water Department. Designers are required to review such guidelines for additional detailed information regarding traffic calming devices.

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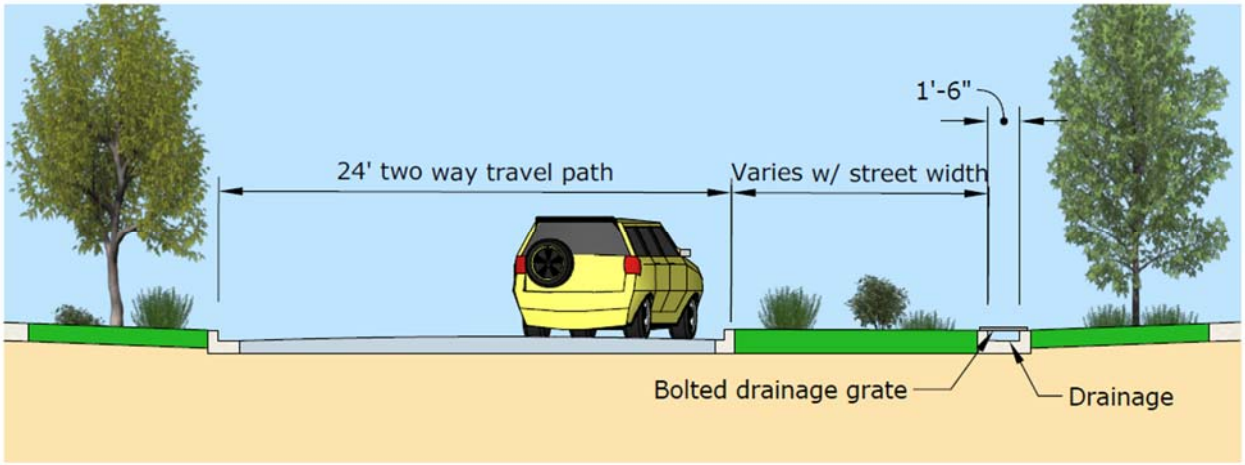
3.3.1 Horizontal Deflections

Horizontal deflections are used to achieve speed reductions by breaking up the linear path of vehicle travel. Traffic calming designs that involve horizontal shifts in the travel way are inappropriate for multilane collector streets, major streets, and arterials. Horizontal deflections include chicanes (mid-block), traffic circles (intersections), and median slow points (mid-block and intersections).

3.3.1.1 Chicanes

A chicane is a channelization that causes a series of tight turns in opposite directions in an otherwise straight stretch or road (see Figure 3–1). The combination of narrowed street width and the serpentine path of travel slows traffic. On new streets, chicanes narrow the street by widening the sidewalk or landscaped parkway. On streets considered for retrofit, raised islands are installed to narrow the street.



Note:
[1] Spacing of chicane segments depend on site considerations, e.g. driveway locations.
[2] Island plantings should not obscure driver's view of chicane traffic (24" maximum height).
[3] Stamped concrete may be used in the chicane island.
[4] Bicycles are to use the same path as motor vehicles, not the drainage channel.

FIGURE 3-1. SECTION A-A: CHICANE

The advantages of chicanes include slower traffic, potential opportunity for landscaping, and a tendency not to divert traffic to nearby streets. Chicanes are inappropriate for use on streets classified as collector or higher, bus routes or emergency response routes, where there is a grade that exceeds 5 percent, or where there is limited stopping sight distance such as at the crest of a hill. Chicanes may cause some loss of on-street parking, may impact driveways, may increase emergency response time, or may affect drainage and street sweeping.

