



THE CITY OF SAN DIEGO

The City of

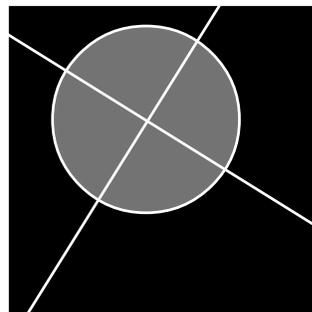
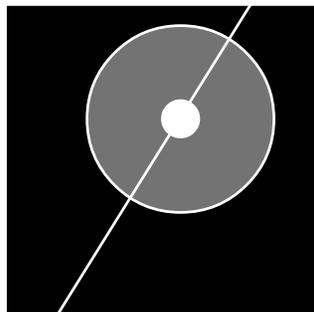
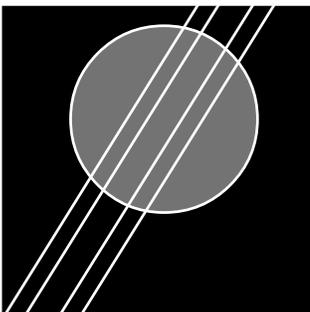
San Diego

Street

Design
Manual

November 2002

"If we can develop and design streets so that they are wonderful, fulfilling places to be—community-building places, attractive for all people—then we will have successfully designed about one-third of the city directly and will have had an immense impact on the rest," Alan B. Jacobs, Great Streets.



2002



THE CITY OF SAN DIEGO

The City of
San Diego
Street Design Manual 2002

"To offer guidelines for the design of streets that will create harmony and promote function for all users while respecting and supporting the needs of the surrounding community."

City of San Diego
Street Design Manual Advisory Committee

Prepared by:
City of San Diego Street Design Manual Advisory Committee
and the City of San Diego Planning Department

With the assistance of:
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Approved by:
Council of the City of San Diego

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Street Design Manual 2002



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Introduction



Introduction

“Community streets are public rights-of-way, which unite neighborhoods, provide access for motorists and non-motorists, and promote neighborhood identity, health, comfort, and safety.” Moorish and Brown, Planning to Stay.

INTRODUCTION

Streets play a major role in shaping the form of the urban environment. The quality of the street experience is a key element in the quality of a neighborhood. *The Progress Guide and General Plan* describes the function of the City's street system as follows:

Streets serve a variety of purposes. One is for the circulation of people, vehicles, goods, and services (utilities). Streets also serve as shopping corridors, restaurant rows, linear parks, residential front yards, extensions of office lobbies, ceremonial gathering places, parade grounds, racing courses, display areas, entertainment strips, etc. The street is really the City, organized along a corridor. It is a continuous forum for gathering where all those activities have their overture, making city life what it is. It has economic, social, aesthetic, political, ecological—even philosophical—implications. And, all this is in addition to providing a right-of-way for people and things.

The City of Villages Initiative recognizes streets as an important element in shaping our urban form and improving our neighborhood quality by:

- Balancing the needs of emergency vehicles with everyday traffic concerns—such as vehicle speeding and pedestrian safety—through street design policy.
- Promoting an interconnected street network that includes pedestrian and bicycle access where topography and land form permit.

- Creating a more attractive and safe pedestrian environment through the promotion of an active streetscape and the use of public art and artistic elements.
- Reducing peak energy demand through the incorporation of urban heat island reduction measures into the appropriate site and street design guidelines, landscape standards, and building codes.
- Promoting pedestrian- and transit-friendly design of City streets.
- Providing capacity and operational improvements to streets to minimize congestion and focus on persons and goods, not just vehicles.

These are the guiding principles of the Street Design Manual.

The purpose of the Street Design Manual is to provide information and guidance for the design of the public right-of-way that recognizes the many and varied purposes that a street serves. The Street Design Manual is intended to assist in the implementation of the *Progress Guide and General Plan*, the Strategic Framework Element, the *Transit-Oriented Development Design Guidelines*, and the Land Development Code. In addition, it is intended to assist in the implementation of the special requirements established through community plans, specific plans, precise plans, or other City Council-adopted policy and/or regulatory documents.

APPLICABILITY

These guidelines are applicable primarily to newly developing areas and to older areas that are undergoing major revitalization and redevelopment. In areas with sensitive habitat or unusual and difficult terrain, these guidelines may be modified as appropriate. In historic and older, developed neighborhoods, the existing character of the streets should be maintained and enhanced. In these older neighborhoods, nonstandard street widths are frequently in place in many locations. Existing street designs and configurations not illustrated in this manual may be considered appropriate for continued use in such neighborhoods.

The manual establishes guidelines to carry out the City's street design functions. It does not establish a legal standard for such functions nor is it intended that it should do so. Moreover, these guidelines do not supersede requirements and policies established through community plans, specific plans, precise plans, regional and City standard drawings or other City Council-adopted policy and/or regulatory documents; but, rather, they are designed to work in concert with them.

It should be noted that all drawings included in this manual are for illustrative purposes only and should not be used as construction plans.

How To Use This Manual

The Street Design Manual is divided into six sections: Roadway Design, Pedestrian Design, Traffic Calming, Street Lighting, Parkway Configurations, and Design Standards. It is important to understand how all six parts work. All six parts should be considered, in order to design an effective street system. The manual complements the *Transit-Oriented Development Design Guidelines* and substantiates the importance of site planning in the design of an effective street system. Each of the street classifications described in this manual includes icons (at the bottom of the page) that indicate the appropriate parkway configuration and traffic calming devices for the type of street, as illustrated below and on the following page.

Sheet Title

Chapter

Design Parameters

Width, Right-of-Way (Single-lane)	54 ft. (16.5 m)/55 ft. (16.8 m) 51 ft. (15.6 m)
Recommended ADT	700
Width, Curb-to-Curb (Single-lane)	30 ft. (9.2 m)±1, (3.5 m) ^{1,2} 28 ft. (8.4 m)
Maximum Grade	
Minimum Curve Radius	100' ft. (30 m)
Land Use	Large Lot, Single-Dwelling Residential, Single-Dwelling Residential, Low Density, Multiple-Dwelling Residential, Open Space-Park
Parkway Options	U-1P, U-3(a), U-4(a)
Land Use	School, Church, or Public Parking
Parkway	U-C

Sheet Title

Chapter

Design Parameters

Typical Cross Section

Drawing Title

plan (not to scale)

12

Page Number

Applicable Parkway Configurations (Detailed in Parkway Configuration section of manual)

U-2 U-3 a U-3 b U-4 a

section A-A (not to scale)

13

Page Number

Applicable Traffic-Calming Devices (Detailed in Traffic-Calming section of manual)

URBAN

Parkway Configurations

- U-1** — 10' parkway - contiguous sidewalk
- U-2** — 10' parkway with tree grates
- U-3** — 12' parkway - non-contiguous sidewalk
- U-4_a** — 15' parkway - non-contiguous sidewalk
- U-4_b** — 22' parkway - non-contiguous sidewalk
- U-5_a** — 14' parkway - with tree grates
- U-5** — 14' parkway - with tree grates (transit area)
- U-6_a** — 20' parkway - with tree grates
- U-6_b** — 20' parkway - (transit area)

Traffic Calming

-  — chicane
-  — traffic circle
-  — median slow point
-  — road hump
-  — speed table raised crosswalk
-  — intersection pop-out
-  — semi-diverter
-  — channelization

RURAL

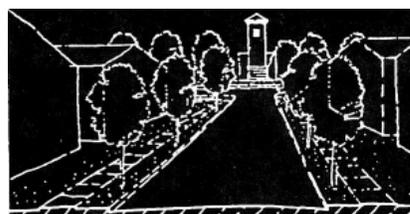
- R-1** — 12' parkway
- R-2_a** — 14' parkway
- R-2_b** — 14' parkway
- R-3** — 18' parkway
- R-4** — 26' parkway

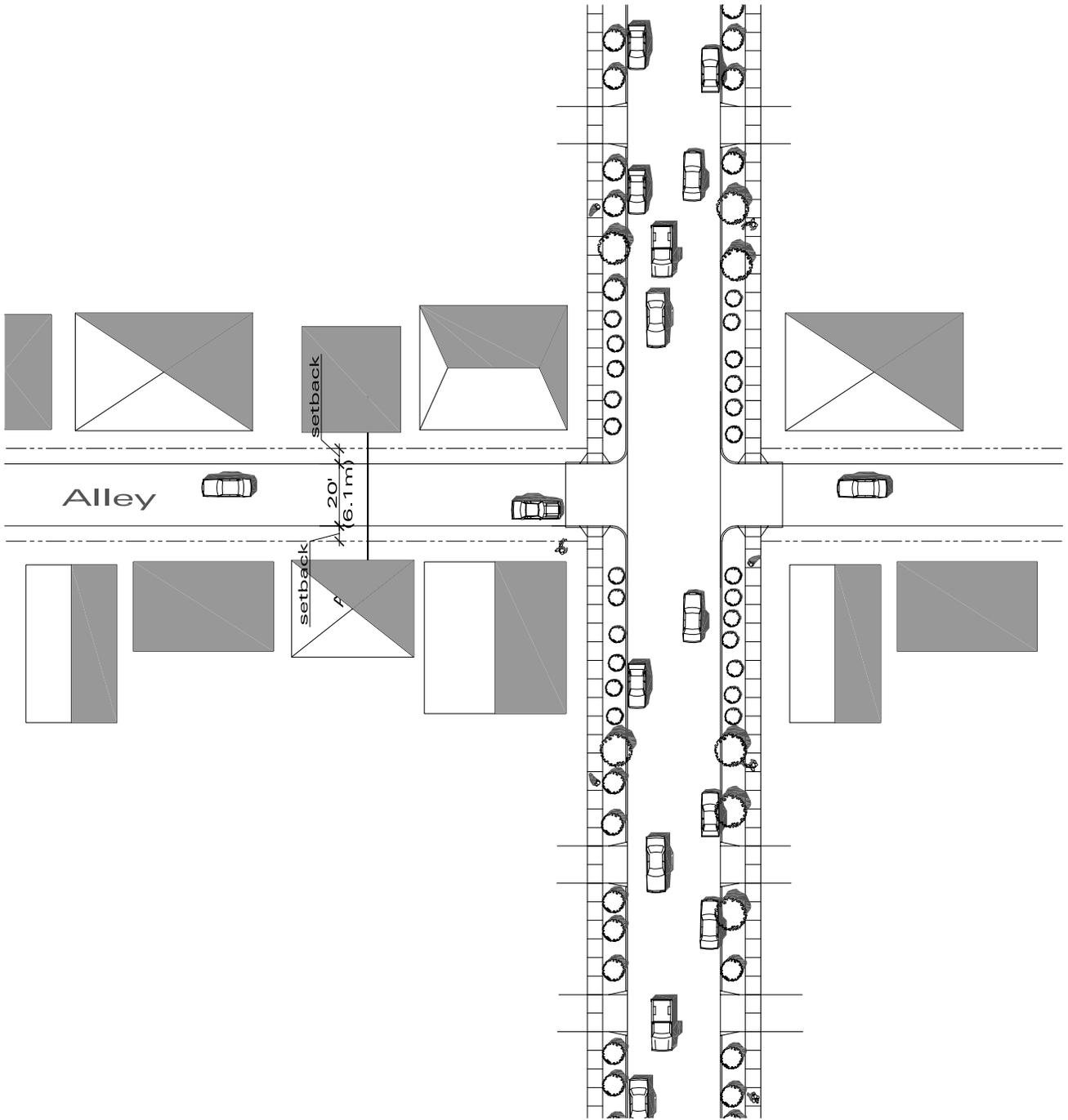
DESIGN REQUIREMENTS

- The necessary width and configuration of a street is also related to the estimated future average daily traffic (ADT).
- Ordinarily, the ADT is the motor vehicle volume projected within the next twenty years. However, in newly developing communities, the volume after buildout may be considered.
- Special studies may be required to establish future traffic volumes for a given street. When required, the study must be performed by a Registered Traffic Engineer. In the absence of such a study, ADT in residential areas will be computed on the basis of the City's standard trip generation factors.
- The "Design ADT" for streets of Collector classification and higher indicates an ADT range. The lower number represents the maximum ADT for LOS C as indicated in the City of San Diego Traffic Impact Study Manual. The higher number represents LOS D according to the Manual. LOS C is the appropriate design parameter for streets in urbanizing communities in accordance with the City's General Plan. LOS D is an acceptable level of service for CEQA (California Environmental Quality Act) review.
- The ADTs corresponding to the various LOS included in the Traffic Impact Studies Manual are intended as guidelines to correlate the quality of traffic service with typical sections of different street classifications. The ADT should not be used as the sole factor in determining the appropriate street classifications, since other factors play an important role in shaping the operating conditions on a facility. Designers are encouraged to perform analysis using Highway Capacity Manual methodologies to assist in determining appropriate street classifications and accompanying levels of service for their street projects.
- Basic width and alignment requirements are described in the Roadway Design section of this Manual.



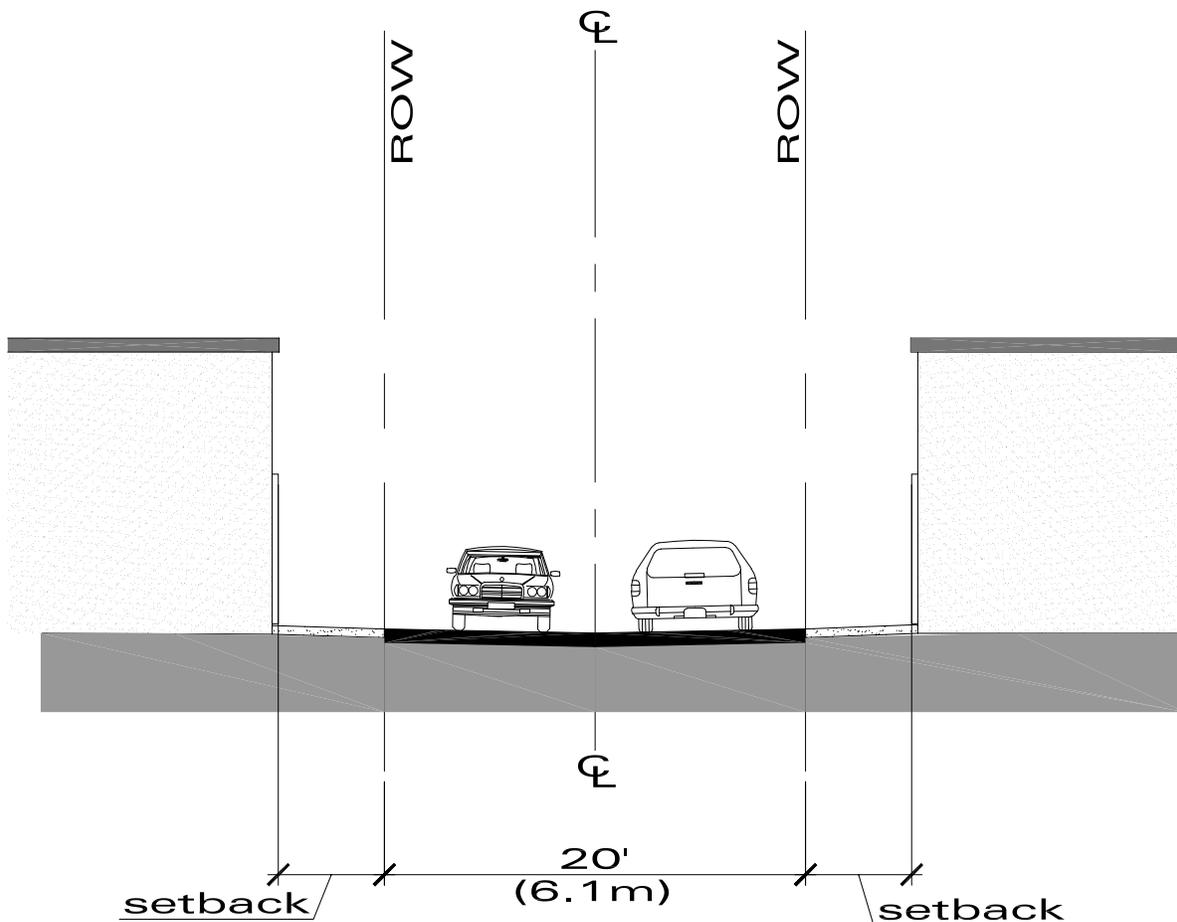
Alleys





plan (not to scale)

- A. An alley is a secondary means of access usually lying along the rear of property, the front of which abuts on and has primary access from a street. Alleys should not intersect streets of four-lane urban major or higher classification.
- B. Alleys are to be improved 20 feet (6.1 m) wide within a 20-foot (6.1 m) right-of-way. Where utility services, fire hydrants, etc. are located in the alley, the right-of-way must be widened as required. At the intersection of two alleys, a triangular area at the corner, 20 feet (6.1 m) on each side, shall be improved and included in the right-of-way.
- C. Maximum grade is 15 percent. Minimum curve radius is 100 feet (30 m) or as needed to accommodate commercial and emergency vehicle access and provide for 15 mph (25 km/h) minimum sight distance.
- D. Curb ramps shall be installed on both sides of an alley entrance in the sidewalk path of travel.
- E. Alleys shall be constructed in accordance with San Diego Regional Standard Drawings.

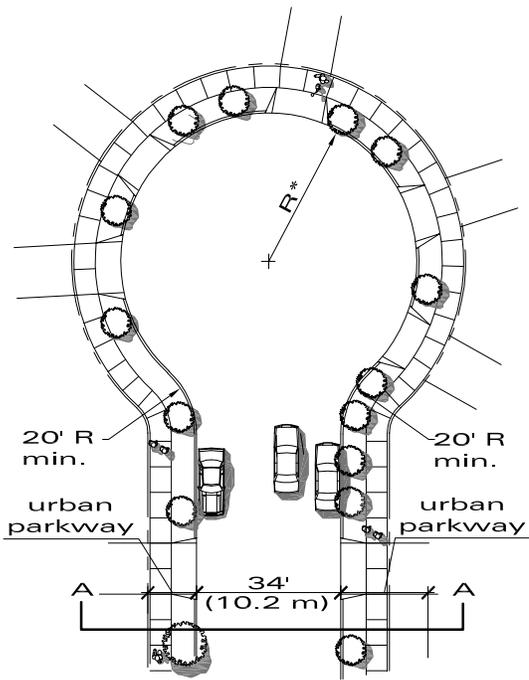


section A-A (not to scale)



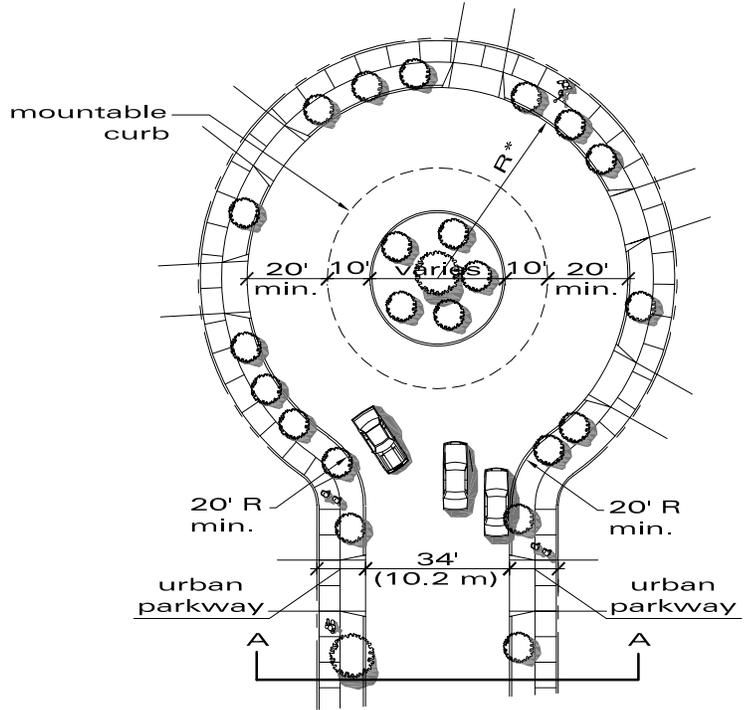
Residential Streets





Cul-de-sac
not to scale

* Refer to Geometric Design, Section E



Enhanced cul-de-sac
not to scale

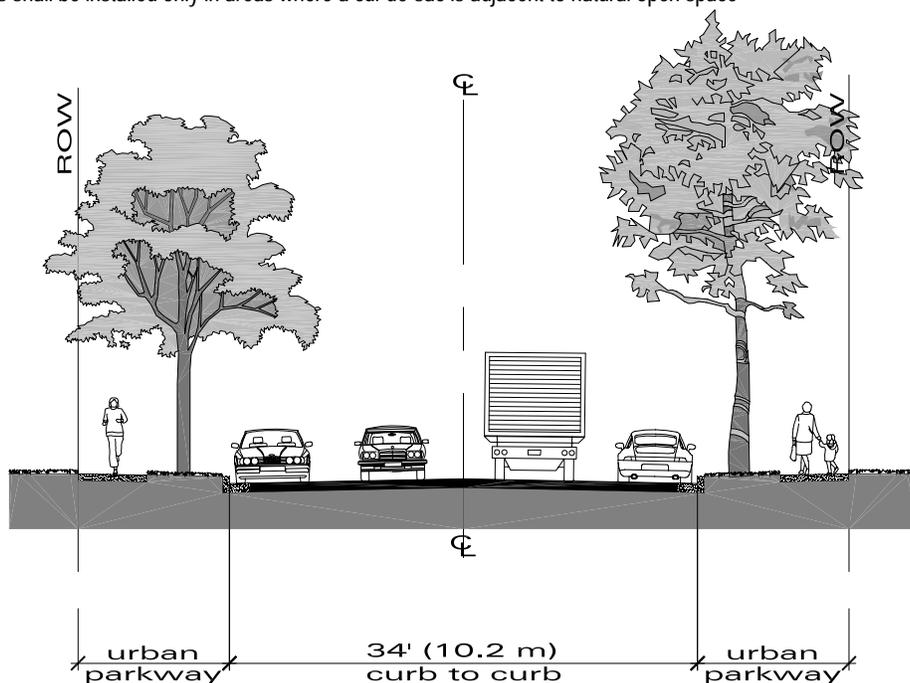
* Refer to Geometric Design, Section E

Note: On-street parking should be prohibited on refuse collection days.

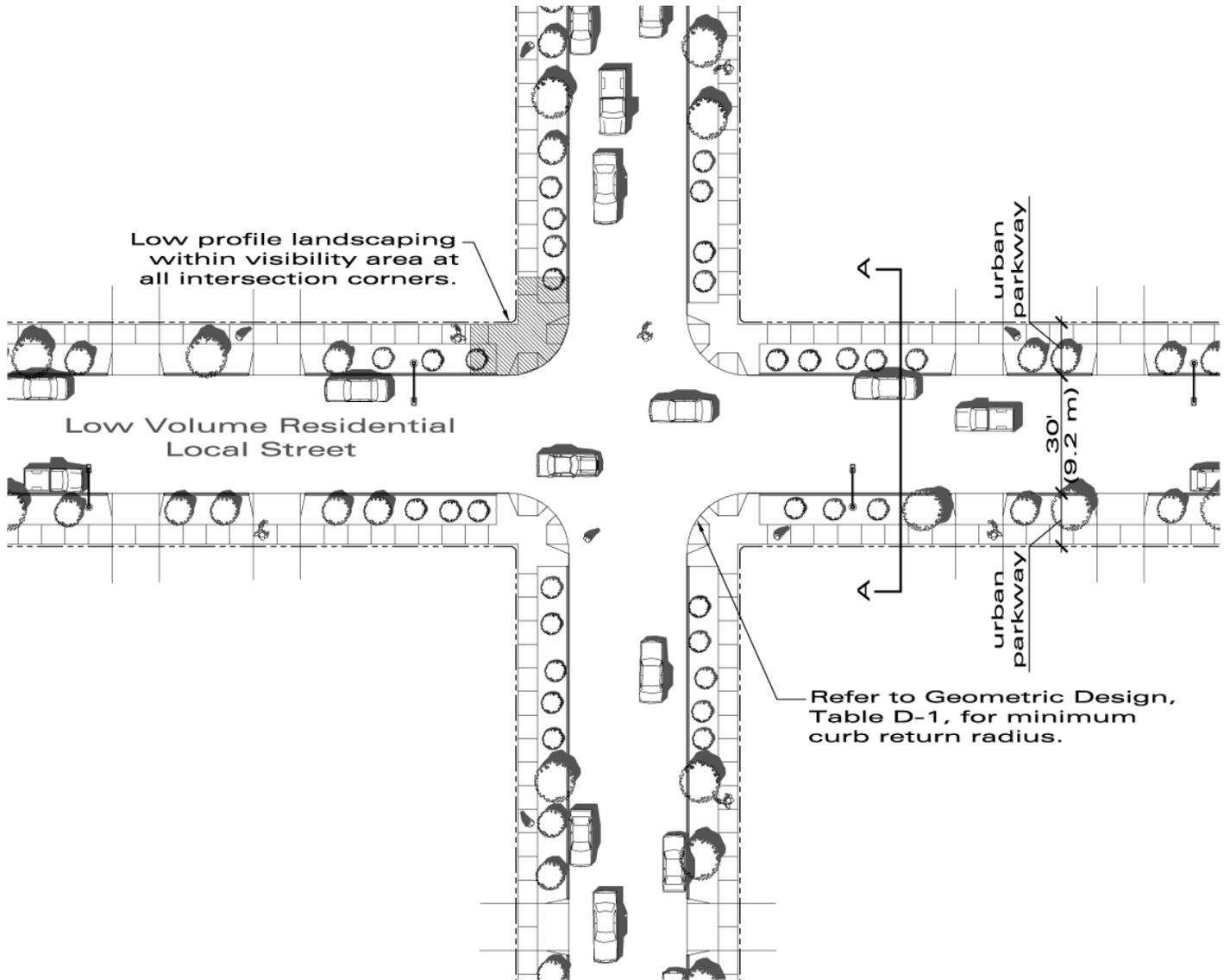
plan (not to scale)

Width, Right-of-Way <ul style="list-style-type: none"> • Reduced Width¹ • Single-loaded² 	54 ft. (16.2 m) – 64 ft. (19.2 m) 52 ft. (15.6 m) – 62 ft. (18.6 m) 48 ft. (14.4 m) – 58 ft. (17.4 m)
Design ADT³	200
Width, Curb-to-Curb⁴ <ul style="list-style-type: none"> • Reduced Width¹ • Single-loaded 	34 ft. (10.2 m) 32 ft. (9.6 m) 28 ft. (8.4 m)
Maximum Grade	15%
Minimum Curve Radius	100 ft. (30 m)
Land Use Parkway Options⁵	Large Lot Single Dwelling Residential, Single Dwelling Residential, Low Density Multiple Dwelling Residential, Open Space-Park U-1; U-3; U-4 (a)
Land Use Parkway	School, Church, or Public Building U-2

- ¹ Reduce width only where cul-de-sac is less than 300 feet (90 m) long and is greater than 600 feet (180 m) from a canyon rim.
- ² Construct sidewalks on both sides of street, including single-loaded cul-de-sacs.
- ³ Refer to Section E, page 117, for cul-de-sacs serving more than 200 ADT.
- ⁴ Within planned residential developments where no on-street parallel parking is allowed, curb-to-curb width may be reduced to 24 feet (7.2 m), provided parking bays are provided at intervals of approximately 200 feet (60 m). At fire hydrant locations, the curb-to-curb width shall be 26 feet (7.8 m), for a distance of 20 feet (6.0 m) on each side of the fire hydrant.
- ⁵ U-1 parkways shall be installed only in areas where a cul-de-sac is adjacent to natural open space



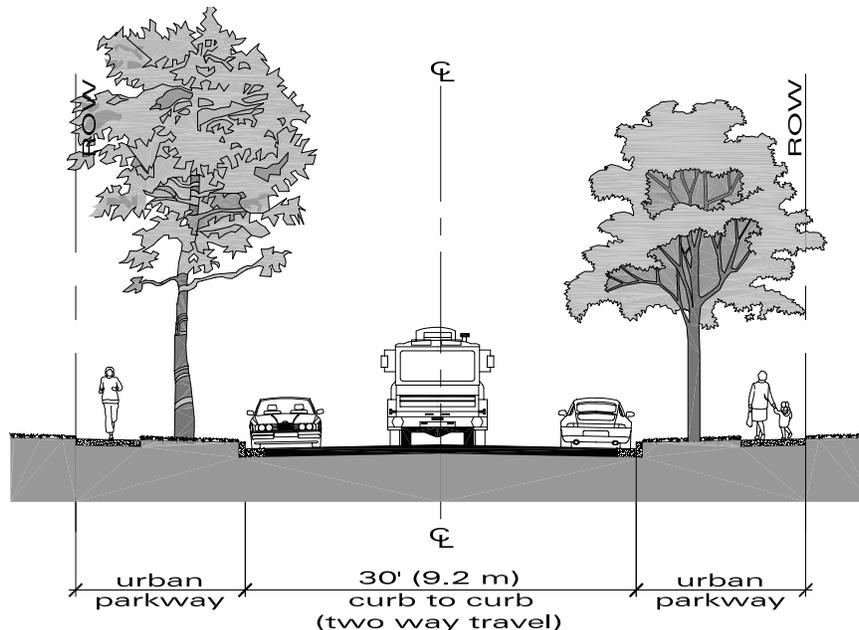
section A-A (not to scale)



plan (not to scale)

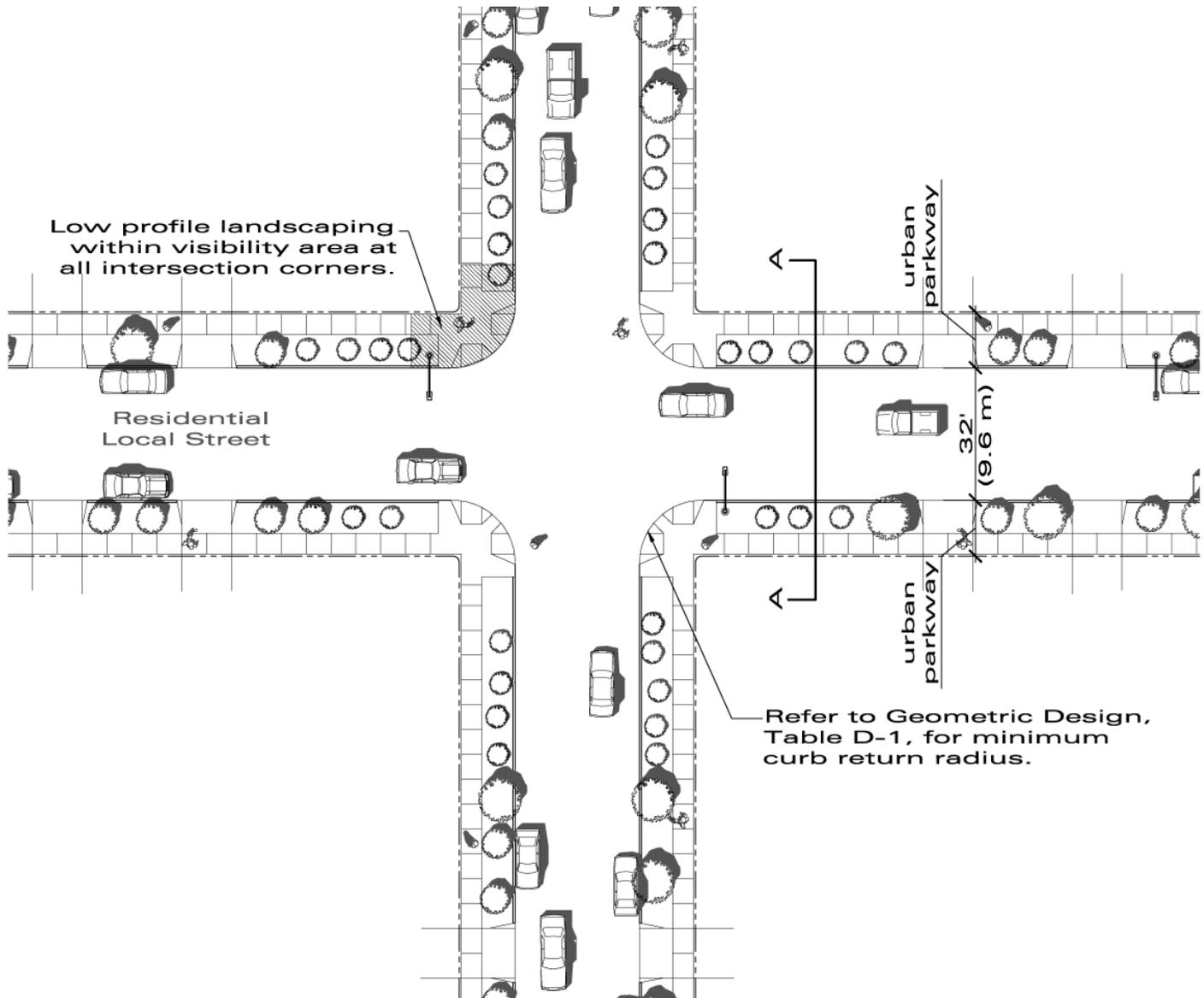
Width, Right-of-Way • Increased Width ¹ • Single-loaded ²	50 ft. (15.2 m) – 60 ft. (18.2 m) 52 ft. (15.6 m) – 62 ft. (18.6 m) 48 ft. (14.4 m) – 58 ft. (17.4 m)
Design ADT	700
Width, Curb-to-Curb ^{3,4} • Increased Width ¹ • Single-loaded	30 ft. (9.2 m) 32 ft. (9.6 m) 28 ft. (8.4 m)
Maximum Grade	15%
Minimum Curve Radius	100 ft. (30 m)
Land Use Parkway Options ⁵	Large Lot Single Dwelling Residential, Single Dwelling Residential, Low Density Multiple Dwelling Residential, Open Space-Park U-1; U-3; U-4 (a)
Land Use Parkway	School, Church, or Public Building U-2

- ¹ Increase width where block is greater than 600 feet (180 m) long, is less than 600 feet (180 m) from a canyon rim, and there is a single access point.
- ² Construct sidewalks on both sides of street, including single-loaded streets.
- ³ Within planned residential developments where no on-street parallel parking is allowed, curb-to-curb width may be reduced to 24 feet (7.2 m), provided parking bays are provided at intervals of approximately 200 feet (60 m). At fire hydrant locations, the curb-to-curb width shall be 26 feet (7.8 m), for a distance of 20 feet (6.0 m) on each side of the fire hydrant.
- ⁴ Where curb-to-curb width is 30 ft. (9.2m), bypass zones of 75 ft. (22.5m) in length should be provided at intervals of 150 ft. (45m) by removal of parking to provide for emergency response vehicles.
- ⁵ U-1 parkways shall be installed only in areas where a street is adjacent to natural open space.



section A-A (not to scale)





plan (not to scale)

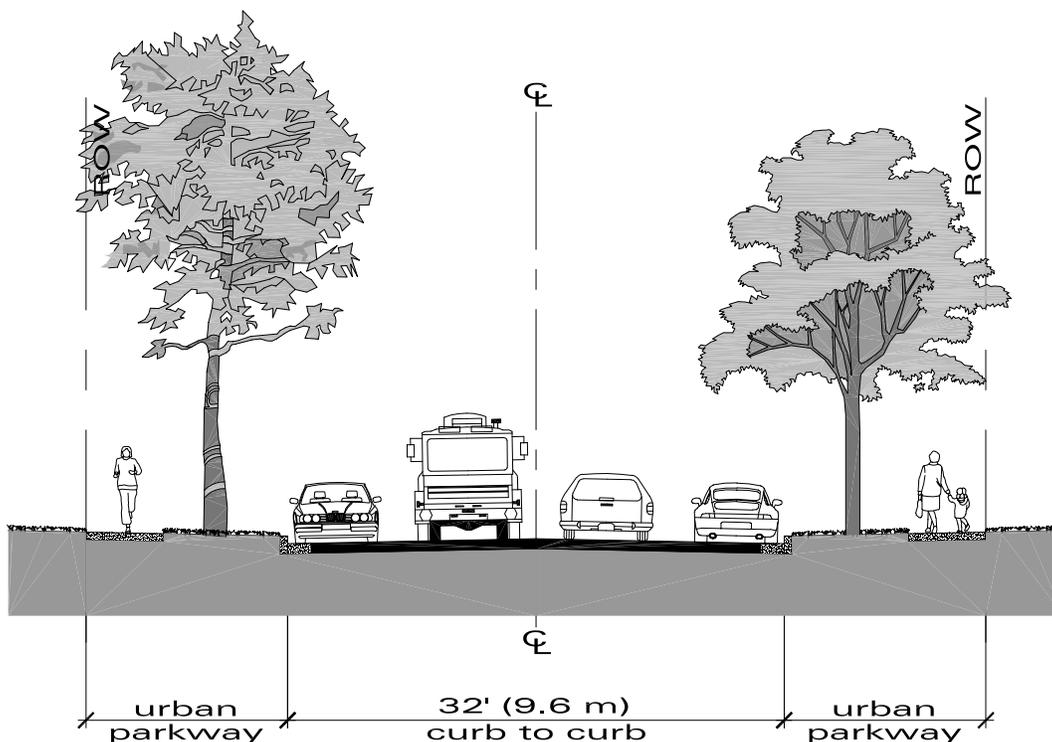
Width, Right-of-Way • Single-loaded ^{1,2}	52 ft. (15.6 m) - 62 ft. (18.6 m) 48 ft. (14.4 m) - 58 ft. (17.4 m)
Design ADT	1,500
Width, Curb-to-Curb ³ • Single-loaded	32 ft. (9.6 m) 28 ft. (8.4 m)
Maximum Grade	15%
Minimum Curve Radius	100 ft. (30 m)
Land Use	Large Lot Single Dwelling Residential, Single Dwelling Residential, Multiple Dwelling Residential, Local Mixed Use, Open Space-Park
Parkway Options ⁴	U-1; U-3; U-4 (a)
Land Use Parkway	School, Church, or Public Building U-2

¹ Single-loaded street not permitted in Medium-to-Very High Density Multiple Dwelling Residential areas.

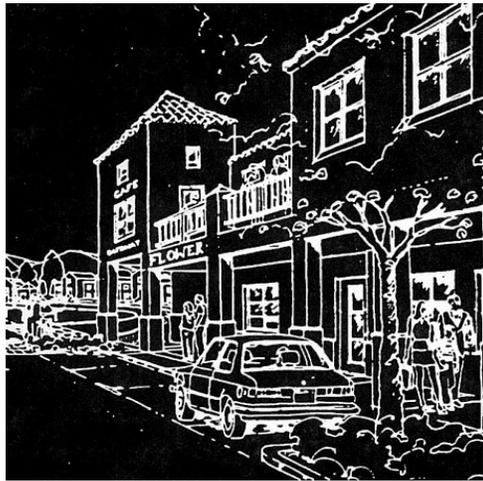
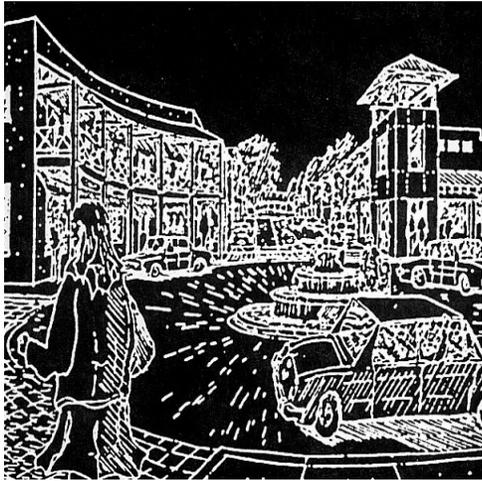
² Construct sidewalks on both sides of street, including single-loaded streets.

³ Curb-to-curb widths may be increased to 44 feet (13.2 m) to allow for angle parking on one side and parallel parking on the other side of street or 52 feet (15.6 m) for angle parking on both sides of street. Angle parking should be installed in accordance with Council approved traffic engineering policies. Angle parking layout should include provisions that allow access to refuse containers.

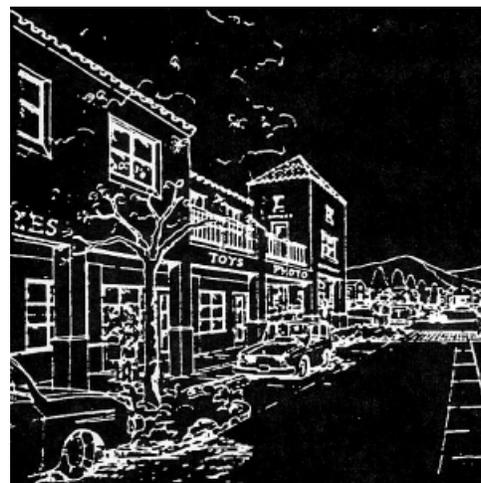
⁴ U-1 parkways shall be installed only in areas where a street is adjacent to natural open space.

