



Design and Procedures Manual

Section 15 - Street Design Standards

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STREET DESIGN STANDARDS AND POLICIES

15.1 GENERAL

The purpose of this section is to provide design engineers with the City's street standards that are to be used in the preparation of plans, specifications and estimates for projects within the City right of way. The primary objective of these standards is to ensure the safe and efficient movement of motor vehicles, bicycles, and pedestrians; and to be considerate of future maintenance costs to sustain desired levels of service.

Development projects are sometimes approved incorporating modified street sections or design elements that are not City design standards. If a design element is not a City standard, an appropriate Caltrans or AASHTO standard is to be applied. Design features not addressed by Caltrans or AASHTO standards shall be designed consistent with standard engineering practices.

All project plans and signing and striping plans shall be stamped.

15.2 RESIDENTIAL TRAFFIC MANAGEMENT

15.2.1 Pedestrian Friendly Streets

Subdivisions, and neighborhood streets are to be designed to discourage excessive traffic volumes and vehicle speeds. The preferred method is with passive street alignment and street patterns that discourage these actions. The following policy goals have been indentified to create pedestrian-friendly neighborhood streets:

1. Residential street cross sections, alignments, and networks should discourage speeds in excess of 25 mph.
2. Traffic volumes and speeds should be maintained at a level appropriate to residential areas. Street alignments and networks should result in traffic volumes less than 4,000 vehicles per day.
3. Provide connectivity between neighborhoods, and between neighborhoods and activity centers.
4. Enhance and improve the pedestrian safety and comfort by constructing landscape buffers (planter strips) between curbs and sidewalks on streets.
5. Design streetscapes and transportation networks to encourage walking, bicycling, and interaction between neighbors.

15.2.2 Design Applications

Development projects are to be designed to meet the policy goals of "pedestrian friendly streets". In some cases, such as in-fill development projects, it may not be possible to design

the streets to meet these goals and standards. Redesigning these developments may not be possible due to the location, size, or shape of the property; however, efforts should be made to meet these goals to the extent possible.

The following design standards are to be considered to achieve “pedestrian friendly streets”:

1. Shorten street segments to 600 feet or less.
2. Realign local streets to eliminate direct, through connections to arterials.
3. Increase the number of connections to collector streets.
4. Design street patterns to avoid concentrating volumes on a small number of streets.
5. Avoid connecting residential streets to: two arterials, two collectors, or to an arterial and collector.
6. Avoid cul-de-sacs that end adjacent to another street unless there is a specific pedestrian destination where access should be provided for.
7. Orient cul-de-sac openings toward likely pedestrian destinations when feasible (e.g. parks, schools, shopping, transit stops, etc.).
8. Increase the frequency of intersections with collector streets to create side-on lots.
9. Construct traffic calming devices on residential streets expected to have traffic volumes in excess of 3,000 vehicles per day.
10. Construct bulb-outs to shorten walking distance across intersections.

15.2.3 Traffic Calming Devices

Traffic calming devices may be required as part of the improvements for new developments. The Department of Transportation has published Traffic Calming Guidelines describing the implementation of traffic calming devices. Such devices include, but are not limited to, traffic circles, chokers, bulb-outs, raised intersections, raised crosswalks, portals, and chicanes. Street alignments and networks should be designed in such a way to discourage speeding. Vertical traffic calming elements, such as speed humps, should not be considered as an acceptable traffic calming device for new development, and are not recommended until after all design options have been exhausted. Traffic circles shall be landscaped and/or decoratively hardscaped, including street lights, trees, etc. Roundabouts also have a calming effect and should be considered as an alternative to signal control where appropriate.

Bulb outs, or curb extensions, shall be installed at intersections within the Central City Core District boundary area where on-street parking exists, and bulb outs would provide benefit to pedestrians without adversely impacting traffic operations, and where feasible. The Central City Core District area is generally bounded by 2nd Street on the west, F Street on the north, 17th Street on the east, and Q Street on the south. Outside of this area, bulb outs should be considered at intersections of three or more lanes and/or where pedestrian activity is high and crossing distances are extensive. For private development projects, bulb outs required outside of the Central City Core District area will be identified during the planning/entitlement phase of

the project. In general, considerations for bulb outs should include pedestrian activity, critical traffic movements, bus and other large vehicle movements, and traffic operations. Bulb outs should not extend further than six feet into the street adjacent to parallel parking, and 12 feet adjacent to diagonal parking. Location of bulb outs must be approved by the City Traffic Engineer.

15.2.4 Implementation Objectives

To assist in the implementation of the Pedestrian Friendly Street Standards and Traffic Calming Devices, a number of implementation objectives have been defined in City Council Resolution 2004-118 to assist engineers in preparing plans, specifications, and estimates. These include:

1. City and landowners will work to meet the goals of the standards in a way that is compatible with the project.
2. Allow flexibility in the application of city standards that adversely affect housing densities, specifically in medium density zones.
3. Coordinate with landowners early in the design process to avoid undue delays or additional re-design costs during the project review process.

15.3 MODIFICATIONS TO STREET STANDARDS

Modifications to the City's street design may be considered under special circumstances and will be subject to the findings for Subdivision Modifications, as defined in Chapter 16.52 of the City Code. Requests for non-standard design must be based on standard engineering practice and written justification indicating the following:

1. Description of non-standard design.
2. All relevant data, technical references, documentation, calculations, alternatives, and benefits.
3. Clearly stated conclusion supporting the non-standard design.
4. Signature and stamp of a registered engineer responsible for the design.

The City will consider the information included in the request and determine if the non-standard design is reasonable and appropriate.

15.4 PRE-DESIGN CONFERENCES

Prior to submittal of public improvement plans for subdivisions and general development projects, the Development Engineering Section of the Department of Transportation recommends that the developer's design consultant(s) request a pre-design conference with City staff. The purpose of this conference is to exchange information on project design

requirements, establish design criteria to review schedule and coordinate the improvement plan review process. Contact the Development Engineering Section to schedule the conference.

15.5 TYPICAL STREET DESIGNATIONS AND DESIGN CRITERIA

Street Designations, also known as classifications, are supported by typical design criteria. Street Designations are primarily based on regional connectivity of the roadway, daily volumes, design speed (centerline radii), adjacent land uses, and level of access control. Table 15-5 lists the typical street designations within the City and Plate 15-1 indicates the typical right of way width, daily volumes, design speed, center line radius, and access control requirements to be applied to City Streets.

TABLE 15-5 TYPICAL STREET DESIGNATIONS

Street Designation	Purpose
Alley	Provide access to the rear of parcels and public utilities.
Local Residential	Serves residential land uses.
Local Commercial	Serves commercial land uses.
Local Industrial	Serves industrial land uses.
Collector- Minor & Major	Connects local streets to arterials.
Arterial	Provides mobility and regional connectivity

Typical sections for each street designation are shown on Plates 15-2 through 15-13 in the Appendix to this section. All City plans are to be designed to these sections unless otherwise approved.

15.6 STREET DESIGN

15.6.1 Traffic Index (TI) Determination

The following information is to be used to determine the traffic index for a road segment:

1. Truck Percentages:

Table 15-6.1A lists the minimum truck percentages that shall be used in determining traffic indices when truck percentage data is not available.

TABLE 15-6.1A MINIMUM TRUCK PERCENTAGE

Street Designation	Minimum Truck Percentage
Local Residential	1%
Local Commercial and Minor Collector	2%
Local Industrial and Major Collector	3%
Arterial (4 travel lanes or greater)	4%

The City may specify higher percentages where a street serves land uses that are expected to generate higher percentages of large vehicle trips (e.g., transit stations, and schools).

2. ESAL Constants:

20-Year Equivalent Single Axle Load (ESAL) constants shall be used for all permanent City street sections. 10-Year ESAL constants may be used for temporary or "throwaway" street sections as approved by the City.

3. Truck Size Distribution:

Table 15-6.1B lists the design values that may be used when truck size distribution data is unavailable.

TABLE 15-6.1B TRUCK SIZE DISTRIBUTION

Truck Size	Percent Distribution
2 Axles	80 %
3 Axles	14%
4 Axles	4%
5 or More Axles	2%

4. Traffic Distribution:

Unless instructed otherwise by the City, traffic may be assumed to be evenly distributed among the travel lanes.

Where traffic projections are not available for streets serving residential uses, daily traffic volumes may be estimated at 10 trips per single family residence served and 7 trips per multifamily unit served (apartment or condominium). Alternatively, Table 15-6.1C may be used as a guide in determining the Traffic Index for such streets.

TABLE 15-6.1C TRAFFIC INDEX FOR RESIDENTIAL STREETS

Number of Residential Units Served	Traffic Index
0-24	4.5
25-40	5.0
41-90	5.5
91-180	6.0
181-300	6.5
301-500	7.0
501-700	7.5
701-900	8.0

Evaluating whether a street segment serves a given residential unit is based on vehicles from the residence being likely to utilize the segment during the morning or evening peak traffic hours, as determined by a reasonable traffic distribution assumed for the area.

In the absence of traffic projections for mixed-use or non-residential areas, Table 15-6.1D may be used as a guide for determining the Traffic Index.

TABLE 15-6.1D TRAFFIC INDEX GUIDE BY STREET CLASS

Street Designation	Minimum Traffic Index
Local Commercial and Minor Collector	7.0
Local Industrial and Major Collector	8.0
Arterial	9.0

Note that Table 15-6.1D is to be used only when there is no other information available upon which to base a Traffic Index calculation. The Traffic Indices shown are appropriate where high volumes of heavy vehicles are expected. The City shall make the final determination as to the appropriateness of the assumptions and methodology used for Traffic Index determination.

15.6.2 Structural Section Determination

Unless otherwise approved, structural pavement sections consist of asphaltic concrete (AC) and aggregate base (AB). Structural sections to be used for design of streets are indicated in Table 15-6.2. The minimum section is four inches of asphalt over eight inches of aggregate base. Lime treated base may be used on clay soils and a minimum of twelve inches of clay must be treated. The basis for design include: street designation, projected traffic index (20 year), and soil "R" – value. The required structural section will be reviewed and approved on a project by project basis incorporating project specific issues which may adversely affect the pavement design life.

Table 15-6.2 Structural Pavement Sections (Inches of AC over AB)

T.I.	R=5	R=10	R=15	R=20	12" LTB
4.5	4/8	4/8	4/8	4/8	4/6
5.0	4/9	4/8	4/8	4/8	4/6
5.5	4/11	4/9	4/8	4/8	4/6
6.0	4/13	4/12.5	4/11.0	4/9.5	4/6
6.5	4/15	4/14	4/12.5	4/11.5	4/8
7.0	4/17	4/16	4/14.5	4/13.5	4/8
7.5	5/17.5	5/16	5/14.5	5/13.5	5/9
8.0	5/19.5	5/17.5	5/16	5/15	5/10
8.5	5/21.5	5/20	5/18	5/16.5	5/12
9.0	6/21.5	6/20	6/18	6/16.5	6/12
9.5	6/24	6/22	6/20	6/18.5	6/16
10.0	8/24	8/22	8/20	6/20.0	6/16

In certain cases, sub-base stabilization by means of lime treatment for clay soil or the cement treatment of base materials may be approved. When approved, a minimum of twelve inches (12") of soil or base is to be treated and a maximum R-value of thirty (30) is to be applied to the structural section calculations. The minimum thickness of aggregate base to be used between the asphalt and treated sub-base is six inches (6"). The City will require soils sampling and testing of treated bases or sub-bases to ensure that adequate stabilization has been provided. Lime treatment of sub grade may be required if construction occurs during wet months of the year.

The minimum street structural section is four inches (4") of asphalt over eight inches (8") of aggregate base. The minimum pavement section for alleys is six inches (6") of PCC over six inches (6") of aggregate base. Alleys providing access to fire stations (fire trucks and heavy vehicles) are to have structural sections with a minimum of 8" PCC over 8" AB and will require reinforcing steel (number 4 bars @ 24 inches O.C, typical).

The information provided in Table 15.6.2 is based on the Caltrans Highway Design Manual. The design engineer may reference this manual to verify that the structural section is adequate. Structural Sections may be determined by interpolation of the data provided in the table.

15.6.3 Soil Testing

Soil sampling and testing is generally required for the design of street structural sections. Soil samples are to be taken at 500 ft. (maximum) intervals along the alignments of the street segments being designed. All samples that, in the opinion of the engineer, differ from each other shall be tested for R-value by both exudation and expansion pressure as specified in the Caltrans Manual of Tests, Volume 2, and Test 301. At least two samples are to be tested if the soils engineer determines that the samples are uniform in nature. Soil test results shall be submitted to the City for review and approval.

For construction of pavement sections less than 12 ft. in width and less than 1000 ft. in length, R-values known to exist in the area may be utilized as approved by the City, or a minimum R-value of 5 may be assumed. Discuss the need for soil testing at the pre design conference if non-standard testing requirements are being considered.

15.6.4 Curb, Gutter, Sidewalk, and Alley Aggregate Base Sections

Where soil R-values are less than twelve or the soil expansion index (ASTM D-4829-88) is greater than seventy-five percent (75%) a minimum of 12 in. of Class II aggregate base is to be placed under curb, gutter, sidewalk and alleys. Where soil R-values are greater than or equal to twelve and the soil expansion index is less than or equal to 75%, a minimum of 6 in. of Class II aggregate base is to be placed under curb, gutter, sidewalk and alleys.

15.6.5 Longitudinal Curb and Gutter Slopes

For new local streets, the minimum gutter slopes are to be no less than 0.35% unless otherwise approved.

For new collectors and arterials, the minimum gutter slopes are to be no less than 0.25%.

For alleys, the minimum gutter slopes are to be no less than 0.50% unless otherwise approved. Alleys are to be designed such that if the drain inlet were to become blocked, water will overflow into the streets and not into adjacent properties.

The maximum street gutter flow into a drain inlet is 500' from any direction. Cross over drain inlets are allowed.

For infill projects along existing streets, gutter slopes are to be no less than 0.20 % for vertical curb and gutter with a preferred minimum of 0.25%, and 0.30% for roll curb and gutter with a preferred minimum of 0.35 %. Deviations may be approved and should be discussed at the pre-design conference.

Minimum gutter grades around round corners and cul-de-sacs shall be 0.50%.

For cul-de-sacs, the crown shall be increased from the normal street crown to 0.80 feet minimum from the center of the cul-de-sac to the flow line of the gutter.

15.6.6 Street Cross Slopes

New streets are to have pavement cross slopes from centerline to lip of gutter as shown on Plates 15-2 to 15-8 in the Appendix to this Section. New streets not conforming to standard street sections are to be designed to be between 2.0 to 2.5 %. Larger streets with expanded intersections are to be close to 2.0% and smaller local residential streets are to be close to 2.5%. Alleys are to have a cross slope of 2.0%, and are to drain to the center of the alley.

For existing streets, cross slopes shall be between 2.0% and 2.5 % unless approved by the Engineer. The project may be required to profile the existing pavement section, or the pavement section may have to be removed and replaced. A variable thickness overlay may also be required. Cross slopes exceeding 2.5% will be considered on a case by case basis.

The pavement cross slopes at intersections of major streets should be given special considerations to avoid an uncomfortable ride at higher speeds. Drainage patterns should be directed away from the higher classification street around the curb returns toward the lower classification street. Preference for a comfortable ride should be given to the higher classification street when ever possible. Adequate survey data should be provided to determine whether there will be adequate drainage and an acceptable ride.

The landscape planter area cross slopes are to be designed to 5% minimum to ensure sidewalk drainage and 10% maximum for maintenance purposes. The preferred cross slope design is planter areas is 5%.

The median area cross slopes are to be designed to 2% minimum and the maximum 10% maximum. Median areas exceeding 10% are to be hardscaped. The preferred cross slope design in median areas is 2%.

15.6.7 Lane Widths, Bike Lanes, and Sidewalk Widths

Lane widths are to be no less than 11 feet unless otherwise approved by the City Traffic Engineer.