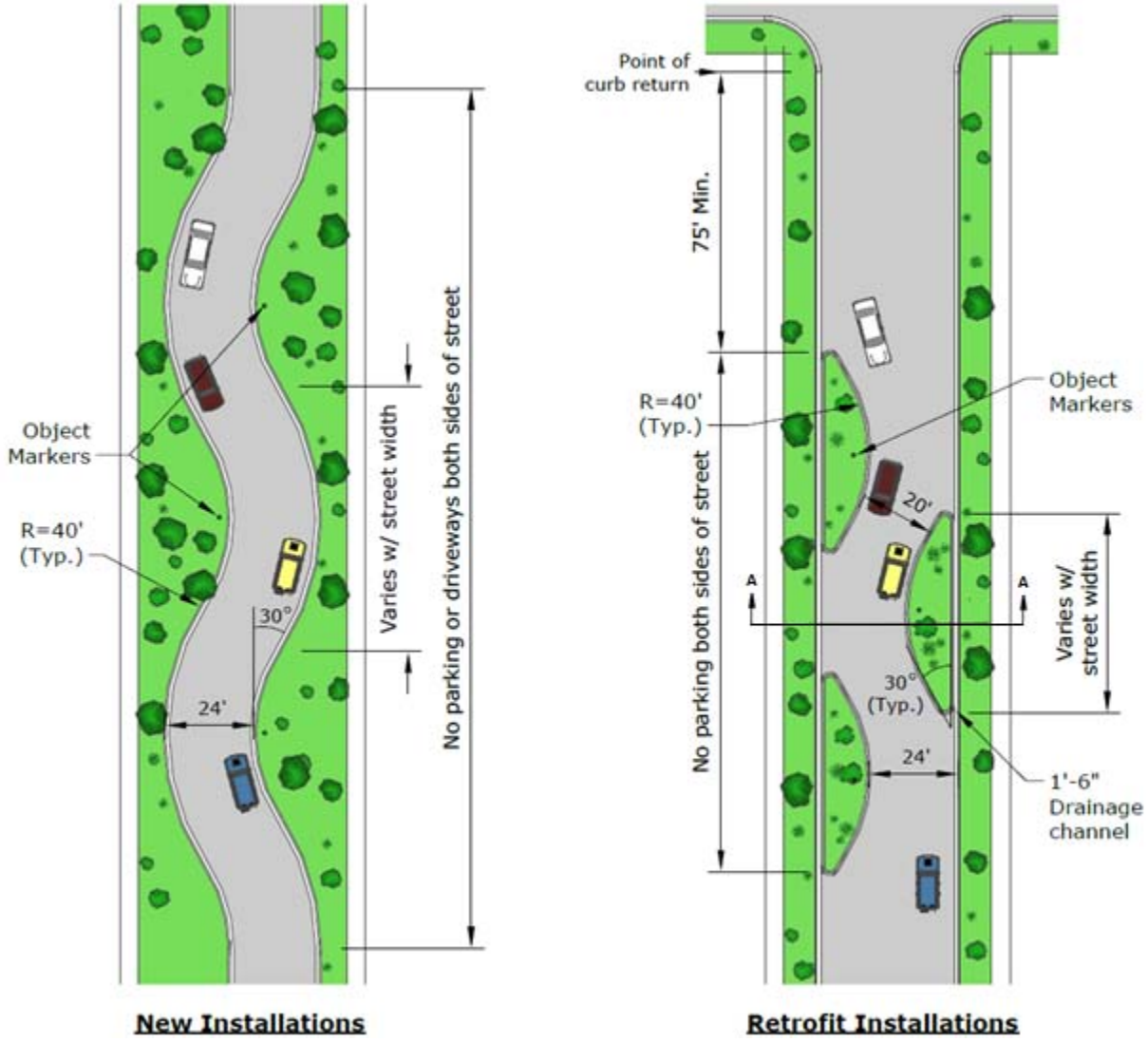
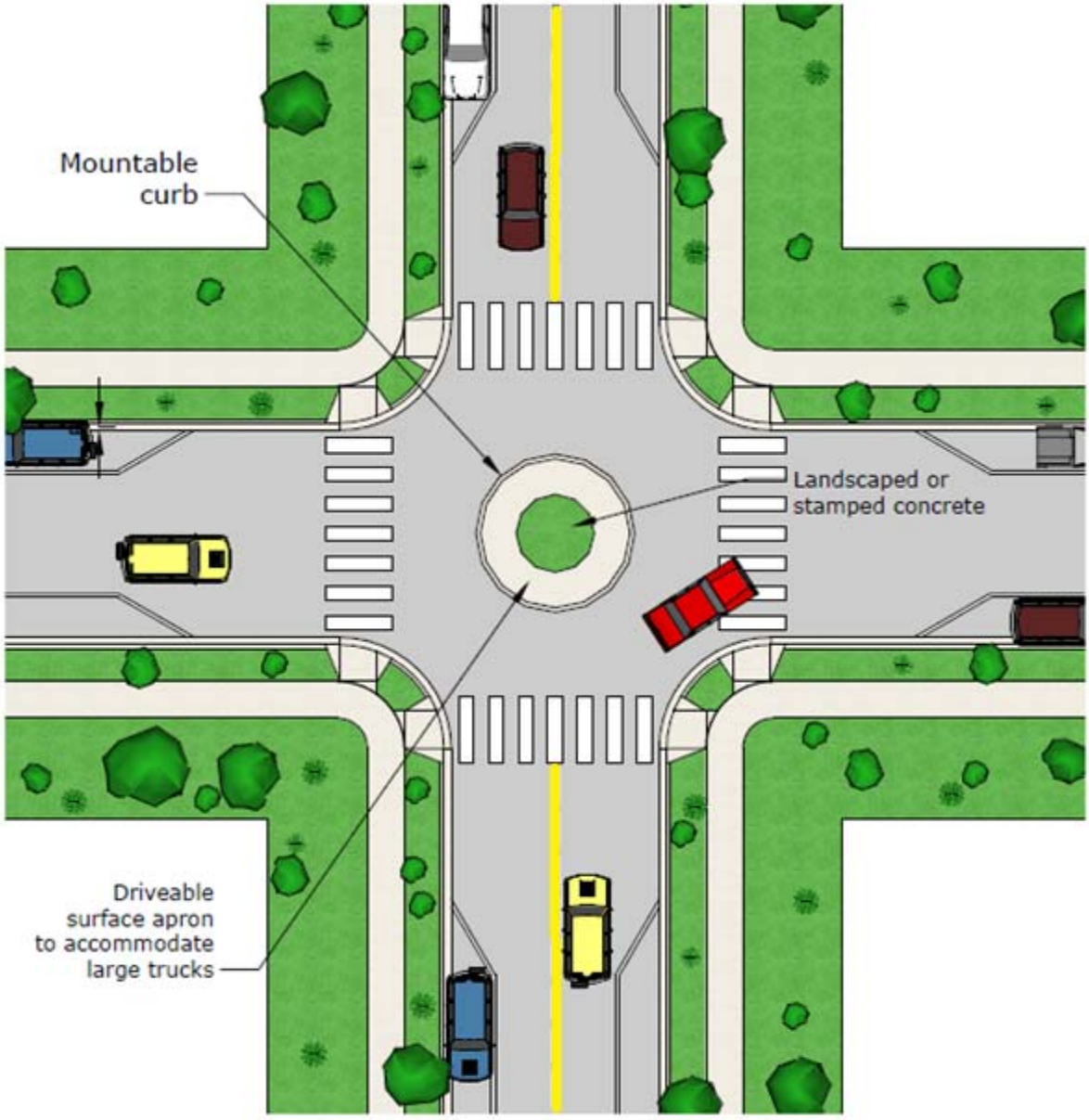


FIGURE 3-2. PLAN: CHICANE

3.3.1.2 Traffic Circles

A traffic circle is a raised circular island placed in the center of an intersection. Traffic yields on entry, then enters to the right, traveling around the circle counterclockwise (see Figure 3–3). A traffic circle slows traffic on each approach, reduces ROW conflicts, and tends not to divert traffic to nearby streets.

Traffic circles are appropriate for usage on residential and collector streets with alternative access points. Traffic circles should not be used on streets classified as major or higher, bus routes or emergency response routes, where there is a grade that exceeds 5 percent, or where there is limited stopping sight distance such as at the crest of a hill. A traffic circle may impact large vehicles' turns or may increase emergency response time. Specific geometric features are not included in this manual because traffic circles are site specific and should be designed on a case-by-case basis. See Section 6.2.13 for Roundabouts.



Note: Refer to CA MUTCD for appropriate pavement markings and signage

FIGURE 3-3. PLAN: TRAFFIC CIRCLE

3.3.1.3 Median Slow Points/Chokers

A median slow point or choker is a small median or island placed in the center of a roadway that causes traffic to shift its path to the right in order to travel around it (see Figure 3–4). It may be on an approach to an intersection or mid-block. If median slow points/chokers are installed at an intersection, the street should have alternative access points.

A median slow point/choker slows traffic, creates a pedestrian refuge area, creates a landscaping opportunity, and tends not to divert traffic to nearby streets. Median slow points/chokers may be used on two-lane streets. They should not be used on streets classified as major or higher or where there is limited stopping sight distance. Median slow points/chokers may cause some loss of on-street parking or may impact large vehicles' turns when installed at intersections.