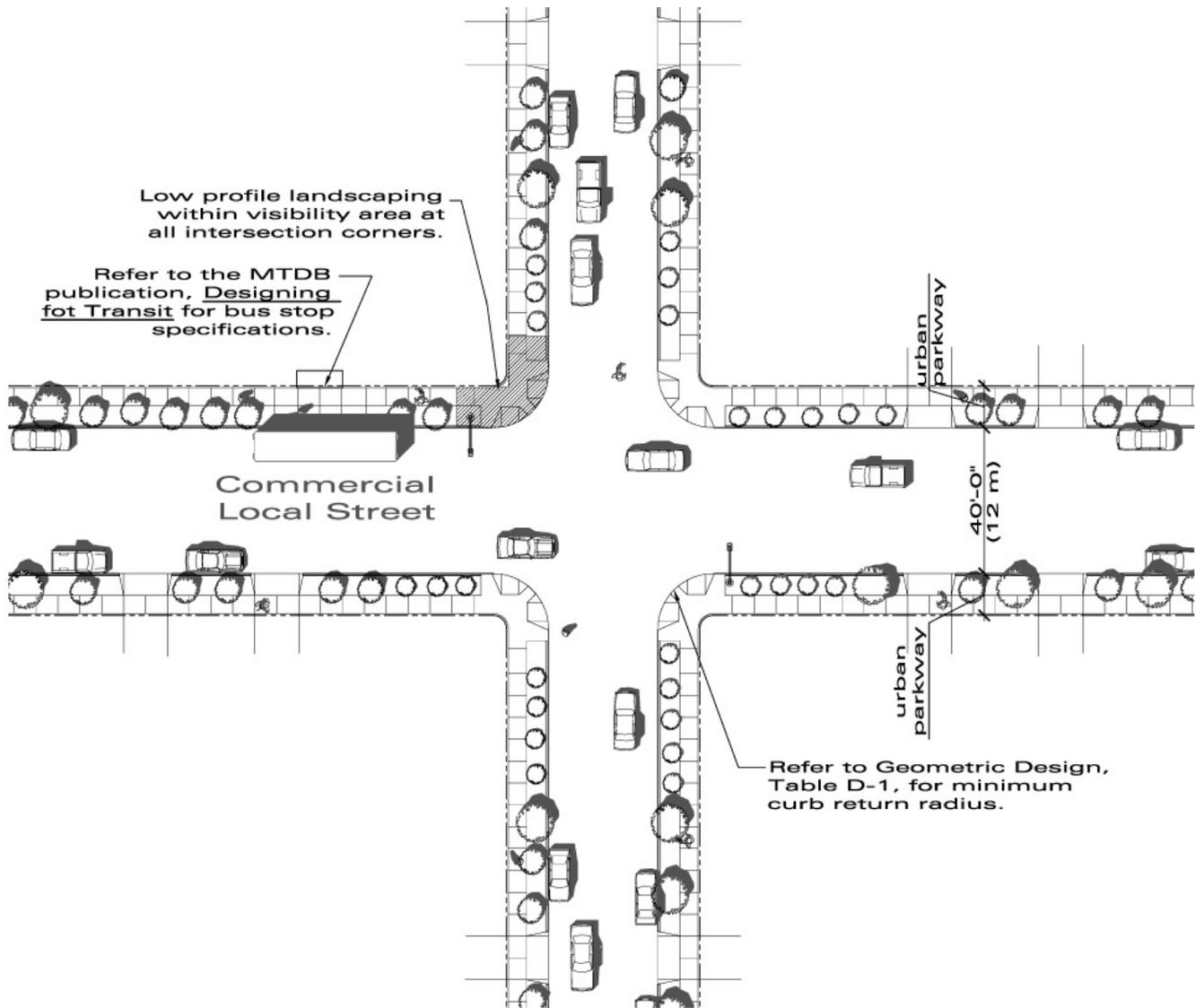


section A-A (not to scale)



Commercial Streets





with parallel parking on both sides

plan (not to scale)

22

urban parkway

U-2

**U-5
a**

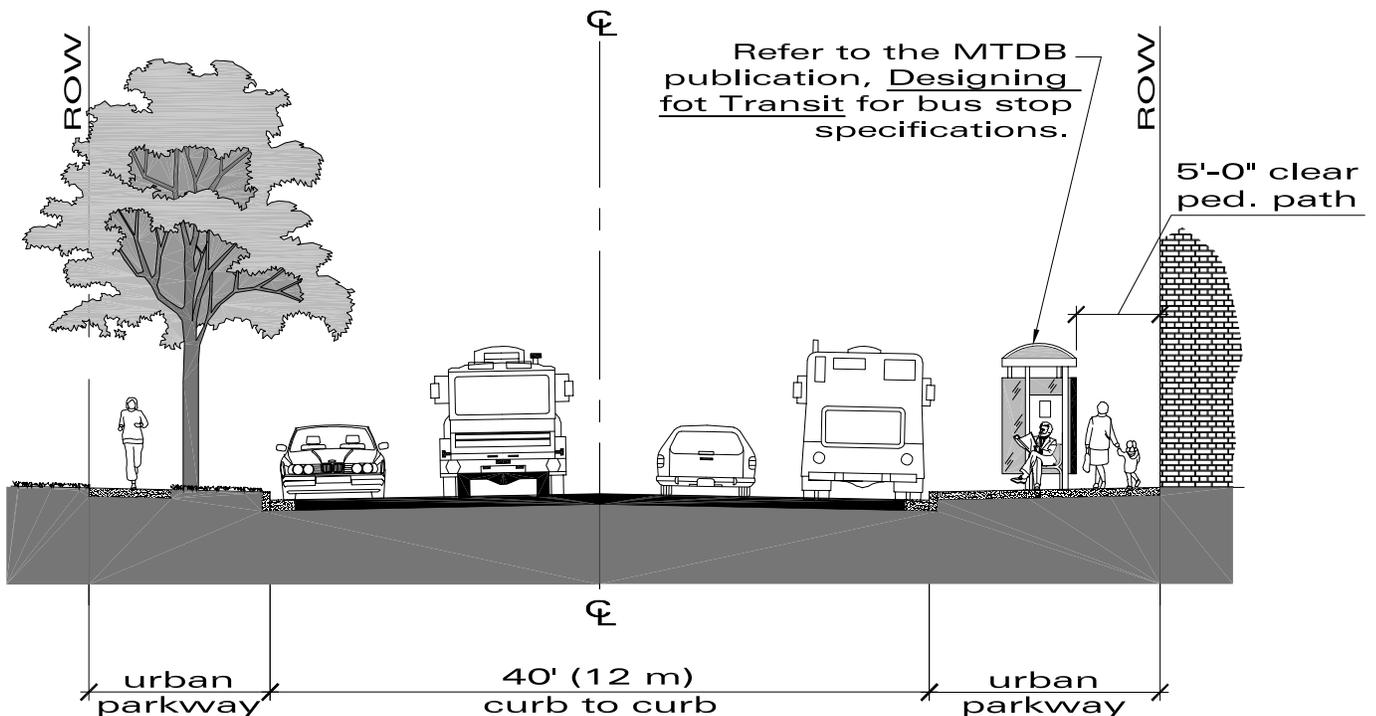
**U-5
b**

**U-6
a**

**U-6
b**

Width, Right-of-Way	60 ft. (18.0 m) - 92 ft. (27.6 m)
Design ADT	2,000
Design Speed	25 mph (40 km/h)
Width, Curb-to-Curb	
• with parallel parking on both sides	40 ft. (12.0 m)
• with parallel/angle parking ^{1,2}	44 ft. (13.2 m)
• with angle parking on both sides ^{1,2}	52 ft. (15.6 m)
Maximum Grade	8%
Minimum Curve Radius	290 ft. (85 m)
Land Use	Commercial, Open Space-Park, School, Church, or Public Building, Scientific Research
Parkway Options	U-2; U-5 (a,b); U-6 (a,b)

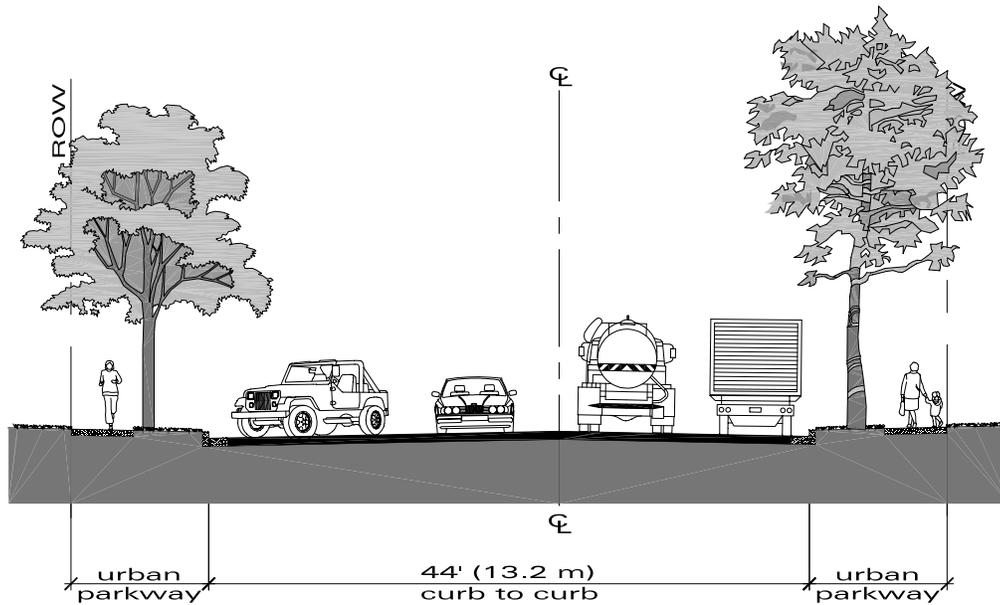
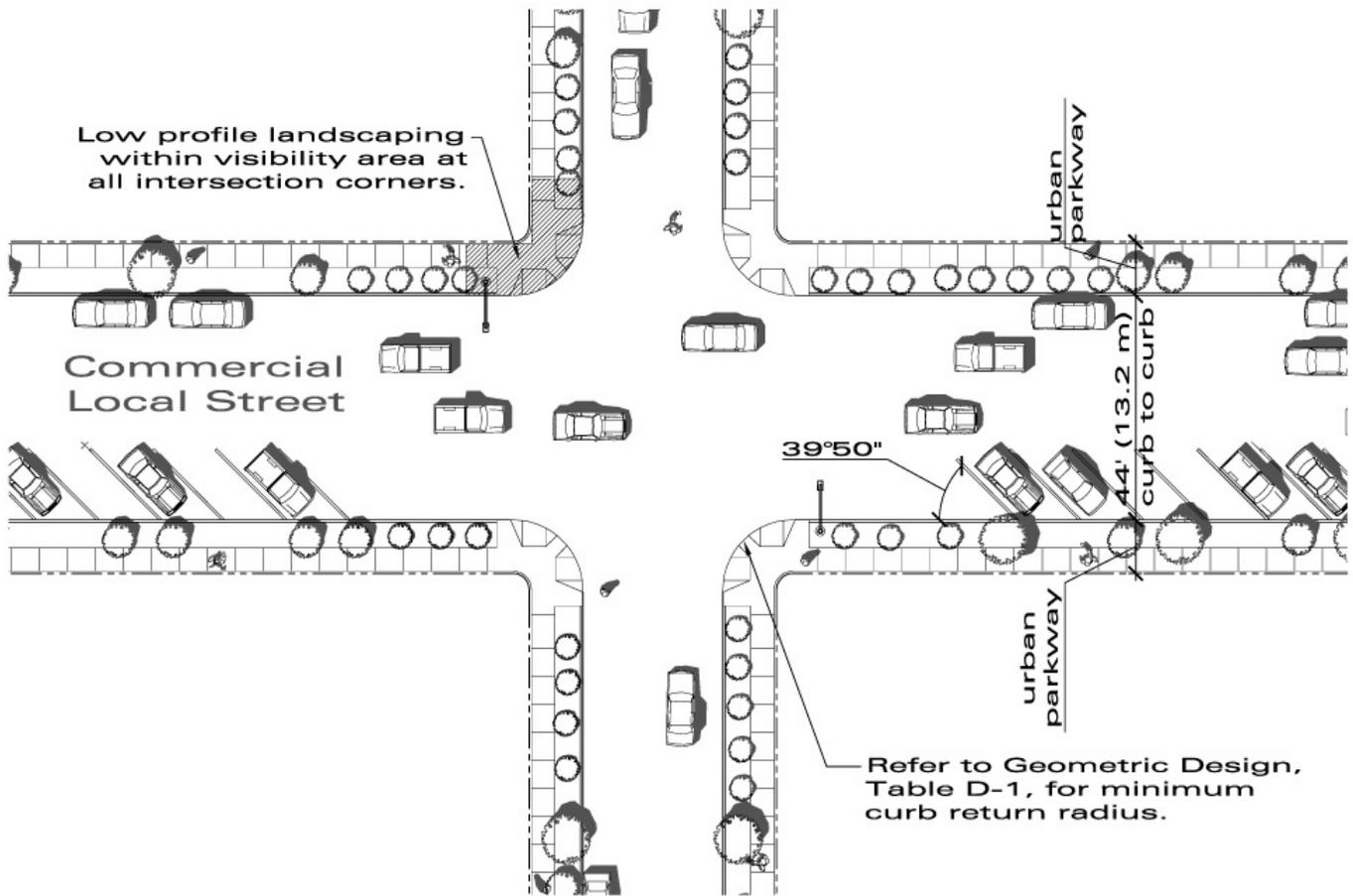
1. Angle parking layout should include provisions that allow access to refuse containers.
2. Angle parking should be installed in accordance with Council approved traffic engineering policies.



section A-A (not to scale)



Commercial Local Street



with diagonal / parallel parking

plan (not to scale)

24

urban parkway

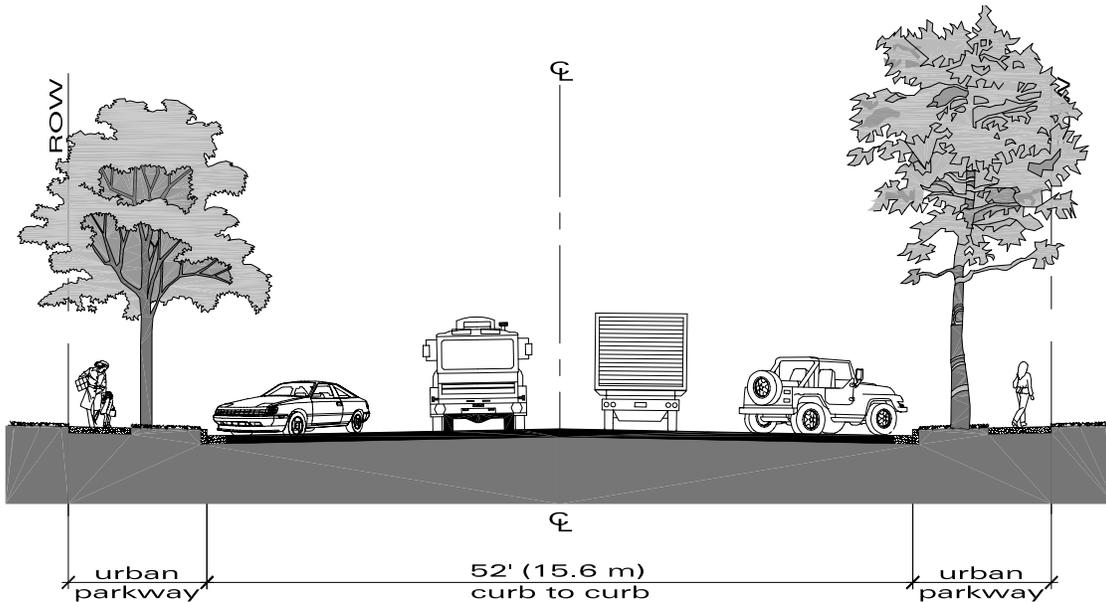
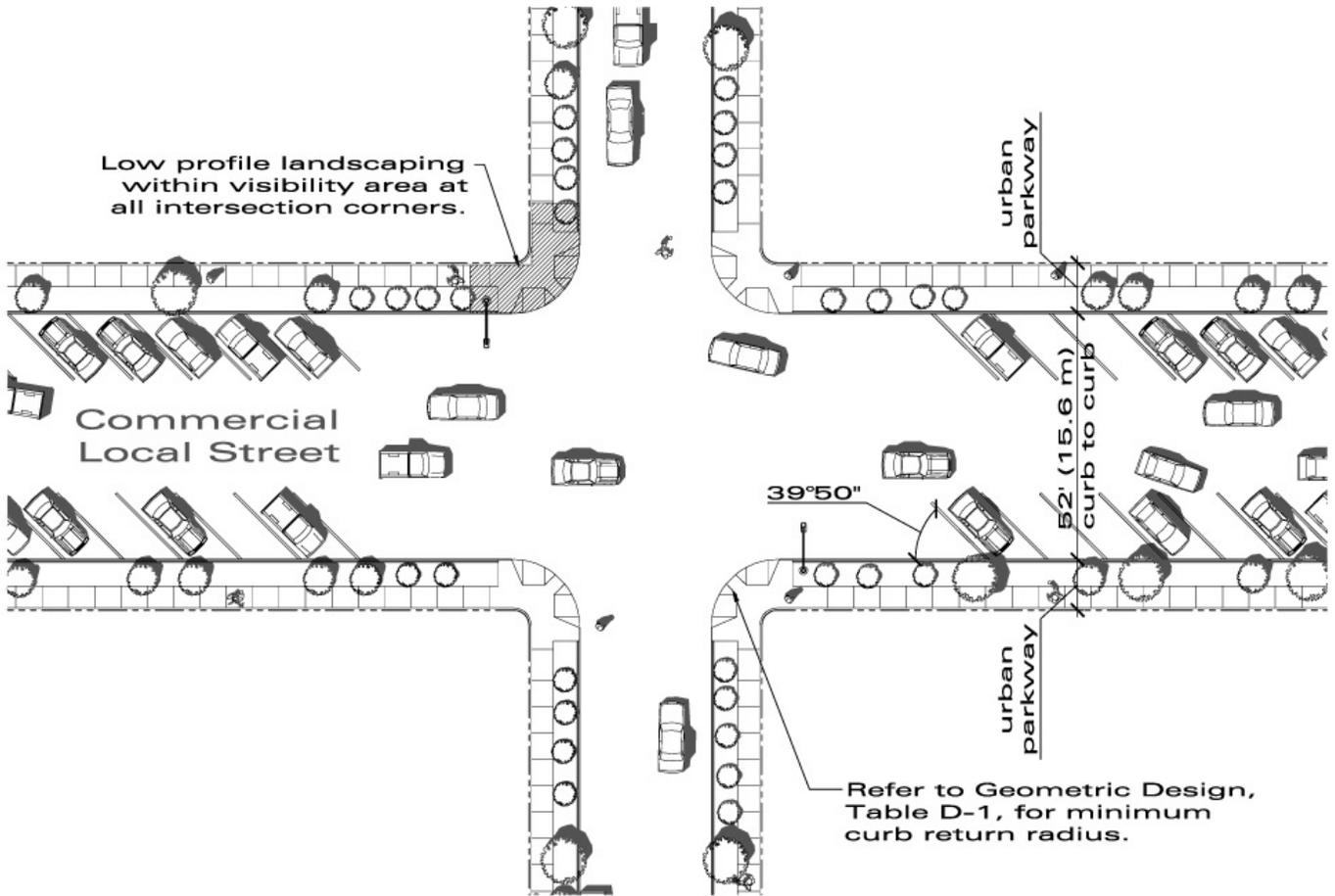
U-2

**U-5
a**

**U-5
b**

**U-6
a**

**U-6
b**

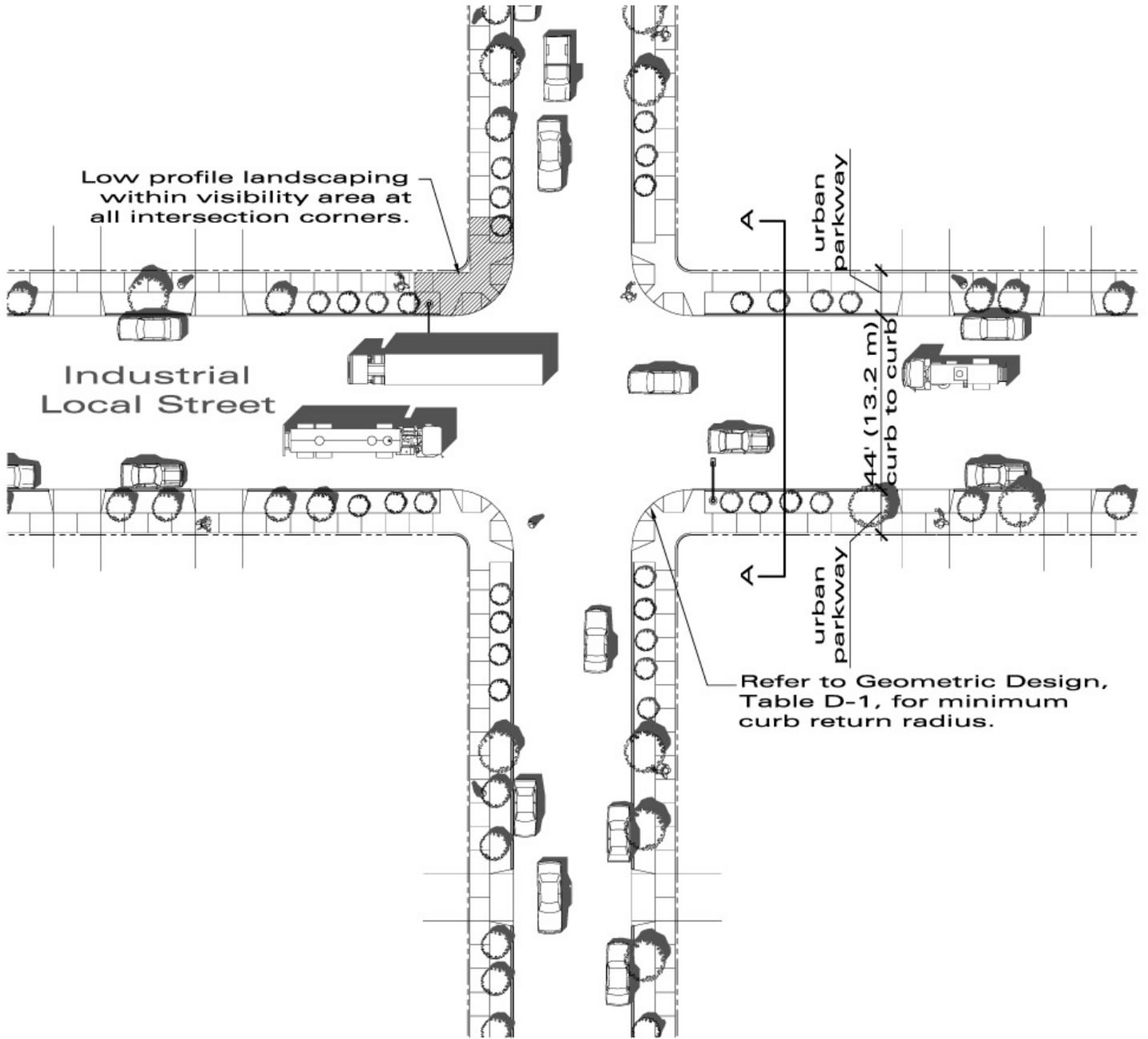


with diagonal parking on both sides

section A-A (not to scale)



Industrial Local Street



plan (not to scale)

26

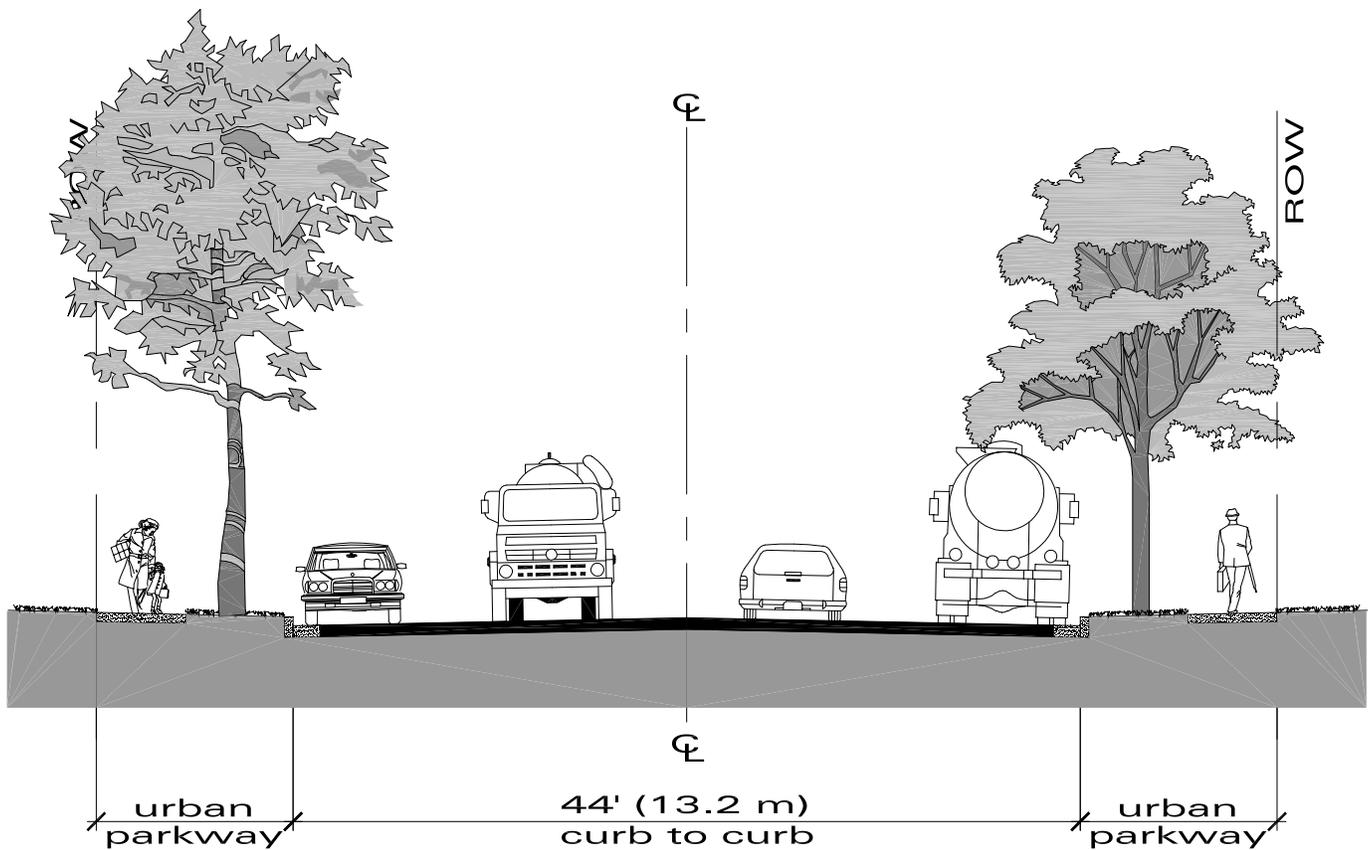
urban parkway

U-2

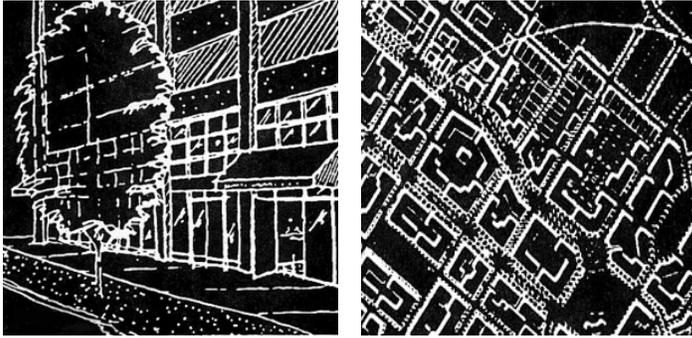
U-3

U-4
a

Width, Right-of-Way	64 ft. (19.2 m) - 74 ft. (22.2 m)
Design ADT	2,000
Design Speed	25 mph (40 km/h)
Width, Curb-to-Curb	44 ft. (13.2 m)
Maximum Grade	8%
Minimum Curve Radius	290 ft. (85 m)
Land Use	Industrial
Parkway Options	U-2; U-3; U-4 (a)



section A-A (not to scale)

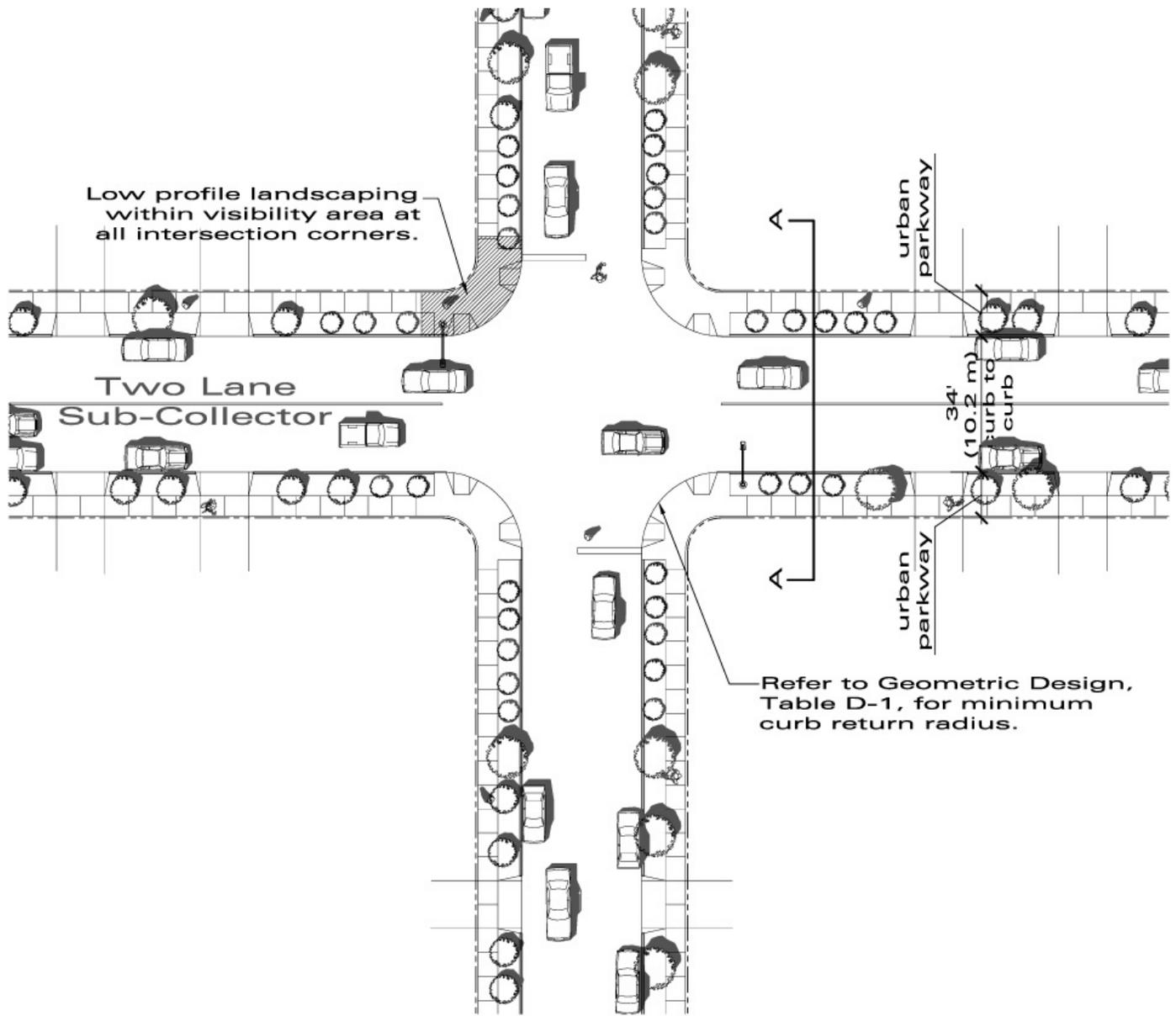


Collector Streets





Two Lane Sub-collector



plan (not to scale)

30

urban parkway

U-2

U-3

U-4
a

U-5
a

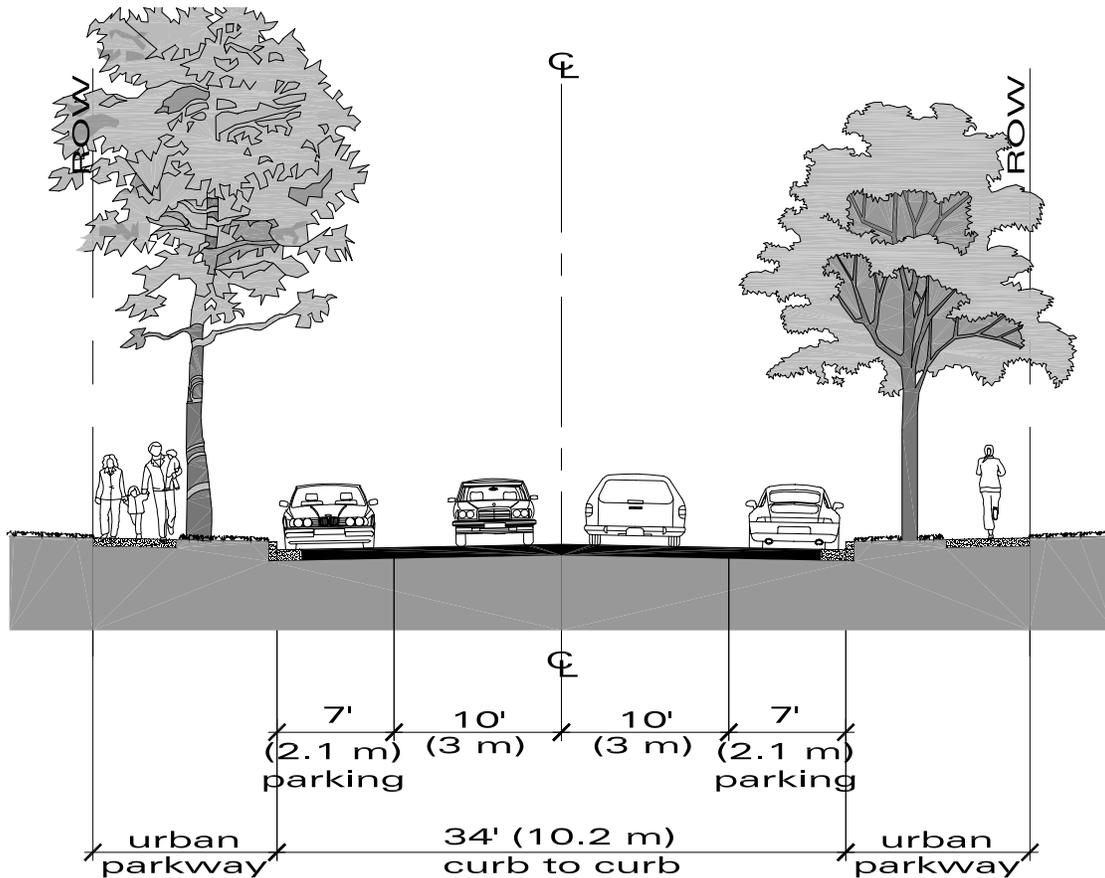
U-5
b

U-6
a

U-6
b

Width, Right-of-Way	54 ft. (16.2 m) - 74 ft. (22.2 m)
Design ADT	2,200
Design Speed	30 mph (50 km/h)
Width, Curb-to-Curb	34 ft. (10.2 m)
Maximum Grade	10% (8% in commercial area)
Minimum Curve Radius	500 ft. (160 m) above 6% grade 450 ft. (145 m) at or below 6% grade
Land Use	Large Lot Single Dwelling Residential, Single Dwelling Residential, Low Density Multiple Dwelling Residential, Open Space-Park, Medium-to-Very High Density, Multiple Dwelling Residential
Parkway Options¹	U-3; U-4 (a)
Land Use	Neighborhood Commercial; Community Commercial, School, Church, or Public Building
Parkway Options	U-2; U-5 (a,b); U-6 (a,b)

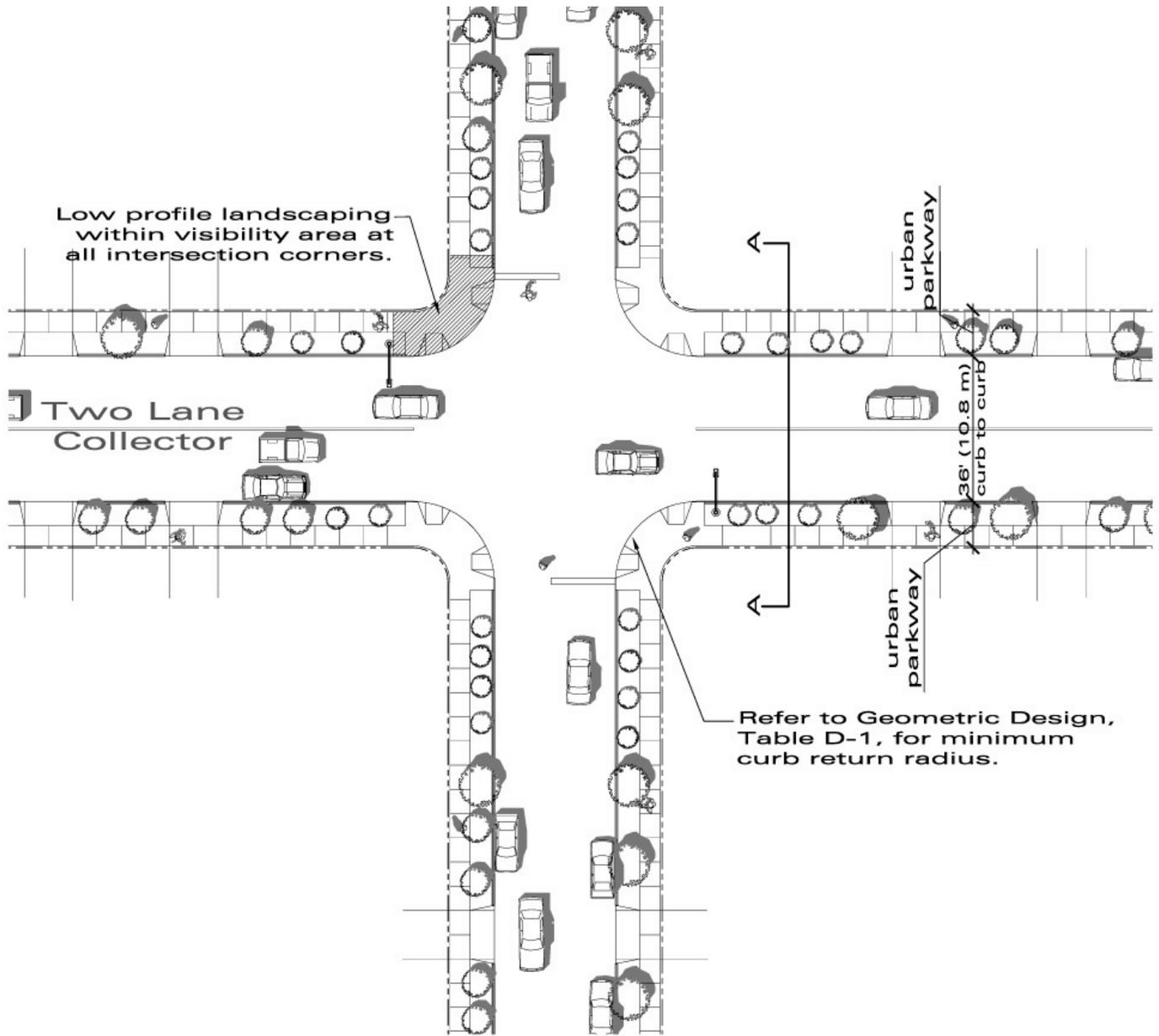
¹ Where building setback is zero, U-4 (a) parkways should be installed.



section A-A (not to scale)



CI Two Lane Collector



plan (not to scale)

