Design Criteria

4.1 Introduction

The design of Seattle's street rights-of-way has a significant impact on the livability of the city as well as the health, safety and welfare of its citizens. The width of a sidewalk, diameter of a curb radius, number of lanes in the right-of-way and the location of utilities such as overhead power lines and underground waterlines all play a role in shaping the right-of-way. A street is also part of the public realm and all streets provide some form of open space including view corridors and green space in between private property and the curb.

This chapter contains mandatory design criteria that must be followed when designing and constructing improvements to the public rights-of-way including streets, sidewalks, trees and landscaping, and utilities. Design criteria present a consistent approach to designing each element of the right-of-way to best serve the traveling public, support land use patterns, and encourage economic growth in the City and the region. When reviewing and approving projects in Seattle's rights-of-way, the City of Seattle makes every attempt to balance the vision for a project with adopted policy, regulation and user acceptance.

The design criteria in this chapter are to be used in conjunction with other applicable City, State and National standards for right-of-way design. More information on these standards can be found in 4.1.2 City of Seattle Standard Plans and Specifications and 4.1.3 Washington State Minimum Design Standards.

In addition to the mandatory design criteria, this chapter contains design considerations which the City recommends be considered when designing right-of-way improvements. Compliance with design considerations is encouraged but not required.

4.1.1 Citywide Policy Guidance for Right-of-Way Improvements

The design criteria in this chapter have been developed consistent with appropriate local, state and national guidelines for right-of-way design. The criteria also support citywide policy defined in companion documents to this Manual, including the City of Seattle Comprehensive Plan (2005), the Transportation Strategic Plan (2005), and the Complete Streets ordinance (2007) and the Stormwater Code (2009).

Seattle's Complete Streets guiding principle is to design, operate and maintain Seattle's streets to promote safe and convenient access and travel for all users -- pedestrians, bicyclists, transit riders, for people of all abilities, as well as for freight and motor vehicle drivers.

4.1.1a City of Seattle Comprehensive Plan

The City of Seattle Comprehensive (Comp) Plan , *Toward a Sustainable Seattle*, is a 20-year policy plan that defines the vision of how Seattle will grow in ways that sustain its citizens' values. The City first adopted the Comp Plan in 1994 in response to the state Growth Management Act of 1990. The Comp Plan makes basic policy choices and provides a flexible framework for adapting to real conditions over time. It is a collection of the goals and policies the City will use to guide future decisions about how much growth Seattle should take and where it should be located. The Comp Plan also describes in a general way how the City will address the effects of housing and employment growth on transportation, especially in designated urban centers and villages.

The Transportation Element of the Comp Plan encourages people to use cars less than they do today.

One way to do that is through the urban village strategy's goal of concentrating most new housing, jobs and services near one another in small areas, so that more trips can be made by walking, biking or transit. Another way is to support new public transit options. The Transportation Element contains policies that set the stage for street design standards that will match future street improvements to the types of uses and neighborhoods the street is serving.

4.1.1b Transportation Strategic Plan

The Transportation Strategic Plan (TSP) was updated in 2005. Linked directly to the goals and policies in the Comp Plan, the TSP outlines the specific strategies, projects and programs that implement the broader city-wide goals and policies for transportation in Seattle. The TSP also includes detailed lists of projects and programs to carry out citywide transportation policy.

4.1.1c Comprehensive Drainage Plan

The City of Seattle adopted a Comprehensive Drainage Plan in 2005 that charts a course for how to manage stormwater in our City. The Comprehensive Drainage Plan charts a broader commitment to protecting and, where possible, improving Seattle's surface water resources. The Plan divides SPU's drainage program into four areas:

- Stormwater and Flow Control
- Landslide Mitigation
- Aquatic Resource Protection – Water Quality
- Aquatic Resource Protection – Habitat

The Plan contains the policy guidance, levels of service and direction for capital and operating programs for each of these four areas.

4.1.2 City of Seattle Standard Plans and Specifications

The City of Seattle has developed design and construction standards for improvements in public rights-of-way to protect the health, safety, and welfare of the public and to minimize post-construction maintenance and repair costs. These standards shall be followed, together with the design criteria presented in this chapter and as required by the Seattle Municipal Code (SMC).

City of Seattle Standards for the design and construction of specific elements of rights-of-way improvements are contained in two publications that are referred to in this Manual by the shortened combined title, Standard Plans and Specifications.

- City of Seattle Standard Plans for Municipal Construction. Individual plans from this publication are referred to in this Manual as "Standard Plan" followed by the number of the plan.
- City of Seattle Standard Specifications for Road, Bridge, and Municipal Construction. Individual specifications from this publication are referred to in this Manual as "Standard Specification" followed by the number of the specification.

In the event of a conflict, Standard Plans and Specifications take precedence over the Manual. In certain cases, a deviation from the design criteria presented in the Manual may be appropriate. Get more information about the deviation process.

4.1.3 Washington State Minimum Design Standards

In addition to the design criteria in this chapter and Seattle's Standard Plans and Specifications, right-of-

way design elements must also comply with the minimum design standards for major arterial and secondary arterial streets in the State of Washington. These minimum design standards are established and adopted in the Revised Code of Washington (RCW) 35.78 Streets – Classification and Design Standards, and have been published in the City and County Design Standards.

4.1.3a Exceptions from Washington State Minimum Standards

Per the City and County Design Standards, it is noted that the professional engineer in charge of the project must evaluate each design situation, and if less than the desirable value is chosen, appropriate documentation laying out the reasons and conclusions should be placed in the project's design files.

Thus, while this document provides design standards, it is not a substitute for engineering judgment.

> "In adopting these standards, the (State's design review) committee seek to encourage standardization of road design elements where necessary for consistency and to assure that motoring, bicycling, and pedestrian public safety needs are met. Considerations include safety, convenience, context sensitive solutions, proper drainage, and economical maintenance. The committees recognize that cities and counties must have the flexibility to carry out the general duty to provide streets, roads, and highways for the diverse and changing needs of the traveling public.
>
> These standards cannot provide for all situations. They are intended to assist, but not to substitute for, competent work by design professionals. It is expected that land surveyors, engineers, and architects will bring to each project the best skills from their respective disciplines. These standards are also not intended to limit any innovative or creative effort, which could result in better quality, better cost savings, or both. An agency may adopt higher standards to fit local conditions. Special funding programs may also have varying standards."

- excerpted from the City and County Design Standards

In any case, evaluation and ultimate approval of deviations to existing street design standards and criteria are the responsibility of SDOT.

4.2 Street Classifications and Street Types

4.2.1 Street Types
4.2.1a Regional Connector Streets
4.2.1b Commercial Connector Streets
4.2.1c Local Connector Streets
4.2.1d Main Streets
4.2.1e Mixed Use Streets
4.2.1f Industrial Access Streets
4.2.1g Green Streets
4.2.1h Neighborhood Green Streets

The City of Seattle classifies streets according to different levels of emphasis on motor vehicle movement versus direct access to property. At one end of the hierarchy, a freeway emphasizes traffic movement, while restricting access to adjacent land. At the other end of the hierarchy, a local street provides easy access to adjacent residential, commercial, and industrial land uses. A description of Seattle's street classifications is located in the Comprehensive Plan and further defined with maps in each classification in the Transportation Strategic Plan. Although street classifications do not change frequently, they are modified periodically. Any changes to traffic classifications are adopted by City Council Ordinance. Please confirm the classification of streets adjacent to a site with a SIP Project Manager.

Seattle's traffic classifications are based on the American Association of State Highway and Transportation Officials (AASHTO) standards that identify major functional classifications for all urbanized areas that have over 50,000 people.

The Traffic Classifications define the roadway network and include Interstate Freeways, Regional, Principal, Minor and Collector Arterial streets, Commercial and Residential Access Streets and Alleys. The arterial network is the "backbone" of the roadway system and accommodates the most trips for all modes.

In addition to the traffic classifications, Seattle's street classifications define networks of streets citywide that are designed to accommodate freight, transit, pedestrians and bicycles. A classification also exists to define Seattle's boulevard system. The classifications are as follows:

Major Truck Streets accommodate significant freight movement through the city and to and from major freight traffic generators including Port of Seattle Terminals, inter-modal rail facilities and the regional freeway network. The Major Truck Street network defines critical connections for freight movement throughout the City and these roadways need to maintain the function of, and capacity for truck movements. Major Truck Streets generally carry heavier loads and higher truck volumes.

Transit Classifications define a network of streets throughout the city that accommodate various levels of transit service.

Bicycle Classifications define an on- street and off-street network of bicycle routes throughout the city.

Boulevard Classifications describe the existing system of boulevards, most of which are owned by the Seattle Parks and Recreation (SPR). Traffic is accommodated on every boulevard and design features must be approved by both SDOT and SPR.

4.2.1 Street Types

Seattle's street classifications (refer to Comp Plan Policies T10-T15 and Transportation Strategic Plan strategies S3-3.5) define how a street should function to support movement of people, goods and services versus access to property. However, street classifications by themselves are not an adequate local planning and design tool. The design of a street--intersections, sidewalks, and transit stops should reflect the adjacent land uses because the type and intensity of the adjacent land use directly influences how the street is used. Street Types are not additional classifications, but provide a more specific definition of the design elements that support the street's function and its adjacent land use.

Street Classifications and Street Types provide design guidance for anyone doing work in Seattle's street rights-of-way. Refer to the table below to assist with identifying the Street Classification and Street Type that applies to a project. This section (4.2.1) provides information on design features that are compatible with each Street Type.

SDOT will review street designs and operational characteristics to ensure that a reasonable balance is achieved among competing uses. This role is critical in Seattle, where there is typically very limited space within the right-of-way to accommodate the needs of pedestrians, transit, bicyclists, freight, cars, landscaping, utilities, and parking.

Not all streets in Seattle currently have a designated Street Type. Refer to SDOT's Street Types map.

Street Types Definition
(Reprinted from the Transportation Strategic Plan)

Name of Street Type	Street Classification	Adjacent Land Use
Regional Connector	Principal Arterial	Industrial, Commercial, Residential
Commercial Connector	Minor Arterial	Commercial, Residential
Local Connector	Collector Arterial	Residential, Institutional (community service)
Main Street	Arterial—all	Neighborhood commercial with a pedestrian designation
Mixed Use Street	Arterial—all	Neighborhood commercial
Industrial Access Street	Arterial—all, non-arterials in commercial areas	Industrial, Maritime
Green Street	Non-arterial in Downtown Seattle	Residential
Neighborhood Green Street	Non-arterial outside of Downtown Seattle	Residential

Identifying Street Classifications and Street Types

#	Information Needed	Resources
1	Is my project located on an	Street Classification Map—Traffic Classifications. Transportation

	arterial street?	Strategic Plan 2005.
2	Does the street my project is located on have a truck, transit, bicycle or boulevard classification?	Street Classification Map—Truck, Transit, Bicycle and Boulevard Classifications. Transportation Strategic Plan 2005. Major Truck Street and Transit Classifications are an important criterion for street design, traffic management decisions and pavement design and repair. The Bicycle and Boulevard Classifications also define certain design priorities or additional reviews needed before a project approval can be granted.
3	My project is located on an arterial. What is its Street Type?	Street Type Policy in the Comprehensive Plan and Transportation Strategic Plan, Street Type Map and Design Guidance in this Manual, Chapter 4.2.1 Street Types.
4	My project is located on a local street (non-arterial) but has industrial zoning.	The Industrial Access Street Type applies to arterial as well as local (non-arterial) streets that serve industrial land uses.
5	My project is located on a designated Green Street or Neighborhood Green Street.	The Green Street and Neighborhood Green Street Types apply to local (non-arterial) streets. Also reference Green Street design guidelines in this Manual Chapter 6.2 Green Streets and Chapter 6.4 Green Stormwater Infrastructure for streets in creek watersheds.
6	My project is located on a multi-use trail.	Street Classification Map—Truck, Transit, Bicycle and Boulevard Classifications. Transportation Strategic Plan 2005. The Bicycle and Boulevard Classifications also define certain design priorities or additional reviews needed before a project approval can be granted.

4.2.1a Regional Connector Streets

Regional Connector streets are principal arterials that link urban villages to each other and connect to regional destinations outside of the city. Although they must be accessible and attractive to all modes, they are designed to provide city-wide and regional access for transit, cars and truck trips. Regional Connectors also connect designated manufacturing and industrial centers to the local and regional freight network. They move high volumes of traffic through the city and between urban villages.

Street Design Features	Character
Roadway Section	4-6 travel Lanes plus transit
Curb bulbs	With on-street parking, and in locations with frequent pedestrian crossings, curb bulbs may be appropriate if they are designed to accommodate the turning movements of trucks and transit vehicles.
Bicycle routes	Bicycle routes may occur on Regional Connectors if no feasible alternative route exists, Bicycle access on or parallel to Regional Connectors is important as they are often the most direct link between dense residential neighborhoods and employment centers.
Truck route signage	Signage is encouraged that directs trucks to destinations such as Port facilities, intermodal rail yards, the regional freeway network and to Seattle's Manufacturing and Industrial Centers.

Medians	Use on streets with three or more lanes only. Medians can be continuous. Appropriate in locations where high volumes of pedestrian crossings occur and depending on left-turn movements. Medians are an access management tool and can also accomplish a variety of community goals such as limiting cut-through traffic, and environmental benefits from trees and landscaping.
Crossing islands	Use on streets with three or more lanes only. Typically a crossing tool used at a crossing location not controlled by a traffic signal.
Sidewalk width	As wide as possible to accommodate pedestrians once vehicle access needs are addressed. Additional sidewalk width is encouraged in the vicinity of transit zones.
Driveways	Minimize the number of driveways that cross the sidewalk to support pedestrian safety and establish a continuous sidewalk.
Street trees and landscaping	A planting strip is encouraged to provide safety through separation between pedestrians and moving traffic. They also provide environmental and aesthetic benefits. Trees in transit zones should be located to be compatible with transit passenger loading areas and maintained so as not to interfere with transit vehicle access.
Street furniture	Bus shelters are appropriate in transit zones. Wayfinding signs and other street furnishings are appropriate where right-of-way width allows.
Pedestrian scaled lighting	Prioritize at pedestrian crossing locations, in transit zones, where there are concerns about personal security, and in where adjacent land uses support pedestrian activity.
Decorative elements	Decorative elements (including public art and special paving) may be appropriate if adequate right-of-way width exists and long term maintenance issues are addressed.
Awnings or other weather protection	Appropriate in locations where adjacent land uses support high pedestrian volumes, including transit zones.

Priority Design Features

- Sidewalks buffered from moving traffic by additional sidewalk width or planting strip
- Pedestrian facilities including weather protection and lighting at transit zones and in locations where adjacent land uses support pedestrian activity
- Bicycle access accommodated if parallel route is not feasible

4.2.1b Commercial Connector Streets

Commercial Connector streets are minor arterials that provide connections between commercial areas of the city, such as neighborhood business districts. They also provide local access within urban villages.

Street Design	Character

Features	
Roadway Section	2-4 travel lanes plus transit or parking
Curb bulb	Curb bulbs may be appropriate in locations where there is on-street parking.
Bus bulbs	Appropriate in locations to support high transit ridership where on-street parking is a lower priority and reliable transit service.
On-street parking	Prioritize short-term visitor and resident parking when adjacent to commercial and residential land uses respectively. On-street parking should be considered after transit service is accommodated, and may be restricted during peak commuter periods.
Bicycle routes	Sign and/or stripe bicycle lanes on designated bicycle routes. Prioritize those routes that are the most direct link between dense residential neighborhoods and employment centers.
Truck route signage	Signage to assist trucks is appropriate in locations that have key freight destinations such as Port facilities, the regional freeway network and to Seattle's Manufacturing and Industrial Centers.
Medians	Use on streets with three or more lanes only. Medians can be continuous. Appropriate in locations where high volumes of pedestrian crossings occur and depending on left-turn movements. Medians are an access management tool and can also accomplish a variety of community goals such as limiting cut-through traffic, and environmental benefits from trees and landscaping.
Crossing islands	Use on streets with three or more lanes only. Typically a crossing tool used at a crossing location not controlled by a traffic signal.
Sidewalk width	As wide as possible to accommodate pedestrians in balance with vehicle access needs. Additional sidewalk width is encouraged in the vicinity of transit zones.
Street furniture	Benches, bus shelters, bike parking, and wayfinding are appropriate if the right-of-way is sufficiently wide to accommodate street furniture and still meet the needs for sidewalk width and landscaping.
Street trees and landscaping	A planting strip is desirable and provides safety through separation between pedestrians and moving traffic. They also provide environmental and aesthetic benefits. Trees in transit zones should be located to be compatible with transit passenger loading areas and maintained so as not to interfere with transit vehicle access.
Driveways	Minimize the number of driveways that cross the sidewalk to support pedestrian safety and establish a continuous sidewalk.
Pedestrian scaled lighting	Prioritize at pedestrian crossing locations, in transit zones, where there are concerns about personal security, and in where adjacent land uses support pedestrian activity.
Decorative elements	Decorative elements (including public art and special paving) may be appropriate if adequate right-of-way width exists and long term maintenance issues are addressed
Awnings or other weather protection	Appropriate in locations where adjacent land uses support high pedestrian volumes, including transit zones.

Priority Design Features

• Wide sidewalks and planting strip buffer walking area from moving traffic
• Street trees and landscaping
• Bus shelters at transit zones
• Signed and/or striped bicycle lanes on designated bicycle routes

4.2.1c Local Connector Streets

Local Connector streets are collector arterials that provide direct connections between pedestrian generators (e.g., residences, transit stops) and destinations (e.g., community centers, schools, neighborhood main streets). They are designed to emphasize walking, bicycling, and access over mobility and tend to be more pedestrian oriented than Commercial Connector Streets.

Street Design Features	Character
Roadway Section	2-3 travel lanes plus bike lanes or transit
Curb bulbs	Use in locations with on-street parking.
Bus bulbs	Appropriate in locations with high transit ridership where on-street parking is a lower priority.
Medians	
Crossing islands	Use on streets with three or more lanes only. Typically a crossing tool used at a crossing location not controlled by a traffic signal.
On-street parking	Where sufficient right-of-way exists, on-street parking is encouraged and has benefits for residents, business districts and may provide some traffic calming effect. Should only be encouraged where transit service is not a priority.
Bicycle lanes	Sign and stripe bicycle lanes on designated bicycle routes.
Sidewalk width	Wide sidewalks support pedestrian activity and are a high priority.
Street furniture	Benches, bus shelters, bike parking, and wayfinding are appropriate if the right-of-way is sufficiently wide to accommodate street furniture and still meet the needs for sidewalk width and landscaping.
Street trees and landscaping	A planting strip is to provide safety through separation between pedestrians and moving traffic. They also provide environmental and aesthetic benefits. Trees in transit zones should be located to be compatible with transit passenger loading areas and maintained so as not to interfere with transit vehicle access.
Driveways	Minimize the number of driveways that cross the sidewalk to support pedestrian safety and establish a continuous sidewalk.
Pedestrian scaled lighting	Prioritize at pedestrian crossing locations, in transit zones, where there are concerns about personal security, and in where adjacent land uses support pedestrian activity.
Awnings or other weather protection	Appropriate in locations where adjacent land uses support high pedestrian volumes, including transit zones.

Priority Design Features

• Wide sidewalks with planting strips
• Signed and/or striped bicycle lanes on all designated bicycle routes
• Street trees and landscaping

• Traffic calming may be appropriate
• Bus shelters at transit stops

4.2.1d Main Streets

Main Streets are arterial streets located within the most pedestrian-oriented sections of neighborhood business districts. These arterial streets and adjacent properties may have a "pedestrian designation" in the Seattle Municipal Code that requires new development to be pedestrian-friendly and help generate pedestrian activity. For more information, and to learn if your project is located within that pedestrian designation, please contact DPD's Applicant Service Center for more information.

Street Design Features	Character
Roadway Section	2-3 travel lanes plus parking and bike lanes
Curb bulbs	Use in combination with on-street parking to support pedestrian activity at corners and shorten crossing distances.
Bus bulbs	Appropriate in locations with high transit ridership. Impacts to on-street parking should be considered.
On-street parking	Appropriate in business districts consistent with the goals of the neighborhood, the City and in locations after transit service is accommodated. When on-street parking exists, it is actively managed for passenger and truck loading, and short-term customer access.
Bicycle routes	Stripe and/or sign designated bicycle routes.
Medians	
Crossing islands	Use on streets with three or more lanes only. Typically a crossing tool used at a crossing location not controlled by a traffic signal.
Sidewalks	Wide sidewalks support pedestrian activity and are a high priority.
Street trees and landscaping	Wide planting strip with mature street trees and landscaping significantly enhance the street for pedestrians. Trees in transit zones should be located to be compatible with transit passenger loading areas and maintained so as not to interfere with transit vehicle access.
Pedestrian scaled lighting	Pedestrian scaled lighting lights the sidewalk and provide a consistent vertical design element to the streetscape. Prioritize at pedestrian crossing locations, in transit zones, where there are concerns about personal security, and in where adjacent land uses support pedestrian activity.
Street furniture	Benches, bus shelters, bicycle parking and signs and maps (wayfinding) are all encouraged to support pedestrian activity and comfort. Consistent design among street furniture elements can enhance the streetscape and should be considered.
Driveways	Minimize the number of driveways that cross the sidewalk to support pedestrian safety and establish a continuous sidewalk.
Awnings and weather protection	Encouraged, especially in locations where adjacent land uses support high pedestrian volumes, including transit zones.

Priority Design Features

• Wide sidewalks and planting strip
• Curb bulbs in locations where there is on-street parking
• Street trees and landscaping
• Pedestrian scaled lighting
• Street furniture
• Awnings and weather protection
• Signed and/or striped bicycle lanes on designated bicycle routes
• Bike parking in business districts
• Short-term, on-street parking

4.2.1e Mixed Use Streets

Mixed Use Streets are arterials located in neighborhood commercial areas that do not have a pedestrian land use designation. They typically connect to Main Streets and have adjacent land uses that are fairly dense and mixed use. Mixed Use Streets accommodate all modes of travel with particular emphasis on supporting pedestrian, bicycle and transit activity.

Street Design Features	Character
Roadway Section	2-3 travel lanes plus parking and bike lanes
Curb bulbs	Use in combination with on-street parking to support pedestrian activity at corners, shorten crossing distances and slow speeds for turning vehicles.
Bus bulbs	Appropriate in locations with high transit ridership. Impacts to on-street parking should be considered.
Medians	Medians or crossing islands are encouraged, where right-of-way width allows.
Crossing islands	Use on streets with three or more lanes only. Typically a crossing tool used at a crossing location not controlled by a traffic signal.
On-street parking	Appropriate in business districts consistent with the goals of the neighborhood, the City and in locations after transit service is accommodated. When on-street parking exists, it is actively managed for passenger and truck loading, and short-term customer access.
Bicycle routes	Stripe and/or sign designated bicycle routes.
Medians or crossing islands	Medians or crossing islands are encouraged, where right-of-way width allows, managing traffic, improving the aesthetics of the right-of-way and improving pedestrian crossing conditions.
Sidewalks	Wide sidewalks support pedestrian activity and are a high priority.
Street trees and landscaping	Wide planting strip with mature street trees and landscaping significantly enhance the street for pedestrians. . Trees in transit zones should be located to be compatible with transit passenger loading areas and maintained so as not to interfere with transit vehicle access.
Pedestrian scaled lighting	Pedestrian scaled lighting lights the sidewalk and provide a consistent vertical design element to the streetscape. Prioritize at pedestrian crossing locations, in transit zones, where there are concerns about personal security, and in where adjacent land uses support pedestrian activity.
Pedestrian scaled lighting	Pedestrian scaled lighting lights the sidewalk and provide a consistent vertical design element to the streetscape. Prioritize at pedestrian crossing locations, in transit

	zones, where there are concerns about personal security, and in where adjacent land uses support pedestrian activity.
Street furniture	Benches, bus shelters, bicycle parking and signs and maps (wayfinding) are all encouraged to support pedestrian activity and comfort.
Driveways	Minimize the number of driveways that cross the sidewalk to support pedestrian safety and establish a continuous sidewalk.
Awnings and weather protection	Encouraged, especially in locations where adjacent land uses support high pedestrian volumes, including transit zones.

Priority Design Features

- Wide sidewalks and planting strips
- Curb bulbs in locations where there is on-street parking
- Street trees and landscaping
- Pedestrian scaled lighting
- Awnings and weather protection
- Signed and/or striped bicycle lanes on designated bicycle routes
- Bike parking in business districts

4.2.1f Industrial Access Streets

Industrial Access Streets are arterials and non-arterials that are adjacent to industrial and manufacturing land uses. They are designed to accommodate significant volumes of large vehicles such as trucks, trailers, and other delivery vehicles.

Street Design Features	Character
Roadway Section	1-3 travel lanes
On-street parking	Load zones in locations to accommodate truck delivery.
Truck route signage	Signage is encouraged that directs trucks to destinations such as Port facilities, intermodal rail yards, the regional freeway network and to Seattle's manufacturing and industrial centers.
Sidewalk width	Sidewalk width must meet minimum requirements and may be wider if sufficient right-of-way exists once vehicle access needs are addressed. Additional sidewalk width is encouraged in the vicinity of transit zones.
Street trees and landscaping	A planting strip with low landscaping or high branching trees is encouraged to support freight mobility and to provide separation between moving traffic and pedestrians. Tree limbs should not interfere with truck movements.
Bicycle lanes	Parallel facility is recommended to accommodate bicycle connections.

Priority Design Features

- Truck route signage
- Load zones to support delivery activities
- Low landscaping or high branching trees in planting strips

4.2.1g Green Streets

Green Streets are designated on a number of non-arterial streets within Downtown Seattle. Landscaping, historic character elements, traffic calming, and other unique features distinguish Green Streets from other Street Types. Refer to Chapter 6.2 Green Streets for a complete description of right-of-way improvements on Green Streets.

Street Design Feature	Character
Roadway Section	1-3 travel lanes
Curb bulbs	Use in combination with on-street parking to support pedestrian activity at corners, shorten crossing distances and slow speeds for turning vehicles.
Bus bulbs	Appropriate in locations with high transit ridership. Impacts to on-street parking should be considered.
On-street parking	On-street parking may be appropriate to support short-term customer access, but should be limited to allow for pedestrian facilities.
Bicycle routes	Bicycles share the road with motor vehicles on these slow speed, non-arterial streets.
Sidewalks	Wide sidewalks support pedestrian activity and are a high priority.
Street trees and Landscaping	Wide planting strip or double rows of street trees with mature street trees and landscaping enhance the street for pedestrians, while maintaining adequate and comfortable sidewalk width.
Pedestrian scaled lighting	Pedestrian scaled lighting that lights the sidewalk and provide a consistent vertical design element to the streetscape.
Street furniture	Benches, bus shelters, bicycle parking and signs and maps (wayfinding) are all encouraged to support pedestrian activity and comfort. Consistent design among street furniture elements can enhance the streetscape and should be considered.
Driveways	Driveways that cross the sidewalk are not encouraged.
Awnings or other weather protection	Appropriate in locations where adjacent land uses support high pedestrian volumes, including transit zones.

Priority Design Features

- Wide sidewalks and planting strip
- Tight curb radii (and curb bulbs when there is on-street parking)
- Curb bulbs in locations where there is on-street parking
- Street trees and landscaping
- Driveways not encouraged in order to create a continuous sidewalk
- Pedestrian scaled lighting
- Street furniture
- Awnings and weather protection
- Bike route shared with motor vehicles

4.2.1h Neighborhood Green Streets

Neighborhood Green Streets may be any non-arterial street outside of Downtown Seattle. Similar to Green Streets, Neighborhood Green Streets emphasize pedestrian facilities, landscaping, historic character elements, traffic calming, and other unique features. Refer to Chapter 6.2 Green Streets for a more complete description of right-of-way improvements on Neighborhood Green Streets.

Street Design Feature	Character
Roadway Section	1-2 shared lanes plus parking on one side.
On-street parking	On-street parking may be appropriate to support short-term customer access, but should be limited to allow for pedestrian facilities.
Bicycle routes	Bicycles share the road with motor vehicles on these slow speed, non-arterial streets.
Sidewalks	Wide sidewalks or walkways in areas without curbs support pedestrian activity and are a high priority.
Street trees and landscaping	Wide planting strip or double rows of street trees with mature street trees and landscaping enhance the street for pedestrians.
Drainage	Natural drainage systems are encouraged in creek watersheds. Refer to Chapter 6.4 Green Stormwater Infrastructure for more detail.
Pedestrian scaled lighting	Pedestrian scaled lighting that lights the sidewalk and provide a consistent vertical design element to the streetscape.
Street lighting	Pedestrian scaled lighting that lights the sidewalk, especially on streets leading to schools, community centers or transit stops.
Street furniture	Benches, bus shelters, bicycle parking and signs and maps (wayfinding) are all encouraged to support pedestrian activity and comfort. Consistent design among street furniture elements can enhance the streetscape and should be considered.
Driveways	Driveways that cross the sidewalk are not encouraged.
Awnings or other weather protection	Appropriate in locations where adjacent land uses support high pedestrian volumes, including transit zones.