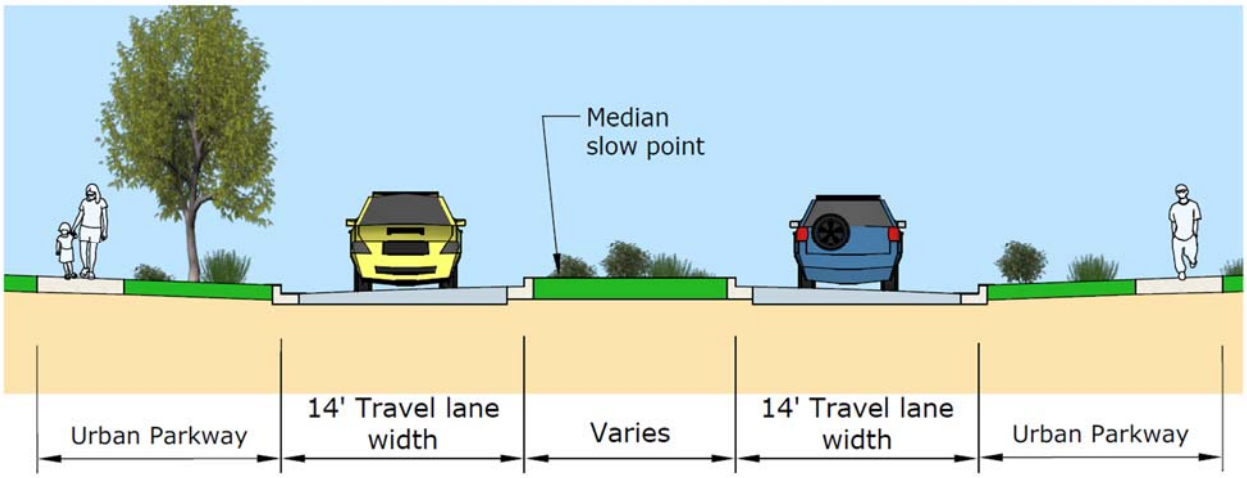
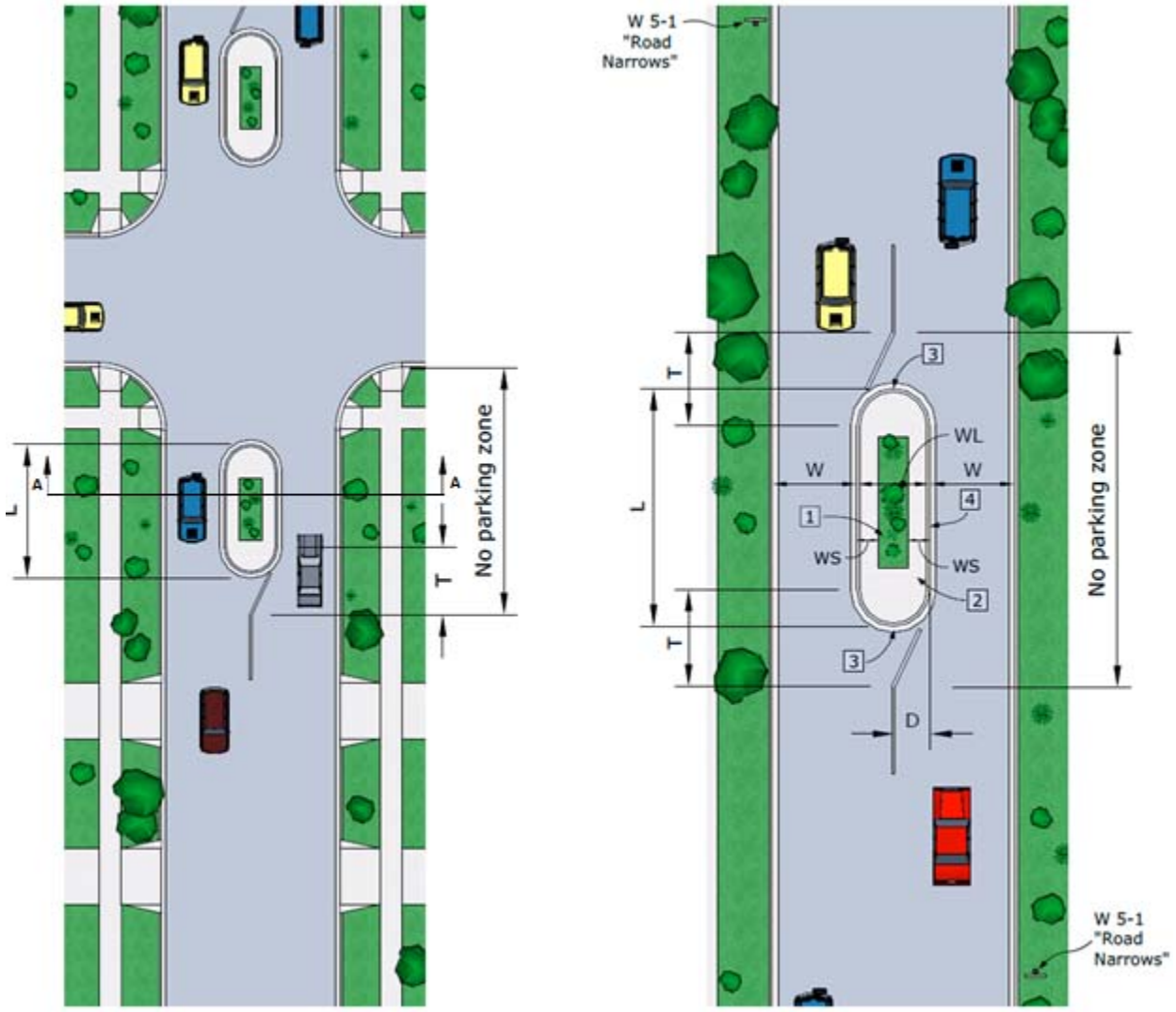


FIGURE 3-4. SECTION A-A: MEDIAN SLOW POINT



Legend

1 area that may be landscaped (landscape, irrigation, and long term maintenance must be considered by a maintenance assessment district or other agreements with the City of San Diego)

2 stamped concrete

3 yellow painted island nose

4 6" curb

W - Travel lane width - 14'
WL - Width of slow point (varies depending on street width)
WS - For landscaped slow point, 2' typical
L - Length of slow point, varies depending on parking and driveways
D - Horizontal deflection

$T = \frac{(DxS^2)}{60}$ Where:
D = deflection in feet
S = 85th percentile speed in mph

FIGURE 3-5. PLAN: MEDIAN SLOW POINT

3.3.2 Vertical Deflections

Vertical deflections are an effective traffic calming technique for speed reductions and discouraging shortcutting on local streets. Traffic calming designs that involve vertical shifts are inappropriate for collectors, major streets, and arterials. Vertical deflections include road lumps and speed tables/raised crosswalks.