32

urban parkway

U-3

U-4
a

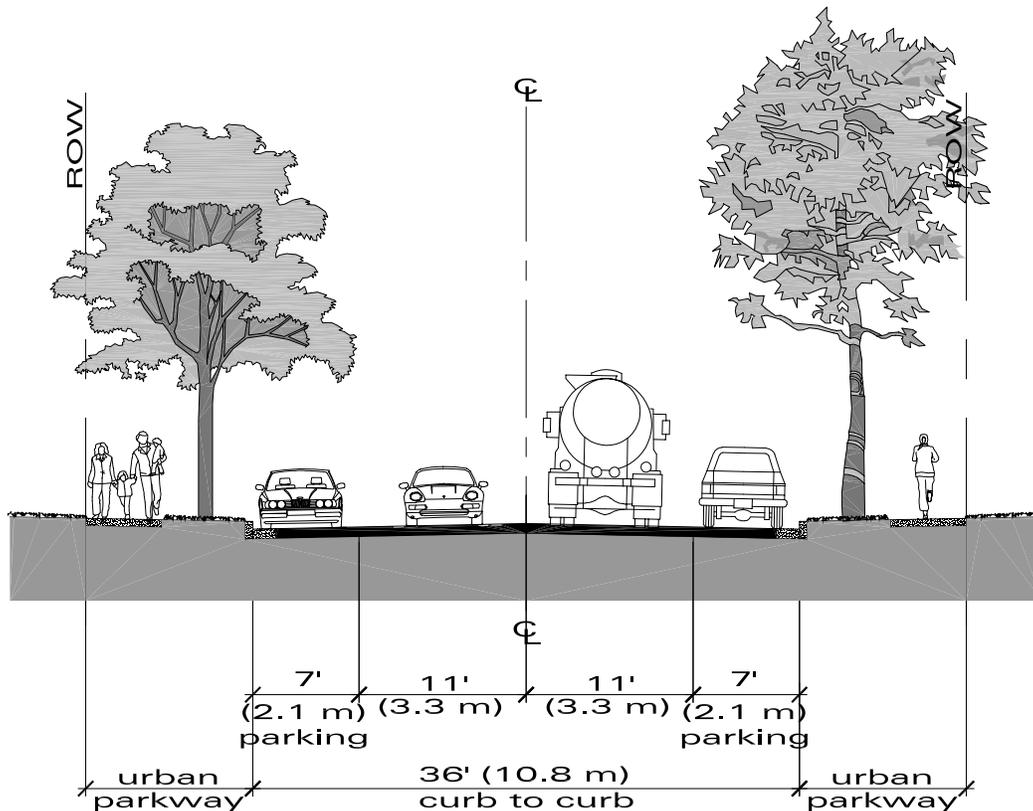
U-5
a

U-5
b

U-6
a

U-6
b

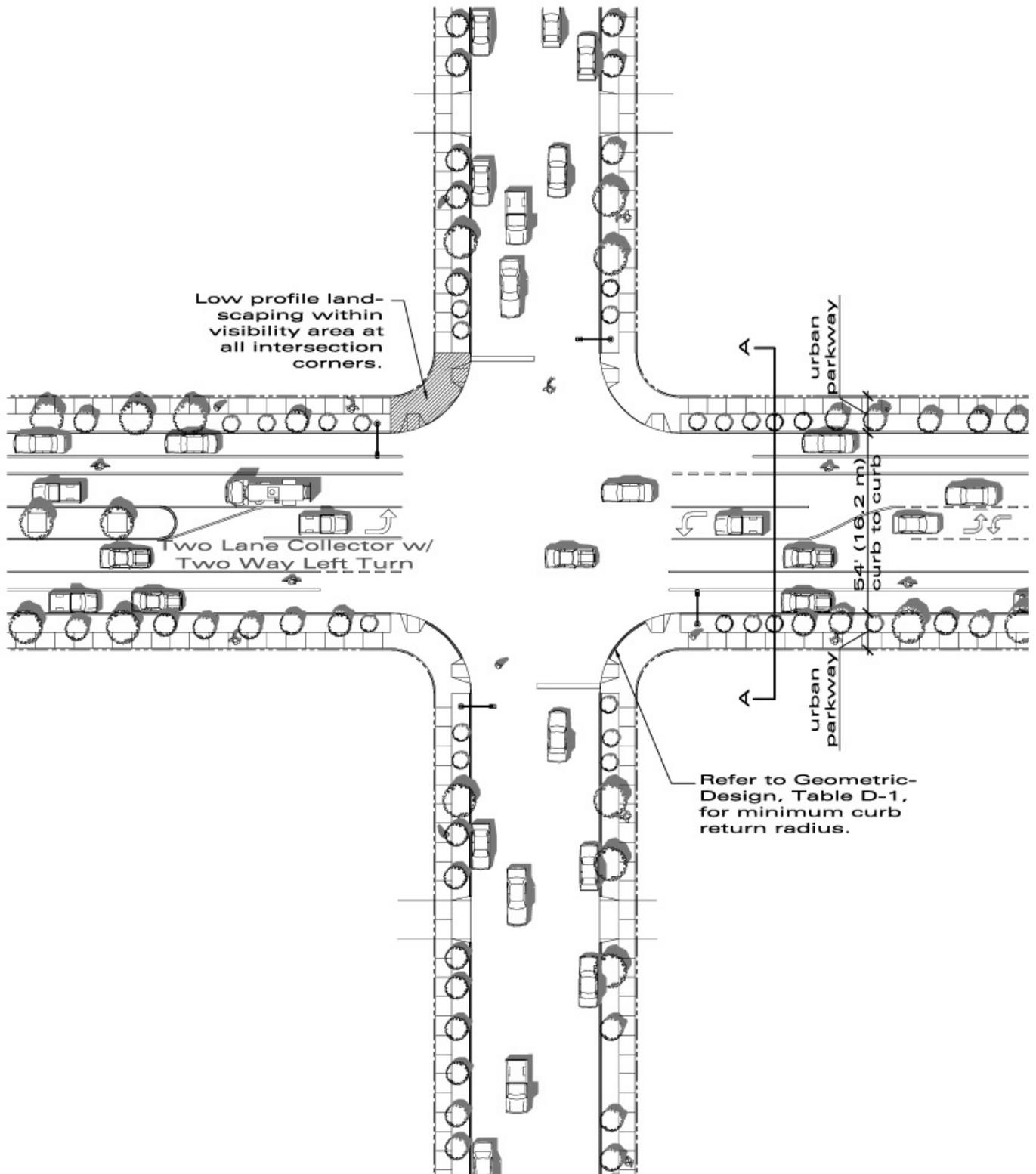
Width, Right-of-Way (with added bike lanes)	60 ft. (18.0 m) - 86 ft. (25.8 m) 70 ft. (21.0 m) - 96 ft. (28.8 m)	
Design ADT	LOS C	5,000
	LOS D	6,500
Design Speed	30 mph (50 km/h)	
Width, Curb-to-Curb (with added bike lanes)	36 ft. (10.8 m) 46 ft. (13.8 m)	
Maximum Grade	10% (8% in commercial area)	
Minimum Curve Radius	500 ft. (160 m) above 6% grade 450 ft. (145 m) at or below 6% grade	
Land Use	Large Lot Single Dwelling Residential - no front yards, Single Dwelling Residential - no front yards, Low Density Multiple Dwelling Residential - no front yards, Open Space-Park	
Parkway Options	U-3; U-4 (a)	
Land Use	Commercial; School, Church, or Public Building	
Parkway Options	U-5 (a,b); U-6 (a,b)	



section A-A (not to scale)



Two Lane Collector with Two Way Left Turn Lane



plan (not to scale)

34

urban parkway

U-3

U-4
a

U-5
a

U-5
b

U-6
a

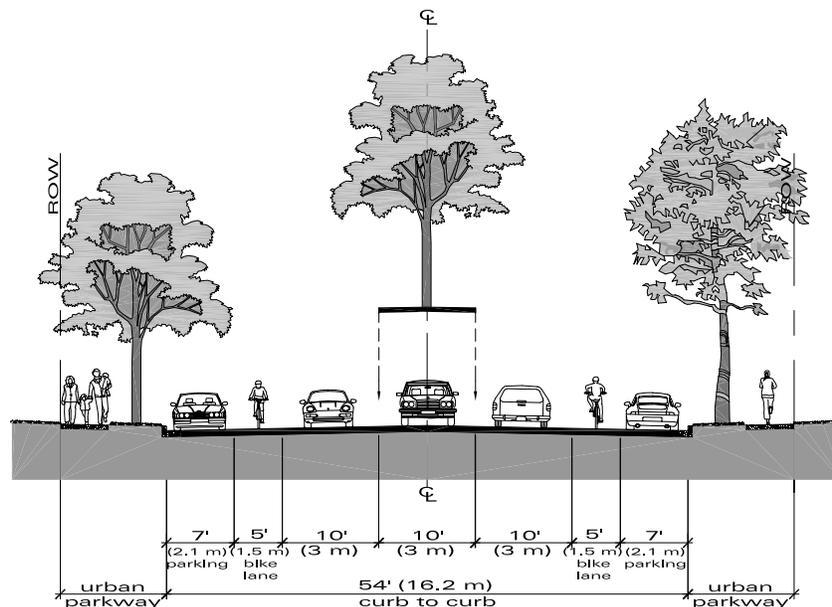
U-6
b

Two Lane Collector with Two Way Left Turn Lane



Width, Right-of-Way	78 ft. (23.4 m) - 94 ft. (28.2 m)	
Design ADT	LOS C	10,000
	LOS D	13,000
Design Speed	35 mph (60 km/h)	
Width, Curb-to-Curb	54 ft. (16.2 m)	
Maximum Grade	8%	
Minimum Curve Radius	610 ft. (220 m) with no superelevation 470 ft. (170 m) with 2% (min.) superelevation 380 ft. (135 m) with 6% (max.) superelevation	
Land Use	Single Dwelling Residential–no front yards, Low Density Multiple Dwelling Residential–no front yards, Open Space-Park, Medium to Very High Density, Multiple Dwelling Residential	
Parkway Options	U-3; U-4 (a)	
Land Use	Neighborhood Commercial; Community Commercial Regional Commercial; Commercial offices Visitor Commercial; School, Church, Public Building	
Parkway Options	U-5 (a,b); U-6 (a,b)	
Land Use	Pedestrian-Oriented Commercial Retail, Urban Village Commercial Retail	
Parkway Options	U-5 (a,b); U-6 (a,b)	

NOTE: Two-way left-turn lane shall be considered only for streets of limited length where intersections are closely spaced or where there is extensive driveway access. For all other conditions, raised center medians should be considered. Where raised center



section A-A (not to scale)

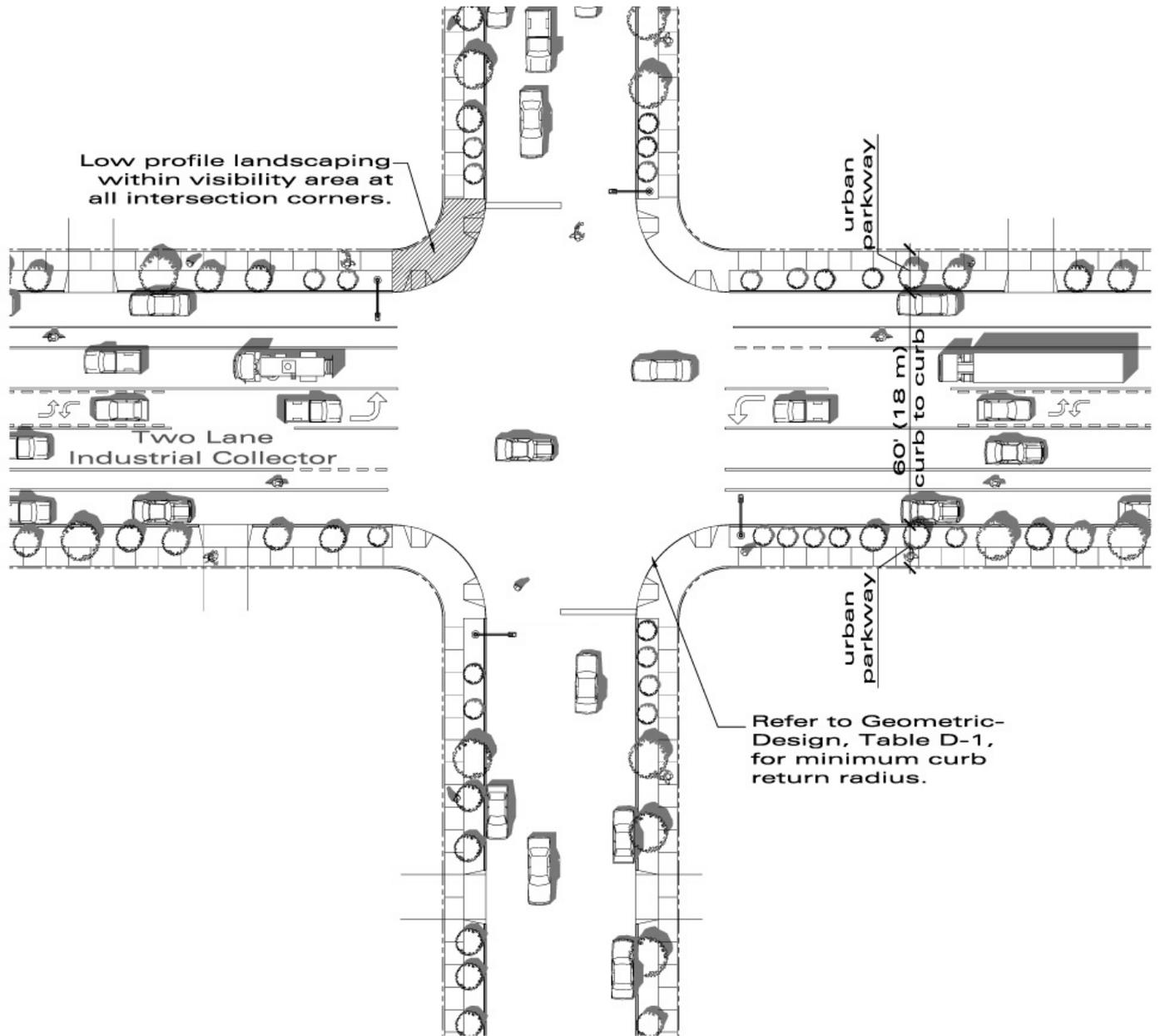
traffic
calming



35



Two Lane Industrial Collector



plan (not to scale)

36

urban parkway

U-2

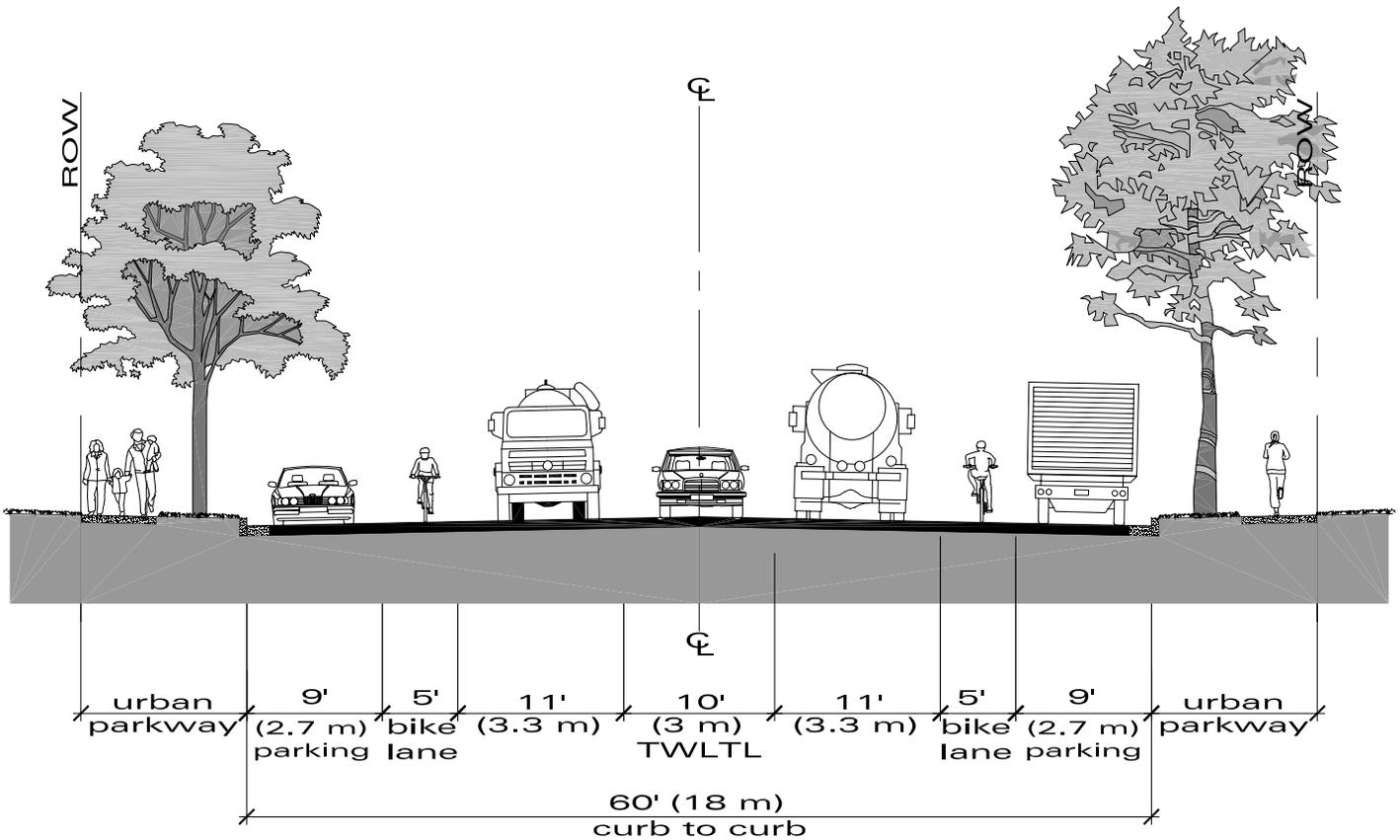
U-3

U-4
a

Two Lane Industrial Collector



Width, Right-of-Way	80 ft. (24.0 m) - 90 ft. (27 m)	
Design ADT	LOS C	5,000
	LOS D	6,500
Design Speed	30 mph (50 km/h)	
Width, Curb-to-Curb	60 ft. (18.0 m)	
Maximum Grade	8%	
Minimum Curve Radius	430 ft. (145 m) with no superelevation 340 ft. (110 m) with 2% (min.) superelevation 300 ft. (100 m) with 4% (max.) superelevation	
Land Use	Industrial	
Parkway Options	U-2; U-3; U-4 (a)	



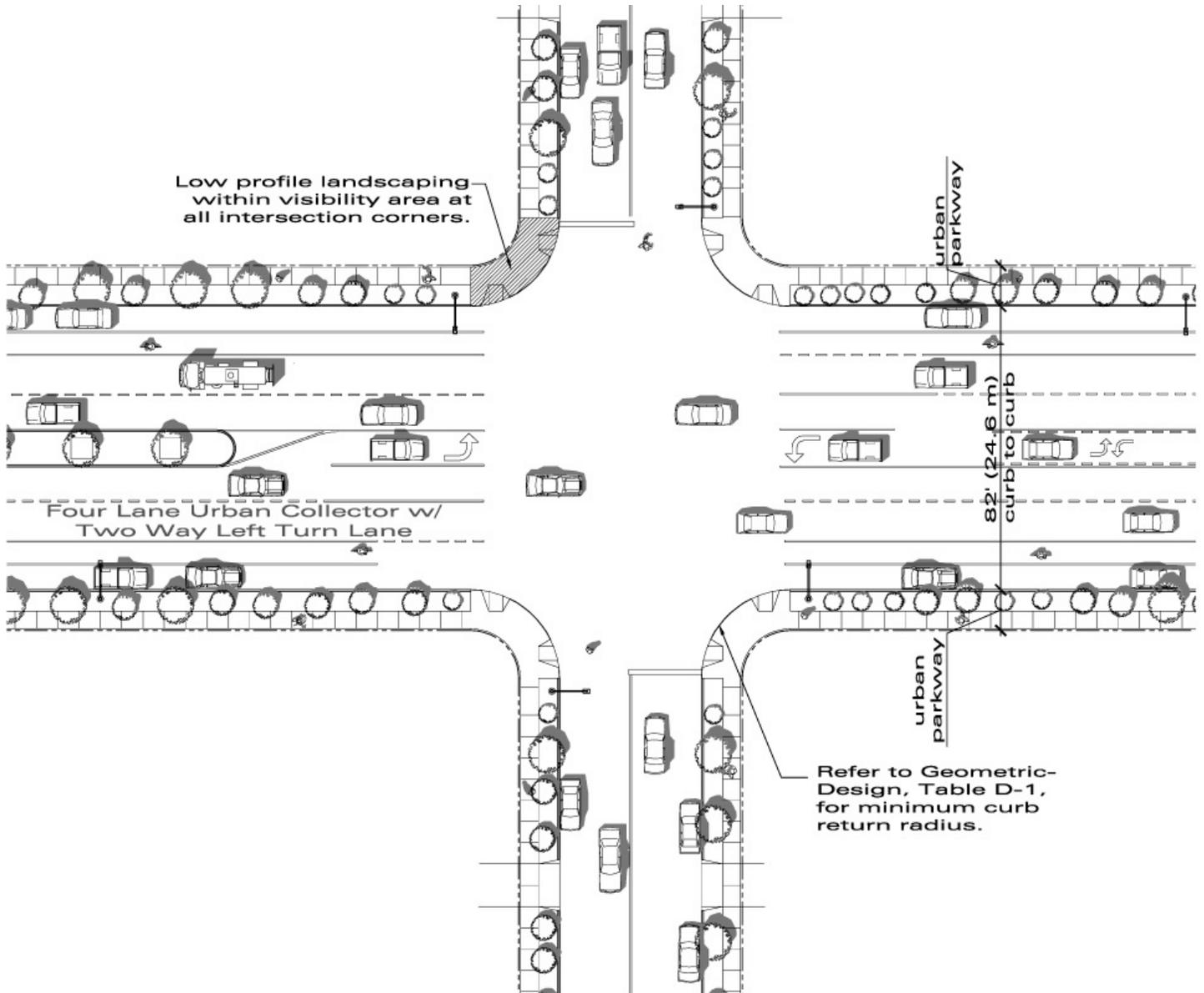
section A-A (not to scale)

traffic
calming





Four Lane Urban Collector with Two Way Left Turn Lane



plan (not to scale)

38

urban parkway

U-4
a

U-5
a

U-5
b

U-6
a

U-6
b

Four Lane Urban Collector with Two Way Left Turn Lane

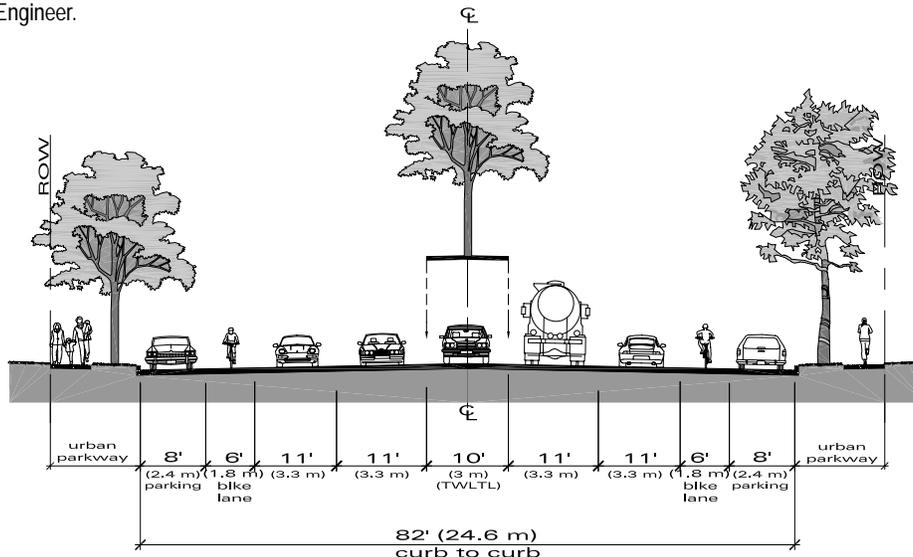


Width, Right-of-Way	110 ft. (33.2 m) - 122 ft. (36.6 m)	
Design ADT	LOS C	20,000
	LOS D	25,000
Design Speed	35 mph (60 km/h)	
Width (includes bike lanes), Curb-to-Curb	82 ft. (24.6 m)	
Maximum Grade¹	8%	
Minimum Curve Radius	610 ft. (220 m) with no superelevation 470 ft. (170 m) with 2% (min.) superelevation 380 ft. (135 m) with 6% (max.) superelevation	
Land Use	Single Dwelling Residential-no front yards; Low Density Multiple Dwelling Residential-no front yards; Open Space-Park; Industrial; Medium-to-Very High Density Multiple Dwelling Residential-no front yards	
Parkway	U-4 (a)	
Land Use	Neighborhood Commercial; Community Commercial; Regional Commercial; Commercial Office; Visitor Commercial; School; Church; Public Building	
Parkway Options	U-5 (a,b); U-6 (a,b)	
Land Use	Pedestrian-Oriented Commercial Retail; Urban Village Commercial Retail	
Parkway Options	U-5 (a,b); U-6 (a,b)	

median is installed, access provisions across the median for emergency vehicles should be provided at 300 ft. (90 m) intervals.

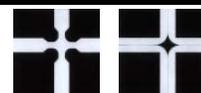
NOTE: Two-way left-turn lane shall be considered only for streets of limited length where intersections are closely spaced or where there is extensive driveway access. For all other conditions, raised center medians should be considered.

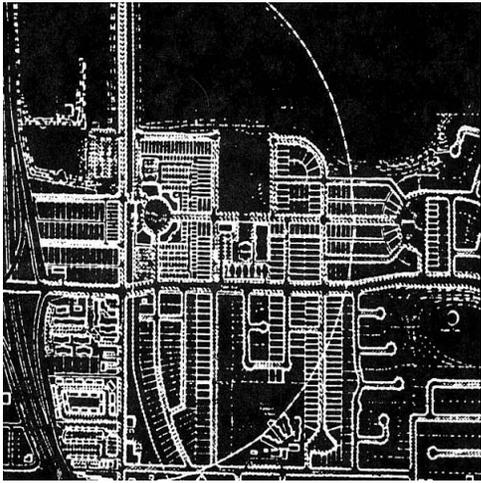
¹ Whenever topographic constraints would cause excessive slope heights or create unmitigable landform impacts, the maximum street grade may exceed 8% for no-fronting property, up to a maximum of 10% for streets with less than 10,000 ADT, subject to approval of the City Engineer.



section A-A (not to scale)

traffic
calming



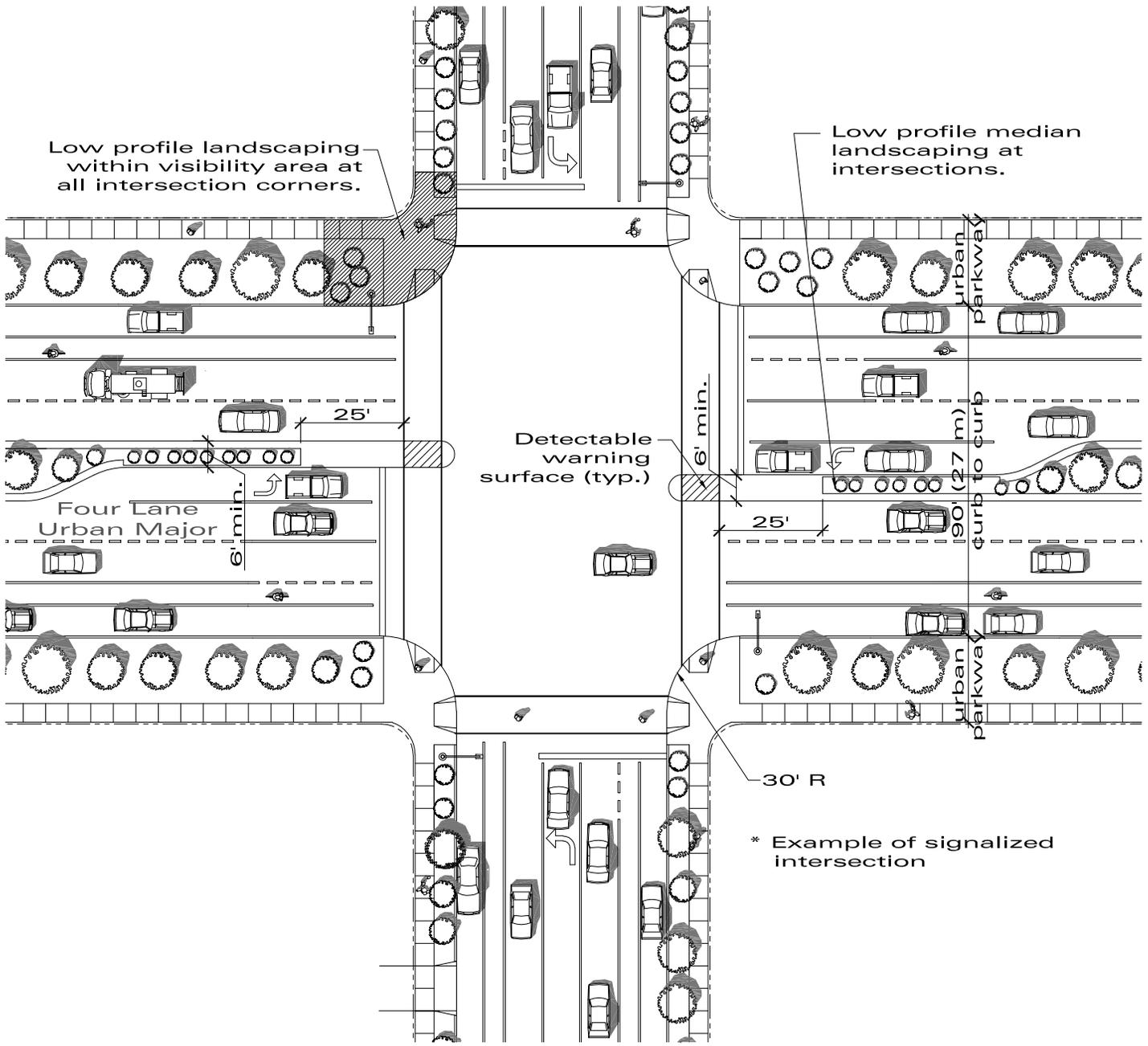


Major Streets





Four Lane Urban Major



plan (not to scale)

42

urban parkway

U-4 a

U-5 a

U-5 b

U-6 a

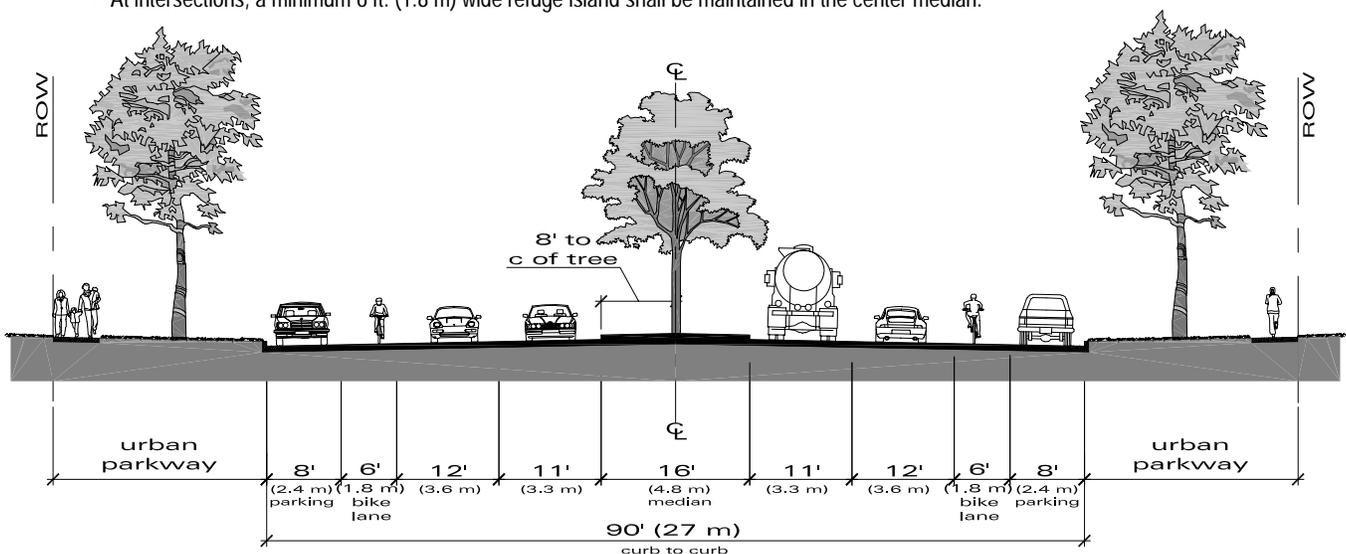
U-6 b

Width, Right-of-Way	118 ft. (35.6 m) - 130 ft. (39.0 m)	
Design ADT	LOS C	30,000
	LOS D	35,000
Design Speed	45 mph (70 km/h)	
Width (includes bike lanes and 16 ft. (4.8 m) raised center median), Curb-to-Curb^{1,2}	90 ft. (27.0 m)	
Maximum Grade	7%	
Minimum Curve Radius	1,090 ft. (325 m) with no superelevation 830 ft. (245 m) with 2% (min.) superelevation 660 ft. (195 m) with 6% (max.) superelevation	
Land Use	Single Dwelling Residential-no front or side yards; Multiple Dwelling Residential-no front or side yards; Neighborhood Commercial; Community Commercial; Regional Commercial; Commercial Office; Visitor Commercial; School (high school and above); Church; Public Building; Urban Village Commercial Retail; Industrial	
Parkway Options	U-4 (a); U-5 (a,b); U-6 (a,b)	

NOTE: Four-Lane Urban Major street classification is applicable to streets of limited length, where intersections are closely spaced, where there is extensive driveway access, or in other situations where the speed is expected to be less 45 mph (70 km/h) or less.

¹ Widen additional 10 ft. (3.0 m) at approaches to intersecting four- or six-lane streets to provide a minimum of 250 ft. (75 m) of two-lane left-turn storage, exclusive of transitions. Receiving lanes for dual lefts shall be 12 ft. (3.6 m) wide. In instances where supporting information exists, such as an approved traffic impact study, showing clearly that dual left-turn lanes would not be warranted, the standard curb-to-curb width may be permitted.

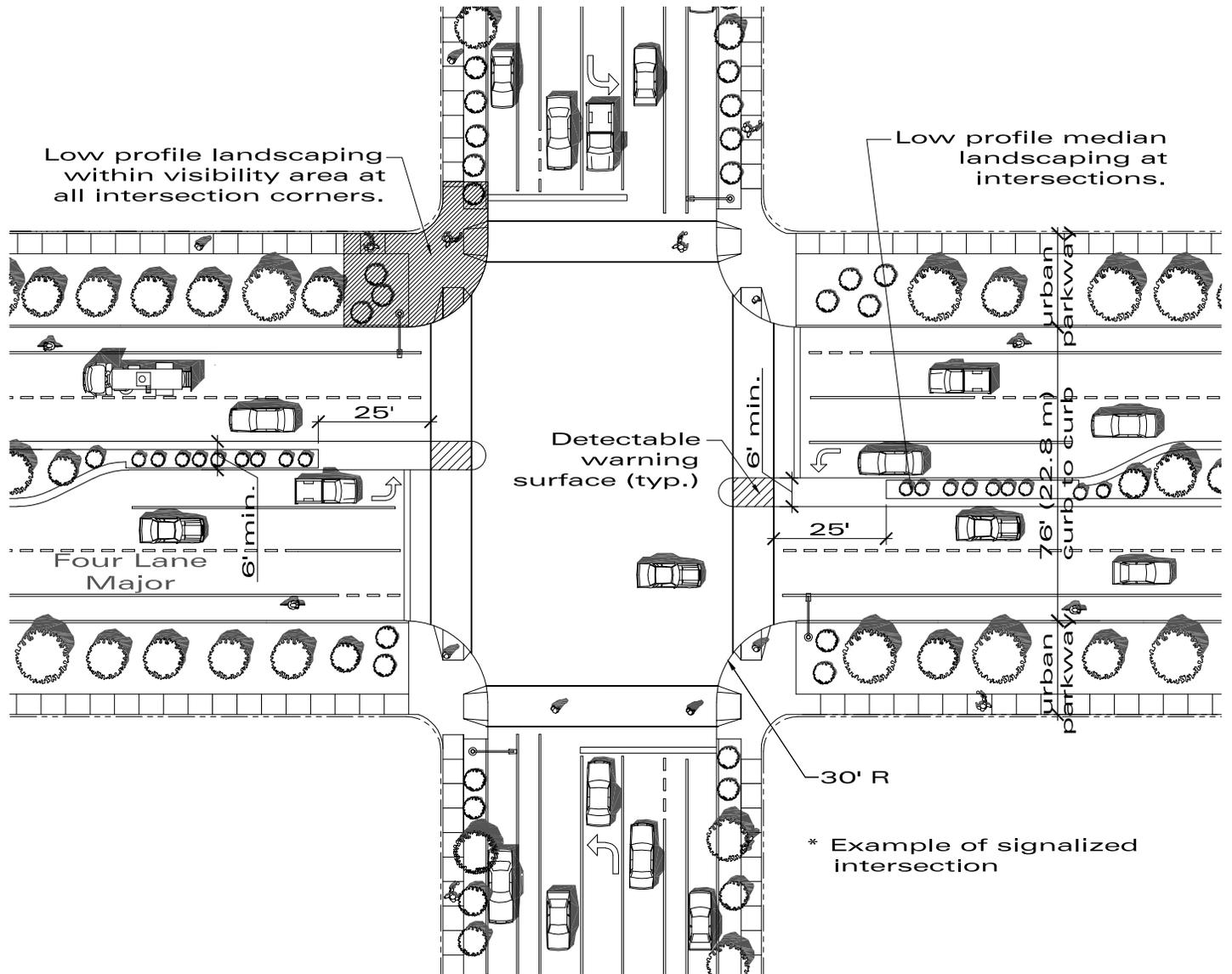
² At intersections, a minimum 6 ft. (1.8 m) wide refuge island shall be maintained in the center median.



section A-A (not to scale)



Four Lane Major

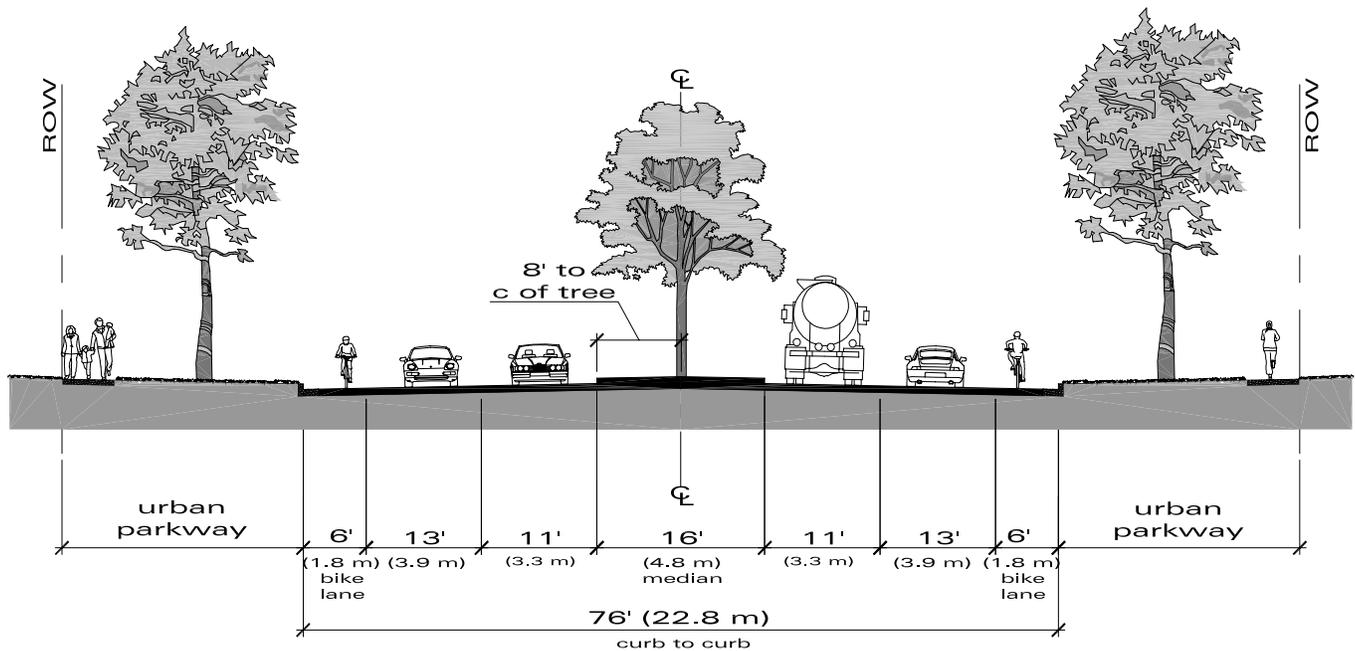


plan (not to scale)

Width, Right-of-Way	120 ft. (36.0 m)	
Design ADT	LOS C	30,000
	LOS D	35,000
Design Speed	55 mph (90 km/h)	
Width (includes bike lanes and 16 ft. (4.8 m) raised center median), Curb-to-Curb^{1,2}	76 ft. (22.8 m)	
Maximum Grade	7%	
Minimum Curve Radius	1,850 ft. (585 m) with no superelevation 1,350 ft. (430 m) with 2% (min.) superelevation 880 ft. (275 m) with 10% (max.) superelevation	
Land Use	Single Dwelling Residential-no front or side yards; Multiple Dwelling Residential-no front or side yards; Community Commercial-no front yards; Regional Commercial; Commercial Office; Visitor Commercial; Church; Public Building; Industrial; Open Space	
Parkway	U-4 (b)	

¹ Widen additional 10 ft. (3.0 m) at approaches to intersecting four-or-six-lane streets to provide a minimum of 250 ft. (75 m) of two-lane left-turn storage, exclusive of transitions. Receiving lanes for dual lefts shall be 12 ft. (3.6 m) wide. In instances where supporting information exists, such as an approved traffic impact study, showing clearly that dual left-turn lanes would not be warranted, the standard curb-to-curb width may be permitted.

