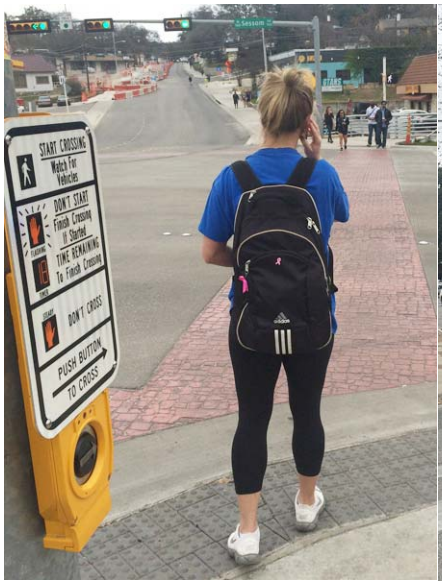
Appendix D: Recommendations

Multimodal Transportation Alternatives Memo

CITY OF SAN MARCOS TRANSPORTATION MASTER PLAN UPDATE

Development and Evaluation of Multimodal Transportation System Alternatives



Prepared by HDR Engineering, Inc.

March 9, 2018

CITY OF SAN MARCOS TRANSPORTATION MASTER PLAN UPDATE
Development and Evaluation of Multimodal Transportation System Alternatives

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INTRODUCTION

This memorandum provides and overview of multi-modal alternatives recommended for the City of San Marcos as part of the Transportation Master Plan Update.

MULTIMODAL TRANSPORTATION ALTERNATIVES

The City of San Marcos has adopted a Complete Streets initiative. This initiative seeks to establish overarching policy to include multimodal aspects throughout the City's transportation system. A multimodal network offers a diverse range of transportation choices to the community and serves everybody in the community- including motorists, cyclists, pedestrians and transit users. Mode alternatives like transit and active transportation (biking and walking) help to reduce the number of cars in the transportation network- thereby helping to reduce overall congestion in the system. In this way, a multimodal network improves conditions for motorists too, by reducing single occupant vehicle travel demand.

Recommendations identified in this chapter support the Complete Streets initiative and incorporate solutions that facilitate a multimodal transportation network. Existing technologies and best practices were considered during the identification and development of these recommended alternatives.

Complete Streets

Smart Growth America defines Complete Streets as 'streets for everyone'. They are designed to enable safe access for people of all ages and abilities, and for all modes of travel. Complete streets are thoughtfully designed and enable safe passage along streets in a community, regardless of how they are traveling. There are many types of complete streets. They are planned and designed to respond to the communities they serve. A complete street designed for an urban community will look different from a complete street designed for a suburban community. The goal of a complete street, however, remains the same - to allow all members of a community, young and old, of all abilities, to have equal and safe access to the transportation network whether in a car, on a bike, in a bus, or on foot.

Active transportation has been growing in popularity as a travel mode in communities, although in many communities, there are few places where it is enjoyable. Vision San Marcos envisions a connected network of efficient, safe and convenient multimodal transportation options that will create a more comfortable pedestrian and bicycle environment. The goals defined in Vision San Marcos fully support Complete Streets policy and design:

- Goal 1: Develop a safe, well-coordinated transportation system implemented in an environmentally sensitive manner that determines appropriate modes of transportation in and around the City.

- Goal 2: Develop a multimodal transportation system that integrates with existing and proposed systems and improves accessibility and mobility, minimizes congestion, and reduces pollution.

Goal 2 objectives seek to obtain a "Bicycle Friendly Community Designation" and focus on non-vehicular transportation improvements. To uphold this goal, roadways should be designed or upgraded with Complete Streets policies in mind as communities in San Marcos redevelop and grow. Updated cross-sections for the transportation network follow these policies, and will seek to accommodate all modes of transportation throughout the network.

Context Sensitive Design

Context sensitive design considers community values and input in the planning and design of transportation infrastructure. The Federal Highway Administration (FHWA) outlines four guiding principles for context sensitive design:

- Involve stakeholders
- Communicate
- Understand the contest
- Be flexible and creative

The City of San Marcos should follow these guiding principles throughout the Transportation Master Plan process and into design. During the Transportation Master Plan update a comprehensive public and stakeholder involvement process was completed and community feedback has been incorporated into the report.

Green Streets

Green streets look to preserve environmental stability. Drainage and stormwater runoff can have negative impacts to the environment. Polluted runoff, erosion and sedimentation are unwanted impacts on surrounding areas. Optimal stormwater management introduces strategies to retain, treat or eliminate runoff at the source. Cost-effective green infrastructure and improving water quality complement Complete Streets policies. To maintain a healthy policy of Green Streets, the City of San Marcos should implement the following best practices when possible:

- Minimize impervious pavement use and opt for pervious asphalt and concrete, or permeable pavers.
- Consider a road diet where suitable to help reduce roadway widths and impermeable cover.
- Instead of impermeable concrete sidewalks, consider reinforced gravel paving where surfaces will not compromise bicycle and pedestrian mobility, safety, or ADA guidelines.

- Implement landscaping elements that help reduce stormwater runoff, such as street trees, bioswales, planters and rain gardens. Traffic calming elements provide potential sites for these types of landscaping elements.
- Introduce xeriscaping with native plants to reduce water consumption and the need to irrigate.
- Encourage alternate modes where trips are less than one mile. Walking and bicycling for short trips can help to reduce CO2 emissions, adding to the environmental benefits of Complete Streets.

The City of San Marcos is in the process of creating a stormwater management plan to help keep garbage, debris and pollution out of the San Marcos River.

Bicycle Facilities

The Transportation Master Plan should give equal priority to the safe and efficient movement of pedestrians and bicycles by expanding the safe, convenient bicycle lanes and trails throughout the City. This will address the Transportation Master Plan goal of converting 10% of trips less than five miles to bicycle trips. The Transportation Master Plan has identified multiple pedestrian and bicycles facility types for integration with the thoroughfares; desired bicycle facilities are as follows:

- Protected Bicycle Lane – Protected bicycle lanes can be one or two-way within the roadway, and is separated from automobile traffic by a physical barrier.
- Buffered Bicycle Lane - Buffered bicycle lanes are on-street lanes with a wider, painted striped buffer to separate bicycle from automobile traffic.
- Shared-Use Path - A shared-use path is an off-street pedestrian trail that is shared with bicycles.
- Sharrow - Sharrows are designated lanes within the roadway that are shared with not automobile traffic and bicycles.

Other options for bicycle facilities are available if right-of-way or other constraints prohibit installation of the desired facility.

- Bicycle Lane – Bicycle lanes are dedicated, striped on-street facilities, but do not have a buffer from motorized traffic.
- Wide Shoulders – Wider roadways may be striped to have wide shoulders that function as bicycle facilities.

Bicycle routes are established by the San Marcos and may follow existing sharrows without designated lanes. The City considers the following factors in route establishment:

- Traffic Density
- On-Road Bicycle Facilities
- Change in Elevation

- Roadway Conditions
- Citizen Feedback

The establishment of bicycle routes should continue to follow the same process with prioritization following the Thoroughfare Plan prioritization. Interim bicycle facilities may be constructed as development of the ultimate thoroughfare cross-sections are designed and implemented.

Pedestrian Facilities

Streets without safe places to walk put people at risk. Sidewalks provide pedestrians with safe, dedicated space away from traffic. The FHWA estimates that pedestrian related crashes are twice as likely to occur when there are no sidewalks. Designing streets for pedestrian travel greatly improves pedestrian safety. Sidewalks also contribute to health by encouraging active transportation in communities. Complete Streets are designed with pedestrians in mind. Wider, connected sidewalks, crosswalks, raised medians, reduced crossing distance, and better bus stop locations are all fundamental elements of a multimodal network.

In August 2015, the City of San Marcos introduced the Sidewalk Cafés, Parklets, and Similar Special Uses of Public Rights-of-Way Ordinance. The City created this initiative to provide a public-private partnership for streetscape improvements in the public realm. The program supports a movement to reclaim and repurpose underutilized spaces through creating sidewalk cafés, parklets, gateway features, and streetscapes. Aesthetic enhancements to the streetscape increases public open space and helps to enliven the sidewalk environment. Sidewalk cafés and parklets can also be a great way to encourage walking and add vitality to the streets.

The current sidewalk network in the City of San Marcos has missing links in critical areas. Many sections are poorly maintained. Wide intersections and high speed traffic make walking unpleasant and sometimes unsafe, discouraging non motorized traffic. Beginning in 2016 the City implemented a sidewalk maintenance program to replace and construct gaps in infrastructure. This program replaces over 10,500 linear feet of sidewalk infrastructure annually.

Public Transit

A well-designed transit system that connects key markets has the greatest potential to reduce congestion on San Marcos roads. Major activity centers include downtown, Texas State University, Midtown, South End, Medical District, STAR Park, East Village, and the airport.

In 2012, the US Census gave the City of San Marcos an ‘urbanized area’ designation. This designation mandates that an Urban Transit District must be created. The Capital Area Rural Transportation System

(CARTS) agreed to provide transit service to the urbanized area. San Marcos CARTS operates 11 bus routes operating at 60 minute headways.

In addition to the CARTS services, Texas State University also provides public transportation options to its students. The BT Shuttle is a residential route service and connects to several multi-family residential communities. There is also the campus route service and the BT Interurban, which provides service to and from Austin and San Antonio.

San Marcos's intermodal transit station is one of the fastest growing Amtrak stations in Texas. It provides full-service Amtrak and Greyhound stations on-site. The future commuter rail between Austin and San Antonio may also operate a commuter rail service from San Marcos to several communities, offering a congestion-proof alternative to an increasingly congested commute along the region's roadways.

Rideshare Programs

Rideshare programs are a common and cost effective travel mode, especially in areas that are not well served by public transit. Ridesharing can be a viable option for commuters traveling to a common destination or for non-drivers. Carpooling or vanpooling can also be an effective alternative to manage congestion during peak hours or special events. These types of programs can be offered by individual employers as part of a trip reduction incentive program, by a campus trip management program, a transit agency, or by a regional transportation agency.

There are many benefits of effective rideshare programs. Ridesharing increases travel choices for commuters and helps to reduce congestion, crash risk and pollution emissions. It can also help to reduce costs involved with roadway and parking facilities. Experience indicates that ridesharing programs typically attract 5-15% of commute trips if they offer only information and encouragement, and 10-30% if they also offer financial incentives such as parking cash out or vanpool subsidies (Victoria Transport Policy Institute, York and Fabricatore, 2001).

Best practices to encourage participation in rideshare programs include:

- Ridesharing should be implemented as part of a comprehensive TDM Program.
- Transportation agencies, businesses and employees should all be involved in planning Rideshare Programs.
- Provide incentives to attract and retain rideshare users.
- Facilitate the use of Transportation Network Companies (TNCs) such as Uber, Lyft, etc.

Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) uses a range of technologies to gather information regarding known traffic conditions. This information can then be shared with travelers so that they may make more

informed decisions while navigating from one location to another. Motorists, cyclists, pedestrians, transit users, and emergency vehicle operations can all benefit from ITS. There are many types of ITS available today.

GPS and navigation applications are already a well-known type of ITS. Google maps and Waze are two examples of popular traffic and navigation apps that provide real-time traffic data and route information.

Variable message signs (VMS) are electronic traffic signs that are often used on roadways to provide information about travel times or special events. VMS is also employed to alert travelers to things like accidents, work zones and traffic congestion.

Traffic management centers (TMC) can take advantage of detection technologies to help monitor changing traffic conditions. Video vehicle detection systems monitor congestion at intersections and along roadways. Data can be sent back to operators at the TMC where adjustments in green times can be implemented to improve traffic flow during peak hours. Detection technologies are also useful during times of low traffic, for example, red time in rural areas. Inductive loops in the pavement can detect vehicle presence and send a message to the signal controller, allowing an adjustment in the signal timing. These types of technologies work together and are part of Adaptive Traffic Control. This is a traffic management strategy that allows traffic signal timing changes to occur based on actual traffic demand.

ITS technologies can provide immensely useful information while navigating to a destination- ITS can also provide parking guidance once a destination is reached. Parking garages or lots with car park guidance systems provide dynamic information on parking availability and help motorists find open spaces. This type of system helps to reduce search time, thereby reducing congestion and air pollution.

Develop a smart phone application for the City of San Marcos to provide real-time information for transit agencies such as CARTS and the Bobcat Shuttle system to improve communication to riders regarding bus arrival times. Crash locations and construction updates through the app could help riders make information travel decisions.

SUMMARY

The Transportation Master Plan update will consider complete streets, context sensitive design, green streets, enhanced pedestrian facilities, enhanced bicycle facilities, and public transit in development of recommend thoroughfare cross-sections. Thoroughfare types will be applied throughout the City transportation network in a manner that enhances multi-modal connectivity and connects Activity Centers. Implementation of the multi-modal alternatives in conjunction with rideshare programs and ITS will create a robust transportation network.

Appendix D: Recommendations

Thoroughfare Design Standards

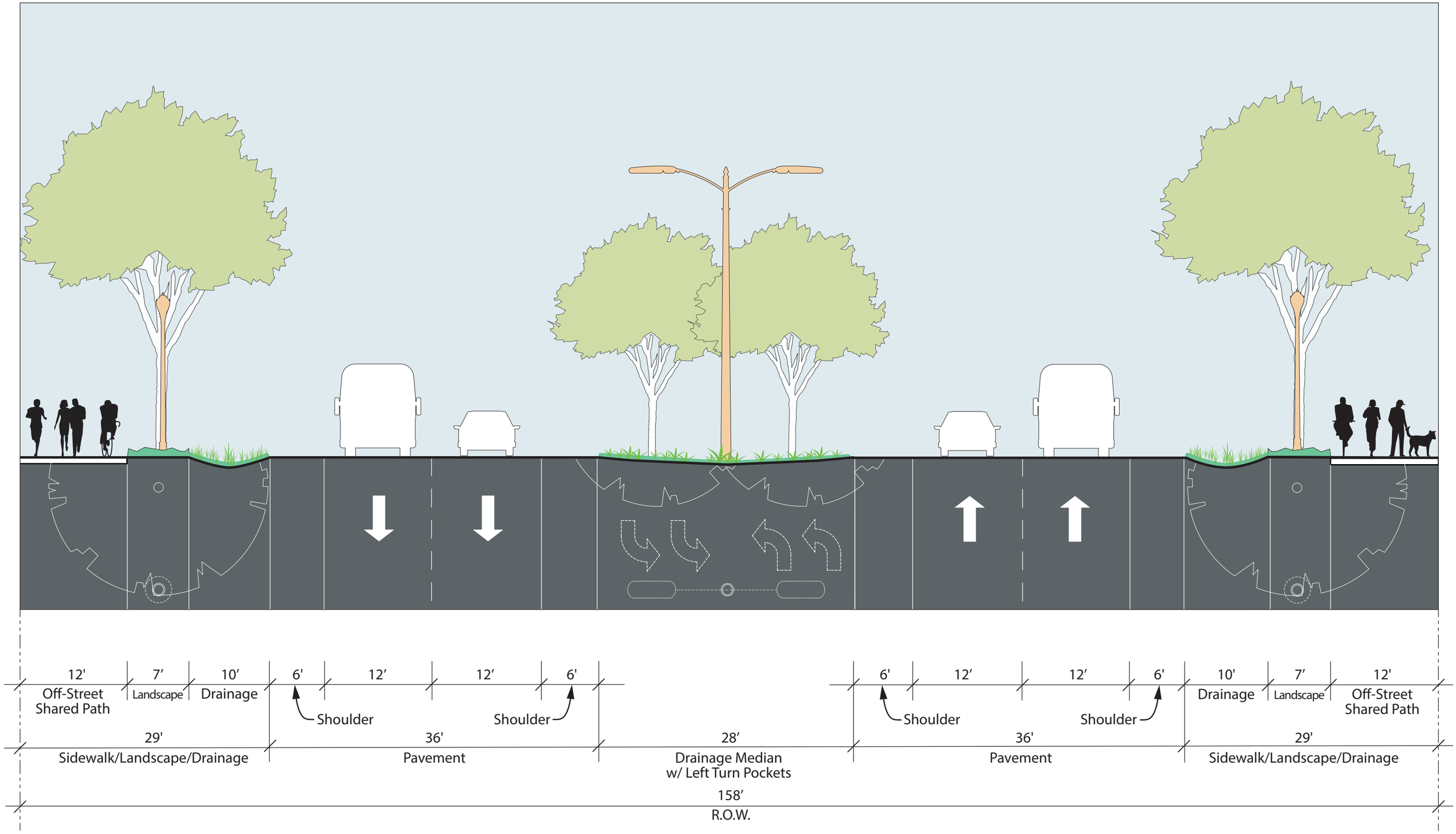
City of San Marcos TMP Update - Proposed Thoroughfare Design Standards

		Vehicular Realm												Pedestrian Realm			
Roadway Classification	**Retrofit or New Design**	**No. of Lanes**	**Anticipated Daily Traffic Volumes**	**Target Speed, mph**	**Interior Lane Widths**	**Curb Lane Widths Upto FOC**	**Shoulder**	**On-Street Parking**	**Median Widths**	**Right-of-Way Mid-Block**	**Bike Facility Type**	**Bike Buffer Width**	**Average Trip Lengths**	**Streetside Width**	**Sidewalk Width**	**Shared Use Path**	**Pedestrian Buffer Width**
Highway:																	
HW 150-72	New	4	15,000 - 35,000	45	12'	12'	6'	No	28'	150'	Off-Street	-	Over 5 Miles	25'	12'	Yes	7'
Boulevard:																	
BV 150-72	New	6	25,000 - 40,000	35	11'	12.5'	No	No	18' - 28'	150'	Off-Street	-	3 - 5 Miles	25'	12'	Yes	7'
BV 140-72	New	6	25,000 - 40,000	35	11'	12.5'	No	No	18' - 28'	140'	Off-Street	-	3 - 5 Miles	25'	12'	Yes	7'
BV 125-72	New	6	25,000 - 40,000	35	11'	12.5'	No	No	18'	125'	Off-Street	-	3 - 5 Miles	17.5'	10.5'	Yes	7'
BV 125-63	New	4	12,000 - 30,000	35	11'	12.5	No	8' Parking Lane	18'	125'	One-Way CT	3'	1 - 5 Miles	12'	5'	No	7'
BV 115-71	New	4	12,000 - 30,000	35	11'	12.5'	No	8' Parking Lane	8'	115'	One-Way CT	7	2 - 5 Miles	22'	7'	No	-
BV 110-50	New	4	12,000 - 30,000	35	-	12.5'	No	No	18'	110'	One-Way CT	7	1 - 5 Miles	21'	7'	Optional	-
BV 100-50	New	4	12,000 - 30,000	35	-	12.5'	No	No	17'	100'	Off-Street	-	1 - 5 Miles	12', 21'	5', 12'	One side	7'
BV 100-41	Both	2	6,000 - 15,000	30-35	-	12.5	No	8' Parking Lane	12'-15'	100'	One-Way CT	3'	1 - 3 Miles	12'-13.5'	5'	No	7'-8.5'
Avenue:																	
AV 100-50	New	3	4,000 - 15,000	30-35	11'	-	No	8' Parking Lane	12' [3]	100'	One-Way CT	3'	1 - 3 Miles	25'	8'	Optional	7"
AV 100-47	Retrofit	4	10,000 - 20,000	30-35	11'	12.5'	No	No	-	100'	One-Way CT	6'	1 - 3 Miles	13.5'	6.5'	Optional	7'
AV 82-43A	Retrofit	3	4,000 - 15,000	30-35	11'	12.5	No	8' Parking Lane [2]	11.5' [3]	82'	One-Way CT	1'-3'	1 - 3 Miles	10.5'	8.5' [4]	No	7'
AV 82-43B	Retrofit	3	4,000 - 15,000	30-35	11'	12.5	No	8' Parking Lane [2]	11.5' [3]	82'	Off-Street	-	1 - 3 Miles	28.5'	14.5'	One side	7'
Commercial Street:																	
CS 100-50	New	2	Less than 10,000	25-30	12.5'	-	No	[5]	-	100'	One-Way CT	3'	Under 1 Mile	25'	11'	No	-
CS 90-61	New	2	Less than 10,000	25-31	13.5	-	No	17' Diagonal Parking	-	90'	Shared Lane	-	Under 1 Mile	14.5	14.5' [6]	No	-
CS 90-40	New	2	Less than 10,000	25-30	12'	-	No	8' Parking Lane	-	90'	One-Way CT	3'	Under 1 Mile	15'	15' [6]	No	-
CS 80-51	Retrofit	2	Less than 10,000	25-30	12.5'-13.5'	-	No	[5]	-	80'	Shared Lane	-	Under 1 Mile	14.5'	7.5'	No	7'
CS 70-40	New	2	Less than 10,000	25-30	12'	-	No	8' Parking Lane	-	70'	Shared Lane	-	Under 1 Mile	15'	8'	No	7'
CS 60-36	New	2	Less than 10,000	25-30	10'	-	No	8' Parking Lane	-	60'	Shared Lane	-	Under 1 Mile	12'	5'	No	7'
CS 44-20	New	1	Less than 10,000	25-30	12'	-	No	8' Parking Lane	-	44'	Shared Lane	-	Under 1 Mile	12'	5'	No	7'
Residential Street:																	
RS 60/70-30	New	2	Less than 1,000	20-25	10'	12'	No	8' Parking Zone	-	60'-70'	Off-Street	-	Under 1 Mile	11'	4'	No	7'
RS 52-30A	New	1 [1]	Less than 1,000	20-25	14'	-	No	8' Parking Zone	-	52'	Shared Lane	-	Under 1 Mile	11'	4'	No	7'
RS 52-30B	New	1 [1]	Less than 1,000	20-25	10'	12'	No	8' Parking Lane [2]	-	52'	Shared Lane	-	Under 1 Mile	11'	4'	No	7'
RS 52-30C	New	1 [1]	Less than 1,000	20-25	10'	12'	No	8' Parking Lane [2]	-	52'	Shared Lane	-	Under 1 Mile	11'	4'	No	7'
Road:																	
RD 50-18	New	1 [1]	Less than 1,000	25	18'	-	No	No	-	40'-50'	N/A	-	Under 1 Mile	11'-16'	-	No	-
Rear Alley/Lane:																	
RA 24-24	New	1 [1]	-	15	24'	-	No	No	-	24'	N/A	-	Under 1 Mile	-	-	No	-
RA 20-15	New	1 [1]	-	15	15'	-	No	No	-	20'	N/A	-	Under 1 Mile	2.5'	-	No	-

