

Design Standards





Design Standards – Geometric Design

A. Horizontal Curves

1. Minimum curve radii with and without superelevation are shown in the Roadway Design section for the various classifications of streets. These radii are derived from the California Department of Transportation (CalTrans) Highway Design Manual comfortable speed on horizontal curves chart.

2. Superelevation

- a. Local streets and two-lane residential collectors should not be superelevated at curves.
- b. Superelevation is allowed on all other streets if required to maintain the design speed along curves.
- c. When superelevation is required, the minimum amount permitted is plus 2 percent. The maximum superelevation permitted, regardless of circumstances, is 4 percent for design speeds of 30 mph (50 km/h) and lower, 6 percent for urban classifications with design speeds between 35 mph (60 km/h) and 45 mph (70 km/h), and 10 percent for rural classifications and for design speeds of 50 mph (80 km/h) and higher.
- d. Superelevation must be designed to show length, transition, and crown runoff. Design must follow CalTrans standards as provided in its Highway Design Manual, Chapter 200.
- e. Superelevation shall extend uniformly from the flow line of the gutter on the high side of the street to the lip of the gutter on the low side of the street, keeping the standard slope of the gutter on the low side unchanged. This shall

also include the slope of median gutters, if any, as shown in Regional Standard Drawing G-6.

- f. All streets not superelevated shall be crowned at 2 percent.
- 3. Sight distance on horizontal curves shall be determined from CalTrans Highway Design Manual Figure 201.6, "Stopping Sight Distance on Horizontal Curves."
- 4. Compound curves are prohibited.
- 5. Reversing Curves
 - a. Reversing curves are permitted; but, for all streets other than local streets, they must be separated by a tangent length adequate to provide safety of travel.
 - b. For non-superelevated reversing curves, the tangent length provided shall be compatible with probable driving speed, type of vehicle use, and individual curve radius and length.
 - c. Superelevated reversing curves shall be separated by tangents sufficient to contain all of the superelevation runoff required.
- 6. Knuckles. Knuckles may be approved on an exception basis for residential cul-de-sacs with 200 ADT or under, intersecting at right angles plus or minus 5 degrees. Knuckles should not be used in lieu of providing a 100-foot (30 m) minimum curve radius required on residential cul-de-sacs.
- 7. Sharp horizontal curves must not begin near the top of pronounced crest vertical curves or near the low point of pronounced sag vertical curves.



B. Vertical Curves

1. Vertical curves shall be designed to the current CalTrans Highway Design Manual Stopping Sight Distance based on design speed.
2. For local streets, the minimum acceptable vertical curve is ten feet (3 m) of curve for each one percent difference in grade.
3. Vertical curves leading into intersections shall be designed such that the grade immediately approaching a cross gutter is no greater than 4 percent.
4. Sight distance on vertical curves shall be determined from CalTrans Highway Design Manual figures 201.2 and 201.4, "Passing and Stopping Sight Distance on Crest Vertical Curves," and from CalTrans Figure 201.5, "Stopping Sight Distance on Sag Vertical Curves."

C. Intersections

1. Streets are to intersect at 90-degree angles or as close thereto as practicable.
2. Two streets intersecting opposite sides of a third street are to have the same points of intersection or else their centerlines are to be separated by a minimum of 120 feet (40 m) for local streets and a minimum of 200 feet (60 m) for all other streets on the third street.
3. Median breaks for intersections along major streets with other streets of collector or higher classification shall be no closer than one-fourth of a mile (400 m).
4. Full access intersections of local streets with major streets should be kept to a minimum, and such intersections shall be at least 500 feet (150 m) apart, measured between

centerlines, and shall be farther apart where turn pockets dictate longer spacing. The need for left-turn storage may require a greater distance. Pedestrian access to transit and adjacent commercial uses should be considered in major street intersection spacing.

5. Local streets should not intersect primary arterials.
6. Maximum grade across intersections along local and two-lane sub-collector and two-lane collector streets shall not exceed 8 percent and along four-lane streets and greater shall not exceed 5 percent.
7. Curb return radius should accommodate the expected amount and type of traffic and allow for safe turning speeds at intersections. Curb return radius shall be installed in accordance with Table D-1.

Table D-1 Curb Return Radius ^a

	Local Residential	Collector	Major
Local Residential	15 ft (4.5m)	20 ft (6.0m)	30 ft (9.0m)
Collector	20 ft (6.0m)	25 ft (7.5m)	30 ft (9.0m)
Major	30 ft (9.0m)	30 ft (9.0m)	30 ft (9.0m)

- a. Curb return radius for all other intersections not covered in Table D-1 shall be 30 feet (9.0m).
8. Sight distance at intersections must consider the following factors: grades, curvature, and superelevation.

- a. The minimum corner sight distance at an intersection of a street (public or private) or multiple dwelling residential/ commercial/ industrial driveway with a collector or higher classification street shall be in conformance with AASHTO Standards.
 - b. Adequate sight distances at intersections and along horizontal curves must be obtained. A sight distance easement that requires fences, monuments, signs, landscaping, walls, and slopes or any other obstruction at and beyond the right-of-way line to be eliminated, kept low, or set back is only acceptable when relocation of the intersection or redesign of the curve does not permit adequate sight distance.
9. The City Engineer may prohibit parking at critical locations.
 10. The City Engineer may control access along major streets at critical locations.

D. Transitions

1. No pavement widening transition is required to increase the number of travel lanes beyond that needed for drainage flow.
2. When reducing the number of through travel lanes, the paved section shall undergo a transition as follows:
for $V > 40$ mph, $L = W \times V$;
for $V \leq 40$ mph, $L = W \times V^2/60$;
where:
 V = design speed, in miles per hour;
 W = width of roadway transition, in feet;
and
 L = transition length, in feet.

E. Cul-de-Sacs

1. Objectives

- a. Cul-de-sacs can be used to minimize encroachments into steep topography or other sensitive environmental features. However, when utilizing cul-de-sacs, care should be taken to design an interconnected street pattern within a residential neighborhood in order to provide, to the maximum extent feasible, direct pedestrian/bicycle routes to local destinations.
- b. In an effort to encourage walking, bicycling, and transit as a viable means of transportation within residential neighborhoods, cul-de-sacs may be utilized within a subdivision so long as the development does not result in a circuitous street system that unnecessarily inhibits pedestrian circulation, discourages transit service, or causes added traffic impacts to other residences within the neighborhood.

2. Connections/Access

- a. When a cul-de-sac exceeds 150 feet (45 m) in length, and/or pedestrian or bicycle circulation is being or will be significantly impacted and the traffic levels on neighboring streets are being or will be degraded, additional design features, including but not limited to: 1) providing for pedestrian and bicycle connections through the cul-de-sac, or 2) the interconnection of the turnaround of the cul-de-sac with an adjacent local street, should be considered in order to provide access to adjacent streets or to adjacent land uses such as open space, parks, trails, or commercial areas.



- b. The design of pedestrian and bicycle access ways should address the following to provide for the safety of users:
 - (1) Length should be kept to a minimum, normally not in excess of 200 feet (60 m).
 - (2) Adequate lighting should be provided.
 - (3) Landscaping, fences, grade differences, or other obstructions should not hinder visibility into the access way from adjacent streets and properties.
 - (4) Surrounding land uses should be designed to provide surveillance opportunities from those uses into the access way, such as with the placement of windows.
 - (5) Emergency vehicle access should be provided in cases where external surveillance is inadequate.
3. Industrial and Commercial Areas
- a. Turnaround curb radius shall be 55 feet (16.8m).
 - b. Such cul-de-sacs shall be limited to 500 feet (150 m) in length from property line of the intersecting street to end of the bulb unless there are clearly defined topographic conditions requiring greater lengths. In such instances, intermediate turnarounds or secondary emergency vehicle only access may be required.
4. Residential Areas
- a. Cul-de-sacs serving more than four dwelling units or over 150 feet (45 m) in length and dead-end alleys require a turn-around. Cul-de-sacs of 150 feet (45 m) or less shall be developed such that access can be provided without backing onto streets intersecting the cul-de-sac.
 - b. Turnaround curb radius shall be 50 feet (15.0 m).
 - c. Turnaround curb radius may be reduced to 35 feet (10.7 m) if cul-de-sac length is less than 150 feet (45m), measured to the end of the bulb.
 - d. Residential cul-de-sacs are limited to a maximum of 200 ADT unless there are clearly defined topographic constraints that require greater volumes. Intermediate turnarounds shall have a 50-foot (15.0 m) radius. In all cases, intermediate turnarounds and/or special design may be required to accommodate access by emergency vehicles and/or emergency evacuations.

Design Standards – Street Element Design

A. Standard Drawings

Most design details, location requirements, pavement computations, and construction methods are included in San Diego Regional and City of San Diego Standard Drawings

B. Street Requirements

Curb-to-curb width is that distance between the curb lines of the respective curbs, as shown in San Diego Regional Standard Drawings.

C. Drainage

1. Street drainage is covered in detail in the City of San Diego Drainage Design Manual.
2. In streets with raised medians, storm water must be intercepted at the median in super-elevated sections to prevent flow at points of transition to crowned sections.
3. In superelevated streets, storm water must be intercepted at side curbs to prevent flow from side streets across the superelevated street.
4. Minimum grade is 0.6 percent unless drainage conditions cause a steeper minimum grade to be required in accordance with City of San Diego Drainage Design Manual.

D. Medians

1. All center medians shall be raised, bounded by 6-inch B-2 concrete curbs and surfaced with stamped concrete, brick pavers, or other decorative paving as called for in the City of San Diego Standard Drawings.
2. Landscaped medians shall conform to City of San Diego Standard Drawing SDG-112. Maintenance for landscaped medians shall be provided for through a maintenance assessment district or by other agreement with the City of San Diego.