Priority Design Features

- Walkways and planting strip
- Street trees and landscaping
- Driveways not encouraged in order to create a continuous sidewalk
- Natural drainage encouraged
- Pedestrian scaled lighting
- Street furniture
- Awnings and weather protection
- Bike route shared with motor vehicles

continue to Chapter 4.3»

Design Criteria

4.3 Design Criteria General Notes

Conceptual sketch of the public right-of-way in a neighborhood business district showing underground utilities.

- As described in Chapter 4.1.2: City of Seattle Standard Plans and Specifications, all elements of the public right-of-way shall be designed and installed according to City of Seattle Standard Plans and Specifications for Road, Bridge and Municipal Construction, most current edition. Please note that each Standard Plan includes one or more related Standard Specification references.
- The **Design Criteria** presented in this chapter constitute a set of requirements for the design, construction and maintenance of improvements within public rights-of-way.
- The **Design Considerations** presented in this chapter are not requirements, but do present information that is important to consider in the design, construction and maintenance of improvements within public rights-of-way.
- Client Assistance Memos (CAMs) developed by DPD, SDOT and SPU are available on line, and at the Applicant Service Center at DPD. Copies of SDOT's CAMs are also available at the SDOT Street Use Counter. Get more information about the Applicant Service Center or contact them directly.
- Please note that revisions to information in this Manual and related links are completed on a regular basis; it is the applicant's responsibility to make sure to reference the most current documents. In the case that a document has been revised more recently than the update cycle for this Manual; the most current documents supersedes the information provided in this Manual.
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4.4 Grading

4.4.1 Definition

Complete and proper street grading can be a challenge in Seattle because of steep slopes and variable topography. Construction of street improvements requires grading the right-of-way to the standard design cross section and below the maximum street grades. SDOT must approve street grades for permanent improvements of each street and alley to minimize adverse impacts on adjacent private property.

Private developments must be designed to accommodate a planned permanent street grade that when fully improved with pavement, curbs, and sidewalks, the street grade will not:

- Result in driveways that are too steep;
- Require retaining walls to protect foundations and landscaping; and
- Create the possibility of an inaccessible or unsafe condition.

4.4.2 Design Criteria

Grading for Standard Design Cross Section : The standard design cross section consists of a crowned roadway centered in the right-of-way, sloping down at 2% from the crown to the gutter line, with a 6-inch high curb and a 2% slope up from the top of the curb to the right-of-way line. See the standard design street details in Figure 4.1: Design Cross Section. New development shall be designed to accommodate the standard design cross section.

Centerline Profile: The centerline profile shall have a constant slope from cross-street to cross-street, with vertical curves as needed at street intersections. Additional slope changes within the block are permitted only when a constant slope cannot be obtained or when needed to accommodate street drainage.

Maximum Slope: The project shall be designed so that any new grading on site will not exceed the maximum slope permitted if it becomes necessary in the future to adjust site grades to accommodate grading for street improvements. The maximum slope permitted without a retaining wall is two horizontal to one vertical (2H:1V). Grades steeper than this require installation of an approved retaining wall or structure.

Survey: Because of the relationship between street grades and site grades, it is essential that survey information for both on-site and off-site improvements be based on NAVD-88 datum, using City of Seattle bench marks and monuments as reference points. When no profile has been established for the streets abutting and leading to the development site, the developer shall provide a survey of the street area by a licensed surveyor for the purpose of establishing the proposed centerline profile. SDOT must approve the centerline profile of the street and accompanying centerline elevations proposed by the developer's professional civil engineer.

The survey shall extend the full length of the block plus 50 feet on either side, show adequate cross section, and be based on NAVD-88 Datum. Include NAVD-88 marks with id numbers, descriptions, locations and elevation. Get more complete information on survey requirements.

Maximum/Minimum Roadway Grade: The following tables show crown elevations along the centerline of a traveled way.

Street Classification	Maximum roadway profile grade permitted
Principal Arterials	9%
Commercial Access Streets	9%
Collector Arterials	10%
Minor Arterials	10%

Residential Access Streets	17%
Alleys	17%
Surface Material	**Minimum roadway centerline profile grade permitted**
Asphalt roadway	1%
Concrete roadway	½%

If the grade of the street or alley exceeds 10%, asphalt concrete or Portland cement concrete is required, crushed rock will not be permitted. If the proposed roadway cannot be kept below the maximum slope the project may meet the street improvement exception criteria defined in the Land Use Code, SMC 23.53.

Vertical Alignment: The design and placement of vertical curves must take into account ADA compliant crosswalk slopes and curb ramps. The placement of the point of vertical curvature (PVC) at intersections must be carefully considered.

Vertical curves shall be based on appropriate design standards (City and County Design Standards, AASHTO or WSDOT Design Manual) and shall not be less than the following minimum vertical curves:

Roadway Posted Speed Limit	Minimum Vertical Curve
35 mph or less	3 times the design speed (V d) where V d is 5 mph greater than the posted speed limit
Greater than 35 mph	3 times the design speed (V d) where V d is 10 mph greater than the posted speed limit

Horizontal Alignment: Design speeds are established by the City Traffic Engineer based on current engineering standards and practices. A minimum horizontal radius with a maximum 4% super elevation for urban conditions are as follows:

Design Speed	Design Radius
20 mph	125 feet
25 mph	205 feet
30 mph	300 feet
35 mph	420 feet
40 mph	565 feet

Regrading for Construction: The design of on-site improvements such as foundations, footings, floor elevations, building entries, driveways, and utility service connections shall be compatible with all grading that will be required to install future street improvements. This is especially critical to project design when the building and doorways are at or near the property line, where driveway slopes are at or near the maximum allowed, and where building height is at or near the maximum permitted by the Land Use Code.

4.4.3 Design Considerations

- Consult the standard profiles in the early stages of project development. Profiles for many Seattle streets have already been determined by SDOT, including some streets not yet open to traffic. These profiles may be a helpful starting point in designing profiles for unopened rights of way. The established street profiles are available at the SPU Record Vault. Consideration of private and public infrastructure that has been built since the profiles were established must also be taken into account.
- In general, the point of vertical curvature (PVC) shall not encroach in to a cross street.

- Foundations and footings shall be designed and constructed so they will not be uncovered or undermined by future grading required for street improvements.
- Grading at intersection approaches should consider appropriate transitions to avoid vehicles bottoming out.

4.5 Design Cross Section

The design cross section defines the location of the standard right-of-way elements (existing and proposed) for a project location. The standard elements are illustrated in Figure 4-1: Standard Design Cross Section and include but are not limited to: right-of-way line and width, roadway width, planting strip and shoulder, catch line, existing and new grade, slope line, sidewalks, street tree, curb, gutter, crown, depression line, thickened edge, pavement, water main, sanitary sewer and storm drain.

4.5.1 Links to Standard Plans and Specification

030 Desirable Locations for Utilities (Residential Street)
400 Half Section Grade
401 Residential Pavement Section
402 Commercial Arterial Section
403 Roadway Cement Concrete Alley Pavements

4.5.2 Design Criteria

Required Cross Sections for Street Improvement
Plans: SDOT requires that street improvement plans include a typical dimensioned cross section. Proposed street and alley improvements require dimensioned cross sections as follows:

- at all driveways; and
- at all building entrances located within 10 feet of the property line.

In addition, if a new curb, street widening, roadway alignment, or roadway profile changes are being proposed, cross sections shall be provided for every 25 feet along the length of the improvement.

All cross sections shall be stamped and signed by the Project Design Engineer.

Description of Required Elements : The design cross sections shall describe the following:

- existing and proposed grades, with spot elevations provided at the centerline;
- existing edge of pavement;
- gutter line or flow line;
- top of curb or thickened paved edge;
- back of sidewalk;
- property lines;
- catch lines; and
- any retaining walls or rock facing.

Elevations: Existing elevations shall be based on current survey data.

Cross Slopes: The standard cross slopes are identified in the table below.

	Standard	Minimum	Maximum

Street	2%	1%	4%
Alley	4.7%	2%	6%
Sidewalk and Planting Strip	2%	0.5%	2%

In areas where the pavement width is being added to an existing street or must vary to accommodate existing infrastructure, the slopes may vary within the minimum and maximums provided above. When an alley is part of an ADA accessible route, a portion or the entire the cross slope may need to be adjusted to meet current ADA standards.

4.5.3 Design Considerations

Whenever possible, street improvements shall conform to the standard right-of-way cross section described in Figure 4-1: Standard Design Cross Section.

4.6 Roadway Width

The term “roadway” refers to the area of the street right-of-way used for vehicular travel, including cars, trucks, bicycles and transit. The roadway may also include a number of additional uses such as on-street parking, curbed structures such as medians and crossing islands, and utility access points.

4.6.1 Standard Plan and Specification References

Standard Plan 400: Half Section Grading
Standard Plan 401: Residential Pavement Sections
Standard Plan 402: Commercial and Arterial Pavement Sections
Standard Plan 405: Types of Joints for Concrete Pavement
Standard Plan 410: Type 410 Curb
Standard Plan 411: Curb Joints and Dowels

4.6.2 Design Criteria

Roadway width on streets with curbs: Where there is a curb, the roadway width is the curb face to curb face width of the street.

Typical Design Cross Sections are provided in the figures below.

Figure 4-2: Crushed Rock Improvement

Figure 4-3: Crushed Rock Improvement Industrial Zones

Figure 4-4: Crushed Rock Edge Detail

Figure 4-5: Asphalt Concrete Pavement: New Pavement For Streets without Existing Hard Surface

Figure 4-6: Asphalt Concrete Pavement: New Pavement For Streets without Existing Hard Surface in Industrial Zones

Figure 4-7: Asphalt Thickened Edge Detail

Figure 4-8: Asphalt Concrete Pavement: Pavement Widening For Streets Existing Hard Surface Streets without Sidewalk

Figure 4-9: Pavement Widening for Existing Hard Surface Streets

Figure 4-10: Curb and Sidewalk Improvement: New Pavement For Streets Without Existing Hard Surfaces

Figure 4-11: New Concrete Sidewalk with Existing Curb

Figure 4-12: Full Improvements for Newly Dedicated Streets

Figure 4-13: Alley Improvement

Minimum pavement width —non-arterial streets: The minimum roadway width varies per Land Use Zone per the table below.

Zone	Standard Roadway Width
Low Density Residential	
SF, LDT, L1, NC1	25 Feet
Mid-Density Residential and Mixed Commercial / Residential	
L2, L3, L4, NC2-30, NC2-40, NC2-65	32 Feet
High Density Residential, Mixed Commercial / Residential, and Industrial	
NC3, MR, HR	36 Feet
C1, C2, IB, IC, IG1, IG2	40 Feet

If a project is on a block which is split into more than one land use zone category, the zone category with the most frontage determines the minimum width required. If the land use categories have equal frontage, the one with the greater requirement shall be used to determine the minimum street width.

When street improvements are required, project applicants shall construct the half street on their side of the-right-of way, plus ensure that a minimum of one - twelve foot paved travel lane and 5 feet of graded shoulder exist on the other side of the centerline. When new pavement is required for this travel lane it shall include a 2-feet wide thickened edge for drainage (see figures above).

Minimum pavement width — arterial streets: Minimum pavement width requirements for arterial streets must meet the minimum design standards given in the Washington State "City and County Design Standards." Refer to Appendix A: Arterial List for existing and required right of way and roadway widths for arterials.

Projects with Reduced Requirements: Projects with reduced requirements must provide the minimum roadway width specified in the land use code, plus a thickened edge if necessary to control drainage. Projects with reduced requirements in industrial zones should provide the minimum roadway width to meet Fire Code requirements. 28 feet is recommended by SDOT.

Lane width for arterials: The following standard arterial lane widths are used in the design of arterials and are compliant with the City and County Design Standards:

Lane Type	Standard Lane Width
Parking lane	8 feet
Parking lane on bus route	10 feet
Through traffic lane	11 feet
Curb lane	12 feet
Bus only lane	12 feet
Turn only lane	12 feet
Curb lane (vehicle/bicycle)	14 feet

Road taper and transitions: For permanent roadway tapers, the standard taper length for the narrowing from two lanes to one lane or offsetting of a lane is:

- $L= WS^2/60$, where L is the length of taper in feet, W is the lane offset in feet, and S is the design speed in miles per hour.
- On non-arterial streets, temporary asphalt tapers are allowed for narrowing a single lane when additional street improvements are anticipated in the future.
- On non-arterial streets, the standard taper for temporary tapers is 25:1.

4.6.3 Design Considerations

Location of roadway within the right-of-way: The roadway is typically centered in the right-of-way, but may be offset due to topography, existing utilities, or limited right-of-way width.

Considerations for developing minimum roadway dimensions should be made within the context of how the entire right-of-way will be developed over time. This includes public safety; available right-of-way; land use and zoning, current and projected roadway capacity; pedestrian facilities, landscaping (including natural drainage where allowable), bicycle facilities, freight and transit needs, and other intended uses of the public realm.

Considerations for establishing lane widths should be influenced by street type designations, street classifications, and the need to have a reasonable balance among competing uses in the right-of-way. They are as follows:

- Lane widths need to support large vehicle movements such as trucks and transit. Wider lanes should be considered on Regional Connector and Industrial Access street types.
- Wide center turn lanes should be considered on streets that have high volumes of truck turning movements including intersections with one or more legs that are designated as Major Truck Streets or Industrial Access streets.
- Wide curb lanes should be considered on streets that have high volumes of transit service.
- On Commercial Connector streets, lane width should support travel demand. Areas where high

pedestrian activity is occurring, consider options that keep lanes as narrow as possible. On streets with high levels of transit service or that accommodate high volumes of trucks and transit vehicles, consider options that have wider lane widths.

- Narrow lanes support slower vehicle speeds, and minimize overall roadway width which supports pedestrian activity. Narrower lanes can be challenging for larger vehicles to navigate, especially on roadways that carry high volumes of trucks and transit vehicles. Narrower lanes should be considered along Local Connectors, Mixed Use, Main Street and Green Street street types. For Green Streets and Neighborhood Green Streets, keep lane widths narrow and limit the number of lanes to minimize the crossing distance for pedestrians as much as possible.

Lane widths on designated bicycle routes shall be evaluated based on the lane width requirements given in the City and County Design Standards and WSDOT Design Manual.

4.7 Roadway Pavement

The most widely used pavement materials for Seattle streets and alleys are portland cement concrete (rigid pavement) and asphalt concrete (flexible pavement). Slag cement as a substitute for a portion of Portland cement in concrete may be allowed or, in some instances, required.

4.7.1 Standard Plan and Specification References

Standard Specification 2-06: Subgrade Preparation
Standard Plan 401: Residential Pavement Sections
Standard Plan 402: Commercial and Arterial Pavement Sections
Standard Plan 403: Cement Concrete Alley Pavements
Standard Plan 405: Types of Joints for Concrete Pavements

4.7.2 Design Criteria

Pavement Type: New pavement shall be of the same type (rigid or flexible) as the existing pavement when a street is being widened, extended, or replaced unless otherwise directed by Seattle Department of Transportation.

Pavement Depth: Pavement depth is determined by a pavement design and is based on the zoning, number and type of heavy vehicles per day using or expected to use the roadway, the strength of subgrade, and the type of pavement being designed. Required pavement sections are provided in the Pavement Opening and Restoration Rules (PORR). The pavement sections provided in the PORR were developed to accommodate the varying design conditions (soil types, drainage conditions, etc) found throughout the City of Seattle and are fairly conservative.

If a project proposes to use a pavement section less than the one specified in the PORR, then a pavement design must be approved by SDOT. The design should be based on specific site criteria and the design parameters described below. For designed pavements, subgrade testing and analysis by a geotechnical engineer, a traffic analysis, and pavement design calculations are required. Subgrade strength tests (CBR, k-value, R-value, etc.) shall be performed by a qualified geotechnical engineer.

Alley Pavement Depth:

Land Use Zone	Pavement Type and Depth
1 or 2 new dwelling units	6" crushed rock
SF. LR1. LR2. LR3. .	6" Portland cement concrete or 3" asphalt

MR, HR	concrete over 6" crushed rock
NC1, NC2, NC3	8" Portland cement concrete or 3" asphalt over 7" crushed rock
C1, C2, IB, IC, IG1, IG2 and Downtown	8" Portland cement concrete

Pavement Design: Default Design Parameters for New Pavement

Initial Serviceability Index (P i)	4.5
Terminal Serviceability Index (P t)	2.0
Reliability	90%
Asphalt Design Life	20 years
Asphalt Standard Deviation	0.45
Structural Coefficient Asphalt HMA Class ½" and Class 1"	.39
Structural Coefficient Mineral Aggregate Type 2, Crushed Rock	0.13
Concrete Design Life	40 years
Concrete Standard Deviation	0.35
Joint Load Transfer Coefficient	3.2
Modulus of Concrete Rupture	650 psi
Modulus of Concrete Elasticity	4.0 x 106 psi
Drainage Coefficient	1.0

The inputs in the table above should be used as a starting point for pavement design and adjusted as needed to reflect the specific project conditions. Pavement design reports should describe how each input value was developed. Pavement design on roadways that accommodate a high volume of heavy vehicles, including Major Trucks Streets, streets included in the Transit Classifications, Regional Connectors, Commercial Connectors, and Industrial Access streets shall be designed using the 1993 AASHTO Guide for the Design of Pavement Structures, 4th Edition with 1998 Supplement.

Panel Layout: When new PCC pavement is proposed or required, the panel layout at all intersections and on arterial streets must be shown on the plans. Additionally, panel layouts may be required for non-arterial streets with non-standard street widths. Longitudinal joints must be placed so that they are not within the wheel path of vehicles or in an area used by bicycles. The joints, dowel bars, and tie bars shall be per Standard Plan 405a through 405d.

Pavement subgrade: The pavement shall be placed on a prepared subgrade of properly compacted suitable material as determined by Seattle Department of Transportation (SDOT).

Compaction of subgrade: The subgrade must be compacted to at least 95% of maximum dry density for all street and alley improvements. Subgrade materials that cannot be compacted to this density shall be over-excavated (removed) and the subgrade replaced with acceptable material.

Soil tests: Soil density tests may be required during construction to show that the required degree of compaction has been obtained.

Limits of pavement replacement and restoration: The extent of new pavement to be installed on roadways with existing pavement depends on required pavement width and existing pavement conditions. Specific rules and requirements for new pavement are detailed in the Street and Sidewalk Pavement Opening and Restoration Rules.

Existing and proposed concrete panel joints shall be shown on street improvement plans for all

intersections, arterial streets and when the pavement restoration will exceed one block. The extent of pavement replacement shall be depicted on street improvement plans by shading panels, or portions of panels, to be replaced.

4.8 Intersections

The design criteria in this section address elements that are typically located in an intersection. Intersections are a challenge to design and operate because they are the location where traffic turns, pedestrians cross the street, bicycles must navigate vehicle turning movements, the roadway may expand to accommodate more capacity, and medians may become turn pockets.

4.8.1 Links to Standard Plans and Specifications

Standard Plan 422a: Curb Ramp Details
Standard Plan 422b: Curb Ramp Details
Standard Plan 422c: Angled Curb Ramp Details

4.8.2 Design Criteria

Curb ramps: Curb ramps are located at intersections and other legal crossings to facilitate wheelchair and pedestrian street crossings. All alteration or new construction projects must follow current ADA requirements. When a new ramp is installed on one side of the street, per State Law (RCW 35.68.075) an ADA compliant companion ramp shall be installed on the opposite side of the street. If project impacts the legal crossing path, curb ramp or the landing then curb ramps must either be retrofitted to comply current ADA requirements, or new ramps must be constructed that meet the current standard. Refer to the PORR for thresholds that require ADA upgrades in the curb return area.

Utility location in intersections: Gratings, access covers, and other appurtenances shall not be located on curb ramps, landings, blended transitions, and gutters within the pedestrian access route.

Curb ramp locations: Curb ramps are permitted only at legal crosswalk locations, at intersections, and at approved marked crosswalk locations. Legal crosswalks at intersections are defined by projections of the curb and back of sidewalk lines right-of-way lines across the street or by a line 10 feet behind the face of the curb or roadway edge when there is no sidewalk. Curb ramps at any other location in the public right-of-way are subject to the approval of the Director of Transportation.

Curb radius : In general, standard curb radius for street intersections are as follows:

When Vehicular Turn is Illegal	10 feet
Arterial to Residential Access	20 feet
Residential Access to Residential Access	20 feet
Arterial to Arterial	25 feet
Arterial to Commercial Access	25 feet
Commercial Access to Commercial Access	25 feet
High Volume Truck and/or Bus Turns	30 feet

SDOT evaluates curb radii based on the type and volume of activity at the intersection. In all cases, with the exception of a location where a vehicle turn is illegal, SDOT will evaluate the curb radii based on a

Single Unit (SU) vehicle with a 42 foot turning radius. An applicant may propose tighter curb radii, and will need to provide supporting documentation and have the request approved by the City Traffic Engineer. Refer to Chapter 4.8.3 Design Considerations - Intersections for more information about curb radii.

Emergency vehicle signal priority: Signal priority for emergency vehicles will be included at all new signal installations, and is typically included for traffic signals that are being modified or updated.

4.8.3: Design Considerations

Layout and grading of intersections: The layout and grading of an intersection must be accomplished so that water flows and the intersection is safe and accessible by pedestrians, meets ADA requirements, and is safe for bicycle use.
Curb ramp considerations: Curb ramps should be placed to align with the adjacent crosswalk. Issues to consider include location and placement of utility poles, hand holes, vaults, inlets, catch basins and signal controller equipment.

Curb radii considerations: Curb radii should be designed based on the location and use of the intersection location and should balance the need to accommodate safe large vehicle movements with pedestrian safety:

- Tighter turn radii are appropriate at intersections that have high volumes of pedestrian and cyclist crossings to support adjacent land uses. These include Main Streets , Mixed Use Streets, Local Connector Streets, and at intersections in Urban Centers and Villages.
- Wider turn radii are typically required at intersections that experience frequent, high volumes of truck and transit vehicle turns. These include Regional Connectors, Major Truck Streets and streets that are part of the Transit classifications. In these locations, curb radii will be evaluated based on the following standard design vehicle: Single Unit (SU) with a 42’ turning radius. If for some reason, SDOT would anticipate a larger vehicle used in a site, a radius evaluation based on this larger vehicle would be required. Examples of typical turning templates would include a SU, WB-40, WB-50, WB-60 and WB-62.
- In locations where there is on-street parking in the receiving lane, consideration of tighter curb radii may be appropriate and still allow for safe larger vehicle movements.

Transit signal priority: Traffic signals may be timed to respond to certain conditions at intersections. Transit Signal Priority, transit signal queue jump and other related treatments may be desirable along Regional Connector, Commercial Connector and Industrial Access, Main Street and Local Connector street types, with high transit ridership.

Pedestrian signal priority: Traffic signals at intersections along Local Connector, Mixed Use, Main Street and Green Street street types should consider enhancing pedestrian crossings including pedestrian walk phases on all legs of the intersection, countdown and/or audible signals where appropriate and elimination of pedestrian push buttons.

4.9 Driveways

A driveway is the portion of the street, alley or private property which provides access to, an off-street parking facility using a curb cut. Portions of the driveway that are in line and adjacent to sidewalk are defined as a sidewalk.

4.9.1 Links to Standard Plans and Specifications

Standard Plan 430: Type 430 Driveway
Standard Plan 431: Concrete Driveway Placed with Sidewalk Construction

4.9.2 Design Criteria

Curb cut and driveway widths: specified in the Land Use Code as follows:

- Overall requirements:
  - SMC 23.54 Parking Space Standards
  - SMC 23.53 Access Easement Standards
- Variations to standards:
  - SMC 23.44 Single Family Parking Location and Access
  - SMC 23.45 Lowrise Parking and Access
  - SMC 23.45 Midrise Parking and Access

Driveway on private property: the portion of the driveway on private property shall meet the requirements specified in the Land Use Code (refer to references above).

Driveways: Driveways shall be installed per the standard plans. The public sidewalk will have the right-of-way over private crossings. Driveways will be designed to meet ADA requirements for an accessible route.

Vertical curves: In accordance with the land use code, appropriate crest and sag curves must be accommodated in the driveway design. The vertical curves and grade breaks shall begin at the property line, not in the right-of-way.

Driveway elevations at the property line shall meet the elevations shown on the Building Grade Sheet and meet the Land Use Code driveway slope and vertical curve requirements. The driveway shall be designed so that any changes in driveway slope that may be needed as a result of future grading in the right-of-way will comply with driveway requirements specified in the Land Use Code.

Driveway Slope: The standards for the driveway slope are located in SMC 23.54.030.

Parking Space Standards: Refer to SMC 23.54.030 Parking Space Standards

Figure 4-11: Driveway Slope
Figure 4-12: Maximum Grade Curvatures for Driveways: Crest Vertical Curve Figure
Figure 4-13: Maximum Grade Curvatures for Driveways: Sag Vertical Curve

Driveway edges: When requested, the following elevations at the driveway edges and centerline shall appear on both Building Permit and Street Use Permit plans:

- centerline of street;
- gutter line;
- top of driveway approach;
- back of sidewalk;
- property line;
- garage floor;
- driveway slope; and

In addition distance from property line to garage floor elevation shall be shown.

4.9.3 Design Considerations

Driveways should be placed sufficiently far from crosswalks to provide enough sight distance into the crosswalk so that drivers can see pedestrians approaching within the crosswalk and so that vehicles do not block the crosswalk when exiting a driveway.

4.10 Curbs

Curbs are a significant component of the right-of-way. They provide multiple functions including delineating the space between the roadway and streetscape and channeling surface water into drainage inlets. New and replacement concrete curbs shall be constructed according to the Seattle Standard Plans referenced below.

4.10.1 Links to Standard Plans and Specifications

Standard Plan 401: Residential Pavement Sections
Standard Plan 402: Commercial and Arterial Pavement Sections
Standard Plan 410: Type 410 Curb
Standard Plan 411: Curb Joints and Dowels
Standard Plan 412: Extruded Curb
Standard Plan 413a: Traffic Curb Pre-cast Cement Concrete 3 foot and 4 foot Sections
Standard Plan 413b: Traffic Curb Pre-cast Cement Concrete 8 foot Section and Radial

4.10.2 Design Criteria

Curb type: the curb type used depends on the type of pavement being installed and shall be in accordance with Seattle Standard Plans 401 and 402. In general, a Seattle Standard Plan 410B curb and gutter is used with flexible pavement and a Seattle Standard Plan 410C doweled curb is used with rigid pavements.

Curb height: Seattle's standard curb height is 6 inches. The curb height may be reduced to a minimum of 4 inches if necessary to obtain adequate sidewalk cross slope.

Permanent curb location: When an existing curb and sidewalk are removed in conjunction with demolition and construction, the new curb shall be placed in the permanent location. The permanent curb location is the edge of the design roadway width in Ch. 4.6.2 Design Criteria .

Flowline Elevation: The flowline elevation should be based on a best fit profile of the centerline of the street and a projected cross slope of 1-4% (2% preferred).

Pedestrian bulbs: Pedestrian bulb standards have been established to ensure the public's safety and allow for street sweepers to negotiate curb line variations. The curb radii used for a 6 feet pedestrian bulb is 10 feet for the radius nearest to the travel lane and 20 feet for the radius closest to the right-of-way margin.

Parking curb setbacks: The installation of a parking curb setback in conjunction with a development proposal requires the approval of both the SDOT and DPD Directors and must meet the requirements in SMC 15.06.050. Parking curb setbacks are not permitted on streets where parking is allowed in the existing curb lane. DPD reviews the curb setback from a land use perspective and SDOT reviews it from a traffic operations and street maintenance perspective. Refer to Figure 4-17: Parking Curb Setback for specific design specifications.

Construction of new curb: When new curb or curb and gutter are constructed, it shall be located in the permanent location required for the adjacent land use zone. Additional paving shall be provided between the existing edge of pavement and the new curb, as needed. In addition, a portion of the existing roadway pavement abutting the site shall be reconstructed as needed when the existing pavement is in poor condition (indicating inadequate subgrade or pavement strength), when the cross slope of the existing pavement is too flat, or when the street was not graded to the standard design cross section prior to paving.

In no case shall the grade in the pavement or gutter be such that allows ponding of water.

4.11 Sidewalks

SDOT's goal is to provide an interconnected network of sidewalks and walkways that allow pedestrians to safely access their destinations including transit stops, places of employment, recreation facilities, schools and residences.

SDOT recognizes and supports the range of benefits a well-designed streetscape provides for all pedestrians, including people with disabilities. For this reason, SDOT reviews streetscape design elements very carefully to ensure that the materials, dimensions and design elements meet safety and accessibility requirements. In addition to the aesthetic and practical benefits of a well-designed streetscape, SDOT must meet state and national safety and access standards for streetscape design.

The streetscape is broken into three parts, the Frontage Zone, Pedestrian Zone and Landscape/Furniture Zone plus Curb. The locations of these zones are defined as follows:

The Landscape/Furniture Zone (including the curb) is defined as the area between the roadway curb face and the front edge of the walkway. The minimum width of this zone is 5½ ft feet except in locations adjacent to high and intermediate capacity transit stations. Objects in the landscape/furniture zone must be setback a minimum of 3' from the face of the street curb. This zone buffers pedestrians from the adjacent roadway and is the appropriate location for street furniture, art and landscaping. It is also the preferred location for street trees, and other elements such as pedestrian lighting, hydrants and below grade utility hatch covers. Transit Zones are also located in the landscape/furniture zone and are designated for transit customer waiting, loading and alighting and may include transit signage, shelters, benches, litter receptacles, and pedestrian scaled lighting. Any landscaping or other objects proposed for this zone must comply with City of Seattle permitting requirements and design criteria.

