



City of Shoreline Engineering Development Guide 2005

STEVE BURKETT

City Manager

PAUL HAINES

Director of Public Works

JOE TOVAR

Director of Planning and Development Services

JILL MARILLEY

City Engineer

**City of Shoreline
Department of Planning and Development Services
Department of Public Works**

TABLE OF CONTENTS

SECTION 1

Addendum to the 1998 King County Surface Water Design Manual

SECTION 2

Engineering Development Guide

CHAPTER 1. GENERAL CONSIDERATIONS

- 1.01 Purpose
- 1.02 General References
- 1.03 WSDOT/APWA Documents as Primary Design and Construction References
- 1.04 Other Specifications
- 1.05 Definitions

CHAPTER 2. ROAD TYPES & GEOMETRICS

- 2.01 Street Classifications
- 2.02 Horizontal Curvature and Sight Distance Design Values
- 2.03 Private Streets
- 2.04 Half Streets
- 2.05 Cul-de-sacs, Eyebrows, and Hammerheads
- 2.06 Alleys
- 2.07 Intersections and Low Speed Curves
- 2.08 Lane Widths for Arterials
- 2.09 Maximum Grade and Grade Transitions
- 2.10 Stopping Sight Distance
- 2.11 Entering Sight Distance
- 2.12 Medians
- 2.13 One-Way Streets
- 2.14 Intersections with State or Federal Highways
- 2.15 Slope, Wall, & Drainage Easements and Right-of-Way Reduction
- 2.16 Appurtenances

CHAPTER 3. DRIVEWAYS, WALKS, & TRAILS

- 3.01 Driveways
- 3.02 Concrete Sidewalks
- 3.03 Curbs, Gutters and Sidewalks
- 3.04 Expansion and Dummy Joints
- 3.05 Soft-Surface Path Construction

- 3.06 Paved Construction Path
- 3.07 Curb Ramps
- 3.08 Concrete Steps, Metal Handrail and Handicapped Access Ramps
- 3.09 Amenity Zone
- 3.10 Asphalt Shoulders
- 3.11 Separated Walkways, Bikeways and Trails

CHAPTER 4. SURFACING

- 4.01 Residential Streets, Pedestrian Facilities and Bikeways
- 4.02 Requirements for Residential Streets on Poor Subgrade
- 4.03 Arterials and Commercial Access Streets
- 4.04 Materials & Lay-Down Procedures
- 4.05 Pavement Markings, Markers, and Pavement Tapers

CHAPTER 5. ROADSIDE FEATURES

- 5.01 Rock Facings
- 5.02 Side Slopes
- 5.03 Street Trees & Amenity Zones
- 5.04 Mail Boxes
- 5.05 Street Illumination
- 5.06 Survey Monuments
- 5.07 Roadway Barricades
- 5.08 Bollards
- 5.09 Guardrail/Embankment Heights
- 5.10 Traffic Control Signing

CHAPTER 6. RESERVED

CHAPTER 7. DRAINAGE

- 7.01 General

CHAPTER 8. UTILITIES

- 8.01 Standard Utility Locations Within the Right-of-Way
- 8.02 Underground Utility Installation
- 8.03 Final Utility Adjustment (To Finish Grade)
- 8.04 Final Cleanup, Restoration of Surface Drainage and Erosion Control

CHAPTER 9. CONSTRUCTION CONTROL AND INSPECTION

- 9.01 Notification and Inspection
- 9.02 Traffic Control in Development Construction

SECTION 3

Details and Drawings

100. Reserved

200. Road Types & Geometrics

Plan No.	Title
201	Typical Local Street
202	Typical Arterial Street
203	Typical Alley
204	Half Street
205	Shoulder Treatment
206	Island Strips
207	Median
208	Reserved
209	Street Ends
210	Traffic Circles
211	Traffic Circle Details
212	Asphalt Traffic Circle Details
213	Speed Hump: Design, Pavement Marking, and Signing
214	Split Speed Hump (24ft Test Design)
215	Intersection Landing
216	Reserved
217	Chicane

300. Driveways, Walks, and Trails

Plan No.	Title
301	Curb and Gutter Section Driveway
302	Driveway w/o Amenity Zone
303	Driveway w/ Reverse Slope
304	Driveway w/ Reverse Slope w/o Amenity Zone
305	Location and Width of New Driveways
306	Shoulder and Ditch Section Driveway
307	Joint Use Driveway Tract
308	Reserved
309	Curb and Sidewalk Joints
310	Cement Concrete Sidewalk Transition to Asphalt
311	Reserved
312	Curbs
313	Extruded Curbs
314	Curb Extensions
315	Crosswalk with Single Approach Lane
316	Crosswalk with Multiple Approach Lanes
317	Reserved

318	Curb Ramp Type A
319	Curb Ramp Type A-3
320	Curb Ramp Type C
321	Curb Ramp Locations
322	Reserved
323	Hand Rails
324	Public ROW Hand/Guardrail
325	Stairs
326	Cement Concrete Stairway
327	Fencing
328	Reserved
329	Typical Section for Trails
330	Reserved
331	Reserved
332	Trail Fencing/Screening
333	Trail Fencing/Screening Cross Section View
334	Trail Signs
335	Greenbelt Fence

400. Surfacing

Plan No.	Title
401	Channelization – Left Turn Lanes
402	Channelization – Vehicle & Bicycles
403	Pavement Marking Detail
404	Reserved
405	Reserved
406	Reserved
407	Reserved

500. Roadside Features

Plan No.	Title
501	Rock Facing – Cut Section
502	Rock Facing – Fill Section
503	Rock Facing Under Sidewalk
504	Rock Facing - Fill Section Reinforcement
505	Bollards
506	Street Signs – Standards and locations
507	Reserved
508	Traffic Sign and Wood Post Installation
509	Traffic Sign and Wood Post Installation
510	Post Cap
511	Traffic Sign and 2” Square Metal Post Installation
512	Object Marker Installation
513	Reserved
514	Mailbox Stand w/ Amenity Zone
515	Mailbox Stand w/o Amenity Zone

516	Neighborhood Delivery and Collection Box Unit Installation
517	Reserved
518	Reserved
519	Monuments
520	Reserved
521	Tree Staking in Sidewalk with Grate
522	Reserved
523	Reserved

600. Reserved

700. Roadside Features

Plan No.	Title
701	Beveled End Pipe Section
702	Trash Rack (Debris Cage)
703	Trash Rack (Debris Cage) – Conical
704	Reserved
705	Catch Basin Type 1
706	Catch Basin Type 1-L
707	Catch Basin Installation
708	Catch Basin Type 2 – 48”, 54”, 60”, 72”, and 96”
709	Catch Basin Details
710	Reserved
711	Reserved
712	Manhole Type 1 – 48”, 54”, and 60”
713	Manhole Type 2 – 72” and 96”
714	Manhole Type 3 - 48”, 54”, 60”, 72”, and 96”
715	Manhole Type 4
716	Manhole Details
717	Reserved
718	Reserved
719	Reserved
720	Locking Manhole Cover
721	Locking Manhole Cover Installation
722	Reserved
723	Curb Inlet
724	Through-Curb Inlet Frame
725	Through-Curb Inlet & Vertical Curb Installation
726	Vaned Grate
727	Reserved
728	Reserved
729	Standard Grate
730	Standard Frame w/ Vertical Curb Installation
731	Solid Cover
732	Reserved
733	Reserved