E. Pavement

1. Streets shall be paved with asphalt concrete over cement-treated base, concrete, or full-depth asphalt concrete in accordance with City of San Diego Standard Drawing, SDG-113 or with a com-parable structural section approved by the City Engineer.
2. P.C.C. pavement is required for streets with grades greater than 12 percent.
3. The same pavement section is required in shoulders as well as driving lanes, except for rural road classifications.
4. Concrete bus pads are required for bus stops along main transit corridors and shall consist of nine inches of Portland cement concrete. Refer to MTDB Design Guidelines for other dimensions.
5. Raised pavement markers are required for all streets of collector or greater classification. Installation and criteria must be according to the latest edition of the State of California Traffic Manual.
6. Stamped concrete or other types of decorative paving will be permitted in the traveled roadway of a public and/or private street provided the following conditions are met:
 - a. At signalized intersections to designate pedestrian crosswalks (brick pavers, but not stamped concrete, may be used);
 - b. The street grade is 8 percent or less;
 - c. Maintenance is assured by either an encroachment removal agreement or by inclusion in an assessment district.Construction plans shall be prepared by a Registered Civil Engineer and shall indicate the location, color, type of material, and stamping pattern. Decorative paving may be allowed at other locations through the deviation process (see Appendix VIII).



7. Stamped concrete or other types of decorative paving will not be permitted at non-signalized intersections to designate pedestrian crosswalks or at locations where it might appear to be a pedestrian crosswalk, in cross-gutters or gutters, or to be used to delineate pedestrian ramps. Stamped concrete or other types of decorative paving is permitted at locations designated and marked as pedestrian crosswalks.
8. Engineers are cautioned that use of stamped concrete in residential areas may cause adverse community reaction due to noise where the roadway is immediately adjacent to dwelling units.

F. Rolled curbs

Rolled curbs are not permitted on publicly dedicated streets but may be used on private streets where the grade does not exceed 5 percent.

G. Right-of-Way

That portion of the right-of-way beyond curbs shall slope upward away from the street at 2 percent grade.

H. Sidewalks

Widths

1. Minimum widths are set forth in the Parkway configuration section for various street classifications.
2. The width of a contiguous sidewalk is measured from the back of the curb.
3. Sidewalk widths are intended to be clear widths. Where fire hydrants, street furniture, or other above ground appurtenances reduce such width, additional sidewalk shall be constructed around the obstacles.
4. Where feasible, the location of transit stops and shelters shall be determined and the sidewalk width shall be 10 feet (3.0 m) where shelters are proposed. Other bus stop loca-

tions shall provide eight feet (2.4 m) of sidewalk. The wider sidewalk widths for bus shelters shall extend for 25 feet (8 m) parallel to the curb measured from the bus stop sign. This will provide adequate clearance to accommodate bus lifts for disabled persons. Refer to MTDB design guidelines for further information.

5. Sidewalks less than 5 ft (1.5m) in continuous width shall provide passing space at reasonable intervals not to exceed 200ft (61 m). Passing space shall provide a 5ft by 10ft (1.5 m by 3.0 m) minimum clear space and may be provided at driveways, at building entrances, and at sidewalk intersections.

Locations

1. Sidewalk areas within curb returns are to be completely paved at all collector, major, and primary arterial intersections, and at other intersections where significant pedestrian volumes are anticipated.
2. A variation or transition in sidewalk location from that recommended above shall be considered to achieve consistency with existing adjacent sidewalks.
3. Transitions shall be four-to-one.

Curb Ramps

1. All sidewalk installations are to include curb ramps at curbed intersections, T intersections, and alley aprons.
2. Installation of two curb ramps per corner is required for new intersections.
3. Existing intersections to be retrofitted for curb ramps, one curb ramp per corner may be installed.

Innovative Sidewalks

Innovative sidewalks may be considered for area enhancement and to avoid existing features such as trees and may be approved on an individual basis provided they are located within the street right-of-way and maintenance of the area

between the sidewalk and curb is provided by special assessment district or other agreement with the City of San Diego. All other requirements shown in Standard Drawings, such as 2 percent fall between property line and face of curb, should be complied with. Sidewalks and the pedestrian path shall be parallel to the curb to the greatest extent practicable.

Construction

1. Sidewalks shall be constructed in accordance with San Diego Regional Standard Drawings.
2. Utility access panels within sidewalks must be slip resistant, flush mounted, and must not include holes greater than 1/4 inch.
3. Throughout the city, contractors stamp the work with their name and the date of construction of the sidewalk. In addition to the contractors' stamp, the name of the street is often imprinted in the curb. In many of the city's older neighborhoods, these street names may not be the current name of the street. However, these markers are an indicator of the age of a particular neighborhood and provide a sense of continuity and history for the residents. When existing sidewalks are being repaired or replaced, care must be taken to retain in place these stamps and imprints or to place them near the new sidewalk work.

I. Landscape Requirements

Street trees are urban amenities whose value is recognized in many of the City's land use policy documents. These documents call for street tree plantings to achieve various goals including: establishing and preserving neighborhood character, encouraging commercial revitalization, and creating a comfortable pedestrian environment. For requirements for street trees and other landscaping in the right-of-way, refer to the citywide Landscape Regulations (San Diego Municipal Code section 142, chapter 14, Article 2, Division 4) and the associated Landscape Technical Manual.

The citywide Landscape Regulations addresses requirements such as the quantity, distribution, size, selection, and approval of plant material, including street trees. The Landscape Technical Manual establishes standards, guidelines, and criteria for all landscaping in the public right-of-way, such as: locational criteria (distance of trees from the face of curb for certain street classifications and speeds, and from traffic signals, signs, and underground utilities), plant selection, maintenance, median landscaping, irrigation, and electrical services.

For all street trees and landscape plantings in roadway islands, watering and maintenance will be assured through an agreement with the City, such as a street tree permit, encroachment removal and maintenance agreement, or maintenance assessment district.



J. Driveways

1. Access to private property from public and private streets shall be by standard concrete driveways. Curb returns will be permitted when the driveway is signalized. Driveway widths on streets with collector or higher classification shall be consistent with the Land Development Code. Driveways shall be designed such that access can be provided without backing onto streets that are collector or higher.
2. No driveway access is normally permitted to a primary arterial. Should a lot have frontage only on a primary arterial, driveway access limited only to right turns in and out will be permitted at locations and under conditions specified by the City Engineer and may require an additional lane.
3. Median breaks for driveway access to major streets will not normally be permitted unless all the following conditions exist:
 - a. The property to be served is a major traffic generator and has a continuous frontage of 1,200 feet (360 m) or more along the major street and is situated between streets that intersect the major street from the side occupied by the property.
 - b. The median opening is not less than 600 feet (180 m) from an intersection with a major or collector street.
 - c. The median opening is not less than 400 feet (120 m) from an intersection with a local street. The need for left-turn storage may require a greater distance.
 - d. The median opening is not less than 600 feet (180 m) from any other existing or proposed mid-block median opening.

- e. All costs, i.e., base material, surfacing, traffic safety street lighting, traffic signals, reconstruction or utility relocation required by a mid-block opening will be borne by the requesting party.

K. Guardrail and Safety Devices

1. All guardrail installations must be done in conformance with the latest edition of State of California Traffic Manual and Regional/City of San Diego Standard Drawings.
2. Guardrail may be required at certain locations for safety purposes in accordance with guidelines in the State of California Traffic Manual.
3. Reflectors and other safety structures may be required when necessary for public safety.
4. Where fire hydrants are required, guardrail shall be installed in a manner so as to not interfere with the operation of such hydrants.

L. Street Name Signs

Metal street name signs on metal posts are required at each intersection, at any point of street name change, and at midpoint in blocks over 2,000 feet (600 m) in length, in conformance with City of San Diego Standard Drawings.

M. Traffic Control and Signalization

Where two or more streets intersect, some form of traffic control is usually needed to define the right-of-way of the vehicles entering the intersection. This control can take the form of yield signs, stop signs on the minor street, all-way stop control, or traffic signals. Stop signs and all-way stop controls are installed according to City Council Policy 200-8. Traffic signals are installed according to City Council Policy 200-6. These Council Policies prescribe warrants based on City, state of California, and federal standards. The warrants take into consideration vehicular and pedestrian volumes, accident history, traffic safety, the transportation system, and other relevant factors.

When traffic signals are synchronized and operating in a coordinated system, they can facilitate the flow of vehicular traffic along a street corridor and within a network of streets.

Coordinated traffic signals can reduce delay and travel times of vehicles, minimize the number of stops and starts and improve air quality by reducing vehicular emissions caused by the starts and stops. For efficient coordination, intersections controlled by traffic signals should be spaced approximately one-fourth mile (400 m) to one-half mile (800 m) apart.

N. Street Furniture

1. Street Furniture and above-ground appurtenances placed in the public right-of-way shall conform to the requirements set forth in the San Diego Municipal Code and applicable council policies.
2. Street Furniture and above-ground appurtenances shall be located in a fashion that preserves the safety, integrity, and layout of the pedestrian passageway and assures that the right of the public to use the public sidewalk is not unreasonably restricted.
3. Bicycle racks, where placed in the public right-of-way, should be sited in a well-lit area as close to building entrances and regular foot traffic as possible without unreasonably restricting pedestrian passageway. The rack must support the bicycle frame (not the wheel) at two points of contact and permit the use of a U-shaped lock to secure the frame and one wheel. The rack must be positioned to provide 2 feet by 6 feet (0.6m by 1.8m) of space per bicycle.

Design Standards- Planned Residential Developments

A. General

These standards shall apply only to areas that have an approved Planned Residential Development Permit.