Bike lanes are required on all street segments as shown on Plates 15-5 thru 15-8 and are to be 6 feet in width. The minimum width of asphalt concrete shall be 3 feet adjacent to the curb and gutter.. Bike lane placement is to be coordinated with the City's Bike/Pedestrian Coordinator, as designated in the City/County Bikeway Master Plan and approved by the City Traffic Engineer.

Sidewalk widths are to be a minimum 5 feet wide for all street classifications except arterials, where sidewalks are to be a minimum 6 feet wide. The width of the sidewalk contiguous to curb and gutter is measured from the back of curb to the back of sidewalk.

15.6.8 Cross Gutters

Concrete cross gutters at street or alley intersections are not acceptable for City street improvements, unless authorized by the City.

15.6.9 Alley Entrance Design

Alley entrances shall be constructed in accordance with Plate 15-14 (Typical Alley Entrance).

15.6.10 Alley Maneuvering Areas

A public alley may be used as a part of the maneuvering space requirements for adjacent parking facilities. Maneuvering width may not be in the public right-of-way except as provided in Chapter 12.40 of City Code. A 6 foot setback from the public right-of-way is required in order to ensure adequate maneuvering room is available.

15.6.11 Street Cul-de-sacs

Cul-de-sacs shall be constructed at the termini of permanent dead-end streets. Maximum cul-de-sac length shall be as defined in City Code section 16.40.080. Cul-de-sacs shall be allowed on local streets only. Typical dimensions are shown on Plate 15-15 in the Appendix to this section.

15.6.12 Street Elbows

Elbows shall be used at a street with a 90 degree bend and no intersection at that location. Elbows shall only be allowed on minor collectors and local streets. Typical dimensions are shown on Plate 15-16 in the Appendix to this section.

15.6.13 Half Street Improvements

Construction of half streets and half alleys are not acceptable as City street improvements, unless otherwise approved by the City. Any partial improvements shall include at least one travel lane in each direction.

15.6.14 Header Boards

Exposed pavement edges due to partially constructed or dead end streets shall be protected with pressure treated wood or plastic header boards. Header boards shall be 2" X 12".

15.6.15 Subsurface Drains

Structural section design where high groundwater or other unusual soil conditions exist will be evaluated on a case-by-case basis. Positive structural section drainage (street subsurface drains) is to be provided in areas where high groundwater levels are likely to occur (occurs next to the American River, Sacramento River, detention basins, and drainage canals).

15.6.16 Base Sheets and Surveying Used for Design

Base sheets used for design must show all pertinent existing elevations, such as gutter, flow line, grades, center of pavement, sanitary sewer and storm drain line invert elevations, manhole invert and elevations, dry utilities, etc. All information shall be based on accurate survey information. Elevations are to be based on the nearest City Benchmark. Elevations shown on as-built drawings are not to be used as the basis for a design.

15.7 INTERSECTION DESIGN

15.7.1 Intersection angle and tangent length

Street intersections are to be designed with their centerlines at right angles. The minimum centerline tangent length at the intersection is to be equal to the width of the cross street (measured from the point of intersection to the face-of-curb) plus the radius of the round corner (measured at the face of curb). Additional tangent length may be required at expanded intersections, major streets, and arterials.

15.7.2 Uniform practice for U-TURN allowance

Measuring from the center of an eight-inch stripe, occupying the right side of a left-turn lane, the minimum distance to the face of the opposing face-of-curb shall be no less than 44 feet when considering U-turn vehicular movements. When a condition exists that provides less than 44 feet, U-turn vehicular movements are to be prohibited.

15.7.3 Intersection spacing

Intersection spacing is the minimum distance between intersections on the same side of the street and is measured between the nearest curb returns on the thru street. The minimum intersection spacing for each street designation is shown in Table 15-7.3.

Table 15-7.3 Minimum Intersection Spacing for Each Street Designation

Street Designation	Minimum Intersection Spacing (feet)
Local Residential	120
Local Commercial	120
Local Industrial	120
Minor Collector	120
Major Collector	250
4-Lane Arterial	250
6-Lane Arterial	500
8-Lane Arterial	1,320

15.7.4 Intersection offset

Intersection offset is the distance between intersections on opposite sides of the through street and is measured between centerline points of intersection on the through street. Minimum offset shall be 120 ft. but may be decreased when a raised median is constructed to prohibit a through movement at one of the intersections, and turning movements are limited.

15.7.5 Round corner radii

Round corner radii (measured at the face-of-curb) for each street designation is shown in Table 15-7.5. The radii may be adjusted as needed to accommodate the appropriate design vehicle in a particular situation.

Table 15-7.5 Round Corner Radii for Each Street Designation

Street Designation Radii (feet)	Local Residential	Local Commercial	Local Industrial	Collectors	Arterial
Local Residential	27	N/A	N/A	27	32
Local Commercial	N/A	27	32	27	32
Local Industrial	N/A	32	32	32	32
Collector	27	27	32	32	32
Arterial	32	32	32	32	32

The above radii may be adjusted based on traffic volumes/patterns, intensity of large vehicle uses and the needs of specific land uses/truck routing. Radii within the downtown are to be determined on a case by case basis.

15.7.6 Expanded Intersections

Requirements for expanded intersections are to be based on 20 year future traffic projections. Expanded intersections may be required prior to build-out especially when traffic signals are

anticipated to be constructed in the future. Projected traffic volumes are necessary to design the number of turn lanes and length of turn pockets at expanded intersection.

The plan views for typical expanded intersections are shown on Plates 15-9 to 15-13 in the appendix to this section. The intersections shown in these drawings are to be adjusted when bike lanes are not allowed or when parking lanes are allowed. Dual left turn lanes are to be provided where hourly left turn volumes are expected to exceed three hundred (300) vehicles per hour.

15.7.7 Acceleration and Deceleration Lanes

Acceleration and deceleration lanes may be required at driveways and minor intersections based on the street designation, design speed, and projected volumes.

15.7.8 Bike Lanes and Medians

Bike lanes are required at expanded intersections as shown on Plates 15-9 thru 15-13 and are to be a minimum of 4 feet in width unless otherwise approved by the City Traffic Engineer.

The minimum width of a median at an intersection for new construction is 2 feet unless otherwise approved by the City Traffic Engineer.

15.8 STREET SIGNS AND MARKINGS

15.8.1 Striping Plans

Roadway signs and markings shall conform to standards specified in the Manual of Uniform Traffic Control Devices (MUTCD). Signs and striping plans shall be included with all improvement plans and shall be approved by the City Traffic Engineer; see example Plate 15-17 in the appendix to this section.

1. Striping plans are required for all projects that will modify, add to, or delete existing roadway signs and/or markings.
2. The striping plans must include a signature block indicating that the City Traffic Engineer has “accepted” the design prior to issuance of a Notice to Proceed.
3. Striping details are to be called out using the appropriate California MUTCD detail number with a circular note. The length of the striping to be installed should be under the note and called out as L = length. The length is the total length which includes the length of the space between the striping.
4. All striping is to be in thermoplastic, unless otherwise approved.
5. Show existing striping, signs, and pavement markings as shaded and new as bold.
6. Striping plans are to include the City's general striping notes.

7. Intersection striping plans at existing and proposed facilities are to provide details for a minimum of 150' at each leg of intersection.

15.8.2 Signs

1. Signs shall be identified with the appropriate California MUTCD sign designation in conjunction with the directive identified in the LEGEND or numbered square note of the Signing and Striping Notes on the signing and striping plan. See striping diagram example Plate 15-17 for details.
2. Exact location of signs is to be determined in the field by the City inspectors unless directly called out on plans.

15.8.3 Pavement Markings

1. Standard pavement arrows for indicating turn movements are Type IV arrows (i.e. for speeds less than 40 mph). Type VI or Type I arrows may be required at the direction of the City Traffic Engineer.
2. Lane and centerline markings are to have both reflectors and thermoplastic stripes lines (e.g. Detail 9 and Detail 22 of California MUTCD)
3. Stop bars are placed behind the curb ramp or ramp landing, whichever applies and shall be located to allow adequate stopping sight distance.
4. Street elbows shall have Detail 23 of California MUTCD placed along the curved portion of the pavement crown.
5. Crosswalks:
 - a. Must comply with the City's Pedestrian Safety Guidelines and be approved by the City Traffic Engineer.
 - b. Crosswalks at controlled intersections must be 12 feet wide with a 10 feet inside clear space.
 - c. Crosswalks at uncontrolled intersections must be high visibility crossings. The City standard is to use a triple four crosswalk with the associated "SLOW PED XING" pavement markings. W11-2 and W16-7p signs should be placed at all uncontrolled crosswalks.
 - d. At Signalized Intersections - Install marked crosswalks on all approaches unless determined by the City to be unsafe. Certain unique intersections with high pedestrian activity may be considered for high visibility crosswalks (e.g. 12th & K Street and 7th and K Street).
 - e. At Stop Sign Controlled Approaches - Install parallel line crosswalks if recommended by the City. Otherwise, install only a limit line. If a triple-four crosswalk or other high visibility crosswalk was existing, then a twelve (12) inch limit line immediately adjacent (not offset) should be installed on the approach side.

6. At Signalized Intersections - Install a 24-inch limit line on each approach offset seven feet from the crosswalk. In cases where minor approaches do not warrant this treatment or where metered parking spaces exist, this requirement may be waived.

15.8.4 Bike Lanes

1. Bike lanes shall conform to MUTCD standards (Traffic Control for Bicycle Facilities Part 9). Bike lane striping must be in thermoplastic. Pavement reflectors shall not be placed adjacent to bike lane striping.
2. If a location cannot accommodate a full bike lane legend, the bike route pavement legend can be used.
3. Bike routes and pavement legends shall be in thermoplastic.
4. Location of bike guide signs shall be coordinated with the City.

15.8.5 Medians and Islands

1. For median widths wider than 1 foot, use a Type OM2-1H marker at the end of the median. For median width of 1 foot or less use Type OM2-IV marker.
2. For median widths equal to or greater than 2 feet use a Type OM2-1H marker with an associated R4-7.
3. Along the median, place one way reflective markers at ½ spacing as shown on Detail 26 of the California MUTCD.
4. At driveways and streets intersecting a street with a median and the median forces one-way traffic flow, place an R6-1 facing the approach street on the median in the direction of travel.
5. Reflectors and/or object markers shall be placed on channelizing islands. The reflectors/delineators shall be on the edge closest to approaching traffic.

15.8.6 School Zones

1. School zone signs and markings shall be per the California MUTCD.
2. Install appropriate School Area Sign Assemblies A through D in a fluorescent yellow green background where yellow is indicated in the California MUTCD.
3. School zone and school route pavement markings shall be in yellow.
4. Uncontrolled school crosswalks shall be yellow triple four crosswalks with the corresponding yellow "SLOW SCHOOL XING" pavement legends and appropriate signage.

15.9 SIGHT DISTANCE

City streets and non-residential driveways shall be designed in accordance with the "Sight Distance" requirements as defined by the Caltrans Highway Design Manual, Sections 201 and 405.

15.10 TRAFFIC SIGNAL DESIGN

A Traffic Signal Design Concept Report is to be submitted prior to submittal of any improvement plans that involve the installation of or modifications to traffic signals. At a minimum, the concept report shall include the four following components:

1. **Existing conditions:** Vehicular, pedestrian, and bike volumes, street dimensions, nearby land uses, disability access ramps, transit facilities, and signal warrants satisfied.
2. **Future conditions:** Projected vehicular, pedestrian, and bike volumes, anticipated roadway changes.
3. **Recommendations:** Analysis of proposed lane configuration, signal phasing, crosswalk operations, bus stop locations, cameras, inter-connect, vehicle detection, and emergency vehicle detection.
4. **Figures:** Graphics depicting existing and future traffic volumes and lane configurations.

It is recommended that concept reports be submitted to the City for review and approval prior to beginning any signal design work. Electrical requirements are explained in Section 14, Electrical and Street Lighting Design Standards.

Prior to the approval of the traffic signal design plan, the preliminary traffic signal timing is to be provided. Signal timing coordination with adjacent traffic signals or a coordination analysis may be required.

15.11 ROUNDABOUT DESIGN

A Roundabout Design Concept Report is to be submitted prior to the approval of any subdivision map or improvement plan that involves the installation of a roundabout. At a minimum, the concept report shall use FHWA-RD-00-067: Roundabouts: An Information Guide as general guidance for fastest path roundabout design.

In general, a typical single lane roundabout inscribed diameter of 120 feet is preferred. Detached sidewalks are required. Ideally, a 5 foot landscaped separation and a 10 foot multi-use path is incorporated into the design. Single lane roundabout speeds, unless located on high-speed corridors or other unusual circumstances, should have entry speeds between 18-24 mph.

The Roundabout Concept Report shall include the following components:

1. Traffic study (RODEL analysis – AM & PM peak)
 - a. Determine adequate diameter of roundabout
 - b. Capacity analysis (indicate level of service of alternative STOP-control or signal at same location)
 - c. Baseline geometrics
 - d. Determine number of entry, circulating, and exit lanes required for future capacity and safety operations
 - e. Balance design entry width (E), average effective flare length (L'), entry angle (ϕ), the entry radius (R1), and the inscribed circular diameter (ICD).
2. Future AM & PM traffic turning movement volumes
3. ROW constraints, adjacent land uses, and bicycle and transit facilities
4. Percentage of heavy trucks (by approaching roadway)
5. Type of truck for each turning movement (i.e. WB-50, WB-67, etc.); minimum WB-50
6. Future pedestrian volumes (if considerably high or worth noting)
7. Concept drawings
 - a. Proper alignment
 - b. Show transition at least 200' either side of the roundabout
 - c. Preliminary design of splitter islands with pedestrian crossings indicated (~20' from yield line)
 - d. Verify truck turning templates
 - e. Indicate truck apron, if required

Final design for roundabouts shall include:

1. Verified fastest path design (~20mph for residential single lane)
2. Speed table identifying fast path speeds at each entry and circulating
3. Horizontal design plan
4. Vertical design plan
5. Signing plan
6. Striping plan
7. ADA ramp, bike path ramp, and pedestrian crossing details
8. Curb and gutter details
9. Landscaping plan and profile (including heights and grading of central island)

10. Lighting plan
11. Grading plan of roundabout

15.12 STREETSCAPE IMPROVEMENTS

15.12.1 Landscaping Areas

The following areas are to be landscaped within the City right of way:

1. Medians: Medians shall comply with the 1999 Median Strip Master Plan. Medians with planter area width of 3 feet or less in width shall be hard-scaped (decorative or plain concrete, pavers, cobble, decomposed granite etc
2. Planters: Planters are located between the curb and sidewalk or behind the sidewalk with widths in accordance with Plates shown in the appendix.
3. Adjacent to sound walls: Areas with less than 2 feet of space between the sound wall and sidewalk shall be hardscaped.

15.12.2 Streets Recommended for Streetscape Improvements

1. Arterial/Collector: Plates 15-9 through 15-13 in the appendix to this section define the minimum street widths and type of streets suitable for medians and/or planters.
2. Gateway Street: A "Gateway" is a street leading into a community area from a major transportation facility (freeway interchange, major street). This includes "Neighborhood Entries" which are enhanced landscape areas added to the landscape corridor at visible street intersections and neighborhood entry points.
3. Economic Enhancement of Commercial Strips: Commercial corridors identified in the Economic Development Strategy Framework, approved by the City Council in April 2000.

15.12.3 Landscaping Design

Approximately 20%-50% of the proposed area shall be hardscaped. The remainder shall be landscaped in accordance with the following:

1. Trees
 - a. Are to be drought-tolerant and/or native trees, and approved by the City arborist.
 - b. Tree canopy shall be at least 8 feet in height over sidewalks and 14 feet minimum over the street, and appropriate for the size of the planter area.
2. Shrubs and ground cover

- a. Are to be drought-tolerant and/or native species and appropriate for the size of the planter area.
 - b. Accent shrubs may be planted on the ends of medians at street intersections or used as focal points in gateway streets. The maximum height for shrubs within a narrow (3' to 6' wide) shall be 2 feet.
 - c. Low spreading shrubs or groundcover can be planted where low-growing plants are desired or required and in confined spaces but shall be used sparingly to reduce ongoing maintenance costs.
 - d. Turf is to be avoided or minimized; and annuals are not allowed.
3. Sight Distance

Landscaping must consider sight distance per Section 15.9 Sight Distance. Trunk size, height, width, and maintenance requirements at maturity are to be evaluated as part of the design process for providing adequate sight distance.