The Pedestrian Zone is the area of the sidewalk corridor that is specifically reserved for pedestrian travel. The minimum width of this zone is 6 feet, except in locations adjacent to high and intermediate capacity transit stations. Street furniture, plantings, and other fixed items should not protrude into travel routes.

The Frontage Zone is defined as the area between the property line and walkway. Where sufficient right-of-way exists, a frontage zone should be provided that is a minimum of 2 feet wide, except in locations adjacent to high and intermediate capacity transit stations. Frontage zones can accommodate sidewalk cafes, store entrances, retail display or landscaping. A frontage zone is not needed if the sidewalk corridor is adjacent to a landscaped space.

Streetscape Zones

Landscape/Furniture Zone Pedestrian Zone Frontage Zone

4.11.1 Links to Standard Plans and Specifications

Standard Plan 420: Concrete Sidewalk Details
Standard Plan 421: Sidewalk with a Monolithic Curb
Standard Plan 422: Curb Ramp Details

Standard Plan 430: Type 430 Driveway
Standard Plan 431: Concrete Driveway Placed with Sidewalk Construction

4.11.2 Design Criteria

Standard construction of sidewalks: A standard sidewalk is constructed of Portland cement concrete and is located at least 5½ feet from the face of the curb and 2 feet from the property line. The sidewalk may be located closer to the property line when necessary to attain the minimum 5 foot planting strip width and 6 foot sidewalk.

Construction of new sidewalks: On streets where the existing sidewalks are greater than 6 feet in width, the new sidewalk shall match the existing sidewalk width. In residential zones, when more than half the block on the project side of the street already has a sidewalk and planting strip, new sidewalks and planting strips may conform to the existing location, unless otherwise direct by SDOT. On streets in non-residential zones where the existing sidewalk is not in the standard location, SDOT shall determine the location of any new sidewalk or sidewalk replacement, based on the need for street trees and the desire to retain existing neighborhood character. New concrete sidewalks may not be installed without a curb. If a concrete sidewalk is required and there is no curb, a concrete curb shall be installed in the permanent location. In many cases, this will necessitate the installation of additional roadway pavement and drainage facilities.

Sidewalk width: Sidewalks shall be a minimum of 6 feet of unobstructed, linear sidewalk space that is free of street furniture, street trees, planters, and other vertical elements such as poles, fire hydrants and street furniture. Point obstructions such as poles and fire hydrants may encroach into the sidewalk area, but the sidewalk must have 5 feet clear width remaining.

Wider sidewalks are required in some cases consistent with the Land Use Code or when the sidewalk must be placed adjacent to the curb because of topography or right of way limitations. Sidewalks may be located adjacent to the curb when there is inadequate right of way or in steep topography areas where grading to a full street width would cause too great of an impact. Steep topography areas are defined by an 8-foot or more elevation difference between the existing grade and the established street grade at the right of way line. Sidewalks adjacent to the curb on non-arterial streets shall be a minimum of 8 feet wide. Sidewalks adjacent to the curb on arterial streets outside of downtown shall be a minimum of 10.5 feet wide.

Sidewalk path of travel: Sidewalks should keep as much as possible to the natural path of travel parallel to the improved roadway. Ideally, they will align with the crosswalk. While sidewalks do not need to be perfectly straight, curves that direct the pedestrian away from the natural path should not be introduced solely for aesthetic reasons.

Setback: A three foot distance between vertical objects on the sidewalk and travel lanes in the roadway is required to minimize conflicts with vehicle activity. Relocation of existing utilities may be required to meet clearance requirements.

Clearance from obstructions: The sidewalk shall be clear of all vertical obstructions, such as poles, fire hydrants, street furniture, and other elements for a width of at least 5 feet. These obstructions should be placed in the landscape / furniture zone or behind the sidewalk. Relocation of existing utilities may be required to meet clearance requirements.

Utility access points: Where practical, handholes, vaults, and other utility access points shall be located out of the sidewalk area and in the landscape/furniture zone. Where this is not practical, these access points must match the level of the sidewalk and be coated with a non-slip surface.

Slope: Sidewalk cross slope must be a minimum of 0.5% but may not exceed 2%.

Sidewalk Finish: Sidewalks shall be constructed and finished per the Standard Plans and Specifications. Any other treatments (non-standard scoring patterns, coloring, texturing) must be approved by SDOT and either the design review board or the design commission.

Visibility: No obstructions to pedestrian visibility should be present within 30 feet of an intersection. These include parked cars, street trees, signal control boxes, sandwich boards, utility poles and landscaping mounds.

Variations from standard sidewalk construction: In general, variations from standard sidewalk construction are required to meet ADA requirements. Additionally, on residential streets where natural drainage is being installed, variations will be considered based on planning and design principles defined in Chapter 6.4 Green Stormwater Infrastructure.

Asphalt pedestrian walkways: There may be locations where asphalt walkways are appropriate on non-arterial streets such as industrial zones as specified by the Land Use Code. Please refer to the figure for more detailed information.

Figure 4-15: Asphalt Pedestrian Walkway - for use in industrial zones only, as allowed by the Land Use Code

Figure 4-16: Asphalt Pedestrian Walkway 10 Feet or More From Existing Roadway - for use in industrial zones only, as allowed by the Land Use Code

Maintenance responsibility: The area between the curb and property line, including sidewalks, is the maintenance responsibility of the abutting property owner. When the existing sidewalk adjacent to a project is in disrepair or is damaged during construction, it shall be repaired or replaced by the property owner.

Accessibility: Pedestrian facilities shall be designed to allow all users to logically connect to other pedestrian facilities (e.g. – length of sidewalk transitions and placement of objects near walkways). They shall be in compliance with current ADA requirements in all cases. Sidewalks and walkways should be constructed with accompanying curb ramps, including companion ramps, as required by current ADA standards.

Sidewalks in the vicinity of transit stations: Applicants proposing new development in the block adjacent to a high or intermediate capacity transit station must accommodate high volumes of pedestrians in the vicinity as follows.

In the block adjacent to the transit station, the sidewalk shall be 18-25 feet as follows:

- **Frontage zone**: (3 feet) If the project has a plaza or other space accessible to pedestrians and free of obstructions adjacent to the property line, the frontage zone requirement may be waived.
- **Pedestrian zone**: (10-12 feet) The pedestrian zone shall consist of a paved linear walkway that is free from obstructions. The following shall be considered when establishing the dimension of the Pedestrian Zone:
    - Ridership projections for the station;
    - Anticipated pedestrian volumes from adjacent land uses;
    - Right-of-way dimensions;
    - Block length; and
    - Location of bus transfer zones.

SDOT staff will work with the applicant to make the final determination of required sidewalk width.

- **Landscape/Furniture zone plus curb:** (5-10 feet) Landscape requirements for the project defined in the Land Use Code (SMC Title 23) can be met within the Landscape/Furniture Zone (they are not additive). The following shall be considered when establishing the dimension of the Landscape/Furniture Zone:
    - Available right-of-way dimensions;
    - Urban design priorities established by the City or Transit Agency; and,
    - Direction of adopted Street Design Concept Plan or other adopted plans.
    - Improvements in these zones shall meet or exceed the accessibility requirements defined by ADA as well as applicable local and state standards.

Additional improvements within 1/4 mile of station entrance: SDOT also requires curb ramps with tactile warning strips at legal crosswalks (refer to Chapter 4.8.2 Intersection Design Criteria) and smooth accessible sidewalks within a quarter mile of the station entrances. SDOT will require the transit agency to assess the conditions within the quarter mile of the station entrance, and add or repair existing sidewalks and curb ramps to provide access to the stations consistent with ADA guidelines. In some cases, consistent with City policy in support of transit oriented development, a project may be allowed to meet the total required sidewalk width and include building columns in between the Pedestrian and Landscape/Furniture Zones. In this scenario, the minimum dimension of clear, unobstructed sidewalk width shall be retained within the Pedestrian Zone.

4.11.3: Design Considerations

Width: Provide adequate sidewalk width, especially at locations such as transit stops where pedestrians can be expected to congregate.

Buffers: Sidewalks and walkways should be buffered from the motor vehicle lane by a planting strip, street furniture, parked cars or a bike lane.

Sidewalks in the vicinity of high and intermediate capacity transit stations: Consistent with the City of Seattle Comprehensive Plan policies that encourage pedestrian access to and from public transit facilities, especially in Urban Centers and Villages, the following shall be considered:

- High and intermediate capacity transit stations have unique needs for pedestrians due to the high volumes of pedestrians exiting stations and onto the adjacent streets. Transit agencies are typically required to size station plazas and waiting areas according to anticipated queuing and exiting volumes. However, the requirements do not typically extend outside the boundaries of the station site.
- The sidewalk on the street fronting the station is the primary location for high volumes of pedestrians congregating, making transfers to other modes or walking to a destination. This first block is where the need for wide sidewalks that are well-buffered from moving traffic is greatest. In some cases, anticipated pedestrian volumes, major pedestrian generators or other special conditions may require the improvements to exceed one block in length (e.g. hospitals, schools, community centers, libraries and parks).
- Additional improvements to pedestrian facilities are needed within a 1/4 mile of the station site to support and encourage safe pedestrian access (e.g. wide sidewalks, buffers, curb ramps).

4.12 Crosswalks

SDOT's goal is to provide an interconnected pedestrian network, including crossing opportunities, that

allows pedestrians to safely and comfortably access their destinations including transit stops, places of employment, recreation facilities, schools and residences.

A legal crosswalk exists at every intersection unless it is otherwise signed. Marking the crosswalk is appropriate in some locations, and some marked crosswalks are best accompanied by other treatments such as signs or beacons. SDOT must approve all new marked crosswalks.

4.12.1 Links to Standard Plans and Specifications

Standard Plan 712: Typical Crosswalk and Stop Line Installations

4.12.2 Design Criteria

Location of legal crosswalks: Legal crosswalks exist at every intersection, unless otherwise signed, regardless of whether they are marked or unmarked.

- **Standard construction of crosswalks**: New marked crosswalks shall be ladder-style crosswalks with the accompanying signing per the MUTCD and Standard Plan No. 712. Additional marking and signing may be needed based upon the traffic conditions. Marked crosswalks should keep as much as possible to the natural path of travel. Ideally they will align with existing sidewalks. Refer to Chapter 4.8.2 Curb Ramps.
- **Materials**: Marked crosswalks shall conform to Standard Specifications 8-22 and 9-29
- **Site distance**: No obstructions between pedestrian and driver visibility should be present within 20 feet of the legal crosswalk. These include parking, trees, and bus zones**.**

Variation from standard construction of crosswalks: Textured and/or colored concrete may be considered in certain crosswalk applications. The following design criteria apply:

- **Area of crosswalk**: At least 10 feet wide.
- **ADA-accessible surface**: The surfacing material must be compliant with ADA.
- **Visibility:** A thermoplastic parallel line on either side of a colored or textured crossing maintains visibility. See Standard Plan 712 for Crosswalk marking standards.
- Street lighting upgrades may be necessary.

SDOT Traffic Management Division must approve the use of textured or colored concrete at crosswalk locations.

4.12.3 Design Considerations

The SDOT Traffic Operations Investigation & Implementation section considers each request for a marked crosswalk individually. In most cases, SDOT will wait to see how people use a new facility before making a decision about a marked crosswalk.

Orientation of building entrances to crosswalks: New development (and their pedestrian access points) should be designed to be consistent with the existing roadway operations and pedestrian travel patterns. For example, entrances and access points to new facilities should orient as much as possible towards a legal crosswalk.

This is especially true of facilities where a high volume of pedestrian travel across the street is expected. New development should take into account the location of existing legal pedestrian crossings when designing pedestrian access points. Entrances and access points that orient pedestrians towards unsuitable crossing locations can promote mid-block or illegal pedestrian crossings. This problem is difficult to remedy after construction is complete.

4.13 Bicycle Facilities

Bicycles are legally considered vehicles and therefore legally allowed to operate on any public roadway except where specifically restricted. There are many features and design elements associated with traffic and signal operations that can greatly enhance the attractiveness and safety of bicycling in the roadway.

4.13.1 Links to Standard Plans and Specifications

Standard Plan #265: Vaned Grate
Standard Plan #722: Bicyclist and Pedestrian Symbols
Standard Plan #724: Bicycle Symbol
Standard Plan #724: Bicycle Detector Pavement Marking

4.13.2 Design Criteria

Per RCW 35.75.060 and 36.82.145, all bicycle facilities must comply with Chapter 1020 of the WSDOT Design Manual which is consistent with the 1999 AASHTO Guide for the Development of Bicycle Facilities.

Drain grates: Must be designed such that narrow tires cannot get caught. When new drain grates are installed or existing drain grates replaced, they must conform to the vaned grate design specified in Standard Plan #265. **The drain grate design specified in Standard Plan #264 should not be used in any location where bicycles may be present.**

Deck grating: Can be extremely slippery, particularly in wet conditions. Bicycle tires, with their small contact area, are extremely vulnerable to loss of traction. If deck grating must be installed, it must be treated to increase traction and the seam width between the decking and the adjacent pavement should be no wider than 0.25 inch.

Signal detection sensitivity: Loop detector systems, and any other detection system employed such as camera-based motion detection systems, must be sensitive enough to recognize bicycles or bicyclists. These systems should also accommodate the trend in bicycle technology which is resulting in bicycles being manufactured with decreasing amounts of metal.

Pavement markings for loop detector systems: As required by State law, RCW 47.36.025, with new construction or upgrade of detection equipment; bicycle loop detector systems should be accompanied by pavement markings that indicate the location where a bicycle should be located to maximize its disruption of the inductance field. Specifications for this pavement marking are illustrated in Standard Plan 725.

Bicycle Parking

On-street bicycle racks: Racks must have the following characteristics:

- are intuitive to use correctly;
- have a no-maintenance finish that won't chip, peel, or rust. Galvanized steel finishes are preferred;
- support the frame of the bicycle;
- allow a u-style lock to secure one of the wheels and the frame to the rack;
- allow removal of the front wheel and locking it with the rear wheel and frame to the rack;

- have a minimum height of 2.5 feet so it is not a tripping hazard;
- are installed as close to, without being directly in front of, the main entrance(s) of a building or site; and
- have adequate clearance from driveways, curb ramps, transit loading areas and immediately adjacent to shelters, and utility poles.

The SDOT bicycle rack program website has sample racks and more information. SDOT will assume ownership and maintenance of bicycle racks once they are installed.

Private, off-street bicycle parking requirements are specified in the Land Use Code.

• SMC 23.49.019 Downtown Parking Quantity Requirements
• SMC 23.54.015 Required Parking
• SMC 23.54.016 Major Institutions Parking and transportation
• SMC 23.54.020 Parking Quantity Exceptions

Bicycle Master Plan: The City of Seattle's Bicycle Master Plan was published in 2007. The Bicycle Master Plan established a recommended bicycle facility network and defined the type of bicycle facilities to be placed on the identified streets.

The following are design criteria for some of the more common bicycle facilities identified in the Bicycle Master Plan. Refer to the Bicycle Master Plan for a full description of all the facility types. The following criteria should be used in conjunction with the current MUTCD and Chapter 1020 of the WSDOT Design Manual which is consistent with the 1999 AASHTO Guide for the Development of Bicycle Facilities.

Bicycle Lanes: The minimum width for a bicycle lane is five feet adjacent to a parking lane and 4 feet adjacent to the curb. Bicycle lanes should include a bicycle pavement marking with an arrow to indicate that bicyclists should ride in the same direction as adjacent motor vehicle traffic. When adjacent to parking, secondary striping is installed to delineate the parking lane from the bike lane. Where the edge line separating the bike lane from a motor vehicle lane is 13 feet from the curb or edge of roadway, the secondary striping should be installed no more than 8 feet from the curb or edge of roadway. Where the edge line separating the bike lane from a motor vehicle lane is less than 13 feet from the curb or edge of roadway, the secondary striping should be installed 7 feet from the curb or edge of roadway.

Shared lane markings: Shared lane pavement markings (or "sharrows") are bicycle symbols that are placed in the roadway lane indicating that motorists should expect to see and share the lane with bicycles. Unlike bicycle lanes, they do not designate a particular part of the roadway for the use of bicyclists. The design location for sharrows should conform to the MUTCD. In addition, a near side sharrow will also be placed at arterial intersections with traffic control and at intersections where there is a far side bus stop and the far side sharrow is placed at the end of the bus stop. At locations where it is desirable to encourage motorist to pass the bicyclist by changing lanes or to wait until they reach a location where the lane widens, moving the marking towards the center of the travel lane should be considered.

Climbing Lanes: Climbing lanes are a hybrid bicycle facility that includes a five foot bicycle lane on one side of the roadway (typically in the uphill direction) and a shared lane marking on the other side of the roadway.

Bicycle Facility Design: The following are criteria to follow when designing bicycle facilities or street improvements that may impact bicyclists:

- Paint or traditional thermoplastic are not satisfactory materials for bicycle lane symbols. Pavement markings should have a thickness no greater than 75 mil and must have retro-reflective and skid-resistant properties. Preformed type B thermoplastic legends should be used for bicycle facilities.
- Vertical obstructions within the path of bicycle travel are not recommended, but in some cases may exist. The pavement marking described in Figure 4-20: Obstruction Warning Pavement Marking provides a visual indication to bicyclists plan for an upcoming obstruction.
- Typical small-scale berms should have an average approach slope of 2%. For example, the approach to a 1.5 inches high berm should be 6 feet long. Berms with shorter approaches increase the likelihood that a bicyclist will lose control of their bicycle, especially those with high pressure tires or without any suspension.
- Concrete panels should be aligned such that seems should be located outside of the zone that bicyclists commonly travel. For example, this zone is typically 10-12 feet from the curb when on-street parking exists.
- The seam width between concrete panels should be no wider than .25 inch; vertical faulting must be maintained at a maximum of .25 inches.
- The minimum setback of a trail from railroad tracks/train should be 10 feet.

4.13.3 Design Considerations

Certain physical characteristics of bicycles require that our transportation system be built and maintained in a manner so bicycles can be safely operated. These characteristics, which are more common in road-style bikes than off-road style bikes, include:

- narrow tires, down to 20mm in width;
- small contact patch with the roadway surface;
- small mass of metal (steel, aluminum, or titanium) compared to motor vehicles;
- high tire pressure, typically 100+ psi; and
- lack of suspension.

These physical characteristics should be considered when designing bicycle facilities.

4.14 Street Trees and Landscape Architectural Standards

Street trees are required by municipal code and standards set by SDOT designed to provide maximum public benefit and compatibility with other infrastructure in the street right-of-way. Street trees are to be protected during construction and otherwise routinely maintained for optimum health, longevity, and public safety. SDOT Urban Forestry advises applicants on tree selection, installation and protection measures to preserve the functional, environmental, social, and economic benefits of trees and to support the citywide urban forestry goal to increase canopy cover.

Like other street design standards, street trees are reviewed and approved by SDOT according to established guidelines and standards (see the SDOT Recommended Street Tree List for spacing recommendations and the Standard Plan # 030 for clearances and installation details). However, because trees are living infrastructure, growing in size over time, each project is reviewed and inspected on a site specific basis to ensure the optimum outcome for the project, the neighborhood, and the city as

a whole.

The street tree design criteria in this section are based on transportation safety requirements and on minimum requirements for street trees to achieve a mature canopy for effective reduction of both storm water runoff and reflected heat from paved street and sidewalk surfaces.

4.14.1 Links to Standard Plans and Specifications

Std Specification 1-07.16(2) Tree Vegetation and Soil Protection
Std Specification 8-01.3(2)B Tree Vegetation and Soil Protection Plan (TVSPP)
Std Specification 8-02 Landscape Construction
Std Specification 8-14 Cement Concrete Sidewalk
Standard Plans 030 through 142
Standard Plans Section 100: Landscape Planting (includes standard plans for trees, shrub and ground cover, irrigation, tree protection, soil preparation and grading)
Standard Plan 424a and b: Tree Pit Detail

4.14.2 Design Criteria

Clearances from street trees Street trees require access to air and water, space for growth and must be located, installed and managed for compatibility with the built environment. Standards for layout of trees and other infrastructure within a transportation corridor described in this manual are established to establish corridors, setbacks and depths for various elements including utilities (i.e. storm drains, sanitary sewer lines, water lines, etc.) to ensure that minimum clearances from trees and other objects in the right-of-way can be met.

Clearances from street trees—at grade: With limited right-of-way, SDOT will evaluate site conditions and may permit one or both of the following:

- variances from the standard clearances from face of curb and/or sidewalk edge based on the street classification (arterial or non-arterial), tree species, curb lane use (parking or travel lane) and recorded or projected information about pedestrian volumes for the corridor; and
- variances from the typical planting strip and/or tree pit location within the street cross section (i.e. tree planting in bulb outs within a parking lane, behind the sidewalk, etc.)

Clearances from street trees—below grade: The design of street improvements must consider underground utilities in relation to standard utility corridors. The location of private service connections must also consider clearances from street trees. Though less than optimum for both utilities and trees, a minimum standard of 5' lateral clearance is required. Where right-of-way width allows allocation of more than 5', the investment to provide additional space up front often provides a long-term benefit through reduced impact on trees due to utility line maintenance and repair.

- Where both utilities and street improvements are proposed by a project, the design must follow standards, including the 5' clearance standard between service connections and street trees.
- Where street improvements are proposed in a ROW with existing utilities that **do** occupy standard corridors, the standard 5' clearance between street trees and service connections is required.
- Where utilities are proposed within a ROW with existing street trees, the design must follow standards with regard to placement of utilities within designated utility corridors and the 5' standard clearance for service connections.
- Where street improvements are proposed within a ROW with existing service connections and the 5' clearance standard conflicts with proposed street trees in standard planting strips or tree pits, Street trees will still be required with additional mitigation measures to help protect both the

trees and the service connection. The mitigation measure must be approved by SDOT.

- Where street improvements are proposed within a ROW with existing utilities that **do not** occupy standard corridors, Street trees will still be required with additional mitigation measures provided to protect the street tree and public utility. The mitigation measures are subject to approval by SDOT and the public utility.

In some cases, depending upon the age, depth, and material of the utility, mitigation may not be possible, and the utility may be required to relocate if trees are required.

Possible Mitigation Measures – Other mitigation measure may be considered as new technologies become available and are assessed as to their feasibility for the project.

- Vertical Root Barrier
- Horizontal Root Barrier
- Ductile Iron Pipe
- Concrete Pipe with Rubber Gaskets (post 1960) after review by utility owners.
- Utility Line Relocation

Planting strip dimensions and clearances: Maintain 5 feet 0 inches clearance between the back of the sidewalk and inside edge of the curb (5 feet 6 inches to the curb face) to allow a setback for street trees measuring 3 feet 6 inches from the centerline of the tree to the curb face and 2 feet 0 inches from the centerline of the tree and sidewalk edge.

Planting strip treatments: Plants in planting strips vary greatly in their potential to provide optimum pedestrian and environmental benefits. Though SDOT allows the installation of grass the department encourages the installation of low (24-30 inches) shrubs, perennial or groundcover plantings that provide a superior degree of separation between the sidewalk and street at reduced maintenance costs. Under some conditions, a combination of the plantings and grass or plantings and pavers may be appropriate depending on the street classification and need to accommodate parking in the curb lane.

Refer to Chapter 6.4 Green Stormwater Infrastructure for guidance on integrating stormwater conveyance and treatment into the planting plan.

Planting strips—grading: The final grade of soil surfaces in planting strips must accommodate runoff from sidewalk surfaces cross-sloped to drain toward the street. In cases where a swale or depressed planting strip is proposed, see Chapter 6.4 Green Stormwater Infrastructure. In cases where a mounded planting strip is proposed to provide a more effective separation between the sidewalk and street, a centerline height of 6” above the adjacent sidewalk grade is typical and gaps between mounded areas must be provided so that backup of runoff and ponding does not occur on the paved sidewalk.

Planting strip paving: Up to 40% of the area in planting strips may be paved if the following conditions are met:

- Paving is done in combination with street trees;
- Related landscape architectural features pose no public safety concern; and
- The combination of paving and trees provides an equal or better balance of functional and environmental benefits than a fully planted condition.
- Paved area is not used for parking.

Pervious pavement materials are encouraged to allow for the infiltration of runoff from the sidewalk before it enters the street to maximize the water quality entering the planting strip. Paving materials and installation details are subject to approval by SDOT.

Tree pits: are typically used as an alternative to planting strips in business districts where additional sidewalk width is important to accommodate pedestrian volumes.

When permitted as an alternative to planting strips, tree pits shall be constructed per Standard Plan 424, dimensioned to meet or exceed the minimum size required to meet standards. The minimum square footage for a tree pit is 24sf of open area (typically 4 feet x 6 feet or 5 feet x 5 feet). Any proposal dimensioned below minimum standards shall be subject to site-specific review to ensure that:

- conditions justify the substandard size;
- the design meets public safety standards; and
- the design provides adequate conditions to support trees.

Tree pits—grading : Shall be graded to provide a soil surface 2 inches below the adjacent sidewalk and curb elevation and be top dressed with bark, wood chips, cinders, or crushed angular aggregate material that is routinely maintained to minimize the grade differential between the sidewalk and open pit area.

Street Tree Permit: Please refer to Chapter 2.9.2 of the Right-of-Way Manual.

Tree grates: Often proposed as an architectural design element and/or as a means to maximize the pedestrian accessible area in the right-of-way, tree grates may be permitted by SDOT, but are not recommended. When permitted, tree grates shall be maintained routinely by the property owner to ensure a flush condition between the grate surface and surrounding pavement, to replace broken segments, and to expand the opening as appropriate to accommodate the growth of the tree.

Tree and plant material—selection : See SDOT Recommended Street Tree List

Tree and plant materials--installation and maintenance responsibilities: It is the responsibility of the property owner to ensure that installation and maintenance of grass, plantings and related improvements in planting strips meet public safety and industry standards. Street tree and landscaping improvements required by the Land Use Code must be maintained to meet public safety standards for the life of the project. This includes:

- watering to ensure establishment of plant material**;**
- mulching to minimize water use, discourage weeds and protect against erosion
- pruning low shrubs and groundcover to control overgrowth onto sidewalks
- pruning street trees(after first obtaining a street use permit) to ensure appropriate clearances over streets and sidewalks.

Tree protection and maintenance: Removal or pruning of street trees proposed requires a permit and is subject to review and, when approved, subject to inspection by the SDOT Landscape Architect's Office.

Permit applications may be required to include public notification and/or mitigation for the lost value of the tree(s) proposed for removal. In cases where the applicant is not the owner of the property abutting the proposed work, applications must include signatures of adjacent property owners. The extent of notification is determined on a case by case basis to ensure public safety and awareness and/or approval of the project. Names and addresses of contacts may be submitted for approval or provided as a component of the permit review process by SDOT Urban Forestry. All permitted work must be completed within 60 working days unless otherwise defined by the permit.

4.14.3 Design Considerations

- Trees and related landscape architectural treatments that are strategically planned for maximum public benefit within the often limited space within the street right-of-way provide a "sense of

place" critical to the vitality of neighborhoods and their business districts.

- The value of street trees to the urban environment is enhanced when they are combined with understory planting, specialized pavements, street furniture and public art.
- Planting strips serve a number of important functions including:
    - pedestrian safety--they provide a buffer between the sidewalk and roadway;
    - reduction of runoff by providing area for rainfall to infiltrate;
    - water quality by infiltrating runoff from sidewalks before it enters the street; and
    - the growth and longevity of street trees.
- Tree health and maintenance: because the standard, whether it be a 5 feet wide planting strip or 5 feet x 5 feet tree pit is not optimum to meet the horticultural requirements of a typical street tree, allocating larger areas to accommodate trees is encouraged whenever right-of-way space allows. Allocation of space is a key factor in the management of trees for compatibility with adjacent paved surfaces and other improvements, with the investment of more space up front often providing a substantial payoff in terms of reduced need for replacement or repair of paved surfaces and related improvements.

4.15 Introduction to Utilities Design Criteria

One of the important functions of the right-of-way is to provide space for water, sewer, electricity, street lighting, traffic signals and other utilities, both above and beneath the street surface. There are standard locations for each utility in relation to roadway pavement, curbs, planting strips, and sidewalks, and there are requirements for utility clearances.

The following sections define the design criteria for utilities in the right-of-way:

4.16: Street Lighting
4.17: Street Drainage, Storm Drains and Sewers
4.18: Water Mains
4.19: Fire Protection

In addition to these sections, the following design criteria apply for utility easements and relocation.

4.15.1 Design Criteria

Utility Easements

Need for utility easements: When public utilities for sewer, storm, or power facilities are constructed on private property, a utility easement will need to be granted to the City. These easements are needed to establish rights for the City including, but not limited to, construction, operation, and maintenance access as needed to own and operate the facility.

Easement width: The width of the required easements are governed by factors such as the type of utility, its depth, size or diameter, the equipment needed for maintenance, etc. Sewer, drainage, water, and solid waste easements are prepared by SPU Real Property Services. Minimum easement widths for sewers and storm drains are found in SPU Client Assistance Memo (CAM) 1180: Design Guidelines for Public Storm Drain Facilities. For water mains, the minimum easement width is 20 feet. These are minimums, and site constraints may warrant greater easement widths.