[1] Width inadequate for separate lanes in each direction - facility is anticipated to serve two-way traffic
[2] One side only
[3] Two-way left-turn lane
[4] Includes 5' Minimum setback
[5] 8' Parking Lane one side, 17' Diagonal on the other side
[6] Includes street trees
CT - Cycle Track

Appendix D: Recommendations

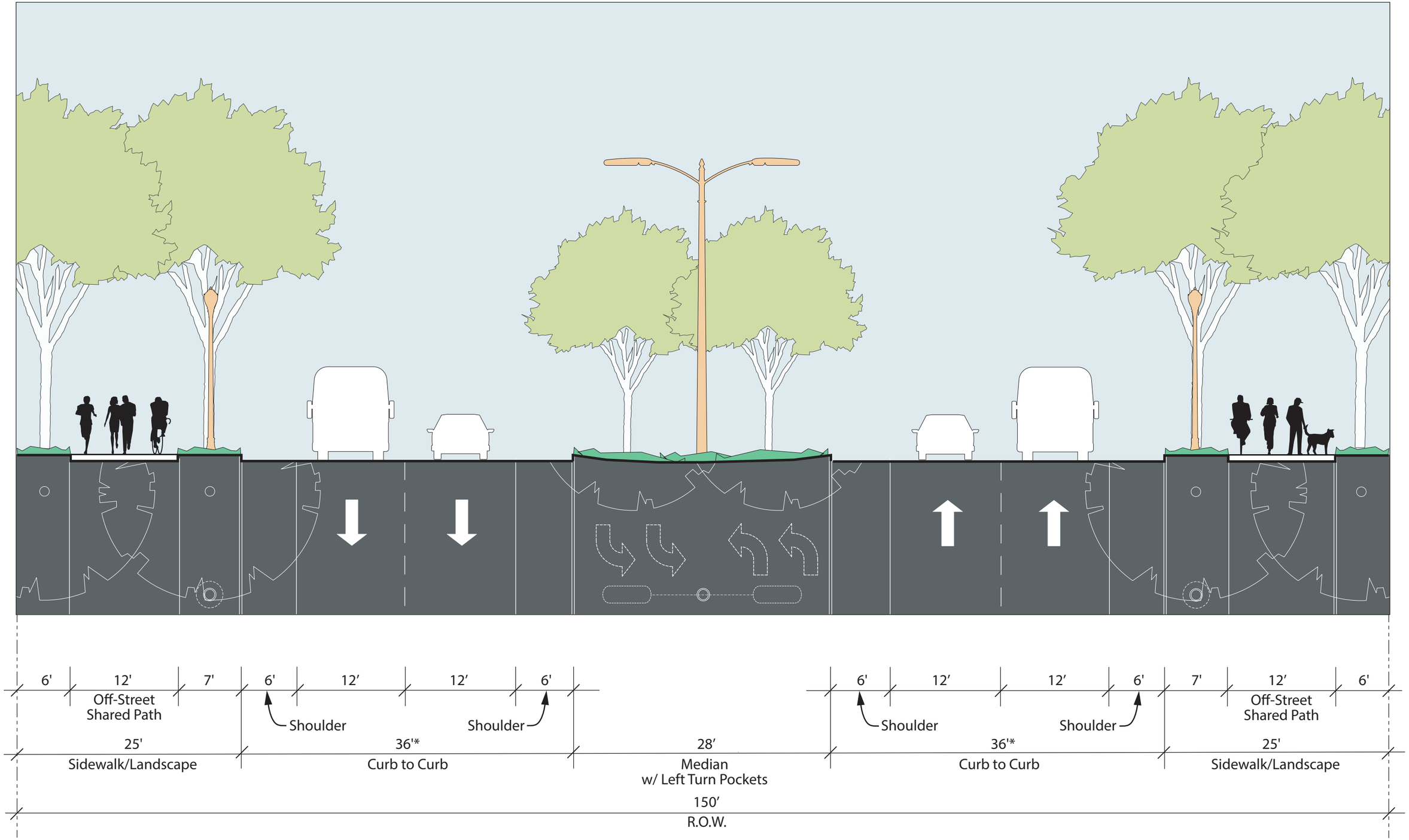
Thoroughfare Classification Typical Sections



FOUR-LANE PARKWAY WITH DRAINAGE AND OFF-STREET SHARED PATH **(HW 158-72)**

0' 5' 10 Feet

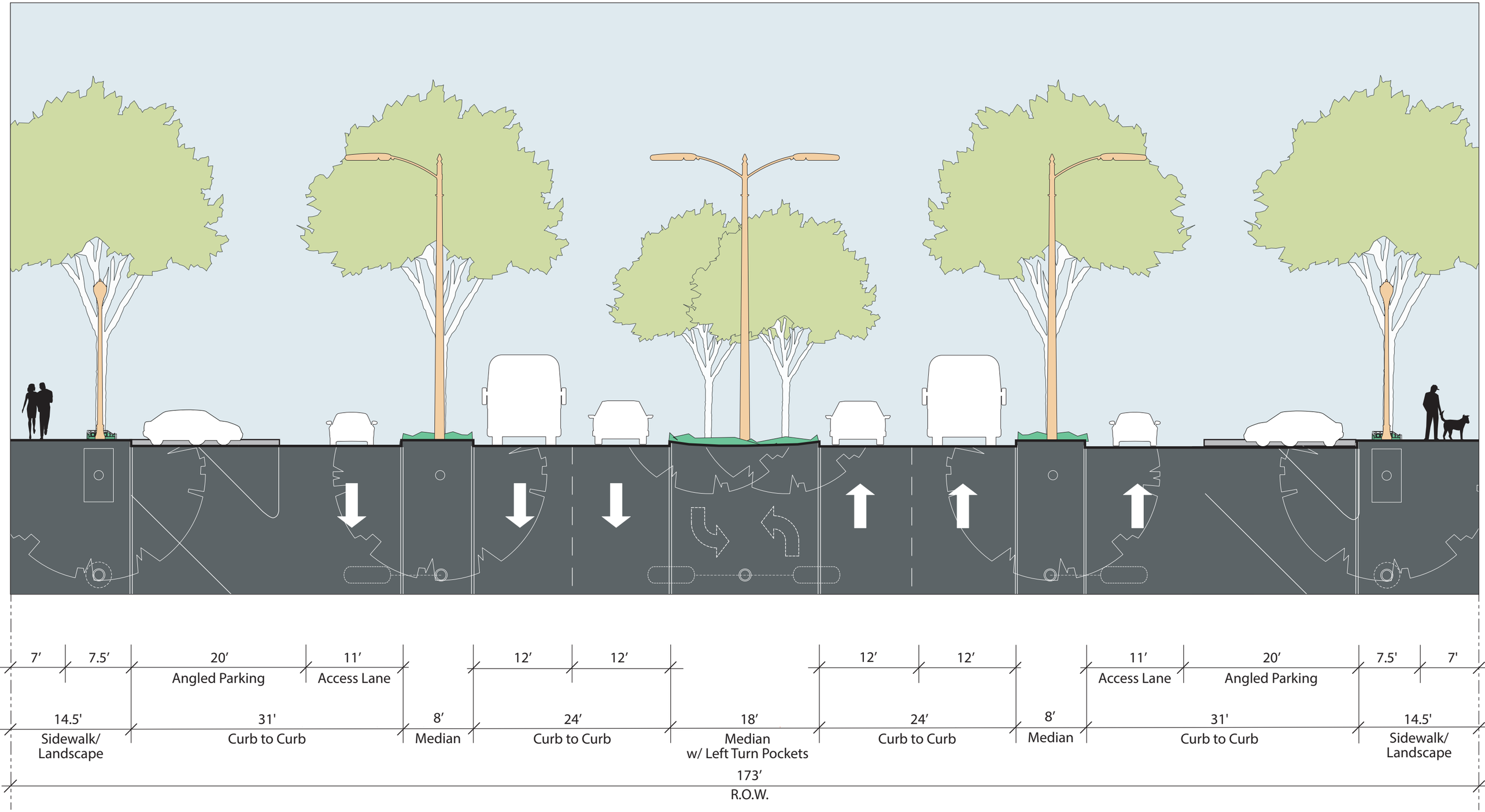
1387



FOUR-LANE PARKWAY WITH OFF-STREET SHARED PATHS **(HW 150-72)**

0' 5' 10 Feet

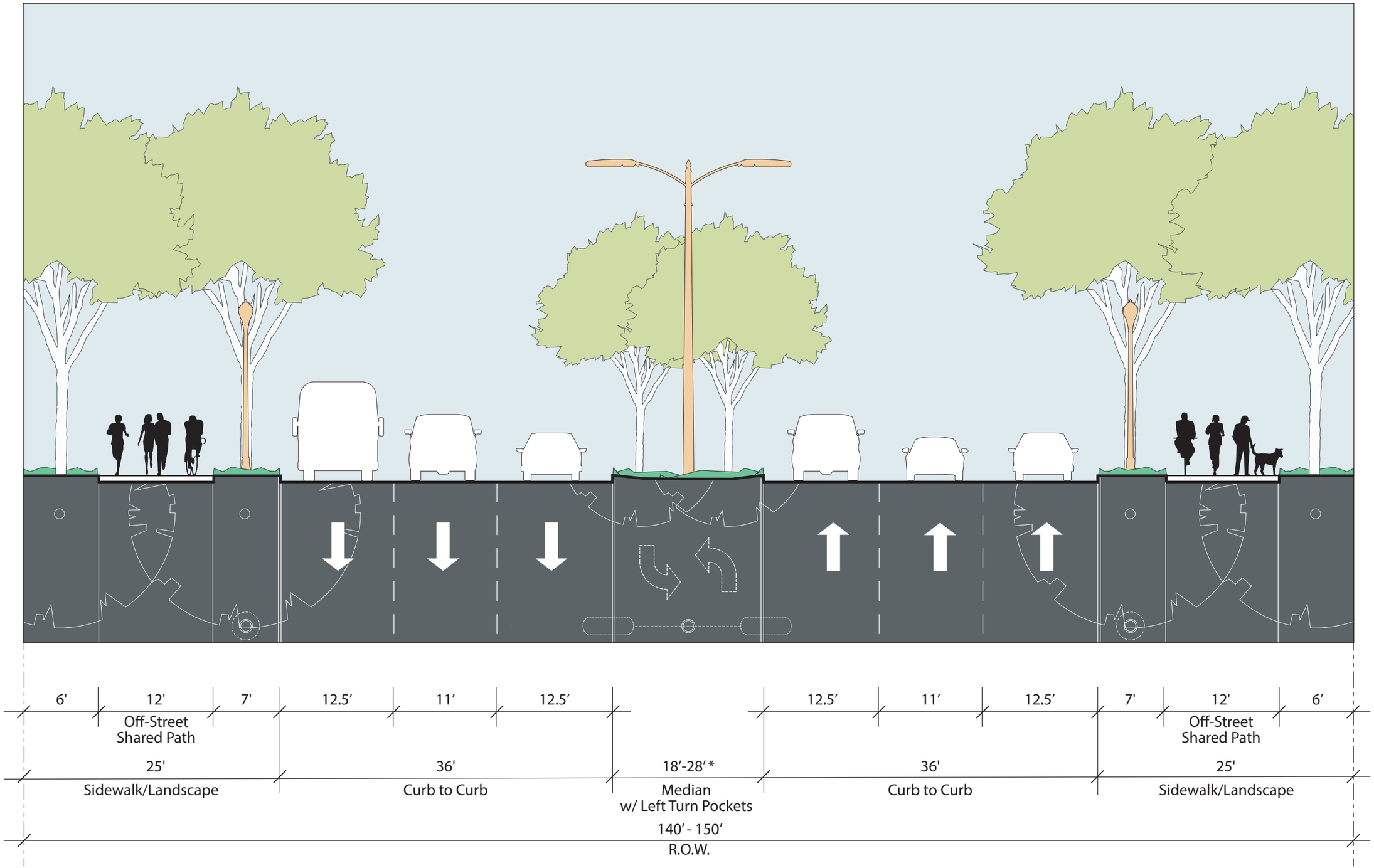
* 36' wide roadway could be converted to 3-lanes



FOUR-LANE BOULEVARD WITH ACCESSWAYS ON BOTH SIDES **(BV 173-110)**

0′ 5′ 10 Feet

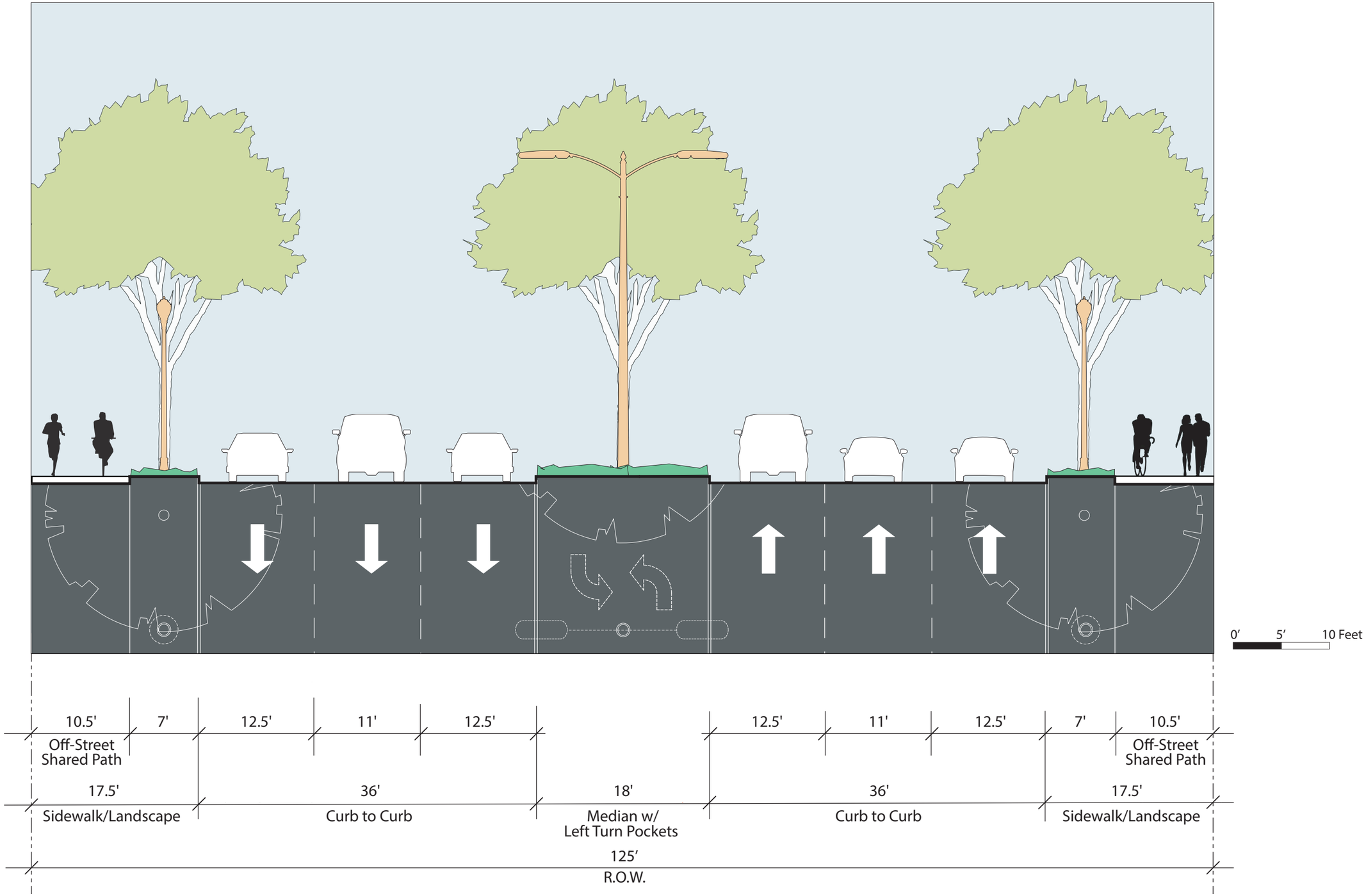
1389



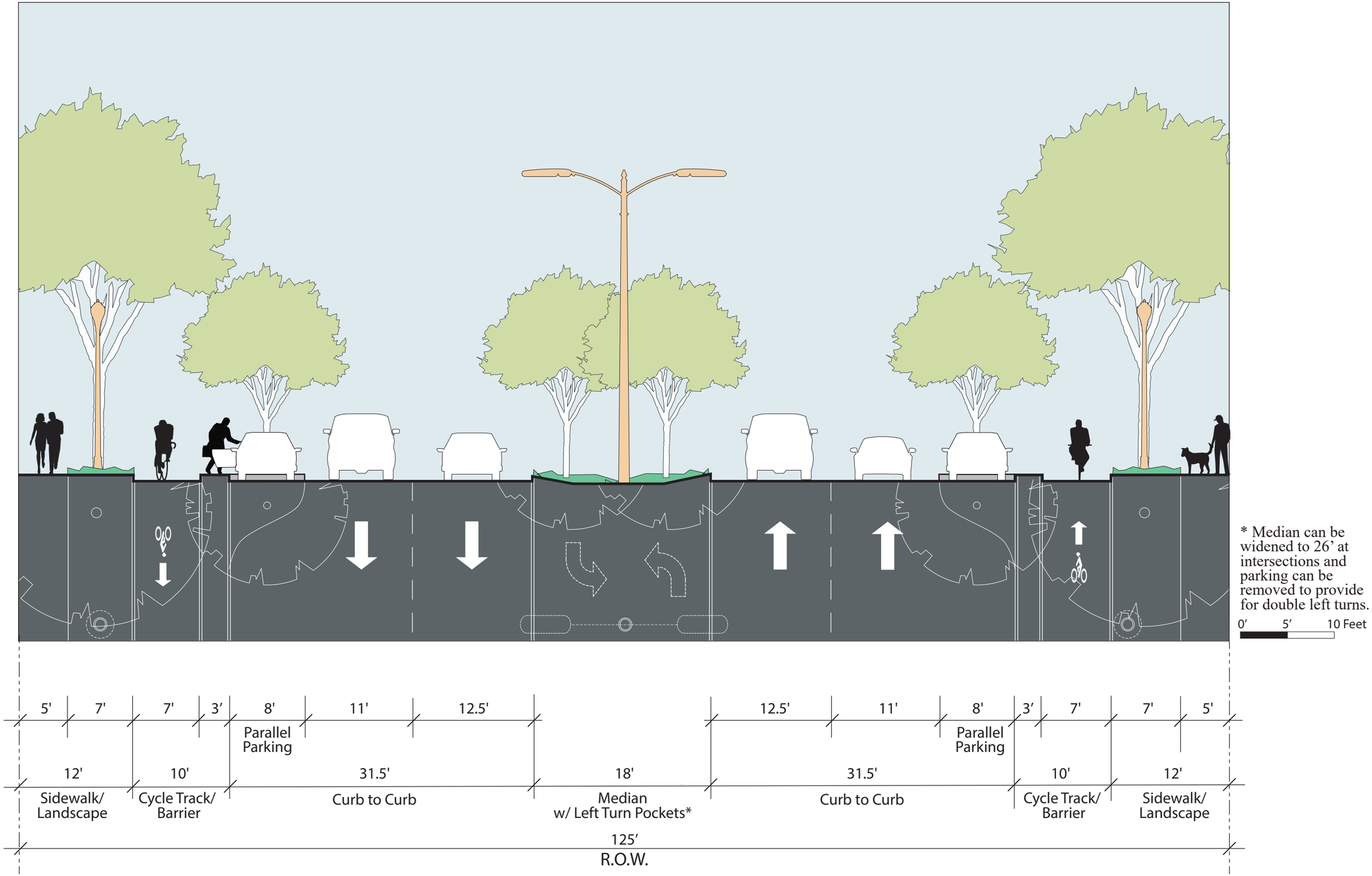
SIX-LANE BOULEVARD WITH OFF-STREET SHARED PATHS **(BV 140-72) (BV 150-72)**

0' 5' 10 Feet

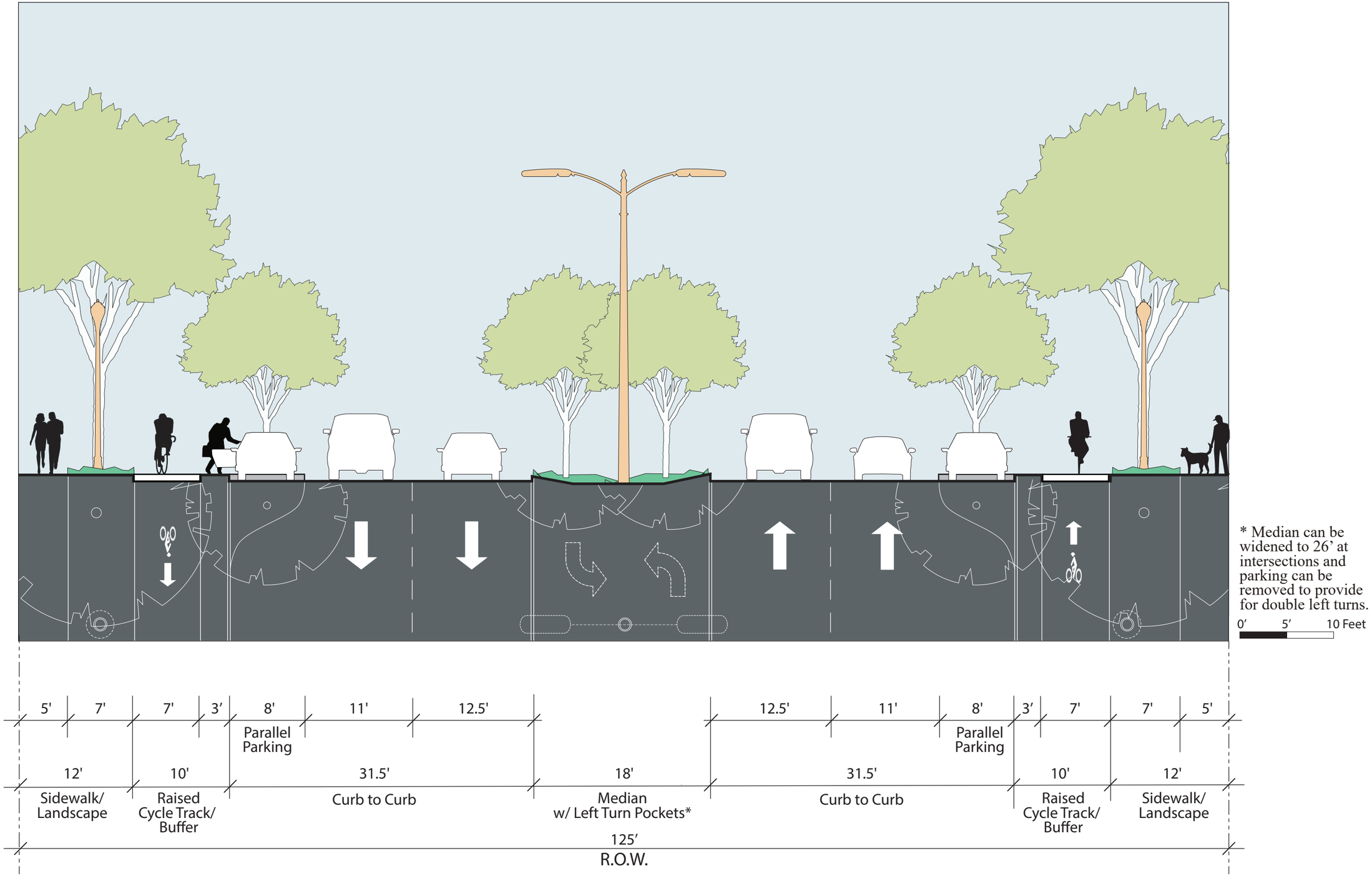
* 2 turn lanes requires 28' median.