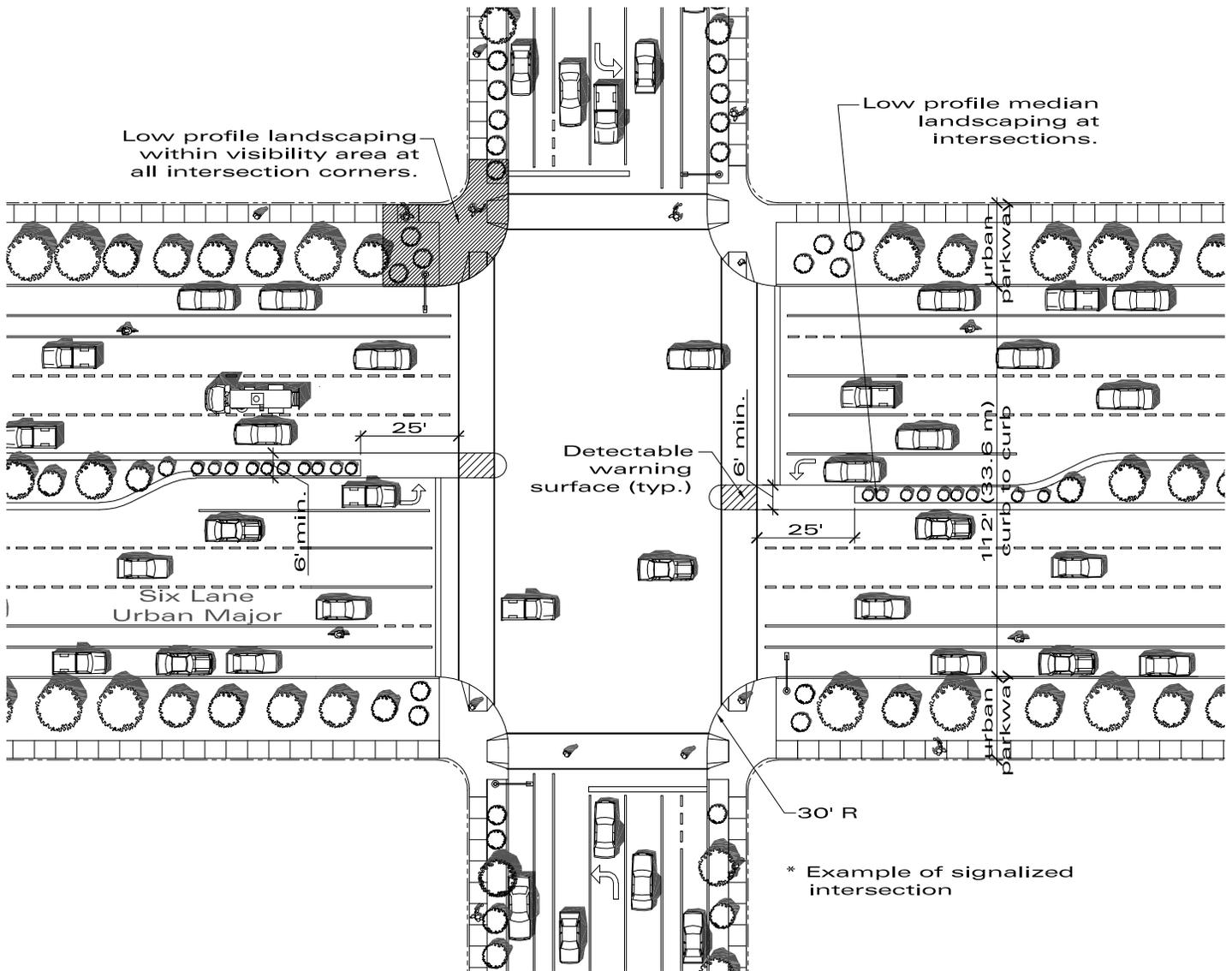
² At intersections, a minimum 6 ft. (1.8 m) wide refuge island shall be maintained in the center median.



section A-A (not to scale)



Six Lane Urban Major



plan (not to scale)

46

urban parkway

U-4 a

U-5 a

U-5 b

U-6 a

U-6 b

Six Lane Urban Major

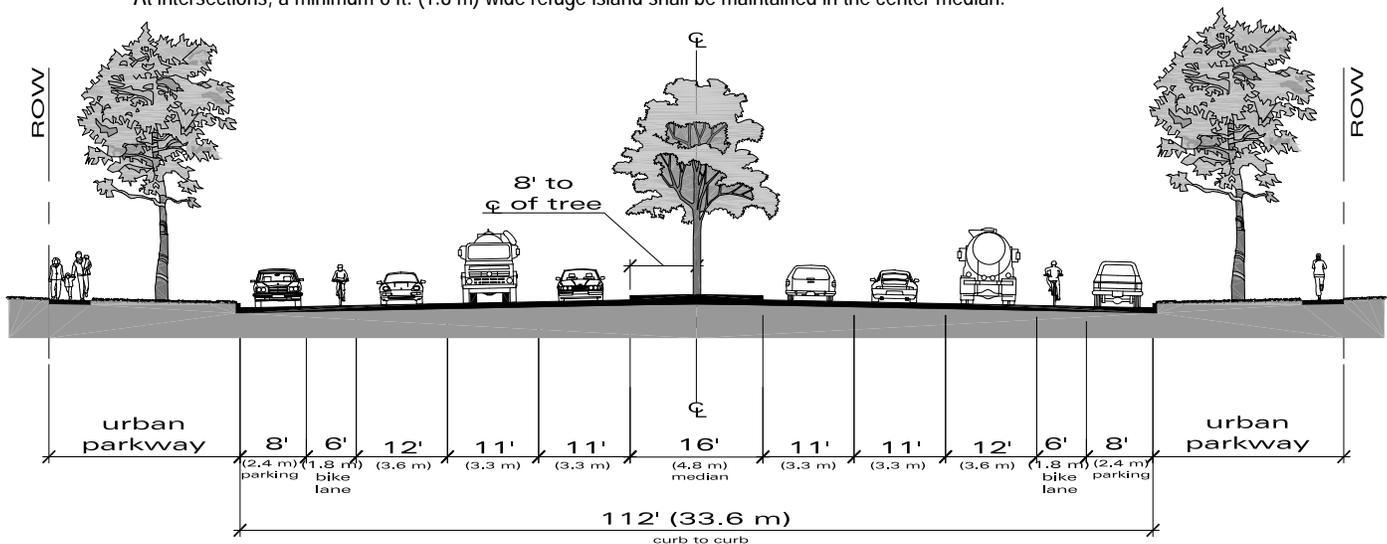


Width, Right-of-Way	140 ft (42.2 m) - 152 ft. (45.6 m)	
Design ADT	LOS C	40,000
	LOS D	45,000
Design Speed	45 mph (70 km/h)	
Width (includes bike lanes and 16 ft. (4.8 m) raised center median), Curb-to-Curb^{1,2}	112 ft. (33.6 m)	
Maximum Grade	7%	
Minimum Curve Radius	1,090 ft. (325 m) with no superelevation 830 ft. (245 m) with 2% (min.) superelevation 660 ft. (195 m) with 6% (max.) superelevation	
Land Use	Single Dwelling Residential–no front or side yards; Multiple Dwelling Residential–no front or side yards; Community Commercial; Regional Commercial; Commercial Office; Visitor Commercial; school (high school and above); Church; Public Building; Urban Village Commercial Retail; Industrial; Open Space	
Parkway Options	U-4 (a); U-5 (a,b); U-6 (a,b)	

NOTE: Six-Lane Urban Major street classification is applicable to streets of limited length, where intersections are closely spaced, where there is extensive driveway access, or in other situations where the speed limit is expected to be 45 mph (70 km/h) or less.

¹ Widen additional 10 ft. (3.0 m) at approaches to intersecting four-or-six-lane streets to provide a minimum of 250 ft. (75 m) of two-lane left-turn storage, exclusive of transitions. Receiving lanes for dual lefts shall be 12 ft. (3.6 m) wide. In instances where supporting information exists, such as an approved traffic impact study, showing clearly that dual left-turn lanes would not be warranted, the standard curb-to-curb width may be permitted.

² At intersections, a minimum 6 ft. (1.8 m) wide refuge island shall be maintained in the center median.



with parking

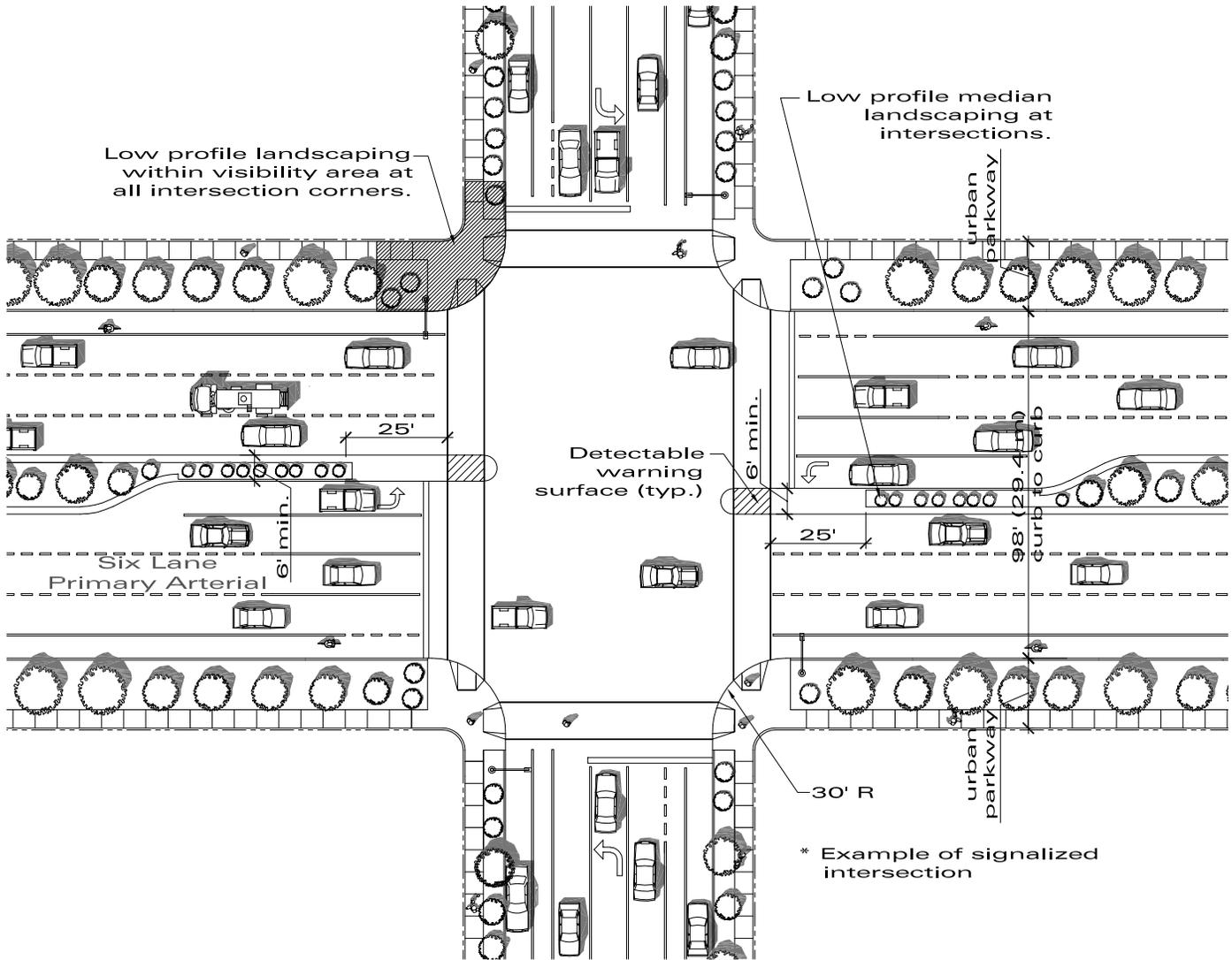
section A-A (not to scale)

traffic calming





Six Lane Primary Arterial



plan (not to scale)

48

urban parkway

U-4
b

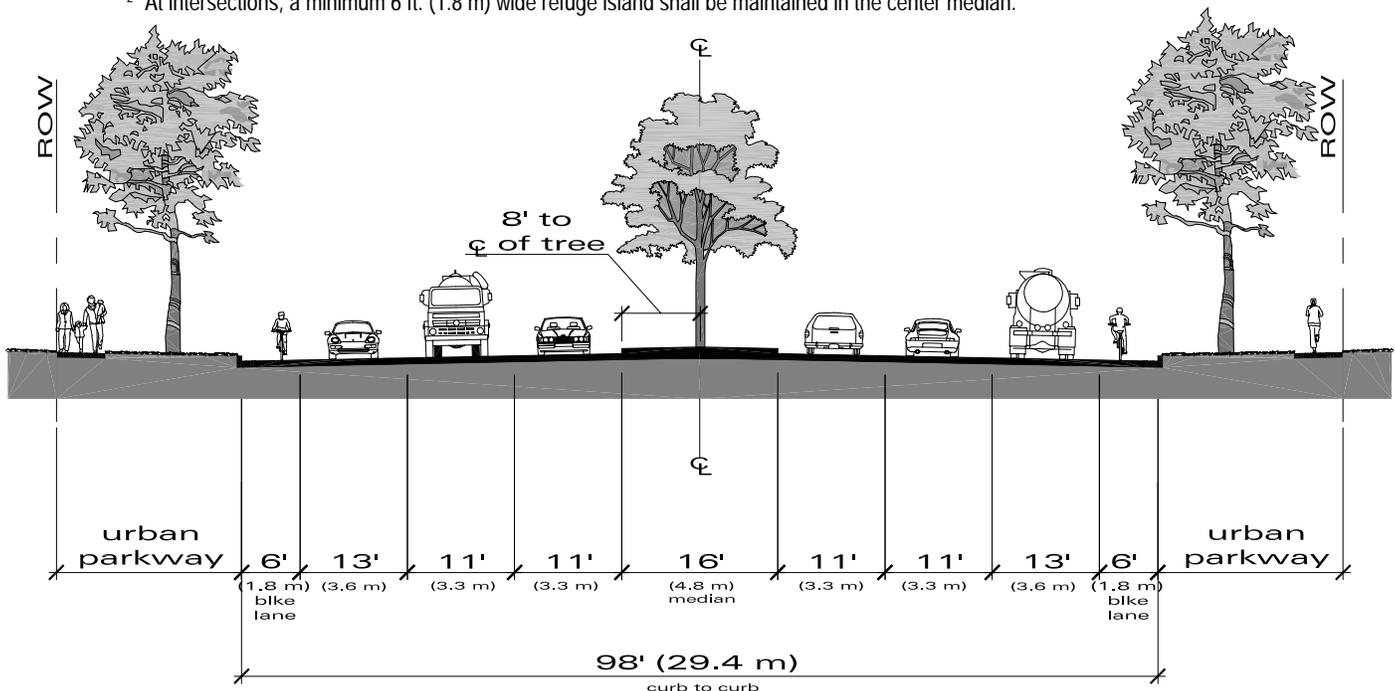
Six Lane Primary Arterial



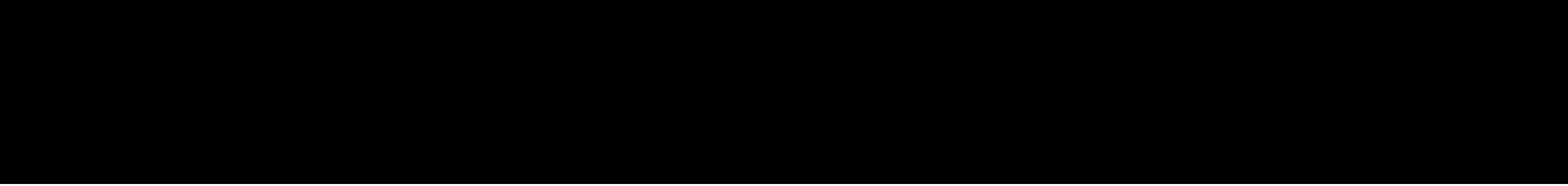
Width, Right-of-Way	142 ft. (42.6 m)	
Design ADT	LOS C	50,000
	LOS D	55,000
Design Speed	55 mph (90 km/h)	
Width (includes bike lanes and a 16 ft. (4.8 m) raised center median), Curb-to-Curb ^{1, 2}	98ft. (29.4 m)	
Maximum Grade	6%	
Minimum Curve Radius	1,850 ft. (585 m) with no superelevation 1,350 ft. (430 m) with 2% (min.) superelevation 880 ft. (275 m) with 10% (max.) superelevation	
Land Use	Large Lot Single Dwelling Residential-o front or side yards; Single Dwelling Residential-o front or side yards; Multiple Dwelling Residential-o front or side yards; Community Commercial - no front yards; Regional Commercial; Commercial Office; Visitor Commercial; Church – no front yards; Public Building - no front yards; Industrial - no front yards; Open Space	
Parkway	U-4 (b)	

¹ Widen additional 10 ft. (3.0 m) at approaches to intersecting four-or-six-lane streets to provide a minimum of 250 ft. (75 m) of two-lane left-turn storage, exclusive of transitions. Receiving lanes for dual lefts shall be 12 ft. (3.6 m) wide. In instances where supporting information exists, such as an approved traffic report, showing clearly that dual left-turn lanes would not be warranted, the standard curb-to-curb width may be permitted.

² At intersections, a minimum 6 ft. (1.8 m) wide refuge island shall be maintained in the center median.

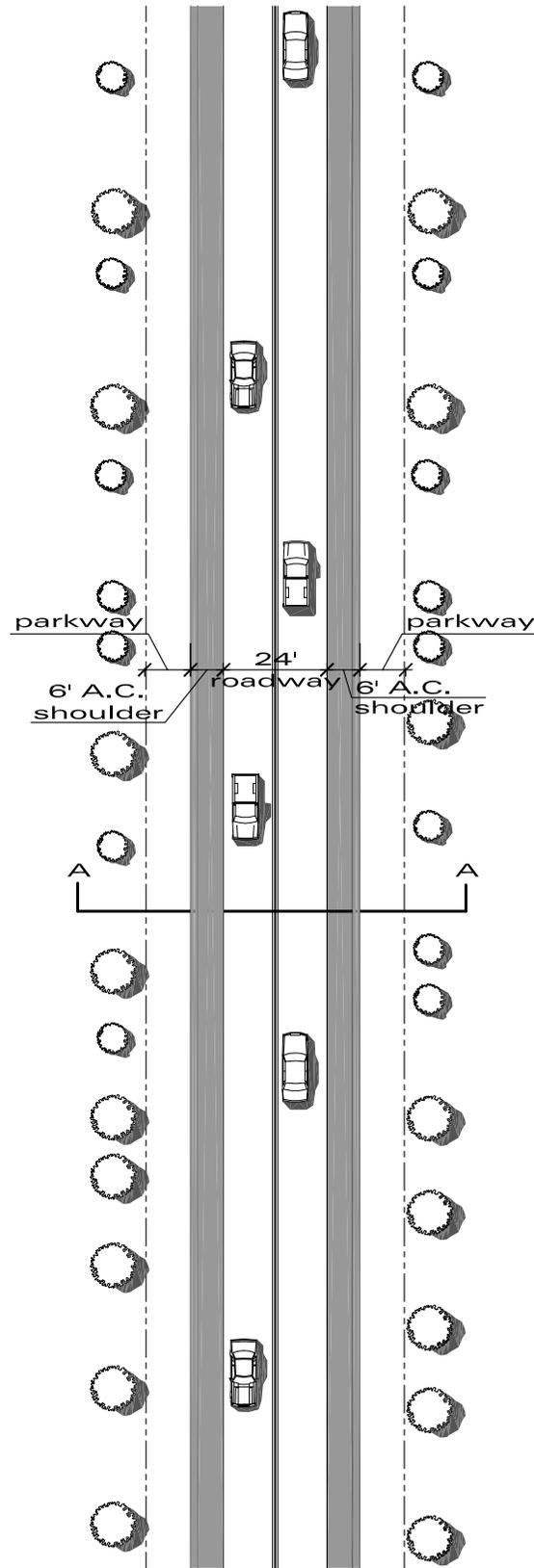


section A-A (not to scale)



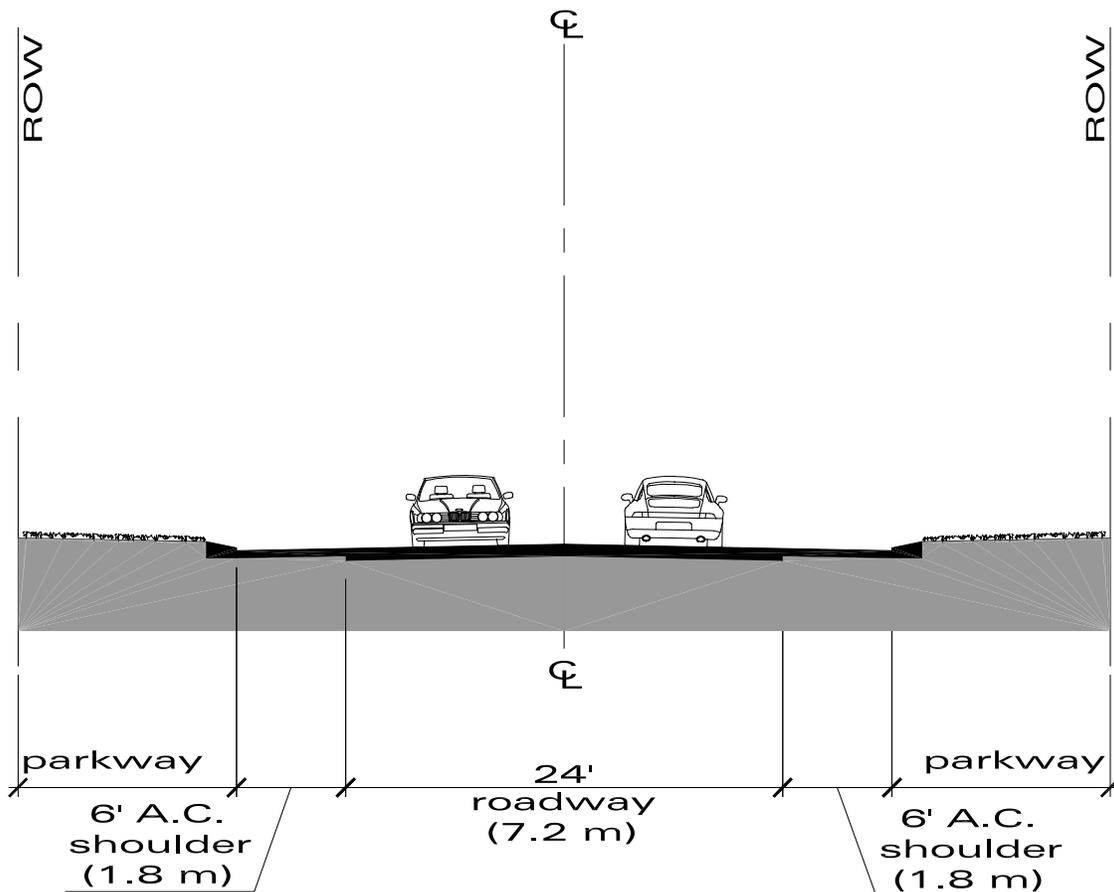
Rural Roads





plan (not to scale)

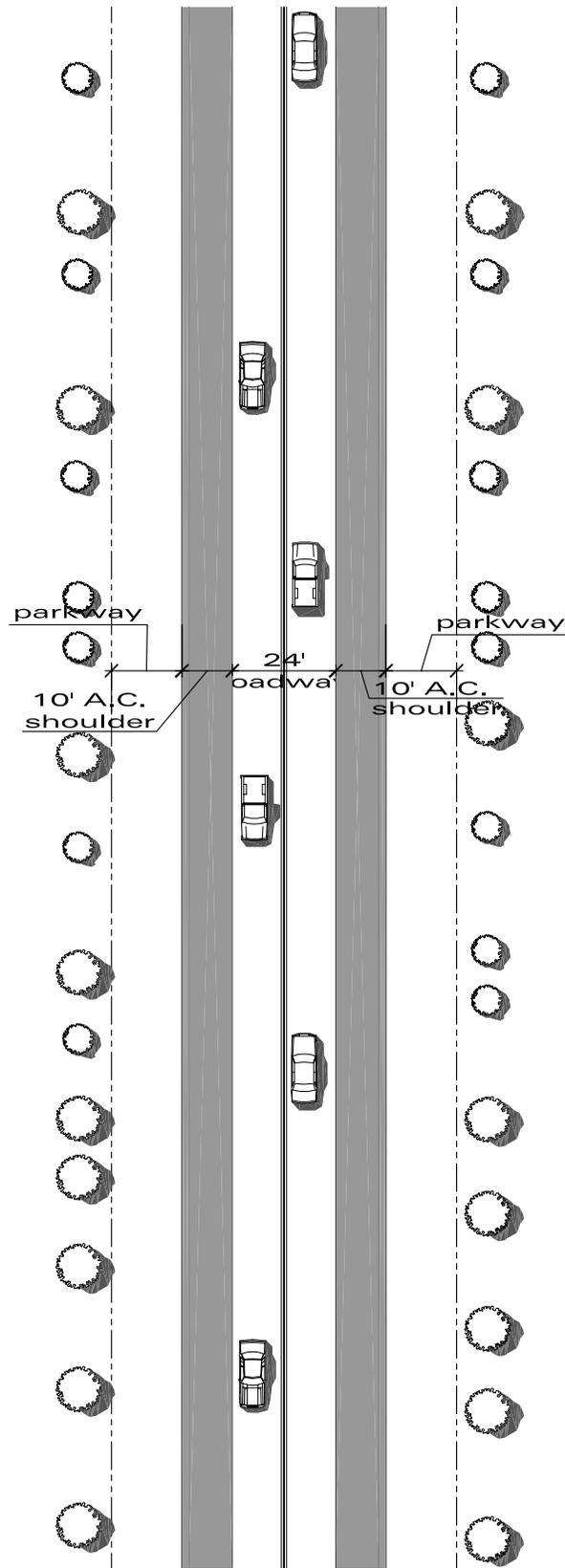
Width, Right-of-Way	60 ft. (18.0 m)
Design ADT	1,500
Design Speed	30 mph (50 km/h)
Width of Traveled Way	24 ft. (7.2 m)
Maximum Grade	15%
Minimum Radius	430 ft. (145 m) with no superelevation 340 ft. (110 m) with 2% (min.) superelevation 300 ft. (100 m) with 4% (max.) superelevation
Land Use	Large Lot Single Dwelling Residential (>2.5 acres) Agriculture Open Space-Park Open Space-Conservation Open Space-Floodplain
Parkway Options	R-1; R-2 (a); R-2 (b)



section A-A (not to scale)

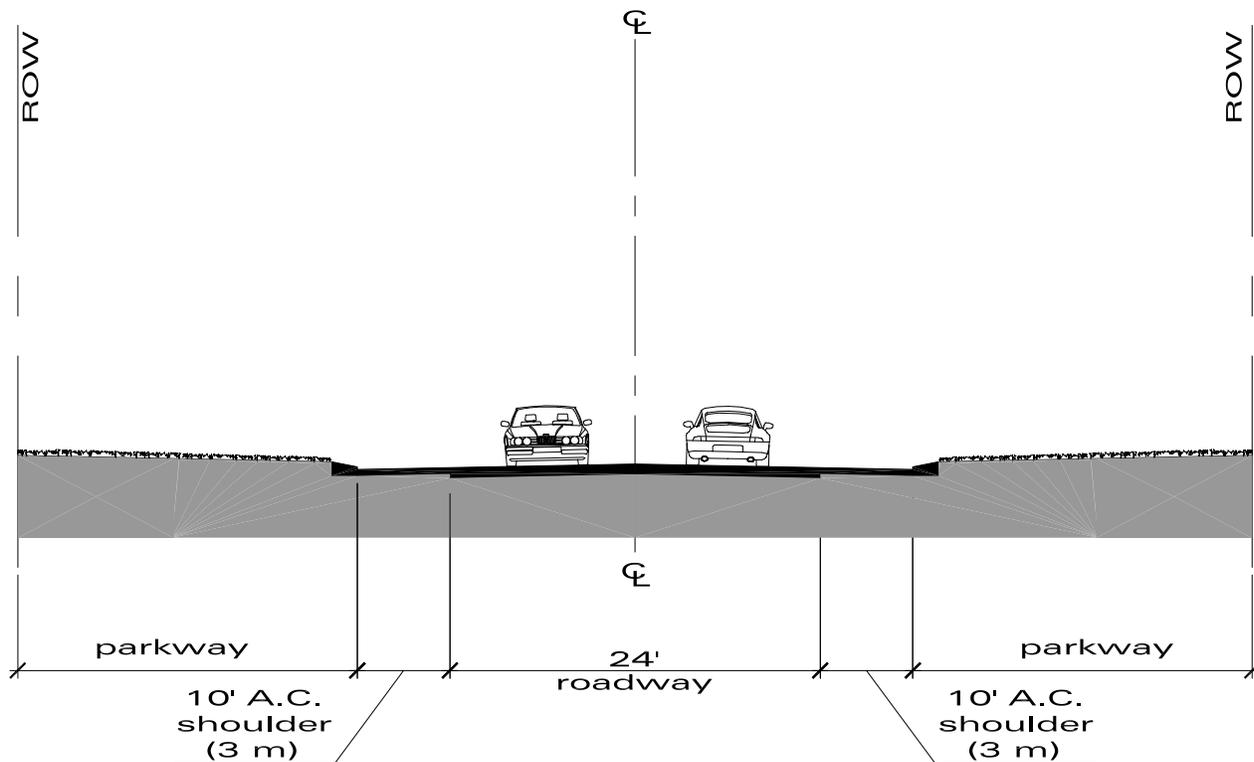


Rural Collector Road



plan (not to scale)

Width, Right-of-Way	80 ft. (24.0 m) – 96 ft. (29.0 m)
Design ADT	7,500
Design Speed	55 mph (90 km/h)
Width of Traveled Way	24 ft. (7.2 m)
Maximum Grade	4% in flat terrain 5% in rolling terrain 7% in mountainous terrain
Minimum Curve Radius	1,850 ft. (585 m) with no superelevation 1,350 ft. (430 m) with 2% (min.) superelevation 970 ft. (305 m) with 8% (max.) superelevation
Land Use	Large Lot Single Dwelling Residential (>2.5 acres) Agriculture Open Space-Park Open Space-Conservation Open Space-Floodplain
Parkway Options	R-3; R-4



section A-A (not to scale)

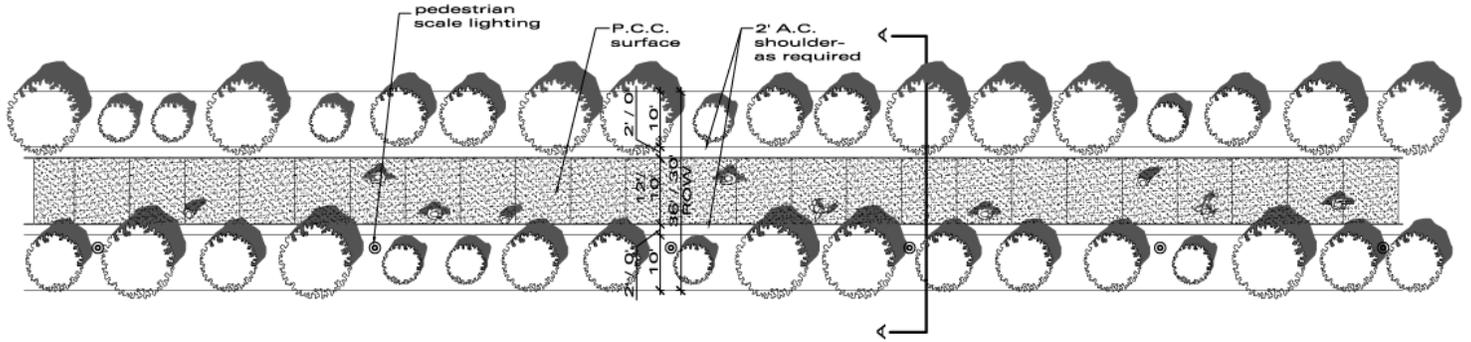


Facilities Without the Automobile

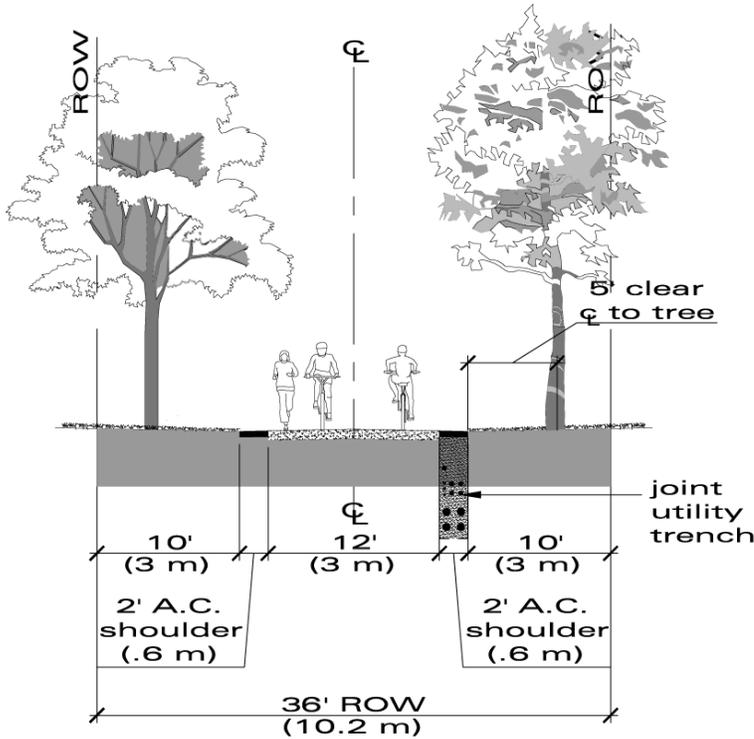




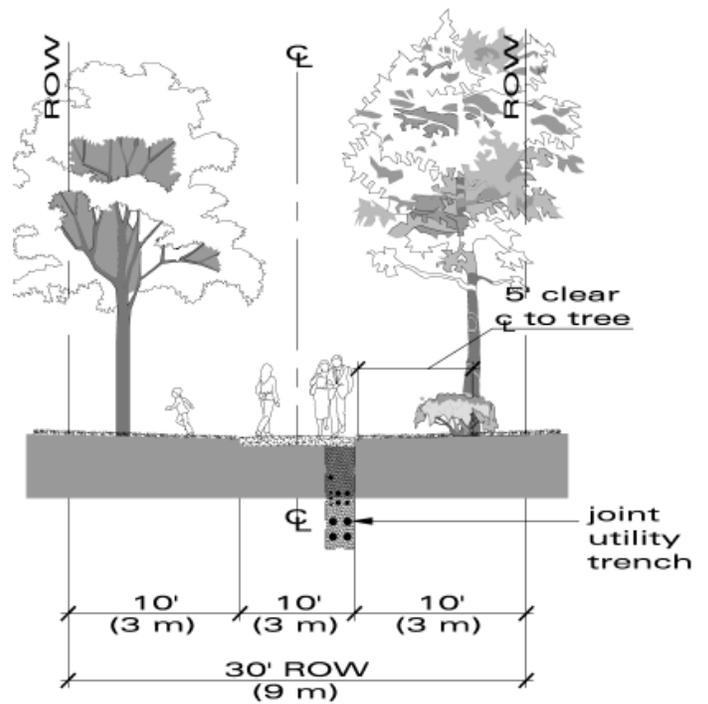
Facilities Without the Automobile



Legend: xx/yy
xx: shared bike/pedestrian facility
yy: pedestrian facility



Shared Pedestrian Bikeway Facility



Pedestrianway

plan (not to scale)

SHARED PEDESTRIAN/BIKEWAY

Width, Right-of-Way^{1,2}	36 ft. (10.2 m)
Width of Traveled Way³	12 ft. (3.6 m)
Width of Shoulder⁴	2 ft. (0.6 m)
Maximum Grade	5%
Street Trees	Permitted
Street Lights	Pedestrian scale
Utilities	One side
Land Use	Single Dwelling Residential-no front yards Multiple Dwelling Residential-no front yards Open Space-Park Commercial-no front yards Urban Village-no front yards Industrial Park-no front yards Small-Lot Industrial-no front yards

1. Right-of-way of 30 ft. (9.0 m) is required for pedestrianways only.
2. Where right-of-way is constrained, parkway width may be reduced to 6 ft. (1.8 m).
3. Width of traveled way of 10 ft. (3.0m) is required for pedestrianways.
4. Shoulders are not required for pedestrianways.

A. Bikeways

1. Bikeways are to be provided in accordance with adopted community plans and the City's Bicycle Master Plan and should be continuous, leading to all major activity centers.
2. Intersections of bike paths with roadways shall conform to CalTrans Highway Design Manual, Chapter 1000, Bikeway Planning and Design.

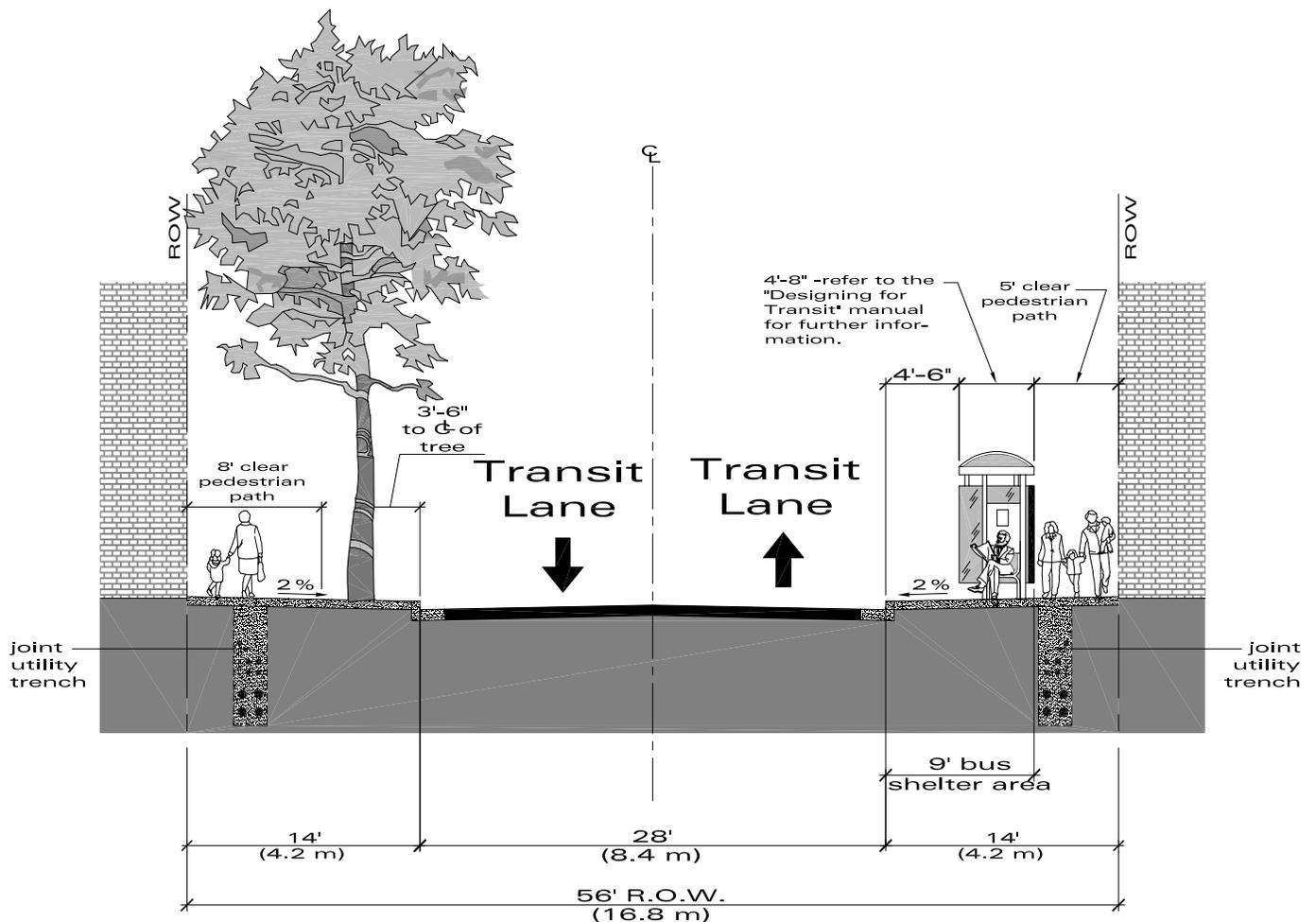
B. Class II Bicycle Lanes

1. Bicycle lanes shall be one way. Bicycle lanes should be 5 to 6 ft. (1.5 to 1.8 m) wide when adjacent to curb and gutter. Bicycle lanes should be 5 ft. (1.5 m) wide when adjacent to a parking lane. If parking is to be retained, street cross section shall be widened as necessary.
2. Where abutting property is not to be developed or does not front on the street, bicycle lanes may be provided by a parking prohibition instead of street widening. Such parking prohibition shall be implemented as soon as the street is opened to traffic.
3. Adjacent to a mandatory right-turn lane, the bicycle facility may be 4 ft. (1.2 m) in width, located to the left of the turn lane.