15.12.4 Streetscape Master Plans

Streetscape master plans may be developed for various street corridors throughout the City. A master plan is a comprehensive plan to guide streetscape development of a particular corridor and is typically of sufficient detail to facilitate design and development of construction documents.

Streetscape master plans are developed with community participation and consensus from various stakeholders and are presented to the City Council for acceptance. The design of streetscape improvements within an area having a streetscape master plan should be consistent with the master plan. Minor deviations may be necessary, but should not change the intent or theme of the master plan.

15.13 ON-STREET PARKING

15.13.1 General

Parking is generally allowed on streets on the basis of a combination of street designation and traffic volumes (see table 15-13.1). Designated parking spaces serving persons with disabilities shall comply with the applicable state and federal requirements.

Table 15-13.1 On-Street Parking Guidelines

Street Designation	On-Street Parking Determination
Local Residential	Allowed
Local Commercial	Allowed
Local Industrial	Allowed
Collectors (4,500-14,000 ADT)	Generally Allowed
Arterial (14,000-24,000 ADT)	Generally Prohibited
Arterial (24,000+ADT)	Prohibited

Parking may be prohibited at any location where the City Traffic Engineer determines traffic operations and/or safety would be compromised.

15.13.2 Streets with future ADT of up to 14,000

Parking is generally allowed on these streets. Parking will typically be required adjacent to specific land uses that require parking but do not have it on-site. These uses are typically schools, parks and multi-family sites. Parking requirements are to be reviewed and approved on a case by case basis.

15.13.3 Streets with future ADT of 14,000 to 24,000

Parking on these streets is generally prohibited. Parking may be allowed, at the discretion of the City Traffic Engineer in in-fill areas where the parking is necessary to accommodate economic development and enhance pedestrian activity, where speeds are expected to be low due to spacing of control devices, street alignment and other factors.

15.13.4 Angled Parking

Angled parking will be considered on a case-by case basis. Angled parking shall be required and/or allowed at the direction of the City Traffic Engineer. Implementation of angled parking may require specific approval by the City Council. Table 15-13.4 lists the general criteria for considering angled parking. However, meeting the criteria does not warrant installation of angled parking.

Table 15-13.4 Angled Parking Criteria

Traffic Volumes	Less than 4,000 ADT
Face-of-Curb Width	Greater than or equal to 48 ft.
Bike Facilities	No Class II facilities on streets.
Speed Limit	Less than or equal to 30 mph
Emergency Services	Concurrence by Police and Fire Departments
Other Agencies	Review by Regional Transit
The majority of business owners and residences with addresses on the block vote in favor of angled parking.	

15.14 PRIVATE AND/OR GATED SUBDIVISION IMPROVEMENTS

Pursuant to City Council Resolution 93-110, the following Design Guidelines shall apply to gated and/or private streets in residential areas.

15.14.1 Design Guidelines for Private Streets

A street approved as a private street shall be constructed to the standards of a public street, specifically regarding the width, structural section, and drainage. Modifications to street width standards may be considered on a case-by-case basis and are subject to requirements of Section 15.3.

1. The design of private streets shall include all relevant traffic safety features, including but not limited to traffic signs and markings, street lighting, and traffic signals.

2. The design of private streets should include appropriate speed control measures (roadway alignment, intersection spacing, etc.) and should provide adequate pedestrian and bicycle circulation patterns. Traffic calming devices may be required on private streets.
3. Private streets shall be designed to avoid blocking access to adjacent parcels and to allow for reasonable future development of these parcels.
4. Private streets should be designed to maintain and/or provide adequate public access to public facilities such as parks, schools, bike trails, transit, recreation areas, etc. Private streets are not appropriate if they restrict access to public facilities.
5. Private streets shall maintain and/or provide adequate access for emergency vehicles.
6. The private street circulation pattern should be designed to integrate with and minimize impacts to the adjacent public street system.
7. High volume private street developments should provide multiple ingress/egress points as necessary to direct traffic to appropriately sized public streets.
8. Entrances to private streets, which have locking gates and are located on collector or larger streets, shall allow vehicles to turn around on-site without backing onto public streets. Adequate stacking room shall be provided between the entrance to private gated streets and the gate controller to avoid vehicle stacking across public sidewalks or intersections.
9. Gates must be operable on a 24-hour basis by police, fire, and utility personnel.

15.14.2 Construction, Maintenance and Ownership Policy

The following outlines key maintenance and ownership policies for private streets in new residential areas and their associated utilities. See City Council Resolution 93-110, available from the City Clerks Office for additional details.

1. Private street surface improvements, including curb, gutter, and sidewalk, shall be privately owned and shall be maintained by a Homeowners' Association or through an alternate financing mechanism acceptable to the City. Private streets and a minimum of 3 ft. adjacent thereto shall be dedicated as Public Utility Easements (PUE's). The Sacramento Municipal Utility District may impose additional PUE dedication requirements. Private streets shall be constructed to City standards and shall be reviewed and inspected by the City under the same process as that for public streets.
2. Water, storm, and sewer utilities within private streets may be privately or publicly maintained. Requests for City maintenance of such facilities is to be requested as part of the application for a tentative map or other entitlement. If the application is approved, the Department of Utilities will outline maintenance responsibilities of the City and the owner(s) relative to the water, sewer, and/or storm drainage facilities in the conditions of approval for the tentative map or other entitlement. The following general provisions shall apply for utilities in private streets that are to be maintained by the City:

- a. The property owner must satisfy all applicable conditions of approval for the tentative map or other entitlement prior to the Department of Utilities accepting such facilities for maintenance.
 - b. The property owner(s) must provide appropriate easements, if necessary, for maintenance of the utilities to be maintained by the City. These easements must be in place prior to commencement of City maintenance of the utilities.
 - c. Water related utilities to be maintained by the City must be constructed to City standards and shall be reviewed and inspected by the City under the same process as that for utilities within public streets.
 - d. Provisions for surface restoration after any repairs to City owned facilities are to be paid for and provided for in the Covenant, Codes, and Restrictions (CC&R's) for the subdivision.
 - e. City maintenance of such facilities will begin 60 days after completion and City acceptance of the facilities or the above-referenced CC&R's are recorded, whichever occurs later. City maintenance of such facilities will be to the same standard as for those within public streets.
 - f. Access must be made available to the City on a 24-hour basis for both routine and emergency maintenance of water, sewer, and storm drainage improvements.
3. Street lighting for new residential subdivisions with private streets is to be publicly maintained. The following general provisions apply to street lighting in such subdivisions:
 - a. Properties adjacent to private streets with publicly maintained street lighting must be included in the City-wide Landscape and Lighting Assessment District.
 - b. Street lighting facilities are to be designed to City standards. The City must review and approve street lighting plans for private streets by the same process as that used for public streets.
 - c. The property owner(s) must provide appropriate easements for street light maintenance. These easements must be in place prior to commencement of City maintenance of street lighting facilities.
 - d. CC&R's recorded for the subdivision must provide for the City to maintain the street lighting facilities.
 - e. City maintenance of street lighting facilities will begin 60 days after completion and City acceptance of the facilities or the above-referenced CC&R's are recorded, whichever occurs later. Maintenance of street lighting facilities on private streets will be performed to the same standard as for those on public streets.
 - f. Access must be made available to the City on a 24-hour basis for both routine and emergency maintenance of street lighting facilities.

15.15 CURB RAMP CONSTRUCTION

Curb ramps are to be constructed at round corners. Curb ramps may also be required along the longitudinal side at "T" intersections (generally at parks, schools, and other high pedestrian areas). Development projects along the longitudinal side of a "T" intersection may be conditioned as part of the approval process to construct a curb ramp even if it does not currently exist.

Development projects are responsible for the cost of installing curb ramps when either of the following conditions exists:

- a. There are no existing curb, gutter and sidewalk improvements adjoining the property.
- b. There are existing curb, gutter, sidewalk and curb ramp improvements adjoining the property but they are all required to be removed and reconstructed to accommodate the new development.

For development projects where the existing curb, gutter, sidewalk and curb ramp improvements are not all required to be removed, new curb ramps will be installed or replaced as part of the citywide curb ramp installation and replacement process.

If the project is required to construct a curb ramp to allow pedestrians to enter the street, receiving ramps or receiving areas are required to allow pedestrians to safely exit the street. If the construction of a receiving ramp or receiving area is not feasible, the developer is to construct a barricade as part of the project improvements. If there is a non-compliant receiving ramp or receiving area, the City will replace it as part of the citywide curb ramp installation and replacement process.

15.16 SURVEY MONUMENTS

Survey monuments are to be constructed along major collectors and arterials at points of intersection (PI's), beginning of curves (BC's), and ending of curves (EC's). On all other streets, the City will make a determination as to the locations for survey monuments necessary to retrace or re-establish the City right of way. Developers constructing these facilities are required to cause a record of survey or plat map to be filed with the County Surveyor as required by law.

Typically, three survey monument wells are required to be constructed in each subdivision. Survey monument wells are to be shown on subdivision and parcel maps, or records of survey. The survey monuments are to be constructed in accordance with the detail shown in the Standards Specifications.

15.17 HISTORICAL SIDEWALK SCORE PATTERNS

To preserve and restore the historic character of the Central City which is the area generally bordered by Interstate 5, Highway 50, Alhambra Boulevard and C Street, construction or reconstruction of sidewalks within the Central City are to be in accordance with Plate 15-19 which details scoring patterns for six and eight foot wide sidewalks.

Prior to placing concrete, approval to deviate from these scoring patterns is required from the Engineer. Work performed without approval or not in accordance with the drawing may require the saw-cutting of score lines into the concrete or possible removal and replacement of the work.

15.18 CONSTRUCTION OF BUS STOP PADS

Bus stop sites and alterations:

1. Bus stop sites shall be chosen such that the areas where lifts or ramps are to be deployed comply with the below requirements.
2. Where provided, when new bus route identification signs are installed or old signs are replaced, they shall comply with the requirements of the California Building Code.

New construction:

Where provided, bus stop pads shall have a firm, stable and slip resistant surface with a minimum clear length of 96 inches (measured from the face of curb or vehicle roadway edge) and a minimum clear width of 60 inches (measured parallel to the vehicle roadway) to the maximum extent allowed by legal or site constraints. Bus stop pads shall connect to streets, sidewalks or pedestrian paths as part of an accessible route complying with Plate 15-21, Plate 15-22, or Plate 15-23.

Newly constructed bus stop pads must provide a square curb surface between the pad and road or other detectable warnings.

Bus stop pads shall be at same slope as roadway in the direction parallel to roadway, and maximum 2% slope perpendicular to roadway.

Where provided, bus stop shelters shall be installed so as to permit a wheelchair user to enter the shelter from the public way and access a clear floor area of 30 by 48 inches completely within the shelter. Such shelters shall be connected by an accessible route to the boarding area (area where lifts or ramps are to be deployed).

APPENDIX
TYPICAL DRAWINGS AND GUIDELINES

STREET DESIGN GUIDELINES

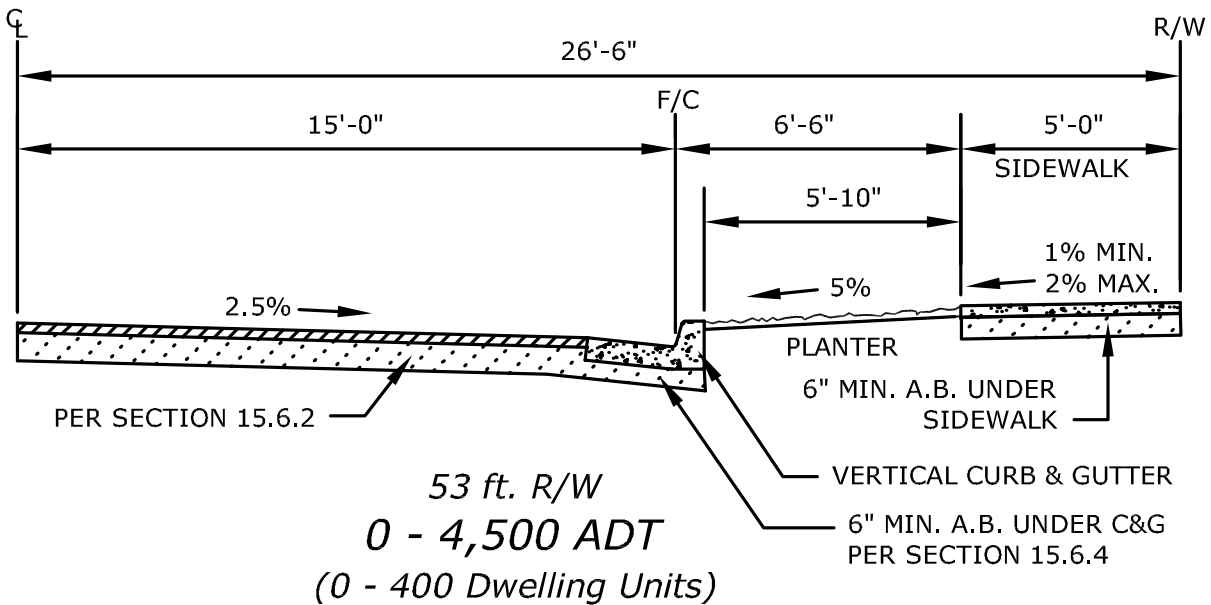
Street Design						Access Control				
Street Designation	Plate Number	Base R/W Width (feet)	DAILY VOLUMES (ADT)		Minimum Design Speed	Center Line ³ Radius for Curves (feet)	Single Family Driveways	Minimum Driveway Separation	Left Turns From Street	Left Turns To Street
Local Residential	15-2	53'	0	4,500	25	200	YES	10	Allowed	Allowed
Local Commercial	15-3	59'	0	16,000	35	400	N/A	10	Allowed	Allowed
Local Industrial	15-4	63'	0	16,000	35	400	N/A	10	Allowed	Allowed
Minor Collector	15-5	57'(71')	4,500	8,000	40	600	NO	Case By Case ¹	Allowed	Allowed
Major Collector 2 Lanes 4 Lanes	15-6	69'(83')	8,000 17,000	13,000 25,000	45	1,000 (600 min.)	NO	Case By Case ¹	Turn Pocket Required	TWLTL ² Required
4-Lane Arterial	15-7	99'(113')	18,000	27,000	50	1,500 (1,000 min.)	NO	250'	Turn Pocket Required	TWLTL ² Required
6-Lane Arterial	15-8	121'	27,000	54,000	55	2,400 (1,500 min.)	NO	500'	Turn Pocket Required	Prohibited
1- On all streets with more than 4,000 daily trips, access to individual single family lots will not be allowed. In such cases, alternate access designs will be considered, including alleys, shared access driveways and frontage roads. 2- Two Way Left Turn Lane (TWLTL) 3- Minimum center lines indicated per City Code Resolution 2004-118.										