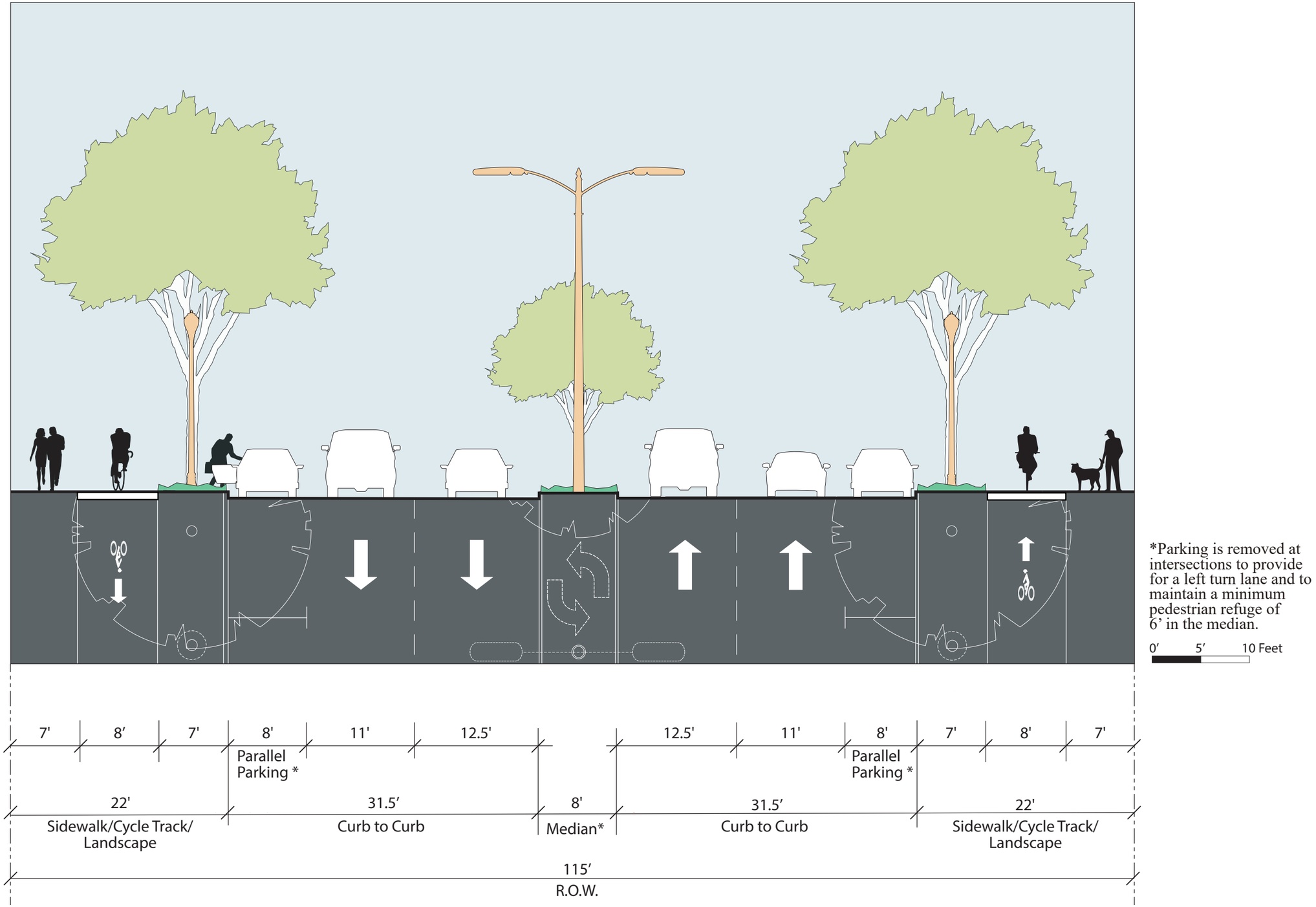
SIX-LANE BOULEVARD WITH OFF-STREET SHARED PATHS **(BV 125-72)**



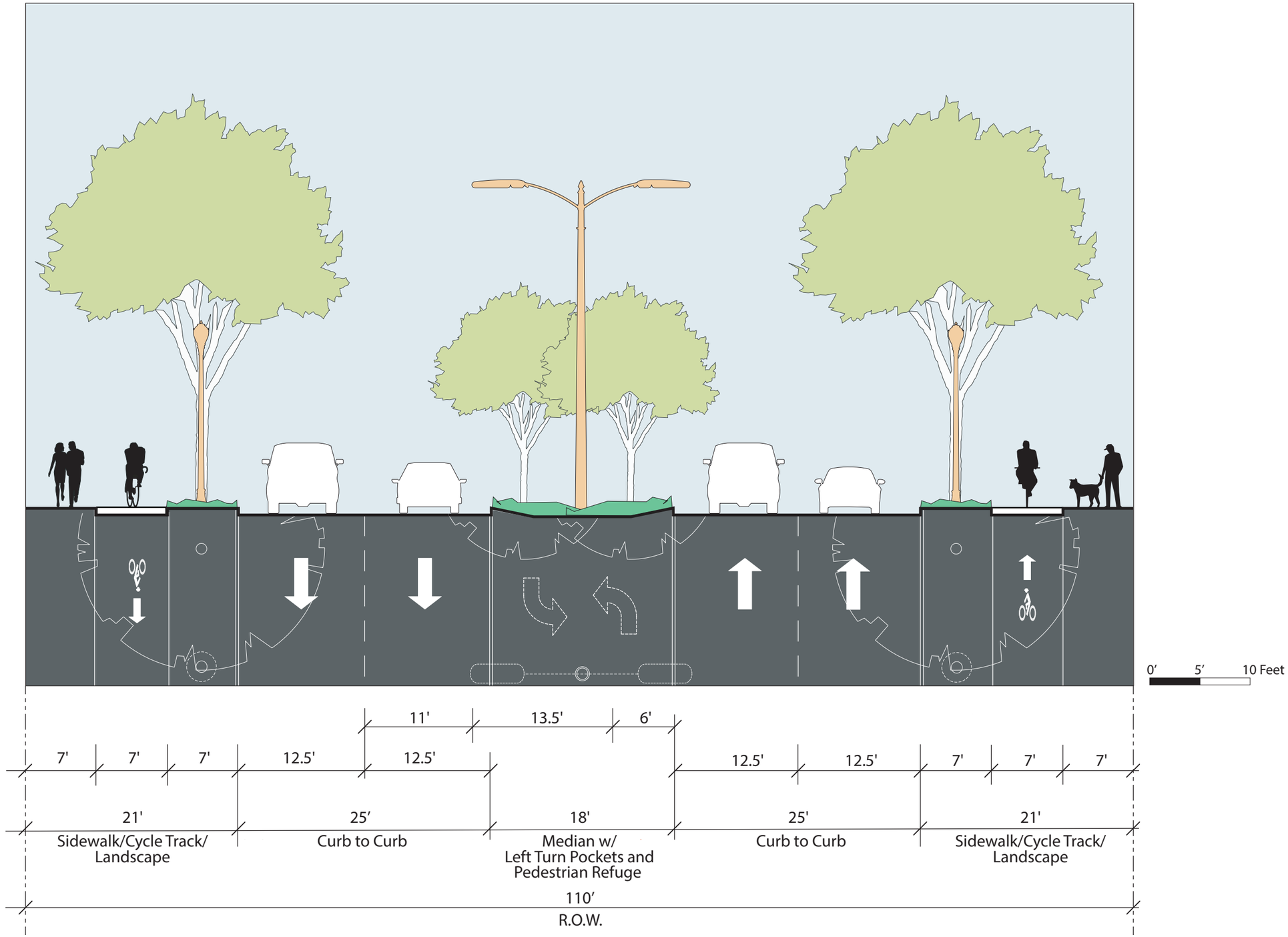
FOUR-LANE BOULEVARD WITH ON-STREET PARKING AND ONE-WAY CYCLE TRACKS **(BV 125-63)**



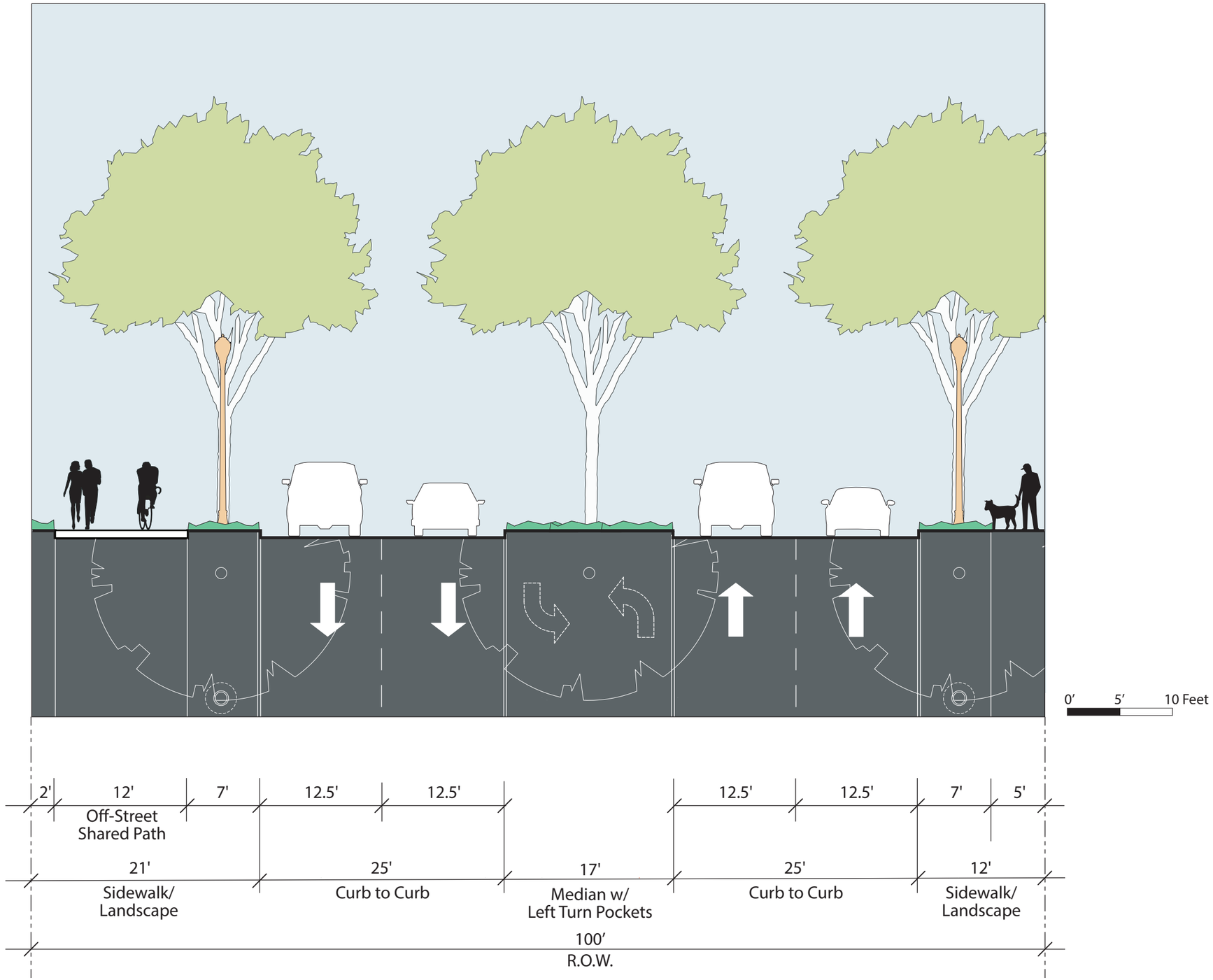
FOUR-LANE BOULEVARD WITH ON-STREET PARKING AND ONE-WAY CYCLE TRACKS **(BV 125-63)**



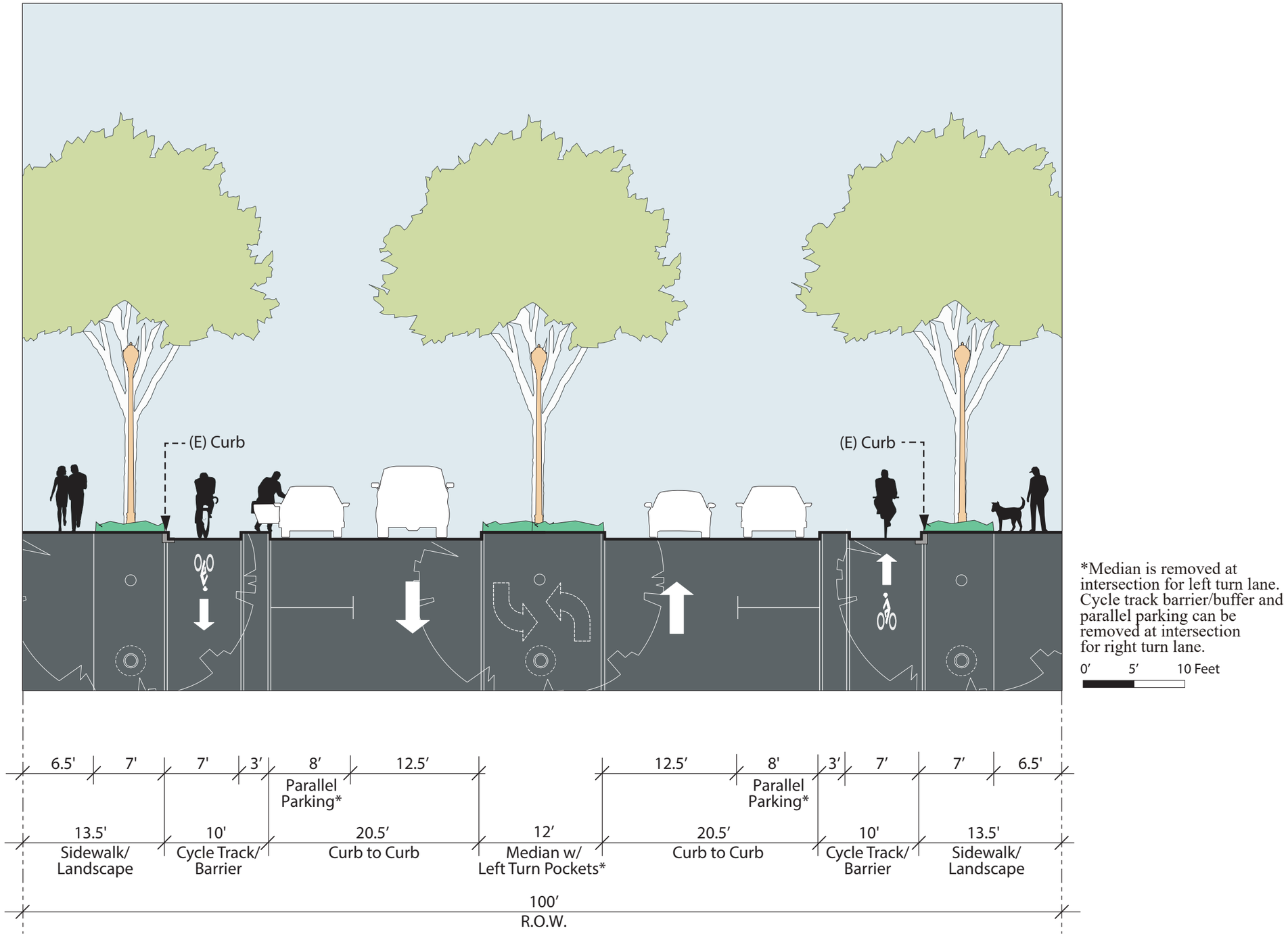
FOUR-LANE BOULEVARD WITH ON-STREET PARKING AND ONE-WAY CYCLE TRACKS (BV 115-71)



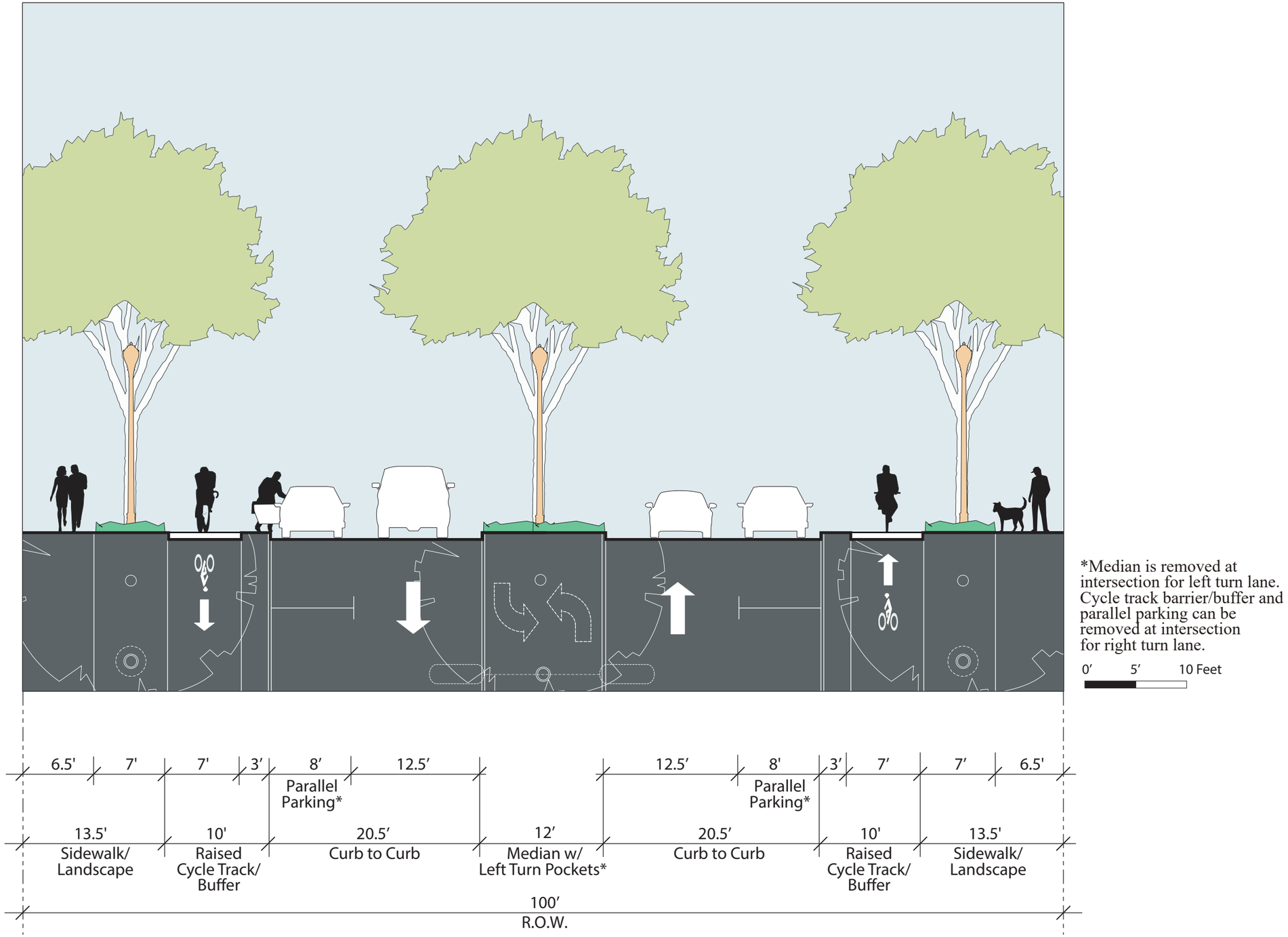
FOUR-LANE BOULEVARD WITH ONE-WAY CYCLE TRACKS **(BV 110-50)**