B. Private Streets

1. Private streets may be utilized where there is a homeowners association established that would maintain the street system.
2. The entrance to private streets shall advise the public of the nondedicated status of the street system and shall have an entrance design that visibly reinforces the private access. As a minimum, absent other design features, this design shall consist of signage designating the street as private. Such entrances must be provided with adequate visitor parking and turnaround facilities.
3. Private streets shall be designed and constructed to the same structural, geometric, lighting, and drainage standards as dedicated streets. Private streets with parking on both sides of the street shall have a minimum curb-to-curb width of 34ft (10.2 m).
4. General utility easements will be required over private streets. Width of easement should be consistent with street right-of-way.

C. Driveways

1. Driveways, where permitted in lieu of either dedicated or private streets, must be designed to allow direct access to all developed areas of the project.
2. Driveways serving as fire lanes shall be designed with a semi truck turning radius of 50 feet (15.2 m).



Design Standards *-Street Element Design*

3. Minimum driveway width shall be consistent with the Land Development Code, with a 26-foot (7.9 m) width within 20 feet (6.0 m) of a fire hydrant.

D. Walkways

A system of improved all-weather walkways must be provided connecting each dwelling unit to street sidewalks within and adjacent to the development and to major points of pedestrian attraction within the development.

E. Parking on Private Streets and Driveways

1. Parking shall meet the minimum requirements established by the applicable zone as contained in the Land Development Code.
2. An unobstructed minimum distance of 25 feet (7.5 m) from the circulation driveway curb to the structure or carport area and not less than 20 feet (6.0 m) from the back of sidewalk shall be provided.
3. Parking bays, both parallel and perpendicular, may be utilized on low-volume residential streets. Such facilities, normally, would be included within the right-of-way or private street easement and would be maintained as part of the street. Where a sidewalk is located on the same side of the roadway as the parking bay, a continuous walkway must be maintained either by restricting parking within five feet of the extended curb line or by providing an improved walkway around the parking bay. All parking bays shall accommodate full-size vehicles.

Appendix



APPENDIX I - Street Classification

A. Functional Classification

The width, street configuration, alignment, and design speed of a street is related to its functional classification. For the purpose of these guidelines, the following functional classifications shall apply.

1. **Alley:** A roadway, usually unnamed, which primarily provides secondary vehicular access to the rear and side entrances of abutting property. It should be a minimum of 20 ft (6m) and a maximum of 24 ft (7.2m) in width.
2. **Private Street:** A street that provides, primarily, direct access to abutting property. It carries low vehicular movement, low-to-heavy pedestrian movement, and low-to-moderate bicycle movement. It has the same overall standards, design and construction as a public street with the exception that the responsibility for maintenance is private.
3. **Pedestrianway/Bikeway:** A facility that provides, primarily, for pedestrian and bicycle circulation between two closely spaced (250 feet (75 m) or less) streets. It has a walkway/riding surface and landscaping, and may include pedestrian-scale lighting and an underground utility corridor.
4. **Bike Path:** A facility that provides exclusively for bicycle circulation along major corridors. It has an all-weather riding surface.
5. **Transitway:** A street that provides, primarily, for moderate-to-heavy transit movement and moderate-to-heavy pedestrian movement in a pedestrian/transit mall setting, with commercial retail, food service, and entertainment uses. It has a narrow transit roadway, wide sidewalks, street trees, traffic safety street lighting, and landscaping. It may include planter boxes, pedestrian-scale lighting, and other pedestrian amenities, and an underground utility corridor.
6. **Local Street:** A street that provides, primarily, direct access to abutting property. It carries low vehicular movement, low-to-heavy pedestrian movement, and low-to-moderate bicycle movement. It has on-street parking, street trees, traffic safety street lighting, and sidewalks. It may include landscaping, pedestrian-scale lighting, and underground utilities.
7. **Collector Street:** A street that primarily provides movement between local/collector streets and streets of higher classification and, secondarily, provides access to abutting property. It carries low-to-moderate vehicular movement, low-to-heavy pedestrian movement, moderate-to-heavy bicycle movement, and low-to-moderate transit movement. It has on-street parking, street trees, traffic safety street lighting, and sidewalks. It may also include landscaping, pedestrian-scale lighting, and underground utilities.
8. **Major Street:** A street that primarily provides a network connecting vehicles and transit to other major streets and primary arterials, and to the freeway system and secondarily providing access to abutting commercial and industrial property. It carries moderate-to-heavy vehicular movement, low-to-high pedestrian and bicycle movements, and moderate-to-high transit movement. It has a raised center median, street trees, traffic safety street lighting, and sidewalks, and may include landscaping, pedestrian-scale lighting, underground utilities, on-street parking, and/or bike lanes.
9. **Primary Arterial:** A street that primarily provides a network connecting vehicles and transit to other primary arterials and to the freeway system. It carries heavy vehicular

movement while providing low pedestrian movement and moderate bicycle and transit movements. It has a raised center median, bicycle lanes, street trees, traffic safety street lighting, sidewalks, and no access from abutting property. It may include underground utilities.

10. Rural Local Road: A road in agricultural, natural open space, and large lot (greater than 2.5 acres) residential areas that primarily provides direct access to abutting property. It carries low vehicular movement, low pedestrian movement, and low bicycle movement. It may include traffic safety street lighting and underground utilities. It typically does not have sidewalks or landscaping.

11. Rural Collector Road: A road in agricultural, natural open space, and large lot (greater than 2.5 acres) residential areas that primarily provides movement between local and collector roads and roads or streets of higher classification and secondarily provides access to abutting property. It carries low-to-moderate vehicular movement, low pedestrian movement, low-to-moderate bicycle movement, and low transit movement. It may include traffic safety street lighting and underground utilities. It typically does not have sidewalks or landscaping.

B. Boulevards

The progress Guide and General Plan and various community plans designate certain streets as being of great importance to a community and recommend special treatment to recognize this. The Bay-Park Link and Broadway in Centre City are two such examples. The recommendations may call for the street to be designed as a boulevard. A boulevard is defined as “a street or promenade planted with trees.”

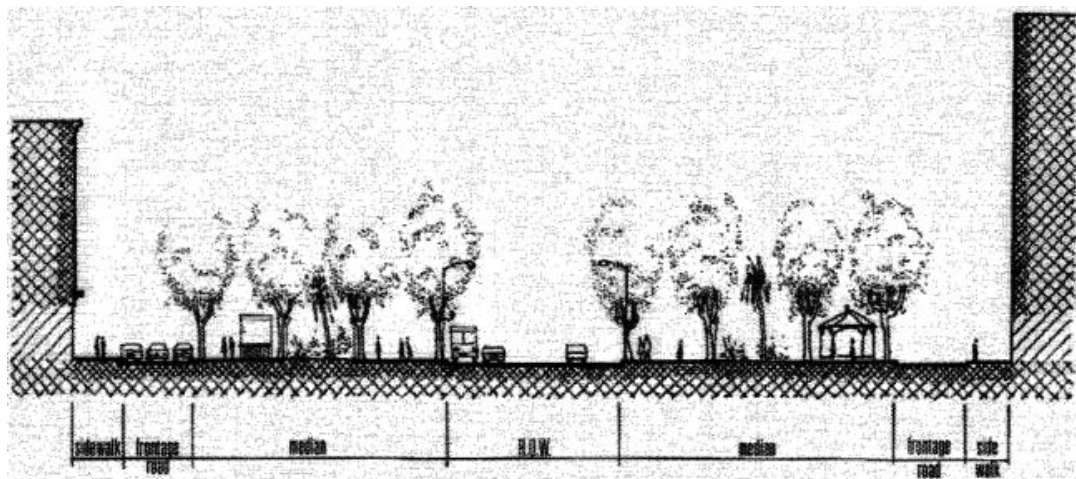
The Boulevard Book¹ describes three boulevard types:

1. A street with a wide central landscaped median flanked on either side by roadways and sidewalks. The central median may be a pedestrian promenade or planted with grass.
2. A street with a wide central roadway and broad, tree-lined sidewalks along each side.
3. A multi-way boulevard is designed to separate through traffic from local traffic and, often, to provide special pedestrian ways on tree-lined malls. It is characterized by a central roadway of at least four lanes for generally fast and non-local traffic. On either side of this roadway are tree-lined medians that separate it from parallel, one-way side access roads for slow-moving traffic.

Each street designated as a boulevard will require a unique and specialized design treatment; therefore, no standards are provided in the Street Design Manual. Boulevard designers are referred to the design and policy guidelines found in The Boulevard Book cited above.

¹ Allan B. Jacobs, et al., MIT Press, 2000

Appendix



Source: Allan B. Jacobs, et al, *The Boulevard Book*, MIT Press, 2000.

APPENDIX II—Land Use

A. Open Space

Land protected for outdoor recreation and education, for scenic and visual enjoyment, and for controlling urban form and design.

Environmentally sensitive lands are also preserved in open space.

Open Space-Park

Public parks and facilities, once they are dedicated as park land, and providing for various types of recreational needs of the community.

Open Space-Conservation

Land preserved for the purpose of protecting natural and cultural resources and environmentally sensitive lands.

Open Space-Floodplain

Land within floodplains where development is controlled to protect the public health, safety, and general welfare, and land areas identified by the flood insurance rate maps on file with the City of San Diego Floodplain Administrator.

B. Agriculture

Areas that are rural in character and are designated for agricultural uses or are not designated for long-term agricultural use but are awaiting development at urban intensities.

Includes all types of agricultural uses and some minor agricultural sales.

C. Residential

Large Lot Single Dwelling Residential

Single dwelling units on large lots with some accessory agricultural uses. Applies to areas that are rural in character. Lots are greater than 2.5 acres. Densities are 0.4 dwelling units per acre or less.

Single Dwelling Residential

Single dwelling units on individual lots that have a variety of lot sizes and residential product types.

Lot sizes range from 3,000 square feet to 2.5 acres. Densities range from 0.4 dwelling units per acre to 8.7 dwelling units per acre.