734	Rolled Curb Frame & Grate
735	Rolled Curb Frame & Grate Installation
736	Rolled Curb Vane Grate
737	Reserved
738	Reserved
739	Rock Lined Shoulder Ditches and Curb or Turnpiked Shoulders
740	Reserved
741	Reserved
742	Reserved
743	Reserved
744	Reserved
745	Reserved
746	Reserved
747	Reserved
748	Reserved
749	Reserved
750	Reserved
751	Reserved
752	Reserved
753	Reserved
754	Reserved
755	Reserved
756	Reserved
757	Reserved
758	Reserved
759	Reserved
760	Reserved
761	Flow Restrictor (Tee)
762	FROP-T Shear Gate Detail
763	Flow Restrictor (Baffle)
764	Reserved
765	Floatable Material Separator 6" Or 8" Pipe
766	Floatable Material Separator 12" Or Larger
767	Reserved
768	Reserved
769	Reserved
770	Detention Pipe
771	Control Structure – 54" Diameter
772	Control Structure – 72" Diameter or Larger

800. Utilities and Restoration

Plan No.	Title
801	Rigid Pavement Restoration Details
802	Flexible Pavement Patching
803	Reserved

Appendices

- Appendix A Local Streets – Geometric Criteria
 - Appendix B Arterial Streets – Geometric Criteria
 - Appendix C Fire Apparatus Access Roads
-



Section 1

Addendum to the 1998 King County Surface Water Design Manual

November 2005

City of Shoreline Surface Water Design Manual

This addendum to the King County 1998 *Draft Surface Water Design Manual* (KCSWDM) applies to development proposals within the City of Shoreline. The City of Shoreline has adopted the KCSWDM by reference with the following exceptions. Text changes are shown in italics.

Section 1.1.1 -- Projects Requiring Drainage Review:

The criteria for requiring drainage review in KCSWDM Section 1.1.1 are replaced by the following criteria.

Drainage review is required for any proposed project (except those proposing only routine maintenance, repair, or emergency modifications) that is subject to a City of Shoreline development proposal, permit, or approval listed in Section 1.1.1, AND which meets any of the following conditions:

1. Adds *1,500 square feet* or more of **new impervious surface**, OR
2. Proposes to **construct or modify** a drainage pipe/ditch that is 12 inches or more in size/depth, or receives surface and storm water runoff for a drainage pipe/ditch that is 12 inches or more in size/depth, OR
3. Contains or is adjacent to a floodplain, stream, lake, wetland or closed depression, or a sensitive area as defined by the Critical Areas Ordinance, excluding seismic, coal mining, and volcanic hazard area, OR
4. Is located within a **Landslide Hazard Drainage Area** and adds *500 square feet* or more of new impervious surface, OR
5. Is located within an identified **Critical Drainage Area**, OR
6. Is a redevelopment project proposing \$100,000 or more of improvements to an existing **high-use site**, OR
7. Is a redevelopment project proposing \$500,000 or more of site improvements and would create *1,500 square feet* or more of contiguous **pollution-generating impervious surface** through any combination of **new and/or replaced impervious surface**.

Section 1.2.3 -- Core Requirements for Flow Control:

Acceptable Flow Control Levels

The KCSWDM defines three flow control levels for impact mitigation. For the City of Shoreline, Level 2 Flow Control is the minimum accepted standard. This level of flow control is designed to control the durations of geomorphically significant flows and thereby maintains existing channel and streambank erosion rates. For areas

where it is important to mitigate water level changes, the City may require Level 3 Flow Control.

Existing Site Conditions

The definition for *existing site conditions* depends upon what, if any, activity has occurred since *August 1995, the date of City of Shoreline incorporation*.

- IF a drainage plan has been approved by the *City* since *August 1995* for any land conversion activity which includes the addition of more than 5,000 square feet of new impervious surface,
- THEN *existing site conditions* are those created by the site improvement and drainage facilities constructed per the approved engineering plans.
- OTHERWISE, *existing site conditions* are those that existed prior to August 1995 as determined from aerial photographs and, if necessary, on knowledge of individuals familiar with the area. The intent is to mitigate unaddressed impacts created by site alterations or improvement, such as clearing, which have occurred since *August 1995*.

Section 1.2.7: Financial Guarantees and Liability

All drainage facilities constructed or modified for projects (except downspout infiltration and dispersion systems for single family residential lots) must comply with the liability requirements and the financial guarantee requirements of the City.

City Equivalents for County Agencies

For proposals located within the City of Shoreline, all references in the KCSWDM to the following King County departments are to be replaced by reference to City departments as follows:

- DNR (Department of Natural Resources) -- replace with **Shoreline Public Works Department**
- SWM (Surface Water Management) – replace with **Shoreline Public Works Department**
- WLR (Water and Land Resources) – replace with **Shoreline Public Works Department**
- DDES (Department of Development and Environmental Services) – replace with **Shoreline Planning and Development Services Department**

County Designations That Do Not Apply in the City

The following designations are used in the 1998 KCSWDM but are not currently used in the City of Shoreline; any reference in the KCSWDM to such areas is to be disregarded for development applications within the City of Shoreline:

- Coal Mine Hazard Area
- Lake Management Plan
- Rural Residential Development
- Shared Facility

Article I. Shoreline Source Control BMP Manual

The City of Shoreline adopts *Urban Land Use BMPs, Volume IV* of the 1992 *Stormwater Management Manual for the Puget Sound Basin* (DOE SWMM), and future amendments by reference as the Source Control BMP Manual for the City of Shoreline.

The KCSWDM and DOE SWDM are available for use and examination by the public, in the following locations:

- Planning and Development Services Department
- Office of City Clerk
- Public libraries located within the City of Shoreline



Section 2

Engineering Development Guide

November 2005

CHAPTER 1. GENERAL CONSIDERATIONS

1.01 Purpose:

The purpose of the City of Shoreline Engineering Development Guide, subsequently referred to as the "Guidelines," is to supplement the provisions of the City of Shoreline Municipal Code (SMC) 20.70.020.

1.02 General References:

These Guidelines implement and are intended to be consistent with:

- A. City of Shoreline Municipal Code (SMC)
- B. City of Shoreline Development Code (SDC)
- C. City of Shoreline Surface Water Management Code, Chapter 13.10 of the SMC.
- D. City of Shoreline Comprehensive Plan, as amended.
- E. City of Shoreline Six Year Transportation Improvement Plan, as amended.
- F. City of Shoreline Storm Water Master Plan.
- G. ADA Standards for Accessible Design

1.03 WSDOT/APWA Documents as Primary Design and Construction References:

Except where these Guidelines provide otherwise, design detail, construction workmanship, and materials shall be in accordance with the following publications produced separately by Washington State Department of Transportation (WSDOT), or jointly by WSDOT and Washington State Chapter of American Public Works Association (APWA).

- A. WSDOT/APWA Standard Specifications for Road, Bridge, and Municipal Construction, as adopted herein by City of Shoreline, current edition as amended. These will be referred to as the "WSDOT/APWA Standard Specifications."
- B. The WSDOT/APWA Standard Plans for Road and Bridge Construction, to be referred to as the "WSDOT/APWA Standard Plans," current edition as amended.
- C. WSDOT Design Manual, current edition as amended.