Approvals for easements: Note that all easements (acquisition, relinquishment, and readjustments) for City owned facilities require approval by the Seattle City Council. For utilities owned by other entities, the applicant must contact the owner to determine required approvals for easements. Planning ahead and working with the City early is highly recommended in order to get all the legal documents signed and

recorded in a timely manner before any work is permitted. Council action can take up to 18 months in some cases.

Pipe location within an easement: For individual water, sewer or storm mains, the pipe shall be located in the centerline of the easement. The standard pipe material within an easement is Ductile Iron Pipe (DIP). For certain site conditions and buildover scenarios, SPU may require restrained joint ductile iron pipe, inside a steel casing pipe. For such installations, SPU requires a 25 feet “pit easement” on either the up hill or down hill side of the casing for the event that the pipe and/or casing must be removed. No private connections shall be allowed within the limits of the casing pipe. Generally casing pipes should have a 5 feet minimum distance past the edge of the building in the event of a buildover.

The easement needs a legal description prepared by a licensed professional land surveyor in the state of Washington.

Sewer and storm drains within the same easement: The minimum separation between the sewer and storm drain shall be 7 feet. The width of the easement on one side or the other will depend on pipe size and influence lines between the pipe and the building foundations (if any).

Utility Relocation:

Need for relocation: It may be necessary to relocate or adjust existing utilities to accommodate new street grades or to attain standard clearances when constructing street improvements. This may include street lighting, traffic signal facilities, water, sewer, and drainage mains and appurtenances. It also may be necessary to relocate curb ramps and bicycle facilities.

Site assessment: The applicant is responsible for obtaining and reviewing surveys and as-built plans, taking field measurements, and contacting the affected utilities to determine if relocation or adjustment is required and the associated costs. The cost of utility relocation and adjustment is the responsibility of the applicant.

Relocated utilities as well as new utilities to serve the development site shall be shown on street improvement plans when street improvements are required.

Pole consolidation: When installing new utilities or relocating existing utilities, it is the standard practice of the City of Seattle to reduce the number of poles where possible by combining utilities on one pole.

4.16 Street Lighting

Street lighting is intended to create an environment at nighttime in which people can see comfortably and can quickly and accurately identify objects on traveled roadways. Street lighting can improve, safeguard, facilitate, and encourage vehicular and pedestrian traffic. SDOT is responsible for ensuring that recommended light levels are achieved and reviews street and pedestrian lighting requests.

4.16.1 Links to Standard Plans and Specifications

Standard Specifications, Section 8-30 Illumination and Electrical Systems
Standard Specifications, Section 9-31 Illumination and Electrical Materials
Standard Plans, Section 500 Signalization/Lighting

4.16.2 Design Criteria

Conformance with Local, State and National Standards: The design of all electrical and lighting systems shall be in conformance with the Seattle Municipal Code and National Electrical Code, the National Electrical Safety Code, Washington State Electrical Code WAC Chapter 296-45.

New or relocated street lighting—non-arterial streets: Street lighting for non-arterial streets should be designed using the most recent edition of the recommended IES guidelines, unless otherwise approved by Seattle City Light.

Arterial Street lighting: SDOT has established design guidelines for arterial street lighting. Existing street light systems may be required to meet the design criteria and new street light systems shall be designed to them. During the review process additional information on type and style of luminaires will be provided. To maintain reliability and maintenance only fixtures approved by SCL will be acceptable.

Pedestrian lighting: Pedestrian lighting illuminates the pedestrian walkway and is typically mounted 12 - 14 feet above the sidewalk. This lighting should be considered when calculating the maintained foot candles and uniformity of roadway lighting.

Pedestrian ways not adjacent to the roadway may require lighting as determined by the Traffic Engineer. For additional information about lighting on non-arterial streets, contact Seattle City Light.

Refer to Figure 4-21 Pedestrian Lighting Sections.

Get more information about pedestrian lighting in neighborhood business districts.

4.16.3 Design Considerations

Good outdoor lighting can create and encourage a pedestrian friendly environment, which is especially beneficial to neighborhood business districts. Pedestrian lighting improves walkway illumination for pedestrian traffic and enhances community safety and business exposure. Lighting for pedestrians is especially important along Main Streets, Mixed Use Streets and Local Connectors, and in other locations where the land use supports large volumes of pedestrians and vehicles.

4.17 Street Drainage, Storm Drains and Sewers

Street design includes provision for the collection and discharge of storm water. Drainage system components such as pipe, catch basins, and inlets are considered integral street improvement elements as are curbs, sidewalks and pavement. All of the Street Drainage, Storm Drains and Sewer requirements in this section are to be considered requirements and are not optional.

When property development includes the installation of new or replaced paving or other impervious surfaces, there may be a need to improve existing drainage systems in the street to accommodate the additional stormwater or sanitary flows that will be incurred. This may trigger a requirement to make grading improvements, or to extend or upgrade existing storm drains, inlets, and catch basins, and there may be requirements for flow control and/or treatment facilities triggered by the City Stormwater Code. Factors such as the amount of impervious surface involved, the project location, the availability and capacity of existing infrastructure, among others, play a role in determining these requirements.

All these drainage improvements are required and shall be designed and constructed in accordance with the City of Seattle Standard Plans and Specifications which establish acceptable materials, dimensions, locations, installation and testing requirements, and other requirements for pipelines, manholes, connections, flow control facilities and other system improvements.

Seattle Public Utilities (SPU) is responsible for the plan review of new street drainage and stormwater treatment and flow control facilities, as well as for the review of project impacts to existing SPU infrastructure.

The following design criteria apply for storm drains and street drainage including drainage appurtenances, sanitary and combined sewers, and side sewers and service drains.

4.17.1 Links to Standard Plans and Specifications and other Resources

Standard Plans 200 Series
Standard Specifications Divisions 7
Standard Specifications Divisions 9
Stormwater Code SMC Ch. 22.800
Stormwater Flow Control and Water Quality Treatment Technical Requirements Manual DPD DR 17-2009/SPU DR 2009-005 Volume III
Green Stormwater Infrastructure – Requirements for Projects DR (Under Development)
Design Guidelines for Public Storm Drain Facilities SPU CAM 1180
Side Sewer Code – SMC Ch. 21.16
Requirements for Design and Construction of Service Drains (Drainage Water Discharges) DPD DR 3-2006/SPU DR 02-06
Requirements for Design and Construction of Side Sewers (Wastewater Discharges) DPD DR 2-2006/SPU DR 01-06
SPU Core Tap Procedures
Side Sewer Permits for Buildover Agreements DPD CAM 507

4.17.2 Stormwater Code Compliance

Project Type. There are six types of projects identified with different minimum requirements for each. See Section 2.3 of Volume 3 of the Stormwater Director's Rules. The 2009 Stormwater Code differentiates between projects on private property and projects in the ROW for the purposes of determining thresholds and minimum requirements. All work in the ROW is treated as a separate project when determining minimum requirements. As such all mitigation for work in the ROW must occur in the ROW and all mitigation for work on private property must occur on private property. The two project types specific to the ROW are listed below:

- Sidewalk Only – This involves only the creation, or replacement, of a sidewalk and only the associated work within the roadway prism needed to construct the sidewalk.
- Roadway – This involves creation or replacement of an existing roadway.

Minimum Requirements for All Projects, Amended Soils: All new, replaced and disturbed topsoil that will be left uncovered by impervious surfaces shall be amended with organic matter. See Volume 3 Chapter 4 of the Stormwater Director's Rules for detailed requirements.

Adding organic compost or mulch to soil improves its ability to support plants and absorb stormwater. Healthy soil is the backbone of green stormwater infrastructure.

Due to the concern that compost amended soils may compact irregularly, Seattle City Light (SCL) and Puget Sound Energy (PSE) require a 3-foot setback around all utility infrastructures. In this 3-foot setback amending soils with compost is not allowed. Seattle Public Utilities also recommends the 3-foot setback from water meters Soils should also be compacted within one foot of a curb or sidewalk.

Drainage Review Thresholds: "Small Project" drainage review will be required for street improvements which involve more than 750 square feet of land disturbing activity but less than 5,000 sf of new plus replaced impervious surface and less than 7,000 sf of land disturbing activity. "Large Project" drainage review will be required for street improvements which involve more than 5,000 sf of new plus replaced impervious surface or more than 7,000 sf of land disturbing activity.

Stormwater Flow Control : In areas served by a combined sewer, storm drains of inadequate capacity, or areas that discharge to non-designated receiving waters, stormwater flow control will be required for roadway projects that have a total new and replaced impervious areas exceeding 10,000 square feet, in

accordance with the Stormwater Code . Stormwater flow control systems shall be either an off-line system or an in-line system as approved by SPU. Standard pipe material for flow control systems located within the City right-of-way and owned and operated by SPU shall be concrete or ductile iron pipe.

Stormwater Water Quality: If the new or replaced pollution generating impervious surface exceeds 5,000 square feet, except for areas that discharge to the combined sewer, there will be requirements for stormwater water quality. (See City Stormwater Code for street specific impervious surface requirements). Public treatment facilities are installed in the right of way, and upon successful inspection they are turned over to SPU for operation and maintenance. Technical standards for the design of these facilities are provided in published SPU Director's Rules.

Green Stormwater Infrastructure: All right-of-way projects with 7,000 square feet or more of land disturbing activity or 2,000 square feet or more of new plus replaced impervious surface must implement green stormwater infrastructure to infiltrate, disperse, and retain drainage water to the maximum extent feasible without causing flooding, landslide, or erosion impacts. Technical standards for the design of these facilities are provided in published SPU Director's Rules.

4.17.3 Stormwater Collection

Drainage: Shall be provided for improved streets and alleys and shall include catch basins and inlets that discharge to a public combined sewer, public storm drain, or other discharge point approved by Seattle Public Utilities (SPU).

Surface drainage: Establishing appropriate street grades is very important for drainage. Standards for cross slopes and longitudinal slopes are important for vehicular and pedestrian safety as well as surface water conveyance. A standard street cross section diagram can be viewed here and shall have a centerline crown elevation. Cross slope shall ensure surface drainage gets to the gutter and flows down to drainage pickups. Streets shall generally have a centerline crown elevation, with some exceptions, such as super-elevated streets. Refer to Chapter 4.4 Grading and Chapter 4.5 Design Cross Section for more information.

- Drainage shall be collected at the low point of all closed contours, the downstream end of developed alleys upstream of the sidewalk, and upstream of all ADA ramps. If the distance from a high point to the intersection, crosswalk, or end of an alley is less than 100 feet, drainage pickup may not be necessary.
- Water from no more than 1,000 total lineal feet of curb may discharge into one catch basin. This includes the length of curb for inlets which discharge into a catch basin as well as the catch basin itself.
- At closed-contour low points and other locations where extra capacity is needed, use Standard Plan 242B catch basins. At low points in the roadway use two Standard Plan 242B catch basins, one on each side of the street, each with an independent connection to the storm drain. Additional drainage structure may be required where tree leaves are prevalent.
- Existing inlets that do not conform to current standards must be replaced if located in areas where new full-depth pavement will be installed. Existing inlets which do not conform to Standard Plan 250, located along new curbs, must be replaced.
- Arterial streets with a grade flatter than 1% shall have drainage pickups (catch basins and/or inlets) at least every 350 feet. Gutter flow calculations may be required.

4.17.4 Drainage and Sewer Conveyance

Public storm drains: A new public storm drain may be required when

- there is no available public storm drain or public combined sewer, and there is no acceptable discharge point;
- to achieve adequate capacity; and

New public storm drains shall be sized to handle all upstream tributary area from the drainage basin in which they are located. They shall be designed to be continuous with existing and future storm drain pipes that are or will be part of the storm drainage system. The engineer shall provide the hydraulic calculations used in the pipe design for review by SPU. Refer to Chapter 6.4 Green Stormwater Infrastructure for guidance on providing a natural drainage conveyance system.

Storm drain pipes:

- Storm drains must be designed for full gravity peak flow with 4% annual probability (25-year recurrence flows. The storm drain's surcharge level (hydraulic grade line) for that peak flow may be no higher than four feet below the street's gutter elevation or one foot below the service elevation of adjacent private property, whichever is lower. The service elevation is defined as two feet below the lowest elevation served on the site (such as the lowest catch basin or footing drain.)
- If calculations show that a storm drain is surcharged, the Hydraulic Grade Line must be shown on the pipe profiles of the contract drawings. Use the high water elevation of the receiving waters to calculate hydraulic gradients. High water for Lake Union and Lake Washington is +18.6; for Elliott Bay and the Duwamish River it is +12.14 (NAVD88).
- Storm drains must be a minimum of 12 inches in diameter. The minimum slope for storm drains is 0.5% with 1.0% or greater being desirable. Flatter slopes may be considered, but pipe slope must achieve a minimum velocity of three feet per second (fps) and shall require SPU approval.
- The effects of excess energy shall be investigated whenever pipe velocity exceeds 20 feet per second (fps). Energy dissipation features may be required. The design shall minimize or mitigate hydraulic jumps.
- The crowns of all pipes shall match at the manholes. Invert elevations shall be calculated by projecting the pipe slopes to the center of the manholes.
- Manholes are required every 375 feet. Generally, manholes are required at pipe junctions, breaks in grade, and changes in horizontal alignment. When a small diameter storm drain intersects a very large diameter storm drain, it may be appropriate to set the manhole on the small diameter pipe 10 to 30 feet away from the junction. Manholes are needed at the end of all pipe runs unless the pipe is 100 feet in length or shorter.
- Storm mains may have one horizontal or vertical bend (maximum 22.5°) between manholes, subject to approval by SPU.

Sanitary and Combined Sewers

In general, requirements for sanitary and combined sewer mains are as described above for storm drain pipes with the following differences:

- All sewer pipe must be designed and constructed to give mean velocities, when flowing full, of not less than 3 fps.
- Pipe located in the ROW must have a minimum slope of at least 2%. Pipe slopes exceeding 50% requires the use of restrained joint ductile iron. Pipes slopes that are <0.5% must have SPU

approval.

- Minimum pipe diameter is 8 inches
- Manholes are required every 350 feet.
- Minimum pipe depth is 12 feet.

4.17.5 Side Sewers

Side sewers and service drains: The pipeline between the building and the sewer or storm drain main is a side sewer or service drain, respectively. All side sewer and service drain work within the right-of-way requires a Street Use Utility Permit issued by DPD on behalf of SDOT.

Minimum grade, pipe size and materials, connection details, installation and testing requirements: Side sewers and service drains shall be designed and installed in accordance with the City of Seattle Standard Plans and Specifications. New core taps shall be per SPU's Core Tap Procedure

Ownership: Side sewers and service drains are owned and maintained by the property owner. The minimum grade is 2%. Pipe material and size shall be according to the Seattle Side Sewer Code.

Use of existing side sewers: It is possible to use existing side sewers in lieu of a new connection in some cases See the Side Sewer code for more details.

4.17.6 Additional Information

Build-Overs: For build-overs for SPU owned sewer and drainage appurtenances, the applicant shall follow the guidance of DPD's build-over CAM.

Ditch Modifications:

The City does not permit the filling of a ditch if that ditch functions as part of the City's informal drainage system in the street right of way and is located within a creek watershed. Creek watersheds are identified on the City GIS system, and on the Seattle Creek Watersheds map. The SDOT Director may approve a requested exception per the Street Use Code SMC 15.04.112 if the Director determines that the modification is likely to be equally protective of public health, safety and welfare, the environment, or public and private property. If the proposed modification is not equally protective, the Director may approve a requested exception if substantial reasons are documented such as:

- An emergency situation necessitates approval of the exception;
- A reasonable use of the adjacent property is not possible unless the exception is approved; or harm or threat of harm to public health, safety and welfare, the environment, or public and private property is at risk unless the exception is approved.

Exceptions to the ditch filling moratorium policy include culvert installations that are necessary to implement driveway permits, and required street improvements. If you are considering modifying the ditches within a creek watershed, the City encourages use of an NDS approach. The capacity calculations will be required to show that the proposed system can, at a minimum, provide the level of service of the existing conditions.

Deviation from Drainage and Wastewater Standards: All requests for exceptions to the drainage and wastewater standards and requirements must be approved by the Drainage and Wastewater Appeals Board.

4.18 Water Mains

New water mains are subject to the approval of Seattle Public Utilities (SPU) Project Management and Engineering Division (PMED).

4.18.1 Links to Standard Plans and Specifications

Standard Specification 1-07
Standard Specification 7-10.3(5)C
Standard Specification 7-11
Standard Specification 9-30
Standard Plan 030: Desirable Locations for Utilities (Residential Street)
Standard Plan Section 300: Watermain Appurtenances
Standard Plan 286a and 286b: Sewer and Water Spacing and Clearances
Standard Plan 330a and 330b: Water Main Thrust Blocking Vertical Fittings

4.18.2 Design Criteria

Water main design: SPU PMED provides design criteria for water mains during SIP design guidance

SPU reviews water system designs through the street improvement process. SPU also reviews proposed work within the right-of-way that may impact existing water mains or water facilities.

Protection of existing facilities: special measures to protect existing or proposed facilities may be required depending on the scope and impact of the proposed water main project. Special protection measures may include the use of restrained joint pipe, corrosion protection, and construction methods that minimize vibration and impacts of excavation to existing utilities.

Pipe material: All materials for water distribution shall be new and conform to Standard Specifications Section 9-30.

Standard location for water mains within the public right-of-way: Water mains will be generally located on the north and east side of the public right-of-way. In the event that the standard location for water mains is not available the best alignment will be determined during SIP design guidance.

Water valves: Water valves will generally be placed aligned with the perpendicular right-of-way margins, as shown in Figure 4-22: Typical Valve Location. If this location is otherwise unavailable SPU PMED will determine the alternative position. SPU PMED will approve the final location for all water components constructed in the City right-of-way.

Water main, sewer and other utilities separation: Water mains and water service lines shall designed for appropriate separation from the following:

- sanitary sewers;
- storm sewers;
- combined sewers;
- house sewer service connections;
- drains;
- sanitary sewer force mains; and
- gas, telecommunications, electrical, and other utilities.

Spacing between water mains and other utilities should comply with City of Seattle Standard Specifications 1-07, and Standard Plans 286a and 286b.

Depth of pipe cover: All pipe shall be laid to a minimum depth as indicated in Standard Specification 7-10.3(5)C and Standard Plan No. 030.

Thrust block: Provide concrete thrust blocks at points where piping changes directions or at dead ends. Thrust blocks shall be designed and installed as indicated in Standard Specification 7-11. Also, thrust blocks must conform to Standard Plan Nos. 330a and 330b.

For pipes larger than 12 inch diameter, or where water pressures are higher and/or soil conditions are poor, the developer engineer shall design the correct block size. All thrust block designs will require the approval of SPU PMED prior to installation. The stamped calculations shall be submitted to SPU PMED for review and approval.

Test pressure for field testing water main pipe: Field pressure testing for water mains shall be in accordance with Standard Specification 7-11. 3(1). Field hydrostatic testing of various diameter ductile iron water main pipes and appurtenances shall be:

Test Pressure for Field Testing Water Main Pipes

Diameter Pipe (inches)	4	6	8	10	12	16 or larger
Test Pressure (psi)	300	300	300	300	300	250

Flushing and disinfection: Before being placed in service all newly installed pipes, valves, hydrants and appurtenances shall be flushed, disinfected and kept clean, and an acceptable bacteriological report shall be obtained. Flushing and purification shall be in accordance with Standard Specification 7-11.

Vault location: Prior to water service approval, SPU Customer Service shall coordinate all work associated with installation of service vaults. The table below provides some preliminary information. SPU Water Crews will perform all service work.

Water services: For further inquiries regarding water services please contact SPU Customer Service or refer to:

http://www.seattle.gov/util/Engineering/Obtain_Utility_Services/Apply_for_Water_Service/index.asp

- Get more information on water service standard charges
- Get more information on metering
- Get more information on drinking water rates

Vault Location by Meter Size and Type

Vault Meter Size and Type	General Location in the ROW
Domestic	
3/4" & 1" Domestic	See City of Seattle Std. Plan #286b
1 1/2" & 2" Domestic	See City of Seattle Std. Plan #286b
3" & 4" Domestic	Vault plan required. Installation by SPU Crews),contact SPU Customer Service
6" Domestic	
Fire	
2" DC Fire Service	Direct-bury in approved enclosure (meter box), standard pending. Installation by SPU Crews, contact SPU Customer Service
4"-10" x 3/4" DC Fire Service	
Combination	
4" Combination Service	

6" Combination Service	Vault plan required. Installation by SPU Crews, contact SPU Customer Service
8" Combination Service	

4.18.3 Design Considerations

- Consider how to maintain fire flow during construction activities.
- Coordination with SPU water operations is required for all new connections, services, meter installations and any temporary cut and caps or temporary mains to facilitate your construction.
- Provide notice to the Fire Department if flow will be impeded and what provisions have been made – also note if access at the site will be limited or if street access will be limited.
- Be sure to check for utilities in the project alignment especially around large service locations as they could interfere with water mains, blocking, or meter vault installations.
- Only SPU crews are allowed to operate the existing water system for public health and safety reasons. Plan to coordinate with SPU water crews well in advance of starting construction to have your work added to crew work schedules.

4.19 Fire Protection

4.19.1 Links to Standard Plans and Specifications

Standard Specification 7-14: Hydrants
Standard Plan 310a and 310b: Type 310 Hydrant Setting Detail
Standard Plan 311a and 311b: Type 311 Hydrant Setting Detail
Standard Plan 312: Fire Hydrant Marker Layout
Standard Plan 313: Wall Requirements for Hydrants
Standard Plan 314: Fire Hydrant Locations and Clearances

4.19.2 Design Criteria

Hydrant pressure: The Seattle Fire Department requires that hydrants operate at a minimum residual pressure of 20 psi. Design and construction of fire protection features should comply with Seattle Fire Code and the Standard Plans and Specifications.

Hydrant resets, relocations and adjustments: Any hydrant resets, relocations and/or adjustments will be identified during the design approval process or with construction scheduling. These changes require 4-6 weeks advance notice. Please contact SPU Customer Service at 684-5800.

Fire flow requirements: The Seattle Fire Department and SPU Engineering will authorize all designs impacting fire flow. The following requirements apply, however they are general and should be confirmed with the Fire Department.:

- Required FF 1000 gpm (single family)
- Required FF 4000 gpm (commercial)
- Required FF 8000 gpm (major institution)

Fire hydrant Locations: Fire hydrant locations must conform to Standard Specification 7-14 and Standard Plan 314.

Use of fire hydrants under non-firefighting conditions: Temporary use of a hydrant by private individuals, businesses or organizations will be allowed under certain conditions. To this extent, Seattle Public Utilities will control use of all hydrants within the distribution system. A temporary water service

from the distribution system, for less than six months, may be authorized via a hydrant use permit or hydrant use meter issued by SPU Customer Service. For information regarding Hydrant Permits please contact the SPU Customer Service.

Reference: http://www.seattle.gov/util/Services/Water/Rates/index.asp.

4.19.3 Design Considerations

- During survey activities, be sure to note the location of existing hydrants and planned hydrant spacing appropriately.
- Hydrants should not be placed next to driveways or other private access points where they may impede existing access.
- Seattle Public Utilities supplies all hydrants. Please contact SPU Customer Service for more information.
- Changes to fire service including street access during construction require coordination with the Seattle Fire Department.

4.20 Seattle City Light

Electrical facilities and driveways: If an existing power pole or underground vault is in the middle of the future driveway, the applicant will be required to pay SCL, in addition to providing SCL with sufficient lead time, to reconfigure or to relocate its electrical facilities to resolve the conflict(s).

Electrical service entry points: It is also beneficial, financially and schedule-wise, for the applicant to pay attention to the electrical service entry point for the new building relative to SCL's facilities in the public right-of-way. The farther the service entry point from SCL's facility, the more complicated, time consuming and costly the service installation will be.

Underground ordinance areas: Certain areas in the City have been designated as underground ordinance areas. There is still a fair amount of overhead electrical distribution facility in some of the recently declared underground ordinance areas. Regardless of whether the existing electrical distribution system in the underground ordinance areas are overhead or underground, the electrical services to developments in these areas are required to go underground. Please contact other overhead utilities such as telephone and cable television companies for their undergrounding requirements in these areas.

Easements: Occasionally, if the available space, or the lack of available space, precludes SCL from serving the building(s) directly from its system in the public right-of-way, easement(s) from the property owner(s) or their neighbor(s) may be required for placing a local distribution system. This may include (but is not limited to) poles, anchors, wires, vaults, handholes, or conduits on site.

Further guidance and contact information: The *Requirements for Electrical Service Connection Manual*, which is currently being updated, will be available as a service installation guide for homeowners, developers.

SCL and DPD staff will work closely with you to accomplish appropriate clearances required for design, during construction and at final build-out. Communication and resolution of required clearances are critical to final design and construction approval of your proposal. Contact City Light Customer Engineering for more information regarding service requirements.

4.21 Clearances

Clearances are the minimum distances between elements in, under and above the street right-of-way. Clearance requirements are a key factor in how space within the right-of-way and on private property adjacent to the right-of-way can be used. Maintaining appropriate clear distances between certain elements in the right-of-way and on private property is necessary for a variety of reasons. Safety is a key consideration—for the traveling public, the property owner and for operations and maintenance crews who must access elements in the right-of-way for routine maintenance or repair. Appropriate clearances also enable the proper growth and development of trees and landscaping, and help protect and maintain both overhead and underground utilities.

This section describes required lateral and vertical clearances as well as special circumstances where additional clearance requirements may apply. The minimum clearances defined in this section are requirements. When minimum clearances cannot be met due to site condition constraints, the City staff will work with the applicant to determine an acceptable solution. Deviations from the standard clearances in this section are considered on a case by case basis and are evaluated by SDOT, SPU and other departments as needed.

4.21.1 Links to Standard Plans and Specifications

Standard Plan 030: Standard Location for Utilities (Residential Street)

4.21.2 Design Criteria

Lateral Clearances

From	To	Standard Clearance
Curb face	Closest part of any fixed object (excluding traffic control signs and parking meter posts)	3 feet
Edge of sidewalk	Closest part of any fixed object (excluding traffic control signs and parking meter posts)	1 foot
Textured surface of curb ramp	Closest part of any fixed object (excluding traffic control signs and parking meter posts)	1 foot
Edge of sidewalk	Stair riser, rockery, retaining wall, fence	2 feet
Pole face, fire hydrant	Closest part of any fixed object (excluding traffic control signs and parking meter posts)	5 feet
Stop sign	Nearest parking space	30 feet
Obstruction in sidewalk	Closest part of any fixed object (excluding traffic control signs and parking meter posts)	6 feet
Multi-use trail, edge of pavement	Closest part of any fixed object (excluding traffic control signs and parking meter posts)	2 feet (3 feet preferred)

Vertical Clearances

From	To	Standard Clearance
Roadway surfaces	Any horizontal projection over surface	20 feet

Sidewalk surfaces	Any horizontal projection over surface	8 feet
Roadway surfaces	Tree limbs	14 feet
Alley surfaces	Any horizontal projection over surface	26 feet
Bicycle path surfaces	Any horizontal projection over named surface	10 feet

Trees : For more information about clearances and trees, including conditions for deviating from the standard clearance listed below due to site constraints; refer to Section 4.14.2 Clearances from Street Trees. Factors to consider for a deviation from the standard required clearances between street trees and utilities may include the depth and age of the pipeline, the possible use of root barriers, the nature of the plantings, fire code requirements, and other factors.

Clearances from Trees

From	To	Standard Clearance
Centerline of Tree	Face of curb	3.5 feet
	Sidewalk or sidewalk landing	2 feet
	Driveway (measured from edge of driveway at sidewalk)	7.5 feet
	Edge streetlight poles	20 feet
	Edge of fire hydrants	5 feet
	Edge of utility poles	10 feet
	Extension of cross street curb at an intersection	30 feet
	Underground utilities	5 feet (except ducts and gas pipes as shown on Seattle Standard Plan 030 for residential streets)
	Roadway edge, where no curb exists	10 feet

Railroad clearances: Certain requirements apply if a project is in the on, over, under, or in the vicinity of land or facilities owned and/or operated by railroad operators. There are three reference points for determining clearances: 1) the franchise agreement for a particular piece of railroad in the right-of-way; 2) state requirements; and 3) federal requirements. Whether state or federal (or both) requirements apply depends on the track classification and function.

Standard Clearances from Railroad Facilities

From	To	Standard Clearance
Centerline of railroad track	Any obstruction 6” or more in height	Minimum lateral clearance of 8.5 feet (10 feet desired). This clearance shall be increased 1.5 inches for every degree of track curvature
	Sidewalk or sidewalk landing	2 feet
	Driveway (measured from	7.5 feet

edge of driveway at
sidewalk)

Other clearances pertaining to railroads shall conform to Clearance Rules and Regulations Governing Common Carrier Railroads prescribed by the Washington Utilities and Transportation Commission. Minimum clear distance above a railroad track shall be 23 feet.

If your project is on or adjacent to property owned by railroad operators, contact the operator for information about required clearances or additional permit requirements.

Bicycle parking clearances: In addition to the clearances defined in the table below, bicycle parking facilities must not encroach upon a minimum of 6 feet of clear sidewalk space. Narrow racks such as the inverted-U rack, must have a total minimum combined clearance of 6' around the rack, measured from any point on the rack.