Low Density Multiple Dwelling Residential

Two dwelling units per lot, with lot sizes ranging from 4,000 square feet to over 6,000 square feet and densities up to 21.8 dwelling units per acre. Includes townhouse developments with densities up to 19.8 dwelling units per acre.

Medium to Very High Density Multiple Dwelling

More than two dwelling units per lot with densities ranging up to 217.8 dwelling units per acre.

D. Commercial

Includes a wide range of uses for the employment, shopping, services, recreational, and lodging needs of the residents and visitors to the City of San Diego. Also includes mixed use development.

Neighborhood Commercial

Smaller scale, lower density developments that are consistent with the character of the surrounding residential areas. May include mixed use (commercial/ residential). Primarily located along local and selected collector streets.

Pedestrian-Oriented Commercial Retail

Developed in a pedestrian-oriented pattern. A functional, convenient, and pleasant environment has been created for people arriving on foot, bicycle, and transit. Also accessible by the automobile.

Community Commercial

Developments with community-serving commercial services, retail uses of moderate

intensity and small-to-medium scale. Includes shopping centers and auto-oriented strip commercial areas. Primarily located along collector streets, major streets, and public transportation lines.

Regional Commercial

Has the broadest mix of retail, wholesale, commercial service, and business/professional office uses. Includes large scale, high intensity developments. Primarily located along arterials, major streets, and major public transportation lines.

Commercial Office

Includes employment uses together with limited complementary retail and medium-to-high density residential development.

Visitor Commercial

Provides for the lodging, dining, and recreational needs of both tourists and the local population.

Urban Village

An Urban Village is a compact pattern of land use including housing, public parks and plazas, offices, stores, and major transit stops on the existing and planned transit system, where pedestrian and bicycle activity is desired. Urban Villages are characterized by interconnected streets, building entries along the street, and architectural features and outdoor activities that encourage pedestrian and bicycle activity and transit accessibility. Urban Villages have their highest intensity of development focused near transit, and a mix of land uses convenient to residents and employees.

E. Industrial

Includes a wide range of industrial/manufacturing activities.

Industrial Park

Includes high quality science and business park development in a campus-like environment characterized by comprehensive site design and substantial landscaping.

Small Lot Industrial

Small-scale industrial activities within urbanized areas.

APPENDIX III—References

A. Federal Government and Other National Sources

Americans With Disabilities Act Accessibility Guidelines, (ADAAG), Department of Justice; Title II, "State and Local Government Programs and Services," and Title III, "Public Accommodations and Commercial Facilities."

A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials (AASHTO)

Manual on Uniform Traffic Control Devices, (MUTCD), Federal Highway Administration.

B. State Government and Other Regional Sources

Highway Design Manual, California Department of Transportation (Caltrans).

Standard Plans, California Department of Transportation.

Standard Specifications, California Department of Transportation.

Title 24, Office of the State Architect, Access Compliance Section.

Traffic Manual, California Department of Transportation.

C. Local Sources

Centre City Streetscape Manual, Centre City Development Corporation (CCDC), latest version.

Designing for Transit, A Manual for Integrating Public Transportation and Land Development in the San Diego Metropolitan Area, Metropolitan Transit Development Board (MTDB), latest version.

Drainage Design Manual, City of San Diego, Engineering & Capital Projects Department, Transportation & Drainage Design Division.

Landscape Technical Manual, City of San Diego, Planning Department, Landscape Planning Section; Document No. RR-274506, approved by City Council on October 3, 1989.

Standard Special Provisions Street Lighting & Traffic Signal Systems of the City of San Diego, City of San Diego, Engineering & Capital Projects Department, latest version.

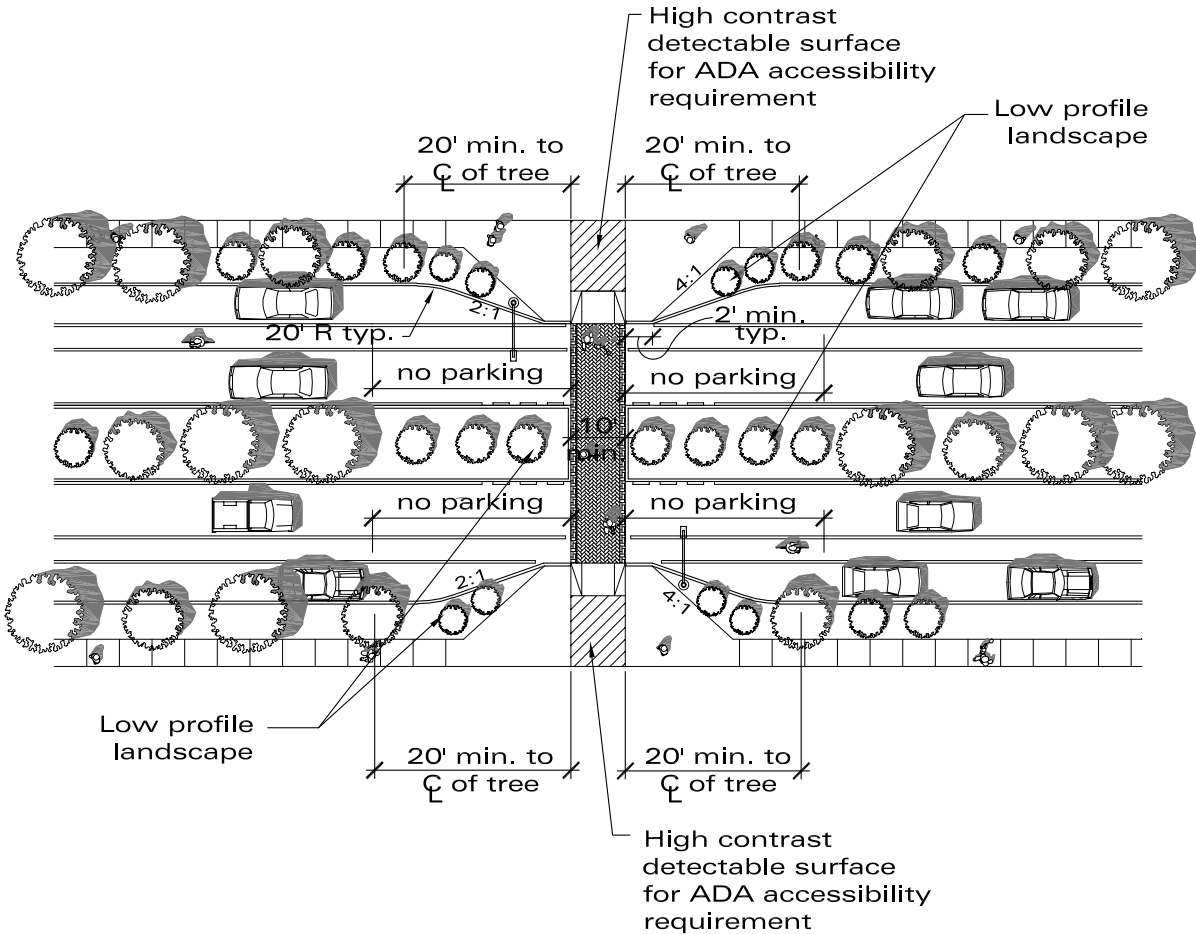
Transportation & Drainage Design Division; Document No. 769814, filed on October 21, 1993 in the Office of the City Clerk.

Standard Drawings of City of San Diego, includes all San Diego Area Regional Standard Drawings; latest version.

Standard Specifications for Public Works Construction, latest version, with City of San Diego Supplement Amendments and Regional Supplement Amendments, Document No. 769818, filed on February 2, 1995 in the Office of the City Clerk.

Transit-Oriented Development Design Guidelines, prepared by Calthorpe Associates for the City of San Diego; approved by the City Council on August 4, 1992.

APPENDIX IV—Midblock Pedestrian Crosswalk



NOTES:

- * On multi-lane streets brick pavers or any other approved contrasting textured materials should be considered in crosswalk area.
- * Flashing beacons may be installed if State warrants are met.
- * Refer to State Traffic Manual for appropriate pavement markings and signage.
- * Drainage requirements must be evaluated and addressed.
- * Crosswalks must meet traffic requirements per City Council Policy 200-07.

- * "No Parking" shall be determined based on visibility requirements set forth in the Caltrans Highway Design Manual.
- * Placement of landscaping shall be consistent with the Landscape Technical Manual and shall allow for sight distance requirements.
- * Curb extensions as shown may be installed to improve pedestrian visibility and reduce crossing distance.

APPENDIX V–Summary of Traffic Calming Measures

Category	Traffic Calming Device	Description	Applicability	Advantages	Disadvantages
Horizontal Deflections	Chicanes	A chicane is a channelization that causes a series of tight turns in opposite directions in an otherwise straight stretch of road	<ul style="list-style-type: none"> ▪ A chicane may be used on local streets. ▪ It is inappropriate for use on: <ul style="list-style-type: none"> - Streets classified as collector or higher, - Bus routes, - Emergency response routes, - Where there is limited stopping sight distance, or - Where there is a grade that exceeds 5% 	A chicane: <ul style="list-style-type: none"> ▫ Slows traffic, ▫ Creates opportunity for landscaping, and ▫ Tends not to divert traffic to nearby streets 	A chicane may: <ul style="list-style-type: none"> ▪ Cause some loss of on-street parking, ▪ Increase emergency response time ▪ Impact driveways, or ▪ Affect drainage and street sweeping
	Mini Circles	A raised circular island placed in the center of an intersection	<ul style="list-style-type: none"> ▪ A mini circle may be used on local streets with alternative access points. ▪ It is inappropriate to use on: <ul style="list-style-type: none"> - Streets classified as collector or higher, - Bus routes, - Emergency response route, - Where there is a grade that exceeds 5% on any approach, or - Where there is limited sight distance 	A mini circle: <ul style="list-style-type: none"> ▪ Slows traffic on each approach, ▪ Creates landscaping opportunity, ▪ Reduces right-of-way conflict, and ▪ Tends not to divert traffic to nearby streets 	A mini circle may: <ul style="list-style-type: none"> ▪ Impact large vehicles' turns, or ▪ Increase emergency response time
	Median Slow Points	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. It may be installed on an approach to an intersection or mid-block.	<ul style="list-style-type: none"> ▪ A median slow point may be used on two lane streets. ▪ If installed at an intersection, street should have alternative access points. ▪ It is inappropriate for usage on: <ul style="list-style-type: none"> - Streets classified as major or higher, or - Where there is limited stopping sight distance 	A median slow point: <ul style="list-style-type: none"> ▪ Slows traffic, ▪ Creates pedestrian refuge area, ▪ Creates landscaping opportunity, and ▪ Tends not to divert traffic to nearby streets 	A median slow point may: <ul style="list-style-type: none"> ▪ Cause some loss of on-street parking, or ▪ Impact large vehicles' turns when placed at intersections