TRANSITWAY

Width, Right-of-Way	56 ft. (17.1 m) – 68 ft. (20.5 m)
Design Speed	20 mph (30 km/h)
Width, Curb-to-Curb	28 ft. (8.5 m)
Maximum Grade	8%
Minimum Curve Radius	65 ft. (20 m)
Street Lights	Pedestrian scale, both sides
Land Use	Medium-to-Very High Density Multiple Dwelling Residential—no front yards
Parkway	Commercial Office—no front yards U-5
Land Use	Pedestrian-Oriented Commercial retail Urban Village Commercial Retail
Parkway	U-6

Note: Refer to the MTDB publication, *Designing for Transit*, for more information.



Pedestrian Design





PEDESTRIAN DESIGN

The 1979 *Progress Guide and General Plan* states that walking within an urban community should be a pleasant and enjoyable experience, an opportunity for healthful exercise and quiet relaxation on the way to work, shopping, or other destinations. Instead, the pedestrian must often contend with annoying vehicular noise and fumes from the adjacent street, narrow and irregular sidewalk surfaces, and a veritable obstacle course of poles, fire hydrants, and trash containers within the public walkway. Additionally, adequate street lighting for nighttime safety is often lacking, especially at bus stops. Moreover, amenities such as shade trees, landscaping, and comfortable seating areas are infrequently provided in commercial districts where walking is the normal transportation mode¹.

The City of Villages strategy calls for a convenient, efficient, and attractive multimodal transportation system in which pedestrians, bicycles, and transit vehicles are accommodated in addition to automobiles. This system should improve mobility for San Diegans by providing competitive—even preferred—alternatives to the automobile for many trips in the region. The strategy, as a policy, recommends: *Promote pedestrian- and transit-friendly design of City streets*².

NOTE: This section of the Street Design Manual is derived from *Planning and Designing for Pedestrians, Model Guidelines for the San Diego Region*, June 2002, prepared for the San Diego Association of Governments by Community Design and Architecture. The Pedestrian Design Guideline section complements and supports the other sections of the Street Design Manual.

1. *Progress Guide and General Plan, 1979.*
2. City of Villages Strategic Framework Element, Draft January 2002.

Who are Pedestrians?

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

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

The following discusses the pedestrian experience at street level, including street design, intersection design, sight distance, pedestrian-crossings, pedestrian refuge islands, sidewalks for overpasses and underpasses and highway on/off ramps, and pedestrian realm.

1. Understanding ADA & Designing for Various Disabilities and Ages

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

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

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

A. Grades

1. There should be enough sidewalk cross slope for adequate drainage. The maximum cross slope should be no more than 2 percent for compliance.
2. Along walkways, pedestrian ways, and shared pedestrian/bikeway facilities, long, steep grades should have level areas every 400 feet for the pedestrian to stop and rest. In areas where it is impossible to avoid steep grades, an alternative route should be provided.

B. Sidewalks

1. Minimum unobstructed sidewalk width shall be 5 feet. (Exceptions may be made to a minimum of 3 feet because of right-of-way (ROW) restrictions, natural barriers, or other existing conditions. The minimum width should be expanded when there is either a vertical barrier fronting the sidewalk or a vehicle travel lane.
2. If a sidewalk is less than 5 feet wide, there shall be a 5 feet x 10 feet passing space every 200 feet of length along the sidewalk.

C. Curb Ramps at Intersections

1. At new intersections, curb ramp should align in the direction of crosswalks, with two per corner at each intersection.
2. Curb ramps shall be installed in accordance with the San Diego Regional Standard drawings.
3. Curb ramps or full cut-throughs 48 inches in width minimum, should be provided at channelization and pedestrian refuge islands.
4. Storm drainage inlets should be placed on the uphill side of the curb ramps to prevent standing water at corner.

D. Surfaces

1. All surfaces should be stable, firm, and slip-resistant with a minimum static coefficient of friction of 0.5.
2. Surface treatments that include irregular surfaces, such as cobblestone, can be difficult to navigate and should be avoided within the primary walkway area. Low profile textured surfaces are acceptable.

E. Eliminating Barriers for Disabled

Since 1971, the state of California has mandated within Health and Safety Codes, section 19956.5, that sidewalks and walks shall be made accessible to and usable by persons with disabilities.

In addition to the following guidelines, individual sections of the guidelines include discussions and guidelines pertaining to ADA accessibility issues.

2. Street Design

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

A. Issues to Consider

General

- A prevailing condition in much of the San Diego region is the location of buildings set back from the street, which can result in a built environment that encourages traffic to travel at higher speeds.
- While it can be important to buffer residential neighborhoods from adjacent busy and noisy streets, the need to buffer should be balanced with the need for pedestrians to easily get from the neighborhood to transit or uses along busy streets.
- Excessively wide lanes encourage higher speeds on streets that can then divide a community.
- Frequent curb cuts along a street both impede traffic flow and create more conflict points between autos and pedestrians, thus reducing the effectiveness of sidewalks as a pedestrian realm.
- Throughout the San Diego region, there are canyons and mesas that make pedestrian connections difficult to achieve.
- The warm and mild climate in San Diego throughout most of the year creates opportunities to make pedestrian travel a realistic option for many people.

B. ADA Accessibility

- Pedestrian facilities must comply with ADA standards and California Title 24, and take into account the entire range of disabilities.
- ADA accessibility requirements most often help to create a better pedestrian environment, particularly for seniors, as well as for those with disabilities.

C. New Development vs. Retrofit

- The guidelines and standards describe the minimum desirable improvements in most cases; and, in many cases, discussions of trade-offs between different needs are discussed to help the reader identify the compromises that may be necessary in the retrofitting of existing streets and developments.
- Improvements to accessibility should consider both sides of the street.
- Neighborhoods evolve over time and the public right-of-way configuration has an influence as to what type of development occurs.
- Prior to improvements to an existing street, utilities such as lighting, electrical and storm drains should be identified and either incorporated into the design or relocated.

D. Relation to Transit

- All streets that are directly served by transit should also be designed or retrofitted to serve pedestrians since there must be adequate facilities to access transit.
- Streets, sites, and buildings within an area that is walkable to transit stops should be designed or retrofitted to serve pedestrians.

E. Guidelines

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

3. Intersection Design and Operations

The word “intersection” means more than just the meeting of two (or more) streets. It is the where the auto realm and the pedestrian realm converge, sometimes in conflict. It is because of this that intersections are often the most vital areas along a street notwithstanding that they are the point of most conflicts between vehicles, pedestrians, and bicycles.

Intersections must be designed with pedestrian safety and accessibility in mind. If pedestrians are either prohibited from crossing or discouraged from crossing, walking as a mode of travel is hampered. The spacing of intersections or crossing points is also an important element in the creation of a supportive pedestrian environment.

This section describes how intersections can be made more pedestrian friendly by reducing crossing distances and improving visibility for both the pedestrian and the driver. Detailed discussion of specific crossing designs and elements is included in the following Pedestrian Crossings section.

A. Issues to Consider

General

- Pedestrians should be made as visible as possible since multiple conflict points for vehicles and pedestrians exist at intersections.
- Intersections that limit the crossing distance, crossing time, and exposure to traffic tend to be more acceptable to pedestrian travel.
- Drivers traveling at a slower rate of speed have more time to process and react to pedestrian conflicts at intersections.

B. ADA Accessibility

- Pedestrian facilities, including curb ramps, signal equipment, etc., must comply with ADA standards and California Title 24, and take into account the entire range of disabilities.

C. New Development vs. Retrofit

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

D. Relation to Transit

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

4. Sight Distance

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

A. Issues to Consider

General

- The sightlines of traffic approaching an intersection on a significant grade are compromised.
- Streets that support pedestrian movements allow for the placement of elements such as trees and medians with landscaping. The presence of such elements creates a slower speed environment that is more conducive to pedestrians. These elements shall be placed in such a fashion that adequate sight distance is provided for all users of the public ROW.
- Sightlines for vehicles at an intersection are affected both by buildings, street trees, street furniture, etc., and by the location of the stop line relative to the intersection.

B. ADA Accessibility

At all pedestrian crossing locations, persons in wheelchairs and small children shall be visible to the driver with on-street parking present.

Relation to Current Standards and Practices

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

C. Guidelines

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

5. Pedestrian Crossings

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

A. Issues to Consider

General

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

B. ADA Accessibility

- Appropriate ADA ramps should be provided at all pedestrian crossings and median refuge areas.

C. New Development vs. Retrofit

- Pedestrian refuge islands and pop-outs can be effective retrofit improvements that serve pedestrians who are unable to cross during one signal interval or in situations where there are no pedestrian signals and the road is excessively wide.
- Textured paving or speed tables are effective means of retrofitting streets to encourage reduced speeds in a pedestrian oriented area.

D. Relation to Current Standards and Practices

- Details on innovative pedestrian crossing treatments for both signalized and unsignalized intersections have been published in a document by the Institute of Transportation Engineers, *Alternative Treatments for At-Grade Pedestrian Crossings, 2001*. This source described a number of measures, including those incorporating signing, striping, lighting, vertical displacement treatments, horizontal displacement, narrow lanes, curb extensions, alternative surface treatments, backdrops, overhead devices, in-pavement devices, signal equipment, pedestrian detection, etc. The study included the following conclusions:

- There are a number of geometric design features, such as curb extensions and pedestrian refuge islands, that can be used to improve safety of marked crosswalks, especially those on high-volume, multi-lane facilities.
- Areas of high pedestrian activity benefit most from being designed in ways that promote pedestrian activity and afford pedestrians a reasonable measure of comfort and safety when crossing streets.
- Lower speed streets, such as those found in active mixed-use areas and residential neighborhoods, allow the use of less complex treatments such as signs and markings.

E. Relation to Transit

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

F. Guidelines

1. The width of crosswalks should be a minimum of 10 feet (3.0) wide. Unless small-scale intersection conditions dictate otherwise, widths should be increased where there is greater pedestrian activity.
2. Adequate lighting at the levels specified in the chapter on street lighting should be present.
3. Marked crosswalks should be considered for uncontrolled crossing locations if there are no controlled crossings (by a traffic signal or stop sign) within 600 feet of the proposed crossing location (provided that the other guidelines presented here are met).

4. Marked crosswalks should be provided at all signalized intersections where pedestrian crossing equipment is provided.
5. Marked crosswalks alone are insufficient (i.e., without traffic-calming treatments, traffic signals, pedestrian signals when warranted, or other substantial crossing improvements presented in these guidelines) and should not be used under the following conditions:
 - (a) Where the speed limit exceeds 40 mph.
 - (b) On a roadway with four or more lanes without a raised median or crossing island that has (or will soon have) an ADT of 12,000 vehicles per day or greater.
 - (c) On a roadway with four or more lanes with a raised median or crossing island that has (or will soon have) an ADT of 15,000 vehicles per day or greater.

6. Special crosswalk markings should be used in order to increase the visibility of the crosswalk and on uncontrolled approaches to unsignalized intersections. These special markings are generally more appropriate on roads where the adjacent land use may divert drivers' attention.

7. Curb ramps (two per corner preferred) should be provided at all crosswalks. If a raised central median extends into the crosswalk, an ADA-compliant channel must be provided through the median. A detectable warning surface should be installed within the channel.

G. Residential Street Crossings

Issues to Consider

- Enhanced pedestrian crossings in residential neighborhoods are a key component of pedestrian-oriented street design and lead to both improved pedestrian safety and the "livability" of the neighborhood.

- Residential street crossings are often combined with traffic calming measures that are designed to maintain low vehicle speeds, such as raised crosswalks, chicanes, and gateway narrowings. Refer to the Traffic Calming section of the manual.
- Enhanced pedestrian crossings in residential neighborhoods may not be used if traffic volumes are low enough that pedestrians are comfortable crossing at any location.

Guidelines

1. Marked crosswalks in residential areas should be warranted if traffic volumes exceed 2,000 vehicles per day.
2. Enhanced pedestrian crossing measures should be considered in residential neighborhoods where a demonstrated crossing demand exists.
3. On residential streets that experience excessive vehicle speeds, enhanced pedestrian crossings should be combined with traffic calming measures such as pop-outs.

H. Mid-block Crosswalks

Issues to Consider

- Mid-block crosswalks provide convenient crossing locations for pedestrians when other crossing opportunities are distant or where there is a presence of concentrated mid-block pedestrian crossing demand.
- As may be the case for crosswalks at intersections, mid-block crosswalks help to concentrate pedestrian crossing activity and alert drivers to the possible presence of pedestrians.

- Safety concerns arise at mid-block crosswalks as drivers typically do not anticipate pedestrians or crosswalks at non-intersection locations.

Guidelines

1. Mid-block crosswalks shall be installed in accordance with Council Policy 200-07.
2. Mid-block crosswalks shall be well illuminated (refer to Street Lighting section).
3. An ADA-compliant curb ramp should be provided at each end of the crosswalk.
4. Curb extensions may be considered at the crosswalk to enhance pedestrian crossing visibility and reduce crossing distance.
5. High contrast detectable surface should be installed on the sidewalk at each end of mid-block crosswalk (see Appendix IV).
6. If mid-block crosswalks are signalized, audible devices should be installed.
7. On streets that experience excessive vehicle speeds, enhanced pedestrian crossings should be combined with traffic calming measures, such as raised crosswalks or curb extensions.

6. Pedestrian Refuge Islands

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

A. Issues to Consider

General

- Pedestrian refuge islands work well on wider streets where there are long pedestrian crossing times and exposure to vehicular traffic or on streets with speeds higher than 35 mph.

B. ADA Accessibility

- Particularly useful for slower pedestrians, such as the very young, elderly, or those with mobility disabilities.
- Where it is not possible to include ramps and waiting pads that meet ADA requirements, waiting areas should be at-grade with the roadway (channels), although slopes should facilitate drainage and planting or bollards should buffer pedestrians from moving traffic.

C. New Development vs. Retrofit

- Pedestrian islands may be installed at intersections or mid-block locations deemed appropriate through engineering studies.

- Pedestrian islands should be considered from the outset of design for intersections that are either complex, irregular in shape, excessively wide or in areas where children and older people are expected to cross frequently

D. Relation to Transit

- The use of pedestrian islands should be considered where transit is “running” within the street right-of-way, particularly in station areas.

E. Guidelines

1. Refuge islands should be a minimum of four feet wide by eight feet long.
2. Pedestrian refuge islands should be well illuminated.

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

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

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

A. Overpasses and Underpasses

Issues to Consider

General

- Overpasses and underpasses necessitate accessible ramps that require a considerable amount of additional land for installation.

New Development vs. Retrofit

- Opportunities to widen sidewalks when retrofits occur.

Guidelines

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

B. Highway On/Off Ramps

Issues to Consider

General

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

New Development vs. Retrofit

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

Guidelines

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

8. Creating a Pedestrian Realm

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

The design of the sidewalk and the elements within it and the location and design of buildings are just some of the additional considerations of creating a pedestrian-supportive environment. Furthermore, walking provides more opportunities to observe details than any other

form of transport. Landscape and architectural details are necessary, therefore, to sustain interest for the pedestrians as well as to provide a safe and comfortable experience.

A. Sidewalk Design

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

B. Issues to Consider

General

- Existing excessive right-of-way widths also allow for widening sidewalks and on-street parking, both of which significantly improve the pedestrian experience.
- Increased buffering between fast-moving traffic and abutting properties created by wider sidewalks or local access lanes makes the street more attractive for buildings to front directly onto the street.
- Provide appropriate sidewalk widths given the use and amount of activity that is expected.
- Select materials with consideration for maintenance and long-term appearance.
- Minimize obstructions and conflict points.

C. New Development vs. Retrofit

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

D. Relation to Transit

- The “footprint” of and access to transit facilities such as bus shelters must be considered in the design of sidewalks.
- Sidewalks must connect transit facilities with the adjacent uses within walking distance of the station or bus stop.
- Review MTDB publication, “Designing for Transit,” as well as these guidelines in relation to pedestrian access to transit facilities.

E. Establishing “Zones”

The Sidewalk Corridor is typically located within the street right-of-way between the curb and building face and/or property line. The sidewalk corridor is composed of four distinct zones: the Edge Zone, the Furnishing Zone, the Throughway Zone, and the Frontage Zone.

1. Edge Zone

The Edge Zone (sometimes referred to as the “Curb Zone”) is the interface between the roadway and the sidewalk. At a minimum, this zone includes the 6”-wide curb. In more active, mixed-use areas with on-street parking, this zone should be a minimum of 1’6” to accommodate the door swing of a parked car to prevent conflict with elements within the Furnishing Zone. At transit stops with shelters, this zone should be widened to four feet to provide wheelchair access to the shelter. (In constrained conditions, transit shelters are available with partially open sides, allowing the Edge Zone to be reduced to 2’6”). Providing a pop-out for the entire length of the transit stop is also an effective way to increase Edge Zone width.

2. Furnishings Zone

The Furnishing Zone also accommodates street trees and landscaping. It is the zone that provides the buffer between the active pedestrian walking area, the Throughway Zone, and street traffic. Street trees, tree lawns, street furniture, utility poles, phone booths, parking meters, fire hydrants, bicycle racks, and the like are consolidated in this zone to keep them from being obstacles in the Throughway Zone. Planting in this zone must comply with the standards and guideline in this manual and the Landscape Technical Manual, particularly in the case of street tree well dimensions. The placement of these aforementioned elements must comply with the Land Development Code, San Diego Municipal Code and applicable Council Policies.

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

3. Throughway Zone

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

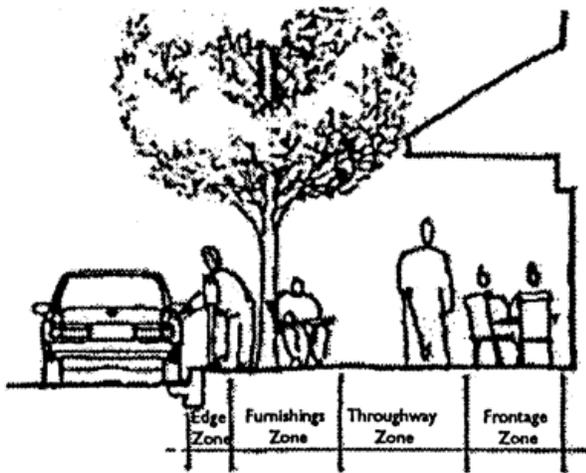
4. Frontage Zone

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

Architectural elements that encroach into the street, such as awnings, stairs, front stoops, artistic elements, planters, marquees, and the like may also occupy this zone. These elements add vitality and visual interest to the street but, nevertheless, must comply with local, state and Federal Regulations.

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

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



Pedestrian sidewalk zones

F. Public Art and Amenities

Pedestrian improvements create a unique opportunity where people can see and be positively impacted by public art as part of their everyday activities; they also help create more walkable communities. Pedestrian improvements, which include public art, can convert ordinary spaces into places of meaning. Improvement projects constructed using public monies may designate a portion of their budget for public art.

Issues to Consider

- On a large scale, public art has the ability to unify a neighborhood with a theme, and at a pedestrian level can provide visual interest for the passerby.
- Public art is an effective means of creating a neighborhood identity, and ideally should reflect the character and history of the community.
- Good design can encourage the use of streets for festivals, parades, and other cultural events that promote neighborhood pride and a sense of place.

Guidelines

1. Public art should be located so as to be a pedestrian amenity without compromising safety.
2. When appropriate, consideration should be given to commissioning artists to create unique street elements such as light poles, benches, trash cans, manhole covers, tree grates, etc.
3. When appropriate, consideration should be given to a design that is conducive to using streets for festivals, parades, and other community events.

Traffic Calming





Traffic Calming

A. Purpose

This section is intended to provide design options for traffic calming on new streets and streets being considered for retrofit. Some general design specifications are provided to assist designers in developing comprehensive streetscape plans for proposed development and redevelopment projects. It is emphasized that these are just guidelines and that innovative street designs that incorporate traffic calming are encouraged.

B. Overview

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

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

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

C. General Guidelines

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

- Delays to emergency vehicles should be minimized by the appropriate placement and design of traffic calming devices. In some cases, certain traffic calming devices may not be appropriate.
- Traffic calming installations should not divert traffic to other local residential streets. Traffic calming installations should support the street classifications established in community plans. Traffic may be diverted from residential streets to classified through streets. The potential impacts of traffic diversion should be evaluated for all traffic calming installations.
- Traffic calming devices on designated transit routes should be limited to those that permit the efficient movement of transit vehicles.
- Traffic calming installations must meet State and Federal accessibility requirements.
- Traffic calming should not impair the mobility of non-motorized users to of the street.
- Traffic calming installations must address drainage, sight distance, and location of underground utilities.
- All traffic calming installations are required to have a landscape element that includes trees and shrubs consistent with the Landscape Technical Manual. If traffic calming devices include decorative pavement, it shall comply with section E of the Design Standards in this Manual.

D. Traffic Calming Techniques

Traffic calming strategies generally fall into six categories:

- Horizontal deflections (chicanes, mini traffic circles, median slow points or chokers)
- Vertical deflections (road humps, speed tables, and raised crosswalks)
- Intersection pop-outs
- Traffic diverters (semi-diverters)
- Channelization

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

Traffic calming" features such as median slow points or chokers, chicanes, mini traffic circles, and intersection 'pop-outs' may be provided in accordance with this design manual. Road humps or speed tables may be installed by the City on existing streets under some circumstances but should not be included in street construction or improvement projects.

E. Horizontal Deflections

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

Chicanes - A chicane is a channelization that causes a series of tight turns in opposite directions in an otherwise straight stretch or road. The combination of narrowed street width and the serpentine path of travel slows traffic. On new streets, chicanes narrow the street by widening the sidewalk or landscaped parkway. On streets considered for retrofit, raised islands are installed to narrow the street. The advantages of chicanes include: slow traffic, may create opportunity for landscaping, and tends not to divert traffic to nearby streets. Chicanes are inappropriate for use on streets classified as collector or higher, bus routes, emergency response routes, where there is a grade that exceeds 5 percent, or where there is limited stopping sight distance such as at the crest of a hill. Chicanes may cause some loss of on-street parking, may impact driveways, may increase emergency response time, or may affect drainage and street sweeping.

Mini Circles - A mini circle is a raised circular island placed in the center of an intersection. Traffic yields on entry, then enters to the right, traveling around the circle counter clockwise. A mini circle slows traffic on each approach, reduces right-of-way conflicts, creates a landscaping opportunity, and tends not to divert traffic to nearby streets. Mini circles are

appropriate for usage on low volume local residential streets with alternative access points. Mini circles should not be used on streets classified as collector or high, bus routes or emergency response route, where the grade exceeds 5 percent on any approach, or where there is limited stopping sight distance. A mini circle may impact large vehicles' turns or may increase emergency response time.

Median Slow Points - A median slow point is a small median or island placed in the center of a roadway that causes traffic to shift its path to the right in order to travel around it. It may be on an approach to an intersection or mid-block. If median slow points are installed at an intersection, the street should have alternative access points. A median slow point slows traffic, creates a pedestrian refuge area, creates a landscaping opportunity, and tends not to divert traffic to nearby streets. Median slow points may be used on two lane streets. It should not be used on streets classified as major or higher or where there is limited stopping sight distance. Median slow points may cause some loss of on-street parking or may impact large vehicles' turns when installed at intersections.

F. Vertical Deflections

Vertical deflections are an effective traffic calming technique for speed reductions and discouraging shortcutting on local streets. Vertical shifts are only appropriate on two-lane streets. Traffic calming designs that involve vertical shifts are inappropriate for collector streets, major streets and arterials. Vertical deflections include road humps and speed tables/raised crosswalks.

Road Humps - Road humps are rounded raised areas placed across the road. Road humps are approximately 12 feet long (in the direction of travel), 3.5 inches high, and parabolic in shape. It is usually constructed with a taper on each side within a foot or two of the gutter line to allow unimpeded drainage between the hump and curb. They are most effective when used in groups that are spaced close enough to avoid encouraging speeding between humps. Road humps are different from speed bumps. Speed bumps are much more abrupt, usually less than three feet in length, and are used in parking lots and private drives. Speed bumps are not used on public streets.

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

Speed Tables/Raised Crosswalks - Speed tables, essentially, are flat-topped road humps, often constructed with brick or other textured materials on the flat section. Speed tables are 3-1/2 inches high and 22 feet long in the direction of travel, with 6-foot ramps at the ends and a 10-foot field on top. The brick or other textured materials improve the appearance of speed tables and draw attention to them. Speed tables are less jarring than the standard 12 road humps. Speed tables are most effective when installed in groups of two or more, about 300 feet apart. Where extended from curb-to-curb and appropriately marked, speed tables serve as raised crosswalks. Raised crosswalks bring the street up to sidewalk level. Drainage requirements must be evaluated and addressed where raised crosswalks are installed.

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

G. Intersection Pop-outs

Intersection pop-outs are curb extensions that narrow the street at intersections by widening the sidewalks at the point of crossing. They are used to make pedestrian crossings shorter and reduce the visual width of long, straight streets. Where intersection pop-outs are constructed by widening the landscaped planting strip, they can have a positive effect on the visual appearance of the neighborhood. Pop-outs can be used at intersections to create a street gateway effect, visually announcing an entrance to a neighborhood. Intersection pop-outs must accommodate bicyclists, transit vehicles and emergency response vehicles. Pop-outs improve pedestrian visibility, create shorter pedestrian crossing width, and may reduce vehicle speeds. Pop-outs may impact large vehicle turns, may impact accessibility by transit vehicles or emergency response vehicles, and may require parking removal. Intersection pop-outs may be installed on local streets, collector streets, and urban major streets. Pop-outs are inappropriate on major streets and primary arterials. The entire intersection should be designed and constructed at one time.

H. Traffic Diverters

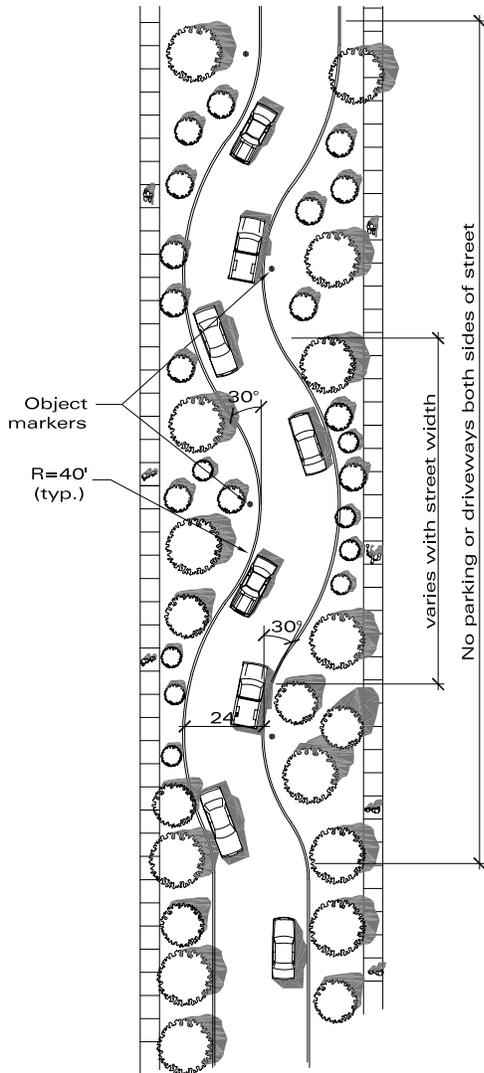
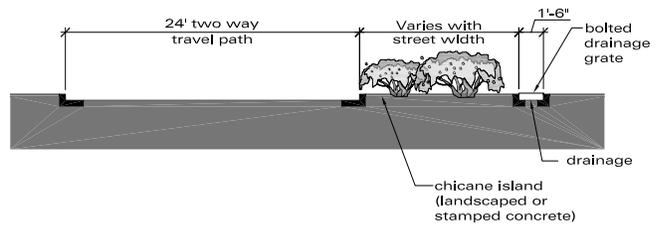
Traffic diversion devices eliminate through trips on streets on which they are installed and divert those trips to other streets. There are several available traffic diversion designs that may be used to calm traffic. Traffic diverters are not primarily installed for the purpose of speed control. Diverters are best suited on long, straight, low-volume, local residential streets. Wherever traffic diversion techniques are employed, provision should be made for continuation of pedestrian and bicycle routing around or through the diversion. Care must be taken in design of diversion installations to allow for emergency vehicles.

Semi diverters. - A semi diverter is a barrier to traffic in one direction of a street that permits traffic in the opposite direction to pass through. It is an alternative to one-way street operation for a block and it allows residents on the block limited two-way travel opportunity. A semi diverter may be used on low-volume, local residential streets and it is best located at the end of a block to prevent entrance and allow exit. Semi diverters reduce cut-through motorized vehicle traffic, reduce pedestrian crossing widths, and create opportunity for landscaping. Semi diverters may divert traffic to other low-volume streets, may increase trip lengths, may cause loss of parking, and may increase emergency response time. Semi diverters are inappropriate for use on emergency response routes, bus routes, or streets classified as collector or higher. No specific geometric features are included in this manual since semi diverters are site specific and should be designed on a case-by-case basis.

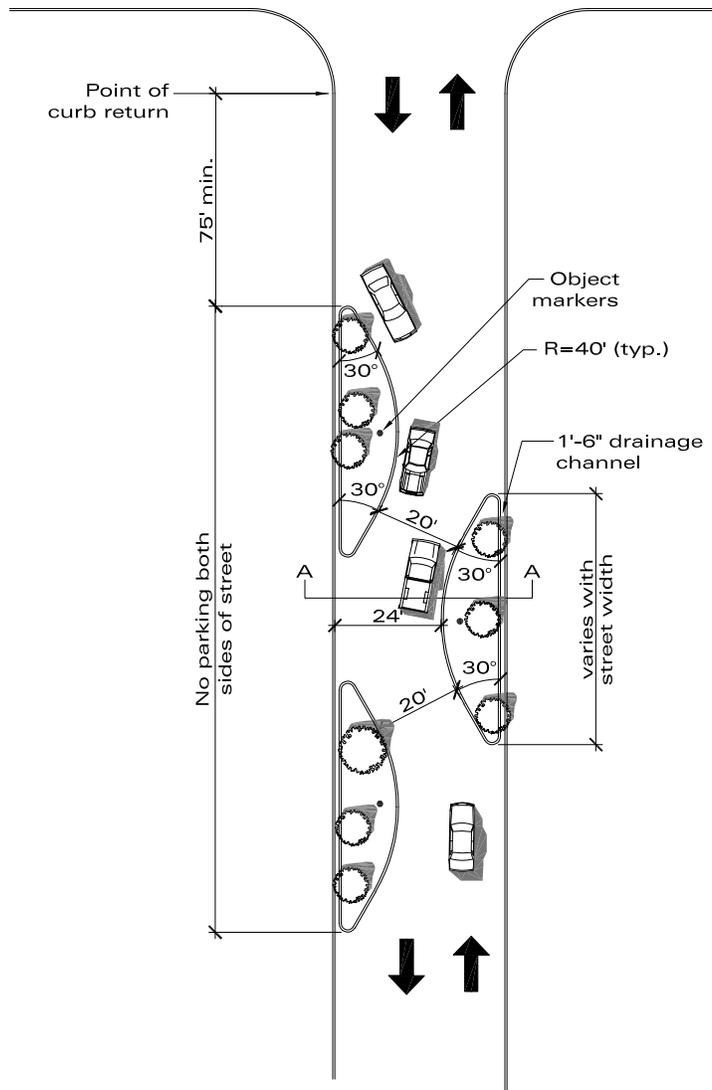
I. Channelization

Channelization may be used on arterial streets to prevent cut-through traffic onto local streets or to control turning traffic in or out of a neighborhood. Channelization can be achieved through regulatory signs and pavement markings, landscaping, or raised channelization islands aimed at motorized, non-motorized, or pedestrian traffic. Channelization may be designed to prevent cut-through traffic, reduce speed, create opportunity for landscaping, control turning traffic in and out of a neighborhood, or physically guide pedestrians. The disadvantages of channelization may include creating out-of-direction travel, increasing trip lengths, increasing emergency response time, or impacting accessibility. No specific geometric features are included in this manual since channelization devices are site specific and should be designed on a case-by-case basis.

Tc Traffic Calming -Chicane



New Installations

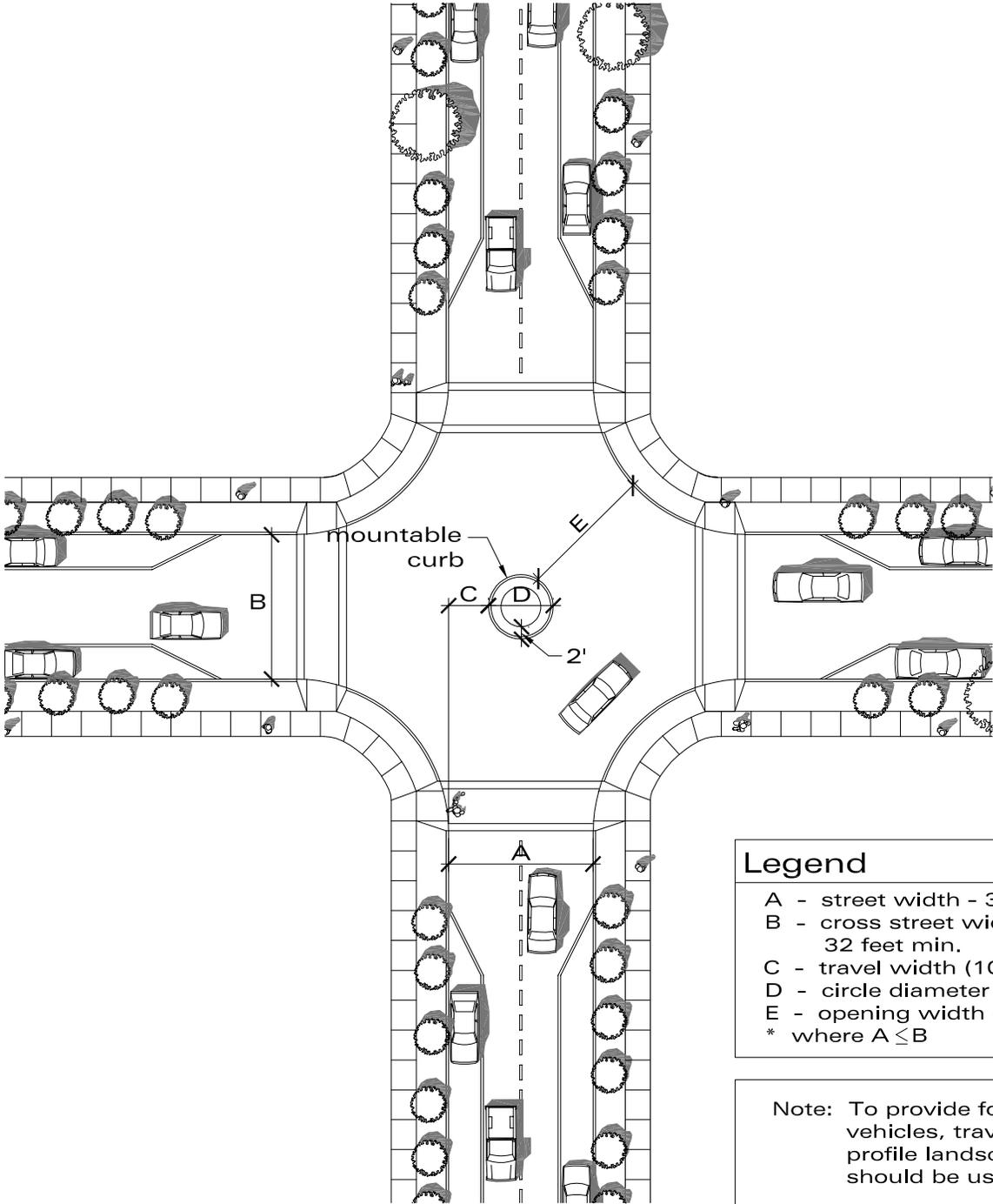


Retrofit Installations



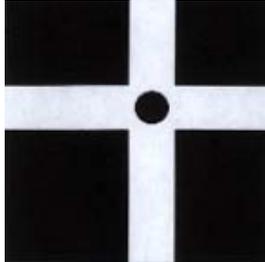
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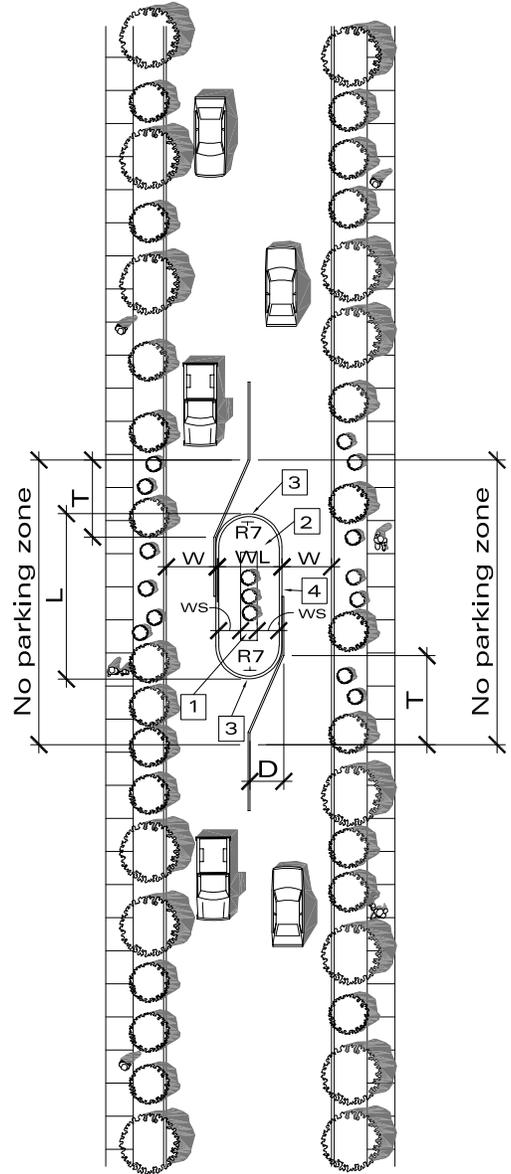
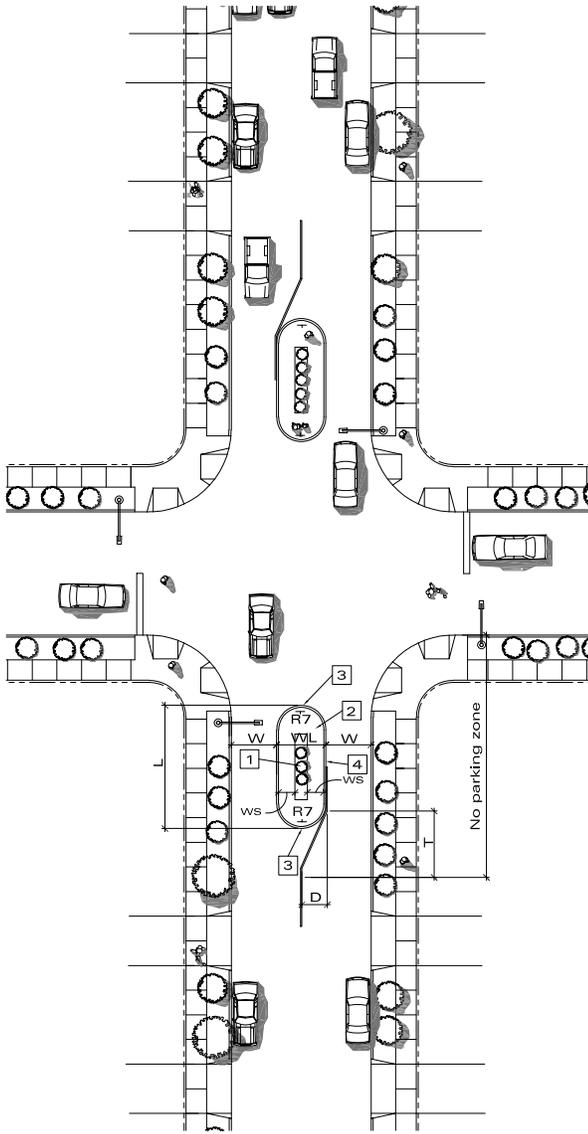
- * Spacing of chicane segments depend on site considerations, e.g. driveway locations.
- * Island plantings should not obscure driver's view of chicane traffic (24" maximum height).
- * Stamped concrete may be used in the chicane island.
- * Bicycles are to use the same path as motor vehicles, not the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



Legend	
A	- street width - 32 feet min.
B	- cross street width (varies) 32 feet min.
C	- travel width (10'*)
D	- circle diameter (12' minimum)
E	- opening width (18' minimum)
* where $A \leq B$	

Note: To provide for emergency vehicles, traversable low profile landscaping should be used.