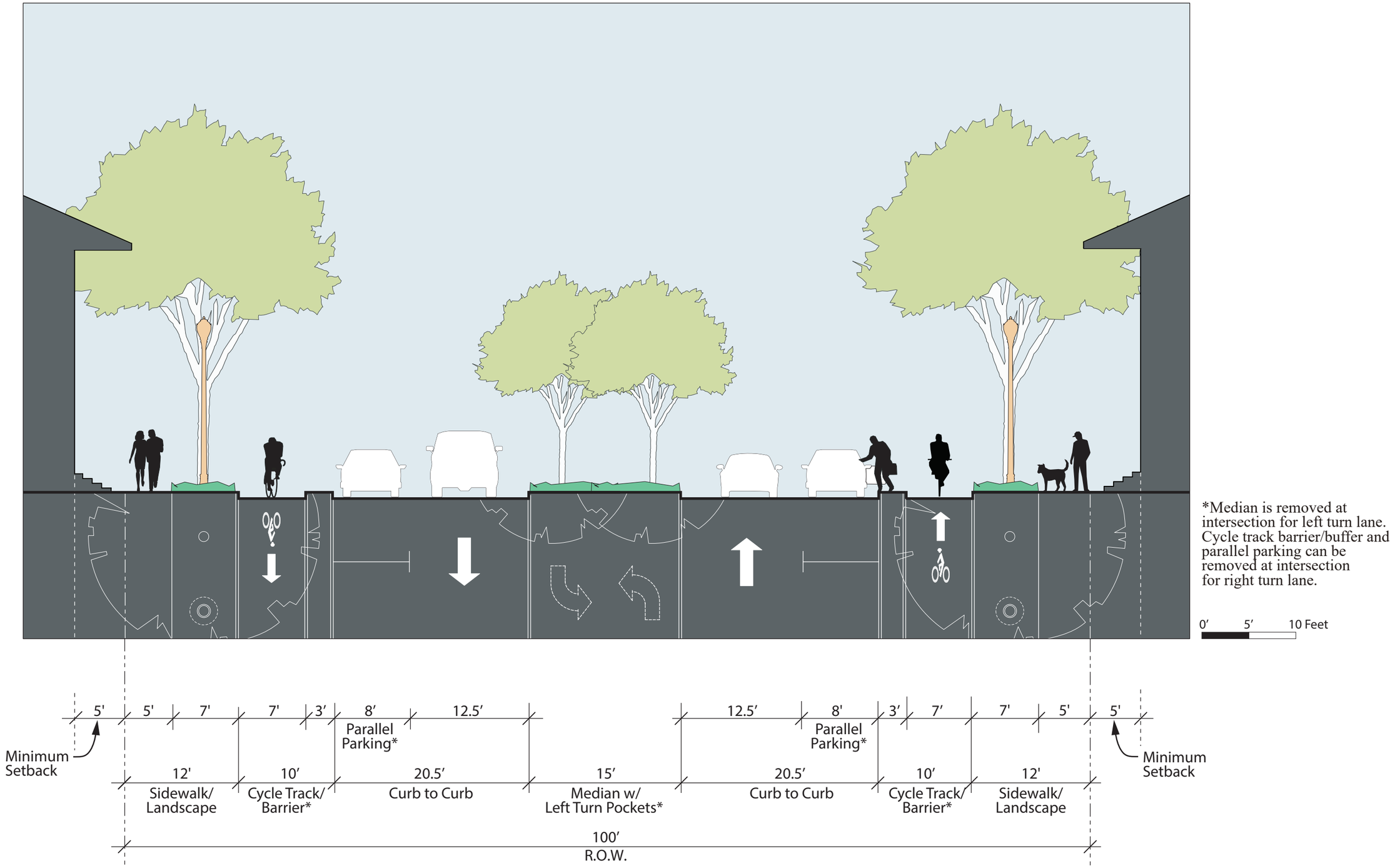
FOUR-LANE BOULEVARD WITH OFF-STREET SHARED PATH ON ONE SIDE **(BV 100-50)**



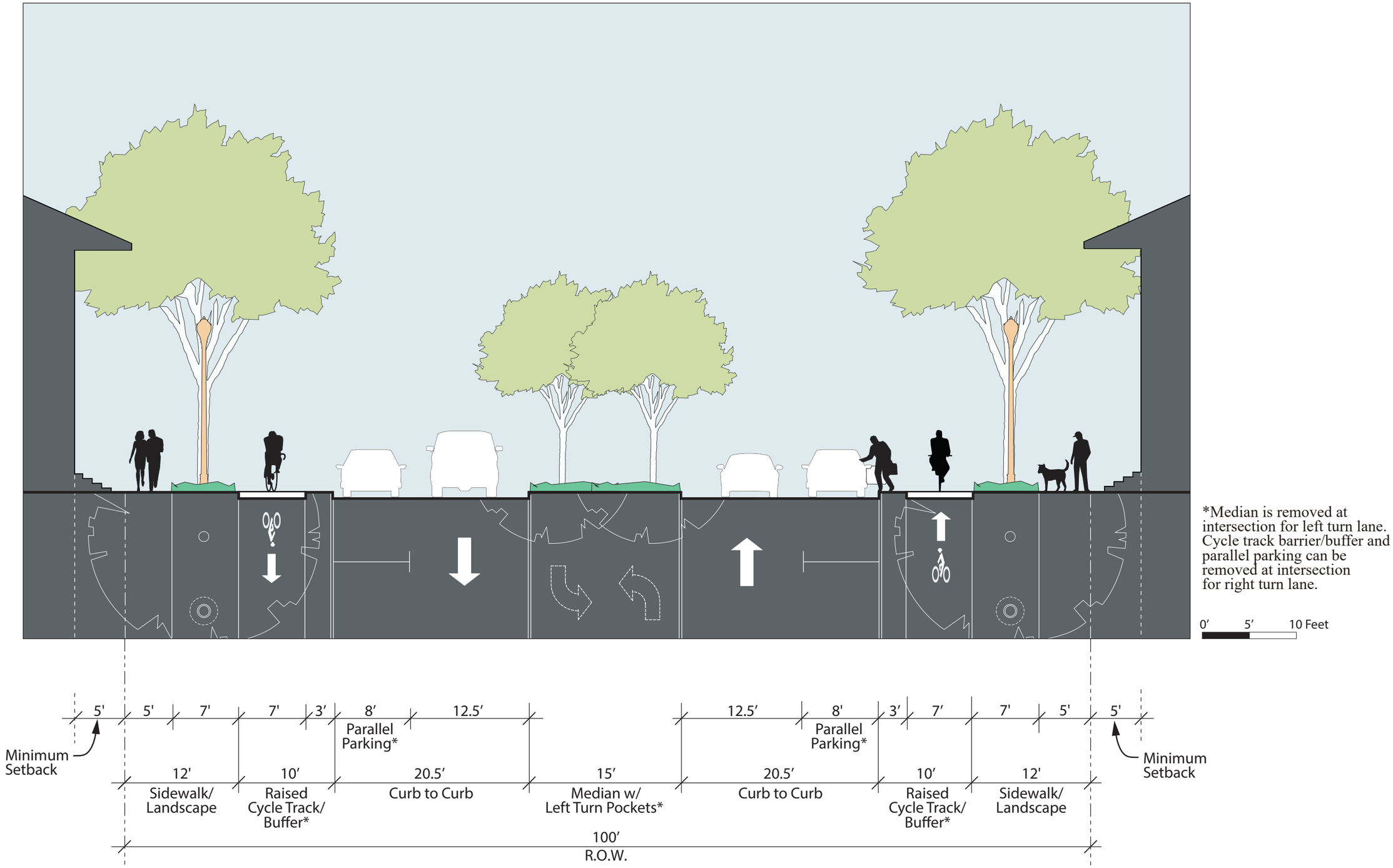
RETROFIT OF FOUR-LANE DIVIDED MAJOR ARTERIAL TO TWO-LANE BOULEVARD WITH ON-STREET PARKING AND ONE-WAY CYCLE TRACKS **(BV 100-41 Retrofit)**



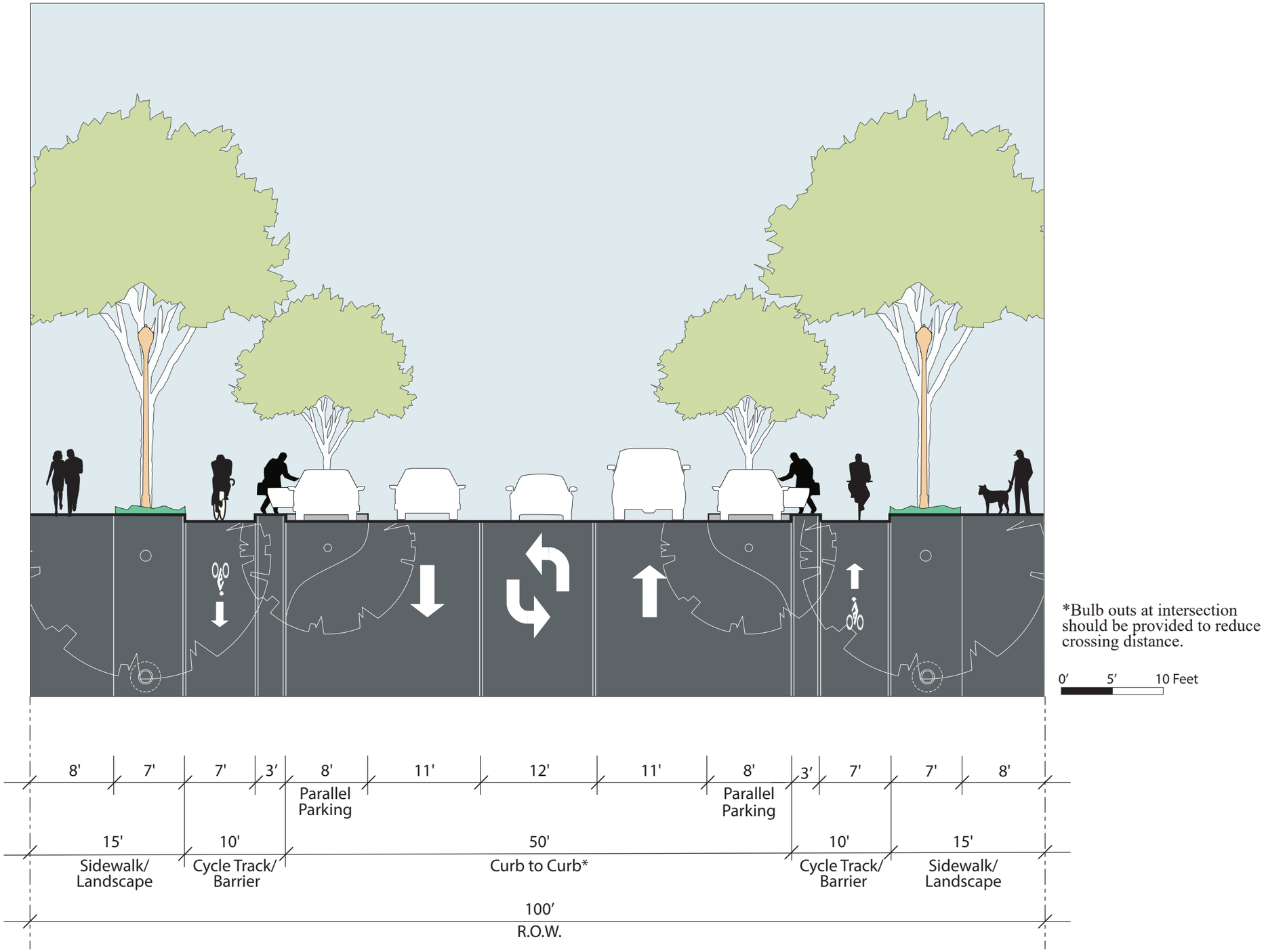
TWO-LANE BOULEVARD WITH ON-STREET PARKING AND ONE-WAY CYCLE TRACKS **(BV 100-41A)**



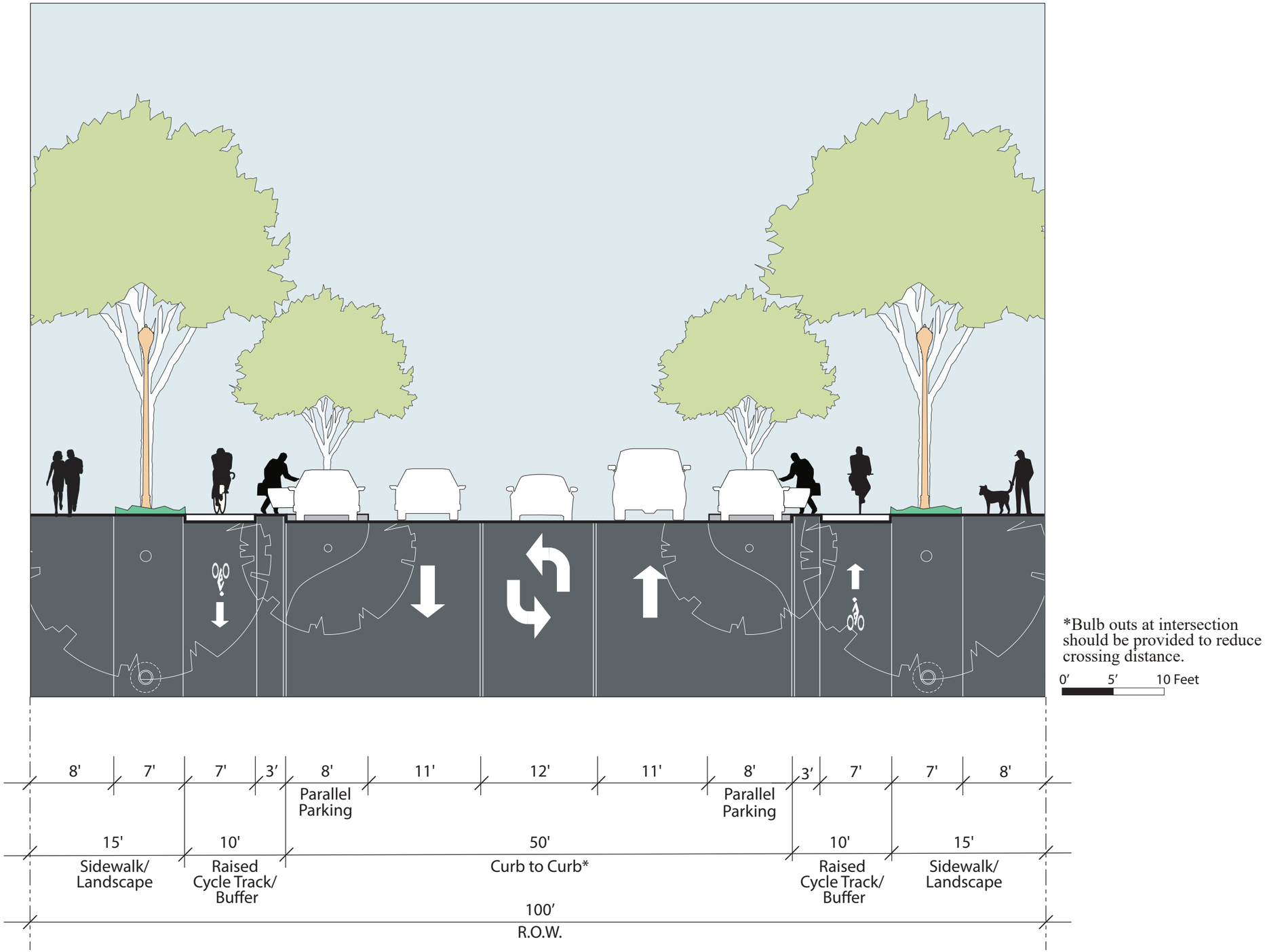
TWO-LANE BOULEVARD WITH ON-STREET PARKING AND ONE-WAY CYCLE TRACKS **(BV 100-41B)**



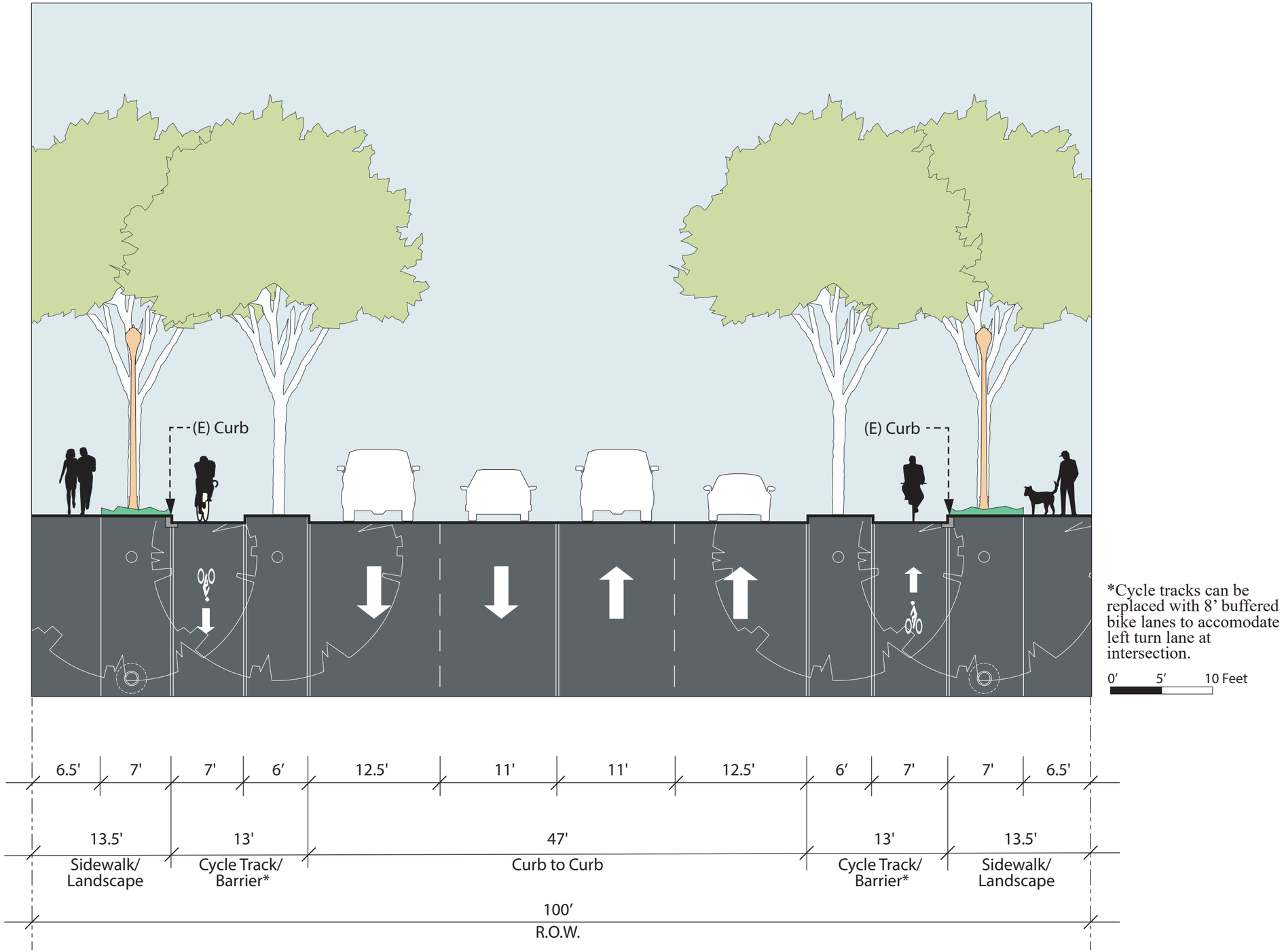
TWO-LANE BOULEVARD WITH ON-STREET PARKING AND ONE-WAY CYCLE TRACKS **(BV 100-41B)**