Category	Traffic Calming Device	Description	Applicability	Advantages	Disadvantages
Vertical Deflections	Road Humps	Rounded raised areas placed across the road, approximately 12 feet long, 3.5 inches high, and parabolic in shape. They are most effective when used in groups spaced appropriately to discourage speeding between humps	<ul style="list-style-type: none"> ▪ Road humps may be used on local streets. ▪ Road humps are inappropriate on: <ul style="list-style-type: none"> - Streets classified as collector or higher, - Emergency response routes, - Bus routes, - Where there is a grade that exceeds 5%, or - Where there is limited stopping sight distance 	Road humps: <ul style="list-style-type: none"> ▫ Slow traffic, and ▫ Discourage short-cutting 	Road humps may: <ul style="list-style-type: none"> ▪ Divert traffic, ▪ Increase noise, or ▪ Increase emergency response time
	Speed Table	Essentially flat-topped road humps often constructed with brick or other textured materials on the flat section. They have gentler effect on buses than road humps.	<ul style="list-style-type: none"> ▪ A speed table may be used on local streets. ▪ It is inappropriate on: <ul style="list-style-type: none"> - Streets classified as collector or higher, - Emergency response routes, - Where there is a grade that exceeds 5%, or - Where there is limited stopping sight distance 	A speed table: <ul style="list-style-type: none"> ▪ Slows traffic, and ▪ Discourages short-cutting 	A speed table may: <ul style="list-style-type: none"> ▪ Divert traffic, ▪ Increase noise, ▪ Increase emergency response time, or ▪ Impact buses
	Raised Crosswalks	An extension of speed table where street is brought up to sidewalk level	<ul style="list-style-type: none"> ▪ A raised crosswalk may be used on local streets. ▪ It is inappropriate on: <ul style="list-style-type: none"> - Streets classified as collector or higher, - Emergency response routes, - Where there is a grade that exceeds 5%, or - Where there is limited stopping sight distance 	A raised crosswalk: <ul style="list-style-type: none"> ▪ Slows traffic, ▪ Discourages short-cutting, and ▪ Enhances pedestrian safety 	A raised cross walk may: <ul style="list-style-type: none"> ▪ Divert traffic to nearby streets, ▪ Increase noise, ▪ Increase emergency response time, or ▪ Impact buses ▪ Require special drainage considerations

Category	Traffic Calming Device	Description	Applicability	Advantages	Disadvantages
Intersection Pop-out	Intersection pop-out	Curb extensions that narrow the street at intersections by widening the sidewalks at the point of crossing. It can be used at an intersection to create a street gateway effect visually announcing an entrance to a neighborhood	<p>Intersection pop-outs:</p> <ul style="list-style-type: none"> ▪ May be used on: <ul style="list-style-type: none"> - Local streets, - Collector streets, or - Urban major streets ▪ Are inappropriate for usage on: <ul style="list-style-type: none"> - Major streets, or - Primary arterial streets 	<p>Intersection pop-outs:</p> <ul style="list-style-type: none"> ▫ Improve pedestrian visibility, ▫ Create shorter pedestrian crossing width, and ▫ May reduce vehicle speeds 	<p>Intersection pop-outs may:</p> <ul style="list-style-type: none"> ▪ Impact large vehicle turns, ▪ Impact accessibility by transit vehicles and emergency vehicles, ▪ Require parking removal,
Traffic Diverters	Semi-diverters	A barrier placed at the end of a block that prevents entrance by blocking traffic in one direction of a street and allows exit by permitting traffic in the opposite direction to pass through. It includes provisions for emergency vehicles and continuation of pedestrian or bicycle routing.	<p>A semi-diverter:</p> <ul style="list-style-type: none"> ▪ May be used on low volume local residential streets ▪ Is inappropriate for usage on: <ul style="list-style-type: none"> - Emergency response routes - Bus routes, or - Streets classified as collector or higher 	<p>A semi-diverter:</p> <ul style="list-style-type: none"> ▫ Reduces cut-through traffic, ▪ Reduces pedestrian crossing widths, and ▪ Creates opportunity for landscaping 	<p>A semi-diverter may:</p> <ul style="list-style-type: none"> ▪ Divert traffic to other low volume streets, ▪ Increase trip lengths, ▪ Cause loss of parking, ▪ Increase emergency response time, or
Channelization	Regulatory signs, markings, landscaping, or raised islands aimed at motorized, non-motorized, or pedestrian traffic	Channelization may be achieved through right-of-way controls at intersections, controls affecting or restricting the direction or speed of traffic, or design features that physically restrict the movement of traffic	Channelization is site specific and should be evaluated on a case-by-case basis	<p>Channelization may be designed to:</p> <ul style="list-style-type: none"> ▪ Prevent cut-through traffic ▪ Reduce speed ▪ Create opportunity for landscaping, ▪ Control turning traffic in/out of a neighborhood, or ▪ Physically control pedestrian movements 	<p>Channelization may:</p> <ul style="list-style-type: none"> ▪ Increase trip lengths ▪ Impact emergency response time, or ▪ Impact accessibility

APPENDIX VI—Best Management Practices Available To Address Storm Runoff Water Quality Associated with Street Design

The 1972 Federal Clean Water Act established the National Pollutant Elimination System (NPDES) permit program to regulate the discharge of pollutants to waters of the United States. Governmental agencies in San Diego County collect and discharge storm water and urban runoff containing pollutants through their storm water conveyance systems. These agencies, including the City of San Diego, implement programs to reduce pollutants under NPDES permit requirements commonly known as the Municipal Storm Water Permit for San Diego Copermittees. The City of San Diego is committed to protecting and improving water quality of the rivers, bays, and ocean in the region, and achieving Municipal Permit compliance. To comply with the Municipal Permit, the City will “enforce the use of storm water Best Management Practices (BMPs) to prevent or reduce discharges of pollutants to the municipal storm drain system.”

The intent of this appendix is to provide developers, project engineers, and planners with site design concepts or BMPs that could potentially be incorporated into the design of streets to address adverse impacts to water quality associated with storm water runoff. It is important to note that other City regulations, including, but not limited to, the *Storm Water Standards* (scheduled to become effective December 2, 2002), will dictate the mandatory site design, source control and treatment control requirements related to development projects of all types, including streets.

The feasibility of using a BMP listed in this appendix should be evaluated by project

engineers on a project-by-project basis. Certain BMPs discussed in the appendix may not be appropriate for a street classification due to constraints associated with site conditions.

A. Effect of Storm Water Runoff From Streets on Water Quality

Storm water runoff from streets contains a variety of pollutants collected and concentrated from impervious surfaces⁽¹⁾. Streets and other transportation structures typically can comprise between 60 and 70% of an urban city's total impervious area and, streets are almost always directly connected to an underground storm water system⁽¹⁾. Pollutants collect on impervious surfaces and are conveyed into the storm drain system in higher concentrations following a rain event. Discharge of concentrated pollutants from impervious surfaces to the storm drain system after a significant rain event is referred to as the “first flush”.

Urban runoff from a developed site including streets has the potential to contribute pollutants, including oil and grease, suspended solids, metals, gasoline, pesticides, and pathogens to the storm water conveyance system and receiving waters⁽²⁾. Primary sources of oil and grease in storm runoff are petroleum hydrocarbon products, motor products from leaking vehicles, esters, oils, fats, waxes, and high molecular-weight fatty acids⁽²⁾. Introduction of these pollutants to the water bodies are very possible in association with typical development projects due to the wide uses and applications of some of these products in municipal, residential, commercial, industrial, and construction areas⁽²⁾. Elevated oil and grease content from, in part, automobile sources can decrease the aesthetic value of the water body, as well as the water quality⁽²⁾.

B. Site Design Best Management Practices for Roadways

A BMP incorporated into a street design is primarily intended to minimize the amount of impervious surface. A goal of project site design should involve constructing streets, sidewalks and parking lot aisles to the minimum widths necessary, provided that public safety and a walkable environment for pedestrians are not compromised.

The design of private roadway drainage should consider using at least one of the following (for further guidance, see *Start at the Source* [1999]). (Note: the City may impose the following and other requirements to private roadway designs through the Storm Water Standards [scheduled to be implemented on December 2, 2002]. Consult the Development Services Department for more information.

- Rural swale system: street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings;
- Urban curb/swale system: street slopes to curb, periodic swale inlets drain to vegetated swale/biofilter;
- Dual drainage system: First flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder, high flows connect directly to storm water conveyance system.
- Other methods that are comparable and equally effective within the project.

Private roadways for storm water requirement purposes are defined as low traffic private roads. However, use of these type of site design BMPs could be applied to public road classifications. Descriptions of these systems are discussed below.