3.3.2.1 Road Lumps

Road lumps are rounded, raised areas placed across the road. Road lumps are approximately 12 feet long (in the direction of travel), 3.5 inches high, and parabolic in shape. They are usually constructed with a taper on each side within 1 or 2 feet of the gutter line to allow unimpeded drainage between the lump and curb. Road lumps have cut-outs placed in them so that an emergency vehicle can pass through lumps instead of going over them (see Figure 3–6 and 3–7).

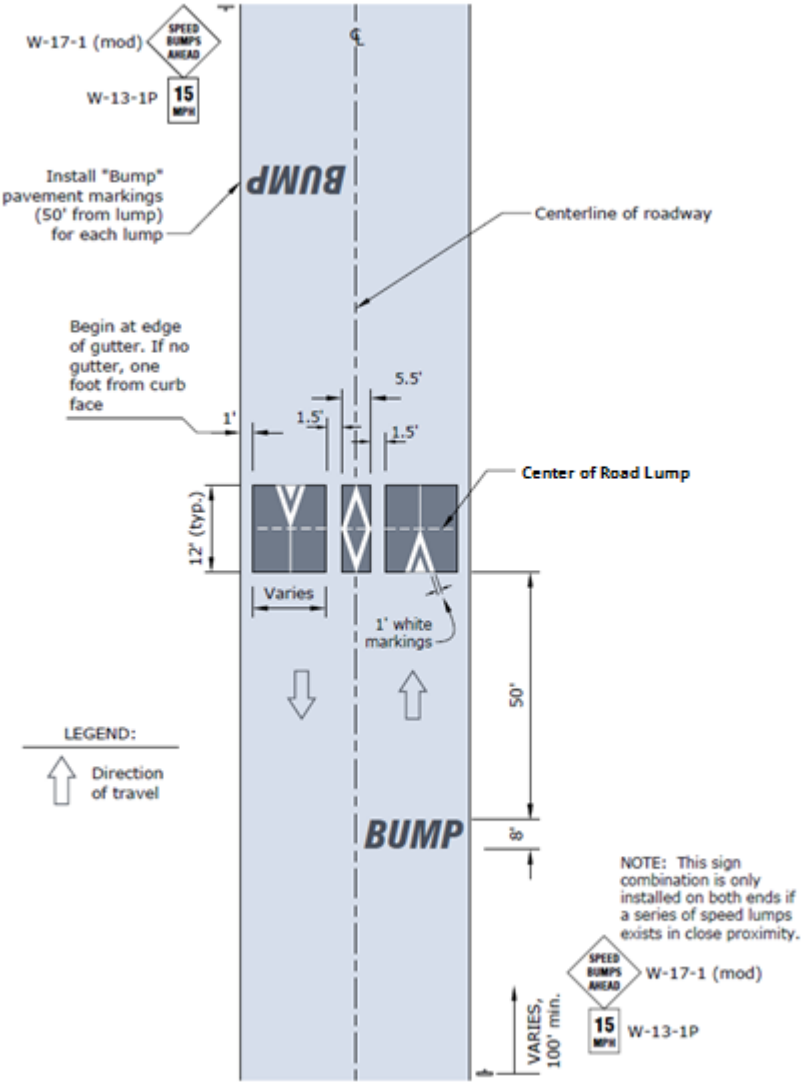


FIGURE 3-6. PLAN: ROAD LUMPS

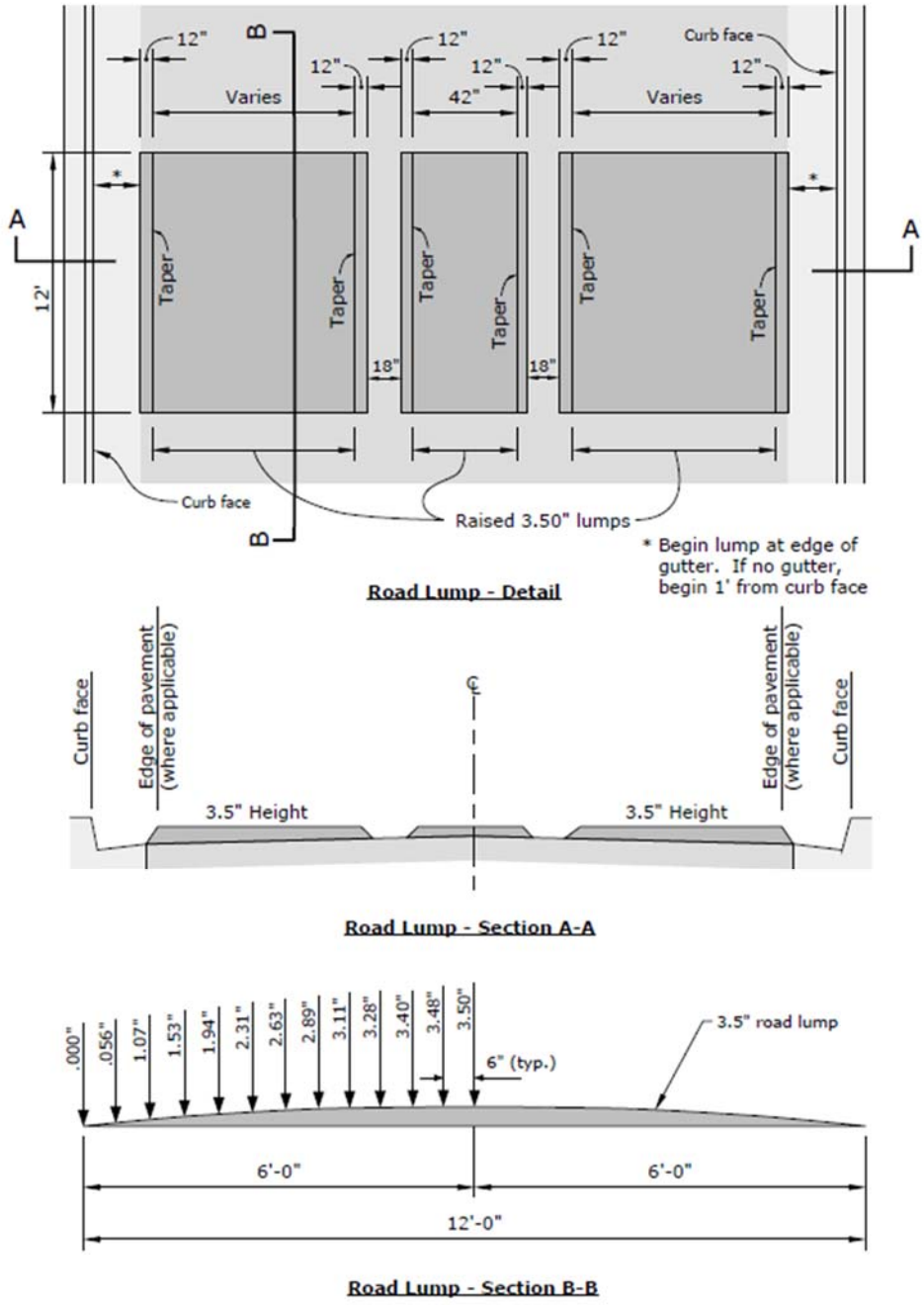
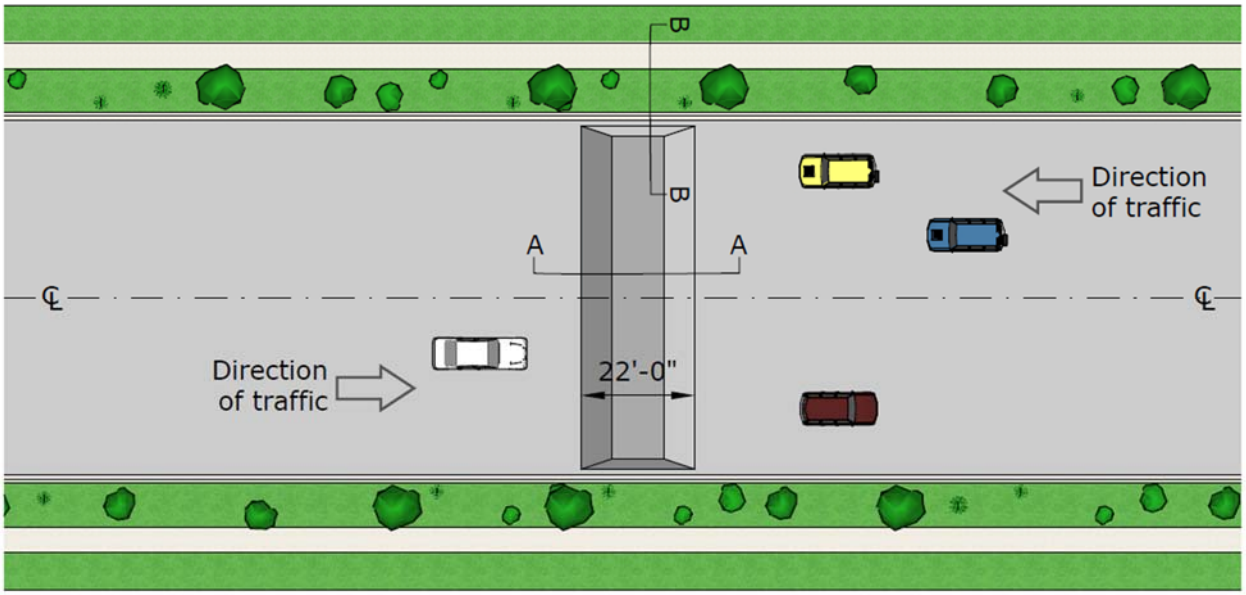


FIGURE 3-7. SECTION A-A: ROAD LUMPS

While primarily used for speed reduction, road lumps can also result in the reduction of traffic volumes on streets where they are employed by diverting traffic to other nearby streets. Road lumps should not be used on streets classified as collector or higher, bus routes or emergency response routes, where there is a grade that exceeds 5 percent, or where there is limited stopping sight distance. The disadvantages of road lumps may include diverting traffic to other low-volume local streets, increasing emergency response time, and increasing noise.

3.3.2.2 Speed Tables/Raised Crosswalks

Essentially, speed tables are flat-topped road lumps often constructed with concrete, brick, or other textured materials on the flat section. Speed tables and raised crosswalks are 3.5 inches high and 22 feet long in the direction of travel, with 6-foot ramps at the ends and a 10-foot field on top. The concrete, brick, or other textured materials improve the appearance of speed tables/raised crosswalks and draw attention to them. Speed tables are less jarring than the standard 12-foot road lumps. They are most effective when installed in groups of two or more, about 300 feet apart. Where extended from curb-to-curb and appropriately marked, speed tables serve as raised crosswalks. Drainage requirements must be evaluated and addressed where raised crosswalks are installed (see Figures 3–8 through 3–12).



Note: Drainage requirements must be evaluated and addressed.