Standard Clearances from Bicycle Parking

From	To	Standard Clearance
Bicycle parking	Curb when adjacent to parking	3 feet
	Curb when adjacent to vehicle travel lane	2 feet
	Street trees and street furniture for the rail-type rack	1 foot

Electrical utility clearance requirements: Applicants who are developing a new project must pay attention to the potential conflicts between existing electrical facilities in the public right-of-way and their new building during project planning, design, demolition and construction. The following criteria applies:

Minimum horizontal and vertical clearances between overhead power distribution and buildings or other structures: The Seattle City Light (SCL) Overhead Power Distribution requires a minimum horizontal and vertical clearance from buildings and structures. The purpose of this clearance is to keep the general public and workers without high voltage electrical expertise out of harms way. Clearances also provide adequate space for qualified electrical workers to operate safely and efficiently during construction and long term operations and maintenance activities. Additional clearances are required to allow for regular building maintenance such as window washing activities.

Zero lot line developments: Zero lot line developments often encounter clearance problems with high voltage overhead and underground electrical facilities and wires. Land use setback requirements alone, for example when minimal front yard setbacks are allowed, are likely not adequate to account for required clearances from overhead electric utilities. Note that clearances are also required where electrical facilities are located in alleys. Thus proposed buildings may need to be located further back from property lines to accomplish required clearances.

Permit applicants must adhere to electric utility clearance requirements. Please contact Seattle City Light to arrange a meeting as early as possible in your design process. We recognize that each proposed development location, adjacent utilities, streetscape, and development request is unique. Even if poles and wires are not immediately adjacent to your property at this time, it is best to assume clearances are needed until you meet with Seattle City Light and verify otherwise. Additional and relocated infrastructure will be needed to serve the demand for growth.

Refer to Figure 4-23: Seattle City Light Utility Clearance.
Refer to Electrical Utility Clearances Notes.

4.21.3 Design Considerations

The applicant is advised to document the existing site conditions early in the design phase to identify any elements that may have a required clearance to help avoid possible costly site modifications during permitting.

4.22 Structures Within the Right-of-Way

City-owned structures are structures in the City's right-of-way installed to benefit the general public, built according to approved plans and specifications, which then are owned and maintained by the appropriate public entity such as: Department of Transportation; Parks and Recreation; Public Utilities; Fleets and Facilities or other public agencies. The primary types of structures are retaining walls, bridges, stairways and other transportation structures. All design elements shall conform to Chapter 4.21.2 of this manual. In addition, each public facility owner may have a specific acceptance policy by which the structural types, design details and construction practice are evaluated prior to approval.

Privately owned structures are installed with the development of private property and are maintained by the adjacent property owner. These structures, typically retaining wall systems, may require an annual permit and an indemnity agreement, insurance and the owner will be responsible for the costs of an annual structural inspection. All design elements shall conform to Chapter 4.21.2 of this manual.

All proposed structures, shall require the approval of the Director of Transportation prior to the issuance of the construction permits. Submittal for approval shall include stamped plans and calculations, specifications, relevant survey and geotechnical information used for the design.

4.22.1 Links to Standard Plans and Specifications

Standard Plan 141: Rock Facing
Standard Plan 440a and 440b: Cement Concrete Stairway & Handrail
Standard Plan 441: Cement Concrete Steps
Standard Plan 442: Steel Pipe Handrail
Standard Plan 443a and 443b: Steel Pipe Railing for Bike Path
Standard Plan 800: Support Wall
Standard Plan 801: Curb Wall

4.22.2 Design Criteria

Wall Location

Cuts and fills along the edge or end of a roadway occur when the existing ground and proposed elevations differ. A retaining wall system is required if the elevation difference cannot be maintained with a maximum allowable ground slope per design standards. The intent of the wall limit shall be clearly defined on the drawings, including details for the wall ends.

All retaining walls shall be at least 2 feet clear of the sidewalk and 3 feet clear of the curb face where there is no sidewalk, unless otherwise approved by the Director of Transportation. Barriers, railings or fencing at the top of these walls may be required to provide safe passage. This requirement will be

determined by the Traffic Division of the Department of Transportation. Refer to Std Plan 141 for the standards.

Design Standards

All design shall be performed by or under the direction of a professional structural engineer.

The following design standards shall be used:

1. City of Seattle Right-of-Way Improvements Manual
2. City of Seattle Standard Plans for Municipal Construction
3. City of Seattle Standard Specifications for Municipal Construction
4. Washington State Department of Transportation (WSDOT) Design Manual.
5. WSDOT Bridge Standards Drawings.
6. AASHTO LRFD Bridge Design Specifications, 4th edition, with 2008 and 2009 interims.
7. International Building Code (case by case basis).

Wall Types and Details

Erosion facing/non-structural walls: When the soil is determined to be stable under static conditions by a geotechnical engineer, the erosion facing wall, such as rock facing or decorative stackable masonry blocks may be used. These are considered non-structural walls. Refer to Chapter 4.21.1 Rock Facing Wall Standard plans. The maximum allowable height for this wall system is 8 feet.

Alternate erosion facing may include stackable masonry blocks, jut matting, etc. Any near vertical erosion facing needs to meet the same slope and clearance criteria as rock facing and requires the approval of the Director of Transportation.

Structural Walls: When soil is unstable under static conditions, a structural wall is required to support the soil permanently. SDOT accepts both the standard and non-standard structural wall types. For proposed structures that are non-standard and lack the long term performance history, pre-approval of the concept is required before design work should proceed.

An example of a non-standard wall is structural soil (geoweb soil wrap) wall. This wall system may be designed where no utilities or excavations would be anticipated. Permission to use these types of walls is rare, due to future utility uses and the no-dig zone space required for the soil mass.

Proposed City-owned and maintained structures require the approval of the Roadway Structures group of the Department of Transportation.

General Requirements:

1. If a retaining wall is not designed to resist hydrostatic pressure, install a 6-inch diameter subsurface drain and 3-inch diameter PVC weep holes spaced 12 feet apart. The weep hole shall be placed 6 inches above the finished grade at the toe of the wall, per City of Seattle Standard Plans. The subsurface drain shall be tied into the City drain systems, as approved by SPU. Refer to the standard plans in Chapter 4.21.1 for weep hole detailing.

2. If a retaining wall is designed on top of an existing retaining wall, the new retaining wall should be designed with the assumption that the lower wall is not contributing to the lateral support to the slope below the newly designed retaining wall unless approved by Roadway Structures. Similarly if the wall is designed at the toe of a slope below an existing retaining wall, the toe wall shall include the surcharge of the existing wall unless approved by Roadway Structures. (See Standard Plans 800 and 801.)

3. Wall details that are water and debris traps should be avoided.

4. Pedestrian guardrail openings shall not exceed 4 inches wide and the general layout shall

discourage climbing activity.

5. Private and public retaining walls shall not be built integrally. Total structural isolation is required for adjacent walls.
6. Concrete walls that are prone to graffiti shall be coated with a moisture barrier and anti-graffiti paint.

The following are types of structures common to the City:

Reinforced Concrete Cantilevered Retaining Walls: Standard WSDOT cantilever reinforced concrete retaining wall design is acceptable. For walls longer than 30 feet, those must have expansion joints at a maximum of 24 foot spacing.

Soldier pile walls: Soldier pile walls are applicable when the soil types are unsuitable for other wall systems and where the right-of-way is unavailable for a standard cantilever retaining wall. This wall system shall have a reinforced concrete face and may be constructed with shotcrete or cast-in-place methods. Precast concrete panels are also acceptable on case by case basis. Timber laggings are not considers as a permanent structure. Weep holes and drainage shall be provided behind the wall. Unless enclosed by structural concrete, steel wide-flange piles should be coated with zinc rich primer and coals tar epoxy per City standard Specifications from the top of the wall to a minimum of 2 feet below the bottom of the lowest lagging.

Stairways: Stairways in public right-of-way shall be designed according to Seattle Standard Plans 440a and 440b Pedestrian lighting shall be provided for stairways.

Handrails and pedestrian rails: Railings shall be designated as "handrails" or "pedestrian rails" and their usage shall be as determined by Figure 4-24: Determination of Hand Rails vs. Pedestrian Rails.

Handrails shall be designed in accordance with Standard Plan 442 or 443, as appropriate.

Pedestrian rails shall be designed in accordance with criteria established by the SDOT Director, in compliance with guard requirement of the International Building Code (IBC), meaning that they shall have a maximum spacing of 4” for vertical elements of the railing.

Traffic barriers: Vehicular railings on bridges shall be designed in accordance with AASHTO standards. Vehicular railings on retaining walls shall be designed in accordance with AASHTO standards unless otherwise approved by the SDOT Director. Vehicular guardrails on approaches to structures shall be designed according to Washington State Department of Transportation standards. For guardrails not on structures, the SDOT Director will determine the type of guardrail required.

Pedestrian overpasses / underpasses and skybridges: Pedestrian overpasses and underpasses typically span a transportation right-of-way and provide a connection between destinations that have a high volume of pedestrian use. Pedestrian overpasses shall be designed in accordance with criteria established by the SDOT Director. Skybridge permit policies are defined in the SMC section 15.64 Skybridge Permits. SDOT requires AASHTO LRFD standard designs over the street provided it does not conflict with the applicable code to the building where the bridge is bearing on.

Areaways: Use the IBC for structural design with 250 lbs/sf live load for sidewalk top or HS20 whichever governs. Include curb ramps in the surface of the areaway to mimic Standard Plan 422 at intersections (including “T” intersections).

Bridges: Bridges shall be designed in accordance with AASHTO LRFD Bridge Design Specifications.

Other structures: Sign support structures and streetlight poles shall be designed in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.

Construction Specifications

Slope stability shall be maintained at all times during the constructions of the wall system. Common methods used include temporary cut slopes, temporary shoring or temporary shotcrete.

Submittal of the construction specifications are required for the mechanically stabilized earth (MSE) wall.

Permission: During construction access rights from adjacent property owners may be needed. A negotiation for these rights by the developer needs to begin as soon as the need is discovered. SDOT will provide the needed document for signature by the affected property owner giving the right to enter private property for the scope of the construction and maintenance of the project.

Ownership/Maintenance Acceptance: Acceptance of privately built retaining walls that will be maintained or owned permanently by SDOT require the following prior to formal acceptance:

1. As-built shop drawings and plans in Mylar and are filed in the City's Record Center, (SPU's Record Vault).
2. Reduced size as-built final design calculations with the Structural Engineer's stamp and signature as well as the geotechnical report submitted to Roadway Structure's staff and all punch list items are completed to the satisfaction of the inspector.

4.23 Turn arounds and Cul-de-Sacs

When an existing right-of-way is not platted through from street to street, or when topography or other conditions preclude a street from being improved to its full street-to-street length, a cul-de-sac or other vehicular turnaround shall be provided. Cul-de-sacs are required at all street dead ends, and turnarounds are required at private access easement dead ends.

4.23.1 Links to Standard Plans and Specifications

N/A

4.23.2 Design Criteria

Determination of through street: DPD, in consultation with SDOT, shall determine when a street does or does not have the potential to become a through street. When a street does not have the potential to go through a cul de sac or turnaround is required. Dedication of additional right-of-way width may be required to accommodate the turnaround.

Cul-de-sac and turnaround design: Refer to Figure 4-25: Cul-de-sacs for passenger vehicle cul-de-sac designs and Figure 4-26: Alley and Easement Turnarounds for turnaround designs approved by the SDOT Traffic Engineer.

Turnarounds for non-residential zones: Shall be designed to accommodate the types of vehicles using the street, alley, or easement. Maximum longitudinal slope permitted for a cul-de-sac or turnaround is 8%.

Alley turns and turnarounds: Turnarounds are required at alley dead ends when the connecting street is an arterial. Figure 4-26: Alley and Easement Turnarounds and Figure 4-25: Cul-de-sacs illustrate alley turns that are approved by the SDOT Director for SF, L1, and L2 zones. All other zones will need individual review. The turn shall be designed to accommodate the types of vehicles using the alley. Alternate designs may be proposed, and are subject to approval by SDOT.

The Fire Department may require additional criteria for cul-de-sacs or turnarounds and alley turns or turnarounds when needed for adequate fire access.

4.24 Traffic Operations

All traffic control devices, such as traffic signals, traffic signs, or channelization shall conform to the Federal Highway Administration's Manual of Uniform Traffic Control Devices (MUTCD). Any revisions or additions to requirements specified in the MUTCD are subject to approval by the SDOT Director. Normally, modifications, additions, and installation of traffic control devices will require appropriate documentation of need.

4.25 Transit Zones

Transit Zones include passenger waiting, queuing and boarding uses in the sidewalk area as well as bus layover and staging uses along curb spaces in the street.

- It is important to design transit facilities and amenities that will attract transit patrons, accommodate pedestrian movements between destinations and transit services, and to maintain and improve the speed and reliability of bus operations
- Transit zones should be easily identifiable, safe, accessible, secure, and provide a comfortable waiting area for transit passengers while providing for pedestrian sidewalk circulation and through block connections for pedestrian travel.

New development projects must coordinate directly with SDOT prior to assuming any changes in the right of way, including curb space designations.

4.25.1 Links to Standard Plans and Specifications

Standard Plan 423: Bus Shelter Footing
Standard Plan 630: Metro Bus Zone Sign Installation

4.25.2 Design Considerations

Design guidelines are to be used for the design of transit facilities, the placement of transit passenger amenities, and to describe the process for developing transit facilities:

- Transit zones should be accessible. Americans with Disabilities Act (ADA) considerations will be given top priority in the siting and design of new and existing transit zones. Transit zones should consist of an accessible pathway and a wheelchair lift landing pad that are free from obstructions.
- Transit signage placement, equipment, service and schedule information will be provided for by King County Metro Transit and authorized by SDOT.
- Transit zones are common places for street furnishings and street lighting. Bus stop improvements should include transit shelters and other amenities including bicycle racks, pedestrian scaled lighting, signage, benches, litter receptacles, etc. Electronic real-time schedule information and other premium elements should be added where demand and funding exist as determined by SDOT. Elements must be consistent with SDOT and transit agency priorities, standards and criteria.
- Utilize and/or design adjacent overhangs, canopies, and building arcades to provide weather protection for transit patrons, including leaning rails, benches and pedestrian scaled lighting. The design of overhead weather protection should be coordinated with the lead transit agency.
- Bus stop design must include careful consideration of transit speed and reliability and overall traffic operations. Installation of bus stops which require buses to pull into and out of traffic should

occur only where an in-lane stop configuration is not feasible. Improvements to any bus stop on that requires buses to pull into and out of traffic should include conversion to an in-lane stop configuration whenever feasible.

- For safety and other reasons, generally give preference to locating transit stops at the far side of intersections.
- Locate transit stops to assure comfort, convenience and safety for all transit users, including pedestrians, cyclists and people with mobility impairments. Consider well placed, well lit locations with good site distance in close proximity to crosswalks.
- Transit zones will be spaced to maximize the speed, reliability, rider comfort, and efficiency of transit service while providing adequate service coverage. The City of Seattle Transit Plan and current industry best practices call for approximately 1/4 mile stop spacing between bus stops in most cases.
- King County/Metro Transit requests pre-design coordination and requires plan review for projects adjacent to transit corridors, zones and facilities. Contact Metro Transit's Transit Route Facilities Supervisor.

4.26 Street Furniture, Public Art and Unique Objects in the Public Right-of-Way

Street furniture, public art, and other unique objects in the public right-of-way, including pedestrian amenities and bicycle installations, are important elements that can create an active, safe, and attractive public realm. Examples of street furniture include benches, litter and recycling receptacles, bike racks, multiple publication modular newsstands, water fountains, pedestrian-scaled lighting, bollards, and planters. Public art may include art installations that have a functional or aesthetic component and that is either owned and maintained by a private or public entity. Some types of street furniture, such as kiosks and other atypical installations, are referred to as 'Unique Objects' because they are nonstandard and require location and design review.

The intent of this section is to promote consistency, predictability, safety, and design excellence in the type and location of public realm installations located in the right-of-way. Get more information on street furniture.

4.26.1 Links to Standard Plans and Specifications

N/A

4.26.2 Design Criteria

To ensure pedestrian safety, the arrangement of installations in the sidewalk corridor should be divided into a landscape/furniture zone, a pedestrian zone, and a frontage zone.

Accessibility consideration: Pedestrians with vision impairments can detect objects mounted on walls or posts if they are installed so that the leading edge is less than 27 inches above the sidewalk grade. Items mounted above this height should not project more than 4 inches into any circulation route. Particular care should be taken to locate temporary signage so that it does not impede pedestrian mobility and access. The pedestrian zone shall be kept clear of all permanent or temporary installations.

Frontage, Pedestrian and Street Furniture/Zones
(*photo courtesy of Shelley Poticha*)

Locating public art in the right-of way: The Seattle Office of Arts and Cultural Affairs is responsible for reviewing public art in the right-of-way. Like other types of street furniture, public art should be located outside the pedestrian zone. For additional information, please review the Director's Rule on how Visual Artworks are reviewed.

Locating unique objects in the right-of-way: Unique objects in the right-of-way may include public art, commemorative plaques, memorials, bus shelters, wayfinding signage, and kiosks. SDOT will evaluate applications and serve as the first point of contact for applicants with recommendation from the Seattle Design Commission or other applicable advisory board. SDOT will also serve as the coordinating agency between the Design Commission, Historical or Landmark District Preservation Board, and other appropriate review authorities.

Any street furniture, public art, or other unique objects in the right-of-way require an Annual Street Use permit to serve as the long-term record of ownership and maintenance responsibilities. This annual permit is in addition to any required Street Use construction permits for the installation work proposed.

Public Art—Unique Objects in the Right-of-Way

4.26.3 Design Considerations

Special pavement: Used appropriately special pavement, including tile, brick, finish treatments and scoring or colored concrete, can increase the quality of the pedestrian environment. Design considerations include ensuring that pavement is durable, slip resistant, and free of trip hazards. A further design consideration is the ease of accommodating future pavement cuts and restorations.

Seating: Successful outdoor seating requires thoughtful design and placement. Seating should be designed to encourage appropriate use and be located to maximize user comfort and utility and not impact the mobility of pedestrians. Consider integrating seating into art installations or other hardscape installations. Seating should be clear of the pedestrian zone.

Sidewalk Cafes: A sidewalk cafe is an outdoor seating area on a public sidewalk used by restaurant patrons for consuming food or beverages provided by an adjoining restaurant or cafe. Sidewalk cafes provide vitality and interest to the sidewalk environment and are encouraged where they can be accommodated. Refer to: http://www.seattle.gov /transportation/stuse_sidewalkcafe.htm for more information.

Another type of outdoor seating option is the table and chairs permit is issued in SDOT's Street Use Division. This permit may allow a maximum of four tables with two chairs per table per permit depending on site characteristics. While the tables and chairs are available to the patrons of an adjoining business, they must be open for use by the general public, table service may not be provided, and alcohol cannot be consumed. Refer to table and chair permits for more information.

An Annual Permit is Required: The City of Seattle will require an Annual Street Use permit to serve as the maintenance agreement for the artwork, street furniture, or unique object installations. The City of Seattle may also require insurance and a hold harmless indemnity agreement, depending on the installation and the site location.

Examples of Public Art Seating

Louis Longi, 1999

Jorg Dubin, 2000

4.27 Access Easements – Design Criteria

Vehicle access easements serving one or two dwelling units shall be surfaced with crushed rock at least 6 inches in depth.

Vehicle access easements serving more than two dwelling units shall be surfaced with 3 inches of asphalt over 6 inches of crushed rock.

A 2 foot wide shoulder shall be provided on each side for clearance. Easements shall be graded to a crowned cross section with thickened edge or a “v” cross section to provide for collection of storm water. Control of storm water runoff from the easement shall meet the same drainage control requirements as the building lot. The top 12 inches of subgrade shall be prepared as specified in the Seattle Standard Specification 2.06.

Turnarounds must meet the requirements shown in Figure 4-25 or 4-26.

4.28 Contact Information

Organization Name/Website	Phone
Bicycle Facilities	(206) 684-7583
Clearances	(206) 684-5283
Crosswalks	(206) 684-7583
Cul-de-sacs and Turnarounds	(206) 684-5283
Curbs	(206) 684-5283
DPD—City Design	(206) 684-0763
Driveways	(206) 684-5283
Fire Protection	(206) 684-5976
Intersections	(206) 684-5283
Metro Transit Route Facilities Supervisor	(206) 684-1321
SDOT Policy, Planning and Major Projects Division, Planning, Street Classifications, and Street Types	(206) 615-0872
SDOT Street Paving, Roadway Pavement	(206) 233-0044
SDOT Street Use Division	(206) 684-5283
SDOT Street Use Division, Design Cross Section	(206) 684-5283
SDOT Street Use Division, Grading	(206) 684-5283
SDOT Street Use Division, Roadway Width	(206) 684-5283
SDOT Urban Forestry Division Seattle Municipal Tower PO Box 34996 700 5th Avenue, Suite 3900 Seattle WA 98124-4996	
Seattle City Light Customer Engineering: Seattle City Light North Electrical Services – north of Denny Way North Customer Engineering, 1300 N. 97th St. Seattle	(206) 615 0600
Seattle City Light Customer Engineering: Seattle City Light South Electrical Services – south of Denny Way South Customer Engineering, 3613 - 4th Ave. S. Seattle	(206) 386 4200
Seattle Office of Arts & Cultural Affairs	(206) 684-7171
Seattle Public Utilities Engineering Utility Customer Service Teams Seattle Municipal Tower 700 5th Avenue Floor 31 Seattle, WA 98104	(206) 684-5976 (206) 684-5800

Seattle Public Utilities (SPU) Records Vault Seattle Municipal Tower, 47th Floor	(206) 684-5132
Sidewalks	(206) 684-7583
Street Lighting	(206) 684-5197
Street Drainage, Storm Drains and Sewers	(206) 386-0028
Street Furniture, Public Art and Unique Objects in the Right-of-Way	
Street Trees and Landscape Architectural Features	(206) 233-7829
Structures within the Right-of-Way	(206)-684-8325
Transit Zones	(206) 684-5283
Water Mains	(206) 684-5976

Additional contact information and resources are located in the City of Seattle Staff Directory, which is searchable by Department, Division and individual staff.

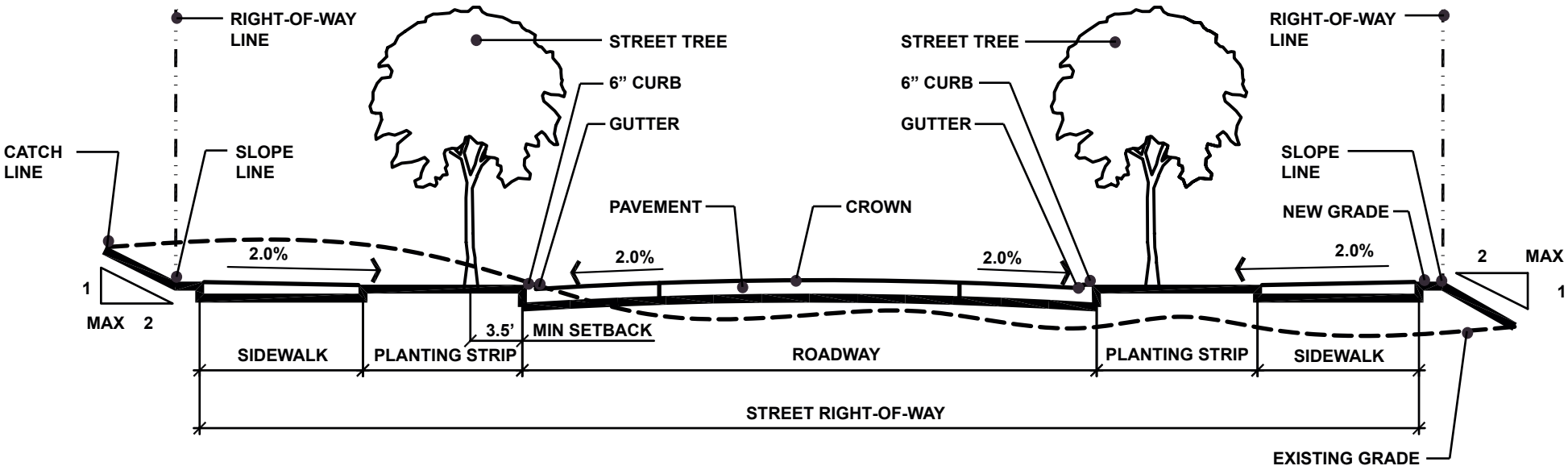

Figure 4-1 September 2005

Standard Design Cross Section

SEATTLE RIGHT-OF-WAY manual

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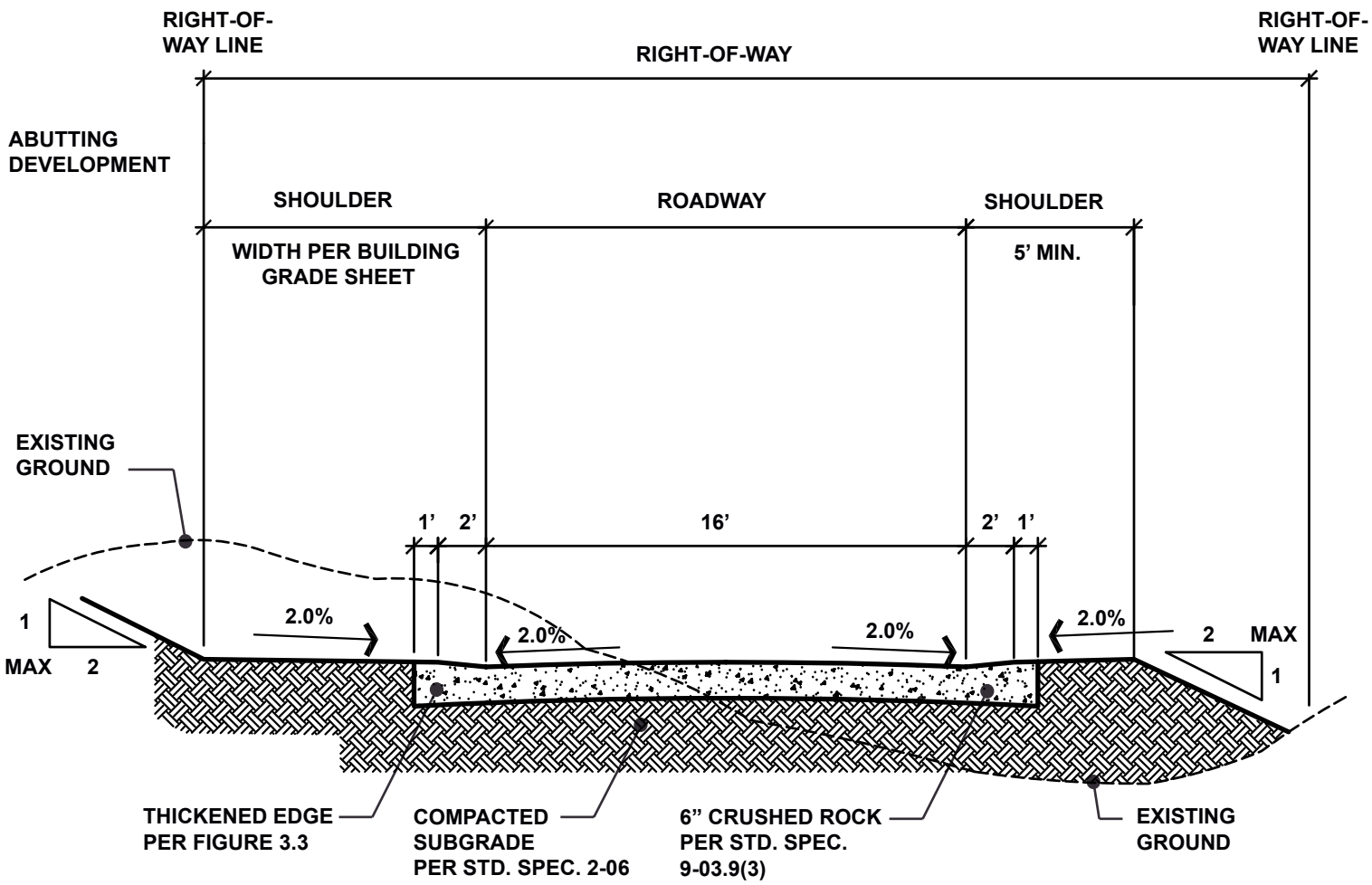