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DATE

DESCRIPTION

RESIDENTIAL STREET

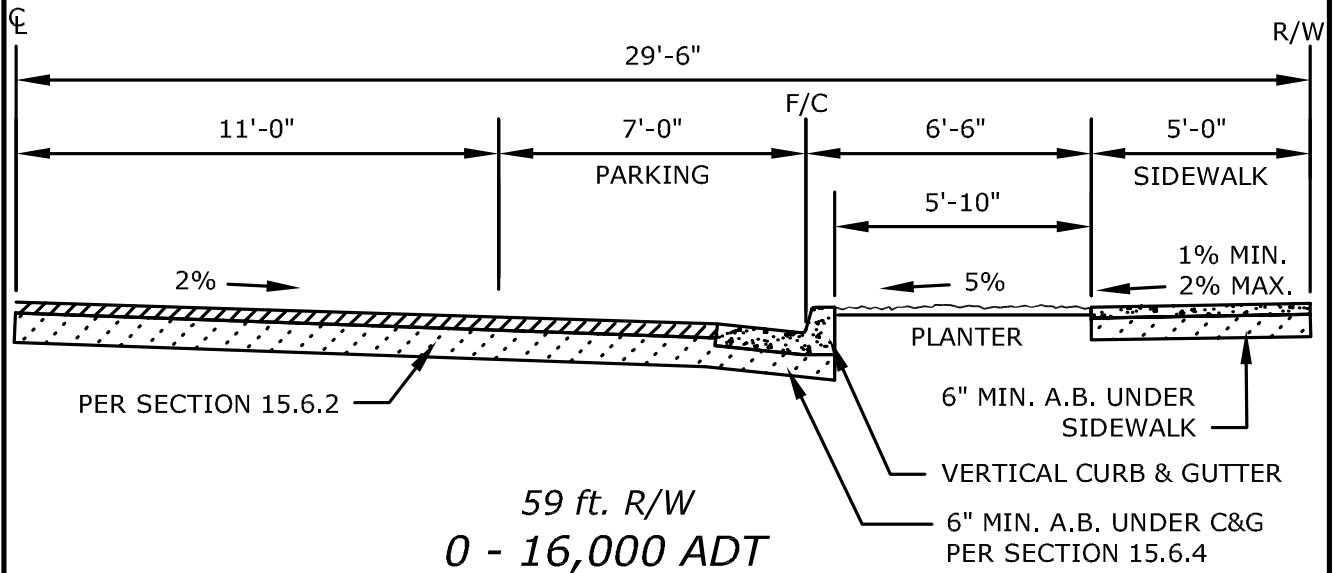


NOTES

1. Typical street section to be used in new residential subdivisions.
2. ADT is Average Daily Traffic.
3. Rolled curb and gutter may be constructed at street elbows and cul-de-sacs if approved.
4. The planter width may only be reduced or the planter removed to meet residential housing densities or to conform to existing street right-of-way if approved.
5. The street section may be modified for infill development.

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LOCAL COMMERCIAL

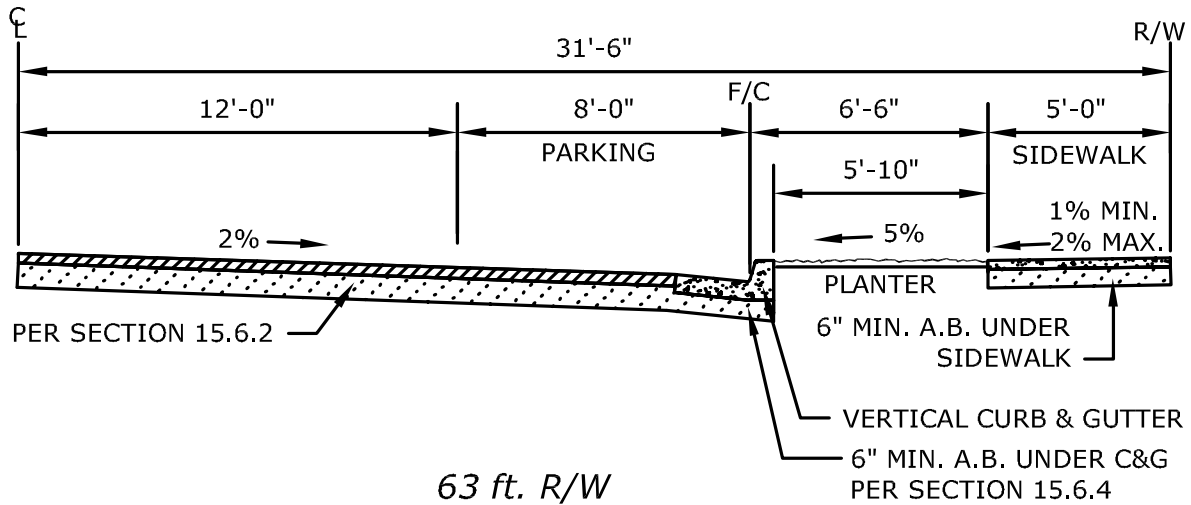


NOTES

1. Street section to be used in office/business parks and certain street adjacent to parks and schools.
2. ADT is Average Daily Traffic.
3. Additional dedications may be required at expanded intersections.

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LOCAL INDUSTRIAL



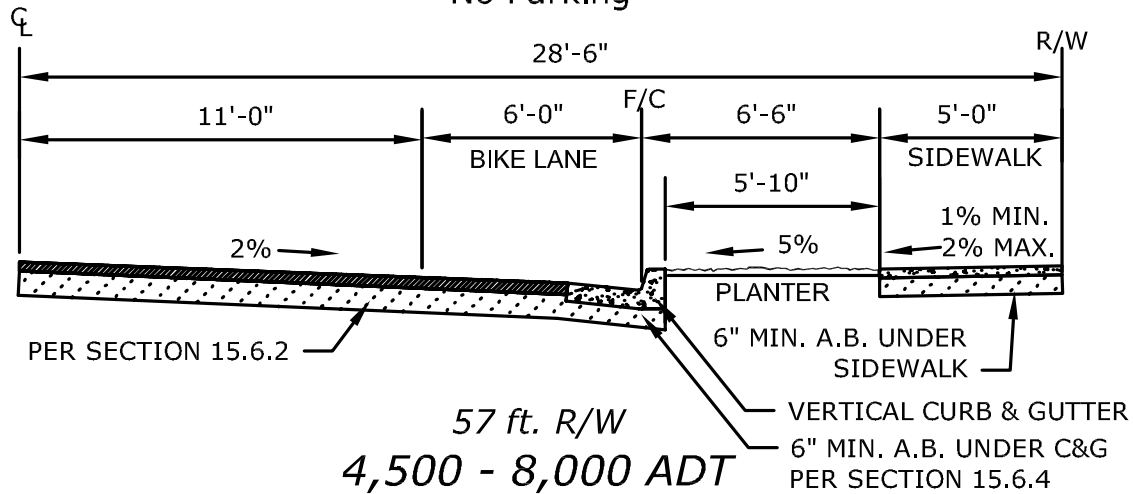
63 ft. R/W
0 - 16,000 ADT

NOTES

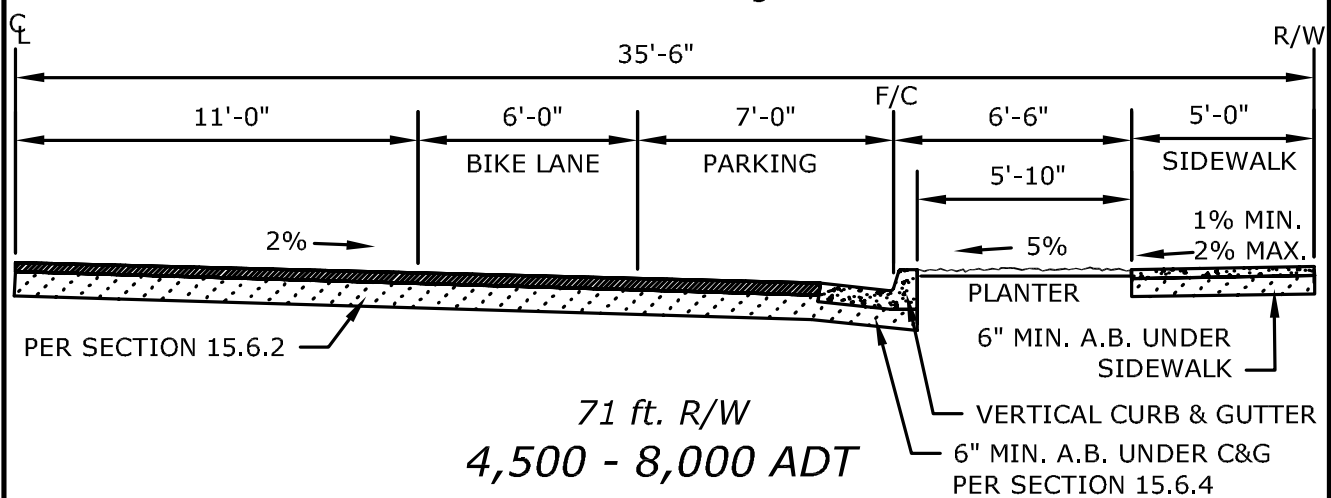
1. Typical street section to be used in industrial parks and certain streets adjacent to parks and schools.
2. ADT is Average Daily Traffic.
3. Additional dedications may be required at expanded intersections.

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MINOR COLLECTOR No Parking



MINOR COLLECTOR With Parking



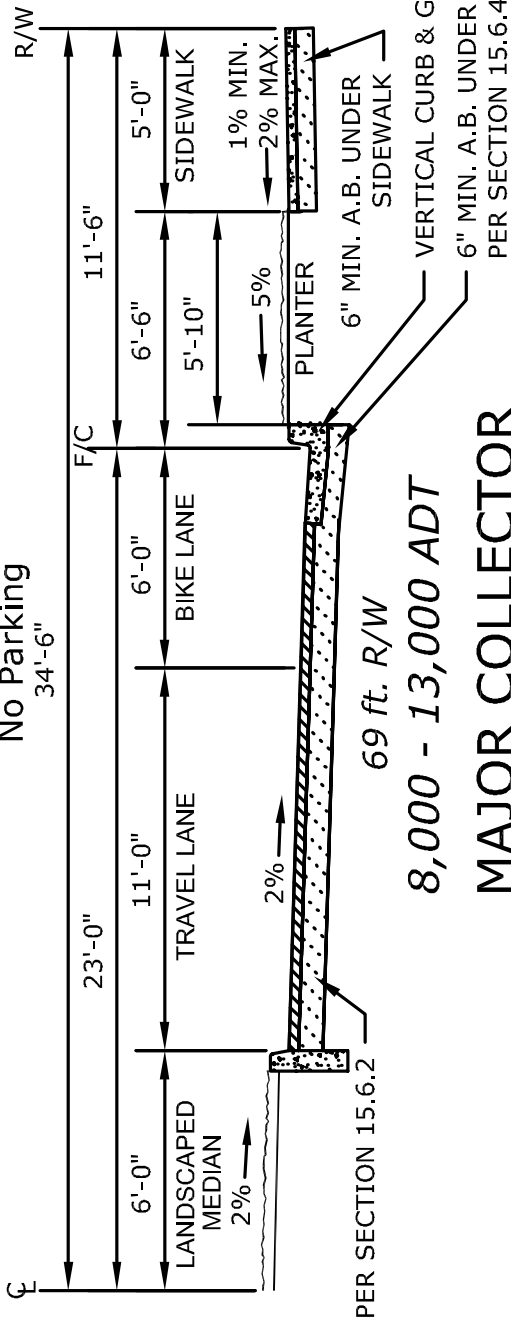
NOTES

1. Street section to be used where the street will serve multiple types of traffic with a volume of 4,500 - 8,000 ADT.
2. ADT is Average Daily Traffic.
3. Additional right-of-way may be required at expanded intersections.

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MAJOR COLLECTOR

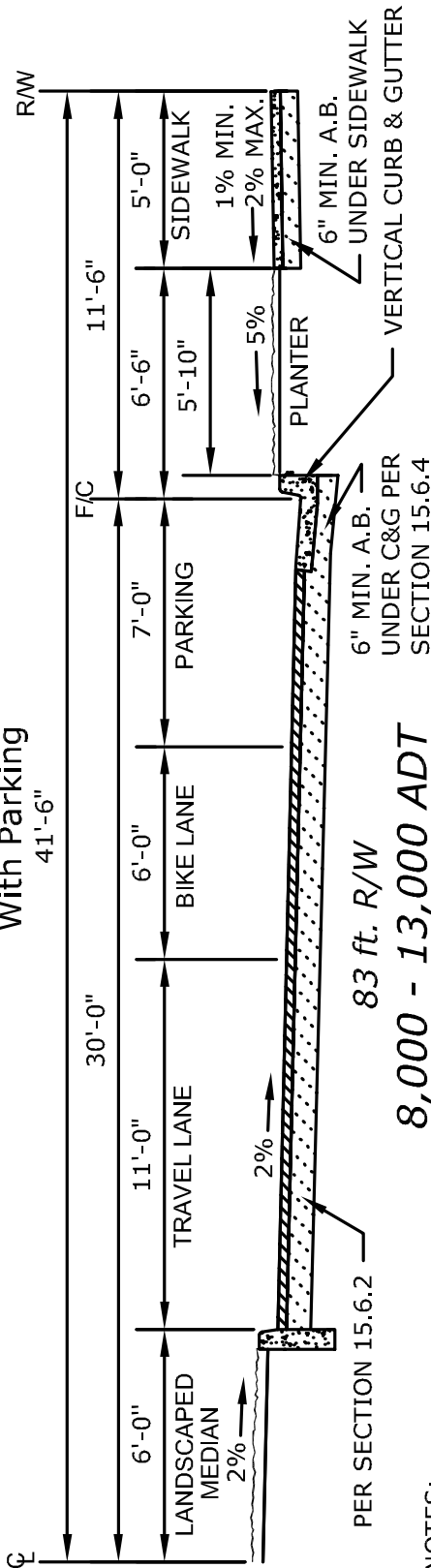
No Parking
34'-6"



69 ft. R/W
8,000 - 13,000 ADT

MAJOR COLLECTOR

With Parking
41'-6"



83 ft. R/W
8,000 - 13,000 ADT

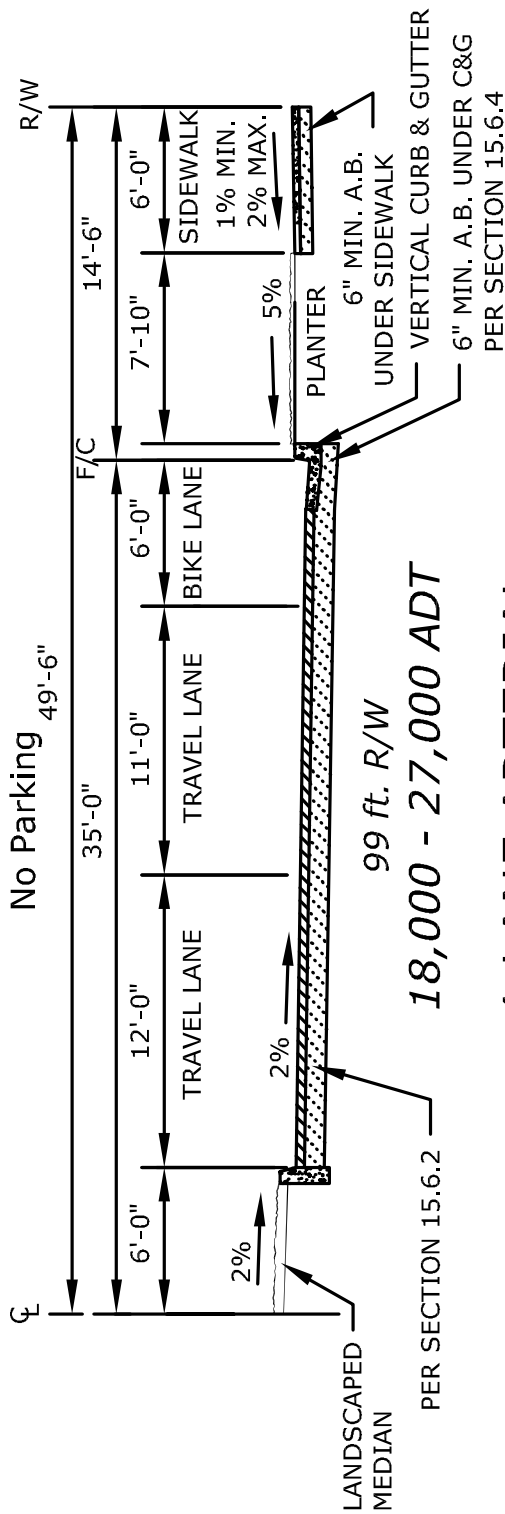
NOTES:

1. Street section to be used in areas with mixed traffic types and volume of 8,000 - 13,000 ADT.
2. For information regarding on-street parking, refer to Section 15.13
3. Additional right-of-way required at expanded intersections.
4. A two way left turn lane may be constructed in lieu of a landscaped median, if approved.
5. When left turn pockets within median islands are needed, and additional right-of-way is not available, the left turn lane may be 10' wide, if approved by the City Traffic Engineer.
6. ADT is Average Daily Traffic.