FIGURE 3-8. PLAN: SPEED TABLE

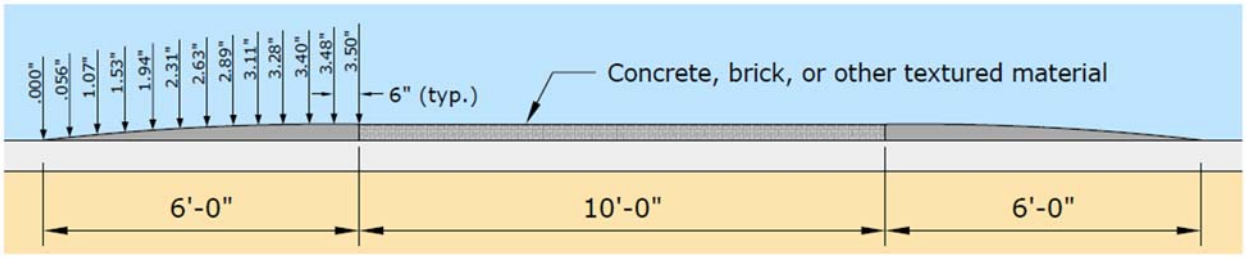


FIGURE 3-9. SECTION A-A: SPEED TABLE PITCH

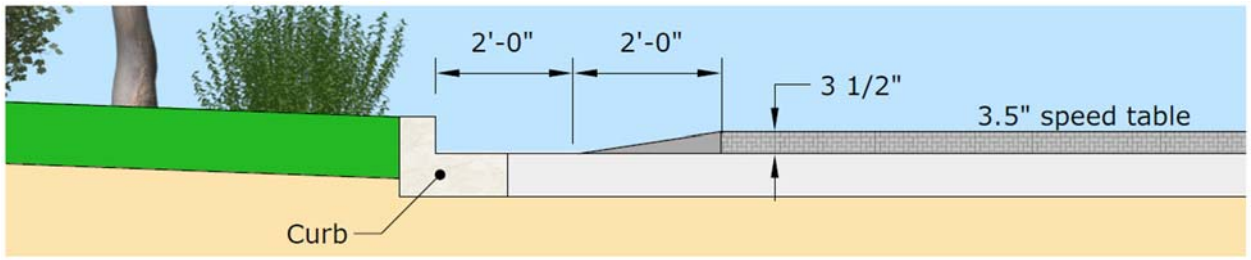
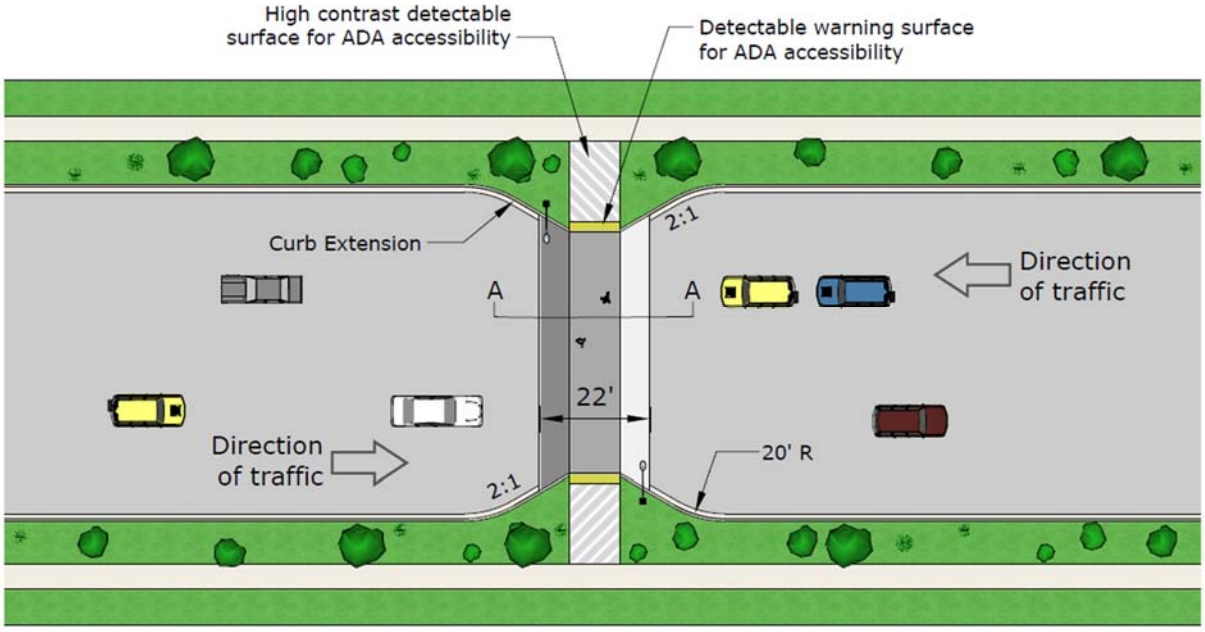


FIGURE 3-10. SECTION B-B: SPEED TABLE



Note:
1. Drainage requirements must be evaluated and addressed.
2. Crosswalks should meet traffic enineering requirements approved by the City Council.
3. Refer to Council Policy 200-07.
4. Refer to CAMUTCD for appropriate signs and markings.

FIGURE 3-11. PLAN: RAISED CROSSWALK

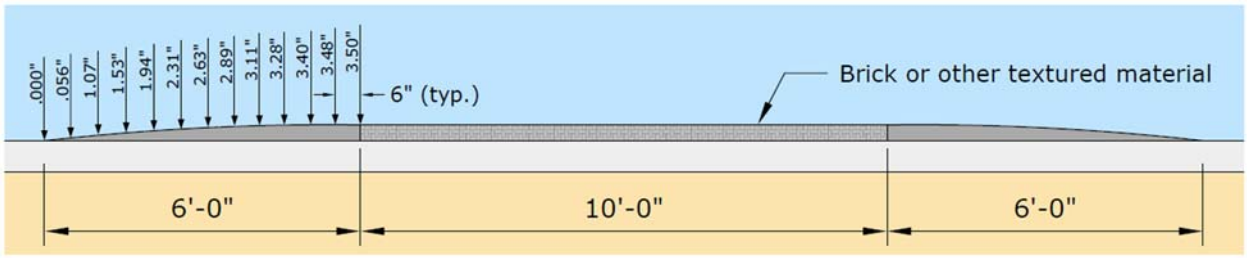


FIGURE 3-12. SECTION A-A: RAISED CROSSWALK

Speed tables and raised crosswalks reduce vehicle speeds. Raised crosswalks enhance pedestrian safety. The disadvantages of speed tables/raised crosswalks may include diverting traffic to nearby low-volume local streets, increasing noise, and increasing emergency response times. Speed tables/raised crosswalks should not be installed on streets classified as collector or higher, bus routes or emergency response routes, where there is a grade that exceeds 5 percent, or where there is limited stopping sight distance.

3.3.3 Intersection Pop-Outs

Intersection pop-outs are curb extensions that narrow the street at intersections by widening the sidewalks at the point of crossing. They are used to make pedestrian crossings shorter and reduce the visual width of long, straight streets. Where intersection pop-outs are constructed by widening the landscaped planting strip, they can have a positive effect on the visual appearance of the neighborhood. Pop-outs can be used at intersections to create a street gateway effect, visually announcing an entrance to a neighborhood. Intersection pop-outs must accommodate bicyclists, transit vehicles, and emergency response vehicles (see Figure 3–13).

Pop-outs improve pedestrian visibility and create shorter pedestrian crossing width, and they may reduce vehicle speeds. Pop-outs may impact large vehicle turns, may impact accessibility by transit or emergency response vehicles, and may require parking removal. Intersection pop-outs may be installed on local streets, collector streets, and urban major streets. Minimal geometric features are included in this manual because intersection pop-outs are site-specific and should be designed on a case-by-case basis.