- D. City Design Standards for the Construction of Urban Arterial and Collector Roads, adopted per RCW 35.78.030, current edition as amended.

1.04 Other Specifications:

The following shall be applicable when pertinent, when specifically cited in the Guidelines or when required by state or federal funding authority:

- A. Local Agency Guidelines, WSDOT, as amended.
- B. Guidelines for Urban Arterial Program, WSDOT, as amended.
- C. Design criteria of federal agencies including the Federal Housing Administration, Department of Housing and Urban Development; and the Federal Highway Administration, Department of Transportation.
- D. A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials (AASHTO), 2001, or current edition when adopted by WSDOT.
- E. Standard Specifications for Highway Bridges, adopted by AASHTO, current edition.
- F. U. S. Department of Transportation Manual on Uniform Traffic Control Devices, "MUTCD", as amended and approved by Washington State Department of Transportation, current edition.
- G. Guide for the Development of Bicycle Facilities, adopted by AASHTO, current edition.
- H. Associated Rockery Contractors, Standard Rock Wall Construction Guidelines.
- I. American Society for Testing and Materials (ASTM).

1.05 Definitions

"AASHTO": American Association of State Highway and Transportation Officials.

"ADA": Americans with Disabilities Act.

"ADT": Average daily trips.

"APWA": American Public Works Association.

"ATB": Asphalt treated base.

"Alley": A service roadway providing a primary or secondary means of automobile, service vehicle or emergency vehicle access to abutting property and not intended for primary traffic or pedestrian circulation.

"Amenity Zone": That area adjacent to the paved roadway and within the right-of-way, that is commonly landscaped, but may include other features for the City's benefit such as utilities, traffic signs, and mailboxes.

"Auxiliary Lane": The portion of the roadway adjoining the traveled way for parking, turning or other purposes supplementary to through-traffic movement.

"Bulb": Round area for vehicle turnaround typically located at the end of a cul-de-sac street.

"Commercial/ Non-Residential": For the purposes of this manual, a building, project, street, or area other than that associated with single-family or duplex structures. Note that the Land Use Code generally includes multifamily in the commercial category.

"Cul-de-sac": The bulb shaped turnaround at the end of a dead-end street.

"Developer": The person or entity who owns or holds purchase options or other development control over property for which development activity is proposed.

"Director:" The director of the City of Shoreline Planning and Development Services or designee

"Director of Public Works:" The director of the City of Shoreline Public Works or designee.

"Driveway": A privately maintained access to a single residential, commercial or industrial property.

"Engineer": A professional engineer licensed to practice in the State of Washington acting on behalf of an applicant or developer.

"Eyebrow": A partial bulb located adjacent to the serving road that provides access to lots and serves as a vehicle turnaround.

"Fire Apparatus Access Road": As defined in the International Fire Code.

"Fire Lane": As defined in the International Fire Code.

"Half-Street": Street constructed along edge of development, utilizing a portion of the regular width of right-of-way and permitted as an interim facility pending construction of the other half of the street by the adjacent owner.

"Internal Road": A road that is contained in the development.

"Joint-Use Driveway Tract": A jointly owned and maintained tract or easement serving two properties.

"Landing": A road or driveway approach area to any public or private road.

"Loop": Road of limited length forming a loop, having no other intersecting road, and functioning mainly as direct access to abutting properties. A loop may be designated for one-way or two-way traffic.

"*MUTCD*": Manual on Uniform Traffic Control Devices.

"Off-Street Parking Space": An area accessible to vehicles, exclusive of roadways, sidewalks, and other pedestrian facilities, that is improved, maintained and used for the purpose of parking a motor vehicle.

"Pavement Width": Paved area on shoulder-type roads or paved surface between curb, thickened edge or gutter flow line on all other roads.

"Pipe Stem": A strip of land having a width narrower than that of the lot or parcel to be served and is designed for providing access to that lot or parcel.

"Private Access Tract": A privately owned and maintained tract providing vehicular access to six or fewer residential properties.

"Private Street": A privately owned and maintained access provided for by a tract, easement or other legal means (SMC 20.70.160).

"Professional Engineer": A professional civil engineer licensed to practice in the State of Washington.

"Project Manager": City of Shoreline staff member responsible for review of the development project.

"Public Street": Publicly owned facility-providing access, including the roadway and all other improvements, inside the right-of-way.

"Residential": A building, project, street, or area associated with single-family or duplex structures.

"Resource Lands": Areas so designated in City of Shoreline Comprehensive Plan and as implemented through community plans and area zoning; characterized by long-term agriculture, forestry, and mining.

"Reviewing Agency": City of Shoreline Department of Public Works or its successor agency for plats and proposed developments.

"Right-of-Way": Property granted or reserved for, or dedicated to, public use for street purposes and utilities, together with property granted or reserved for, or dedicated to, public use for walkways, sidewalks, bikeways, and parking whether improved or unimproved, including the air rights, sub-surface rights and easements thereto.

"Road": A public or recorded private thoroughfare providing pedestrian and vehicular access through neighborhoods and communities and to abutting property.

"Road" and "Street" will be considered interchangeable terms for the purpose of these Guidelines.

"Roadway": Pavement width plus any non-paved shoulders.

"Shoulder": The paved or unpaved portion of the roadway outside the traveled way that is available for emergency parking or non-motorized use.

"Traveled Way": The part of the road made for vehicle travel excluding shoulders and auxiliary lanes.

"Utility": Private or municipal corporations owning or operating, or proposing to own or operate facilities that comprise a system or systems for public service. Private utilities include only gas, electric, telecommunications, or water companies that are subject to the jurisdiction of the State Utilities and Transportation Commission and that have not been classified as competitive by the commission. (Ord. 324 § 1, 2003).

"WSDOT": Washington State Department of Transportation.

CHAPTER 2. STREET TYPES & GEOMETRICS

2.01 Street Classifications

- A. Existing Shoreline streets have been classified as shown in the Comprehensive Plan. The primary classes of Local Street and Arterial Street are described in subsections B and C. Based upon these classifications, the criteria for desired right-of-way width, pavement width, and other geometrics are as stated in Appendices A and B and Table 2.1. See Drawing Details 201 and 202 for typical cross sections of Local and Arterial Streets. Function is the controlling element for classification and shall govern right-of-way, road width and road geometrics. Other given elements such as access, arterial spacing and average daily traffic count (ADT) are typical.
- B. Local Street – neighborhood street with low traffic volumes. Access is limited to abutting properties. Traffic calming features may be used to improve safety. Average daily traffic (ADT) is typically less than 4,000.
- C. Arterial Street – streets extending through multiple neighborhoods or communities. Arterials are further classified as:
 - 1. Collector Arterial – intra-community street that connects residential neighborhoods with community centers and facilities. Access is partially controlled, and the street typically serves 3,000 to 9,000 ADT.
 - 2. Minor Arterial – intra-community street that connects community centers and facilities. Access is partially controlled, and the street typically serves 8,000 to 30,000 ADT.
 - 3. Principal Arterial – inter-community street that connects larger community centers and facilities. Access is partially controlled, and the street typically serves 20,000-plus ADT.
- D. State Route – inter-community streets extending through the entire metropolitan Seattle area requiring review by City of Shoreline and Washington State Department of Transportation.
- E. Interstate 5 – An interstate highway serving as the primary north-south highway for metropolitan Seattle and linking the cities of the Pacific Coast.
- F. Alleys – A service roadway providing a primary or secondary means of automobile, service vehicle or emergency vehicle access to abutting property and not intended for primary traffic or pedestrian circulation
- G. Private Streets – The City of Shoreline will not accept private streets for maintenance as public streets until such streets are brought into conformance with

current City of Shoreline Engineering Development Guide. This requirement will include the design standard for the road classification placed upon the private street.