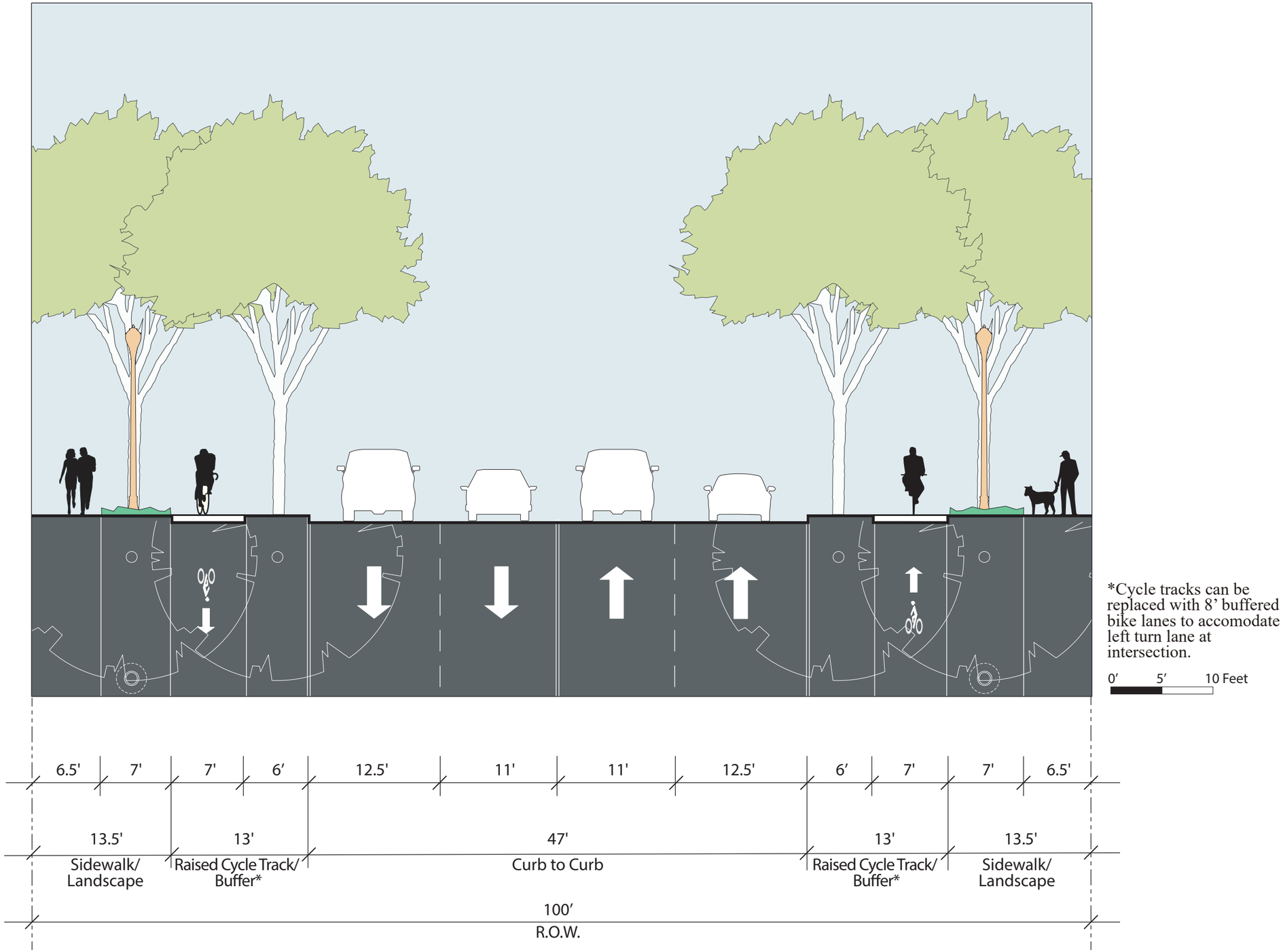
THREE-LANE AVENUE WITH ONE-WAY CYCLE TRACKS AND ON-STREET PARKING **(AV 100-50)**



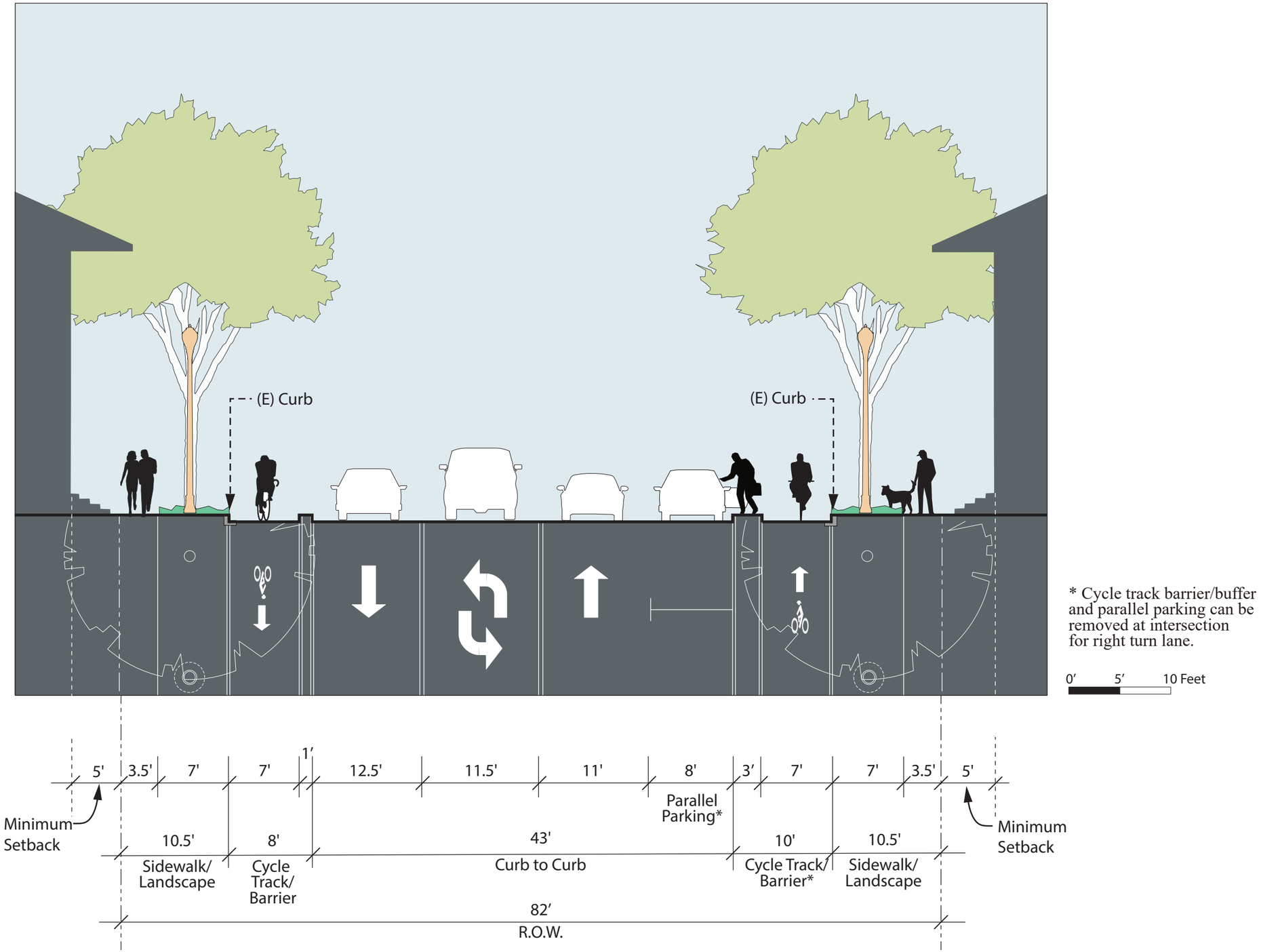
THREE-LANE AVENUE WITH ONE-WAY CYCLE TRACKS AND ON-STREET PARKING **(AV 100-50)**



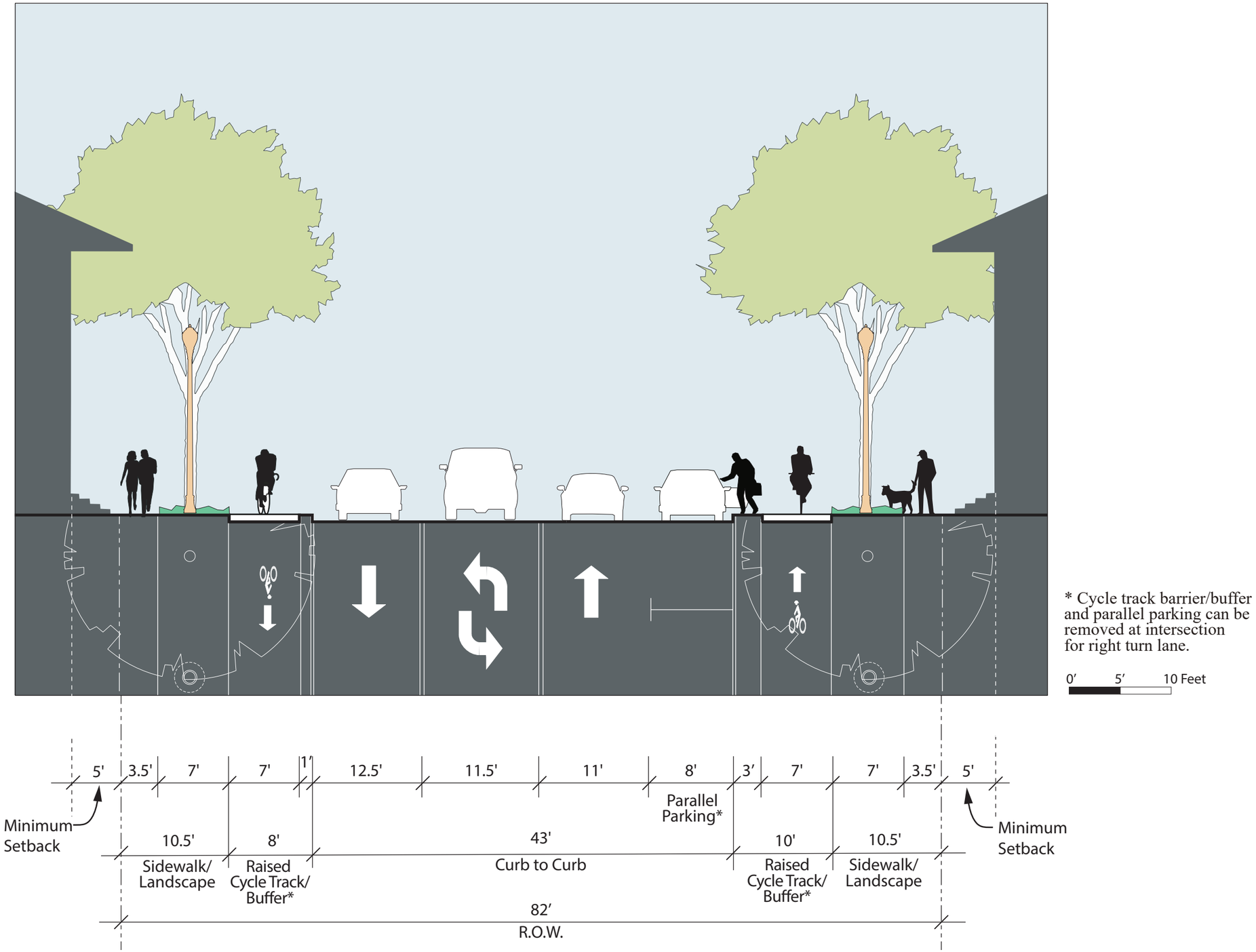
RETROFIT OF FOUR-LANE DIVIDED MAJOR ARTERIAL TO FOUR-LANE AVENUE
WITH ONE-WAY CYCLE TRACKS **(AV 100-47 Retrofit)**



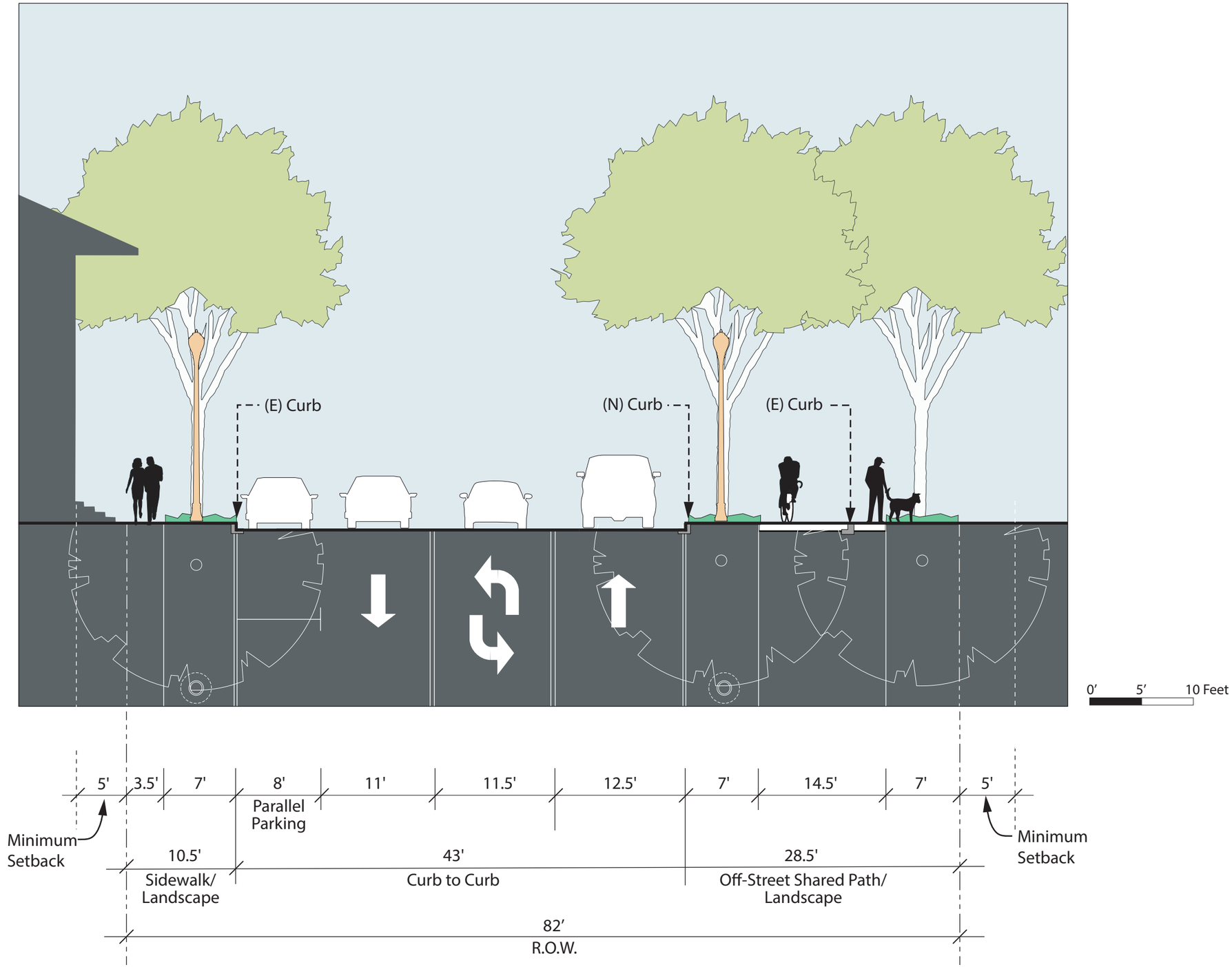
FOUR-LANE AVENUE WITH ONE-WAY CYCLE TRACKS **(AV 100-47)**



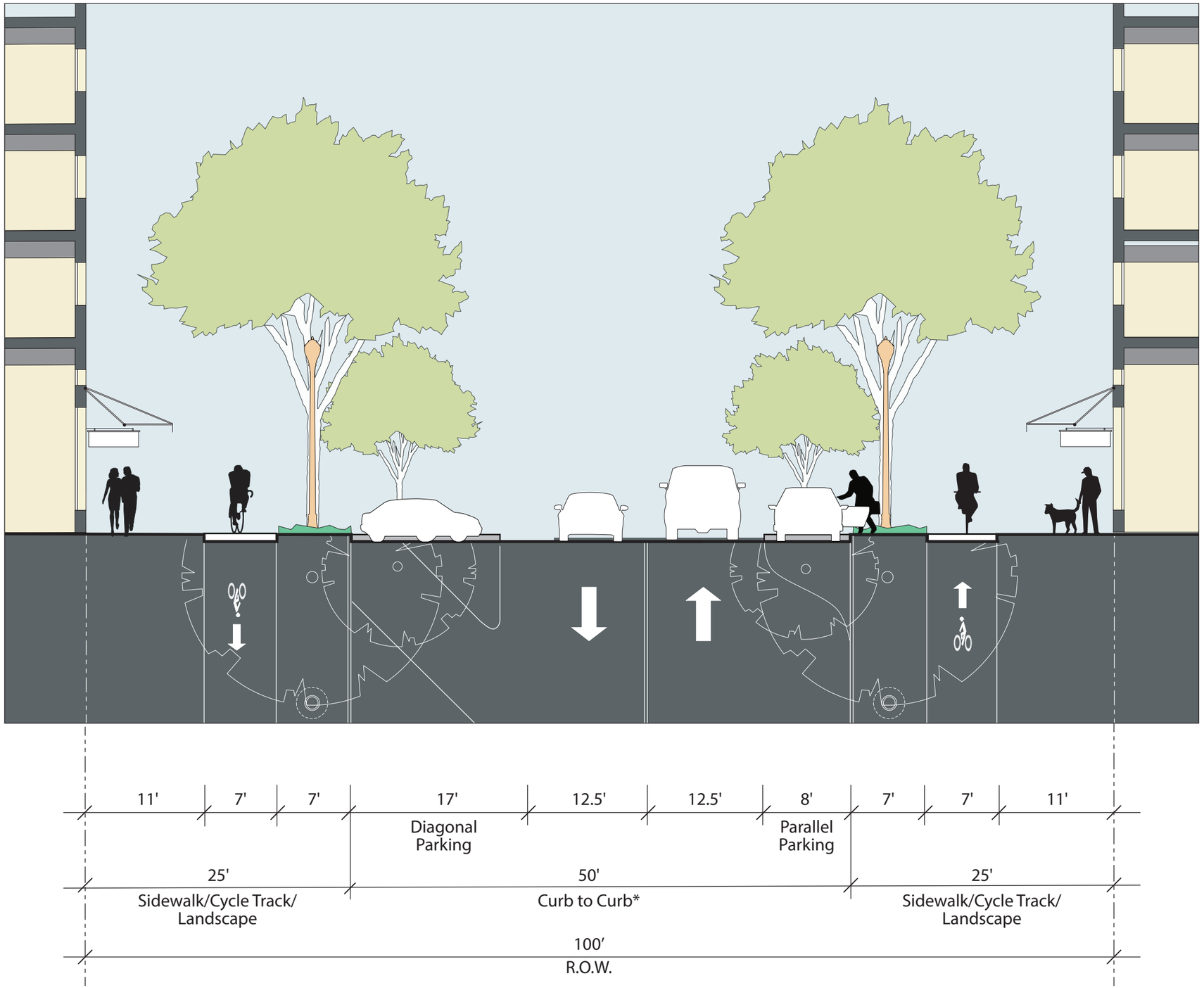
RETROFIT OF FOUR-LANE UNDIVIDED MINOR ARTERIAL TO THREE-LANE AVENUE WITH ONE-WAY CYCLE TRACKS AND ON-STREET PARKING ON ONE SIDE **(AV 82-43 Retrofit A)**



THREE-LANE AVENUE WITH ONE-WAY CYCLE TRACKS AND ON-STREET PARKING ON ONE SIDE **(AV 82-43)**



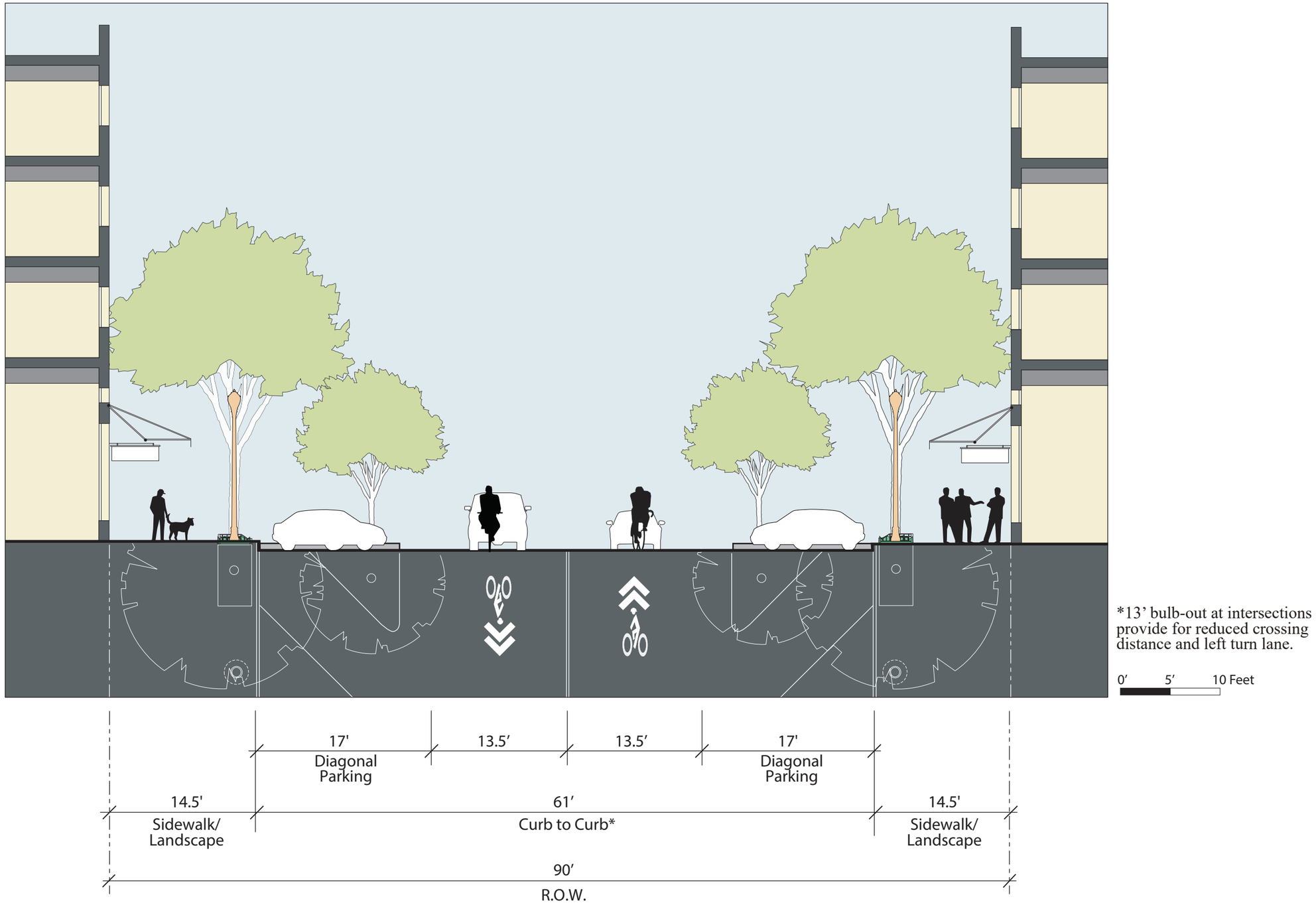
RETROFIT OF FOUR-LANE UNDIVIDED MINOR ARTERIAL TO THREE-LANE AVENUE
WITH OFF-STREET SHARED PATH AND ON-STREET PARKING ON ONE SIDE **(AV 82-43 Retrofit B)**