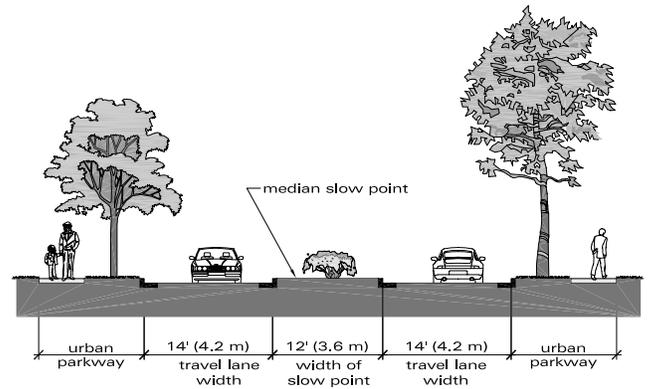
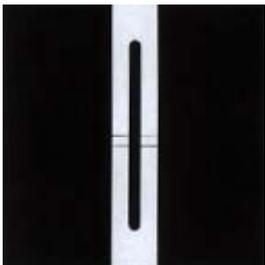


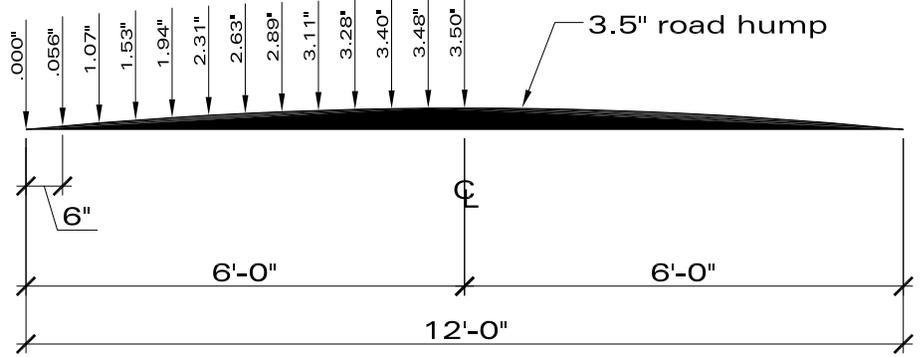
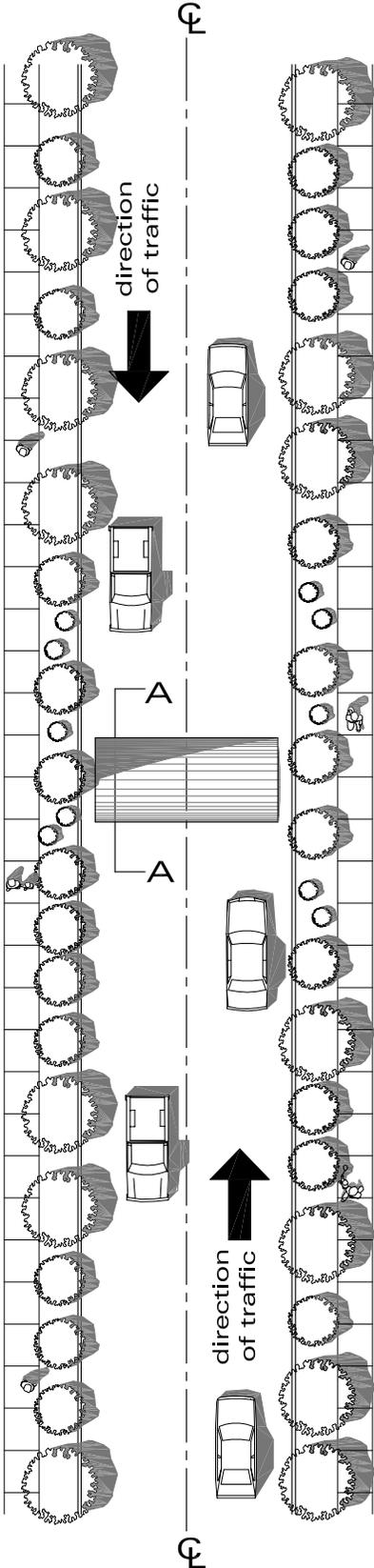


Legend

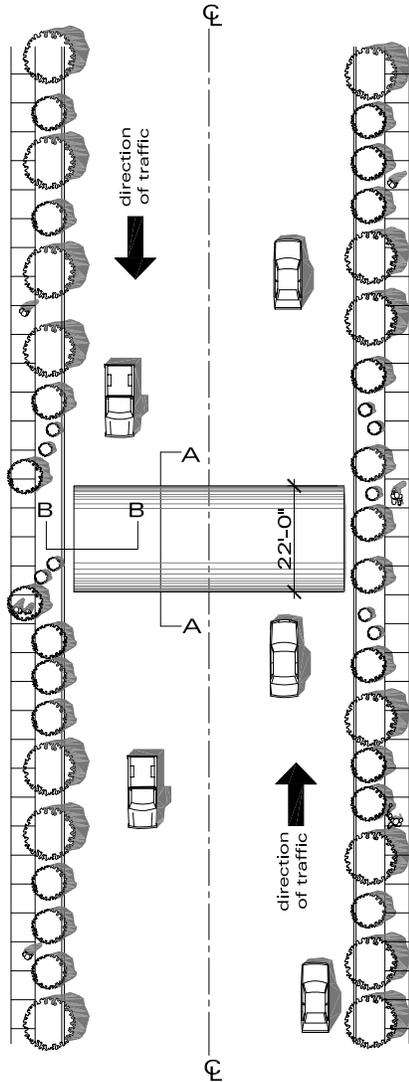
- 1 area that may be landscaped (landscape, irrigation, and long term maintenance must be considered by a maintenance assessment district or other agreements with the City of San Diego.)
- 2 stamped concrete
- 3 yellow painted island nose
- 4 6" curb

W - travel lane width - 14'
 WL- Width of slow point (varies depending on street width- 12' minimum)
 WS - For landscaped slow point, 2' typical
 L - Length of slow point, varies depending on parking and driveways
 D - horizontal deflection, 6' minimum
 T - Transition, calculated as follows:
 $T = (D \times S^2) / 120$ - minimum
 Where: D= deflection in feet
 S= 85th percentile speed in mph

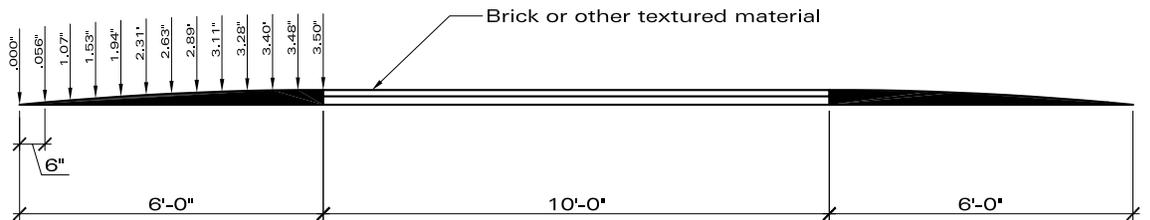




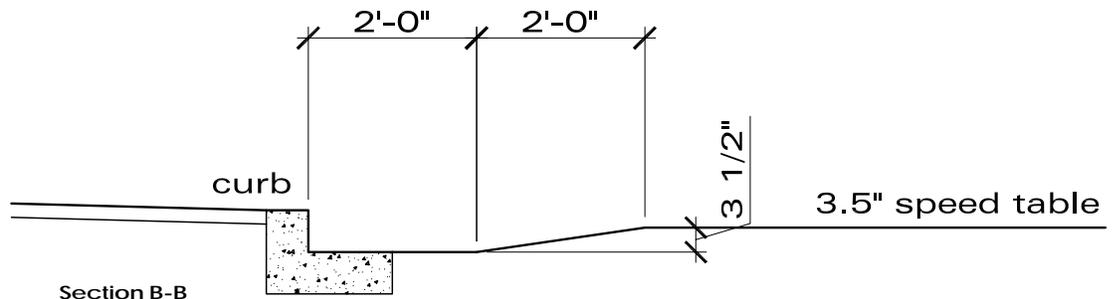
Tc Traffic Calming -Speed Table



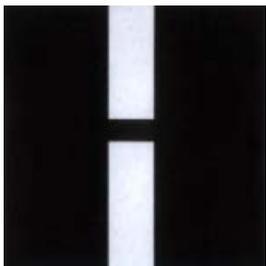
NOTE:
• Drainage requirements must be evaluated and addressed.



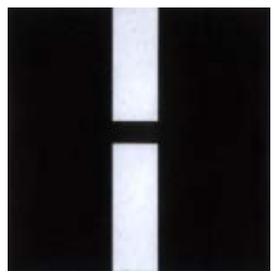
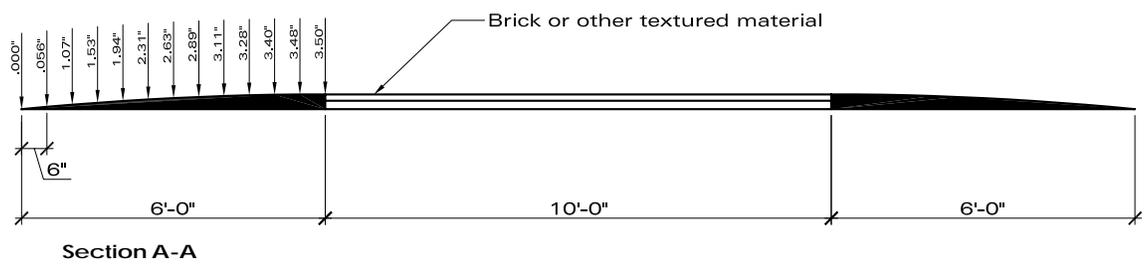
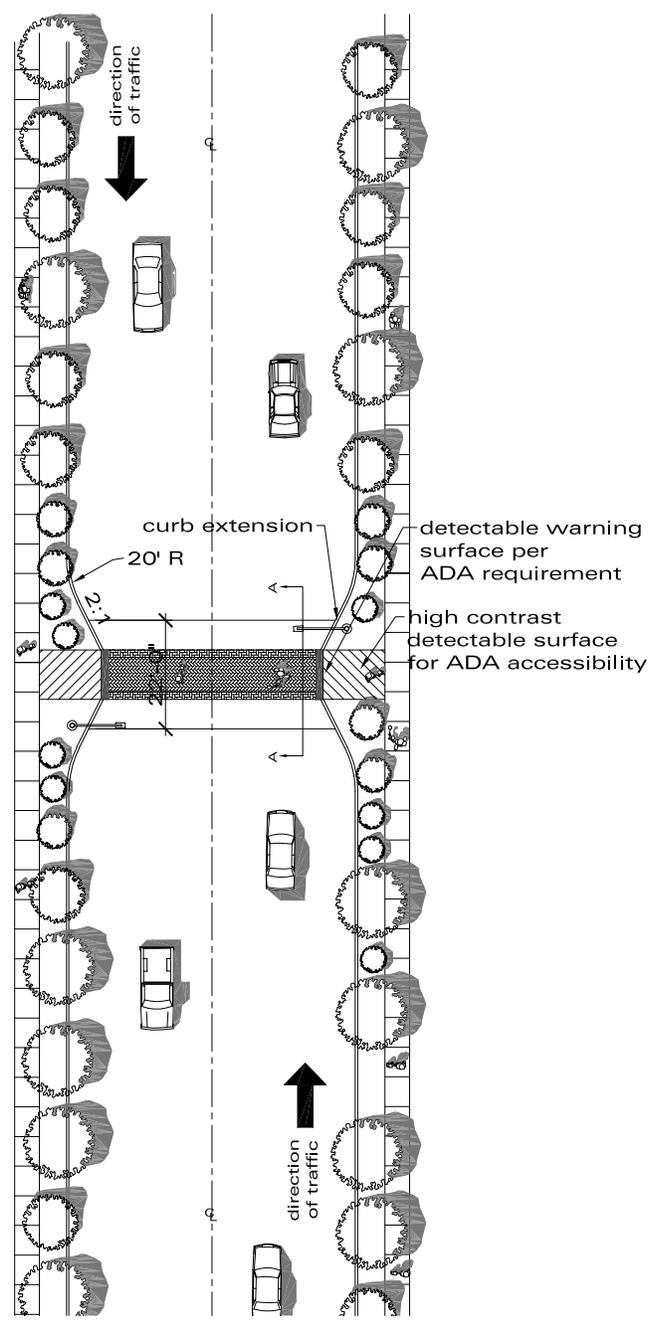
Section A-A



Section B-B

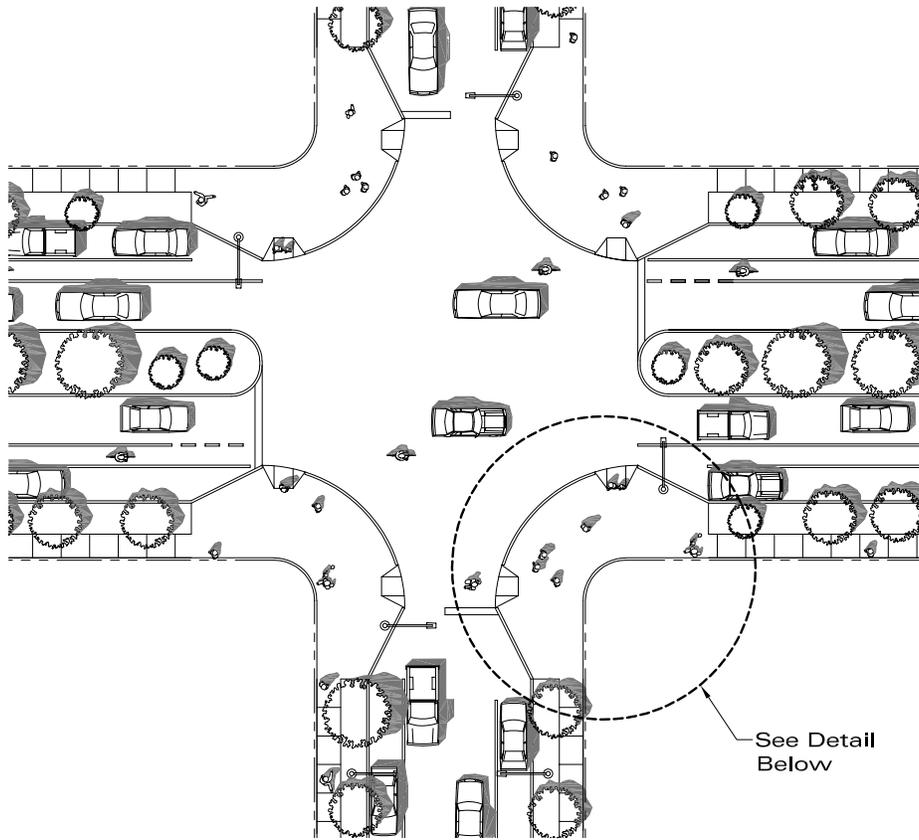


NOTES:
 * Drainage requirements must be evaluated and addressed.
 * Crosswalks should meet traffic engineering requirements approved by the City Council. Refer to Policy 200-07.



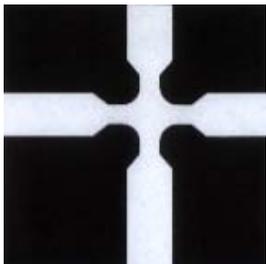
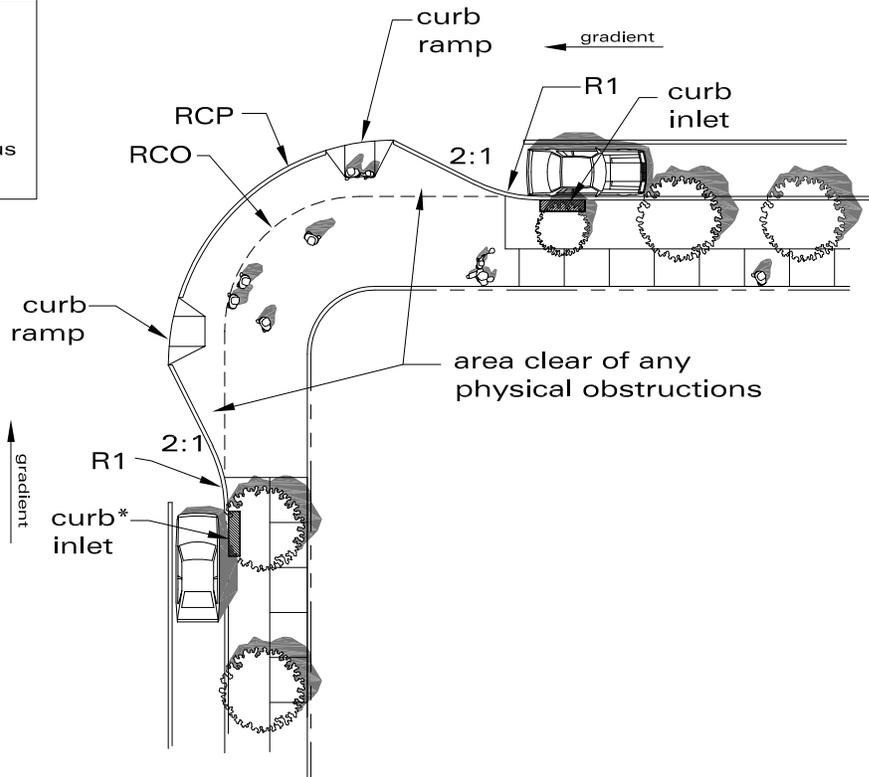


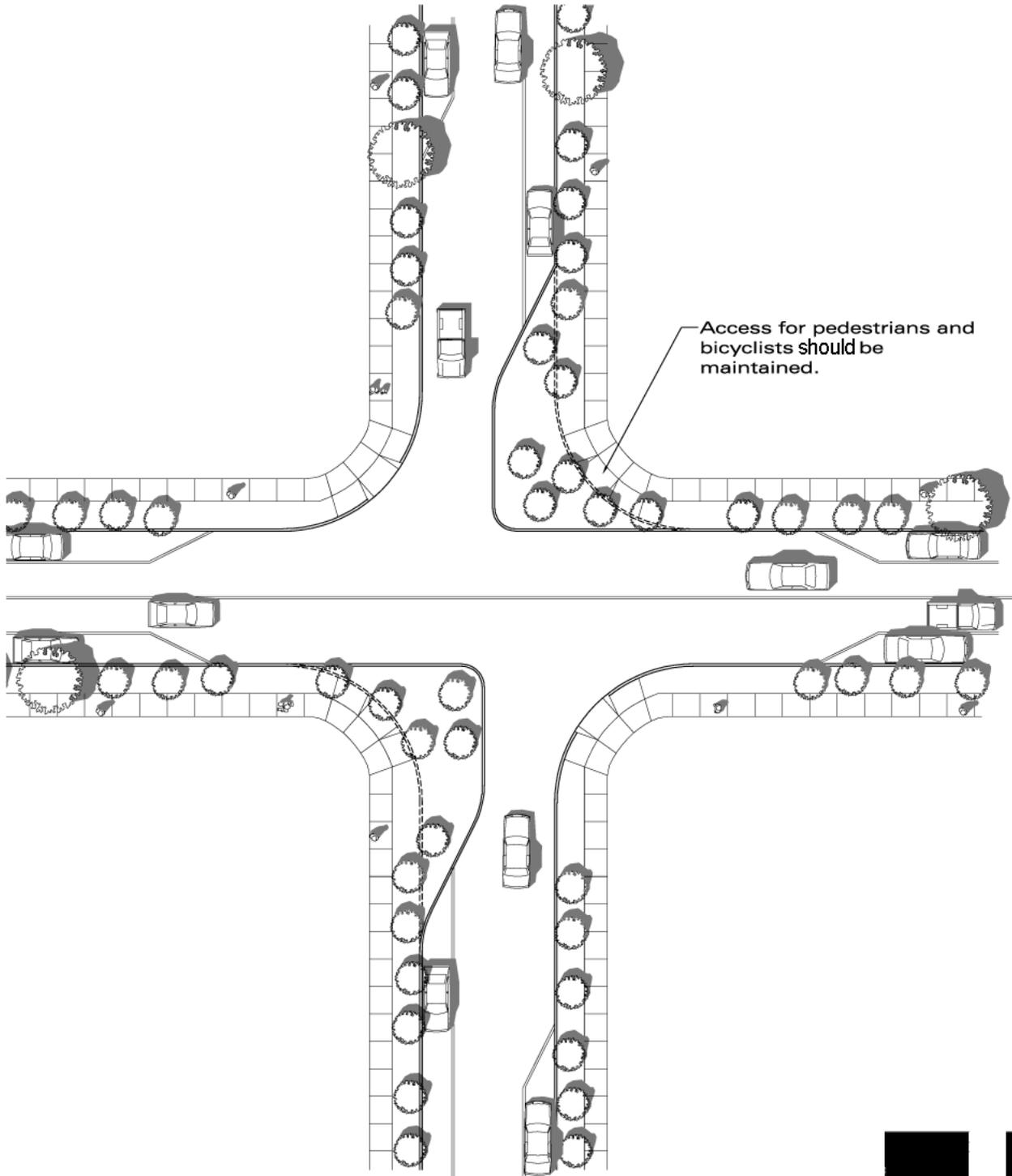
Traffic Calming -Intersection Pop-out



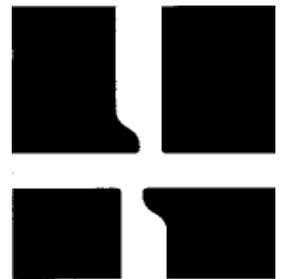
NOTE:
* Drainage requirements must be evaluated and addressed.

Legend
RCP - 30' (9.2 m) minimum
RCO - Retrofit installations- original curb radius
R1 - Curb radius 20' (6 m)



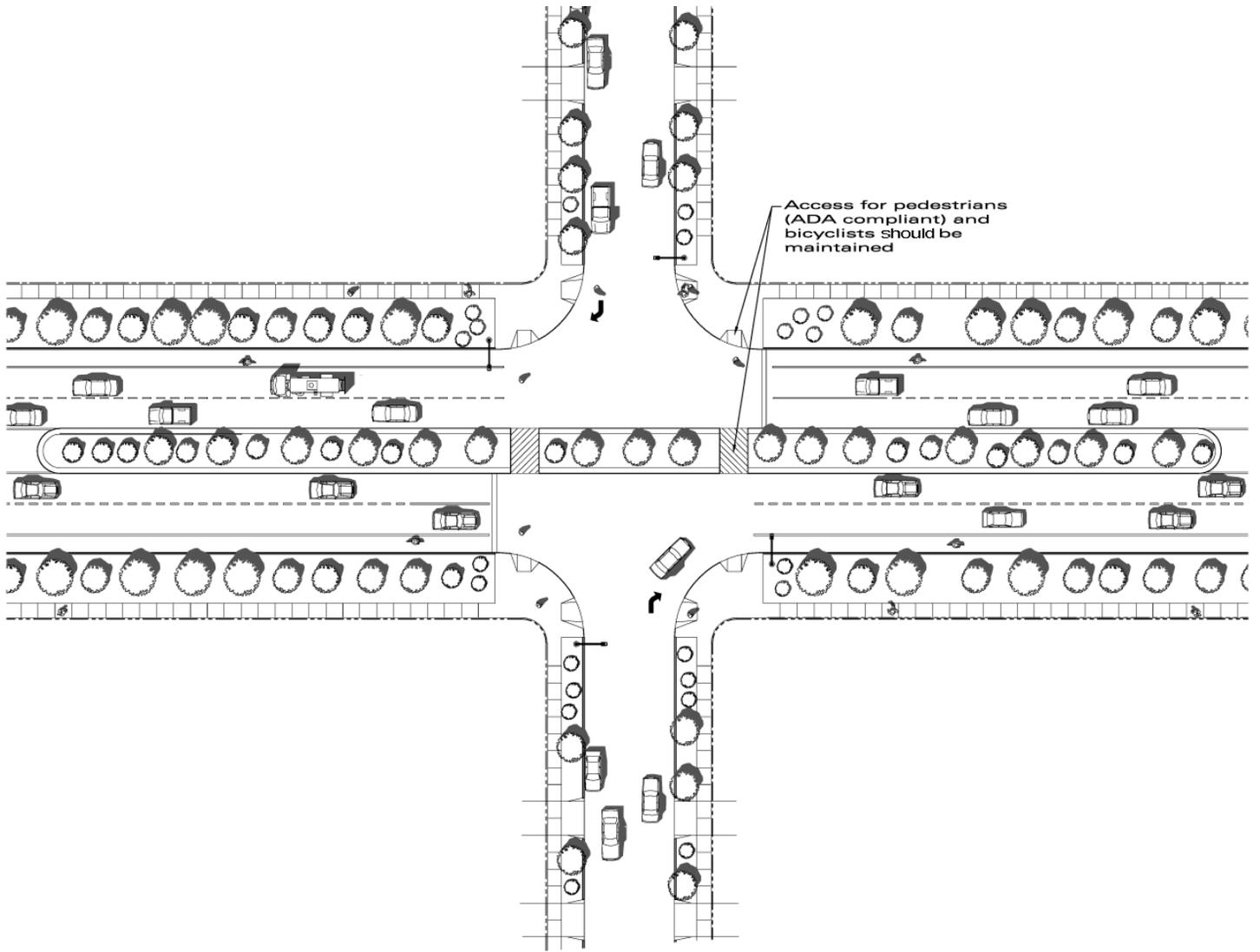


For illustrative puposes only

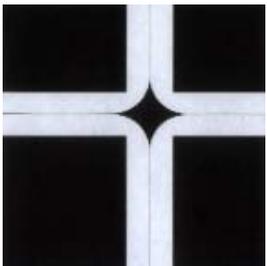




Traffic Calming -Channelization



For illustrative purposes only



Street Lighting



–Street Lights shall be provided in accordance with the approved Council Policy 200-18, Street Lighting.



Street Lighting -Street Lights

Street Lights

1. Street lighting shall be installed at all street intersections and shall conform to Table L-1. All street lighting shall be high-pressure sodium vapor (HPS) except for areas which are designated for low pressure sodium vapor (LPS). Contact the Development Services Department for current information.
2. Midblock street lighting shall be installed as follows:
 - a. On residential and collector streets, staggered at intervals not to exceed 150 feet (45m) within 1,320 feet (400 m) of transit stops and in residential and commercial high-crime census tracts, or in other areas staggered at intervals not to exceed 300 feet (90 m).
 - b. On Four-Lane Urban Major Streets or higher with center medians, on both sides of the street at intervals not to exceed 150 feet (45 m) within 1,3020 feet (400 m) of transit stops and in residential and commercial high-crime census tracts, or in other areas on both sides of the street at intervals not to exceed 300 feet (90m).
 - c. Near the end of cul-de sacs that exceed 150 feet (45m) within 1,320 feet (400 m) of transit stops and in residential and commercial high-crime census tracts, or in other areas near the end of cul-de-sacs that exceed 200 feet (60 m) in length.
 - d. One light on each side of the street at at-grade railroad crossings to illuminate the side of the train facing the motorist.
 - e. In areas of high pedestrian activity, such as schools, parks, transit centers, access to transit, and commercial and recreational facilities that draw large numbers of pedestrians.
 - f. At other locations, such as at abrupt changes in horizontal or vertical alignment, or areas of heavy pedestrian use, as needed.
3. Agriculture-zoned or natural open space land may be exempted from midblock street lighting provisions, at the directions of the City Engineer.
4. Midblock street lighting shall be full cutoff, Type III fixtures and shall conform to the following:
 - a. 100 Watt HPS or 55 Watt LPS, as applicable, in alleys.
 - b. 150 Watt HPS, or 90 Watt LPS, as applicable, for local residential streets (any width) and streets classified as collector or higher with curb-to-curb width up to and including 40 feet (12.2 m).
 - c. 250 Watt HPS or 135 Watt LPS, as applicable, for streets classified as collector or higher with curb-to-curb width greater than 40 feet (12.2m) up to and including 52 feet (16.0m).
 - d. 250 Watt HPS or 180 Watt LPS, as applicable, for streets classified as collector or higher with curb-to-curb width greater than 52 feet (16.0 m).
5. Supplemental street lighting, for: a) ornamental, b) continuous street lighting, or c) pedestrian-scale lighting purposes, shall be installed in street lighting assessment districts. Street lighting assessment districts will be formed only upon the request of the properties which will be included in the district.
 - a. Ornamental street lighting shall be designed to meet the desires of the street lighting assessment district. Custom poles, luminaries, and spacing may be used.
 - b. Continuous street lighting shall conform to RP-8, "American National Standard Practice for Roadway Lighting," or the Illuminating Engineering Society of North America.

**Table L-1
Street Lighting at Non-Signalized Intersections***

Street A Street B	B1 Local residential streets (any width) and collector or higher streets up to and including 40 ft. wide, curb-to-curb	B2 Collector or higher streets greater than 40 ft. and up to and including 52 ft. wide, curb-to-curb	B3 Collector or higher streets greater than 52 ft. wide, curb-to-curb
A1 Local residential streets (any width) and collector or higher streets up to and including 40 ft. wide, curb-to-curb	(A1-b1) Install one 150 W. HPS or 90 W. LPS light, as applicable, on the far right corner of the higher volume street.	(Same as A2-B1)	(Same as A3-B1)
A2 Collector or higher streets greater than 40 ft. and up to and including 52 ft. wide, curb-to-curb	(A2-B1) Install one 250 W. HPS or 135 W. LPS light, as applicable, on each of the far right corners of the wider street.	(A2-B2) Install one 250 W. HPS or 135 W. LPS light, as applicable, on each of the far right corners of the higher volume street.	(Same as A3-B2)
A3 Collector or higher streets greater than 52 ft. wide, curb-to-curb	(A3-B1) Install one 250 W. HPS or 180 W. LPS light, as applicable, on each of the far right corners of the wider street, and 150 W. HPS or 90 W. LPS light, as applicable, on each of the far right corners of the narrower street.	(A3-B2) Install one 250 W. HPS or 180 W. LPS light, as applicable, on each of the far right corners of the wider street, and one 250 W. HPS or 135 W. LPS light, as applicable, on each of the far right corners of the narrower street.	(A3-B3) Install one 250 W. HPS or 180 W. LPS light, as applicable, on each of the far right corners of the intersection.

* Energy and maintenance costs are provided by the City.

NOTES:

1. Street lighting fixtures shall be HPS or LPS full cutoff, Type III.
2. Street lighting standards and mounting heights shall conform to City of San Diego Standard Drawing SDE-101.
3. Street Lighting at signalized intersections shall conform to the Caltrans Traffic Manual.



Street Lighting *-Intersection Lighting*

c. Pedestrian Scale Lighting

Where pedestrian-scale lighting is installed, sidewalk or walkway lighting shall provide adequate lighting for pedestrians of all abilities and shall conform to the following:

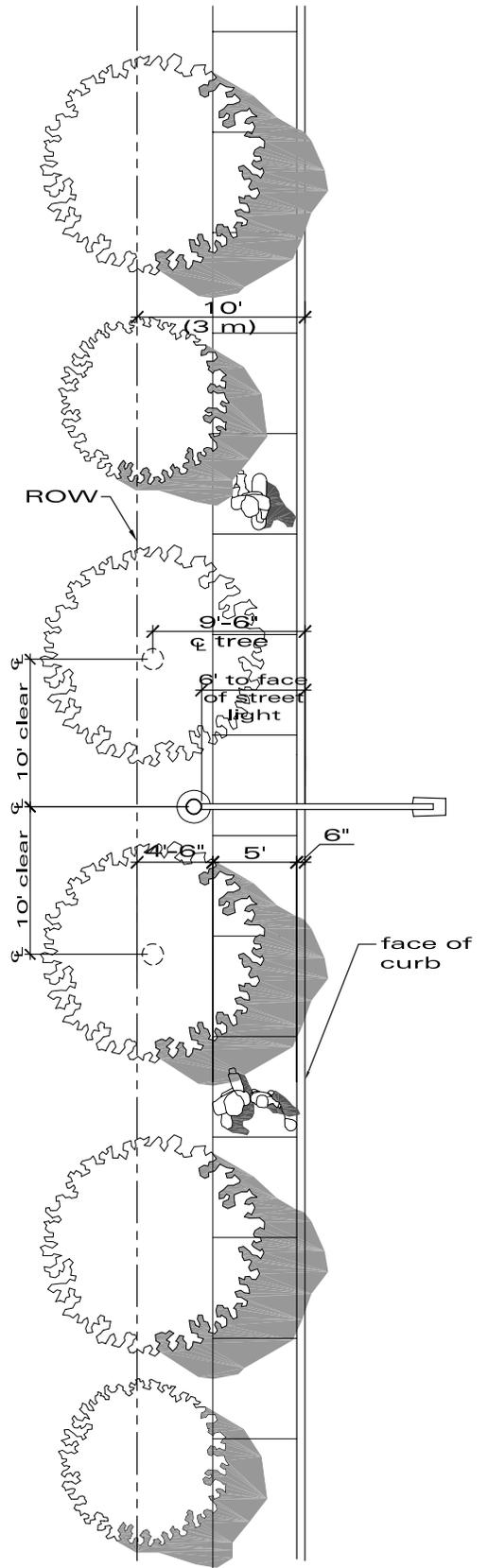
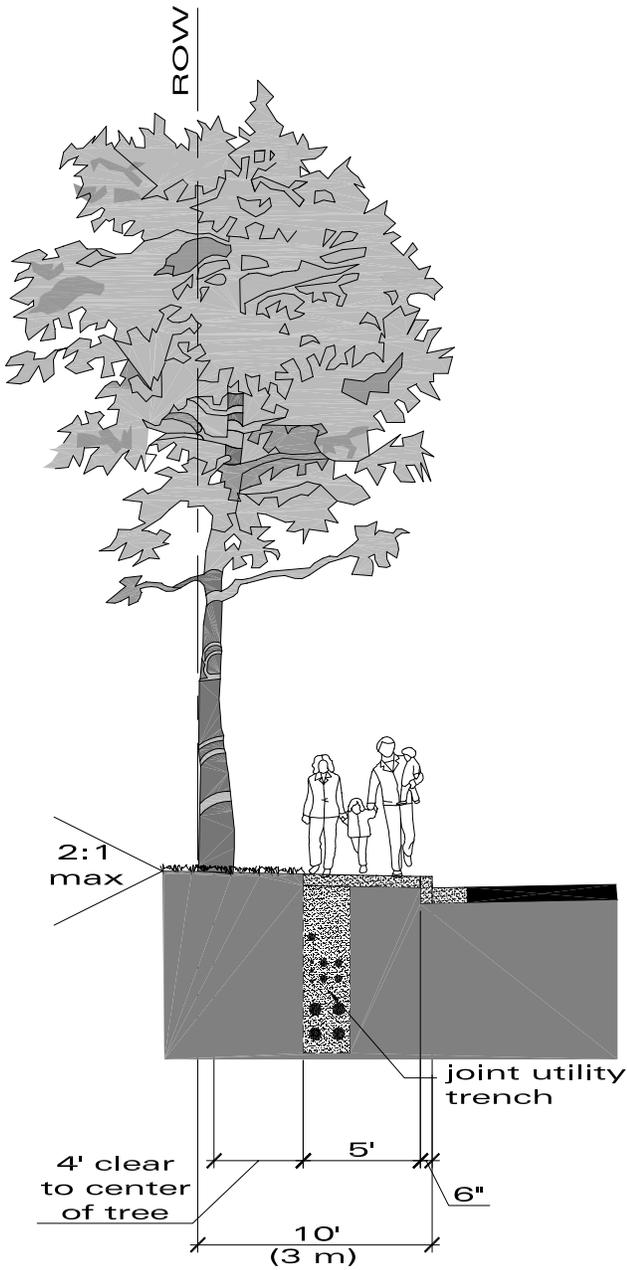
1. In commercial areas, the average maintained horizontal illuminance (FC) on the sidewalk or walkway shall not be less than 0.9 foot-candles and shall not exceed illuminance uniformity ratio (UR) of 4:1 ($FC_{Avg} : FC_{Min}$).
2. In mixed-use areas, the average maintained horizontal illuminance on the sidewalk or walkway shall not be less than 0.6 foot-candles and shall not exceed UR of 4:1 ($FC_{Avg} : FC_{Min}$).
3. In residential areas, the average maintained horizontal illuminance on the sidewalk or walkway shall not be less than 0.4 foot-candles and shall not exceed UR of 6:1 ($FC_{Avg} : FC_{Min}$).
4. In commercial areas, contributions from other nearby storefront lighting, private lighting, sign lighting and/or reflections from structures on private property should not be considered as a reason for reducing the sidewalk or walkway illuminance levels indicated above.
5. Sidewalk or walkway lights shall have cutoff fixtures that keep light pollution, light trespass, and glare to drivers to a minimum, as approved by the City Engineer. Manufacturer models for sidewalk and walkway lighting shall be approved by the City Engineer.
6. Agriculture-zoned land or open space may be exempt, at the discretion of the City Engineer, from pedestrian scale lighting provisions.
7. Further design guidelines can be found in the RP-8 publication of the Illuminating Engineering Society of North America, "American National Standard Practice for Roadway Lighting."