- H. Within each functional classification, roads are further characterized as "curb" or "shoulder" type. A "curb" type road typically includes curb and gutter with inlets and underground pipe drainage. A "shoulder" type road typically includes a shoulder and open ditch drainage used to transition new construction or developments to existing shoulder systems. This is a temporary situation and will be replaced with a curb as develop or road projects are constructed.

2.02 Horizontal Curvature and Sight Distance Design Values

- A. The design values shown in Table 2.1 are minimum values necessary to meet the requirements for a selected design speed and road classification. A maximum of 8 percent superelevation may be used, upon approval of the Director, for design of improvements to existing arterials, as necessary, to meet terrain and right-of-way conditions. Superelevation run-off lengths on arterials, residential and commercial access streets shall be calculated in accordance with the WSDOT Design Manual.
- B. Superelevation is not required in the design of horizontal curves on urban residential access streets; however, horizontal curves must be designed based on design speed and selected cross section as indicated in Table 2.1. Table 2.1 is based on AASHTO "Low Speed Urban Streets" design methodology. Superelevation may be used on urban residential streets as necessary to meet terrain and right-of-way conditions.

Table 2.1
Arterial and Local Street Design Values

Design Speed (mph)	25	30	35	40	45
Horizontal Curvature for 6 percent Superelevation, Radius (Ft.)	185	275	380	510	660
Horizontal Curvature for 8 percent (maximum allowable on arterials) Superelevation, Radius (Ft.)	170	250	350	465	600
Stopping Sight Distance (Ft.)	165	200	250	325	400
Entering Sight Distance (Ft.)	365	430	490	555	620
Minimum Run-Off Length (ft)	80	90	100	115	125
Passing Sight Distance (Ft.) for a 2-Lane Road		1,100	1,300	1,500	1,650

2.03 Private Streets

- A. See SMC Chapter 20.70.160 for requirements.
- B. Minimum width of private streets when allowed by the SMC:

Table 2.2

# of single family lots	Tract or Easement Width	Pavement/Traveled Way Width	Length
4 or fewer	24 ft	20 ft	150 ft*
Up to 6	28 ft	24 ft	150 ft*

* The length may be extended upon approval from the Fire Department

2.04 Half Streets.

- A. When allowed by the SMC, a half street shall meet the following requirements:
 - 1. Right-of-way width of the half street shall equal at least 30 feet; and
 - 2. If feasible, half street shall be graded consistent with locating centerline of the ultimate road section on the property line; and
 - 3. Traveled way shall be surfaced the same as the designated road type to a width not less than 20 feet, curb, planter strip and sidewalk shall be constructed as required for the designated road type; and
 - 4. Property line edge of street shall be finished with temporary curbing, shoulders, ditches, and/or side slopes so as to assure proper drainage, bank stability, and traffic safety; and
 - 5. Half streets shall not intersect other half streets unless so approved by the Director.
- B. When a half street is eventually completed to a whole street, the completing builder shall reconstruct the original half street as necessary to produce a proper full-width street of designated section.

2.05 Cul-de-sacs, Eyebrows, and Hammerheads.

- A. Turnaround facilities shall be provided at street ends where the street length from the nearest intersection is more than 150 feet as measured from the centerline of intersecting street to end of dead-end street pavement and shall be constructed as follows:

1. Minimum right-of-way diameter across bulb section: 100 feet in a permanent cul-de-sac; 84 feet in a temporary cul-de-sac, with bulb area lying outside straight-street right-of-way provided as temporary easement pending forward extension of the street. Right-of-way may be reduced, provided utilities and necessary drainage are accommodated on permanent easements within the development. See Section 2.16.
 2. Minimum diameter of surfacing across bulb: 90 feet of paving in curb type road.
 3. Cul-de-sac Island: Optional feature for any cul-de-sac when bulb paved diameter is 90 feet or less; mandatory when bulb paved diameter exceeds 90 feet. If provided, island shall have full-depth vertical curb. Minimum diameter shall be 20 feet and there shall be at least; 30 feet of paved traveled way in a curb type section around the circumference. Island shall be grassed or landscaped. The adjoining lot owners shall maintain it.
 4. Sidewalks shall be constructed on both sides of the stem and on the bulb.
- B. A dead end residential street shall not be longer than 600 feet measured from centerline of intersecting street to center of cul de sac. The maximum length may be extended to 1,000 feet if 50 or fewer potential lots are to be served and there is provision for emergency vehicle turnaround near mid-length.
- C. The Director of Public Works may require an off-street walk or an emergency vehicle access to connect a cul-de-sac at its terminus with other streets, parks, schools, bus stops, or other pedestrian traffic generators, if the need exists. Off-street sidewalks shall be contained in the right-of-way or a sidewalk easement.
- D. If a street temporarily terminated at a property boundary serves more than three lots or is longer than 150 feet, a temporary bulb shall be constructed near the plat boundary. The paved bulb shall be 90 feet in diameter with sidewalks terminated at the point where the bulb radius begins. Removal of the temporary cul-de-sac, restoration and extension of the sidewalk shall be the responsibility of the developer who extends the road.
- E. The maximum cross grade of a street at the street end shall be 8%.
- F. Partial bulbs or eyebrows shall have a minimum paved radius and an island configuration as shown on Drawing No. 209. Island shall be offset two feet from edge of traveled way.
- G. A hammerhead per Drawing Detail 209 may be used to fulfill the requirement to provide a turnaround facility where the street serves (or will serve) 4 or fewer single family residential units

2.06 Alleys

- A. An alley is considered a public road. (See also Drawing Detail 203)
 - 1. Serves a maximum of 20 lots, with a maximum length of 300 feet, no dead ends or cul-de-sacs.
 - 2. Minimum tract width 22 feet with a pavement surface of 20 feet (including thickened edge), based on a five-foot structure setback. For differing structure setback requirements, alley configuration shall be designated to provide for safe turning access to properties.
 - 3. Paved surface shall have a thickened edge on one side and cross slope in one direction.
 - 4. Public streets to which an alley connects or which provide access to the front boundary of the properties served by the alley shall be 28-foot minimum paved width with vertical curb. Alley entry shall be provided by a driveway cut with a minimum 35-foot radii.
 - 5. Modifications to existing alleys serving commercial or industrial properties, in accordance with the above, will be determined on a case-by-case basis subject to approval by the City.