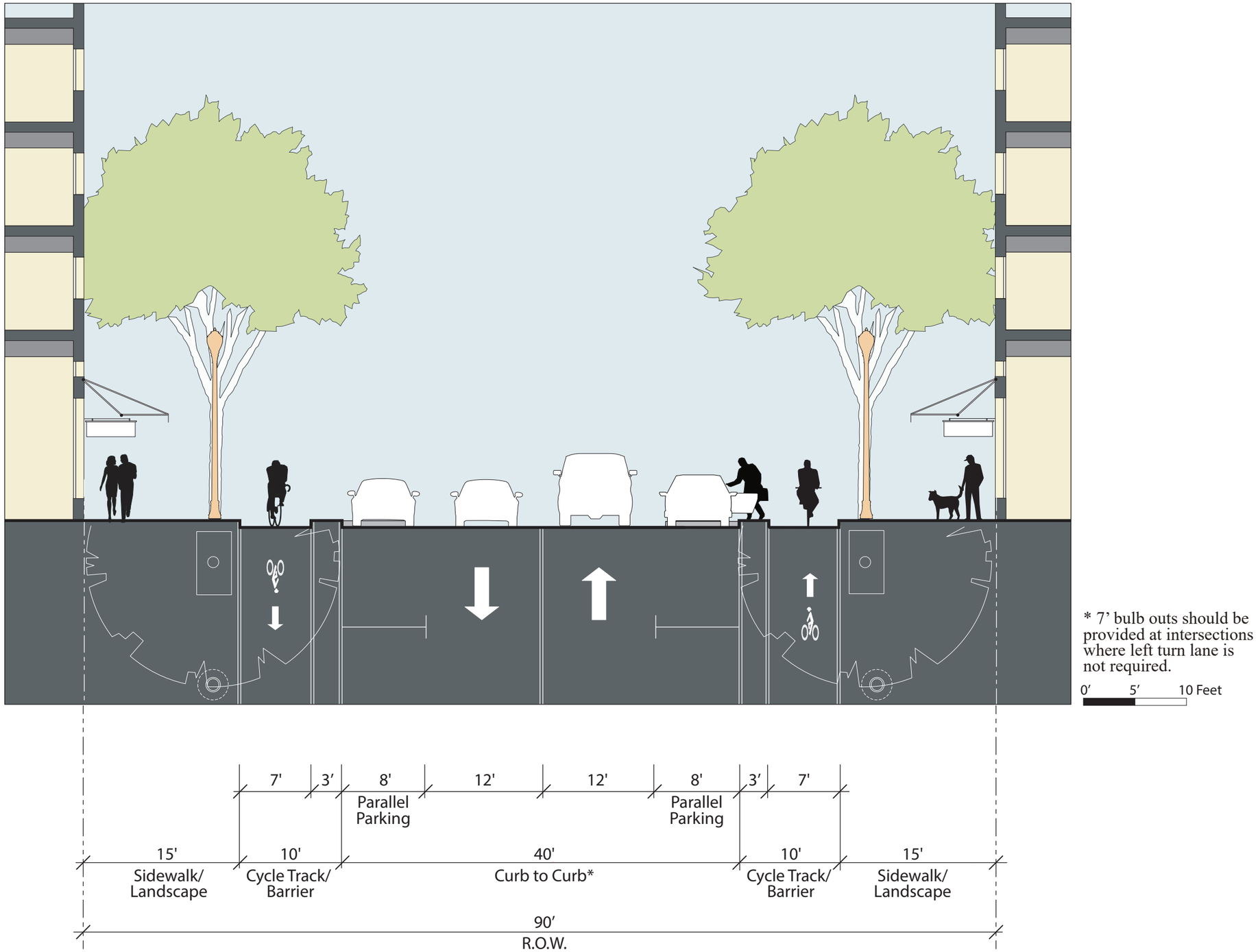
*7' bulb-out at intersections provide for reduced crossing distance and left turn lane.

0' 5' 10 Feet

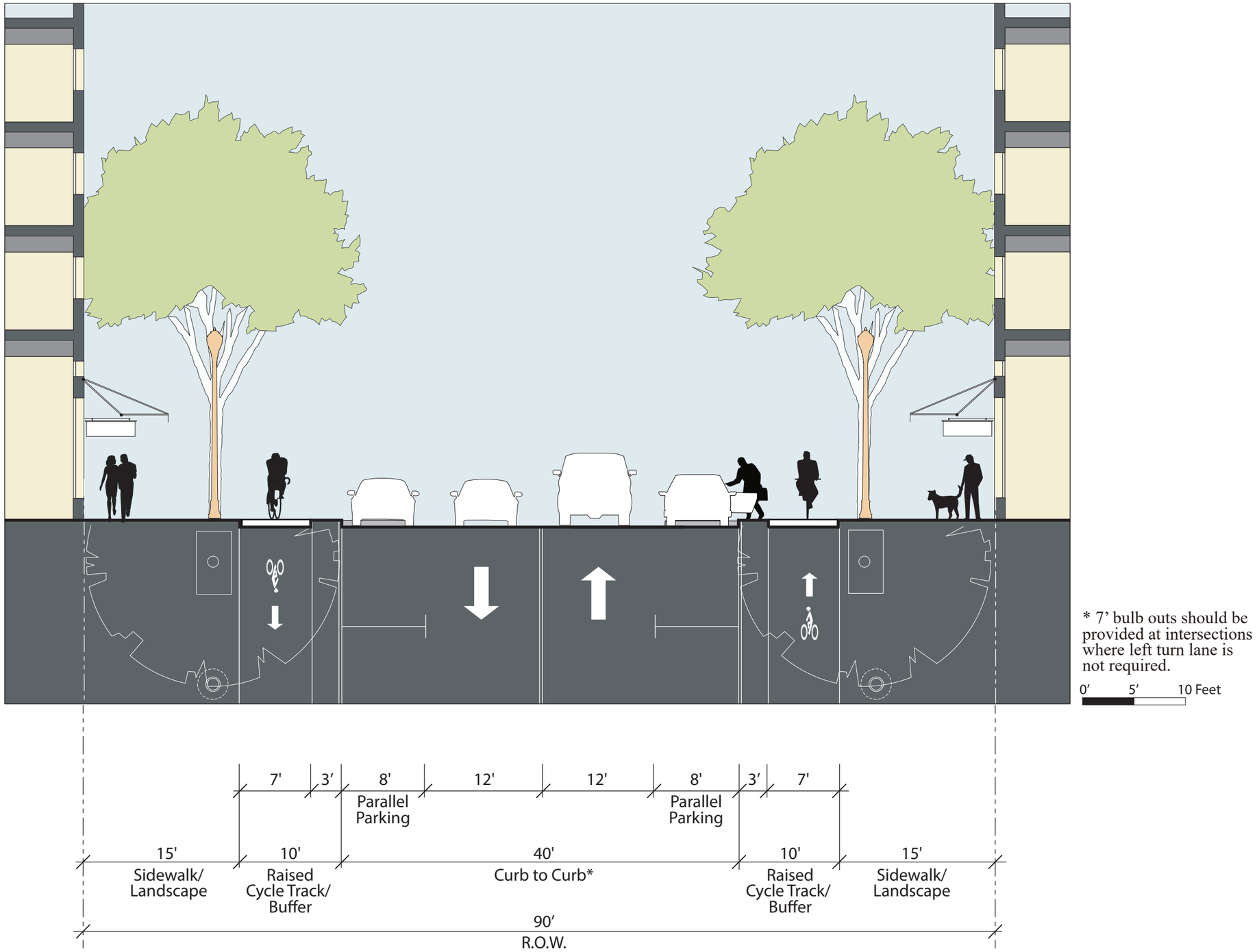
TWO-LANE COMMERICAL STREET WITH DIAGONAL AND PARALLEL PARKING AND ONE-WAY CYCLE TRACKS **(CS 100-50)**



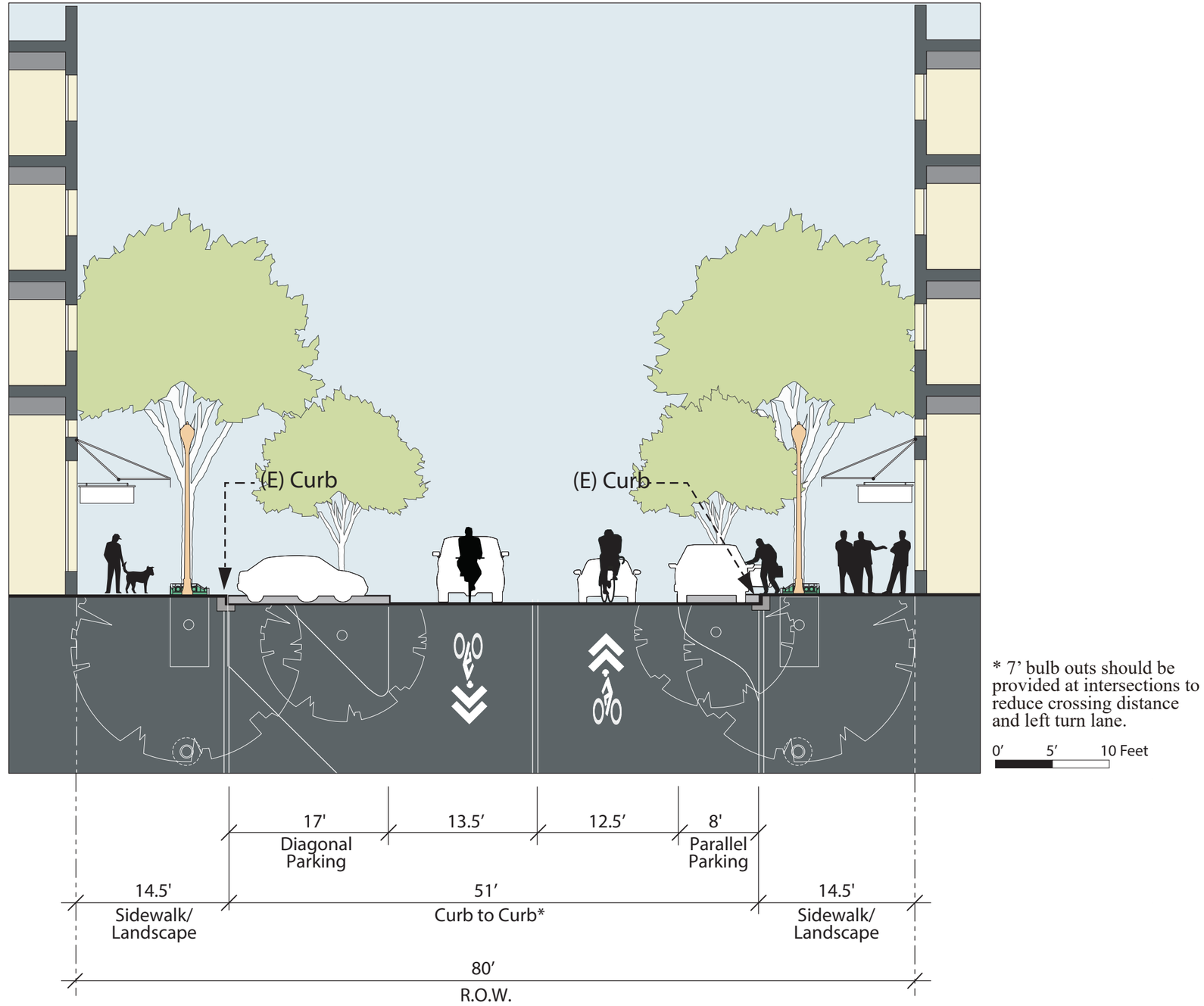
TWO-LANE COMMERCIAL STREET WITH DIAGONAL PARKING AND SHARROWS **(CS 90-61)**



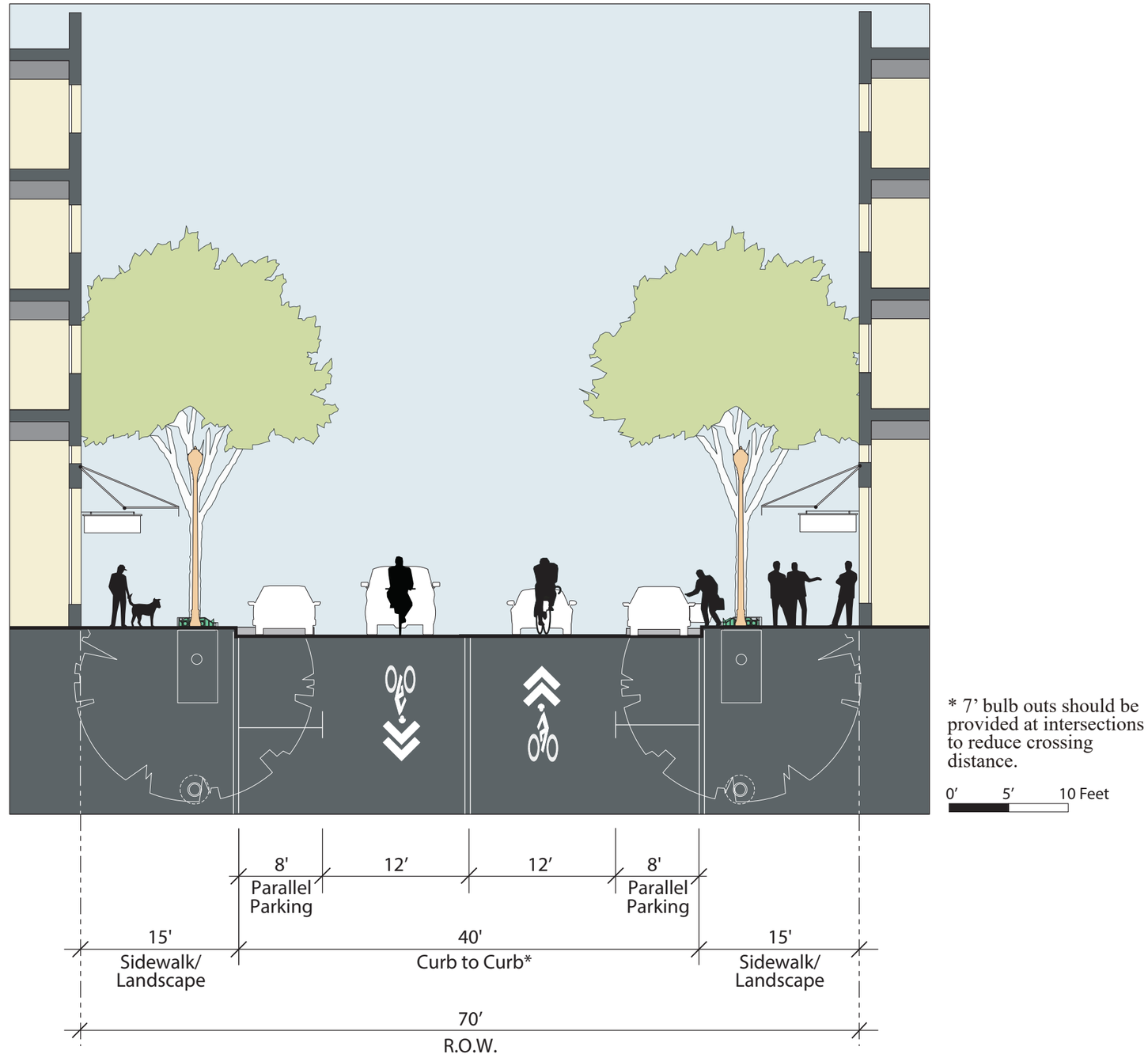
TWO-LANE COMMERCIAL STREET WITH ONE-WAY CYCLE TRACKS AND ON-STREET PARKING **(CS 90-40)**



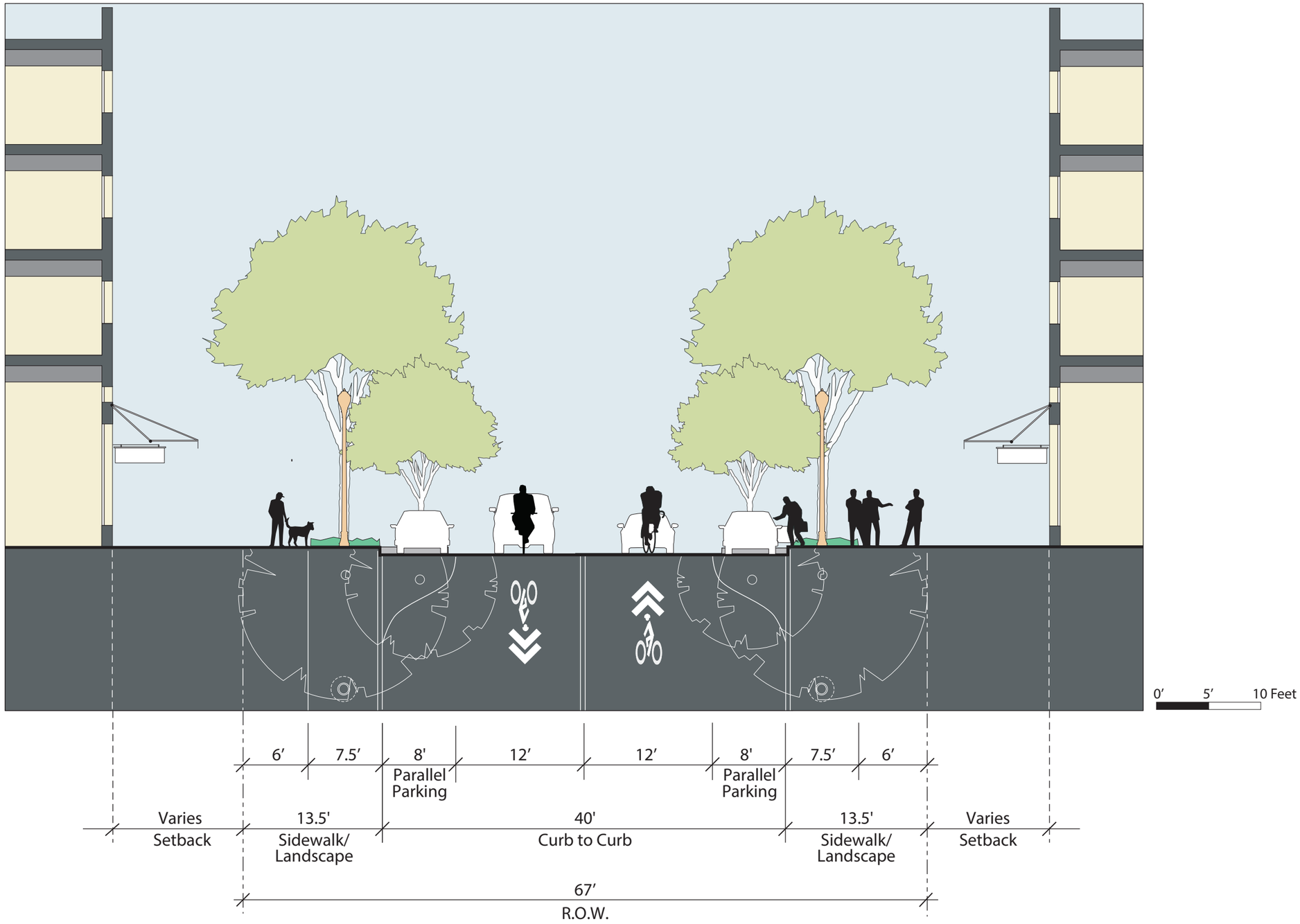
TWO-LANE COMMERCIAL STREET WITH ONE-WAY CYCLE TRACKS AND ON-STREET PARKING **(CS 90-40)**