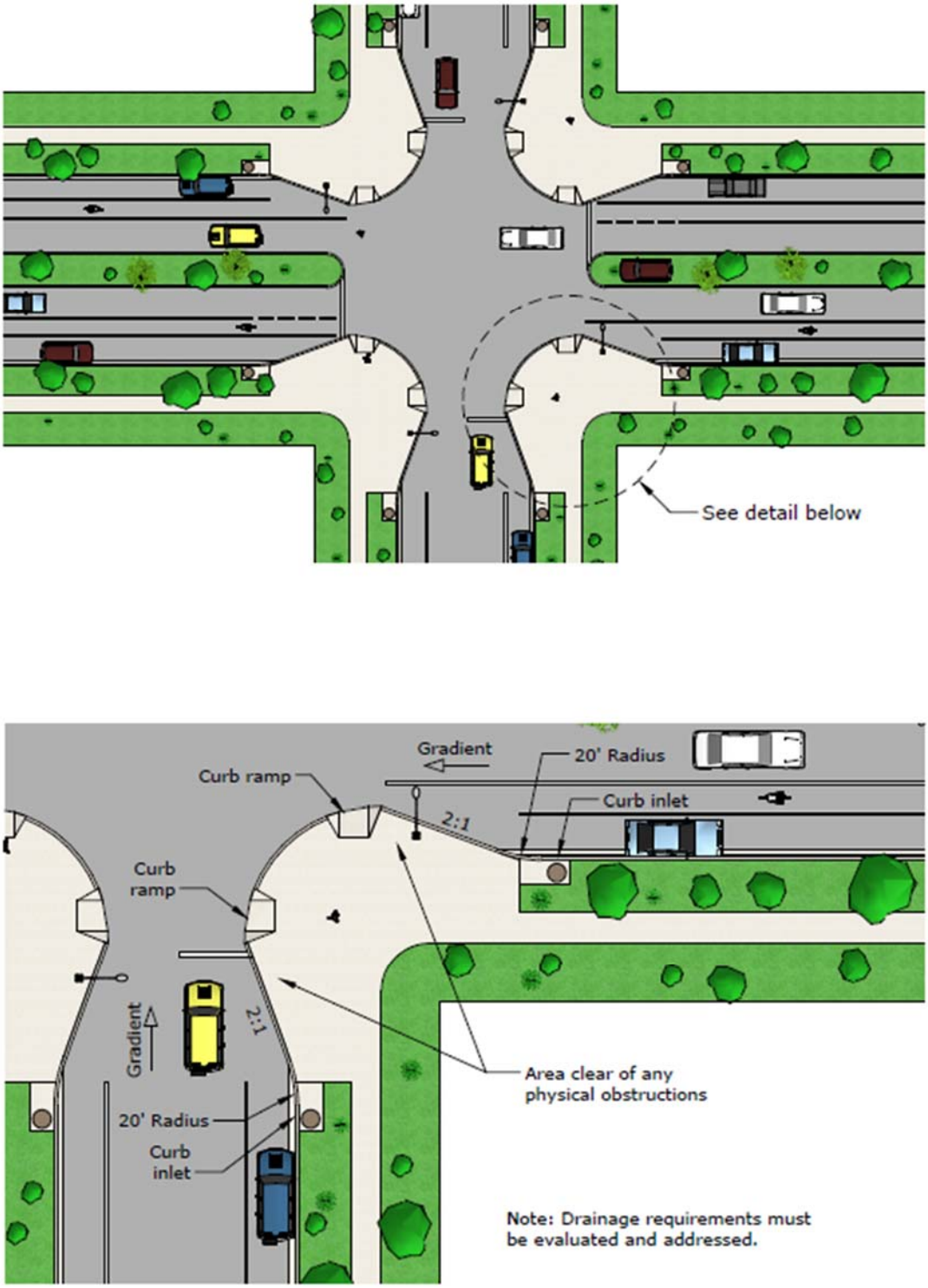


FIGURE 3-13. PLAN: INTERSECTION POP-OUT

3.3.4 Traffic Diverters

Traffic diversion devices eliminate through trips on streets on which they are installed and divert those trips to other streets. There are several available traffic diversion designs that may be used to calm traffic. Traffic diverters are not primarily installed for the purpose of speed control. Diverters are best suited on long, straight, low-volume, local residential streets.

Wherever traffic diversion techniques are employed, provision should be made for continuation of pedestrian and bicycle routing around or through the diversion. Care must be taken in design of diversion installations to allow for emergency vehicles.

3.3.4.1 Semi Diverters

A semi diverter is a barrier to traffic in one direction of a street that permits traffic in the opposite direction to pass through. It is an alternative to one-way street operation for a block and it allows residents on the block limited two-way travel opportunity. A semi diverter may be used on low-volume, local residential streets and it is best located at the end of a block to prevent entrance and allow exit. Semi diverters reduce cut-through motorized vehicle traffic, reduce pedestrian crossing widths, and create opportunity for landscaping (see Figure 3–14).