Urban Parkway Configurations

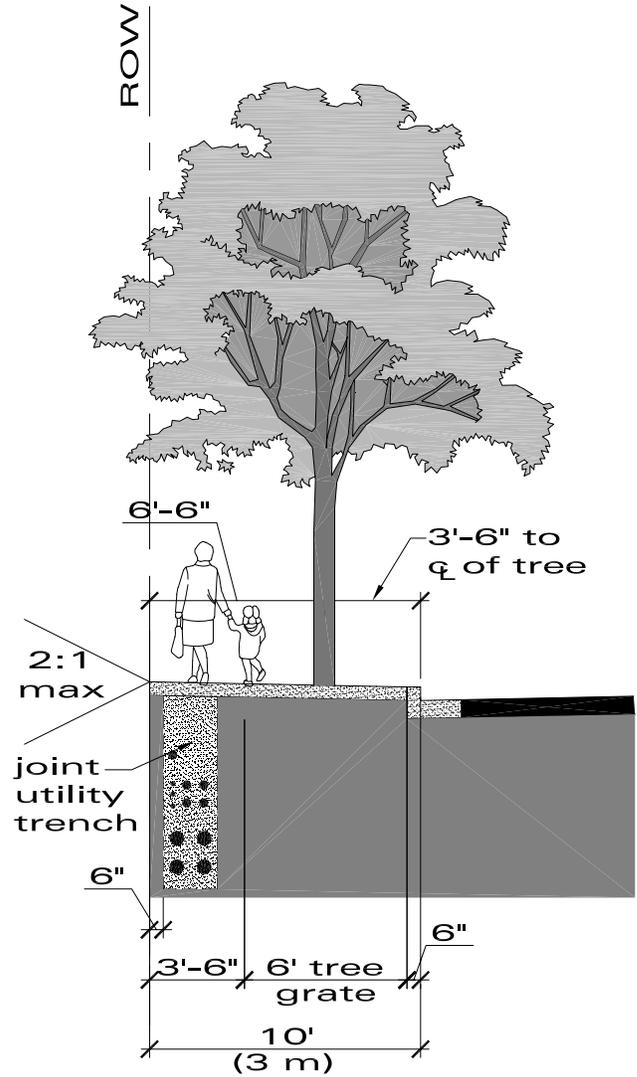
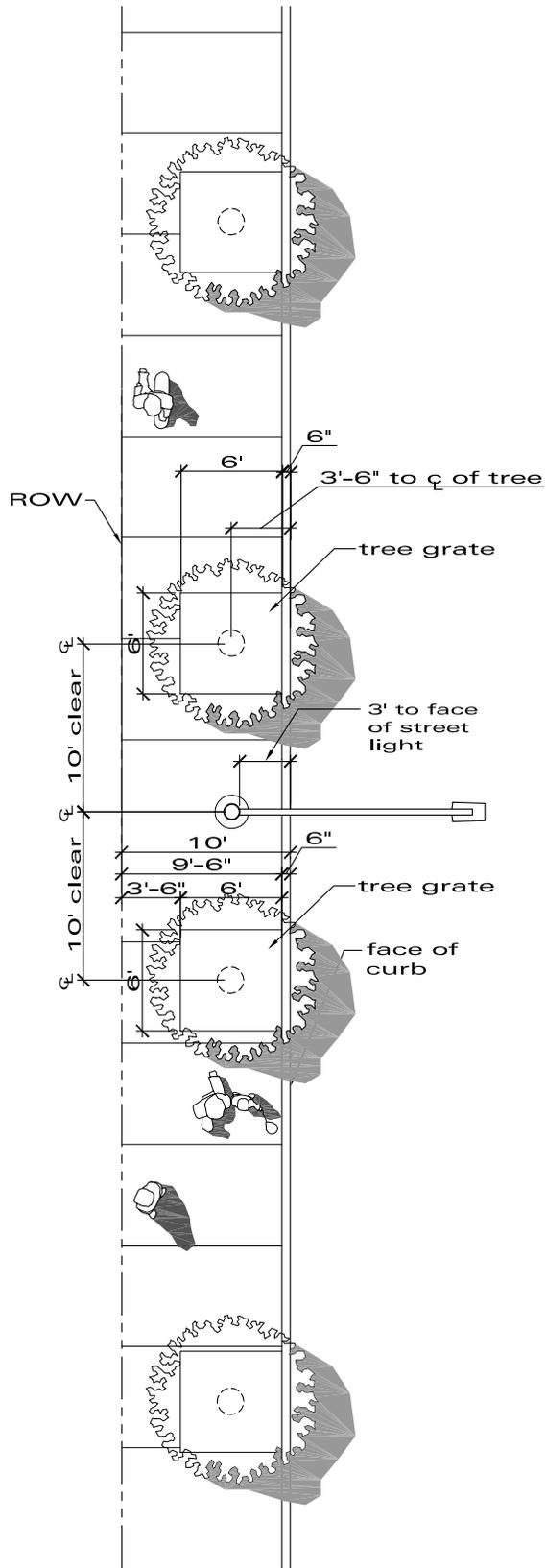




Urban Parkway Configurations



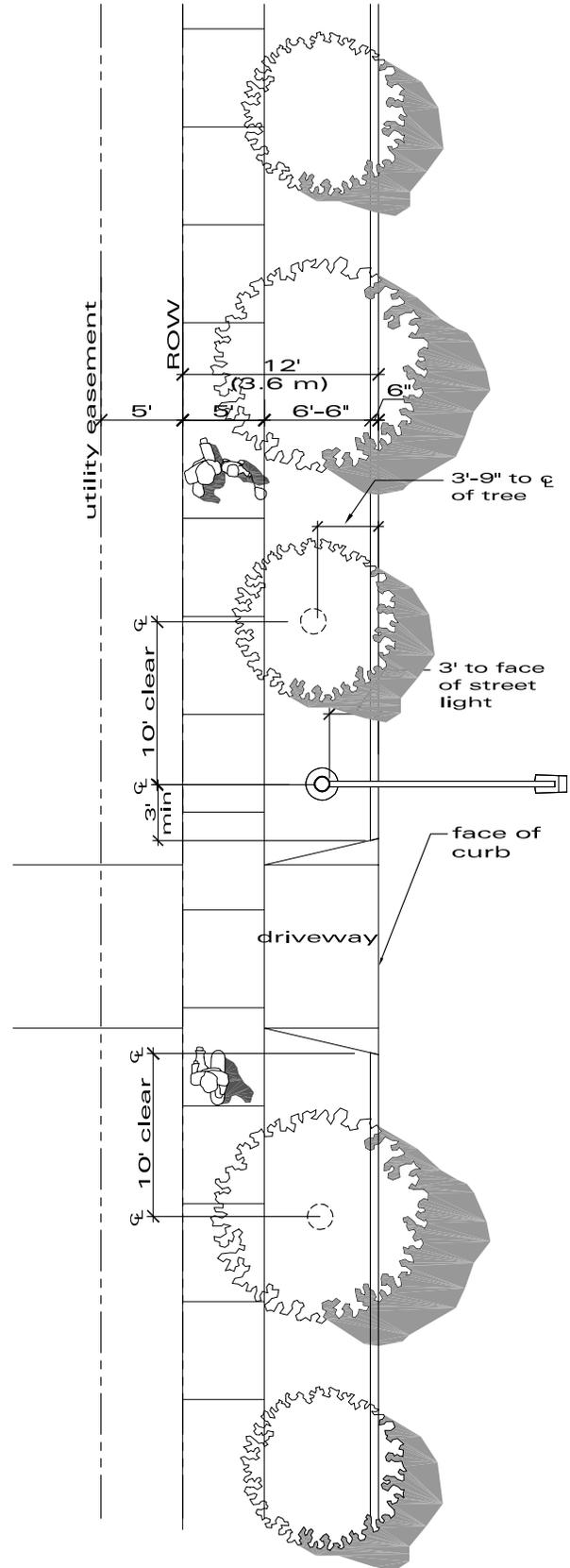
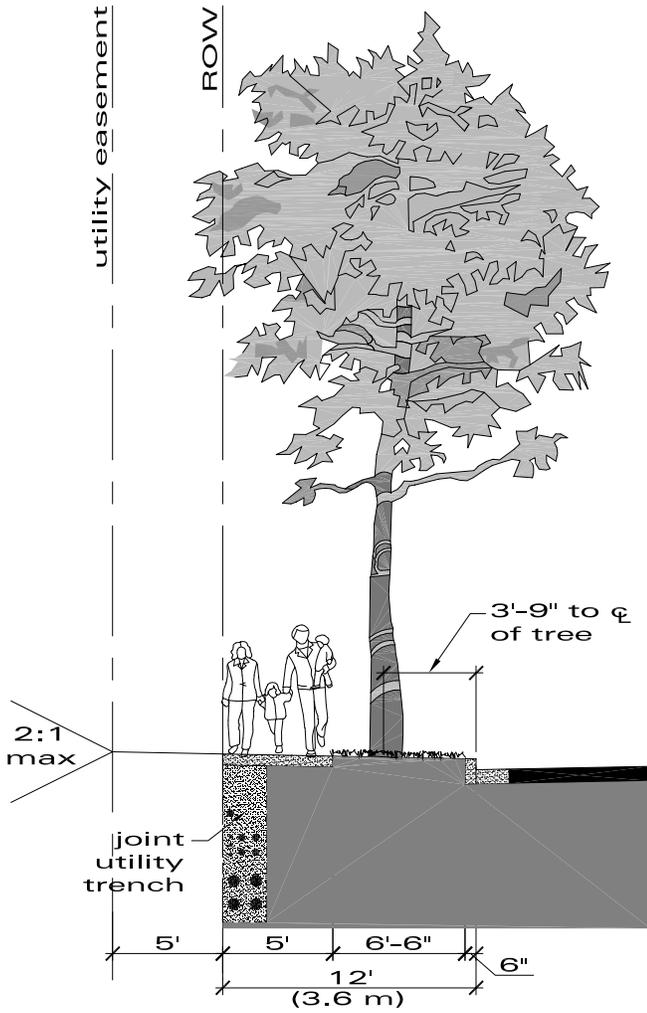
U-1



U-2



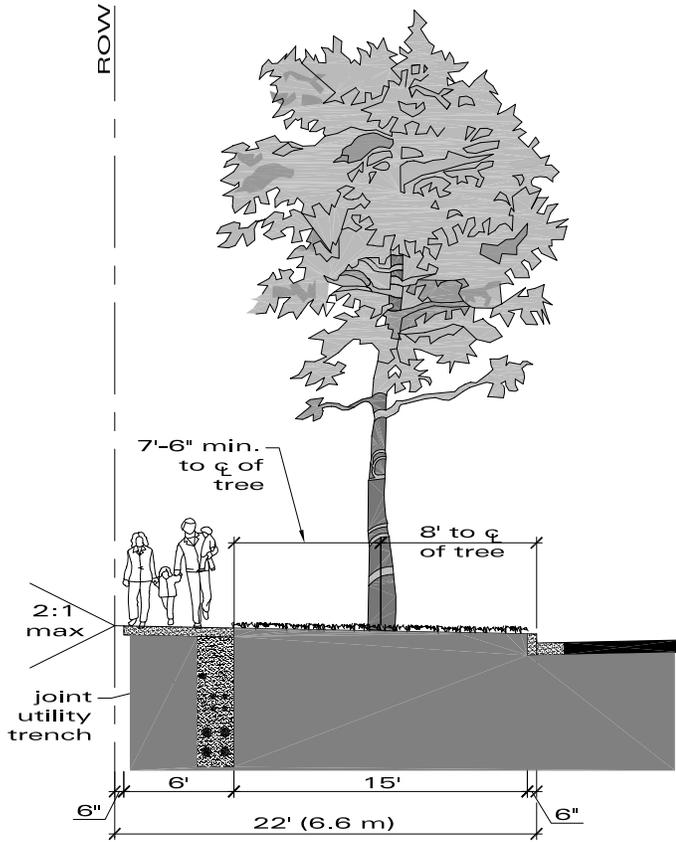
Urban Parkway Configurations



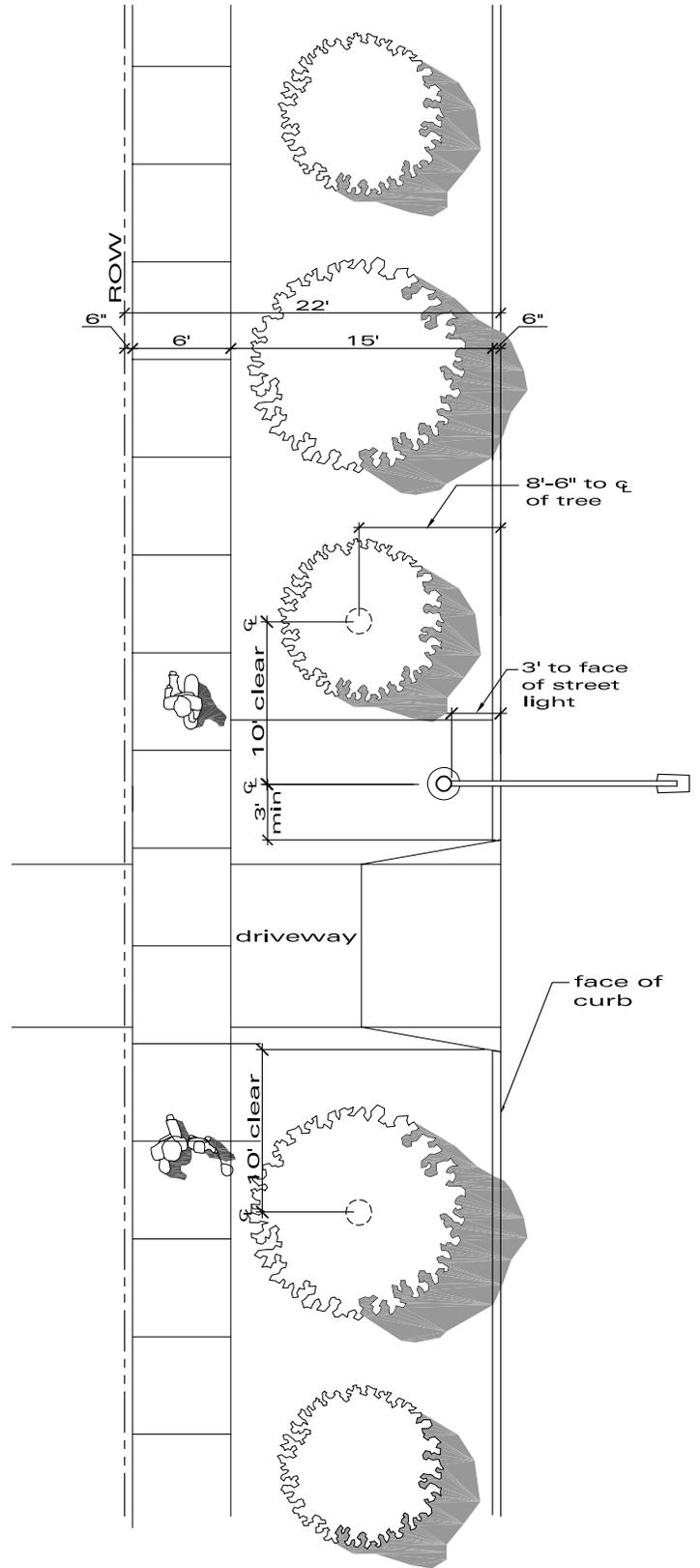
U-3



Urban Parkway Configurations



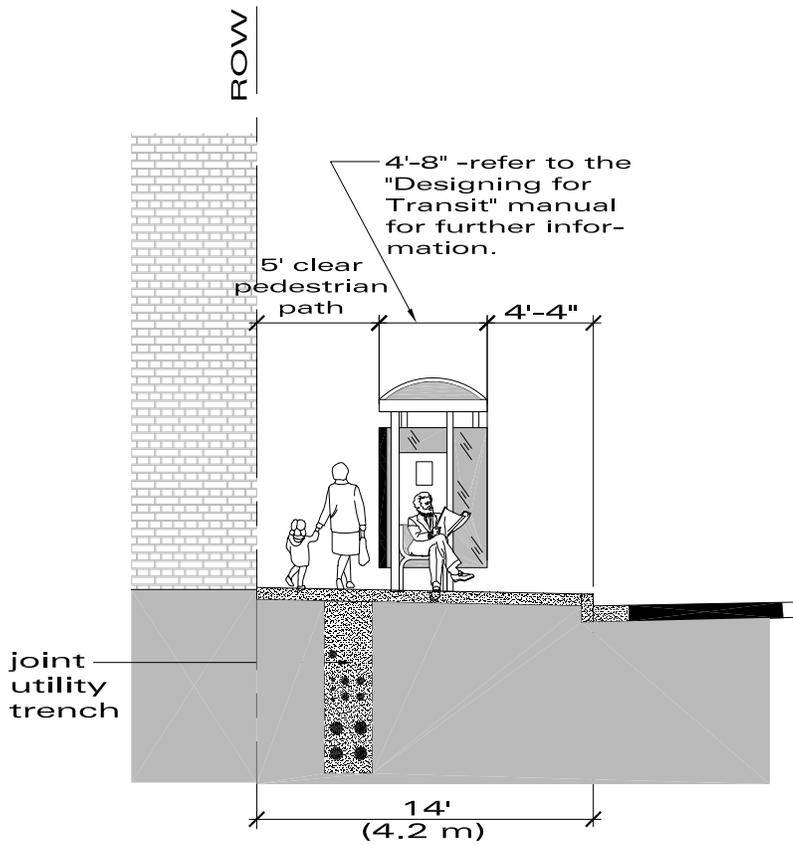
* Alternative configuration of sidewalk and landscape strip may be installed subject to approval of the city engineer.



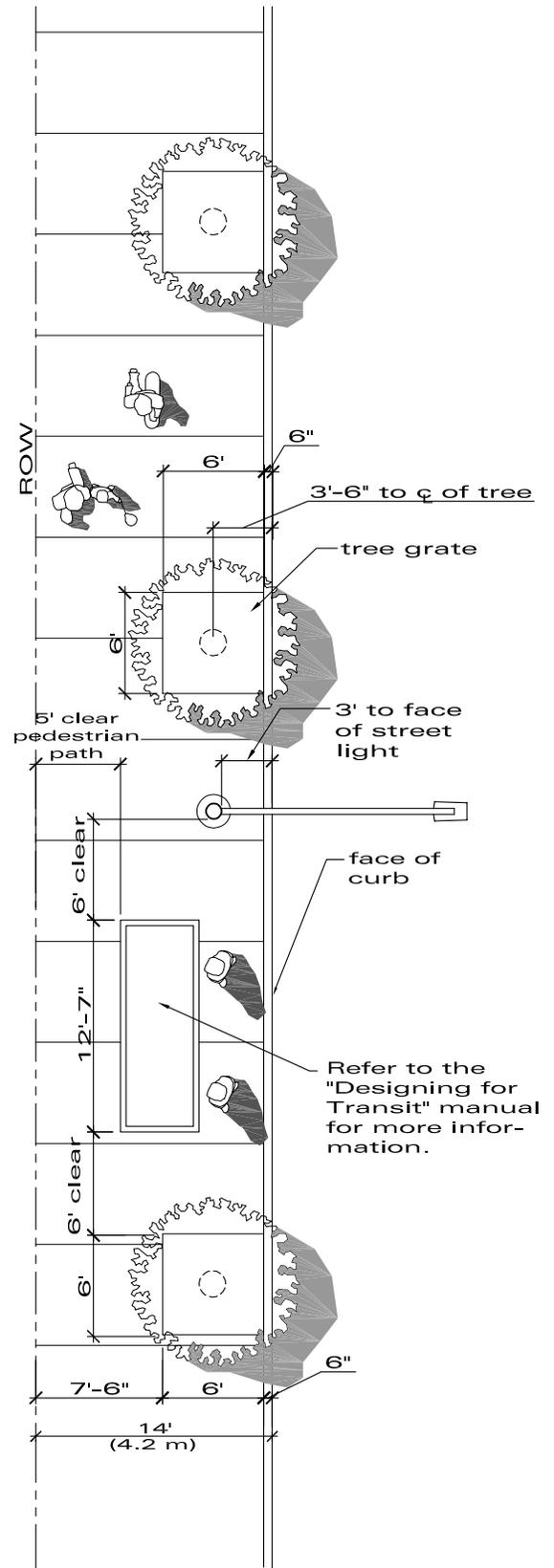
U-4
b



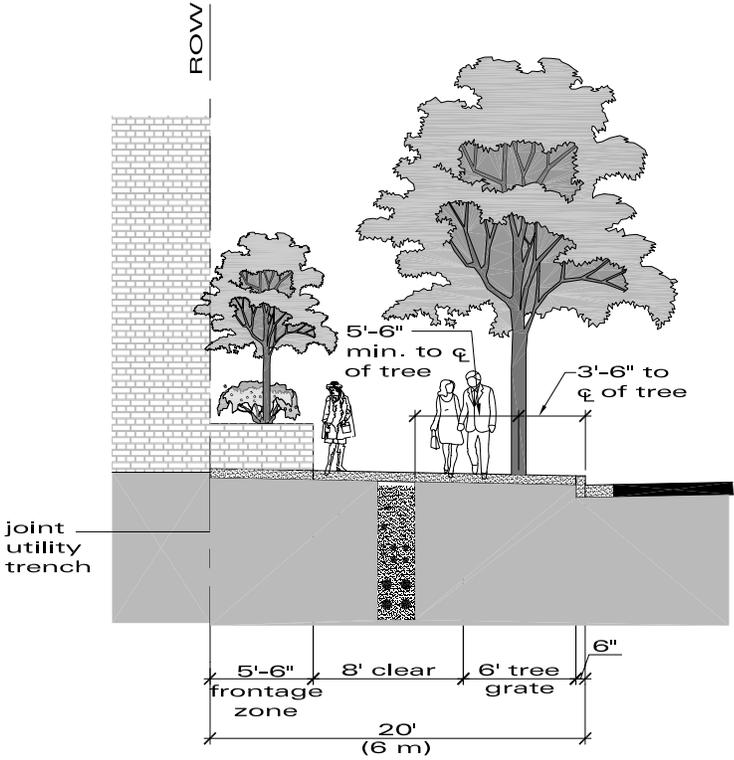
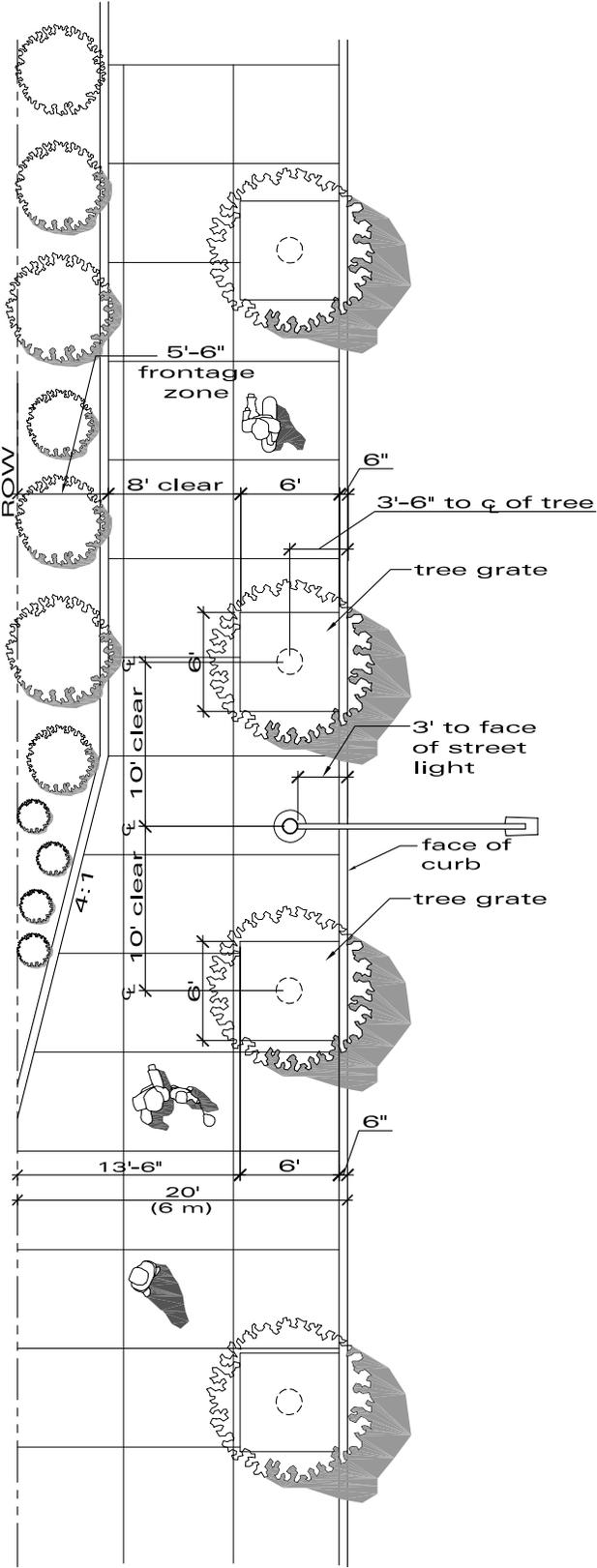
Urban Parkway Configurations



* Where storefront furniture is provided, the clear pedestrian passage way shall not be less than 5'-0".



U-5

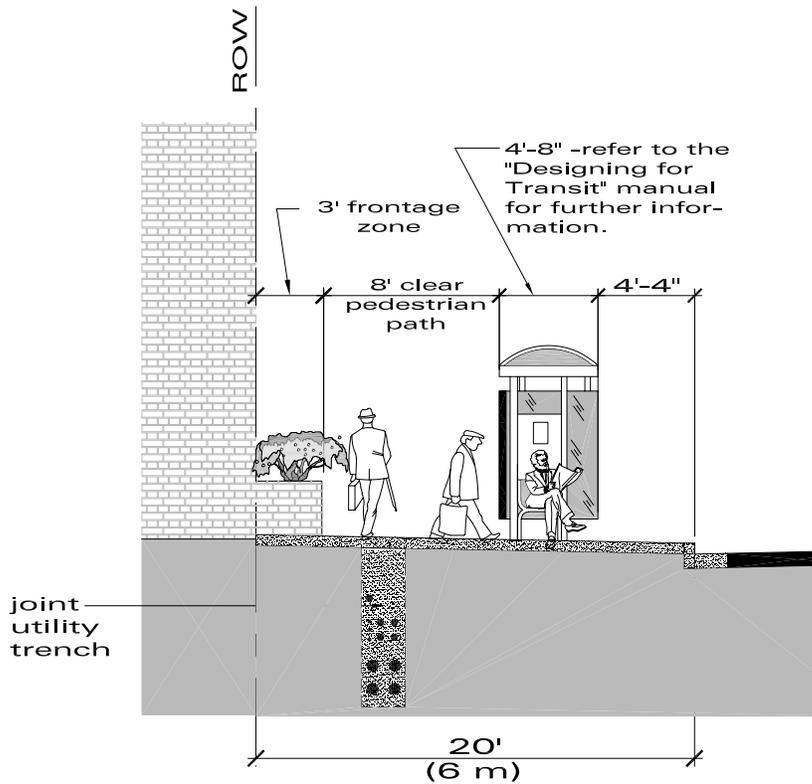


* Where storefront furniture is provided, the clear pedestrian passage way shall not be less than 8'-0".

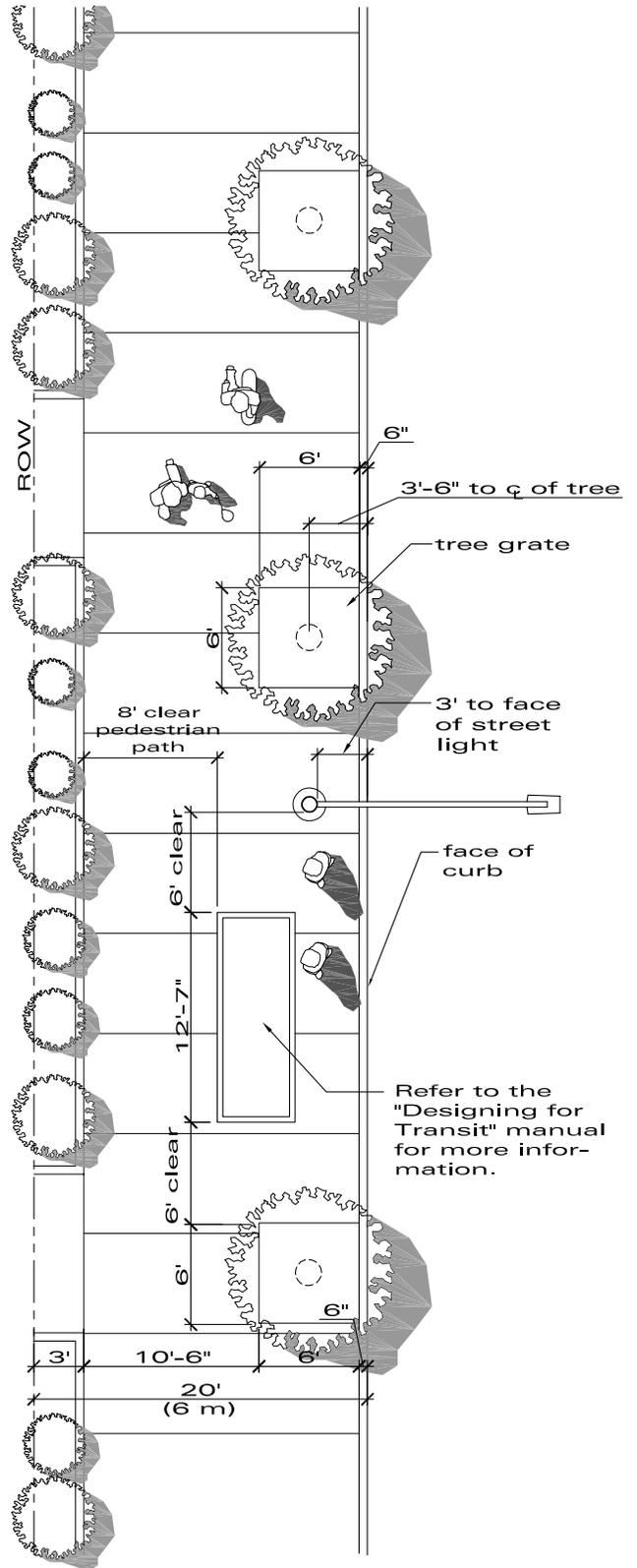
U-6 a



Urban Parkway Configurations



* Where storefront furniture is provided, the clear pedestrian passage way shall not be less than 8'-0".



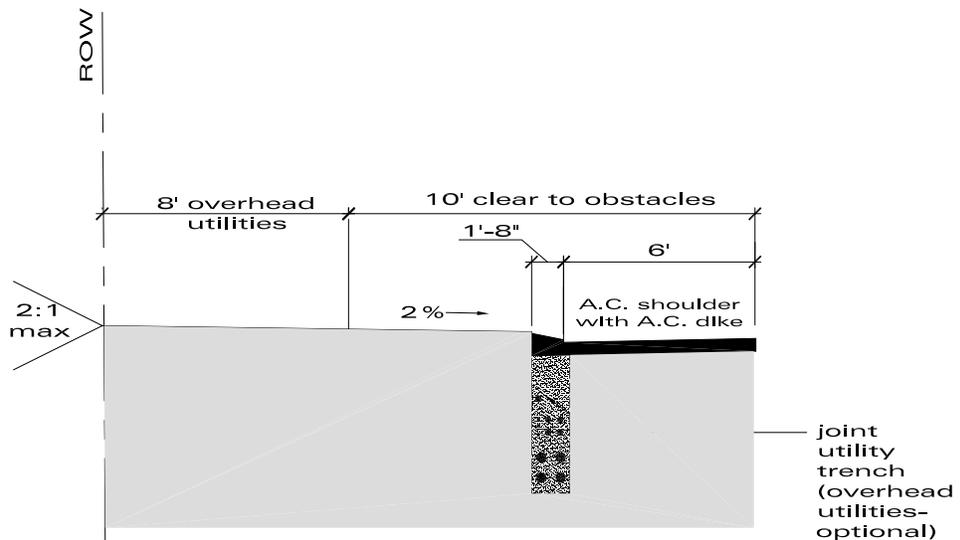
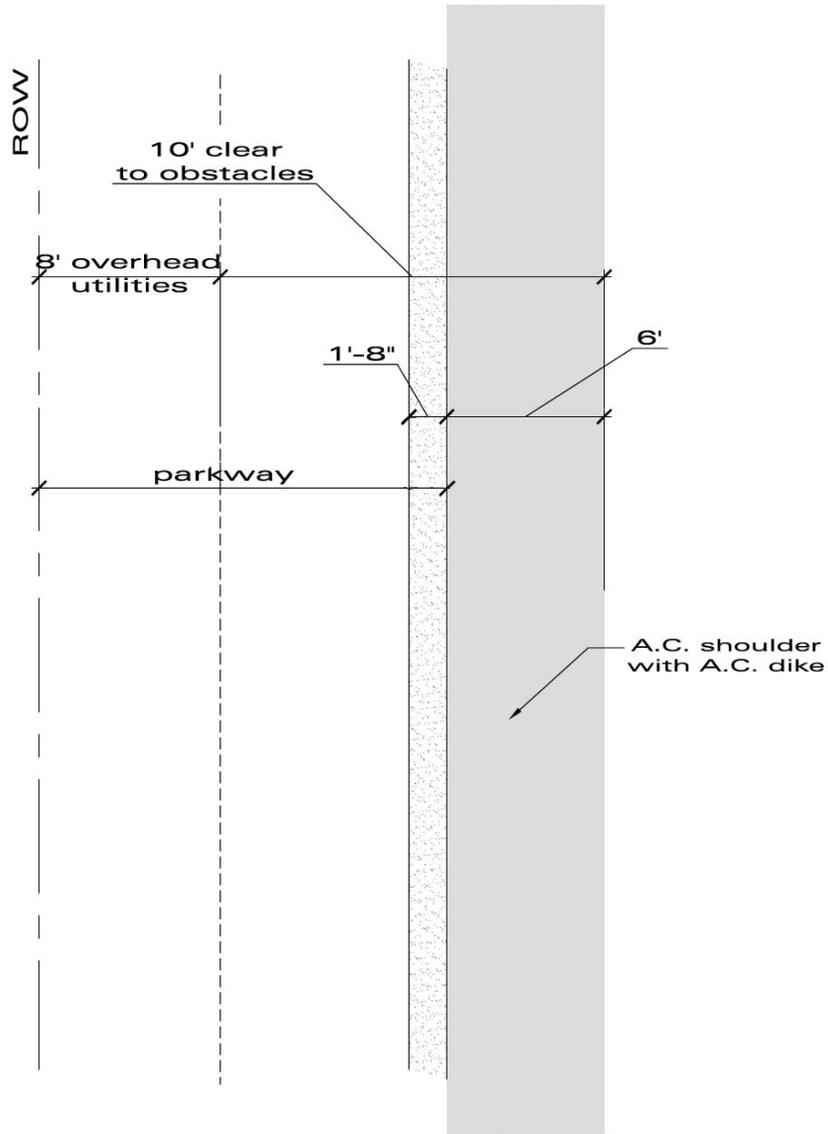
**U-6
b**

Rural Parkway Configurations

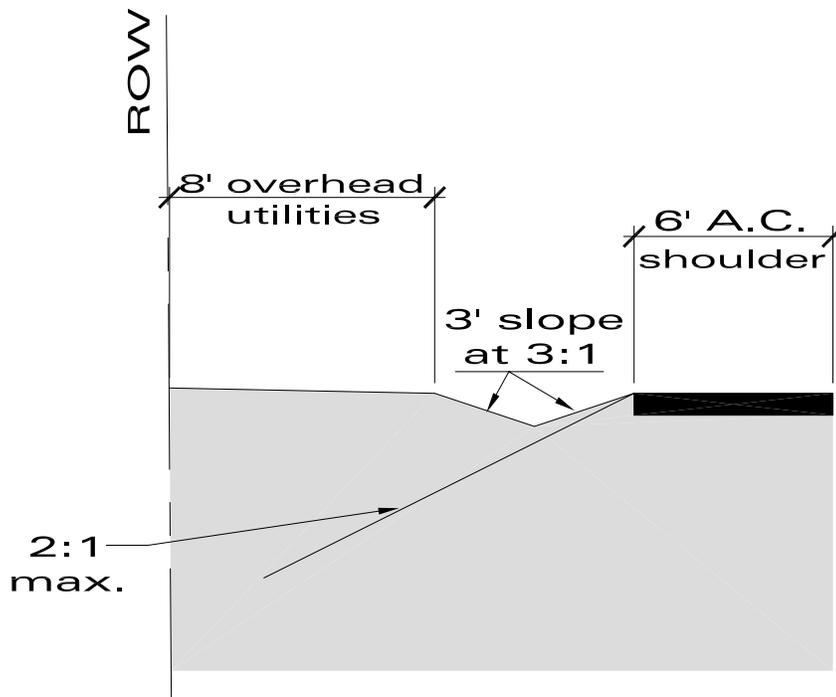
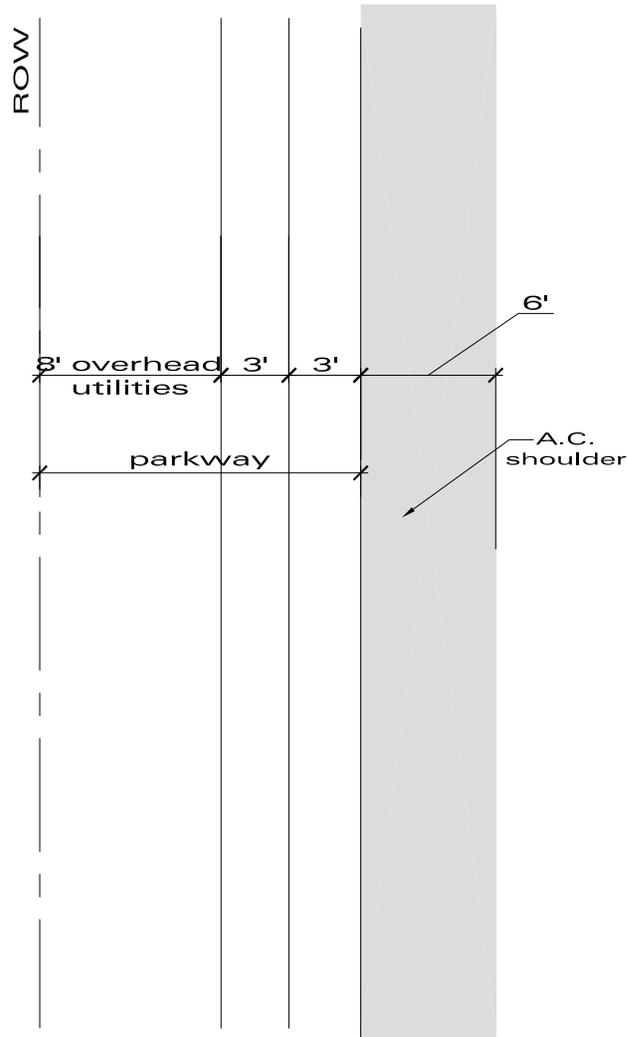




Rural Parkway Configurations



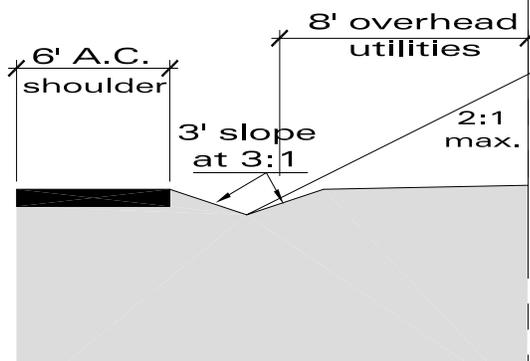
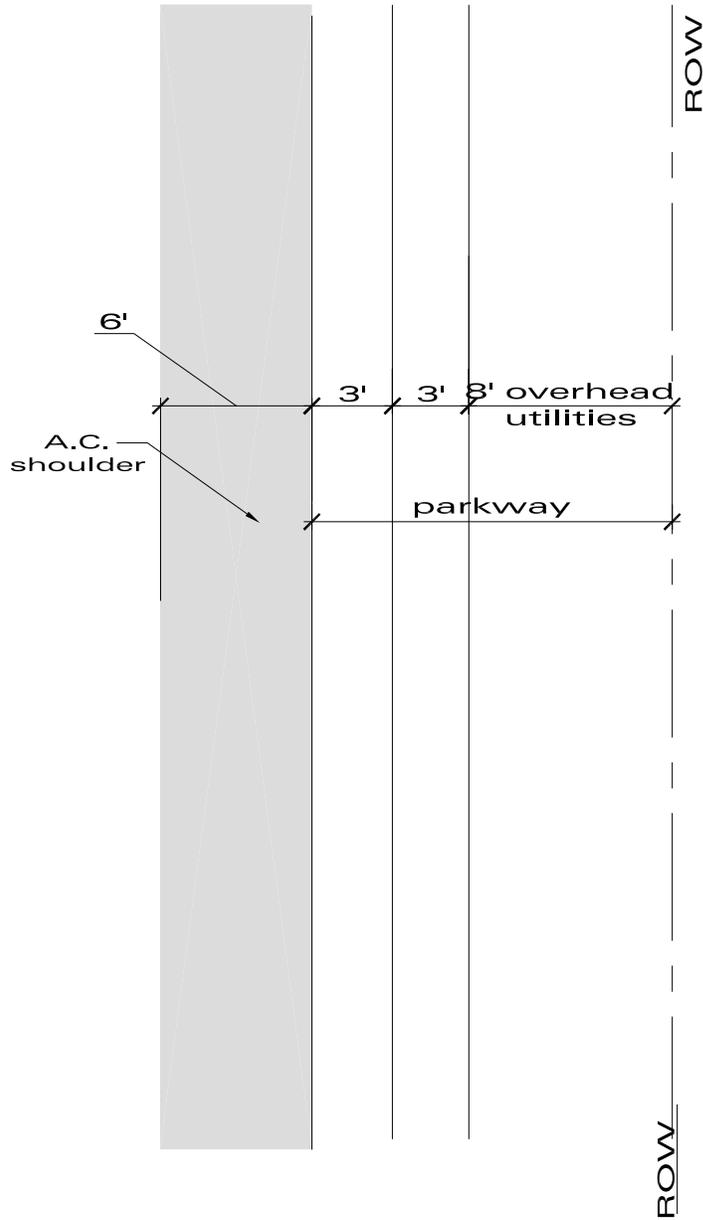
R-1



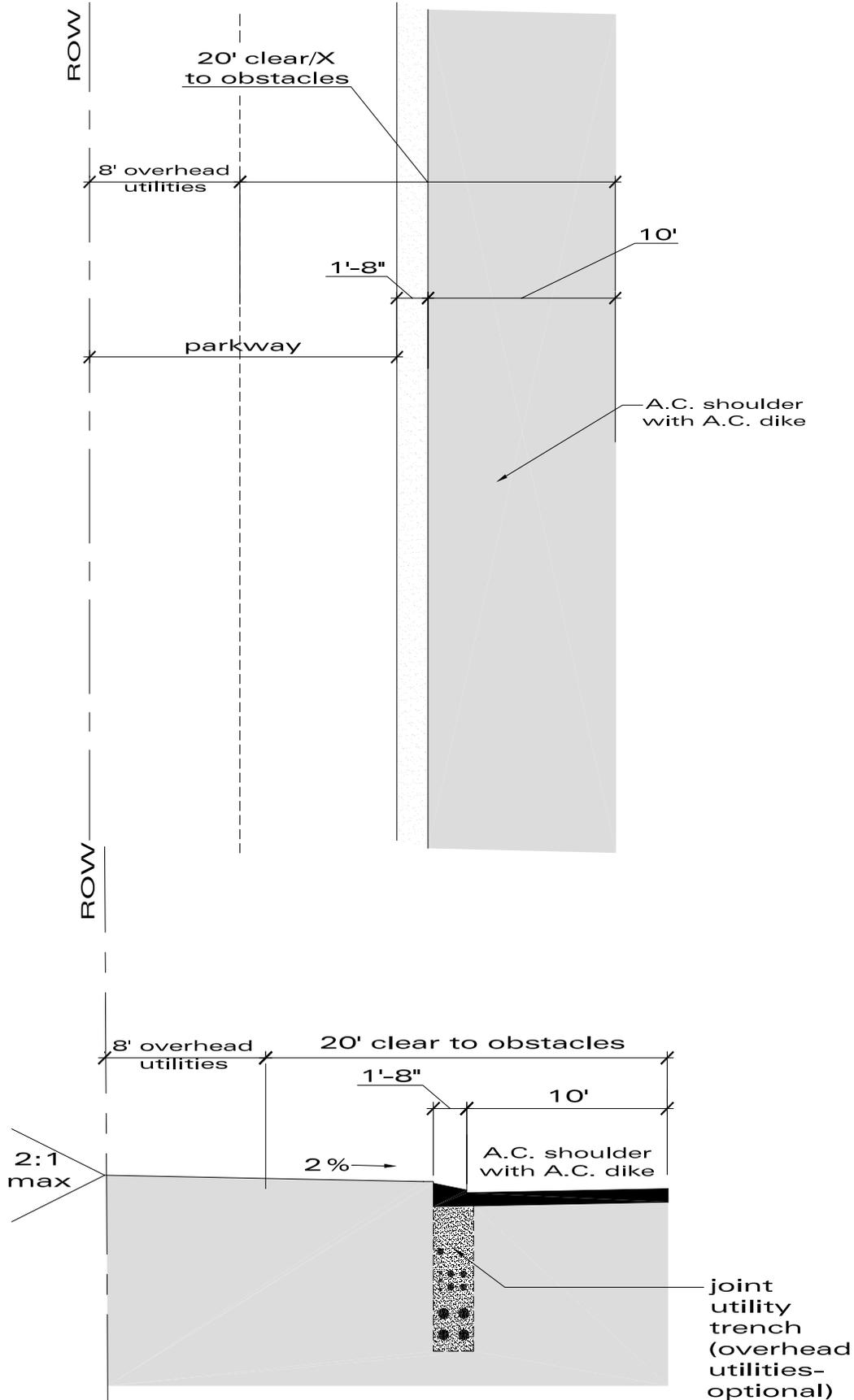
R-2
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Rural Parkway Configurations