Figure 4-2 September 2005

Crushed Rock Improvement

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manual

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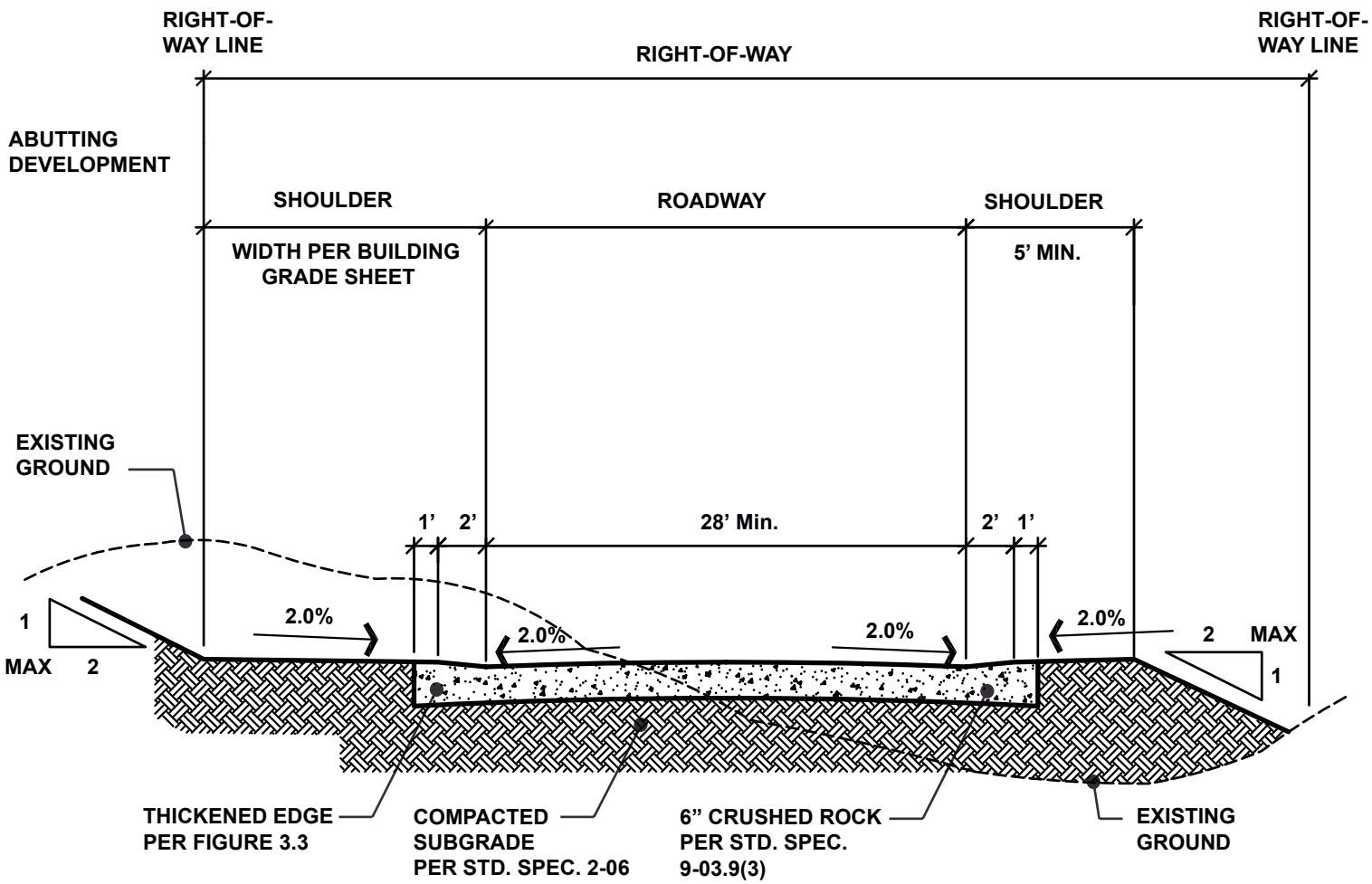

Figure 4-3 September 2005

Crushed Rock Improvement
Industrial Zones

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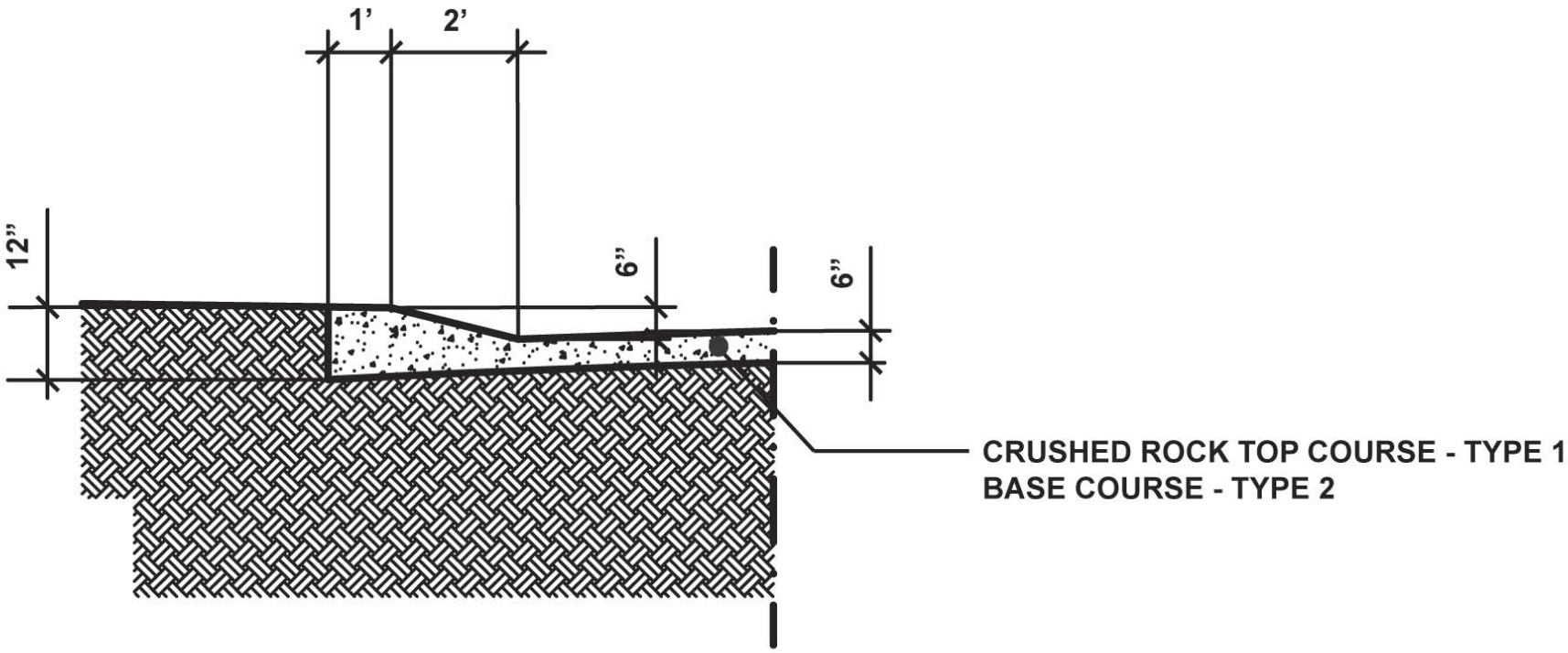

Figure 4-4 September 2005

Crushed Rock Improvement
Edged Detail

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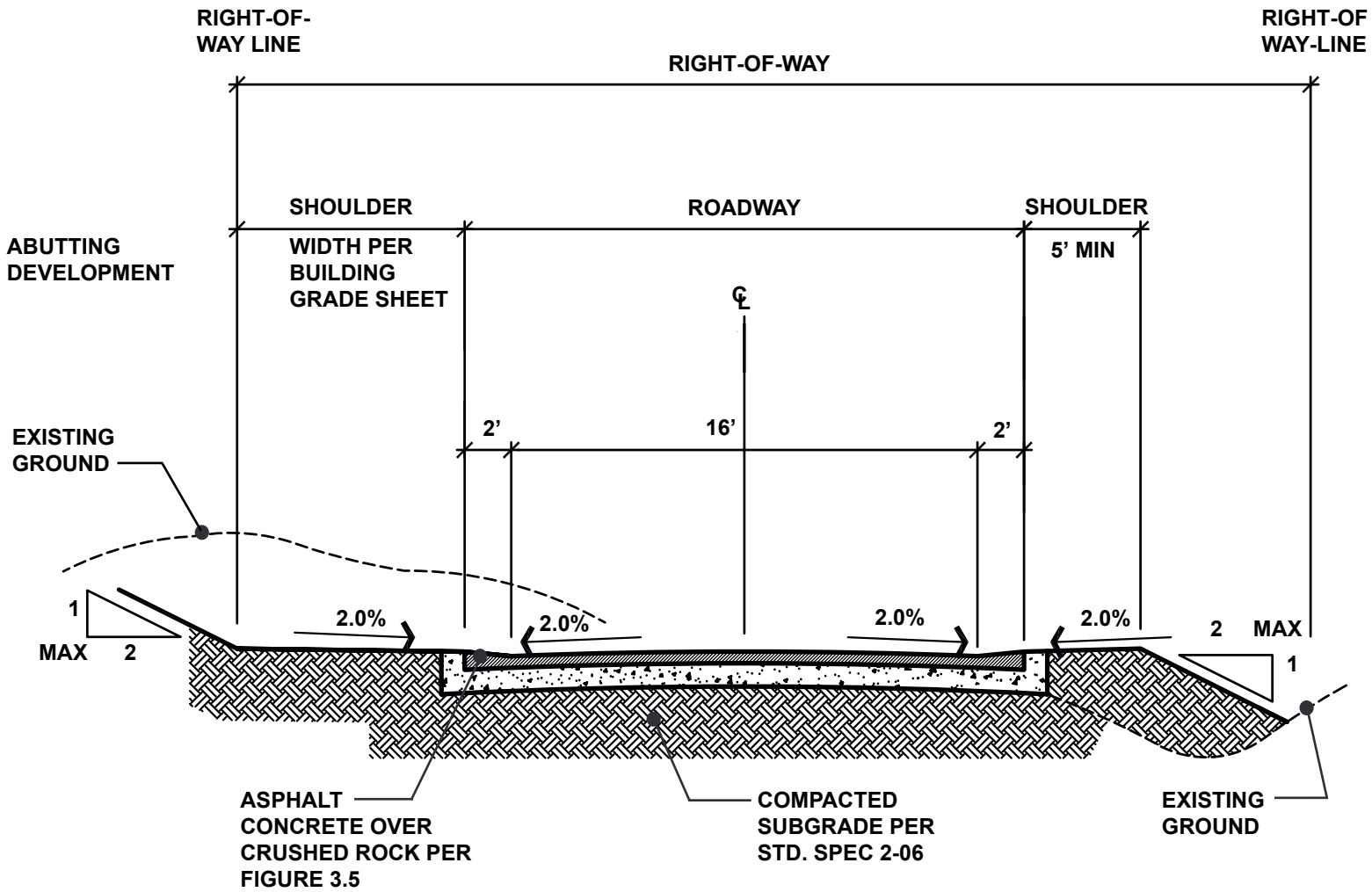

Figure 4-5 September 2005

Asphalt Concrete Pavement: New Pavement
For Streets without Existing Hard Surface

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manual

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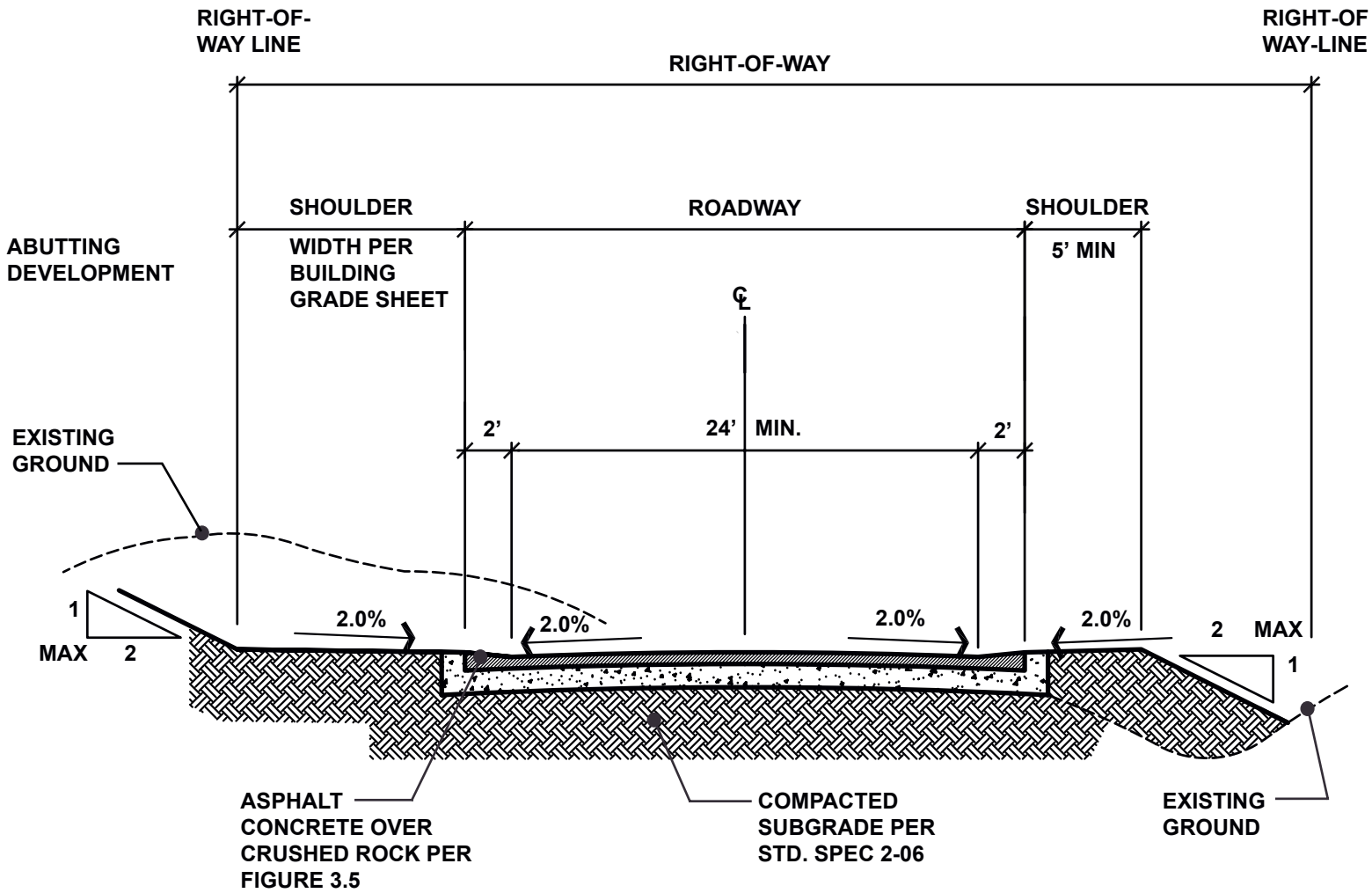

Figure 4-6 September 2005

Asphalt Concrete Pavement: New Pavement For Streets without Existing Hard Surface in Industrial Zones

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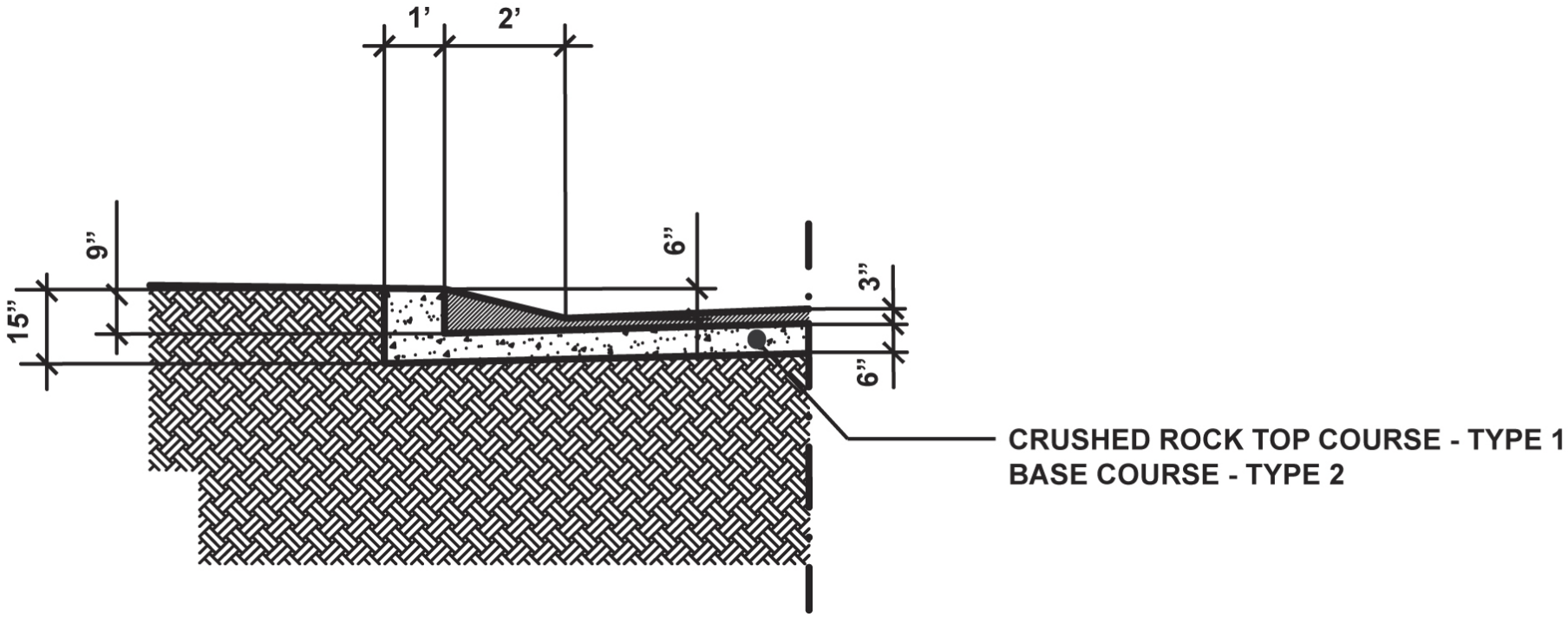

Figure 4-7 September 2005

Asphalt Thickened Edge Detail

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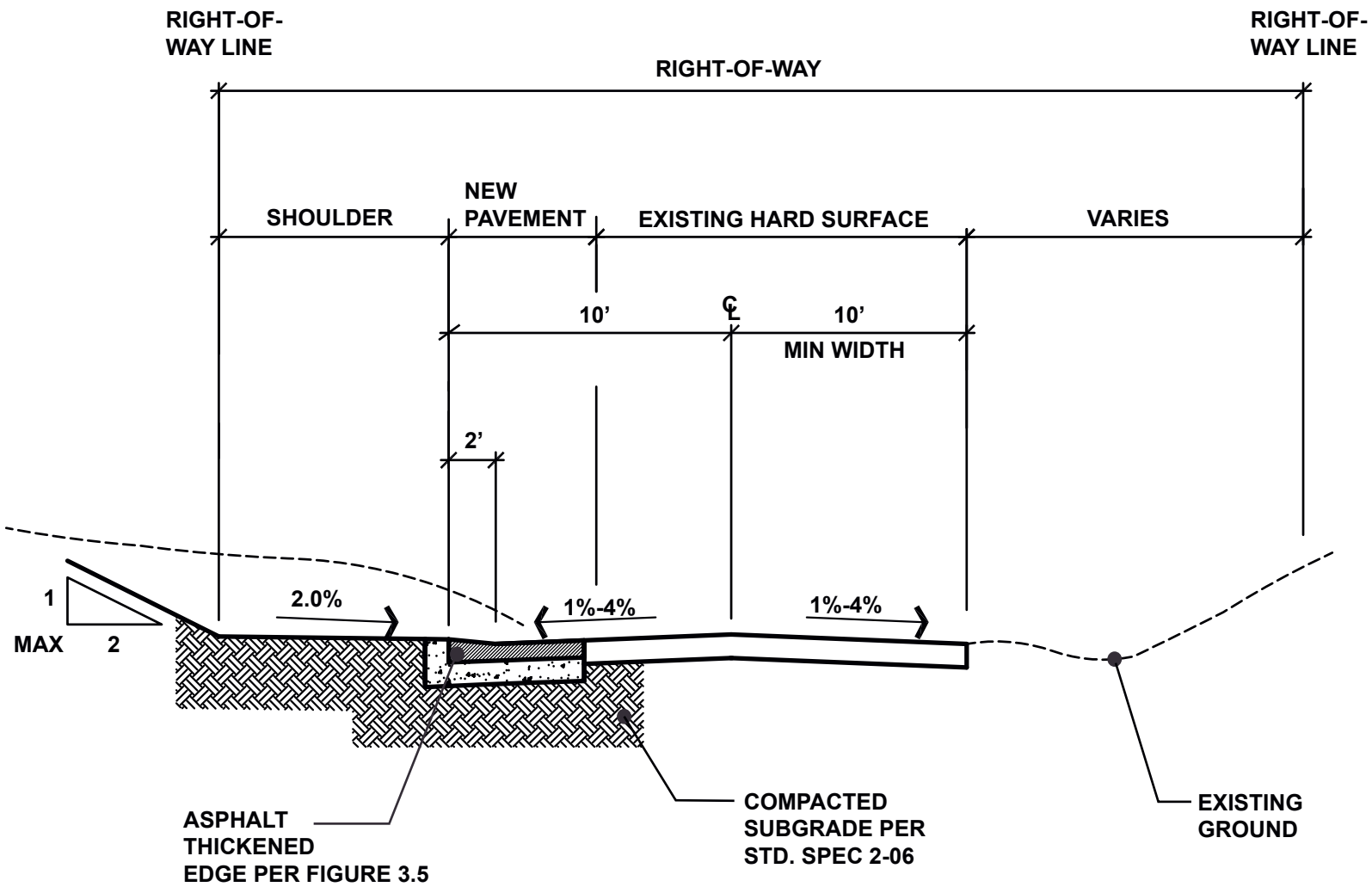

Figure 4-8 September 2005

Asphalt Concrete Pavement: Pavement Widening For Existing Hard Surface Streets

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manual

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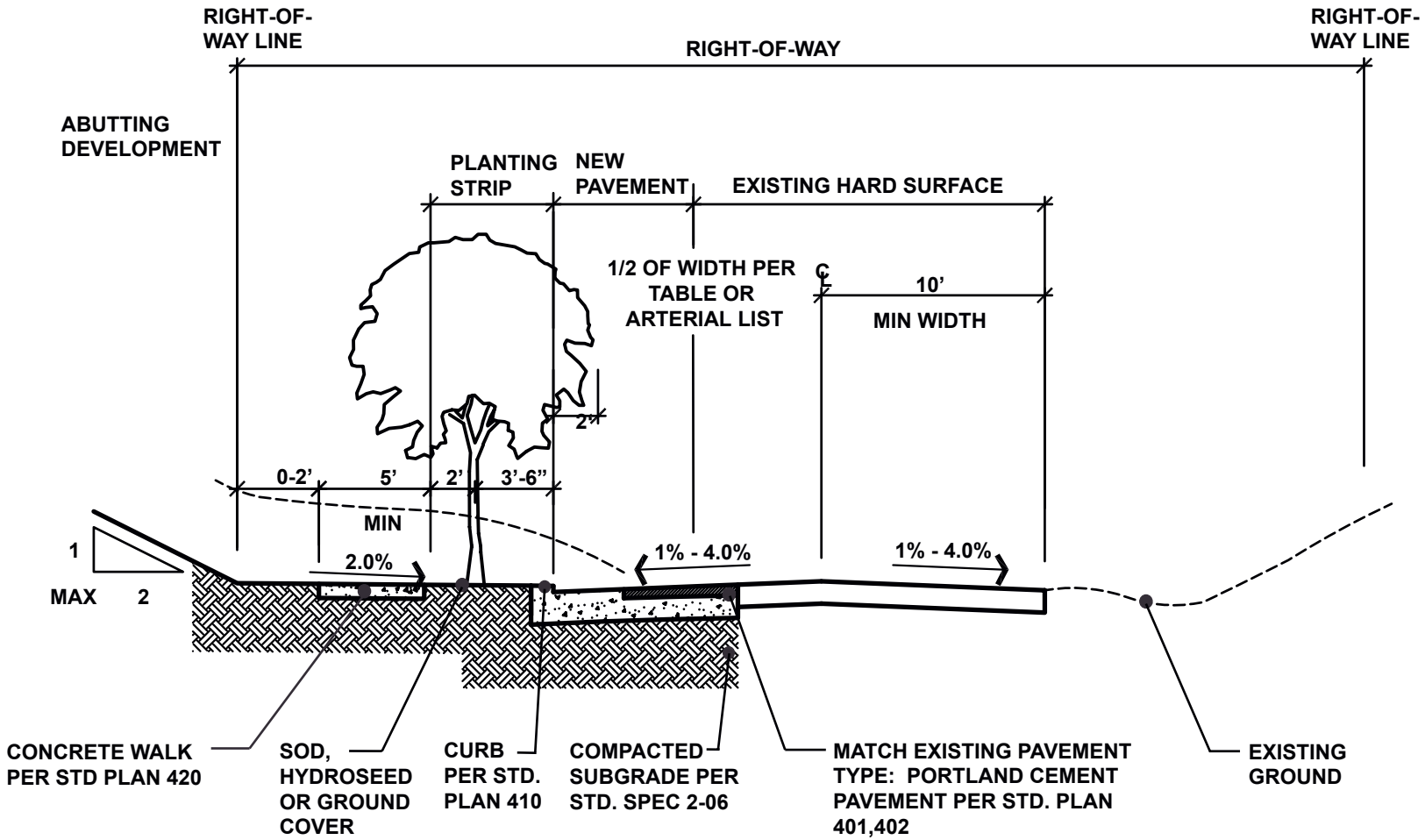

*REFER TO XXX

Figure 4-9 September 2005

Pavement Widening For Existing Hard Surface Streets

SEATTLE RIGHT-OF-WAY manual

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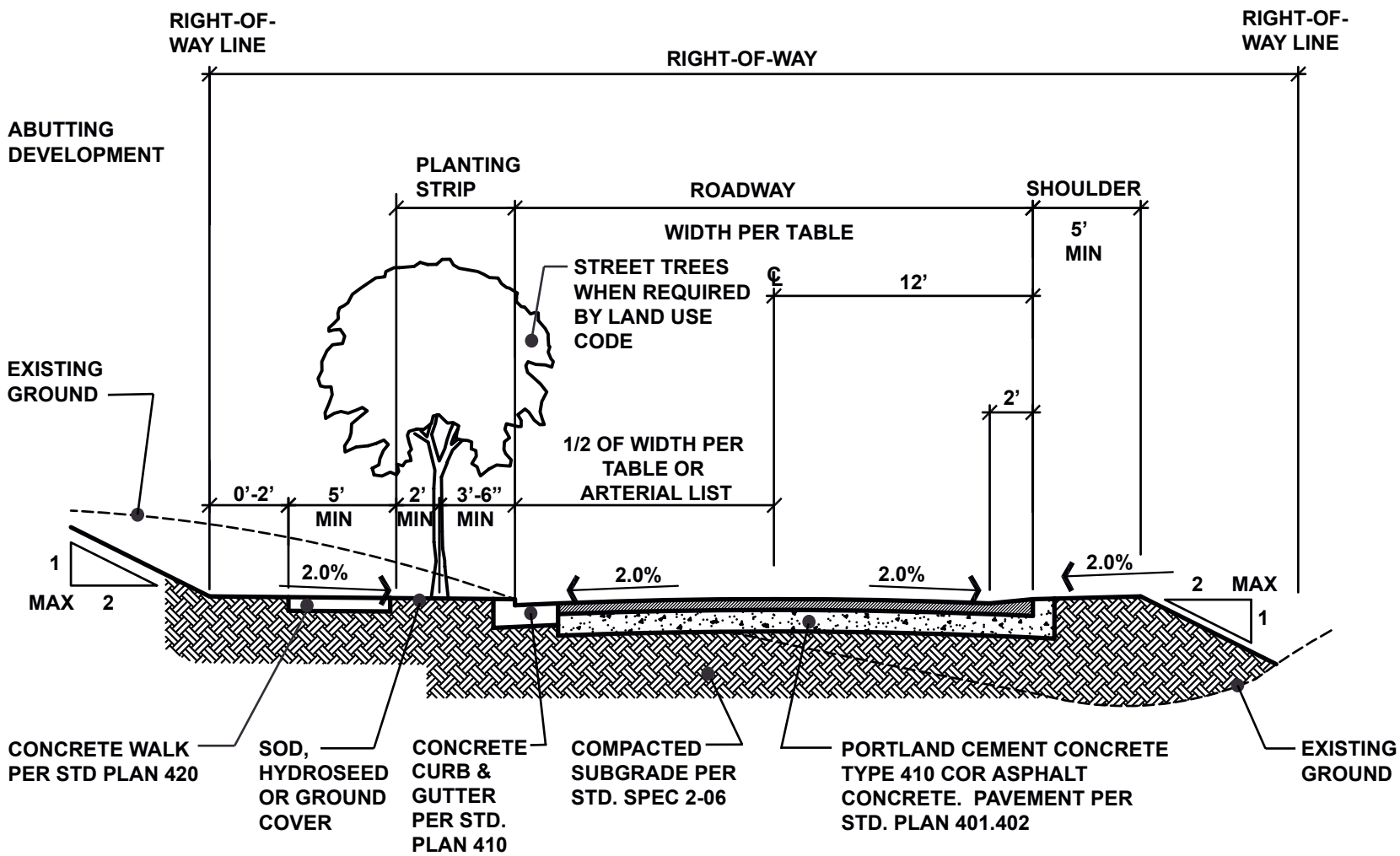