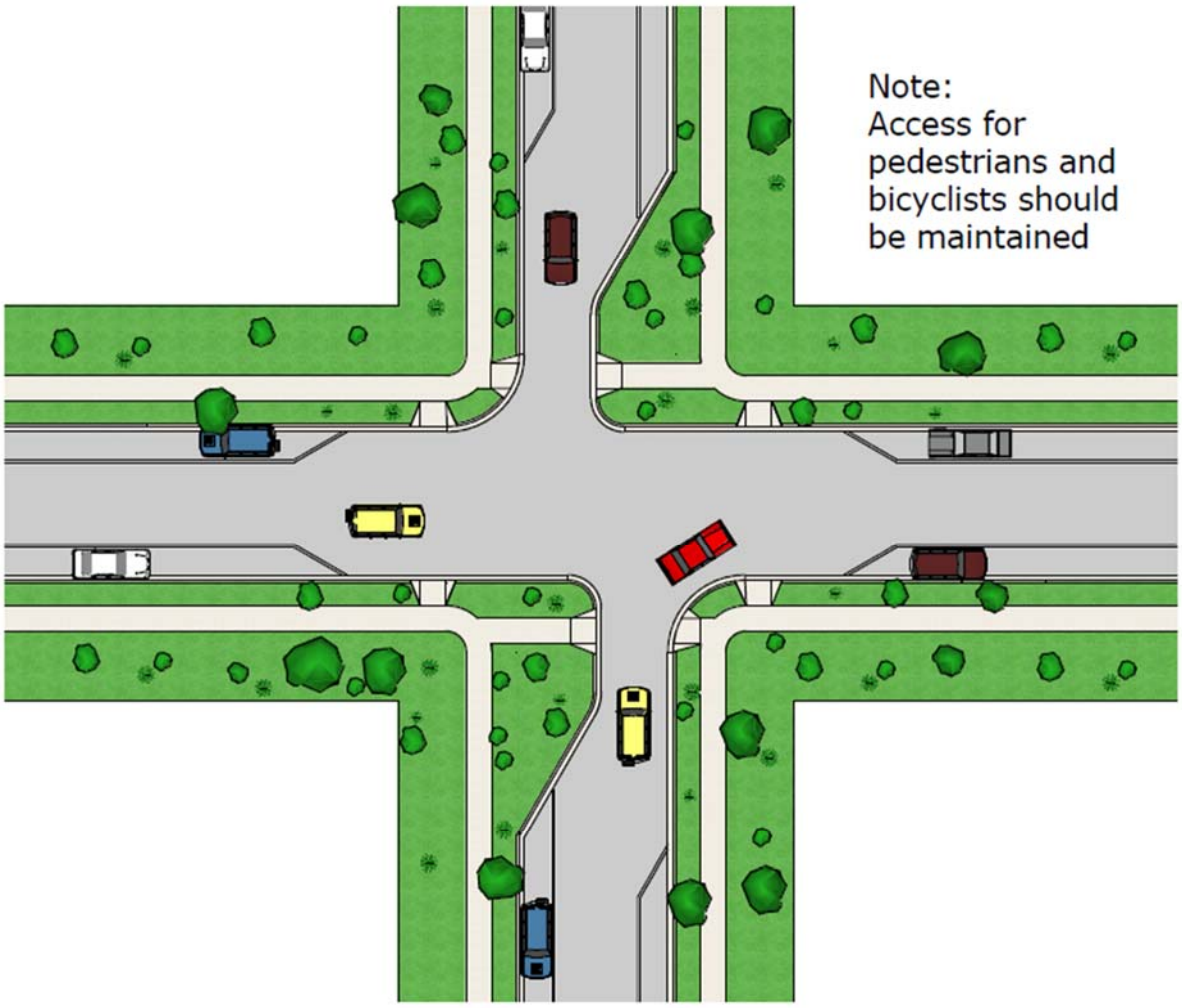


FIGURE 3-14. PLAN: SEMI DIVERTER

Semi diverters may divert traffic to other low-volume streets, may increase trip lengths, may cause loss of parking, and may increase emergency response time. Semi diverters are inappropriate for use on bus or emergency response routes or on streets classified as collector or higher. No specific geometric features are included in this manual because semi diverters are site-specific and should be designed on a case-by-case basis.

3.3.5 Channelization

Channelization may be used on arterial streets to prevent cut-through traffic onto local streets or to control turning traffic in or out of a neighborhood. Channelization can be achieved through regulatory signs and pavement markings, landscaping, or raised channelization islands aimed at motorized, non-motorized, or pedestrian traffic. In addition to preventing cut-through traffic, channelization may be designed to reduce speed, create opportunities for landscaping, control turning traffic in and out of a neighborhood, and to physically guide pedestrians (see Figure 3–15).

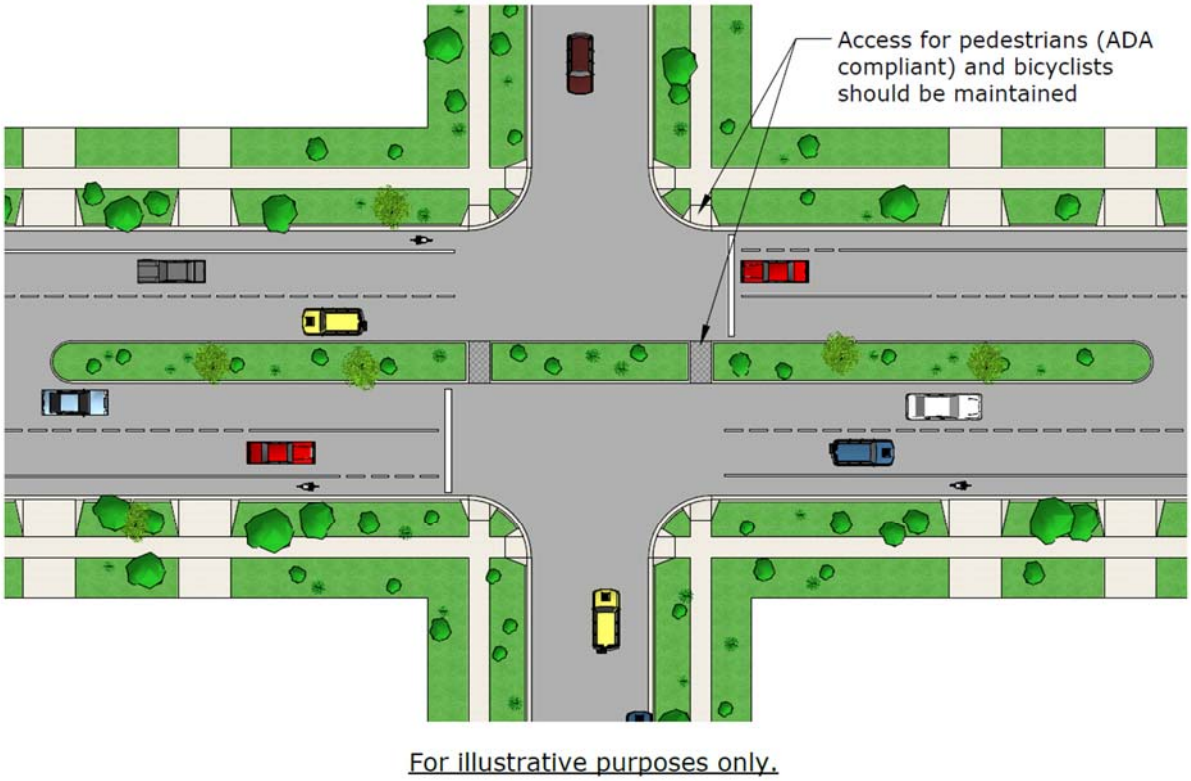


FIGURE 3-15. PLAN: CHANNELIZATION

The disadvantages of channelization may include creating out-of-direction travel, increasing trip lengths, increasing emergency response time, and impacting accessibility. No specific geometric features are included in this manual because channelization devices are site-specific and should be designed on a case-by-case basis.