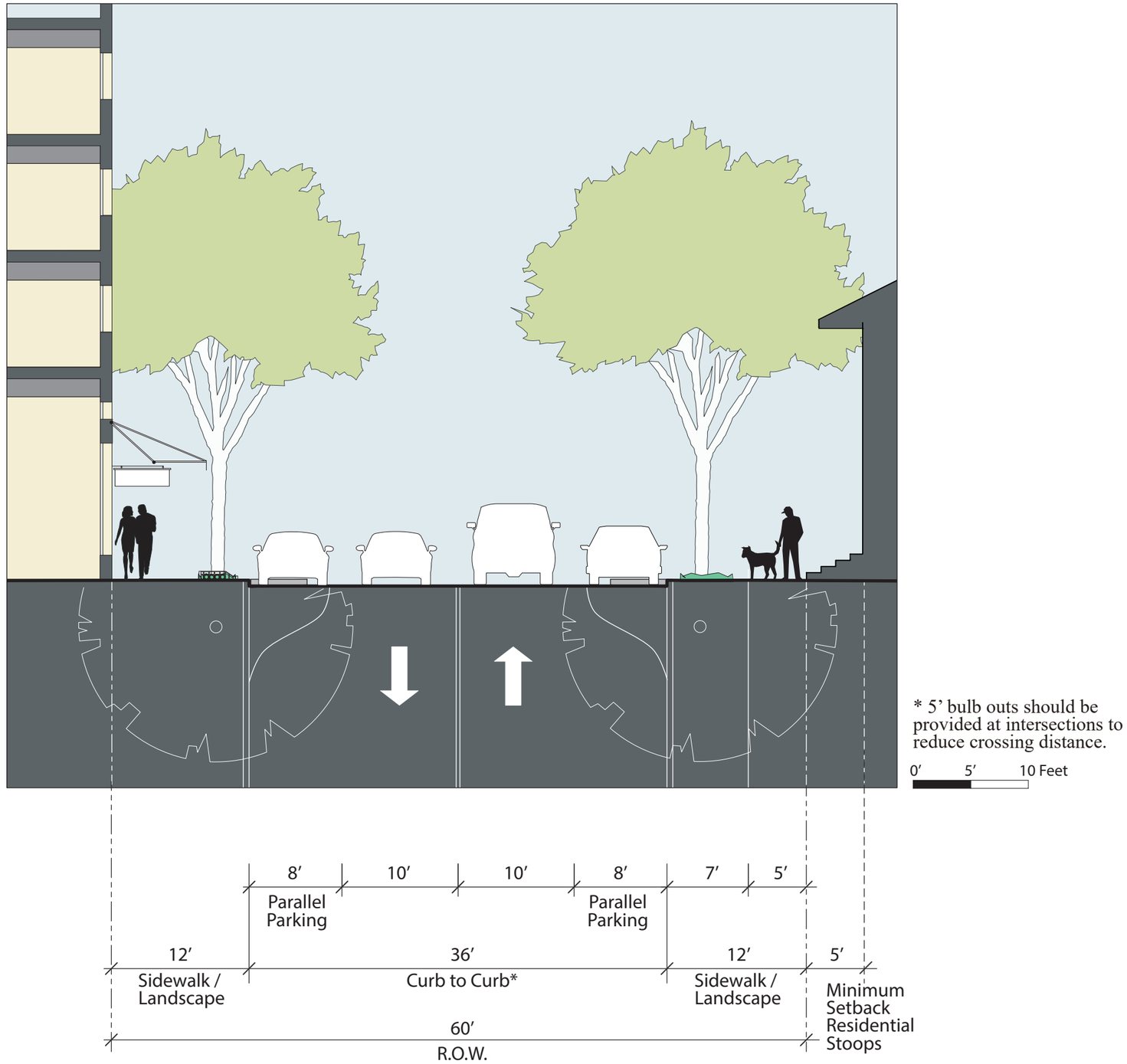
RETROFIT OF COMMERCIAL MULTI-FAMILY STREET TO TWO-LANE COMMERCIAL STREET WITH DIAGONAL AND PARALLEL PARKING AND SHARROWS **(CS 80-51 Retrofit)**



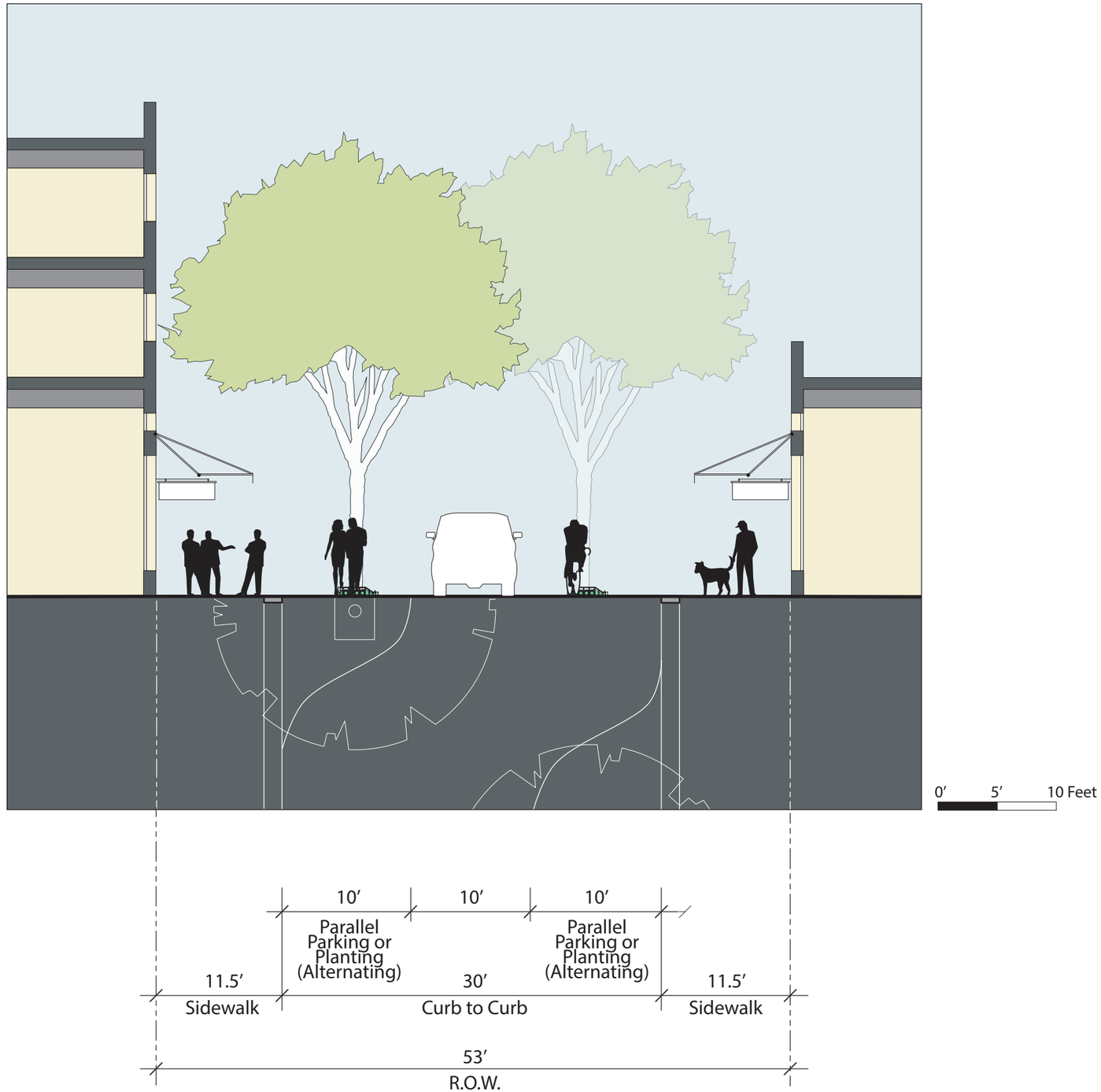
TWO-LANE COMMERCIAL STREET WITH SHARROWS AND ON-STREET PARKING **(CS 70-40)**



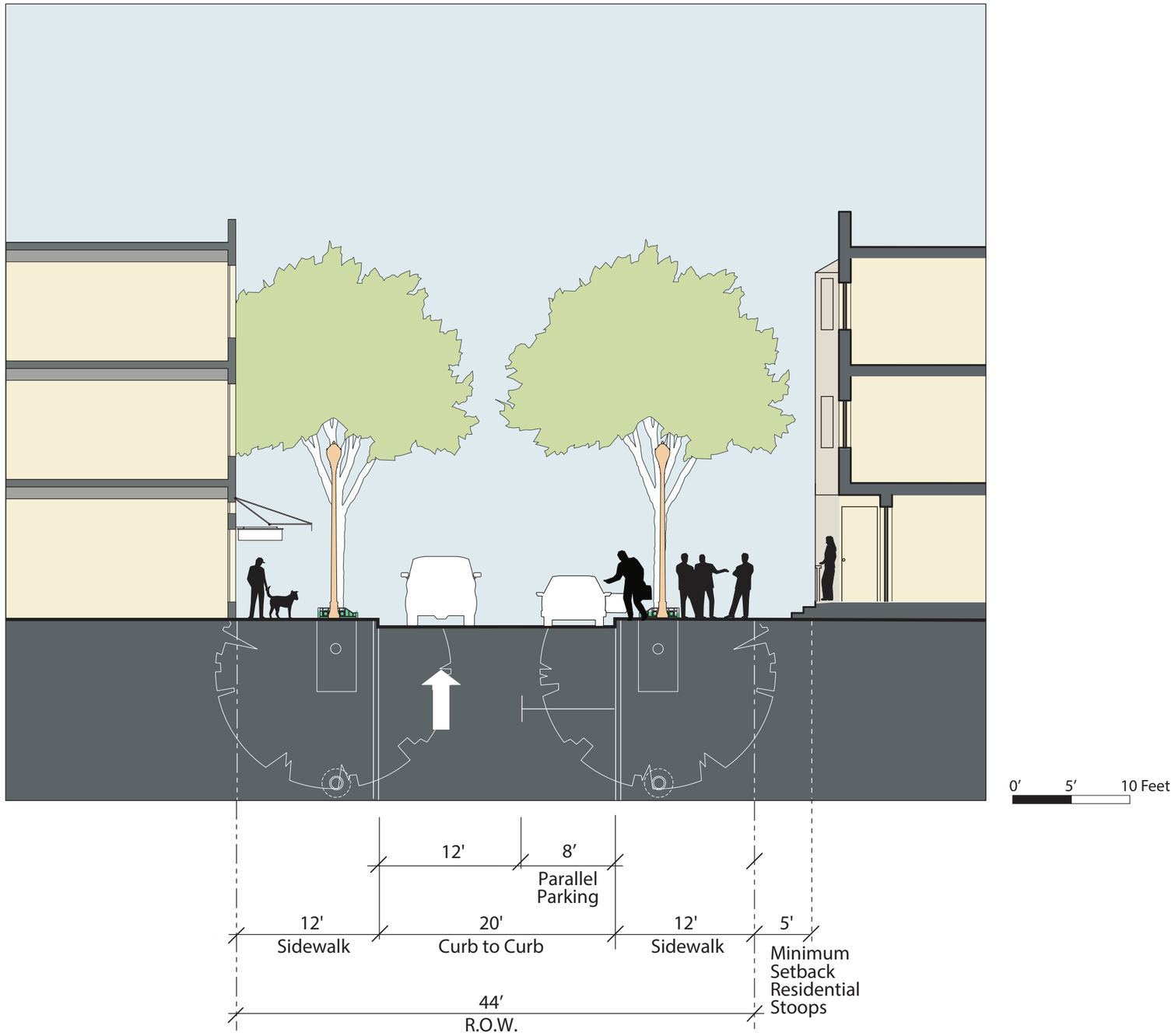
TWO-LANE COMMERCIAL STREET WITH ON-STREET PARKING AND SHARROWS **(CS 67-40)**



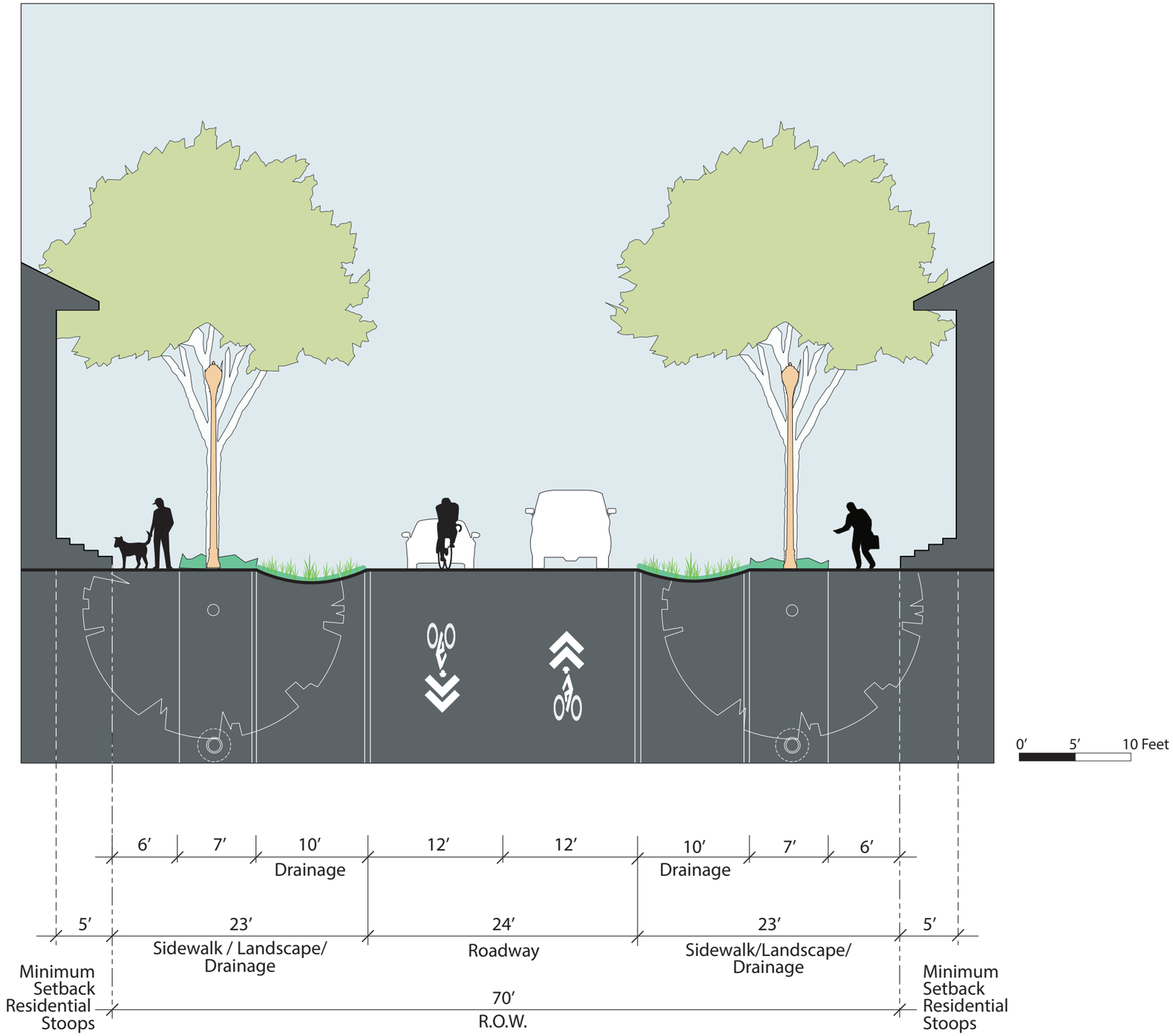
TWO-LANE COMMERCIAL OR RESIDENTIAL STREET WITH ON-STREET PARKING **(CS 60-36)**



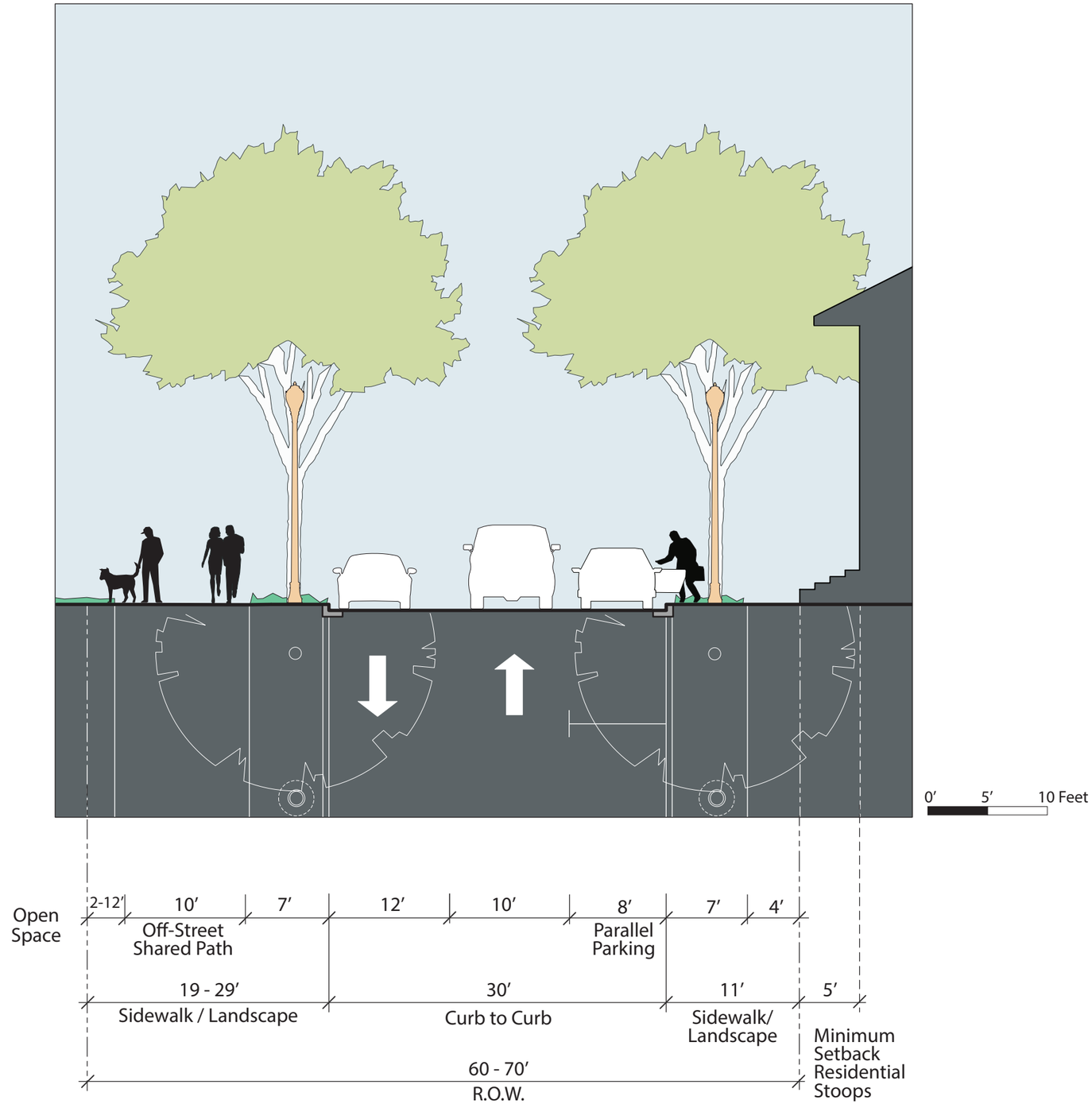
COMMERCIAL SHARED STREET **(CS 53-30)**



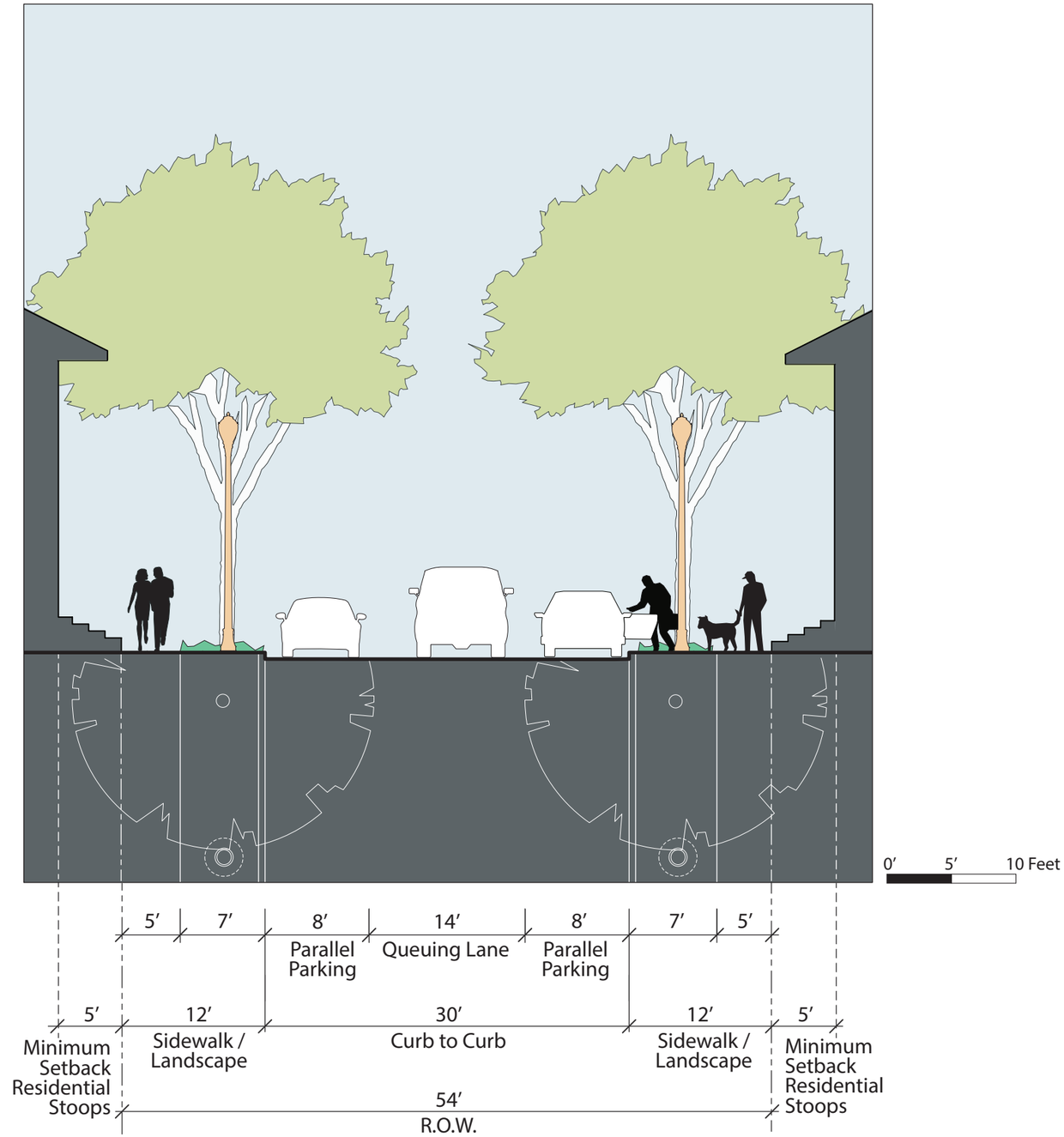
ONE-WAY COMMERCIAL STREET WITH ON-STREET PARKING ON ONE SIDE **(CS 44-20)**