*REFER TO XXX

Figure 4-10 September 2005

Curb and Sidewalk Improvement: New Pavement

For Streets without Existing Hard Surface

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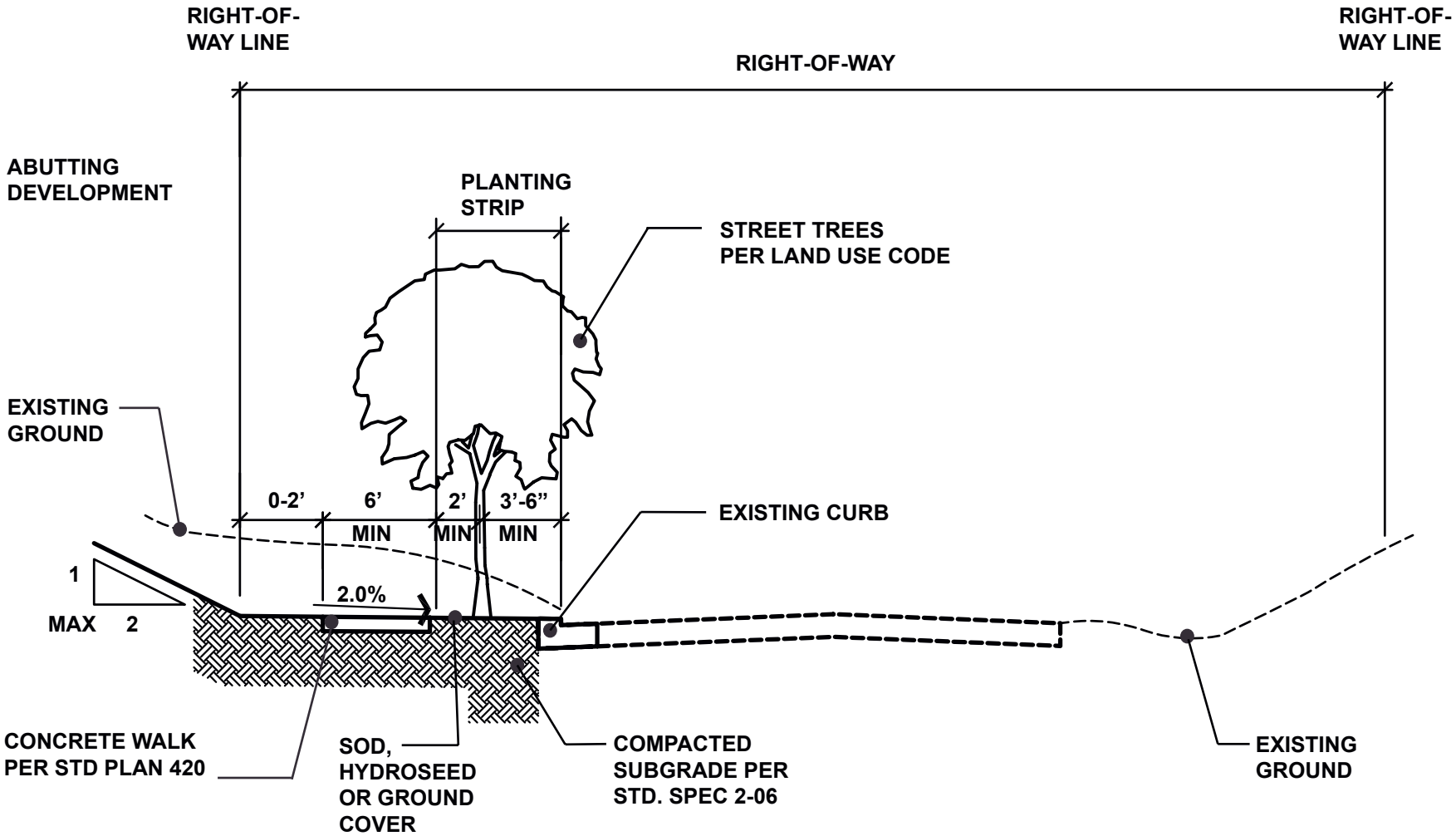

*REFER TO CHAPTER 3: NEW STREETS | WIDTH REQUIREMENTS

Figure 4-11 September 2005

New Concrete Sidewalk with Existing Curb

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manual

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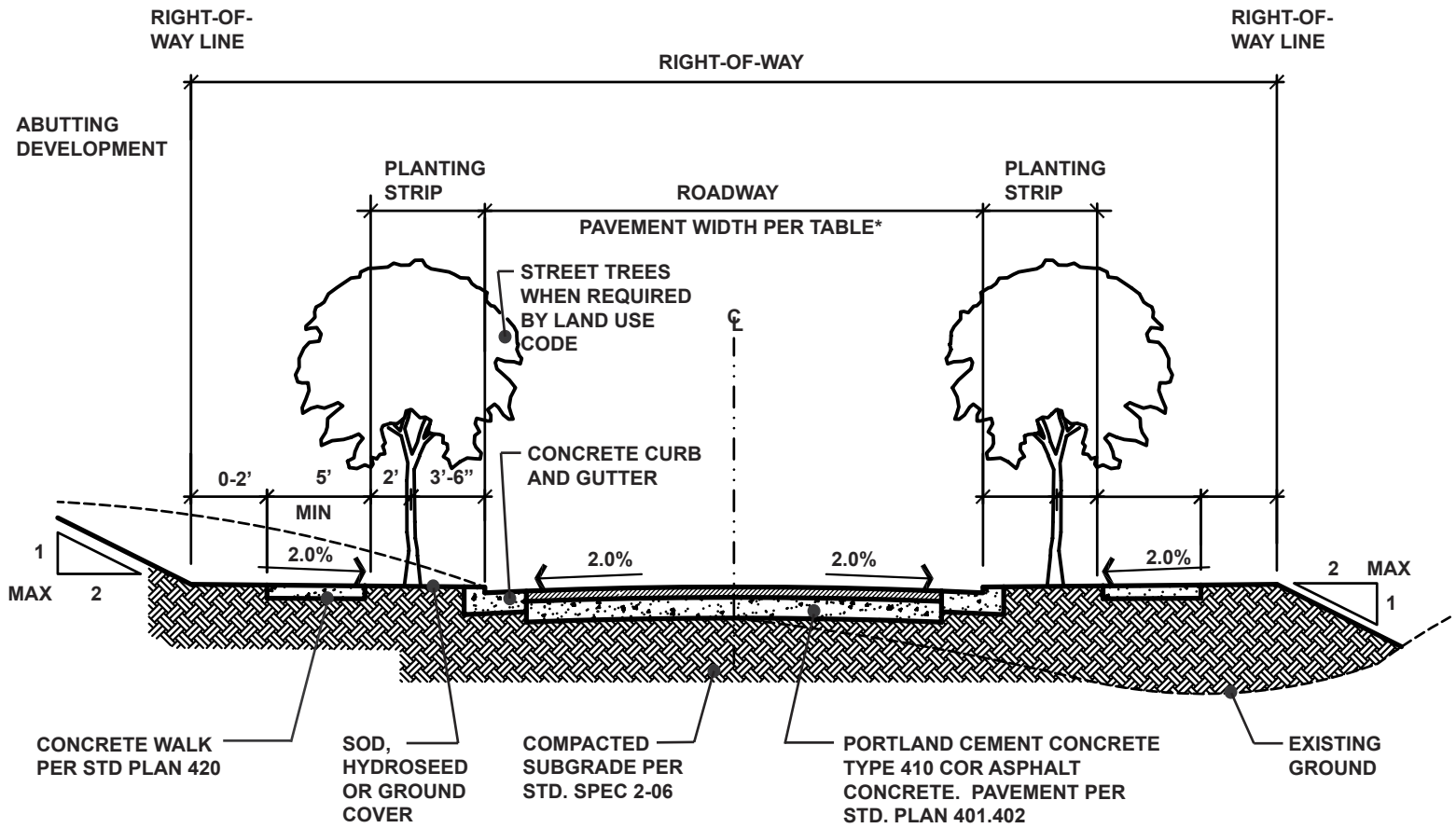

*REFER TO CHAPTER 3: NEW STREETS | WIDTH REQUIREMENTS

Figure 4-15 September 2005

Full Improvements for Newly Dedicated Streets

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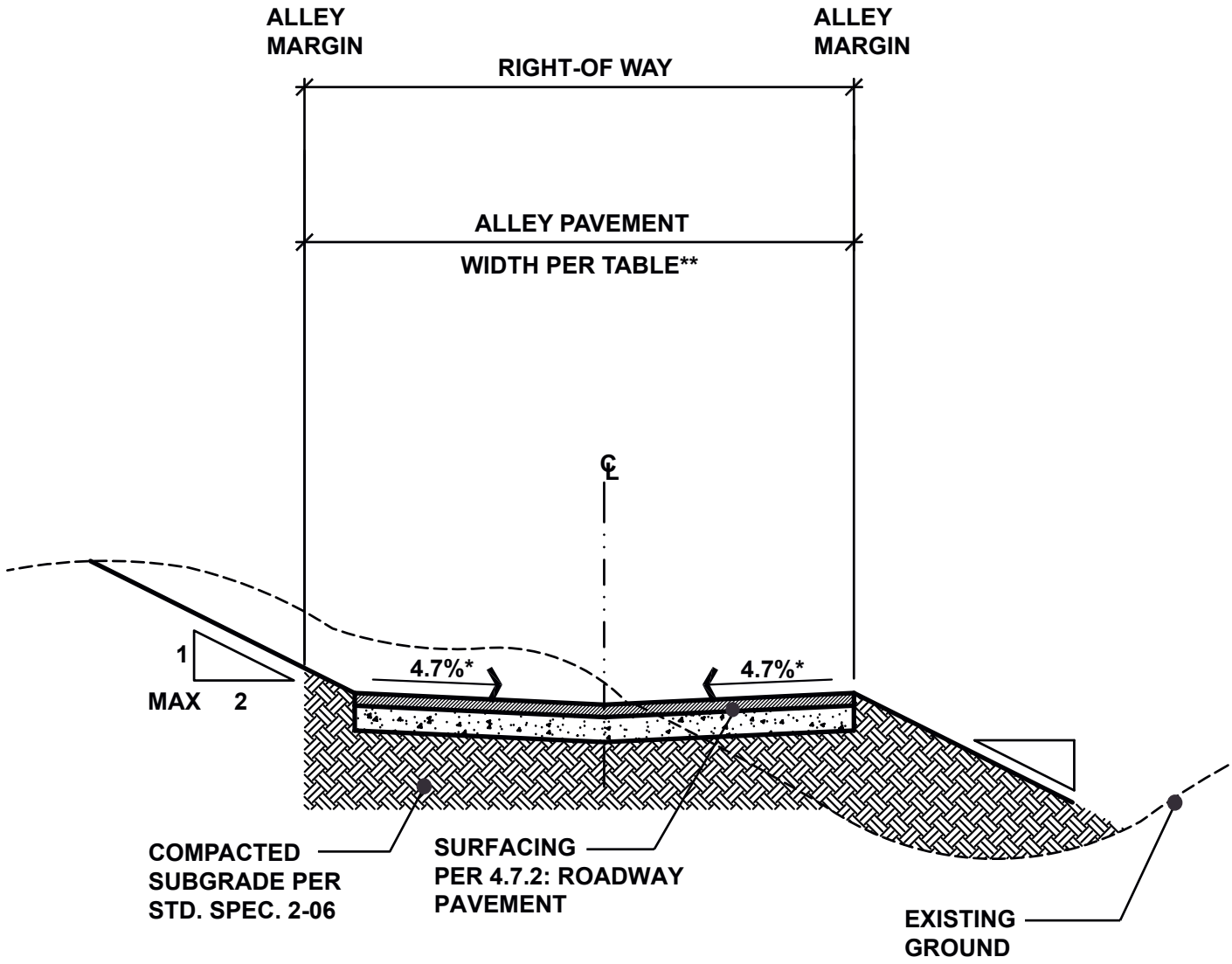

*** SEE STD PLAN 403.**
ALLEY IMPROVEMENTS SHALL CONSIDER AN ADA ACCESSIBLE ROUTE FOR THE ENTIRE ALLEY.

****REFER TO CHAPTER 3: NEW STREETS | WIDTH REQUIREMENTS**

Figure 4-16 September 2005

Alley Improvement

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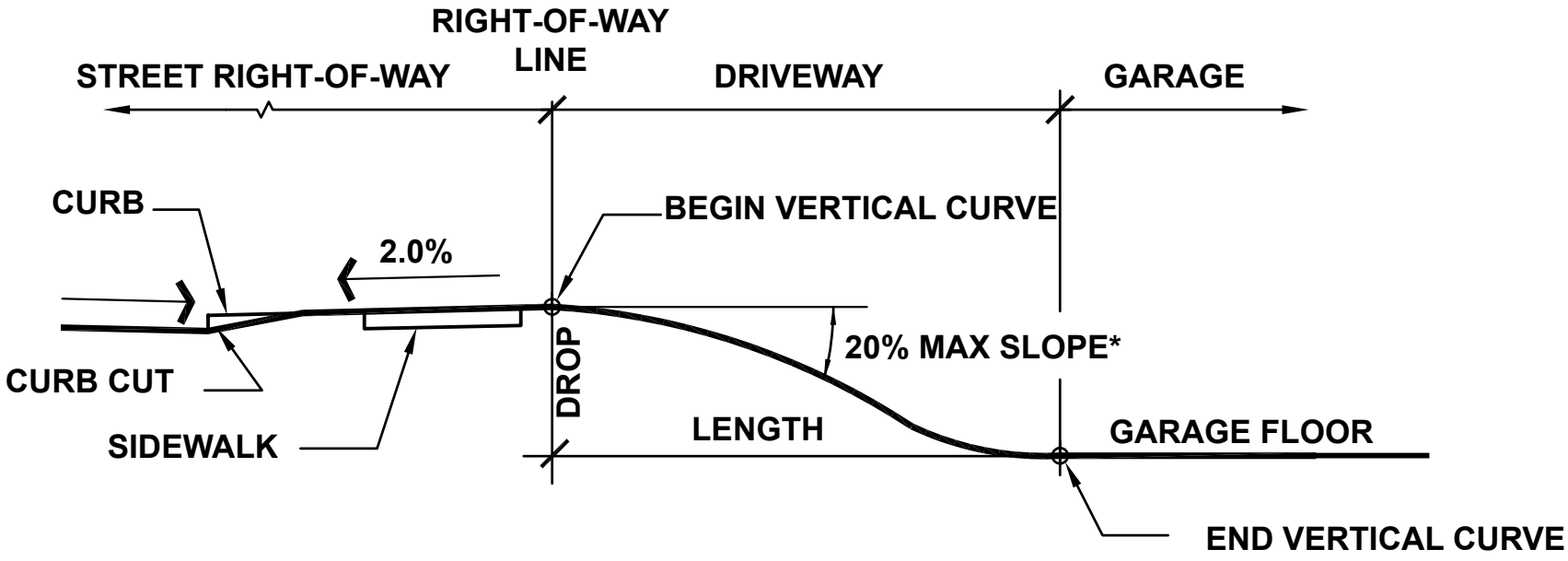

*FOR BACK-IN ACCESS ONLY, MAX SLOPE IS 10%

Figure 4-14 September 2005

Driveway Slope

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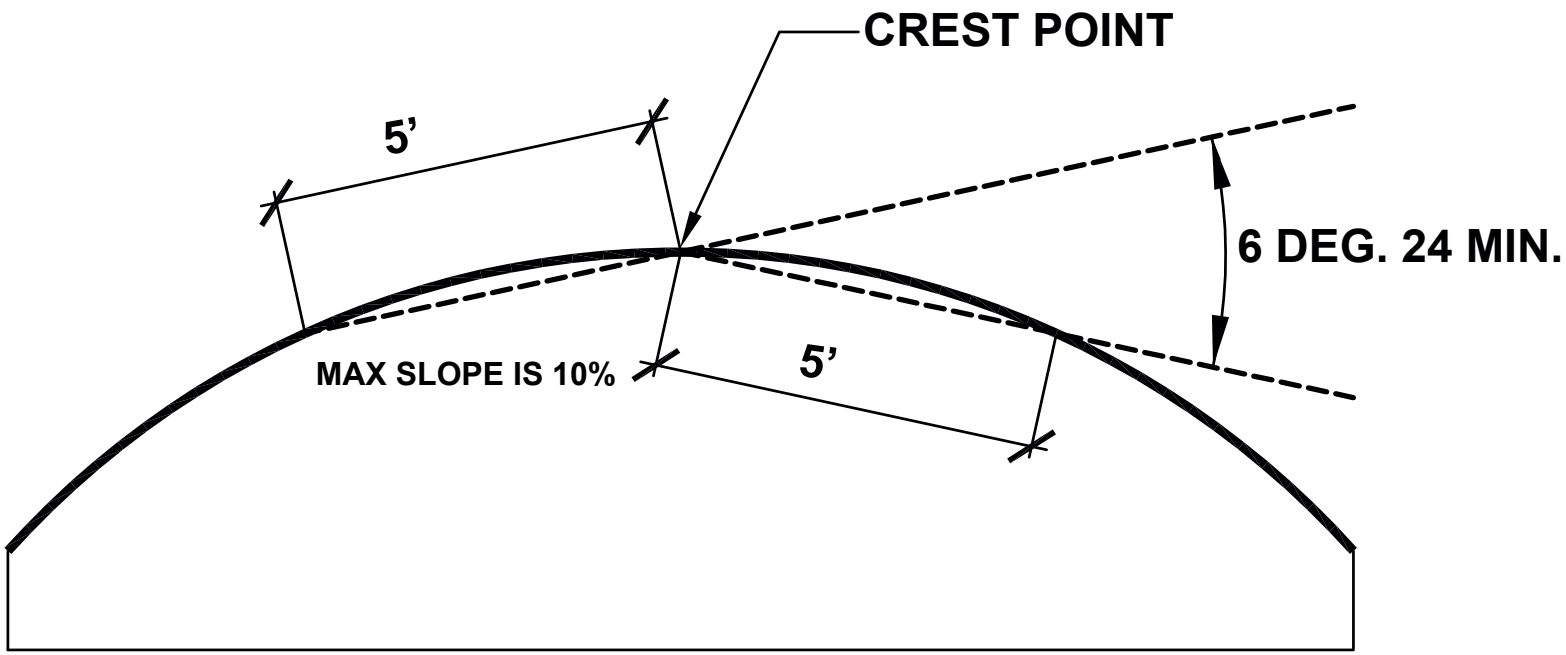

Figure 4-12 September 2005

Maximum Grade Curvatures for Driveways:
Crest Vertical Curve

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RIGHT-OF-WAY
manual

NOT TO SCALE

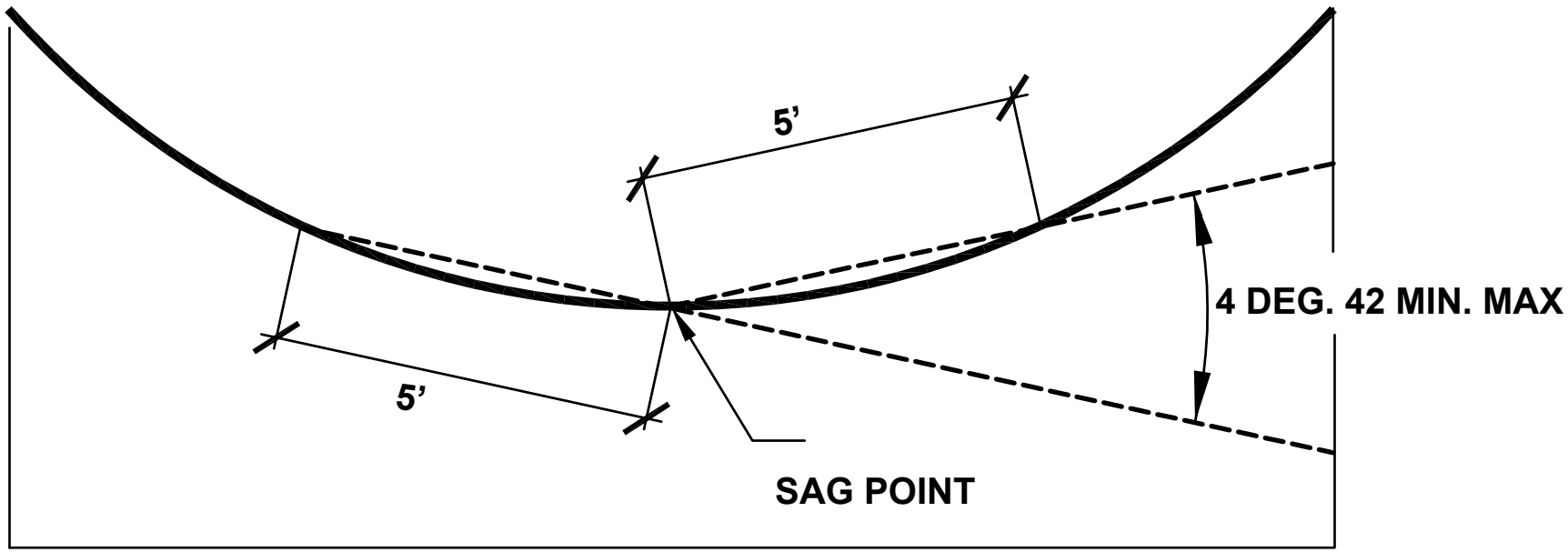

Figure 4-13 September 2005

Maximum Grade Curvatures for Driveways:
Sag Vertical Curve

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manual

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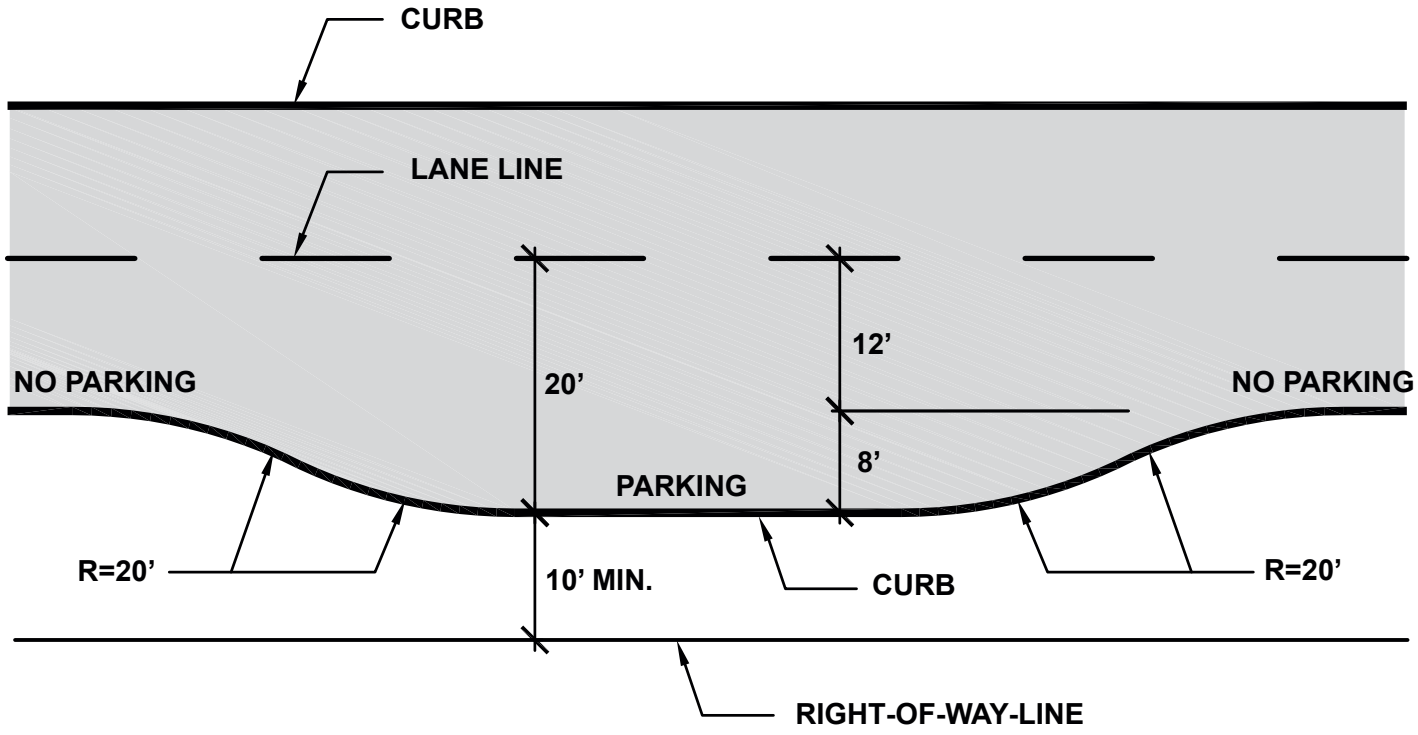

Figure 4-17 September 2005

Parking Curb Setback

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manual

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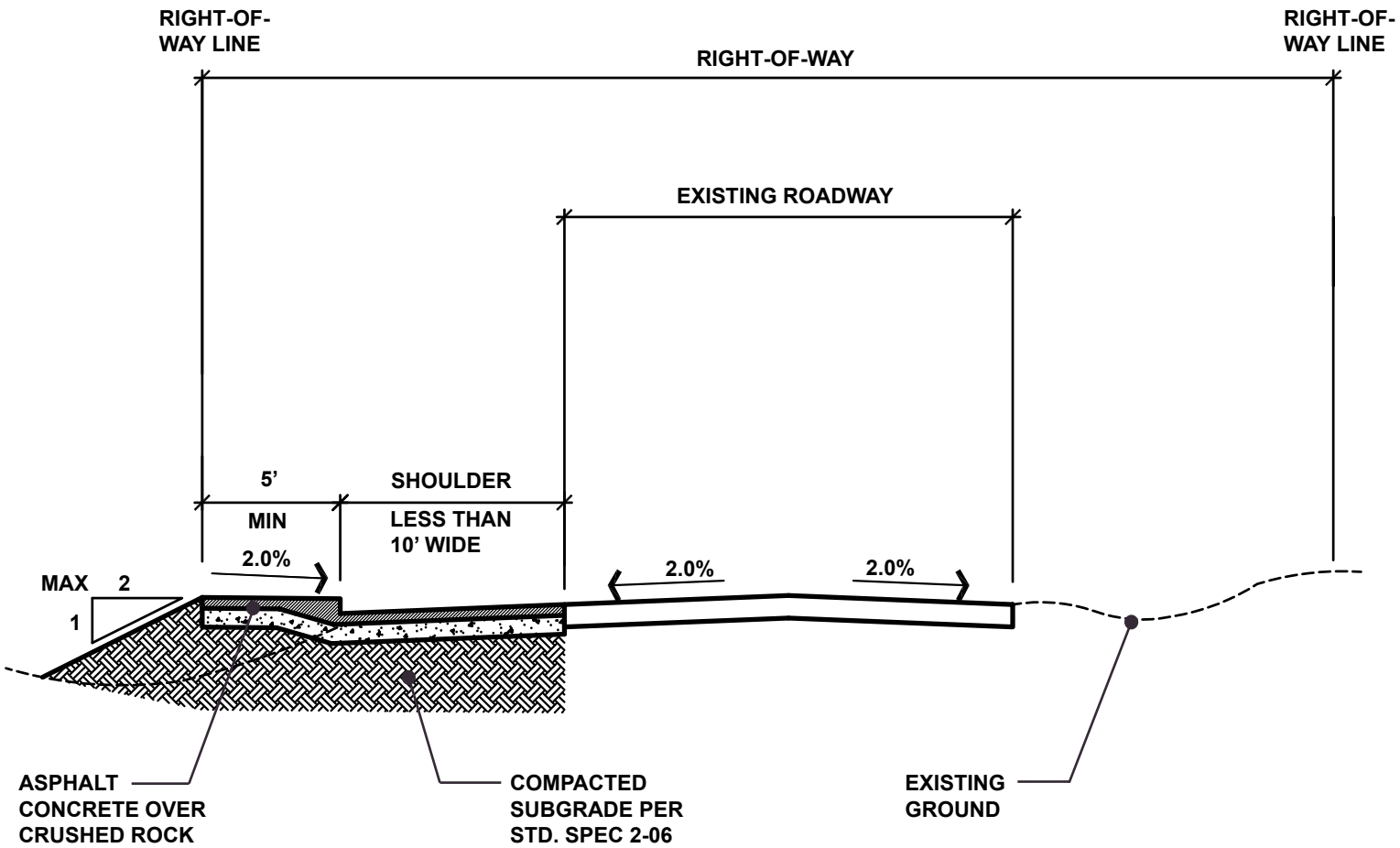