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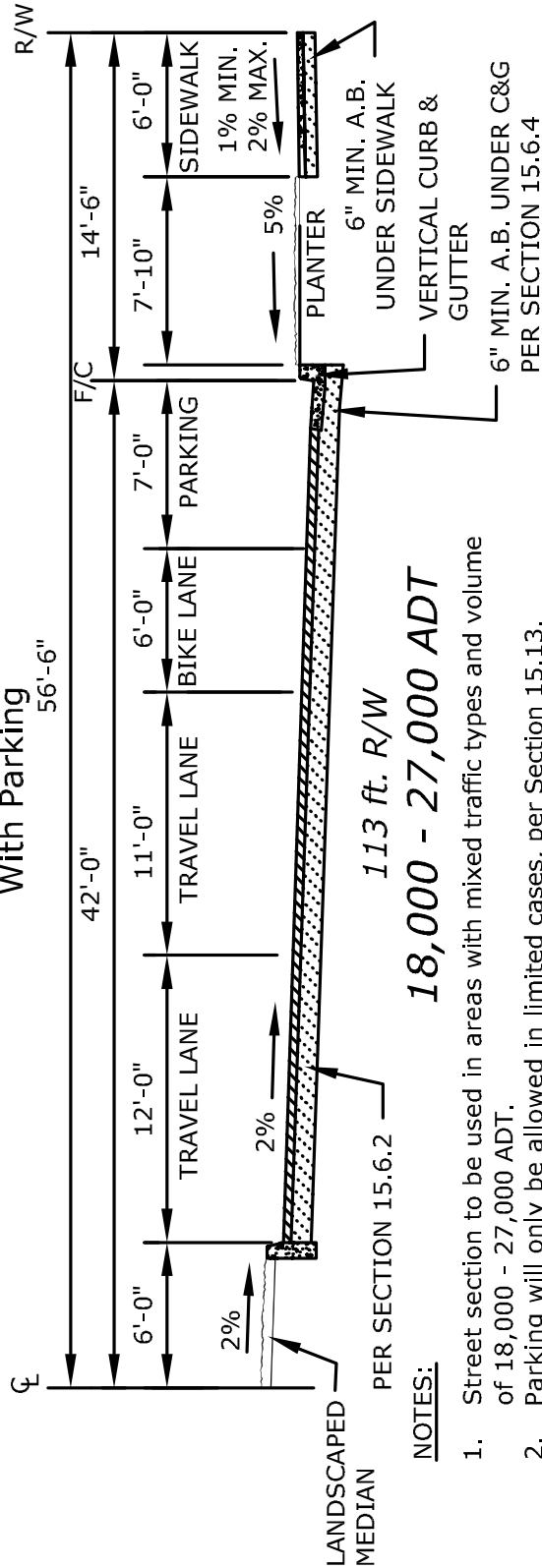
4-LANE ARTERIAL

No Parking 49'-6"



4-LANE ARTERIAL

With Parking 56'-6"



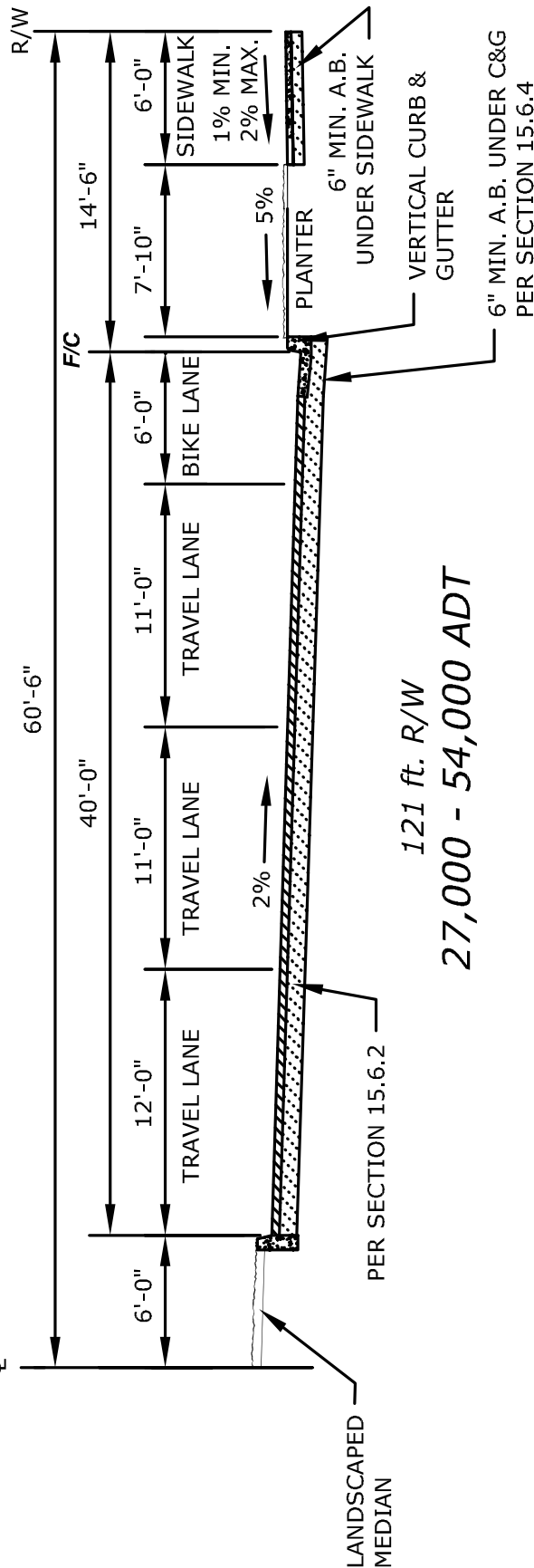
NOTES:

1. Street section to be used in areas with mixed traffic types and volume of 18,000 - 27,000 ADT.
2. Parking will only be allowed in limited cases, per Section 15.13.
3. Additional right-of-way required at expanded intersections.
4. ADT is Average Daily Traffic.
5. A two way left turn lane may be constructed in lieu of a landscaped median, if approved by the City Traffic Engineer.

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6-LANE ARTERIAL

No Parking

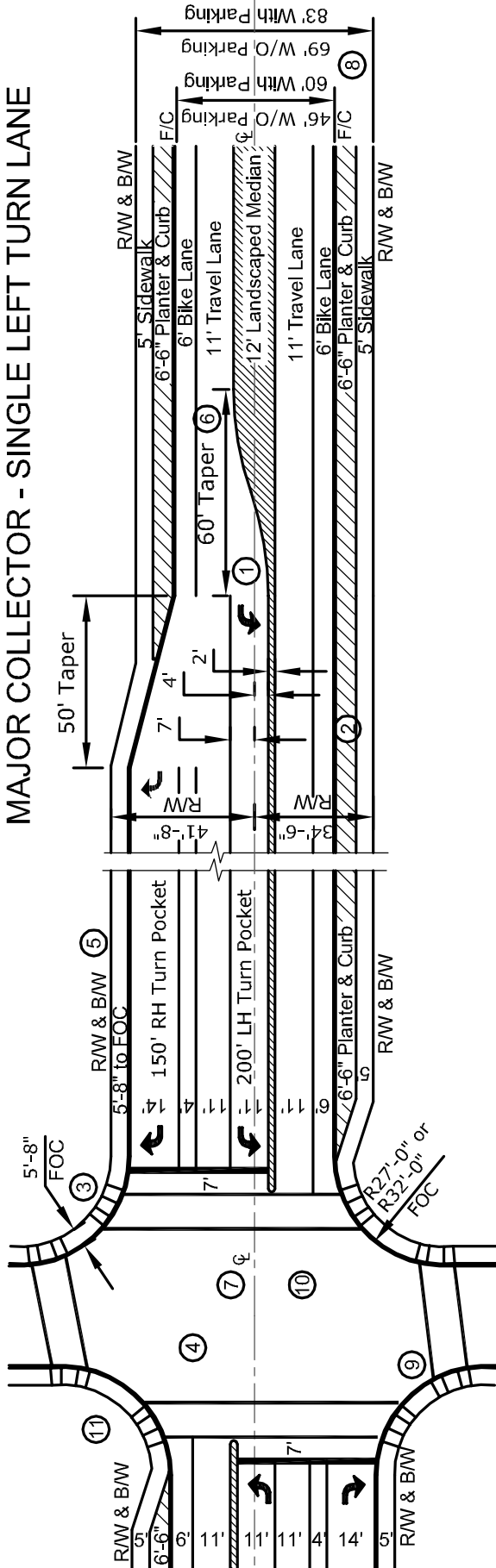


NOTES:

1. Additional right-of-way required at expanded intersections.
2. Parking is prohibited per Section 15.13.
3. ADT is Average Daily Traffic.

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Expanded Intersection MAJOR COLLECTOR - SINGLE LEFT TURN LANE



NOTES:

- ① Dual left turn lanes shall be provided if more than 300 peak hour left turns are anticipated, and at other locations required by Department of Transportation.
- ② Geometrics to be approved by the City Engineer. Eliminate portion of the planter to provide bus turn-out when required. See Plate 15-20.
- ③ Dual curb ramps are required at all intersections.
- ④ All signs & markings shall be provided per California MUTCD Standards.
- ⑤ No driveway shall be allowed in area of turn lanes or tapers per City Code 18.08.040.
- ⑥ Bay taper shall be a reverse curve (per Caltrans Highway Design Manual - 120' min. radius).
- ⑦ Adequate sight distance (per Caltrans Highway Design Manual Sections 201 and 405) shall be provided.
- ⑧ Street width will vary with addition/deletion of parking.
- ⑨ Cross walks will be designed to minimize skew.
- ⑩ This design incorporates a 1' offset through the intersection.
- ⑪ Pedestrian plazas should be considered at all expanded intersections with planned moderate to high pedestrian activity.

EXPANDED INTERSECTIONS ARE REQUIRED WHERE 4-LANE STREETS INTERSECT AND AT ALL OTHER LOCATIONS AS NECESSARY PER THE DEPARTMENT OF TRANSPORTATION.

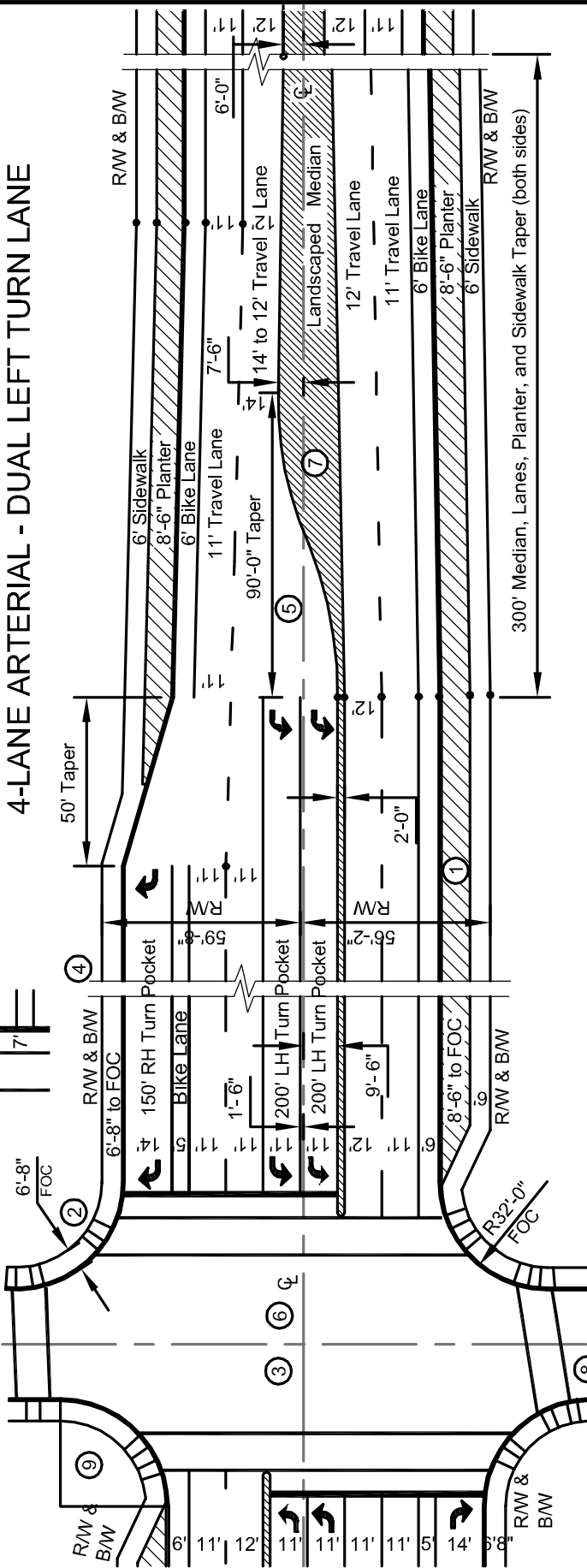
CITY OF SACRAMENTO
DEPARTMENT OF TRANSPORTATION

TYPICAL CROSS-SECTION
MAJOR COLLECTOR
SINGLE LEFT TURN LANE

APPROVED BY: N. Theodorides SCALE: NONE
DATE: April 2009 **PLATE 15-9**

REV.	DATE	DESCRIPTION
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Expanded Intersection 4-LANE ARTERIAL - DUAL LEFT TURN LANE



NOTES:

- ① Eliminate a portion of the planter to provide bus turn-out when required. See Plate 15-20.
- ② Adequate sight distance (per Caltrans Highway Design Manual Sections 201 and 405) shall be provided.
- ③ Dual curb ramps are required at all intersections.
- ④ Median widened to provide shadowing of dual left turn lanes. Transition tapers are to be designed for the approved design speed of the street.
- ⑤ All signs & markings shall be provided per California MUTCD Standards.
- ⑥ No driveway shall be allowed in area of turn lanes or tapers per City Code 18.08.040.
- ⑦ Bay taper shall be a reverse curve.
- ⑧ Cross walks will be designed to minimize skew.
- ⑨ Pedestrian plazas should be considered at all expanded intersections with planned moderate to high pedestrian activity.