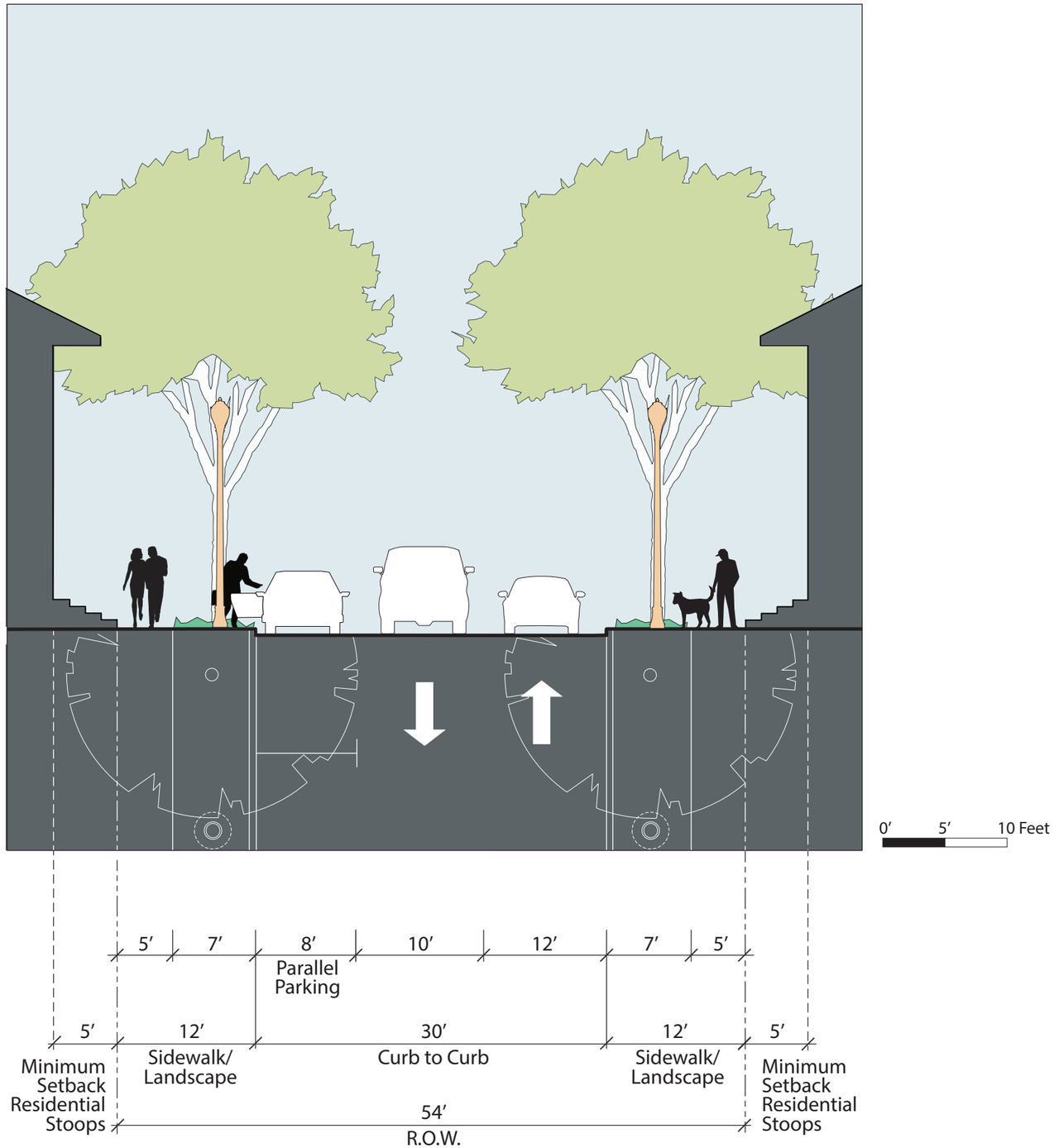
TWO-LANE RESIDENTIAL STREET WITH SHARROWS AND DRAINAGE **(RS 70-24)**



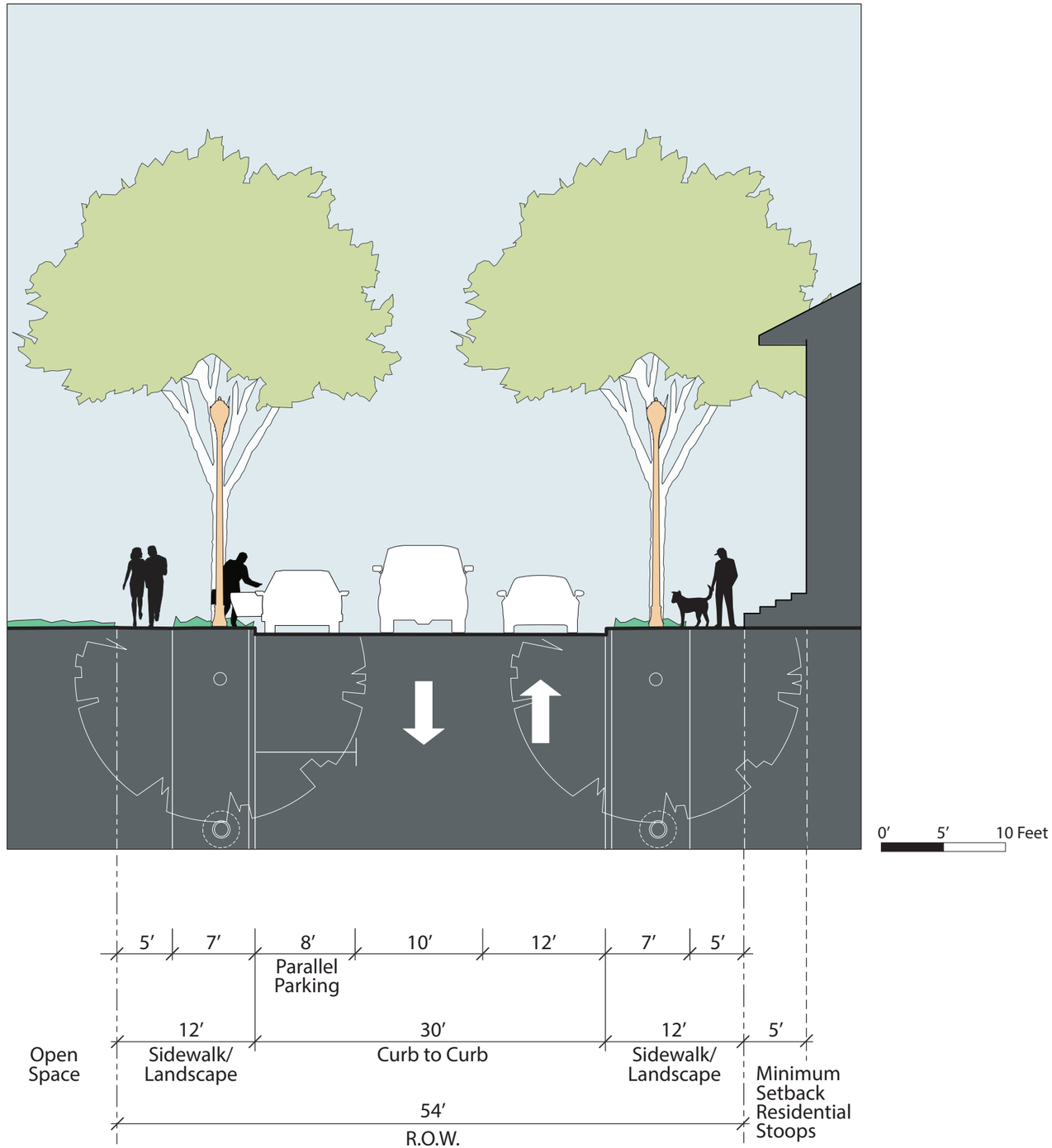
TWO-LANE RESIDENTIAL STREET WITH ON-STREET PARKING ON ONE SIDE AND OFF-STREET SHARED PATH ADJACENT TO OPEN SPACE **(RS 60/70-30)**



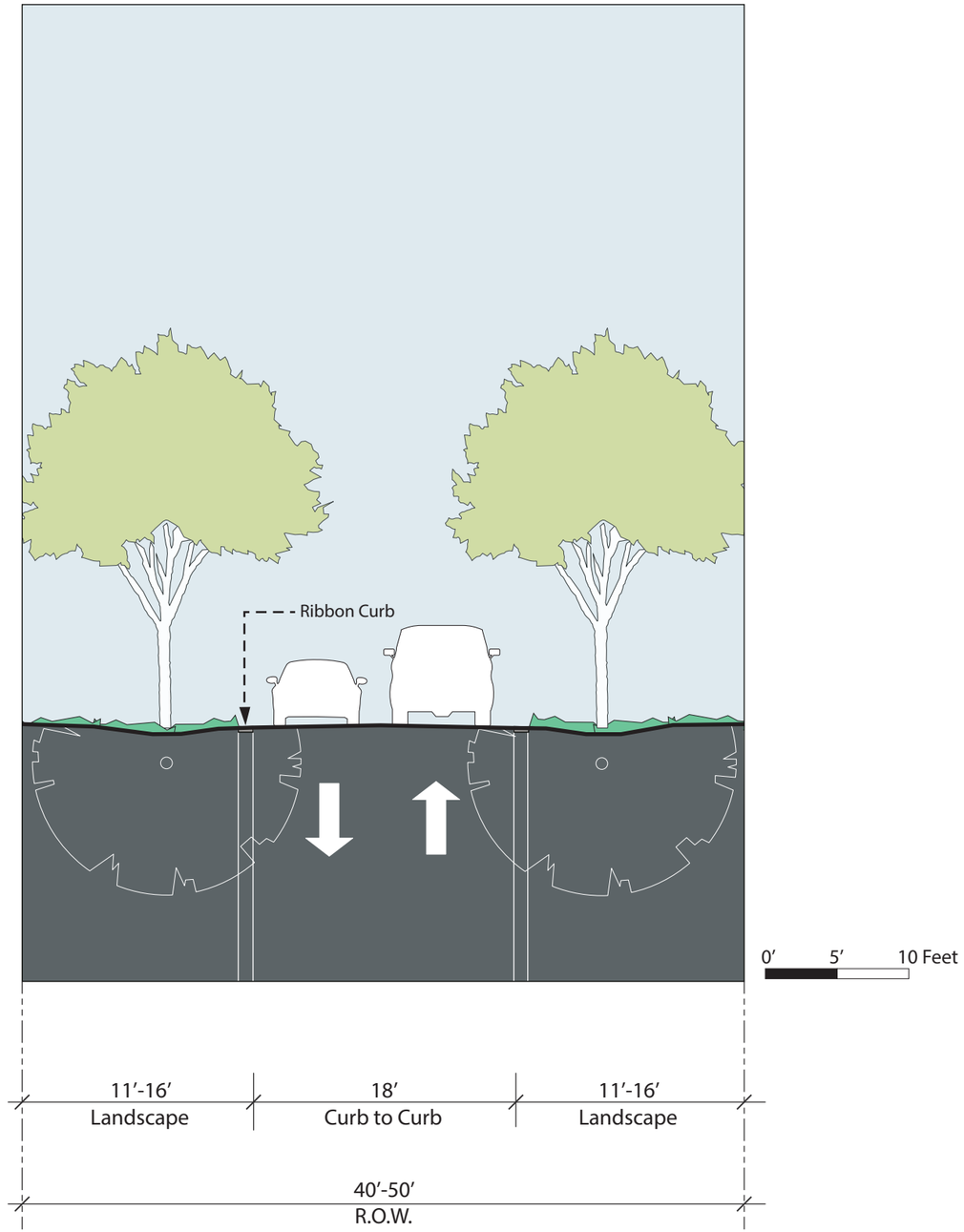
TWO-WAY RESIDENTIAL QUEUING STREET WITH ON-STREET PARKING **(RS 54-30A)**



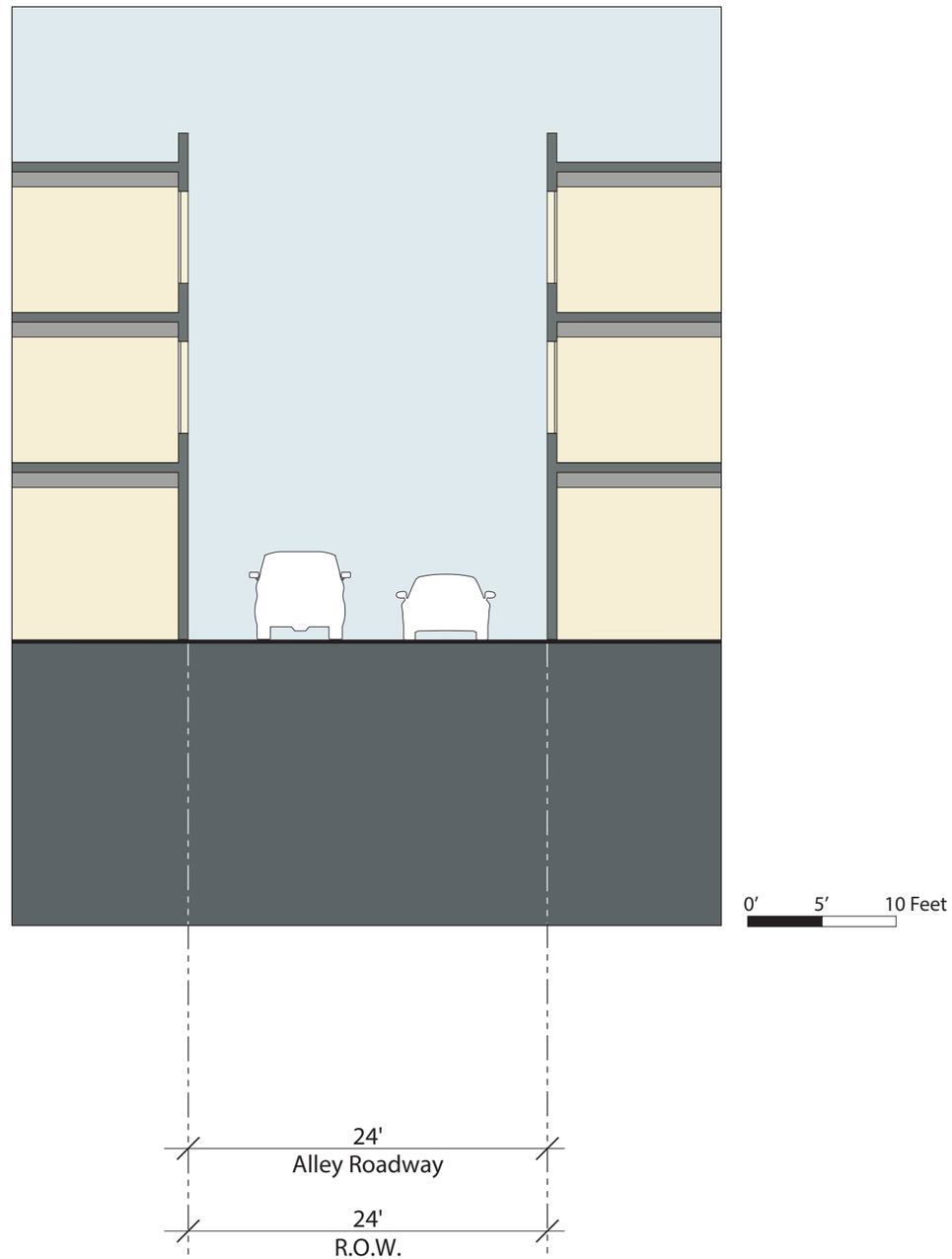
TWO-LANE RESIDENTIAL STREET WITH ON-STREET PARKING ON ONE SIDE **(RS 54-30B)**



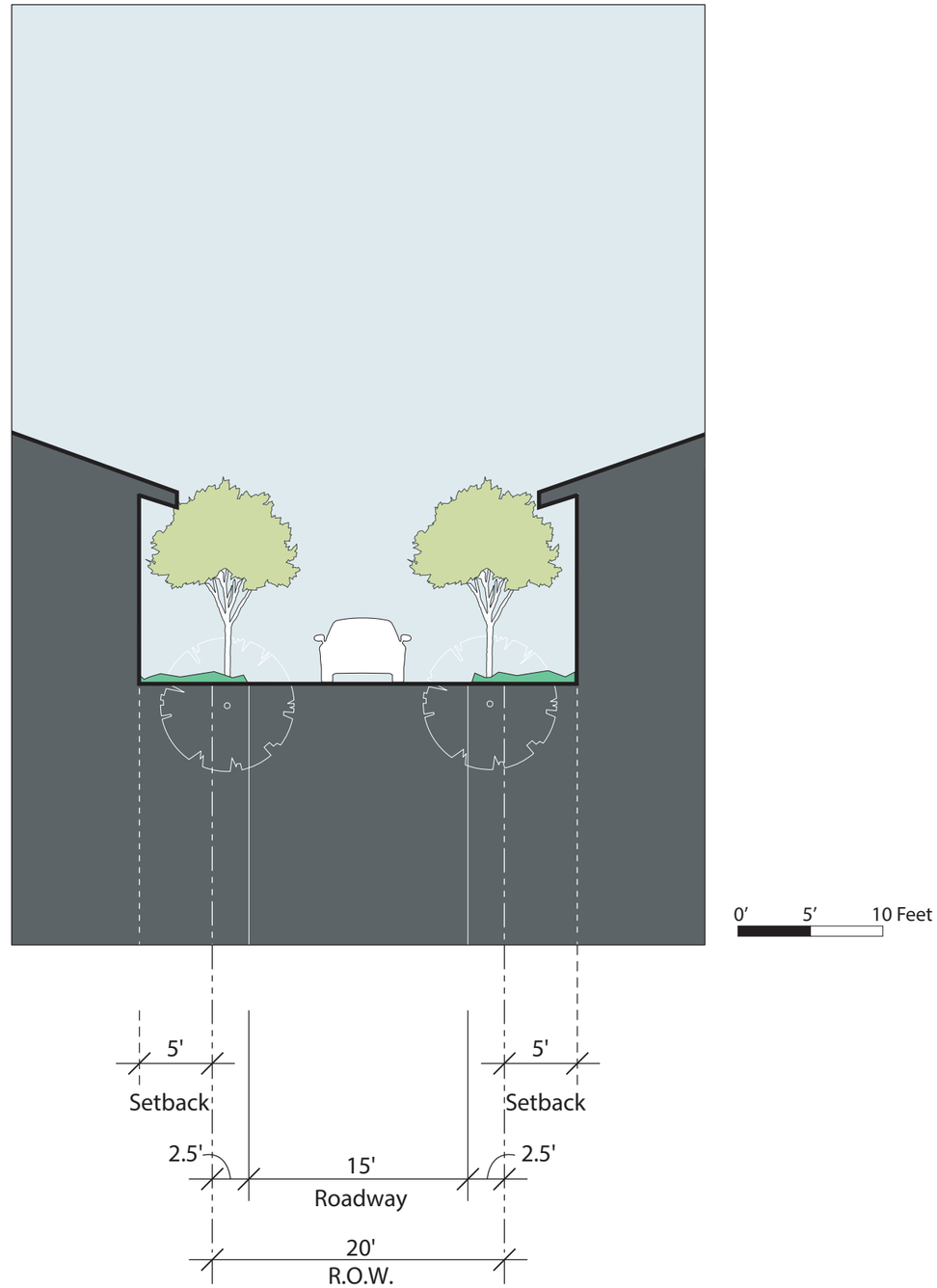
TWO-LANE RESIDENTIAL STREET WITH ON-STREET PARKING ADJACENT TO OPEN SPACE **(RS 54-30C)**



UNSTRIPED TWO-WAY ROAD WITH NO SIDEWALKS **(RD 40-18) (RD 50-18)**



REAR ALLEY IN COMMERCIAL DISTRICT **(RA 24-24)**



ONE-WAY REAR ALLEY IN RESIDENTIAL NEIGHBORHOOD (**RA 20-15)**