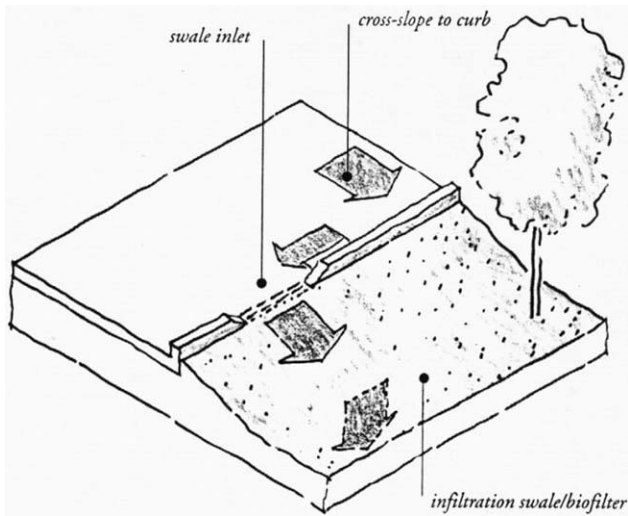
1. Descriptions of Best Management Practices for Urban Curb/Swale System Roadways

For streets where a rigid pavement edge is required, curb and gutter systems can be designed to empty into drainage swales. Runoff travels along the gutter, but instead of being emptied into a catch basin, multiple openings in the curb direct runoff into surface swales or infiltration/detention basins⁽¹⁾. The urban curb/swale system design would be appropriate for Local Street, Collector Street, Major Street, Primary Arterial, Expressway and Freeway classifications that require use of curb and gutter.

a. Urban Curb/Swale Inlet Design

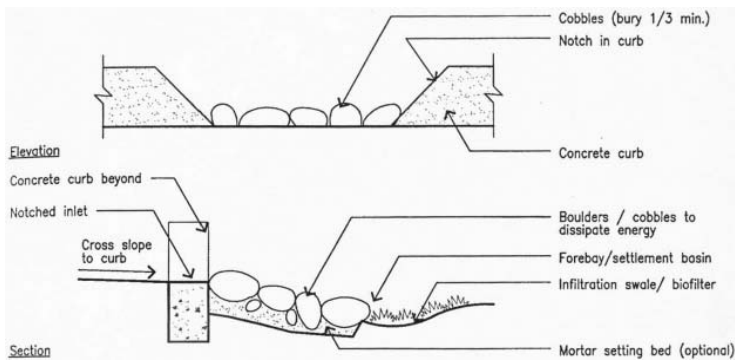
Typical, curb and gutter systems collect runoff into an underground pipe system. A swale inlet collects runoff into a surface infiltration system. A diagram and section of a typical urban curb/swale system are shown in Figures 1 and 2. The swale inlet includes features such as cobbles to dissipate flow velocities and minimize erosion from initial first flush of runoff. Swales remove dissolved pollutants, suspended solids (including heavy metals, nutrients), oil and grease by infiltration using the following features: 1) runoff through the swale topography that collects water in a forebay/ settlement basin prior to discharge; and 2) infiltration of runoff into groundwater through vegetative surface layer or Biofilter. ⁽¹⁾

Figure 1
Urban Curb/Swale System-Diagram⁽¹⁾



6.2c Urban curb/swale system

Figure 2
Urban Curb/Swale Inlet Design Section⁽¹⁾



b. Surface Vegetated Swale/Bio Filter Design

Vegetated swales used in the urban curb/swale design are vegetated earthen channels that convey and infiltrate water and remove pollutants. A grass swale is planted with turf grass; a vegetated swale is planted with bunch grasses shrubs or trees.⁽¹⁾ A photograph as well as sections of typical vegetated swale are shown in Figures 3 and 4.

Figure 3
Vegetative Swale Design Section⁽¹⁾

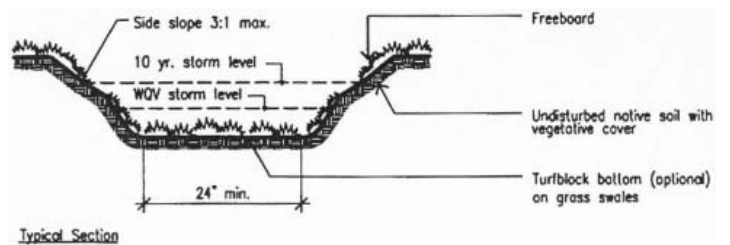


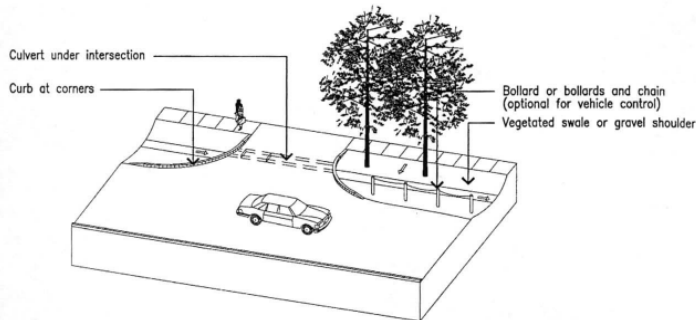
Figure 4
Vegetative Swale – Southbound Interstate 5 near La Costa Avenue Offramp



2. Descriptions of Best Management Practices for Rural Swale System Roadway Classifications

Rural swale systems are a combination of street design elements that allow for surface drainage while simultaneously protecting the roadway edge, organizing parking and allowing for driveway access. ⁽¹⁾ A section of a typical rural swale system is illustrated in Figure 5. As shown in Figure 5, curb and gutter is not required. The street is crowned to direct runoff to shoulders where it is collected into a vegetated swale or gravel shoulder. The rural swale system would be appropriate for Private Street, Rural Local Road and Rural Collector Road classifications.

Figure 5
Rural Swale System Diagram⁽¹⁾

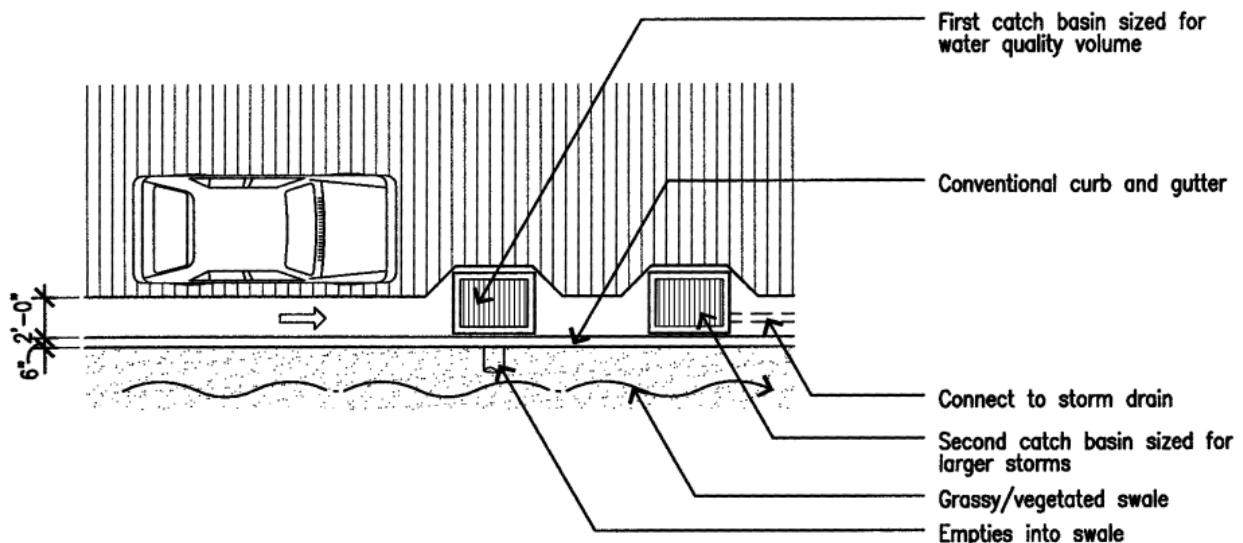


3. Description of Best Management Practices for Dual Drainage Systems

Dual drainage systems provide a pair of catch basins at each inlet point. The first is sized to direct the water quality volume into a landscaped infiltration area, and the second collects the overflow of larger storms and directs it to the storm drain system. A section of a typical dual drainage system is shown in Figure 6. ⁽¹⁾ The Dual Drainage system design would be appropriate for Local Street, Collector Street, Major Street, Primary Arterial, Expressway and Freeway classifications that require use of curb and gutter.

As shown in Figure 6, in a dual drainage system two catch basins are located adjacent to each other. The first uphill catch basin involves a design outlet pipe to accommodate the water quality volume and direct to adjacent grass or vegetated swale. When first catch basin is full, water will flow past first basin inlet and enter second catch basin. ⁽¹⁾

Figure 6
Dual Drainage System Diagram⁽¹⁾

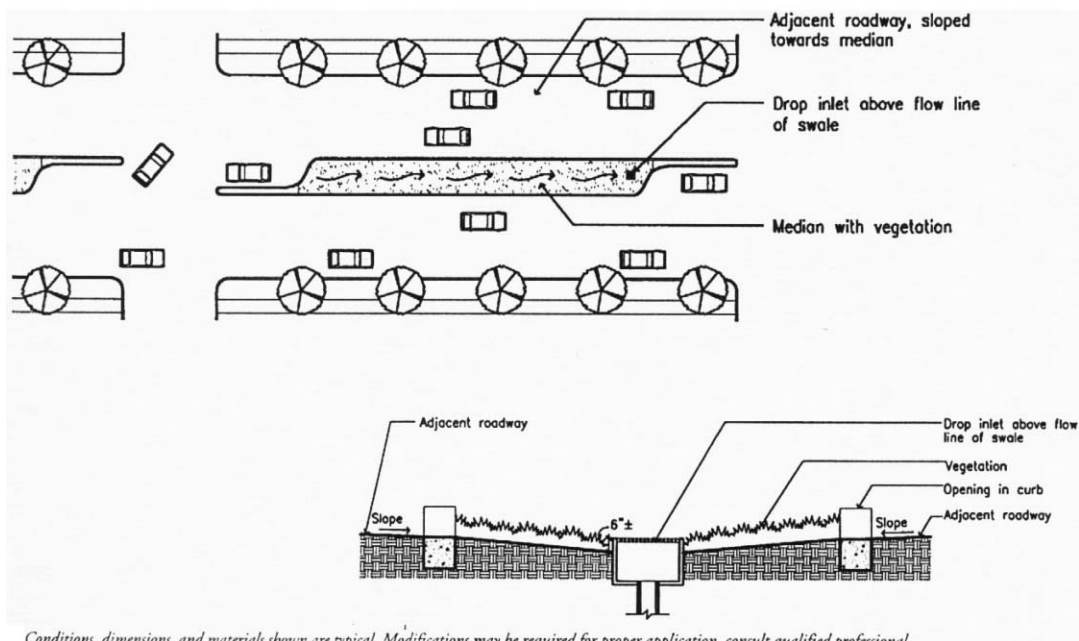


4. Description of Best Management Practices for Concave Medians

Conventional medians are normally designed as a convex surface to shed water onto adjacent pavement and into a curb and gutter system. Concave medians reverse this relationship by designing the median to receive runoff. ⁽¹⁾ A diagram and section of a typical concave median is shown in Figure 7.