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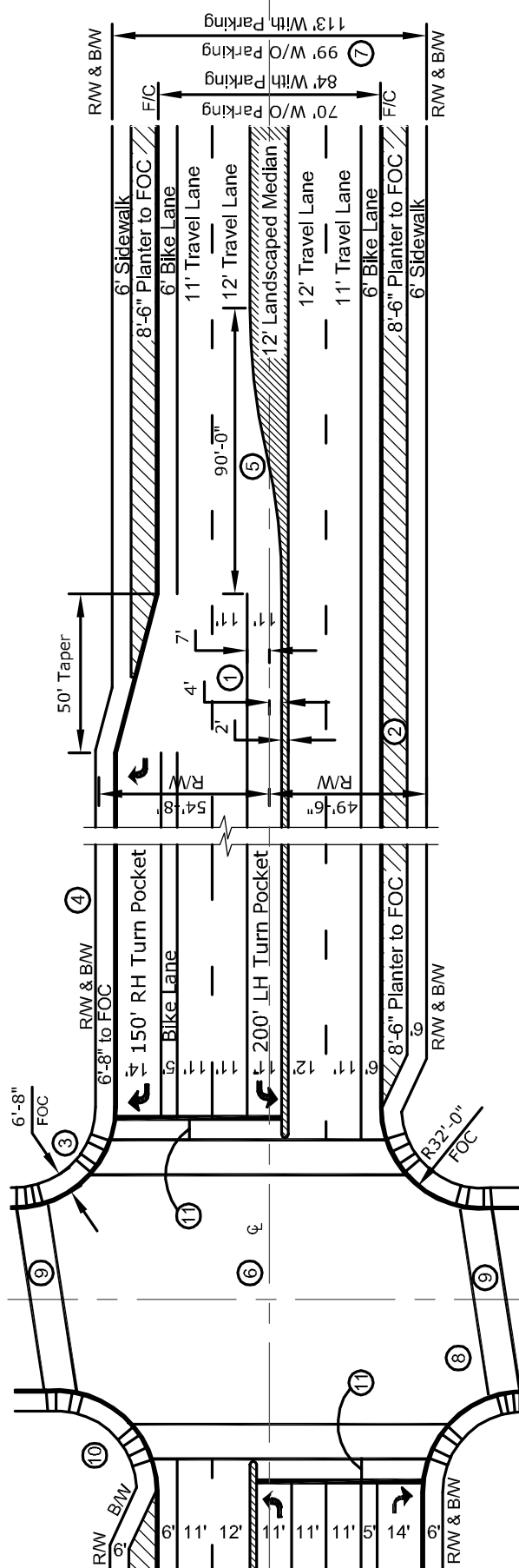
CITY OF SACRAMENTO
DEPARTMENT OF TRANSPORTATION

TYPICAL CROSS-SECTION
4 LANE ARTERIAL
DUAL LEFT TURN LANE

APPROVED BY: N. Theodorides SCALE: NONE
DATE: April 2009 **PLATE 15-10**

EXPANDED INTERSECTIONS ARE REQUIRED WHERE 4-LANE STREETS INTERSECT AND AT ALL OTHER LOCATIONS AS NECESSARY PER THE DEPARTMENT OF TRANSPORTATION

Expanded Intersection 4-LANE ARTERIAL - SINGLE LEFT TURN LANE



NOTES:

- ① Dual left turn lanes shall be provided if more than 300 peak hour left turns are anticipated, and at other locations required by the Department of Transportation.
- ② Eliminate the portion of the planter to provide bus turn-out when required.
- ③ Dual curb ramps are required at all intersections.
- ④ All signs & markings shall be provided per California MUTCD Standards.
- ⑤ No driveway shall be allowed in area of turn lanes or tapers per City Code 18.08.040.
- ⑥ Bay taper shall be a reverse curve. (120' minimum radius)
- ⑦ Adequate sight distance (per Caltrans Highway Design Manual Sections 201 and 405) shall be provided.
- ⑧ Street width will vary with addition/deletion of parking.
- ⑨ Cross walks will be designed to minimize skew.
- ⑩ Pedestrian plazas should be considered at all expanded intersections with planned moderate to high pedestrian activity.
- ⑪ Distance between crosswalk and stop bar shall be 7'.

EXPANDED INTERSECTIONS ARE REQUIRED WHERE 4-LANE STREETS INTERSECT AND AT ALL OTHER LOCATIONS AS NECESSARY PER THE DEPARTMENT OF TRANSPORTATION.

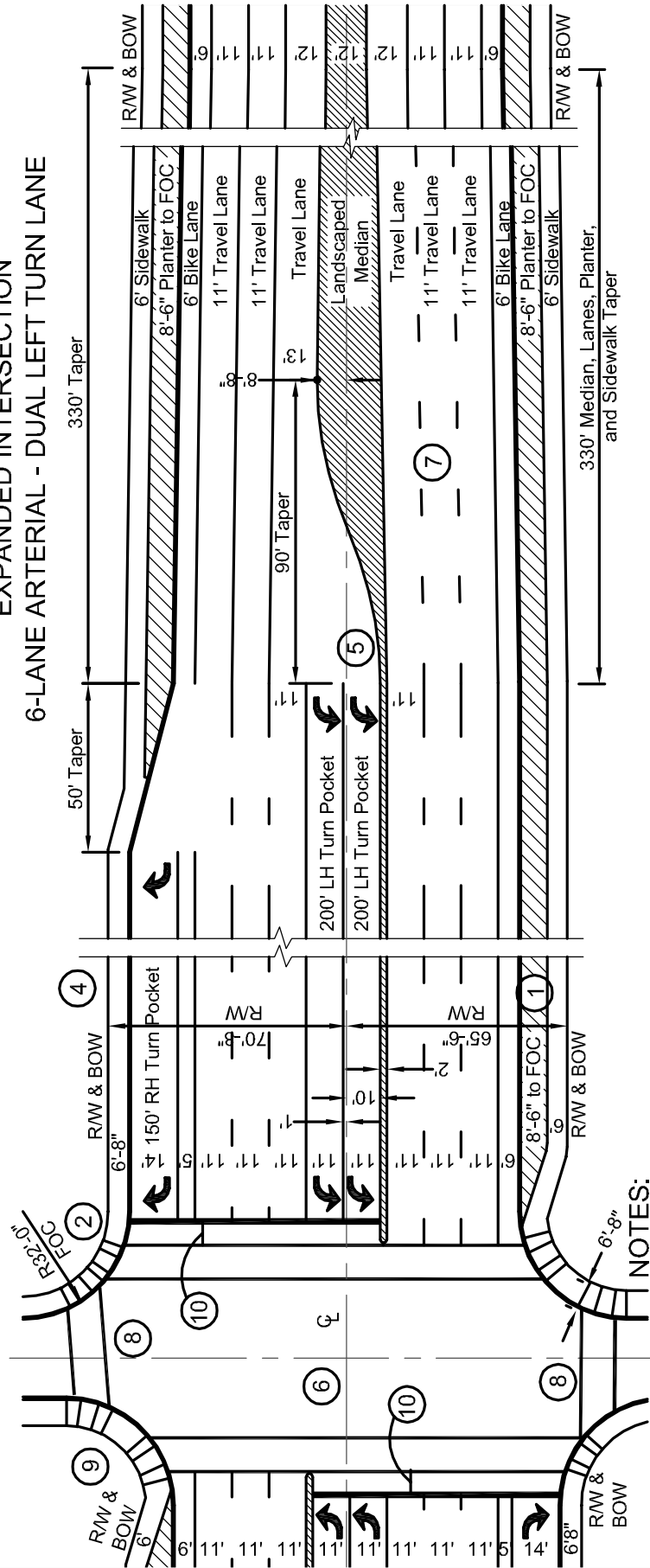
CITY OF SACRAMENTO
DEPARTMENT OF TRANSPORTATION

TYPICAL CROSS-SECTION
4 LANE ARTERIAL
SINGLE LEFT TURN LANE

APPROVED BY: N. Theocharides SCALE: NONE
DATE: April 2009 **PLATE 15-11**

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EXPANDED INTERSECTION 6-LANE ARTERIAL - DUAL LEFT TURN LANE



NOTES:

- Delete planter to provide bus turn-out when required
- Dual curb ramps are required at all intersections. (where feasible)
- All signs & markings shall be provided per California MUTCD
- No driveway shall be allowed in area of turn lanes or tapers per City Code 18.08.040
- Bay taper shall be a reverse curve. (120' minimum radius)
- Adequate stopping sight distance (per Caltrans Highway Design Manual Sections 201 and 405) shall be provided.
- Transition tapers are to be designed for design speed of road.
- Cross walks will be designed to minimize skew.
- Pedestrian plazas should be considered at all expanded intersections with planned moderate to high pedestrian activity.
- Distance between crosswalk and stop bar shall be 7'.

EXPANDED INTERSECTIONS ARE REQUIRED WHERE 4-LANE STREETS INTERSECT AND AT ALL OTHER LOCATIONS AS NECESSARY PER THE DEPARTMENT OF TRANSPORTATION

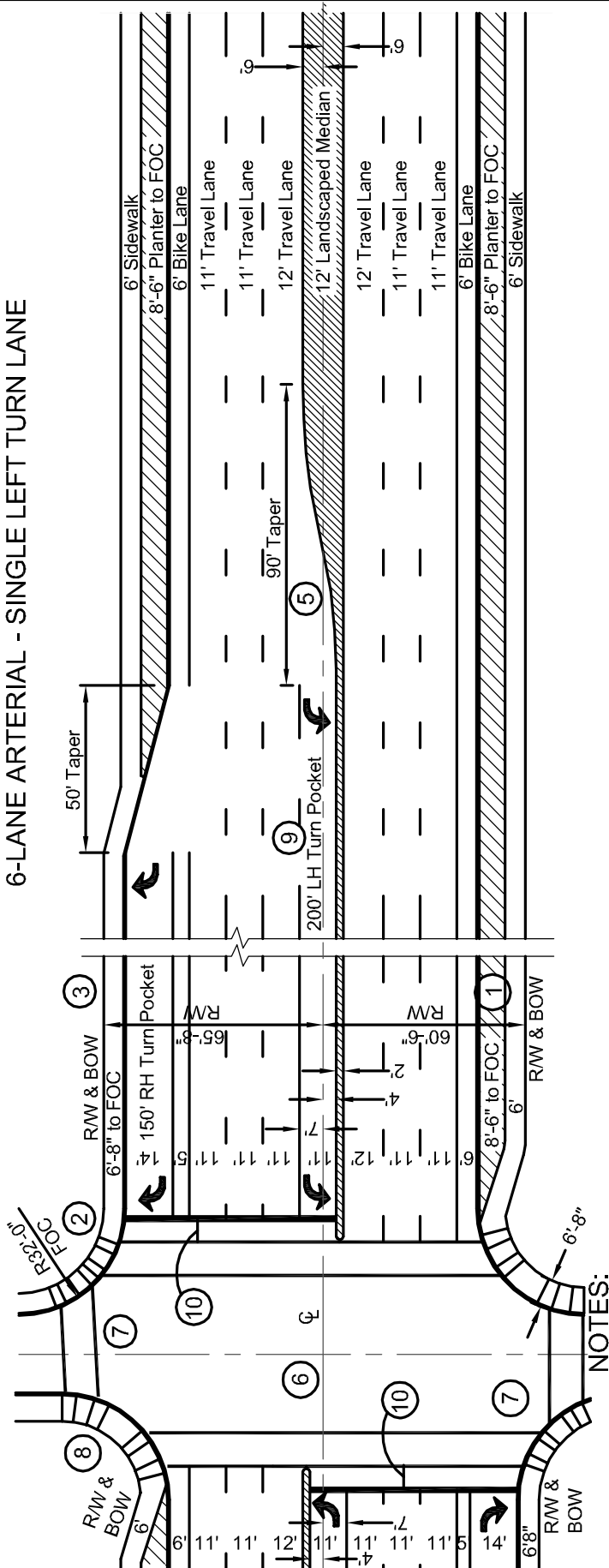
CITY OF SACRAMENTO
DEPARTMENT OF TRANSPORTATION

6-LANE ARTERIAL
DUAL LEFT TURN LANE

APPROVED BY: N. Theodorides SCALE: NONE
DATE: April 2009 **PLATE 15-12**

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EXPANDED INTERSECTION 6-LANE ARTERIAL - SINGLE LEFT TURN LANE



NOTES:

- ① Eliminate the portion of the planter to provide bus turn-out when required.
- ② Dual curb ramps are required at all intersections.
- ③ All signs & markings shall be provided per California MUTCD.
- ④ No driveway shall be allowed in area of turn lanes or tapers per City Code 18.08.040
- ⑤ Bay taper shall be a reverse curve. (120' minimum radius)
- ⑥ Adequate sight distance (per Caltrans Highway Design Manual Sections 201 and 405) shall be provided.
- ⑦ Crosswalks will be designed to minimize skew.
- ⑧ Pedestrian plazas should be considered at all expanded intersections with planned moderate to high pedestrian activity.
- ⑨ Dual left turn lanes shall be provided if more than 300 peak hour turns are anticipated.
- ⑩ Distance between crosswalk and stop bar shall be 7'.
- ⑪ Dual left turn lanes shall be provided if more than 300 peak hour left turns are anticipated, and at other locations required by the Department of Transportation.

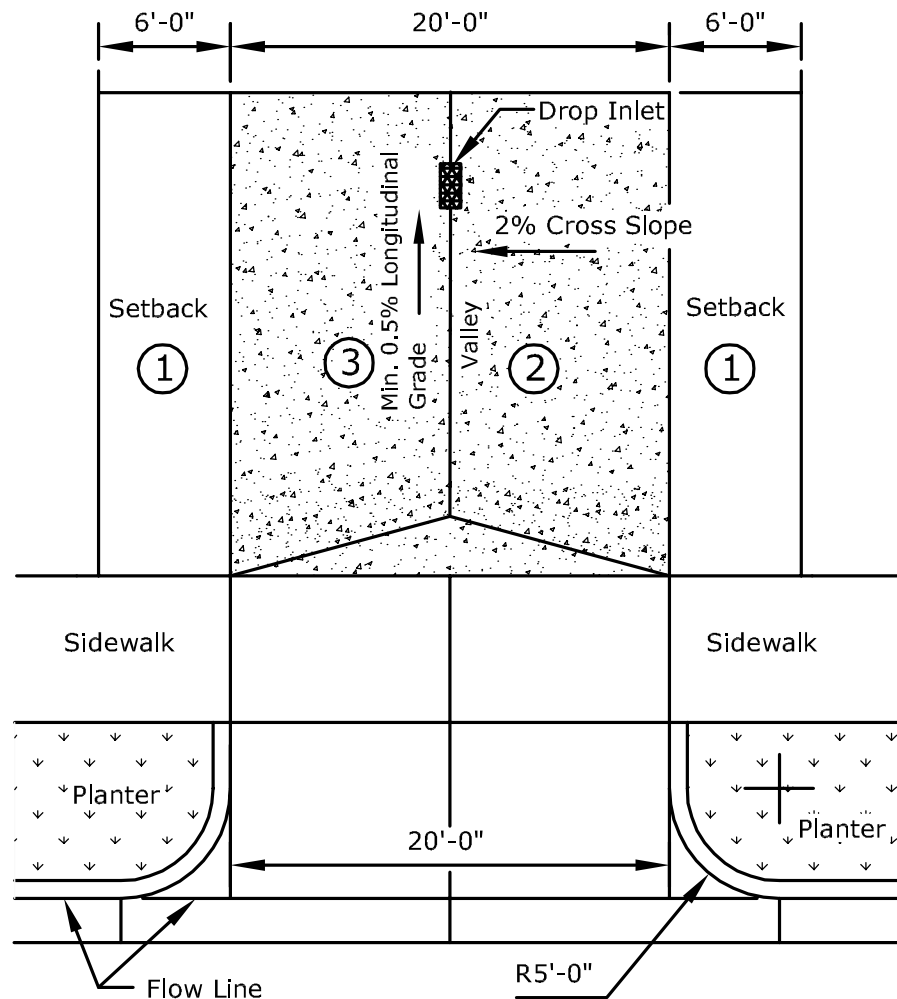
EXPANDED INTERSECTIONS ARE REQUIRED WHERE 4-LANE STREETS INTERSECT AND AT ALL OTHER LOCATIONS AS NECESSARY PER THE DEPARTMENT OF TRANSPORTATION

CITY OF SACRAMENTO
DEPARTMENT OF TRANSPORTATION

6-LANE ARTERIAL
SINGLE LEFT TURN LANE

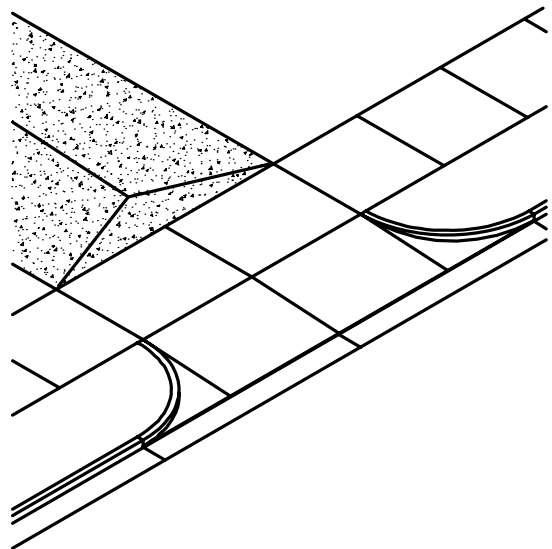
APPROVED BY: N. Theodorides SCALE: NONE
DATE: April 2009 **PLATE 15-13**