2.07 Intersections and Low Speed Curves

- A. Intersection traffic control shall be designed as specified in the *MUTCD*, City of Seattle Traffic Control Manual for In-Street Work (current edition), and by the Director.
- B. Geometric Design Requirements
 - 1. The angle of an intersection of two streets shall be 85° to 95°.
 - 2. The minimum distance between adjacent parallel local streets shall be 150 feet, measured from nearest curb edge to nearest curb edge.
 - 3. See Table 2.3 below for minimum curb radii at intersections:

Table 2.3
Curb Radius Design Values

Street Classification (for highest street classification at intersection)	Dimension
Arterial to Arterial	25 feet
Arterial to Local Street	20 feet
Local Street to Local Street	20 feet
Arterial Street to Commercial Access	25 feet
Commercial Access to Commercial Access	25 feet
Transit/truck Route (as adopted by comprehensive Plan)	30 feet
Where vehicular turn is prohibited	10 feet
Radii for curb setbacks and bulb-outs	10/20 feet

- C. The line of sight for drivers at intersections shall not be obstructed.
- D. Intersection design may result in increased right-of-way width requirements.
- E. On sloping approaches at an intersection, landings shall be provided with grade not to exceed one foot difference in elevation for a distance of 30 feet approaching an arterial or 20 feet approaching a residential or commercial street, measured from future right-of-way line (extended) of intersecting street.
- F. Entering Sight Distance. See Table 2.1 for specific entering sight distance values based on required design speed.

2.08 Lane Widths for Arterials

- A. The following lane width standards are used in the design of arterials:

Table 2.4

Lane Type	Design Lane Width
Parking Lane	8 Ft
Parking Lane on Bus or Truck Route	10 Ft
Through Traffic Lane	11 Ft
Curb Lane	12 Ft
Bus Only Lane	12 Ft
Turn Only Lane	12 Ft
Curb Lane (shared vehicle/bicycle)	14 Ft

2.09 Maximum Grade and Grade Transitions

- A. Maximum grade may be exceeded for short distances of 300 feet or less, upon showing that no practical alternative exists. Exceptions which exceed 15% will require verification by the Fire Marshal that additional fire protection requirements will be met. Grades exceeding 12 percent shall be paved with asphalt concrete (AC) or portland cement concrete (PCC). Any 20% grade must be paved with PCC.
- B. Grade transitions shall be constructed as smooth vertical curves except in intersections where the difference in grade is one percent or less and upon approval of the Director of Public Works. The minimum vertical curve for roadways is 75 ft. The point of vertical curvature (pvc) shall not encroach into a cross street any further than the center of pavement of the cross street.

Table 2.5

Roadway Classification	Maximum Roadway Profile grade
Principal Arterials	9%
Commercial Access	9%
Collector Arterial	10%
Minor Arterials	10%
Residential Access Streets	17%
Alleys	17%

2.10 Stopping Sight Distance (SSD) applies to street classifications as detailed in Section 2.01. See Table 2.1 for specific SSD values based on required design speed.

- A. Height of eye is 3.5' and height of object is 0.5'.
- B. Minimum SSD for any downgrade averaging three percent or steeper shall be increased by the values shown below for any downgrade averaging three percent or steeper (Source: AASHTO Policy on Geometric Design, Table III-2). Interpolate values for other design speeds and grades.

Table 2.6
SSD ADJUSTMENT VALUES (FT)

Design Speed (MPH)	Downgrade		
	3%	6%	9%
45	25	55	105
40	20	40	75
35	15	30	55
30	10	20	30
25	0	10	20

- C. Sag vertical curves on local access streets with stopping sight distance less than that called for in Section 2.02, may be approved by the City if no practical design exists and if acceptable road lighting is provided throughout the curve and is maintained by a franchised utility.
- D. Intersecting Stopping Sight Distance
 - 1. Stopping sight distances for the design speeds of proposed commercial access streets, neighborhood collector streets and arterials must be met when intersecting arterials.
 - 2. The minimum stopping sight distance on proposed intersection approaches for all other classifications of intersecting roadways shall be 125 feet.

2.11 Entering Sight Distance (ESD)

Entering sight distance criteria will not apply on local access streets or minor access streets (commercial). Specific ESD values for required design speeds are listed in Table 2.1.

- A. Entering vehicle eye height is 3.5 feet, measured from 10-foot back from edge of traveled way. Approaching vehicle height is 4.25 feet.
- B. Requirements in Drawing Detail 215 apply to an intersection or driveway approach to a typical road under average conditions. In difficult topography the Director of Public Works may authorize a reduction in the ESD based on factors mitigating the hazard. Such factors may include an anticipated posted or average running speed less than the design speed or the provision of acceleration lanes and/or a median space allowing an intermediate stop by an approaching vehicle making a left turn.
- C. Where a significant number of trucks will be using the approach road, the Director of Public Works may increase the entering sight distance requirements by up to 30 percent for single-unit trucks and 70 percent for semi-trailer combinations.

2.12 Medians

Median width shall be additional to, not part of, the specified width of traveled way. Edges shall be similar to outer road edges: formed vertical curb; except that median shoulders shall be minimum five feet in width. Twenty feet of drivable surface (which includes traveled way and paved shoulders) shall be provided on either side of the median. Median may be grassed or landscaped, or pavement. Median shall be designed so as not to limit turning radii or sight distance at intersections. No portion of a side street median may extend into the right-of-way for an arterial street or be within 35 feet of an intersection. The Director of Public Works may require revisions to medians as necessary to provide for new access points and to maintain required sight distance. Non-yielding or non-breakaway structures shall not be installed in medians. Street trees shall be planted in median subject

to approval by the Director of Public works. Pedestrian access across medians shall be as required by the Director of Public Works and shall conform to ADA standards.

2.13 One-Way Streets

Local access streets, including loops, may be designated one-way upon a finding by the Director and Fire Marshal that topography or other site features make two-way traffic impractical.

2.14 Intersections with State or Federal Highways

In the event that the City has jurisdiction on a development that requires the construction or improvement of a commercial/industrial driveway or any classification of street that intersects a state or federal highway, minimum intersection spacing, entering sight distance and landing requirements in accordance with these Guidelines shall be satisfied in addition to the requirements of all other applicable permits. In the instance State or Federal standards exceed these Guidelines, State or Federal standards shall govern.

2.15 Slope, Wall, & Drainage Easements and Right-of-Way Reduction

A. Easements

Either the functional classification or particular design features of a road may necessitate slope, sight distance, and wall or drainage easements beyond the right-of-way line. Such easements may be required by the Director in conjunction with dedication or acquisition of right-of-way.

B. Right-of-way reduction on local access

In proposed developments served by underground utilities within easements, the right-of-way may be reduced to the minimum roadway width plus sidewalk and planter strips with the approval of the City. Where it is desired to reduce right-of-way to a minimum width, the right-of-way, plus easement, shall allow for construction and maintenance of the following as appropriate, sidewalks, planter strips, drainage facilities, sign placement, and also allow sidewalk widening around mailbox locations. On local access, installation of fixed objects, other than required above ground utility structures, greater than four inches in diameter within four feet of back of sidewalk shall not be permitted.

2.16 Appurtenances

A. An appurtenance is defined as a fixed object that may be a safety hazard located adjacent to a street.

B. Appurtenances shall be located a minimum of 2.5 feet behind the face of the curb. Appurtenances shall not be located within the sidewalk area.

- C. A breakaway object is any object having properties up to that of a 4-inch by 4-inch wooden post at a point 6 inches above the ground. All breakaway objects shall be located a minimum of 2 feet behind the face of curb or 6 feet behind the edge of pavement.