Figure 4-18 September 2005

Asphalt Pedestrian Walkway

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manual

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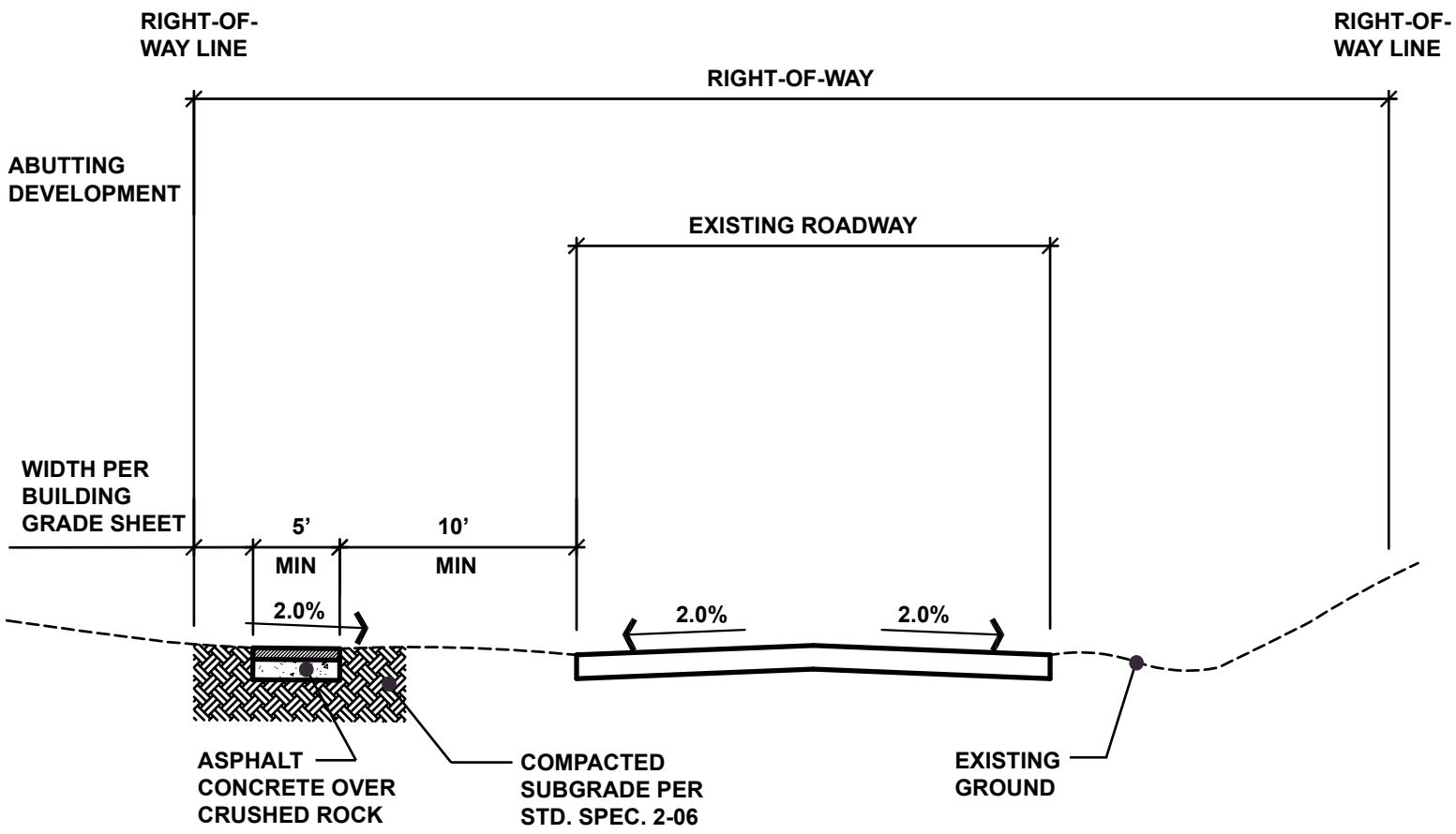
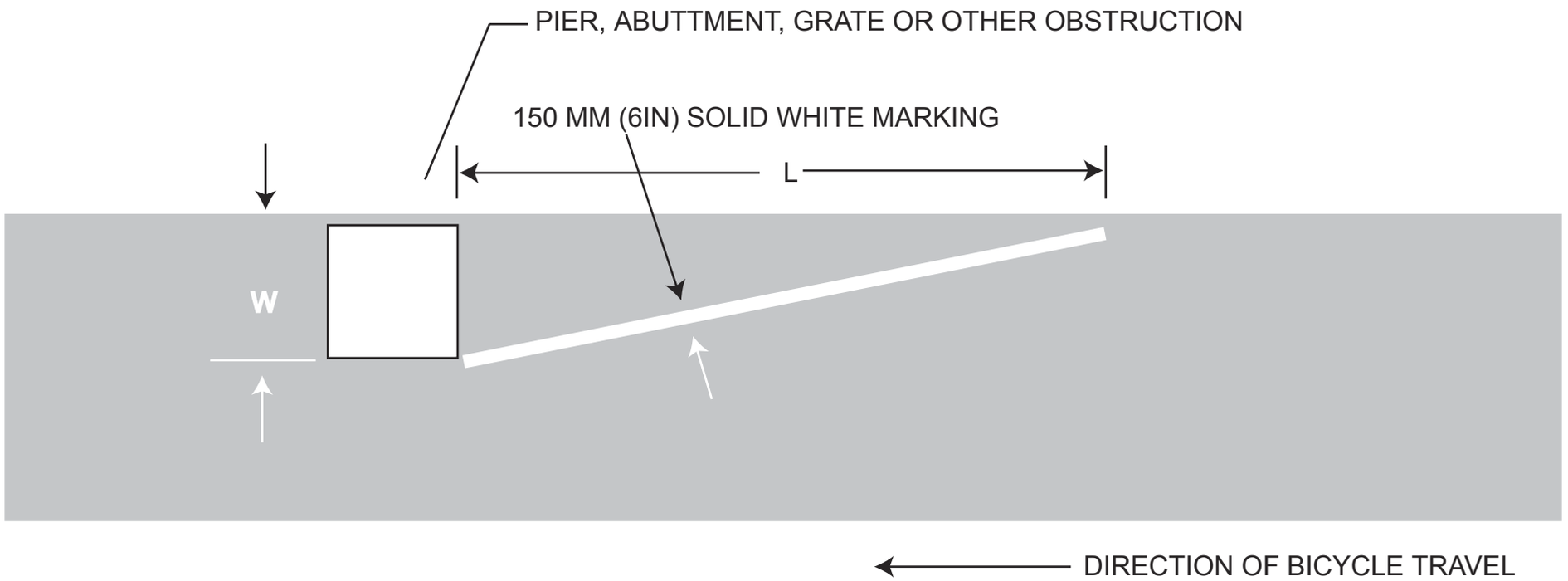


Figure 4-19 September 2005

Asphalt Pedestrian Walkway 10 Feet or More From Existing Roadway

SEATTLE
RIGHT-OF-WAY
manual

NOT TO SCALE



FOR METRIC UNITS:
L=0.62 WV, WHERE V IS BICYCLE APPROACH SPEED (KM/H)

FOR ENGLISH UNITS:
L: WV, WHERE V IS BICYCLE APPROACH SPEED (MPH)

Figure 4-20 September 2005

Obstruction Warning Pavement Marking

SEATTLE RIGHT-OF-WAY manual

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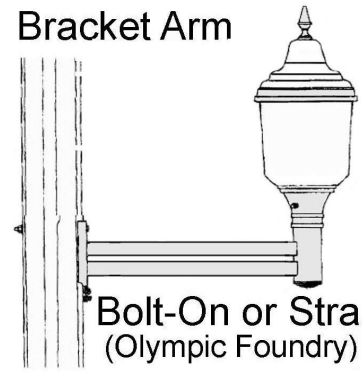
Z11

Z15

Z40

Z47A

Bracket Arm



Bolt-On or Strap-On
(Olympic Foundry)

Colors

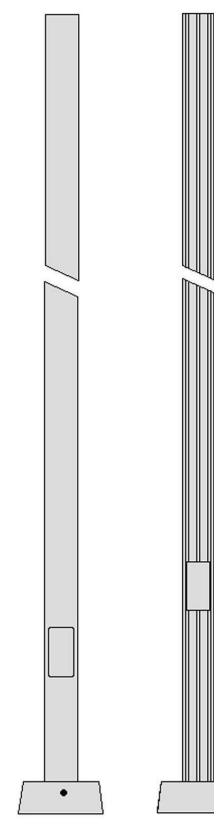
BKTX, Textured Black

GYTX, Textured Grey

GN8TX, Textured Dark Green

BRTX, Textured Bronze

Poles and Bases



APR4 P134A

B104 B40

Preapproved Manufacturer - Lumec

Figure 4-21 September 2005

Pedestrian Lighting Sections

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manual

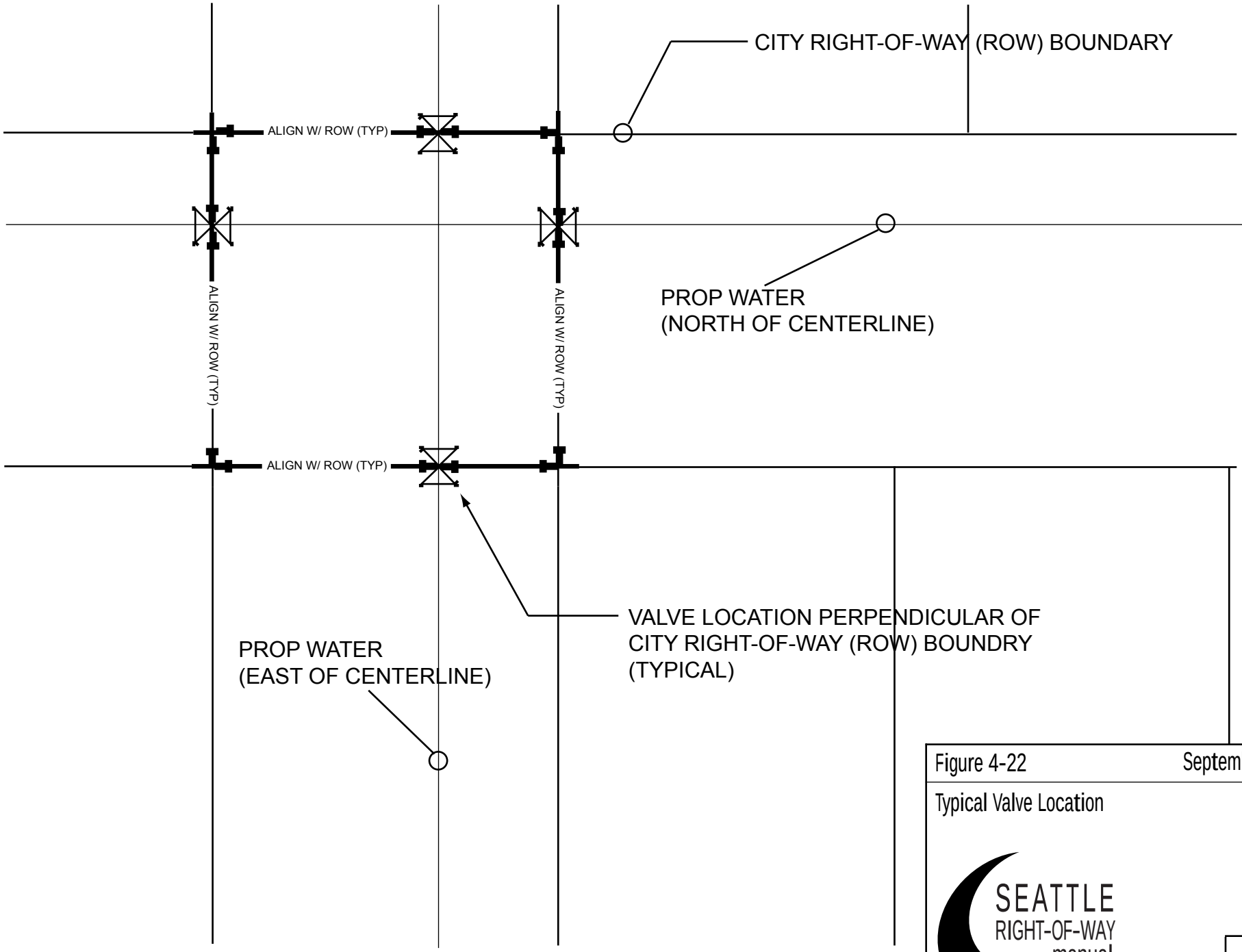


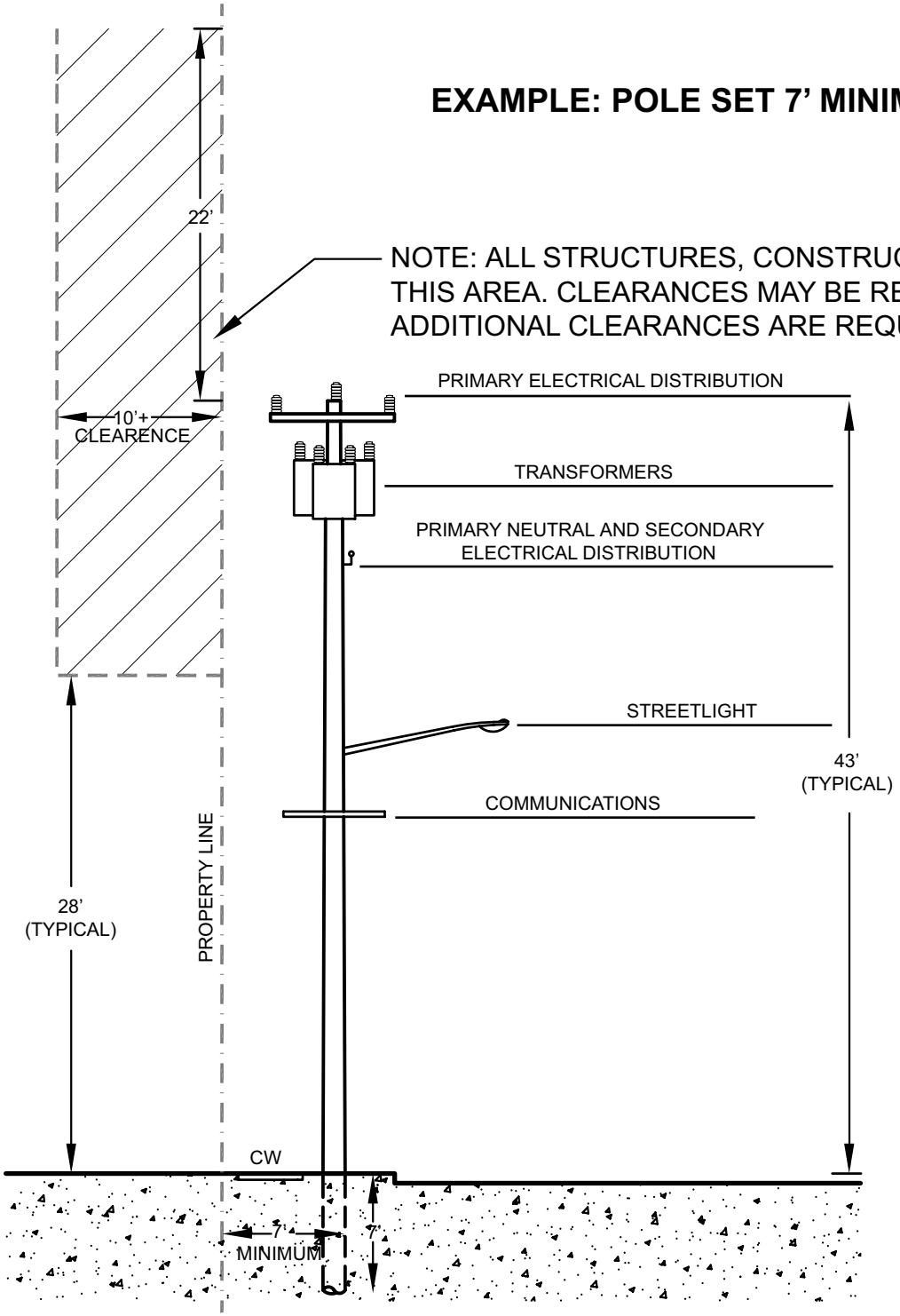
Figure 4-22 September 2005

Typical Valve Location

SEATTLE
RIGHT-OF-WAY
manual

N
W E
S
NOT TO SCALE

EXAMPLE: POLE SET 7' MINIMUM TO PROPERTY LINE



NOTE: ALL STRUCTURES, CONSTRUCTION AND MAINTENANCE ACTIVITIES PROHIBITED IN THIS AREA. CLEARANCES MAY BE REQUIRED IF POLES AND WIRES ARE NOT PRESENT. ADDITIONAL CLEARANCES ARE REQUIRED FOR BUILDING MAINTENANCE ACTIVITY.

=MINIMUM SETBACK OF FINISHED BUILDING OR STRUCTURE REQUIRED FOR UTILITY CLEARANCE FROM SCL ELECTRICAL OVERHEAD UTILITY.

TYPICAL SCL CONSTRUCTION

THE SEATTLE CITY LIGHT (SCL) 26KV OVERHEAD POWER DISTRIBUTION REQUIRES A MINIMUM HORIZONTAL AND VERTICAL CLEARANCE FROM BUILDINGS AND STRUCTURES PER THE MOST RESTRICTIVE ELEMENTS AMONGST CURRENT WASHINGTON ADMINISTRATIVE CODE (WAC 296-155-428, WAC 296-24-960), NATIONAL ELECTRIC SAFETY CODE (NESC-2002, RULES 236/237), AND SCL CONSTRUCTION GUIDELINE (D2-3).

POLE LOCATION WITHIN STREET RIGHT-OF-WAY MUST HAVE SDOT APPROVAL.

Figure 4-23 September 2005

Seattle City Light Utility Clearance

SEATTLE RIGHT-OF-WAY manual

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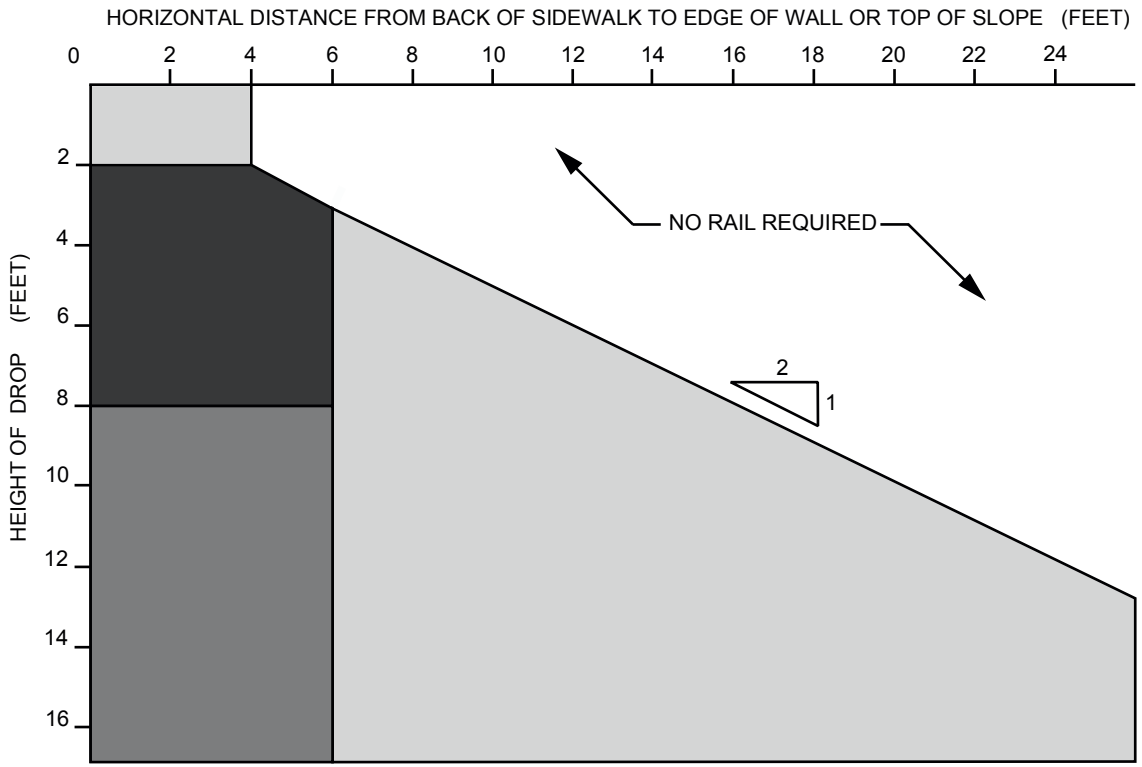

RAILINGS SHALL BE DESIGNATED AS “HANDRAILS” OR “PEDESTRIAN RAILS” AND THEIR USAGE SHALL BE AS DETERMINED BY THE DIAGRAM.

HANDRAILS SHALL BE DESIGNED IN ACCORDANCE WITH SEATTLE STANDARD PLAN 441 OR 443, AS APPROPRIATE.

PEDESTRIAN RAILINGS SHALL BE DESIGNED IN ACCORDANCE WITH INSTRUCTIONS PROVIDED BY THE ENGINEERING SERVICES DIVISION OF THE ENGINEERING DEPARTMENT OR RULES DEVELOPED FOR THIS PURPOSE BY THE DIRECTOR OF ENGINEERING.

Figure 4-24 September 2005

Determination of Handrails vs. Pedestrian Rails

LEGEND

- Railing requirements to be determined by SDOT
- Handrail or other barrier device as approved by SDOT
- Pedestrian rail

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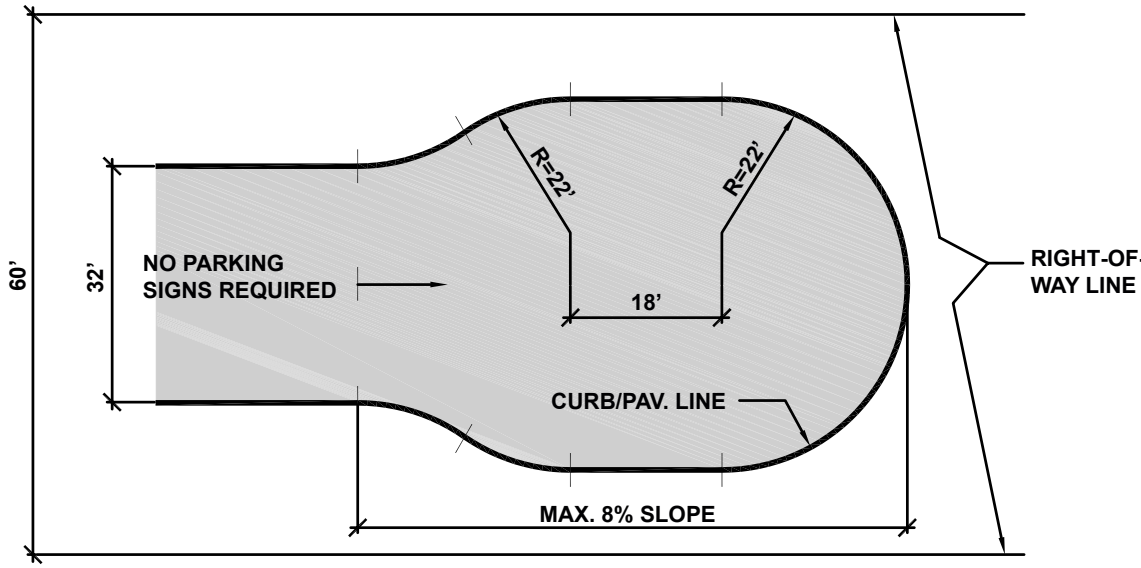
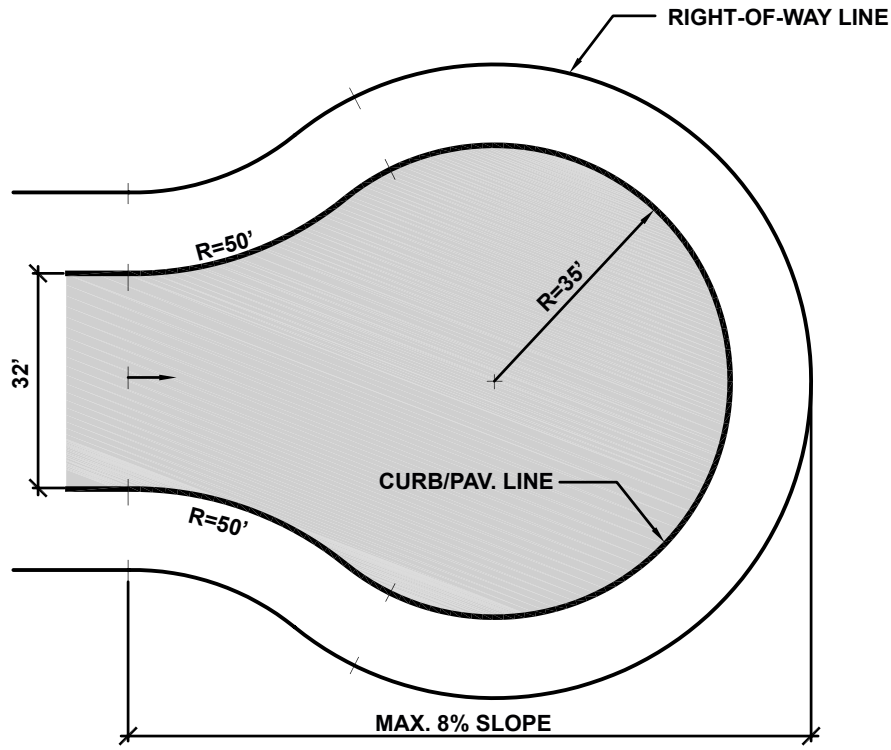


WITHIN EXISTING 60' RIGHT-OF-WAY



NEW PLATTED STREET

Figure 4-25 September 2005

Cul de Sacs

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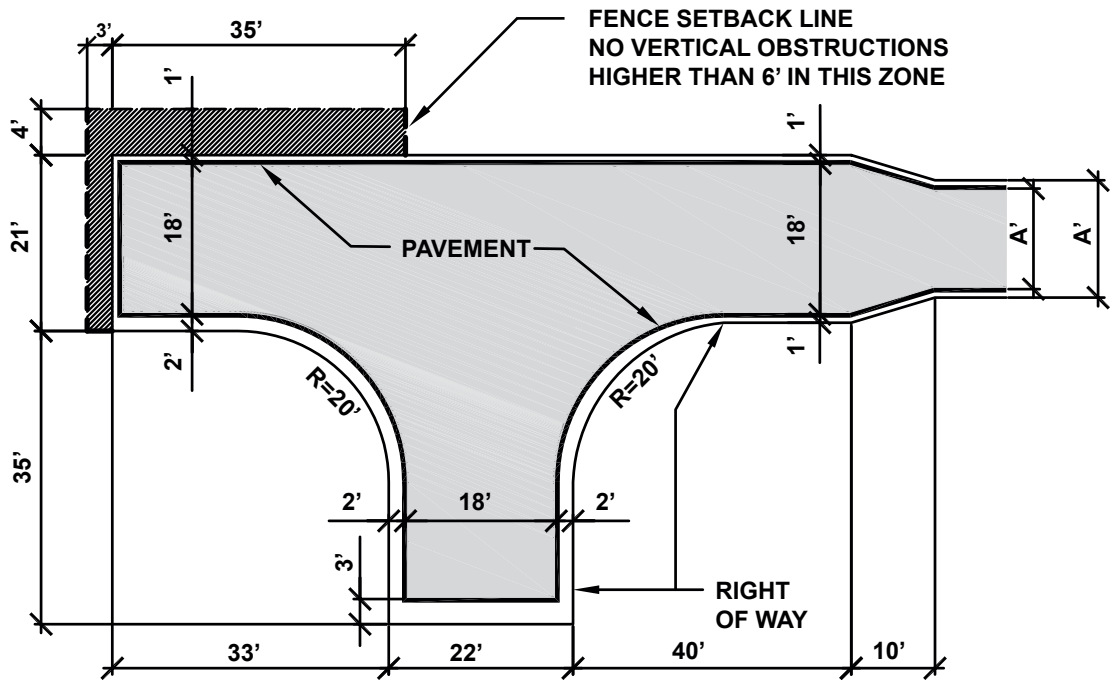

A = PER ALLEY OR EASEMENT WIDTH STANDARDS

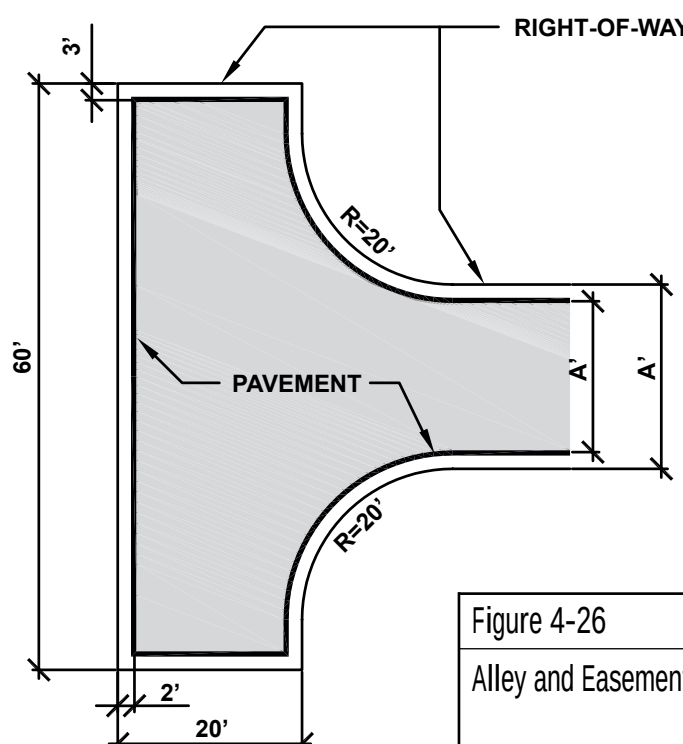

Figure 4-26 September 2005

Alley and Easement Turnarounds

SEATTLE RIGHT-OF-WAY manual

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