The infiltration portion of the landscape median can be designed as a landscaped swale or turf-lined biofilter to treat first-flush runoff. Catch basin and underground storm drain systems may be required for high flows depending on the available area for infiltration and the duration that water is retained in the swale. ⁽¹⁾

Figure 7
Concave Median Diagram and Section ⁽¹⁾



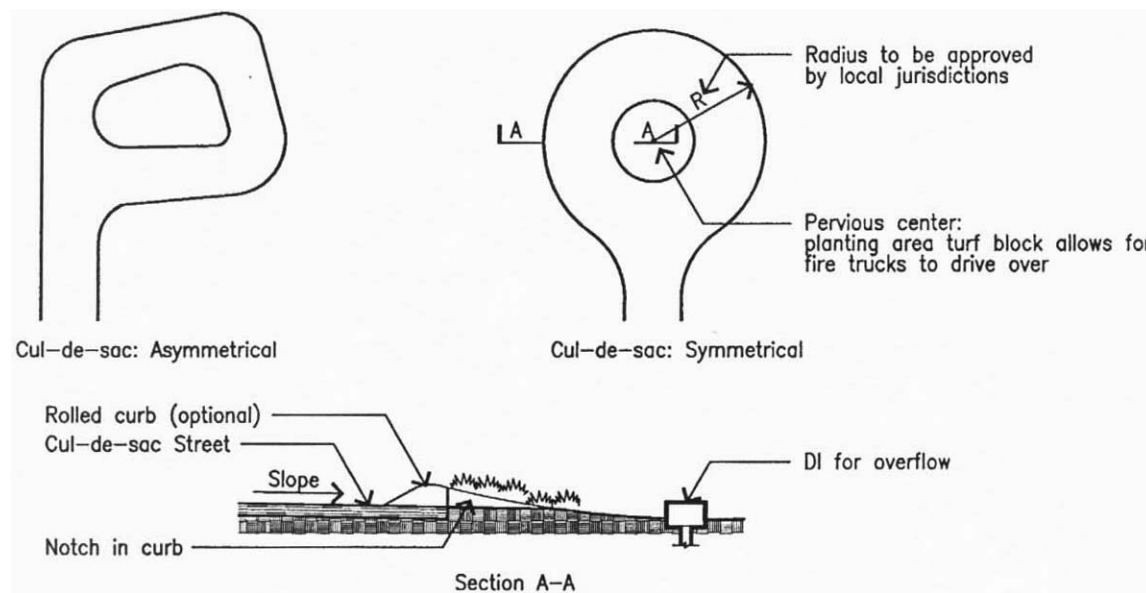
5. Description of Best Management Practices for Cul-de-sacs

Typical cul-de-sacs are paved across their entire diameter. This large impervious area adds to environmental degradation by increasing runoff. Adding a landscaped area in the center of the cul-de-sac (See Figure 8) can reduce impervious land coverage by 30-40%, depending on configuration, while maintaining the required turning radius.⁽¹⁾

References

1. *Start at the Source*, Bay Area Stormwater Management Agencies Association, 1999.
2. *Reference Guide for Stormwater Best Management Practices*, City of Los Angeles Stormwater Management Division, July 2000, www.lacity.org/SAN/wpd/index.htm.

Figure 8
Cul-de-sac Best Management Practices⁽¹⁾



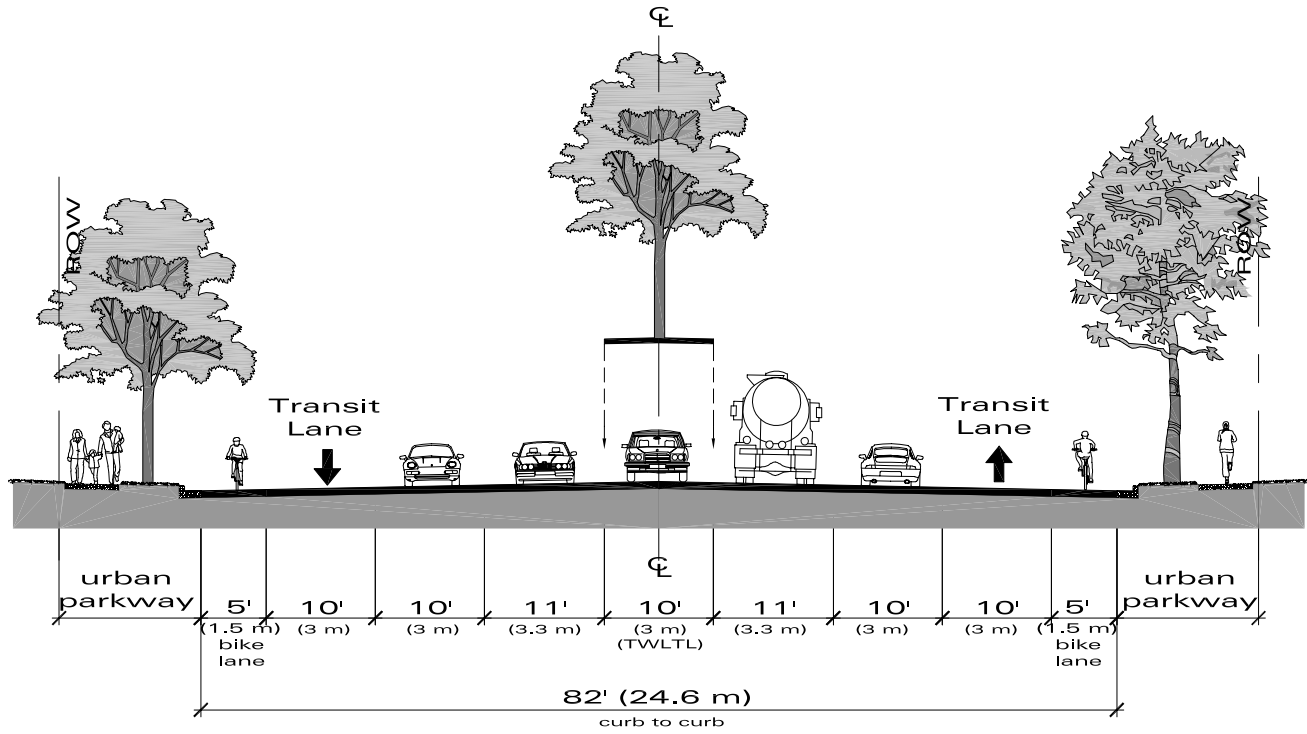
APPENDIX VII – Transit Streets

The Strategic Element of the City of San Diego *Progress Guide and General Plan* and the Transit First initiative of the Metropolitan Transit Development Board recommend major improvements to the region's transit system. These improvements include a system of rubber tire trolleys operated on separate rights-of-way within road alignments.

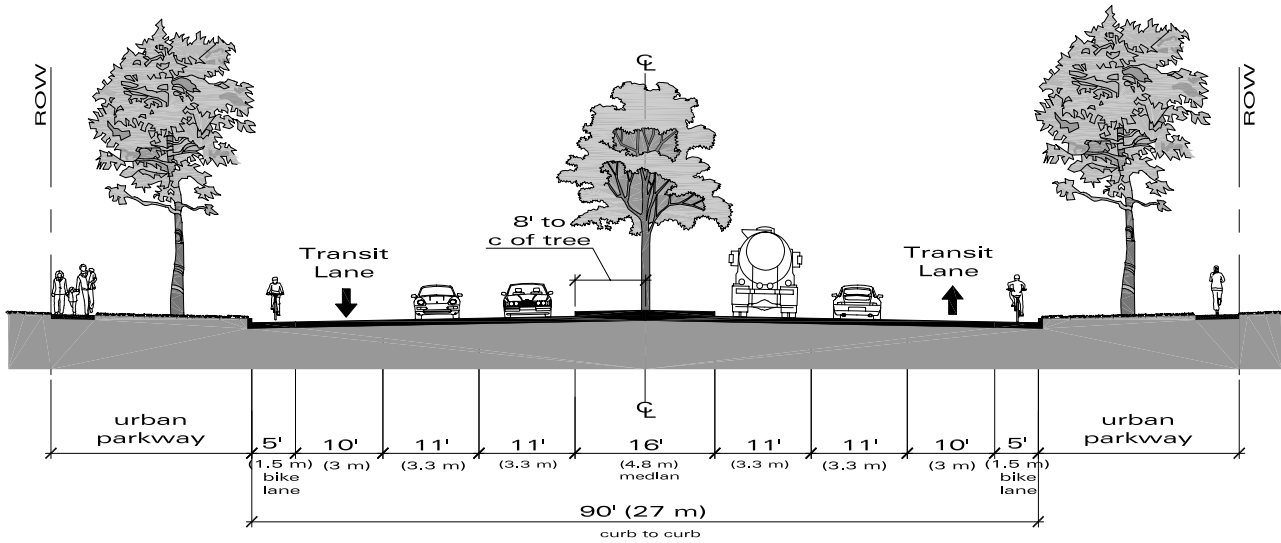
The first phase includes several "showcase" pilot projects; and, each of them will require a special and unique design solution. This design manual sets forth basic design guidelines for the design of transit streets.