CHAPTER 3. DRIVEWAYS, WALKS, & TRAILS

3.01 Driveways

- A. Driveway approaches shall be designed per Drawing Details 301-307. Driveway design must be consistent with these Guidelines and 20.50.420 of the SMC. The following requirements also apply:
1. Driveways shall be aligned with, or located to ensure the least amount of conflict with driveways on the opposite side of the street.
 2. Driveways directly giving access onto arterials should be denied if alternate access is available.
 3. Landings on sloping approaches are not to exceed a 7% slope for a distance of 30 feet approaching the back edge of sidewalk on an arterial, or a 10% slope for 20 feet approaching the back edge of sidewalk on a local street.
 4. The maximum driveway grade shall be 15%.
 5. All driveways shall be at 90° to the street, unless designated as right turn only.
 6. Where no curbing exists, an asphalt driveway approach may be used.
 7. A private street intersection opening shall be designed and used if the projected driveway usage is greater than 2,000 vehicles per day. The design must meet the following criteria:
 - Appropriate traffic control must be approved and provided;
 - A 100-foot storage area must be provided between the street and any turning or parking maneuvers within the development;
 - The opening is at least 100 feet from any other intersection opening;
 - The opening is at least 100 feet away from any other driveway on the property frontage under the control of the property owner; and
 - Easements for traffic control devices are provided if they are to be located on private property.

8. Where the building façade or other design element is less than 10 feet behind the sidewalk both pedestrian and vehicular sight distance shall be maintained.
9. All abandoned driveway areas on the same frontage shall be removed and the curbing and sidewalk, or shoulder, and ditch section shall be restored.
10. No stamped driveways in City right-of-way. In addition, no concrete in right-of-way unless constructed per details 301-304.
11. Maintenance of driveway approaches shall be the responsibility of the owner whose property they serve.
12. For driveways crossing an open ditch section, culverts shall be adequately sized to carry anticipated stormwater flows and in no case be less than 12 inches in diameter. The property owner making the installation shall be responsible for determining proper pipe size. The City may require the owner to verify the adequacy of the pipe size and to install catch basins.
13. A residential driveway shall serve no more than two parcels. A joint use driveway may be used to serve two parcels as specified in 3.01(A)(14) and 3.01(B)(2).
14. A joint use driveway easement may be used to serve two adjacent parcels:
 - (a) Minimum easement width shall be sufficient width to accommodate the driveway, cross slope in one direction and curb or thickened edge on one side. Minimum easement length shall extend 20 feet from right-of-way line.
 - (b) Driving surface shall be paved with approved materials. A paved approach shall be provided from the edge of pavement of the intersecting street to the edge of the right-of-way consistent with Details 301-304.

B. Driveway widths shall be as shown in the table below:

Table 3.1
Minimum Driveway Widths (in feet)

Driveways Serving	Local Access Streets		Arterial Streets	
	Width		Width	
	Minimum	Maximum	Minimum	Maximum
1-2 Dwelling Units (attached or detached)	10'	20'	10'*	20'
Multifamily	20'	30'	24'	36'
Commercial	24'	30'	30'	36'

*For driveways serving two dwelling units, the minimum width at the right-of-way is 20 feet. This width must be maintained for a distance of 20 feet measured perpendicular to the right-of-way line.

1. Driveways serving multifamily developments may be up to 30 feet in width, subject to the approval of the Director. A 36-foot wide multifamily or commercial driveway may be allowed when separate left- and right-turn exit lanes are approved by the Director. A commercial driveway wider than 36 feet may be approved through the Engineering Variance procedure.
2. Joint use single family and multifamily driveway may be reduced to a minimum of 16 feet in width, subject to approval of the Director and the Fire Marshal.
3. Individual site conditions may necessitate the minimum required width of a driveway serving 1-2 dwelling units be increased to facilitate the safe movement of vehicles and/or when the driveway also serves public facilities.

C. Driveway Details

1. Dimensions, slope, and detail shall be as indicated in Drawing Details 301-307, and as further specified in the following subsections. See Section 2.01 for entering sight distance requirements.
2. For driveways designated as fire lanes and/or fire apparatus access roads the design standards delineated in Appendix C and the International Fire Code shall also apply.
3. On frontages 100 feet or less, no more than one driveway per lot shall be constructed unless the second driveway serves a separate lot; on frontages over 100 feet, two or more driveways per lot may be permitted, subject to approval by the City.
4. One-way driveways, or circular driveways, may be permitted if at least 100 feet separates driveway openings serving the same lot. The driveway surface shall be 10-12 feet wide, subject to approval by the City.
5. No portion of driveway width shall be allowed within 5 feet of side property lines in residential areas or 9 feet in commercial areas except as follows:
 - a. A joint use driveway may be located as provided in Drawing Detail 307.
 - b. Driveways may utilize full width of narrow "flag pole" parcels or easements if approved by City.
 - c. On cul-de-sac bulbs as necessary for proposed residential access.
6. Grade transitions, excluding the tie to the roadway, shall be constructed as smooth vertical curves. Ties to the roadway shall be constructed as shown in

Drawings Details 301 - 304. The maximum change in driveway grade, within the right-of-way, shall be 6% within any 10 feet of distance on a crest and 12% within any 10 feet of distance in a sag vertical curve. Driveway shall be graded to match into possible future widened road section without encroachment into graded shoulder or sidewalk. The designers of proposed developments must consider the access driveway profile when designing the serving road to ensure that required grade transitions can be complied with considering building set back and lot terrain conditions.

7. Driveways in existing rolled curb sections may not be constructed abutting and flush with sidewalk or back of curb without gapping or lowering height of curb.
- D. Existing driveways may be reconstructed as they exist provided such reconstruction is compatible with the adjacent road.
- E. For commercial or industrial driveways with heavy traffic volumes or significant numbers of trucks, the City may require construction of the access as a road intersection. This requirement will be based on traffic engineering analysis submitted by the applicant that considers, among other factors, intersection spacing, sight distance and traffic volumes.

3.02 Concrete Sidewalks

- A. Sidewalks shall be constructed:
 1. Behind the amenity zone (planting strip) unless approved by the Director of Public Works as part of a landscaping plan.
 2. To include an 18-inch root barrier placed between trees and sidewalks/curbs.
 3. Concrete sidewalk construction:
 - a. All sidewalks shall be constructed with Class 4000 concrete 5-inches thick with a non-slip broom finish.
 - b. At driveways, the concrete shall be 6 inches thick. In commercial/industrial areas, thickness may be increased dependent on use.
 - c. Specialty finishes may be allowed with the approval of the Project Manager when the proposed material will provide a non-slip surface.
 - d. The width of a sidewalk does not include the curb. Sidewalks shall maintain their full width around obstructions that cannot be

relocated. Concrete sidewalk widths shall be constructed on each street classification as follows:

- i. All Local Streets and Arterials abutting residential areas - 6 feet on both sides of street
 - ii. Dead-end Residential Street – 6 feet on one side of street
 - iii. Commercial/Industrial streets and Arterial streets adjacent to commercial or industrial areas - 8 feet on both sides of street
 - iv. Alley – no sidewalk required
4. The required width of a sidewalk in a commercial area may be greater than eight feet when it has been determined greater widths are warranted due to expected pedestrian traffic volume.
 5. With portland cement concrete surfacing as provided in Sections 3.03 and 4.01. See specifications for joints in Section 3.04 and Drawing Detail 309.
 6. The concrete shall be placed and finished per WSDOT 8-14.3(3).
 7. All concrete shall be free of potmarks, graffiti, footprints, and tiremarks, in accordance with WSDOT 6-02.3(6).
 8. Concrete sidewalks shall be cured for at least 72 hours. During curing time the sidewalks shall be protected from pedestrian and vehicle traffic.
- C. During the design of arterials and neighborhood collectors, the designer shall contact Metro Service Planning and the local school district to determine bus zone (stop) locations, wheelchair accessibility requirements and other bus operation needs.