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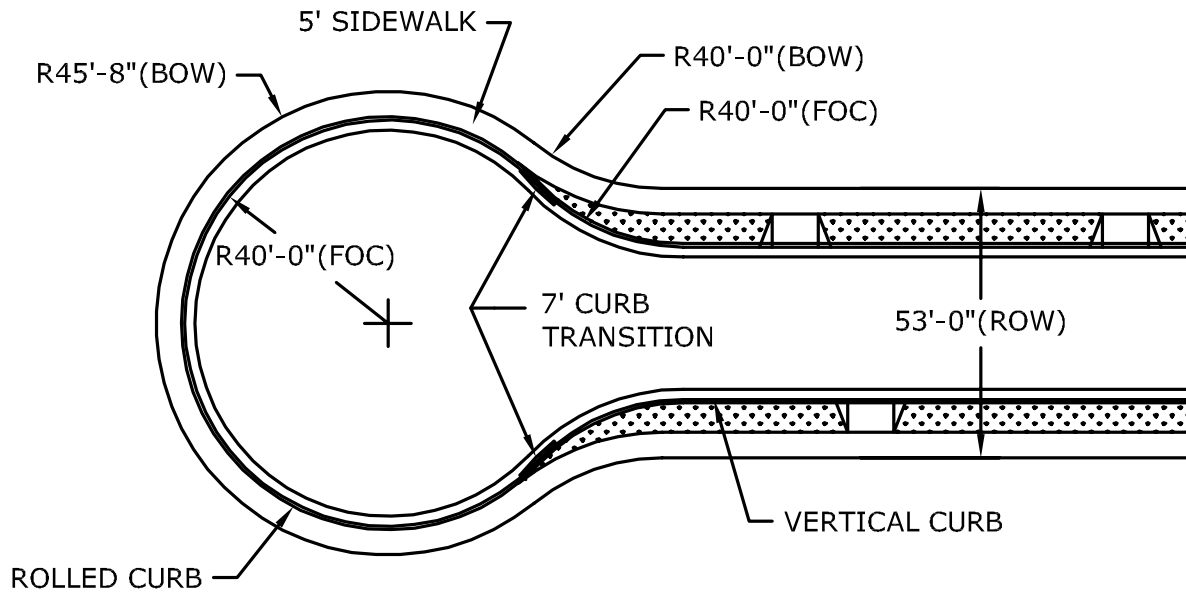


Notes:

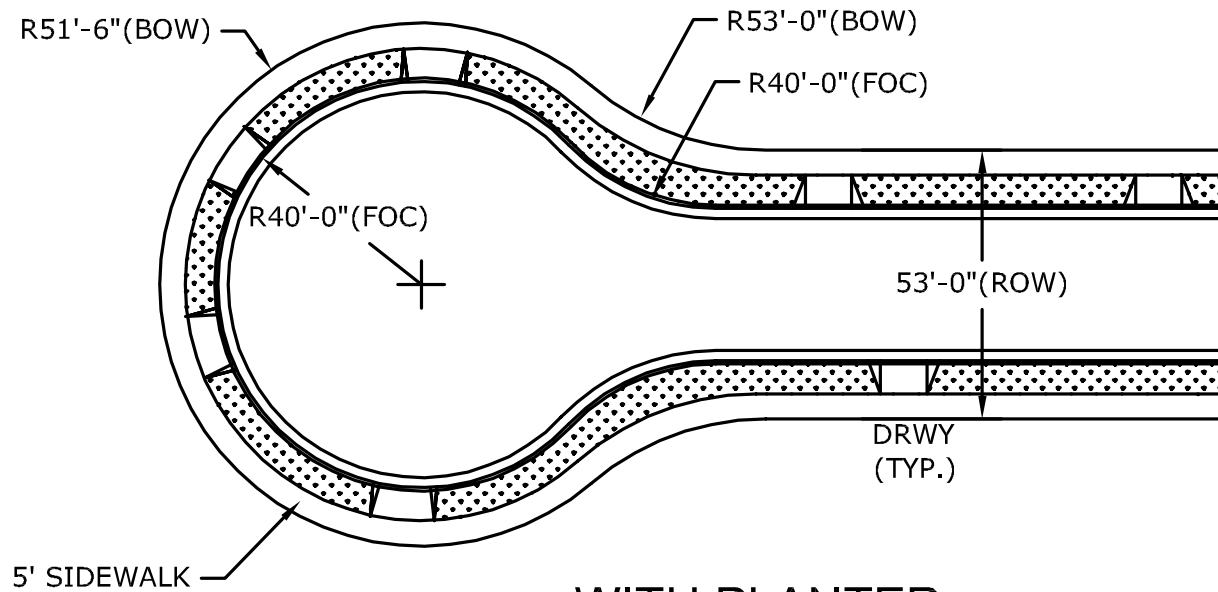
- ① A public alley may be used as a part of the maneuvering space requirements for adjacent parking facilities. Maneuvering width may not be in the public right-of-way except as provided in Chapter 12.40 of City Code. A 6 ft. setback from the public right-of-way is required in order to ensure adequate maneuvering room is available.
- ② If an alley is to be used for site access it must be improved to City standards. The extent of the improvements shall be the entire alley frontage of the subject site to the nearest alley entrance. Alleys shall have 6 in. of PCC with an appropriate subgrade as determined by TI and R-values for the area in which the alley is located.
- ③ Minimum longitudinal grades on alleys shall be 0.50 percent. In general, the cross slope shall be 2 percent from the property line to the center of the alley.



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WITHOUT PLANTER

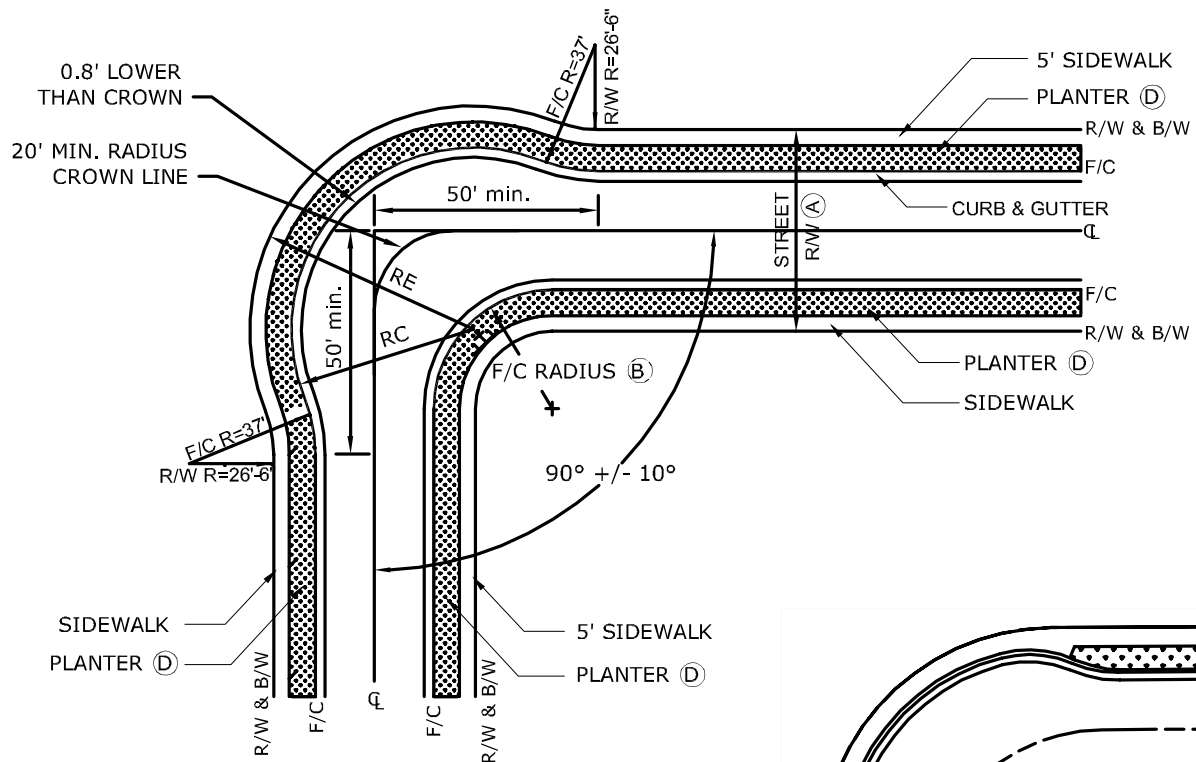


WITH PLANTER (Vertical)

NOTES:

1. Cul-de-sacs only are allowed on residential local streets
2. Cul-de-sac center point may be offset from street centerline
3. Easements required for street lights

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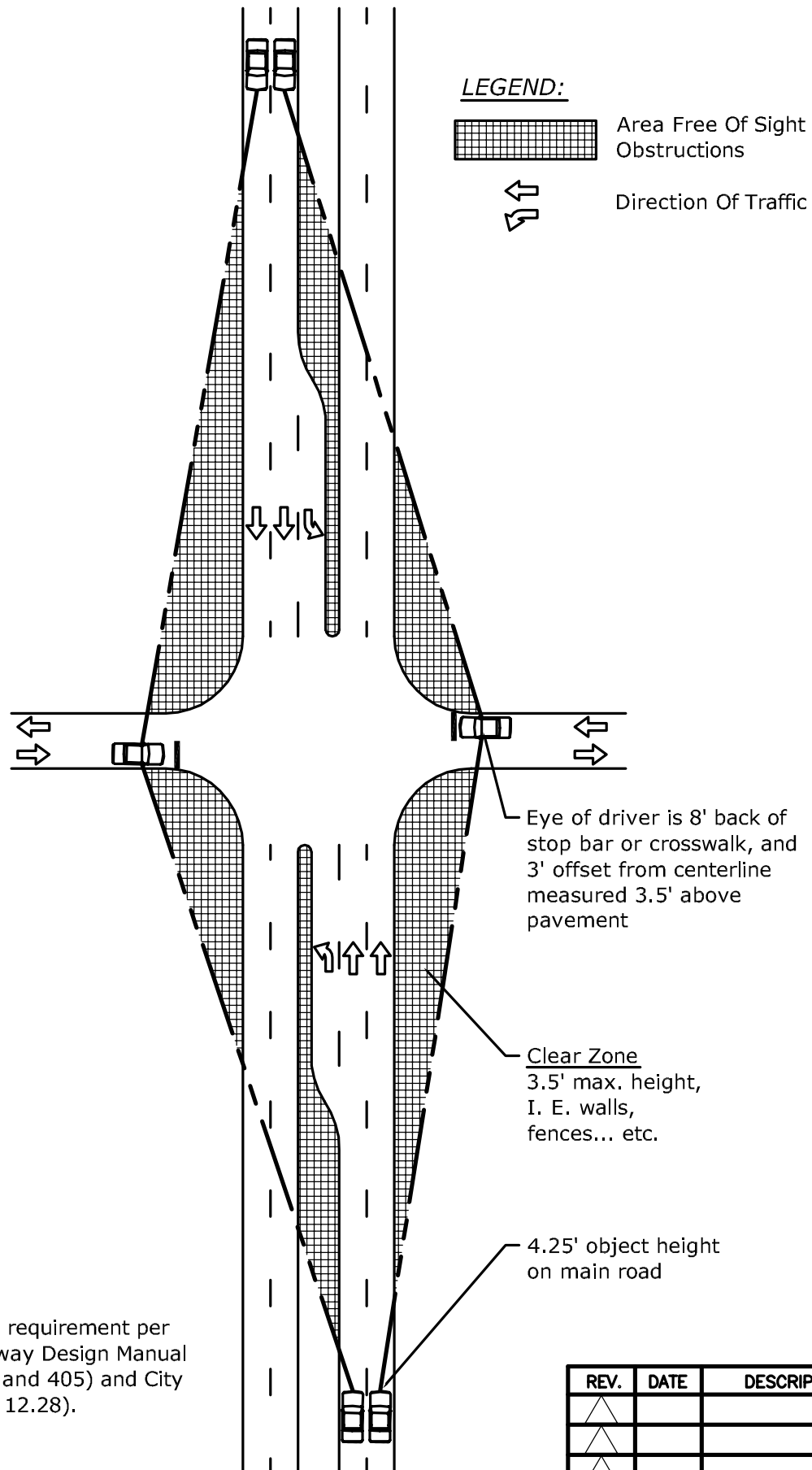
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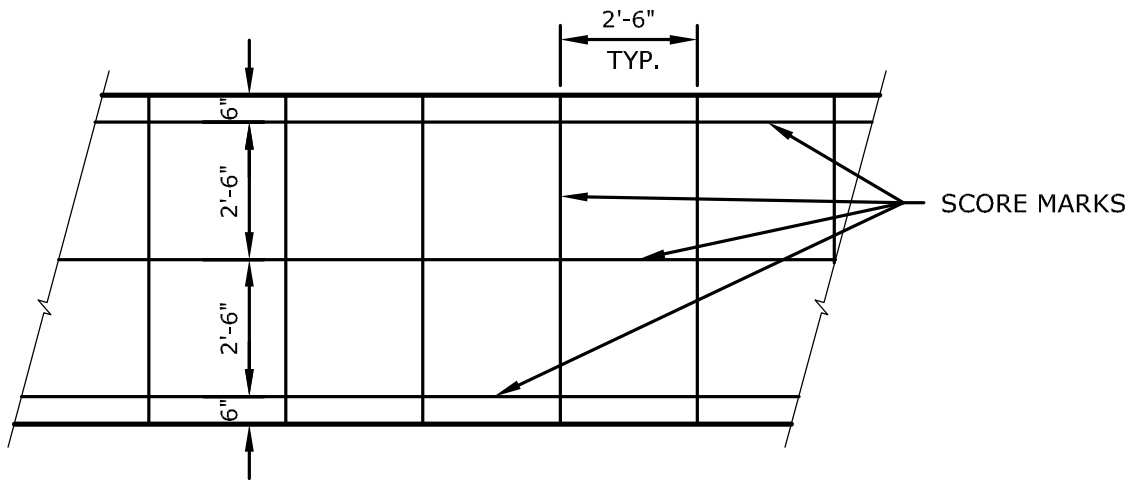
1. Elbows are only allowed on local residential, minor commercial and minor industrial streets.
2. The planter only may be removed within the elbow.