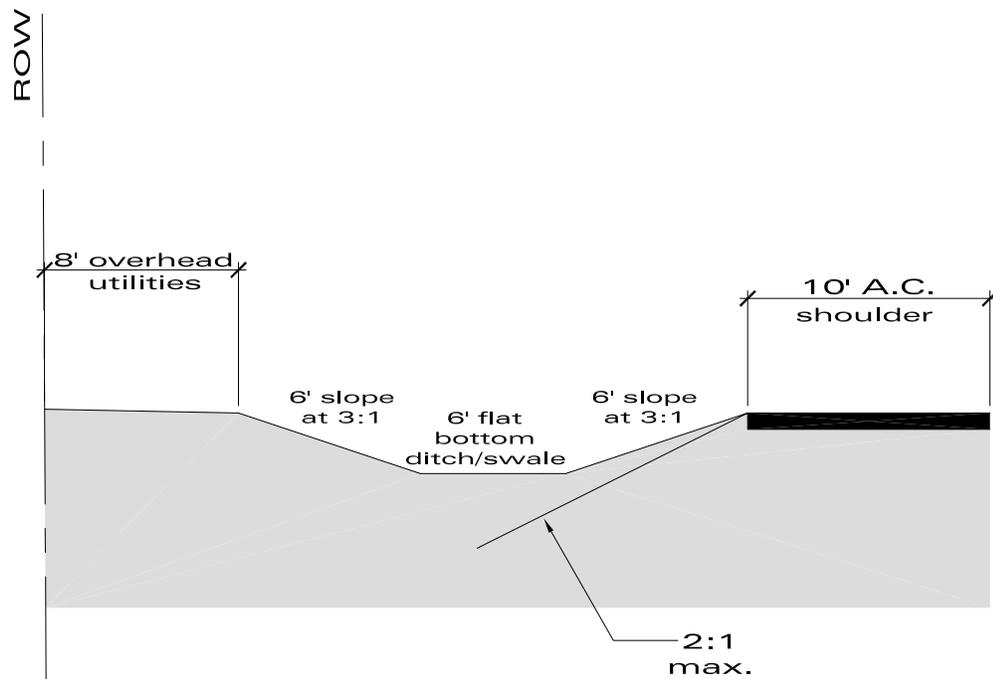
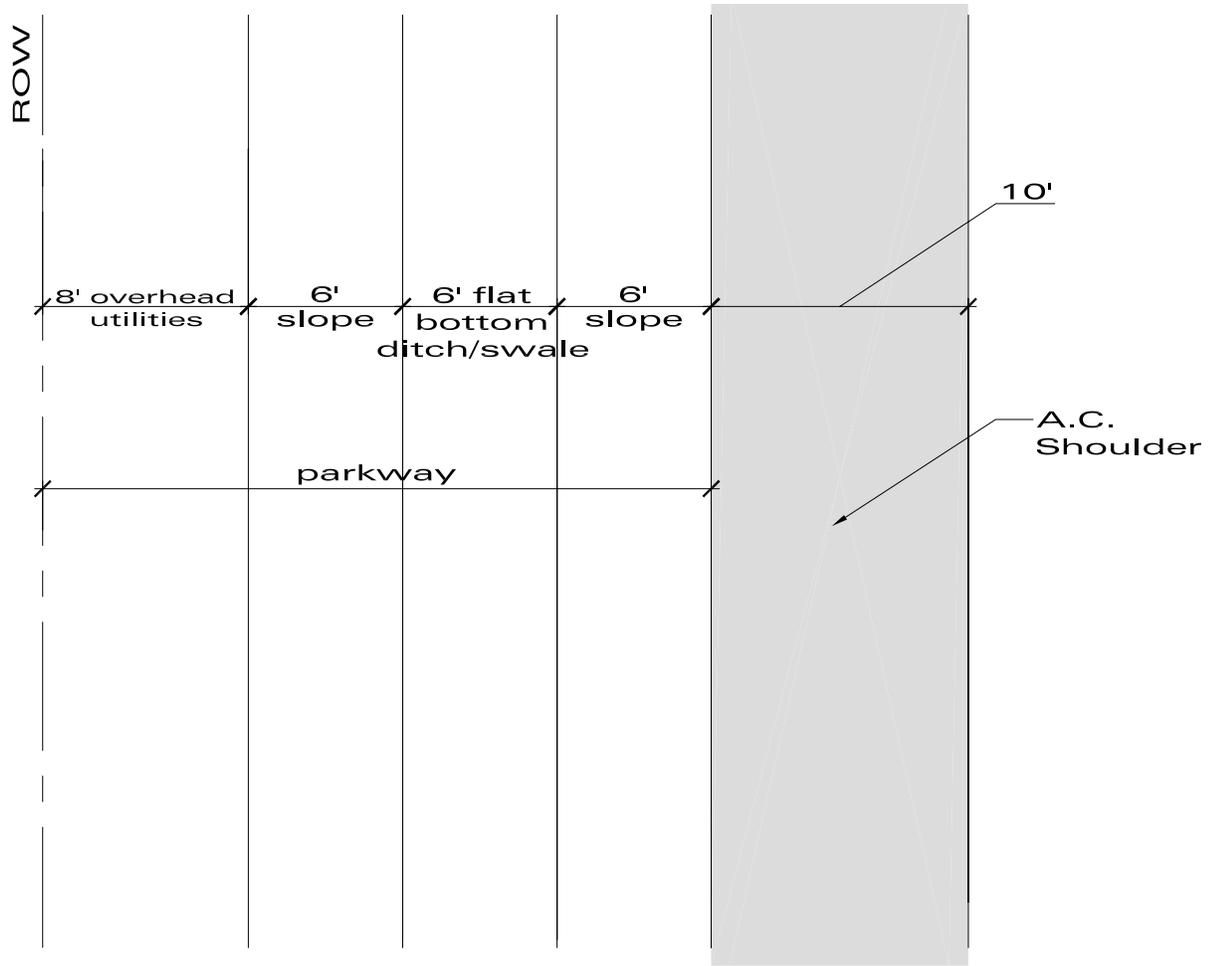
**R-2
b**



R-3



Rural Parkway Configurations



R-4

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.”

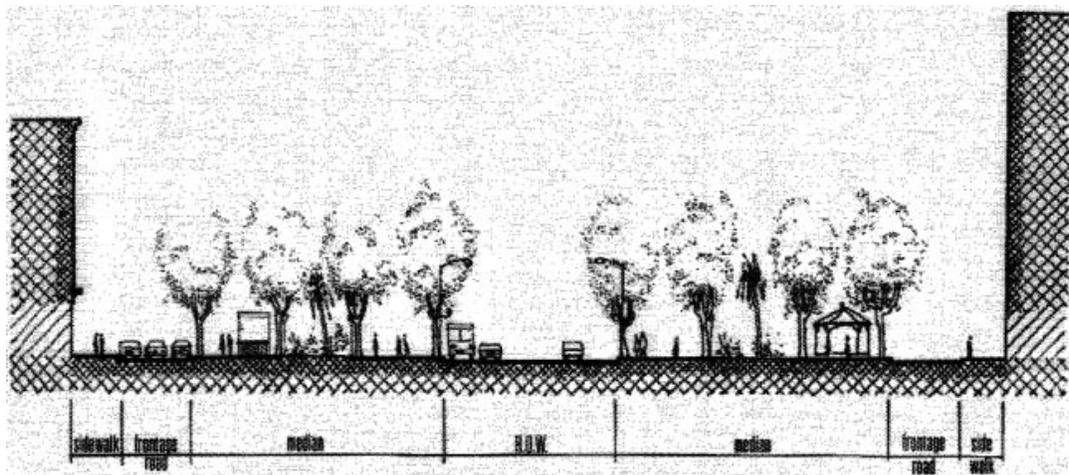
The Boulevard Book¹ describes three boulevard types:

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.

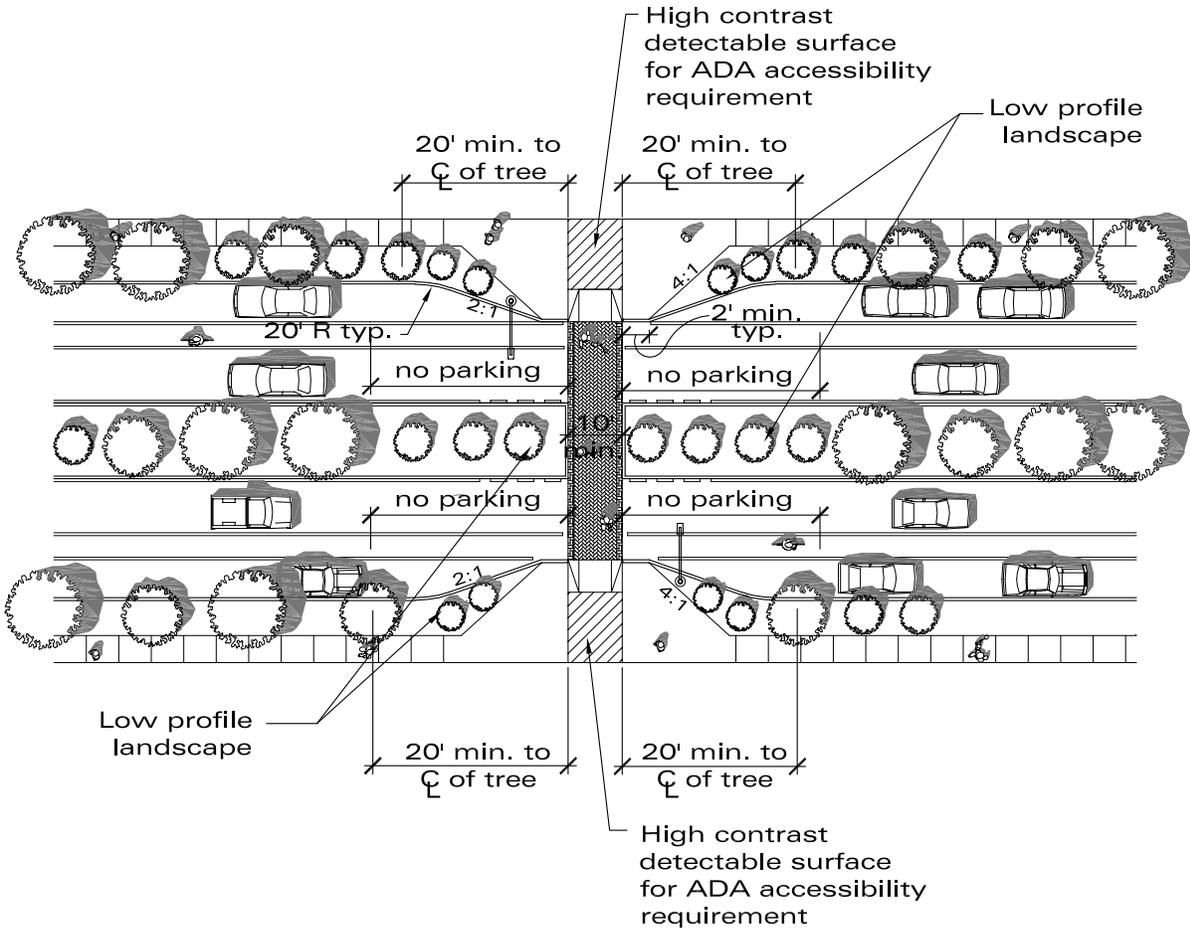
Transportation & Drainage Design Division; Document No. 769814, filed on October 21, 1993 in the Office of the City Clerk.

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.

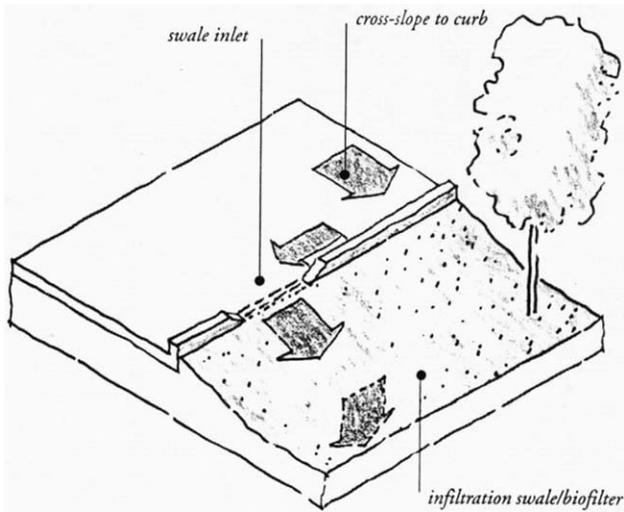
1. Descriptions of Best Management Practices for Urban Curb/Swale System Roadways

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

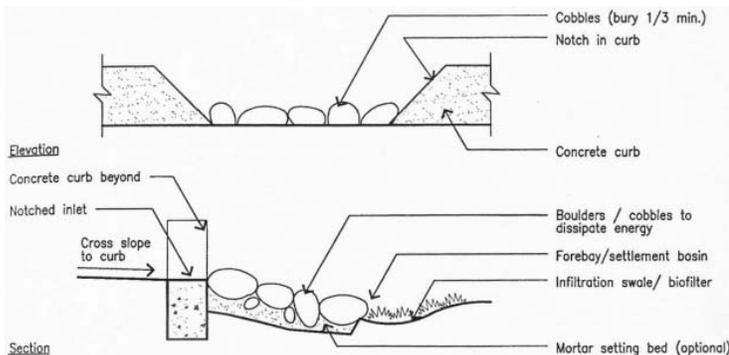
Typical, curb and gutter systems collect runoff into an underground pipe system. A swale inlet collects runoff into a surface infiltration system. A diagram and section of a typical urban curb/swale system are shown in Figures 1 and 2. The swale inlet includes features such as cobbles to dissipate flow 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⁾

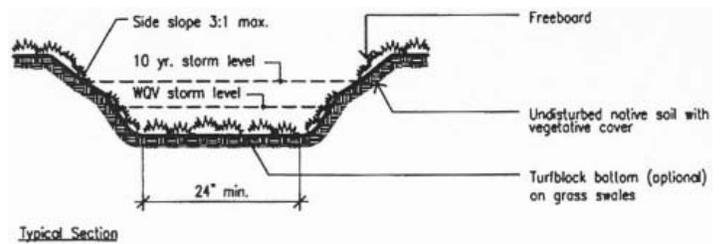


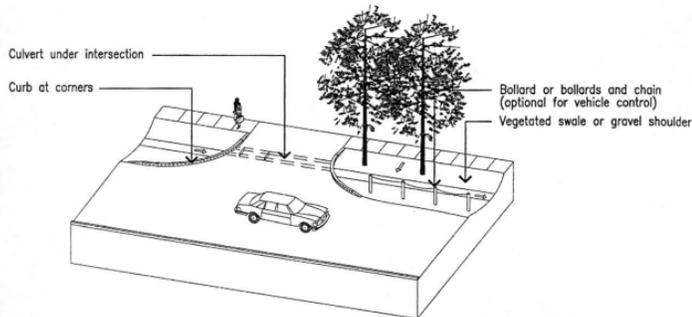
Figure 4
Vegetative Swale – Southbound Interstate 5 near La Costa Avenue Offramp



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⁾

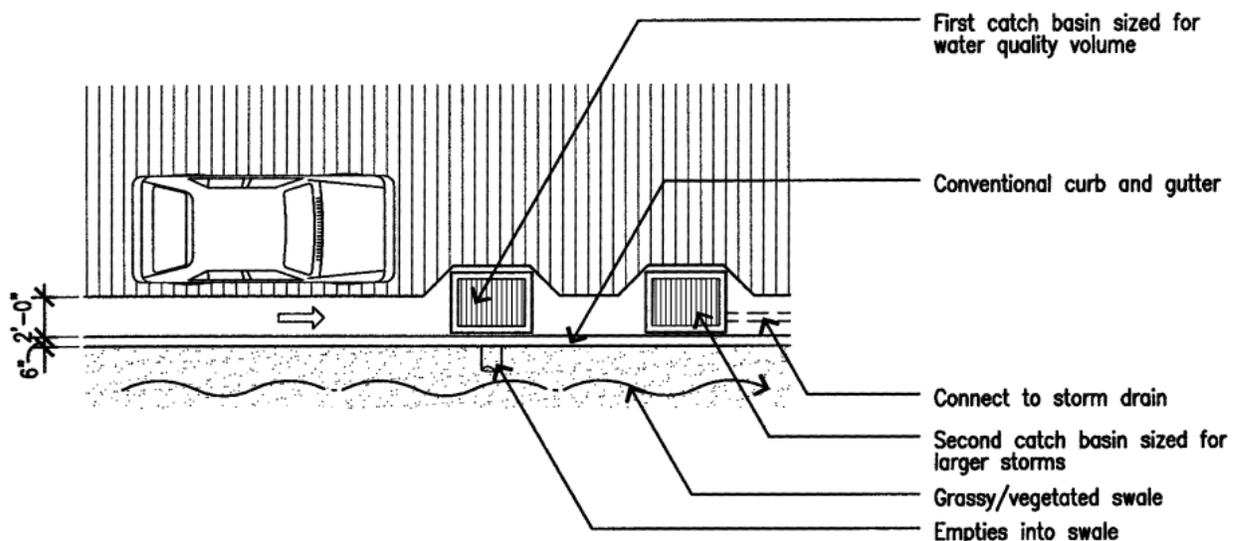


3. Description of Best Management Practices for Dual Drainage Systems

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⁾

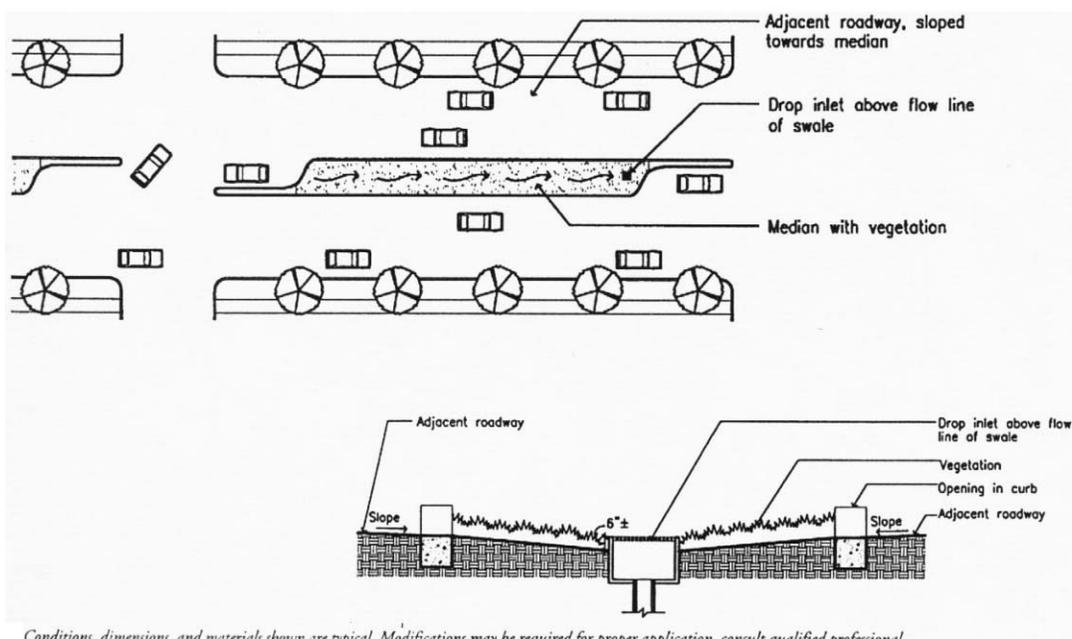


4. Description of Best Management Practices for Concave Medians

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⁾



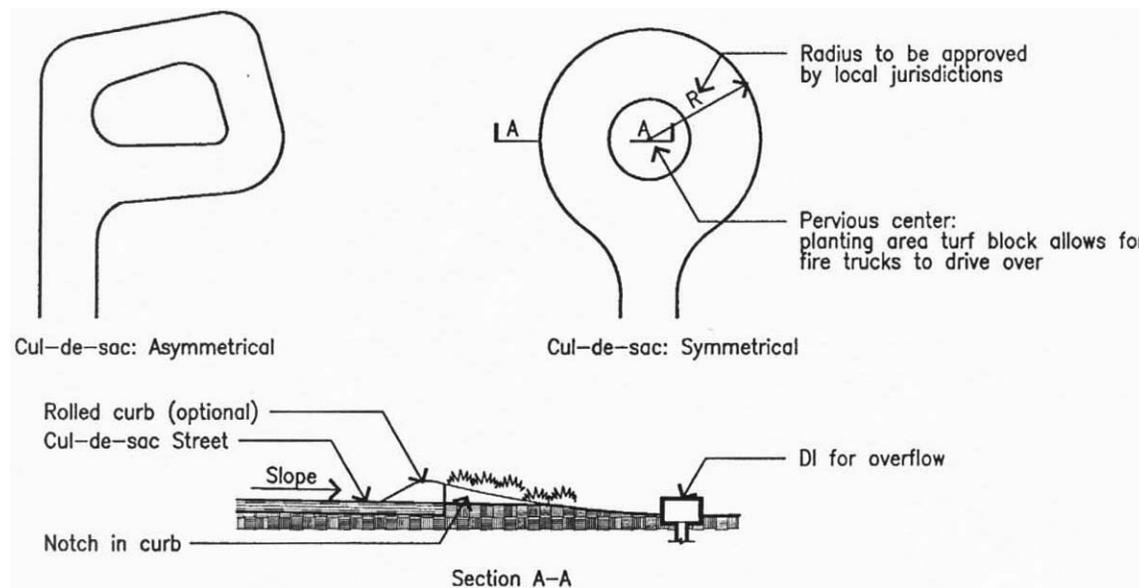
5. Description of Best Management Practices for Cul-de-sacs

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⁾



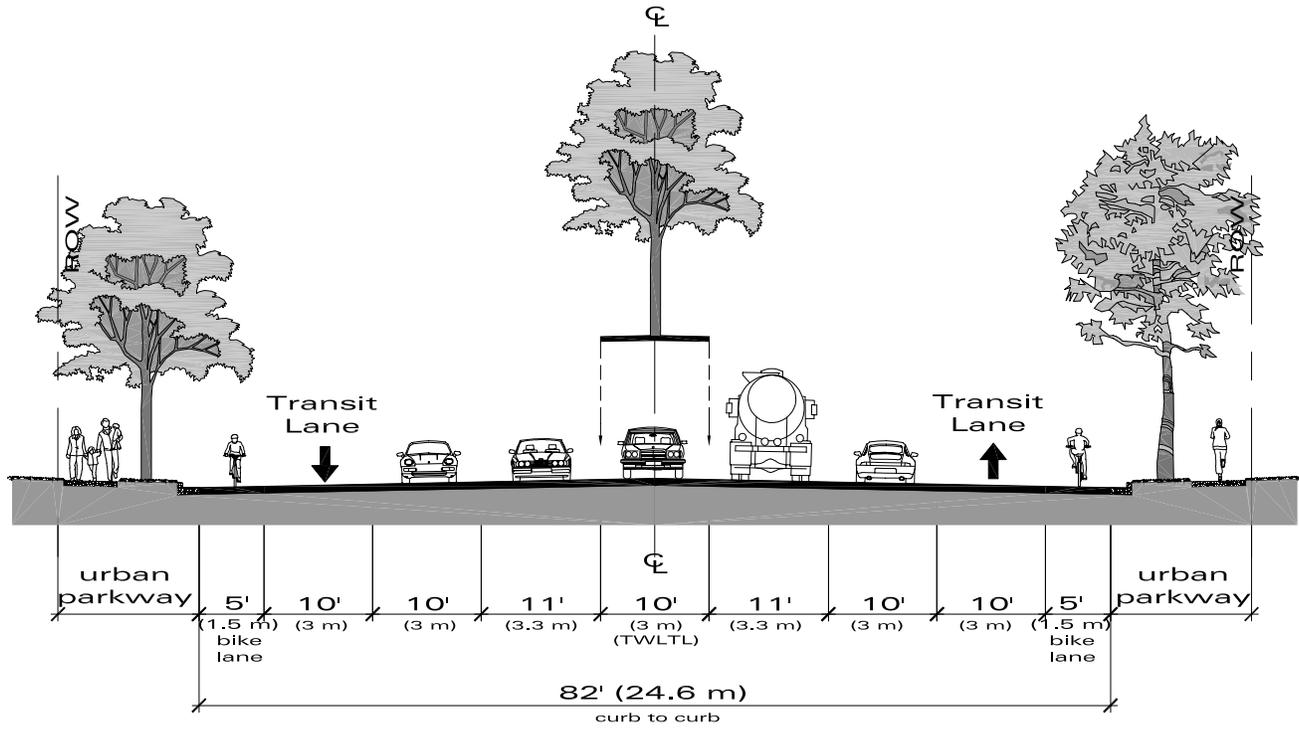
APPENDIX VII – Transit Streets

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.

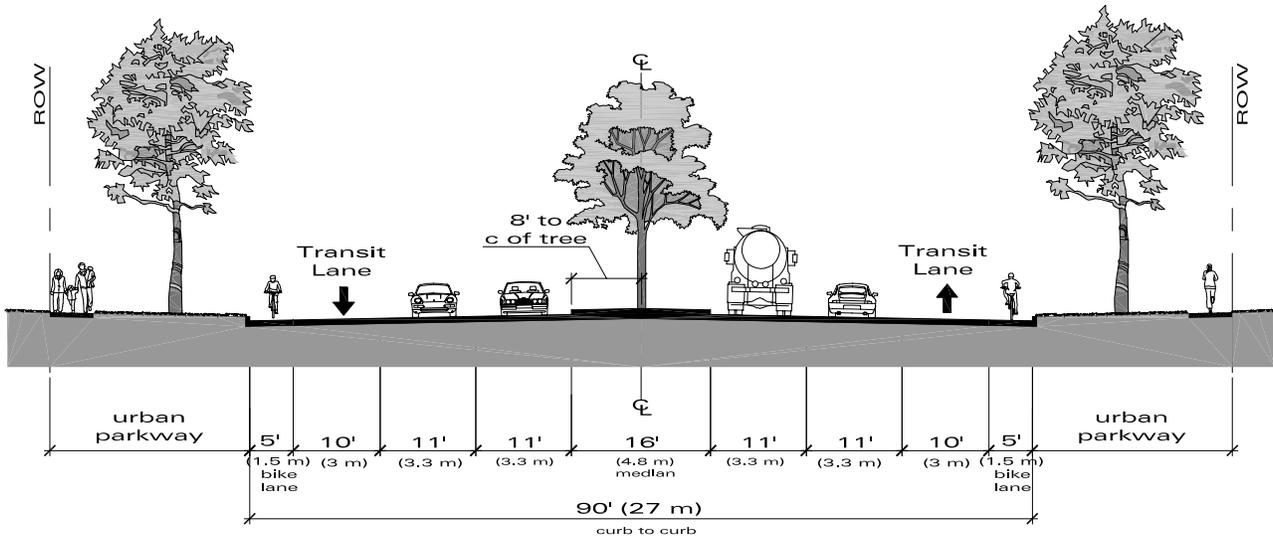
The first phase includes several "showcase" pilot projects; and, each of them will require a special and unique design solution. This design manual sets forth basic design guidelines for the design of transit streets.

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

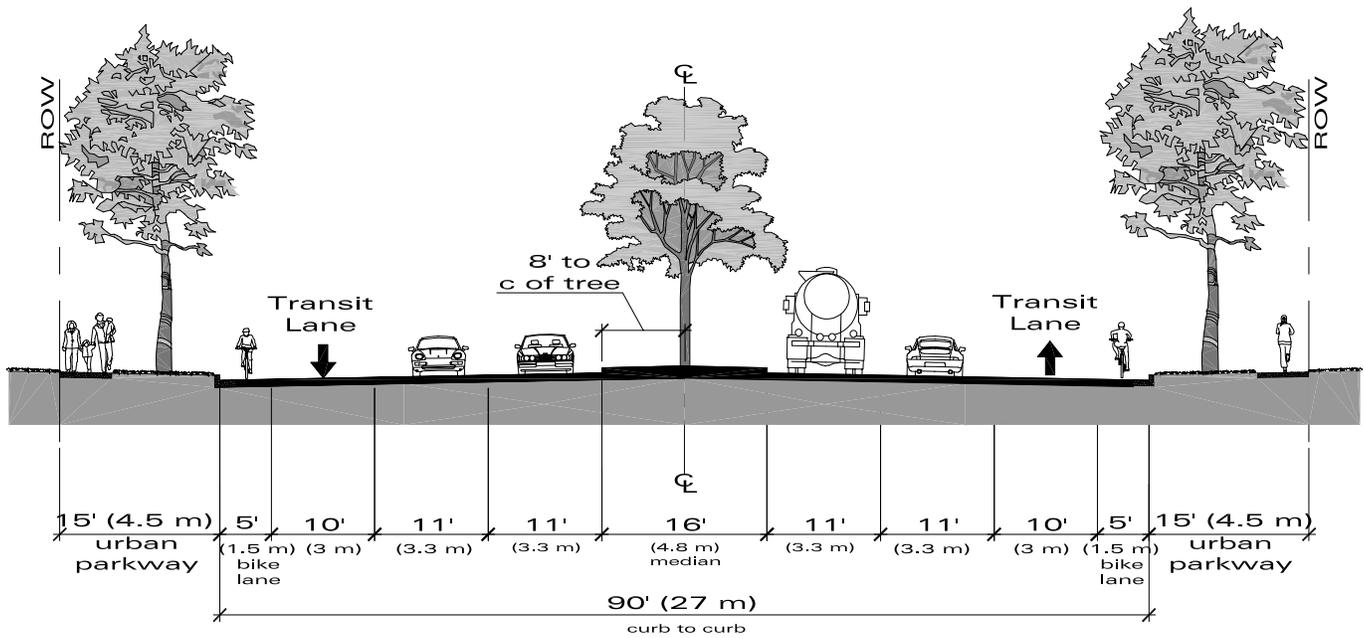
The following includes few examples of how to accommodate exclusive transit lanes within the public right-of-way.



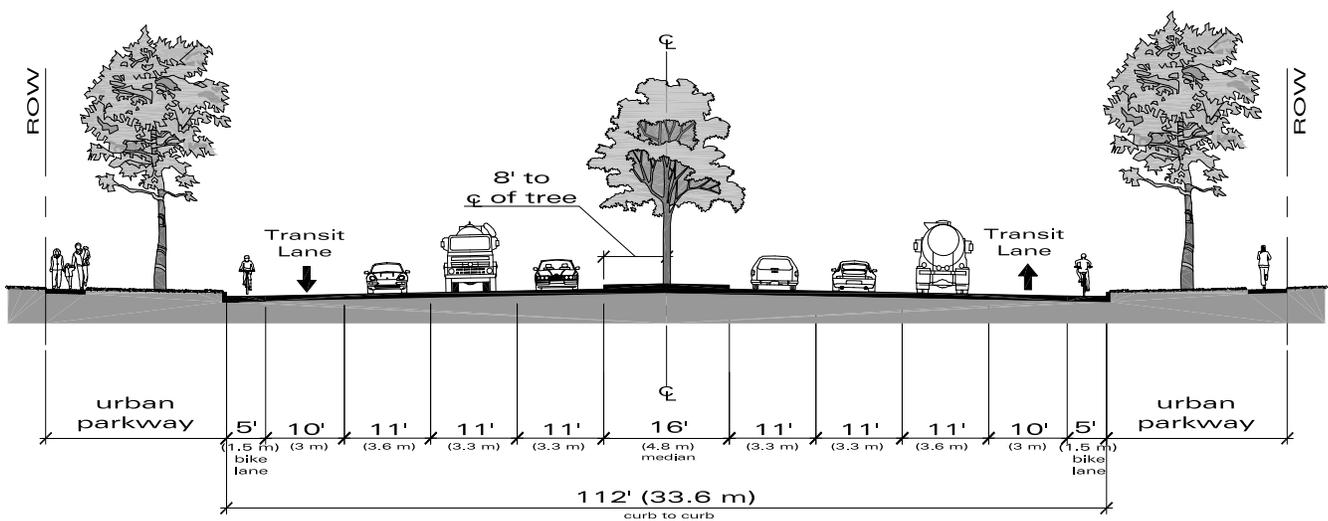
Transit Lanes – Four Lane Urban Collector



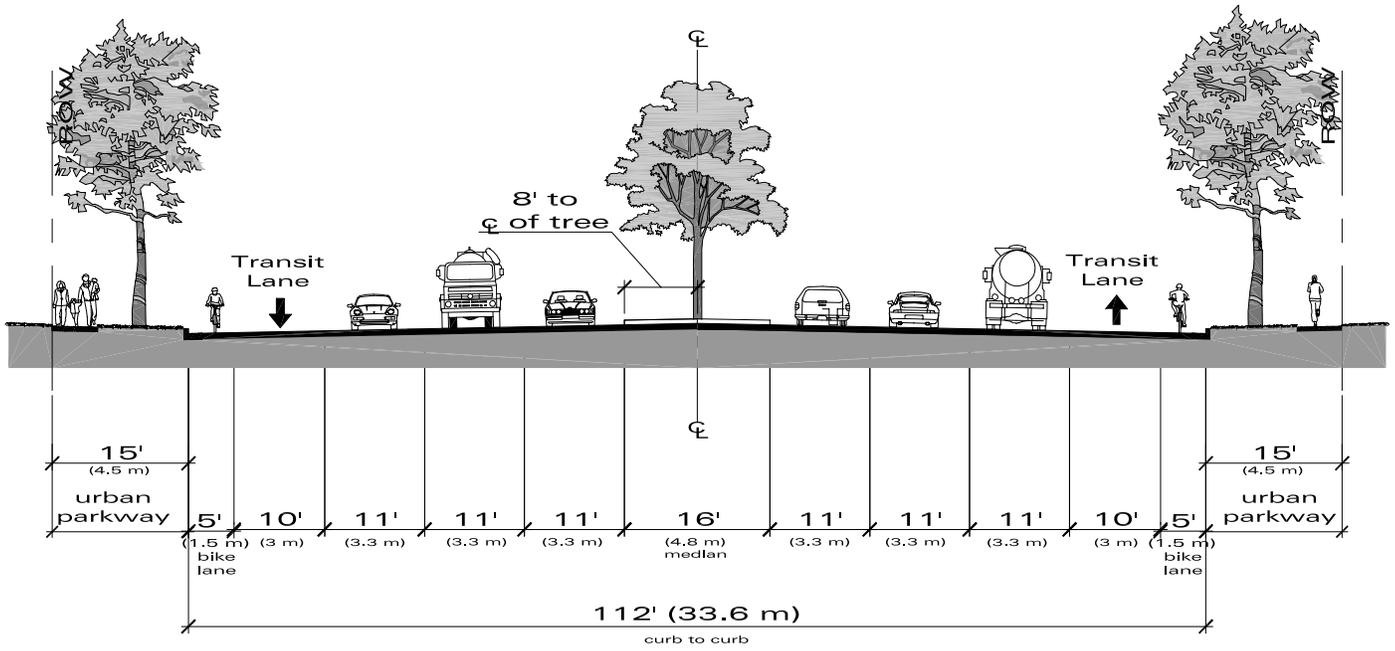
Transit Lanes – Four Lane Urban Major



Transit Lanes – Four Lane Major



Transit Lanes – Six Lane Urban Major



Transit Lanes – Six Lane Primary Arterial

Glossary



ADT—Average Daily Traffic: the number of vehicles to pass a given point on a roadway during a 24-hour period on an average day of a given year. Existing volumes may be measured with a recording device (machine counter) placed on the roadway. Existing volumes may also be estimated, or future volumes forecast, with the aid of computerized travel models representing existing or future land use and transportation networks.

Concrete; P.C.C.; A.C.—terms and abbreviations used to describe the materials used in the construction of roadways, bridges, and sidewalks. Concrete and P.C.C. refer to portland cement concrete, a material consisting of portland cement, coarse and fine aggregates, and water. A.C. refers to asphaltic concrete, a material consisting of asphalt cement, coarse aggregates, and fine aggregates.

Design Speed—the maximum safe speed that can be maintained over a specified section of roadway when conditions are so favorable that the design features of the roadway govern.

Easement—an interest in land owned by another that entitles its holder to a specified limited use or enjoyment.

Horizontal Curve—a geometric design feature of a roadway—provides a smooth change in direction to the left or right.

Low Profile Landscaping—plantings with mature height of 24 inches.

Major Street/Minor Street—descriptive terms of the relative traffic volumes on two streets at an intersection. The major street carries the higher volume of traffic and is usually wider than the minor street. At a T-intersection, the major street is the through street and the minor street forms the stem of the “T.”

Median—the part of the roadway, wider than a double yellow line, that separates opposing directions of traffic. It is usually raised and delineated by curbs, and may be landscaped. It may also be depressed or level with the traffic lanes.

Parkway—the part of the street between the face of the curb (or edge of the traveled way) and the right-of-way line.

Passing Sight Distance—the distance required for a vehicle to safely overtake a slower vehicle on a two-lane roadway by maneuvering into the lane of opposing traffic and then back into the right lane when past the slower vehicle. It is rarely provided on urban streets, but is common on rural roads in flat or rolling terrain.

Pedestrian-scale lighting—Adequate and aesthetically pleasing lighting should be provided for safety, security, and a greater sense of comfort for pedestrians of all abilities, allowing them to quickly and accurately recognize cues that will enable their safe navigation. The appropriate height for pedestrian lighting is between 12 and 20 feet high. Light standards may also be combined on one post. Low, pedestrian-oriented lights can be affixed to a post and direct light onto sidewalks while the same post may also accommodate auto-oriented lights directed at roadways.

Precise Plan—a detailed, long-term plan for the development of a sub-area of a community plan. Generally, a precise plan would include a residential neighborhood, commercial area, industrial area, or some geographical area sharing common facilities or problems. Usually a precise plan proposes specific land uses for each parcel and is often based on a detailed grading plan. In some instances, very specific proposals relative to the layout of buildings, parking, and landscaping are included within the precise plan. A precise plan is adopted by resolution.

Right-of-way—the property dedicated for public roadway.

Single loaded street—a single loaded street is a street serving property (front yard or side yard) on one side only, with no need for access (to a rear yard or to open space) or parking on the other side.

Specific Plan—a tool to implement a general or community plan (policy documents). The minimum contents of a specific plan are stipulated by state law. At various degrees of detail, specific plans address land use, infrastructure, development standards, and implementation measures. Specific plans are adopted by ordinance.

Stopping Sight Distance—the distance required for a vehicle traveling at a particular speed to come to a safe stop to avoid colliding with an object in the roadway. It is measured with a driver's eye height of 3.50 feet (1070 mm) above the roadway and an object height of 6 inches (150 mm) above the roadway. The distance includes vehicular travel during the driver's perception of and reaction to the object and the vehicular travel during braking.

Street Tree—a tree adjacent to a street and located within the public right-of-way.

T.O.D. (Transit-Oriented Development)—a mixed-use community within a typical 2,000-foot (600 m) walking distance of a transit stop and core commercial area. The design, configuration, and mix of uses emphasize a pedestrian-oriented environment and reinforce the use of public transportation without ignoring the role of the automobile. TODs mix residential, retail, office, open space, and public uses within a comfortable walking distance, making it convenient for residents and employees to travel by transit, bicycle, or foot, as well as by car.

Transit—the carrying of passengers in a bus or trolley along a regularly scheduled route for a fixed, basic fare.

Traveled Way—the lanes of a street or roadway in which the moving vehicles travel; does not include shoulders or parking lanes.

Vertical Curve—a geometric design feature of a roadway—provides a smooth transition between an ascending grade and a descending grade, or vice-versa. A *crest* vertical curve begins with an ascending grade and ends with a descending grade. A *sag* vertical curve begins with a descending grade and ends with an ascending grade.

Visibility Area—Specified areas along intersection corners that should be clear of obstructions that might block a driver's view of pedestrians and potentially conflicting vehicles. The dimensions of the visibility area depend on the design speeds of the intersecting roadways and the type of traffic control used at the intersection.

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