3.03 Curbs, Gutters and Sidewalks

- A. Type A vertical curb and gutter shall be used for street edges and shall always be used under the following conditions:
1. on all arterials and residential collector streets
 2. in drainage low spots where special drainage facilities are required
 3. on streets with grades greater than 8%
- B. Type A vertical curb and gutter shall be used on all street classifications. 24-inch width vertical curb shall be only used for uniformity or replacement.

- C. All curb and gutter shall be constructed with Class 4000 concrete furnished and placed in accordance with WSDOT/APWA Standard Specifications, Sections 6-02, 8-04, and 8-14. Cold weather precautions as set forth in WSDOT/APWA Standard Specifications Sections 5-05.3(14) and 6-02.3(6) shall apply.
- D. Rolled curbs may only be used to replace or match existing conditions as approved by the Director of Public Works.
- E. Subgrade compaction for curbs, gutters, and sidewalks shall meet a minimum 95 percent of maximum density.
- F. Extruded cement concrete curb shall be anchored to existing pavement by either steel tie bars or adhesive in conformance with WSDOT/APWA Standard Specification Section 8-04.
- G. Extruded asphalt curb shall be anchored by means of a tack coat of asphalt in accordance with WSDOT/APWA Standard Specification Section 8-04.

3.04 Expansion and Dummy Joints. See Drawing Detail 309.

- A. An expansion joint consisting of 3/8" or 1/4" x 2" full depth of premolded joint material shall be placed around fire hydrants, poles, posts, and utility castings and along walls or structures in paved areas. Joint material shall conform to the requirements of ASTM D994 (AASHTO M33).
- B. A dummy joint consisting of 3/8" or 1/4" x 2" of premolded joint material shall be placed in curbs and sidewalks at a minimum of 15 foot intervals and at sides of drainage inlets. When curbs and/or sidewalks are placed by slip-forming, a premolded strip up to 1/2" thick and up to full depth may be used.
- C. Dummy joints in sidewalk shall be located so as to match the joints in the curb whether sidewalk is adjacent to curb or separated by planting strip.
- D. Tool marks consisting of 1/4" V-grooves shall be made in sidewalk at five foot intervals or equal to width of sidewalk, intermediate to the dummy joints.
- E. As alternative to expansion joints around structures, reinforcing bars may be embedded in concrete on four sides of structures.
- F. Interface between curb and adjacent sidewalk on integral pour construction shall be formed with 1/4" radius edging tool. On separate pour construction an expansion joint consisting of 3/8" or 1/4" x 2" full depth of premolded joint material shall be placed between the curb or thickened edge and the adjacent sidewalk.

3.05 Soft-Surface Path Construction

- A. Width shall be 8' to 12' unless otherwise approved by Director of Public Works.
- B. Acceptable surface materials are crushed rock, wood chips, and asphalt.
- C. The maximum grade shall not exceed 10%. Depending on site conditions, stairs and/or switchbacks may be required. For grades greater than 5%, the Director of Public Works may specify the type of paving material to be used.

3.06 Paved Path Construction

- A. Width shall be 8' to 12' unless otherwise approved by Director of Public Works.
- B. Acceptable surface materials are asphalt concrete (asphalt) and Portland cement concrete (concrete).
- C. The edges of asphalt paths shall be defined by inverted thickened edges along both sides to prevent edge deterioration.
- D. The maximum grade shall not exceed 10% (5% when bicyclist use is anticipated). Depending on site conditions, stairs and/or switchbacks may be required. The Director of Public Works may specify special paving and other treatment to be used on grades greater than 5%.
- E. Paths shall be a minimum of 5 feet from the edge of the vehicular travel way. A physical barrier may be required in lieu of the 5-foot separation when conditions dictate, particularly when bicyclist use is anticipated.
- F. A 2-foot wide graded shoulder is required on either side of a paved bicycle pathway. The Director of Public Works may require a wider graded shoulder if heavy pedestrian use is anticipated.
- G. When asphalt paved paths are used, the widths shall correspond to the widths required for concrete sidewalks.

3.07 Curb Ramps

Wheelchair curb ramps shall be provided at all sidewalks, paths, and pedestrian crossings with curb ramp sections or elevation changes (where crossing is permitted) in accordance with state law and federal guidelines established by the ADA. Ramps shall be designed as detailed in Drawing Details 318, 319, and 320 and placed whenever possible as shown in Drawing Details 315, 316, and 321.

3.08 Concrete Steps, Metal Handrail and Handicapped Access Ramps

- A. Steps shall only be used where acceptable alternative access is available for handicapped access and there is a need for a separate stairway. Where used, concrete steps shall be constructed in accordance with Drawing Details 325 and/or 326 or other accepted design that is consistent with the WSDOT/APWA Standard Specifications. Handrails, whether for steps or other applications, shall be provided consistent with Drawing Details 323 and 324 and the WSDOT/APWA Standard Specifications.
- B. Ramps used to provide handicapped access shall have a maximum slope of 1 unit vertical to 12 units horizontal with a maximum rise of 30 inches between landings. Landings shall have a minimum length of five feet and should be of sufficient width to allow wheelchairs to pass, generally five feet minimum width for two way traffic.
- C. Safety railing shall be provided and installed by the developer:
 - 1. When a nonmotorized transportation facility will be above a slope or adjacent to a rock wall or retaining wall where the lowest finished elevation of the slope, rock wall, or retaining wall is 30 inches or more below the finished elevation of the facility, and
 - a. The vertical wall face is less than 4 feet in horizontal distance from the near side face of the facility.
 - b. The vertical wall face is greater than 4 feet in horizontal distance to the near side face of the facility, but the slope down to the wall top exceeds 1 vertical to 3 horizontal.
 - c. The slopes adjacent to the facility average greater than 1 vertical to 2 horizontal.
- D. Guard rail shall be provided and installed by the developer as directed by the Director of Public Works. For purposes of warrants, design, and location, all guard-rail along public and private roadways shall conform to the criteria of the WSDOT Design Manual.

3.09 Amenity Zone

- A. All streets shall have an amenity zone except where protection of critical areas requires special consideration.
- B. The minimum amenity zone width is 4 feet.
- C. The amenity zone shall be located between the curb and the sidewalk on all streets.

- D. Street tree type and placement shall conform to section 20.50.480 of the SMC.
- E. Utilities, street light poles and traffic signs can be located in the amenity zone.

3.10 Asphalt Shoulders

- A. Asphalt paved shoulders may be used where approved by the City Engineer on existing roads to provide for bicycle and pedestrian use as specified in Section 1.03B and to provide continuity of design.
- B. Where shoulders are paved on one side only, they shall be delineated by a four-inch white thermoplastic edge line.