	Street R/W & Back of Walk (A)	Inner F/C Radius (B)	Outer F/C Radius RC	Outer R/W Radius RE	Planter Curb Width (D) *
Residential	53'	27'	44'	55'-6"	6'-6"
Commercial	59'	27'	54'	65'-6"	6'-6"
Industrial	63'	32'	60'	74'-6"	6'-6"

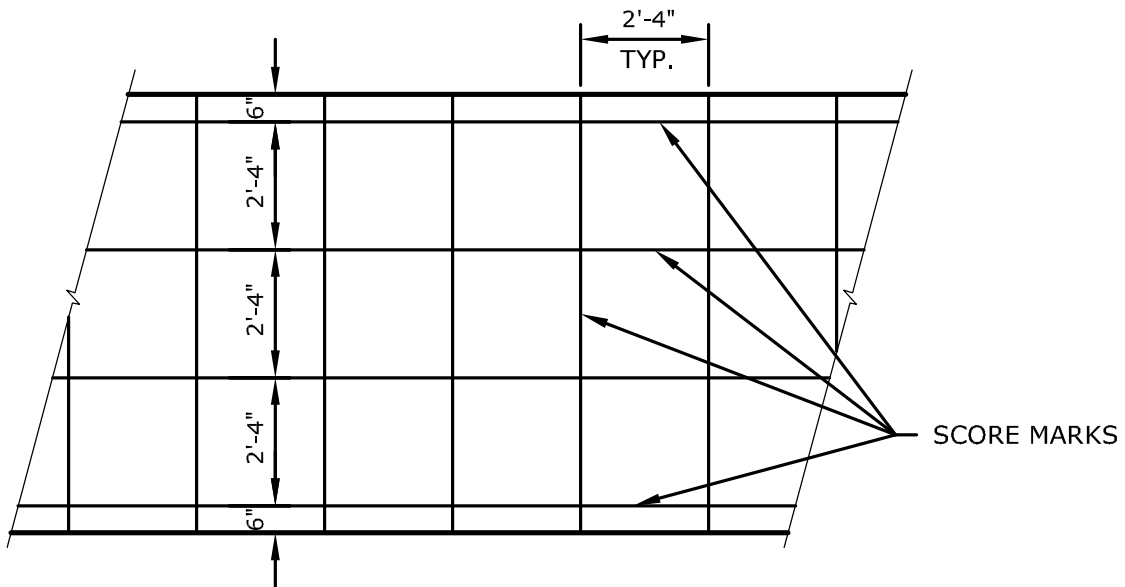
* Measured from face-of-curb to back of walk

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6' SIDEWALK



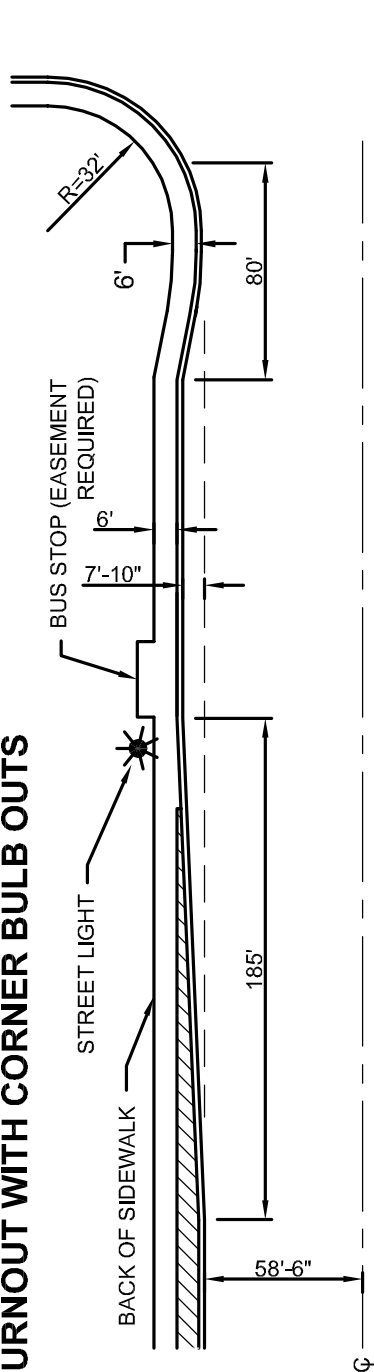
8' SIDEWALK

NOTES

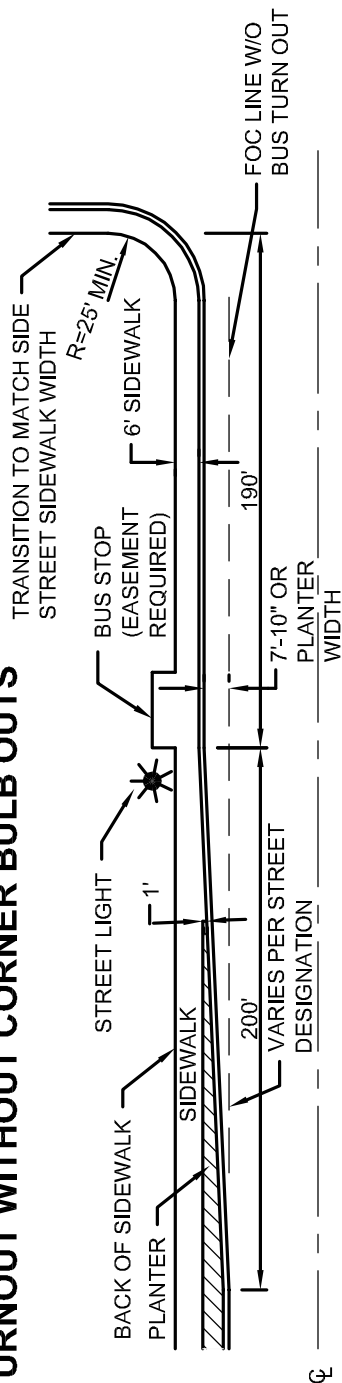
1. Contractor is to request approval of the scoring pattern prior to placement of concrete.
2. Score marks are $\frac{1}{8}$ " - $\frac{1}{4}$ " wide and $\frac{1}{4}$ " deep.
3. Expansion joints required per Standard Specifications.
4. Use color additive as directed by the engineer (approx. 1 lb/cy of lamp black color).

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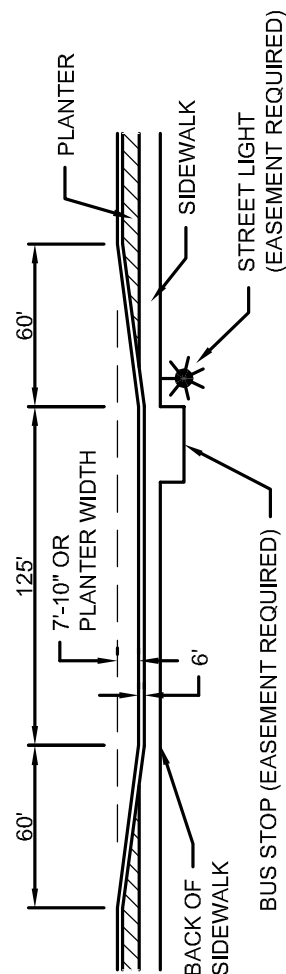
BUS TURNOUT WITH CORNER BULB OUTS



BUS TURNOUT WITHOUT CORNER BULB OUTS



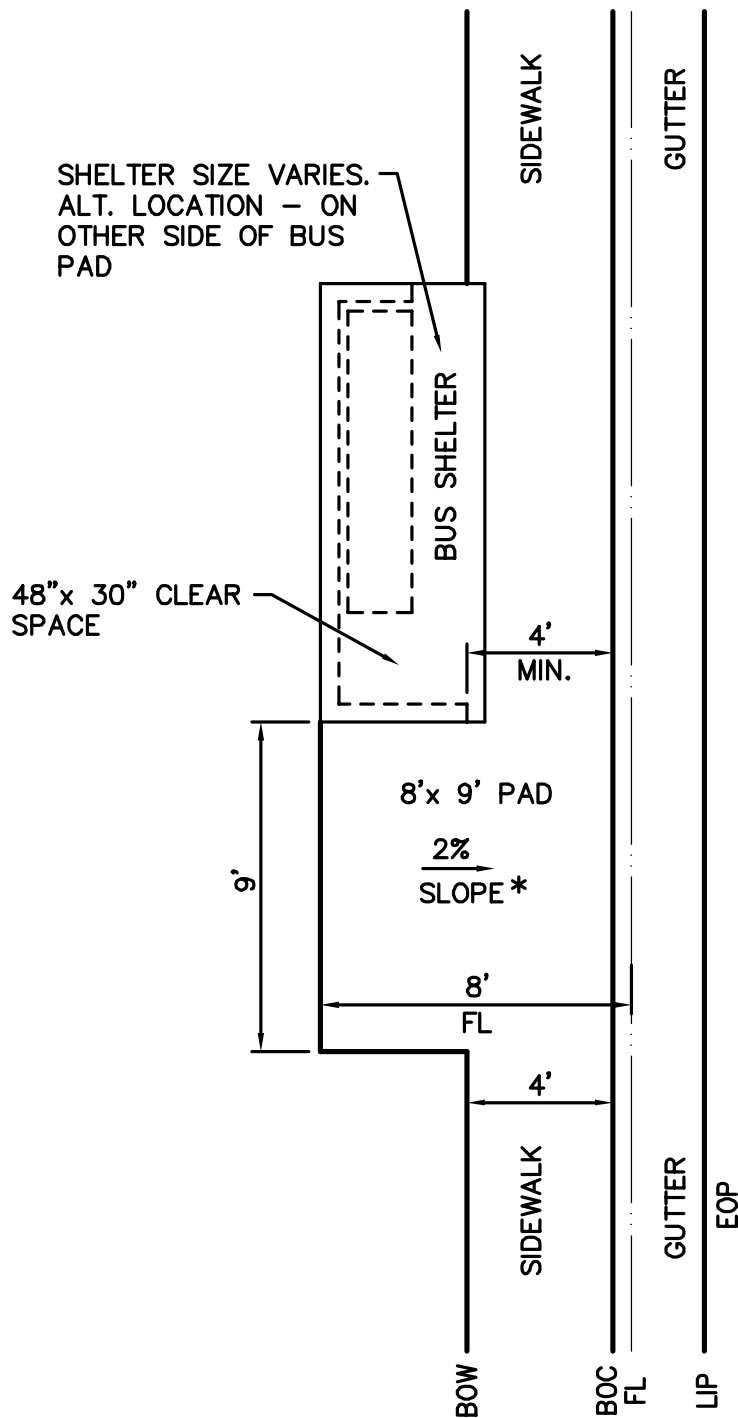
TYPICAL MID-BLOCK BUS TURNOUT



NOTES:

1. BUS STOPS AT INTERSECTIONS OF 84' STREETS, 103' STREETS & 117' STREETS ARE PROVIDED FOR BY STANDARD INTERSECTION WIDENING.
2. THE DIMENSIONS SHOWN ARE MINIMUM S. ALTERNATE WIDENINGS MAY BE NECESSARY AT CERTAIN SPECIAL CASE INTERSECTIONS, TO BE APPROVED BY THE CITY TRAFFIC ENGINEER.

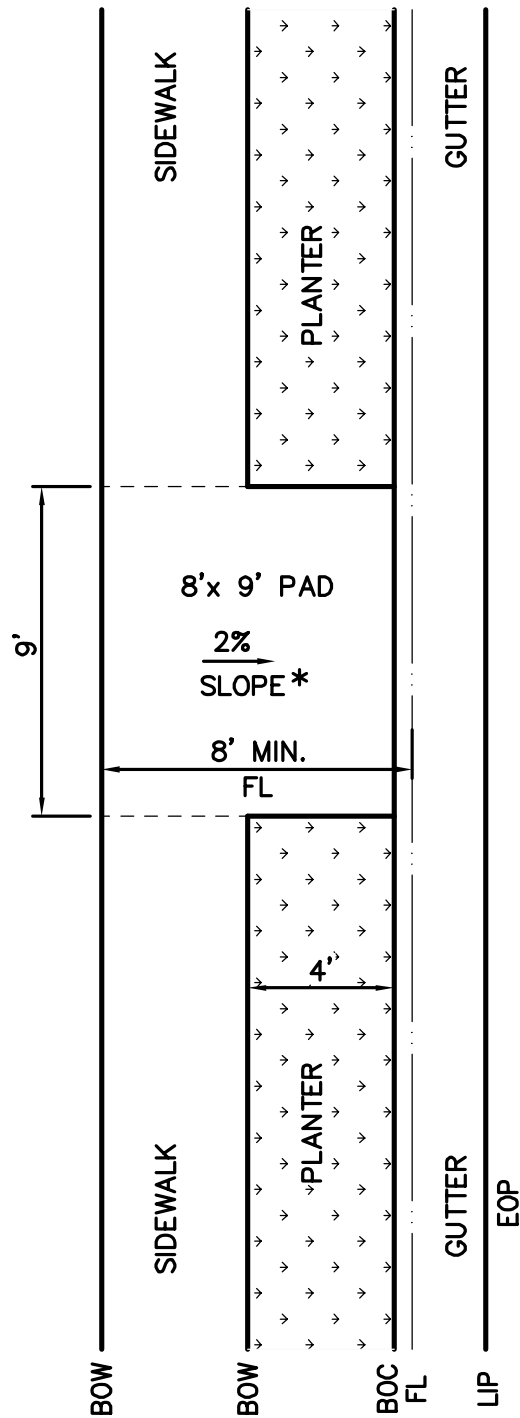
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NOTE:

BUS STOP PAD SHALL BE AT SAME SLOPE AS ROADWAY IN THE DIRECTION PARALLEL TO ROADWAY, AND MAXIMUM 2 PERCENT SLOPE PERPENDICULAR TO ROADWAY

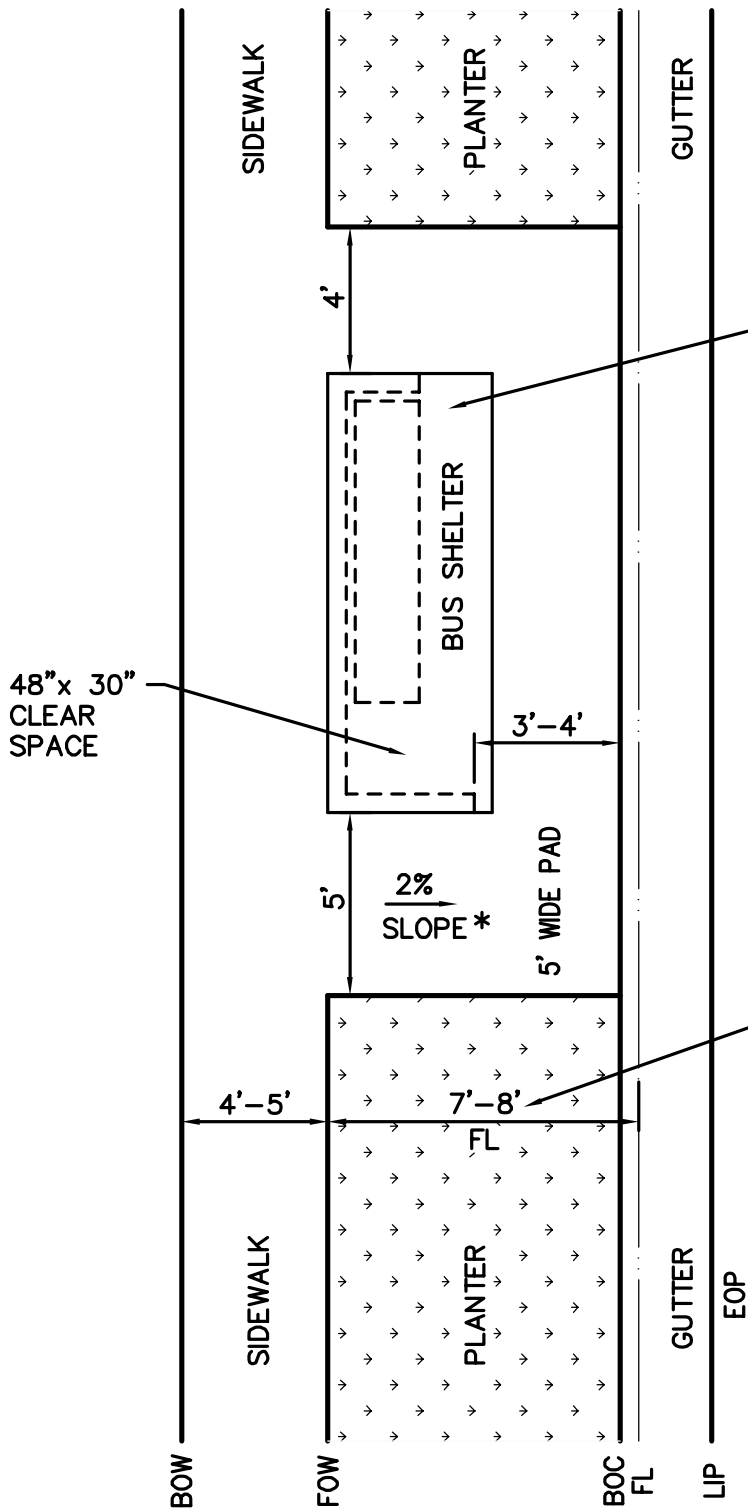
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NOTE:

BUS STOP PAD SHALL
BE AT SAME SLOPE
AS ROADWAY IN THE
DIRECTION PARALLEL
TO ROADWAY, AND
MAXIMUM 2 PERCENT
SLOPE PERPENDICULAR
TO ROADWAY

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SHELTER SIZE VARIES

NOTE:

BUS STOP PAD SHALL BE AT SAME SLOPE AS ROADWAY IN THE DIRECTION PARALLEL TO ROADWAY, AND MAXIMUM 2 PERCENT SLOPE PERPENDICULAR TO ROADWAY

SITE LOCATIONS WHERE PLANTERS ARE BETWEEN 4' TO 7' SHALL BE ASSESSED ON A CASE BY CASE BASIS

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