Reference: *Designing for Transit, A Manual for Integrating Public Transportation and Land Development in the San Diego Metropolitan Area*. MTDB, July 1993.

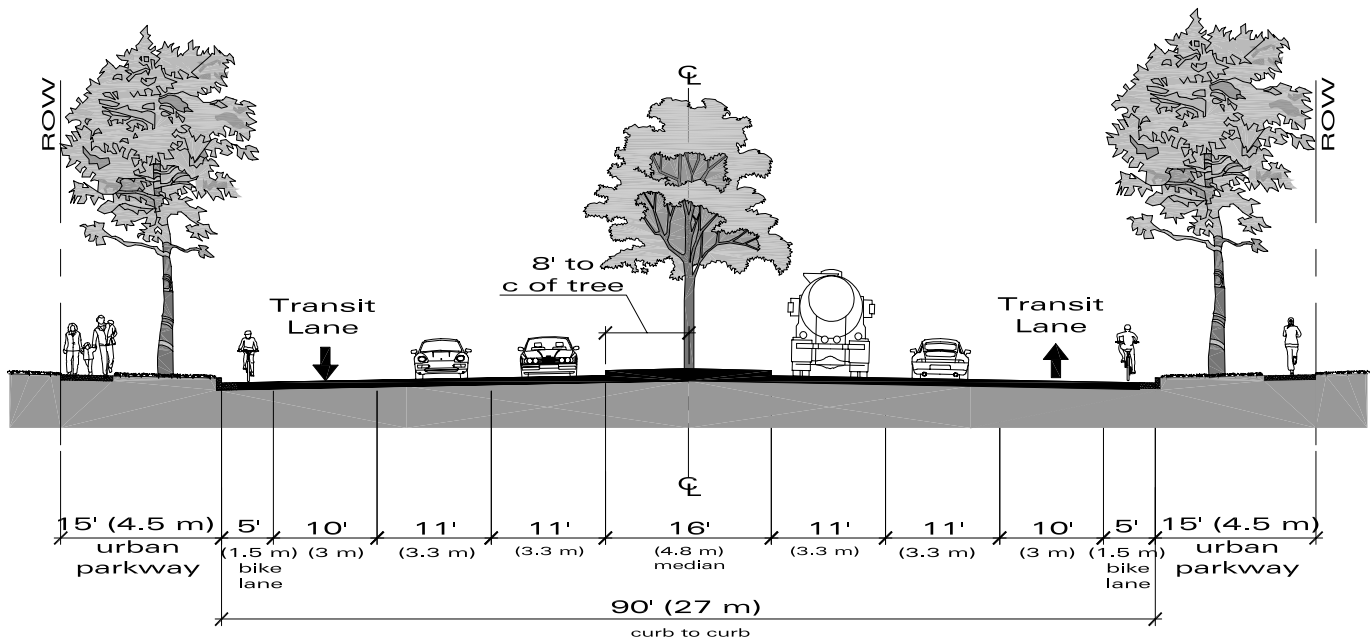
The following includes few examples of how to accommodate exclusive transit lanes within the public right-of-way.



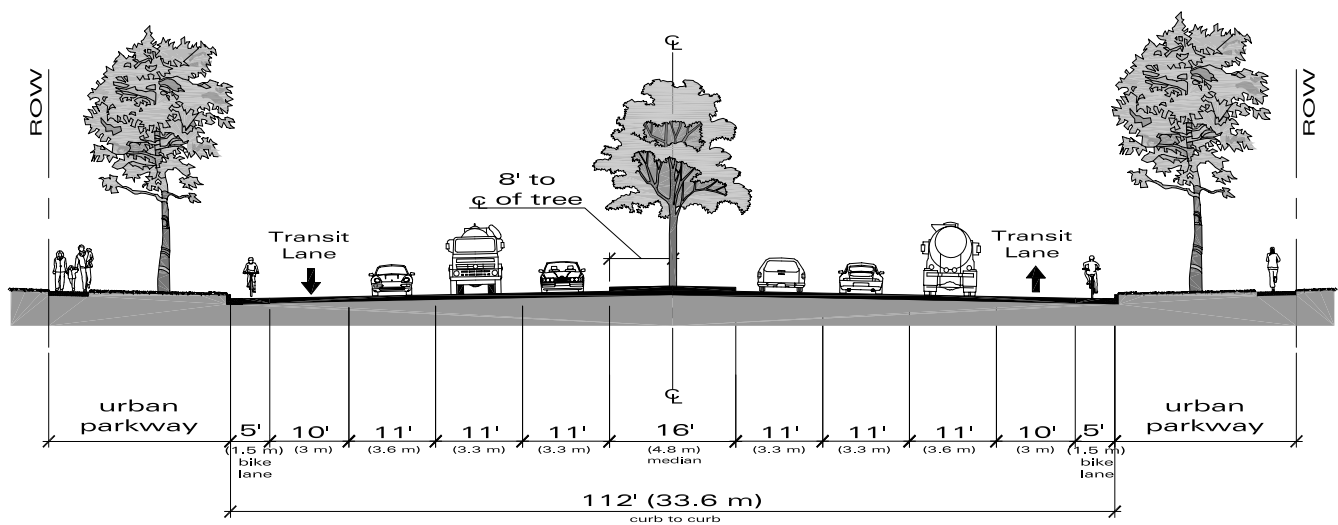
Transit Lanes – Four Lane Urban Collector



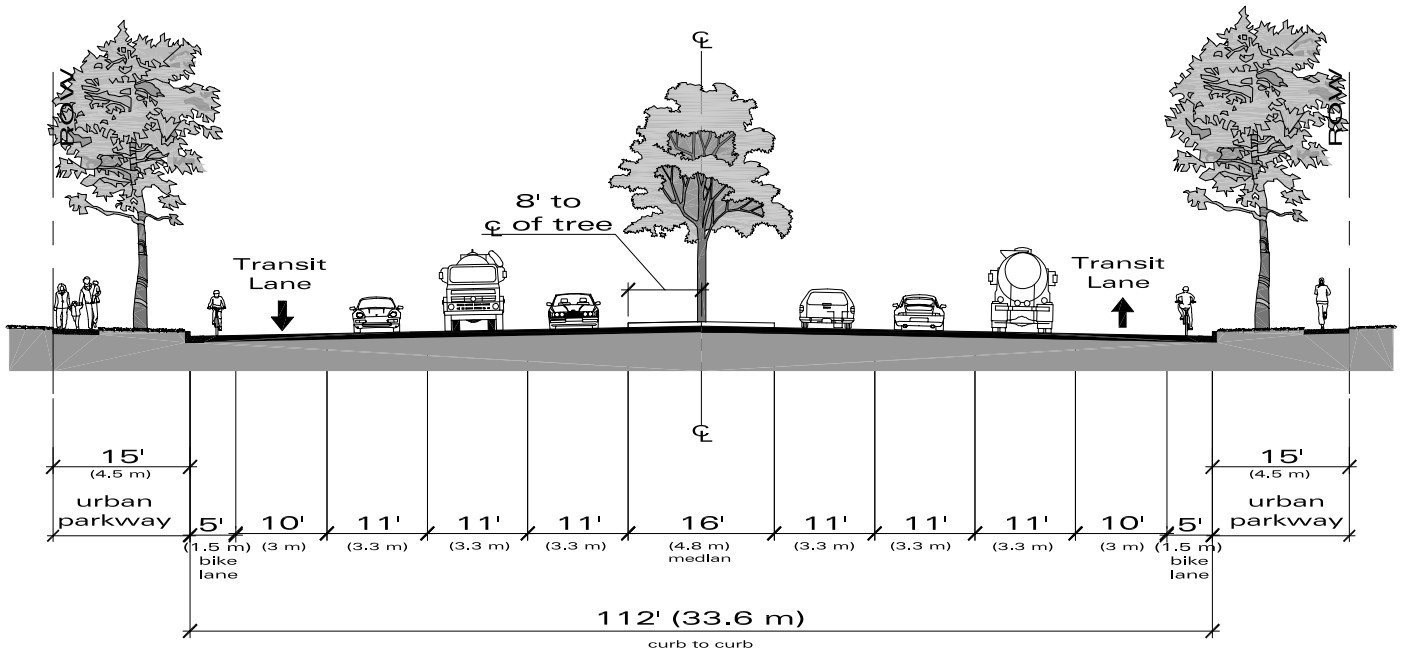
Transit Lanes – Four Lane Urban Major



Transit Lanes – Four Lane Major



Transit Lanes – Six Lane Urban Major



Transit Lanes – Six Lane Primary Arterial

APPENDIX VIII-Deviation From Standards Form

CITY OF SAN DIEGO
LAND DEVELOPMENT REVIEW
DEVIATION FROM STANDARDS

CASE/PERMIT/WO NUMBER: _____ COORD: _____

PROJECT DESCRIPTION/?LOCATION: _____

ENGINEER OF WORK: _____ RCE NO. _____ EXP DATE: _____

STANDARD BEING DEVIATED FROM : _____

DESCRIPTION OF DEVIATION:

ANALYSIS:

REVIEWED BY: _____ DATE: _____

APPROVED BY DEPUTY CITY ENGINEER: _____ DATE: _____

DEPUTY DIRECTOR: _____ DATE: _____

Devfm std REVI(SED 8/19/96