3.11 Separated Walkways, Bikeways and Trails

Separated facilities are to be located on an easement or within the right-of-way when separated from the roadway by a drainage ditch or barrier. Where separated walkways, bikeways, or trails intersect with motorized traffic, sight distance, marking and signalization (if warranted) shall be as specified in MUTCD. Additionally, facilities shall be designed as follows:

- A. Separated asphalt walkways are designed primarily for pedestrians and are to be located within the right-of-way or easement.
- B. Neighborhood pathways are soft surface facilities designed for pedestrians and equestrians. Such pathways shall be a minimum five feet wide with at least one and one-half foot clearance to obstructions on both sides and 10-foot vertical clearance. Pathways shall be designed and located so as to avoid drainage and erosion problems. Pathways shall be constructed of two and one-half inches of crushed surfacing top course or wood chips over cleared native material as approved by the City.
- C. Multi-purpose trails are typically designated for bicycle and pedestrian use and in general follow a right-of-way independent from any road.
- D. Separated bicycle path - See requirements for paved path construction.
 - 1. Acceptable surface materials are asphalt and concrete.
 - 2. A two-way separated bike path shall be a minimum of 10 feet wide with a 2-foot-wide minimum clear zone on both sides. A one-way bike path shall be a minimum of 8 feet wide with a 2-foot-wide minimum clear zone on both sides.

E. Bicycle lane

1. Acceptable surface materials are asphalt and concrete.
2. A bicycle lane on a public roadway shall be a minimum of 5 feet wide when curb and gutter is in place. The distance shall be measured from the face of curb to the near edge of the fogline that designates the bicycle lane. An 18-inch Type A curb and gutter is required.
3. A bicycle lane on a public roadway shall be a minimum of 4 feet wide when no curb and gutter is in place. The width shall be measured from the edge of pavement to the near edge of the fogline that designates the bicycle marking. A minimum 2-foot-wide graded shoulder is required adjacent to the pavement.

F. Shared roadway

1. Acceptable surface materials are asphalt and concrete.
2. The curb lane of a shared roadway shall be a minimum of 14 feet wide. The distance shall be measured from the face of curb to the near edge of the lane marking.

CHAPTER 4 SURFACING

4.01 Residential Streets, Pedestrian Facilities and Bikeways:

- A. The minimum paved section, with alternative combinations of materials, for residential streets, shoulders, sidewalks and bikeways shall be as indicated in Drawing Details 201 and 202. These sections are acceptable only on visually good, well-drained, stable compacted subgrade. Any proposed exception to these materials will be subject to soils strength testing and traffic loading analysis and subject to review and approval by the Director of Public Works as outlined in Section 4.02 below. All expenses for determining revised materials shall be borne by the Developer.
- B. When a walkway or bikeway is incorporated into a road shoulder, the required shoulder section, if higher strength, shall govern. Subgrade compaction for bikeways and paved walkways shall meet a minimum of 90 percent maximum density.
- C. Driveways may be surfaced as desired by the owner, except:
 - 1. On curbed streets with sidewalks, driveway shall be paved with portland cement concrete Class 4000 from curb to back edge of sidewalk. See Drawing Details 301 - 304.
 - 2. On shoulder and ditch section, driveway between edge of pavement and right-of-way line shall be surfaced as required by Drawing Detail 306.
 - 3. On thickened edge roadways with underground utilities, portland cement concrete may be used for driveways between the thickened edge and the right-of-way line provided that a construction joint is installed at the right-of-way line.
- D. Street Widening/Adding Traveled Way to Existing Roads
 - 1. When an existing asphalt paved street is to be widened, the edge of pavement shall be sawcut to provide a clean, vertical edge for joining to the new asphalt. After placement of the new asphalt section, the joint shall be sealed and the street overlaid one inch, plus a pre-level course, full width throughout the widened area. The requirement for overlay may be waived by the Director of Public Works based on the condition of existing pavement and the extent of required changes to channelization.
 - 2. When an existing shoulder is to become part of a proposed traveled way a pavement evaluation shall be performed. This evaluation shall analyze the structural capacity and determine any need for improvement. Designs based

on these evaluations are subject to review and approval by the Director of Public Works. The responsibility for any shoulder material thickness improvement shall be considered part of the requirement for roadway widening.

3. Any widening of an existing roadway, either to add traveled way or paved shoulder shall have the same surfacing material as the existing roadway.

4.02 Requirements for Residential Streets on Poor Subgrade

The minimum material thicknesses indicated in Section 4.01 are not acceptable if there is any evidence of instability in the subgrade. This includes free water, swamp conditions, fine-grained or organic soil, slides or uneven settlement. If there are any of these characteristics, the soil shall be sampled and tested sufficiently to establish a pavement design that will support the proposed construction. Any deficiencies, including an R-value of less than 55 or a CBR of less than 20, shall be fully considered in the design. Remedial measures may include, but are not limited to, a stronger paved section, a strengthening of subgrade by adding or substituting fractured aggregate, asphalt treated base, installing a geotextile, more extensive drainage or a combination of such measures. Both the soils test report and the resulting pavement design will be subject to review and approval by the Director of Public Works.

4.03 Arterials and Commercial Access Streets

Any pavement for arterials and commercial access streets shall be designed using currently accepted methodology that considers the load bearing capacity of the soils and the traffic-carrying requirements of the roadway. Plans shall be accompanied by a pavement thickness design based on soil strength parameters reflecting actual field tests and traffic loading analyses. The analysis shall include the traffic volume and axle loading, the type and thickness of roadway materials and the recommended method of placement. Pavement sections shall not be less than those required for collector arterials.

4.04 Materials & Lay-Down Procedures:

Shall be in accordance with WSDOT/APWA Standard Specifications and the following requirements:

- A. Crushed surfacing top and base courses may be substituted for a structurally equivalent thickness of ATB. The substitution ratio of crushed surfacing to ATB shall be 1.6:1. Where base or top courses cannot be placed without possible contamination, then these courses shall be substituted by ATB.

- B. During surfacing activities utility covers in roadway shall be adjusted in accordance with Section 8.03.
- C. ATB may be used over isolated areas of unstable subgrade, providing the final lift of asphalt shall not be placed for a minimum of six months to allow time for the observation and repair of failures in the Subgrade and ATB.
- D. Asphalt pavers shall be self contained, power-propelled units. Truck mounted type pavers are not considered self propelled. Truck mounted pavers shall only be used for paving of irregularly shaped or minor areas as approved by the Director of Public Works, or as follows:
 - 1. pavement widths less than eight feet; and
 - 2. pavement lengths less than 150 feet.

4.05 Pavement Markings, Markers, and Pavement Tapers

Pavement markings, markers or striping shall be used to delineate channelization, lane endings, crosswalks and longitudinal lines to control or guide traffic. Channelization plans or crosswalk locations shall be approved by the Director of Public Works.

Channelization shall be required when through traffic is diverted around a lane or obstacle; and when connecting full width streets with different cross sections; and when extending an existing street with a new cross section different than the existing one. The channelization shall provide tapers equal in length to the posted speed limit times the distance in feet of diversion from the road centerline or the original alignment of travel, or the offset distance, as applicable. Channelization shall also be required to redirect traffic back to their original alignment.

Left turn channelization shall include a minimum of 150 feet of full width lane to include storage and a reverse curve 90 feet in length for posted speeds up to 45 mph. The reverse curve shall be 120 feet in length for posted speeds greater than 45 mph. The reverse curve may be included within the taper distance. A deceleration taper as shown in the WSDOT/APWA Standard Plans may be used in place of a reverse curve. Standard left turn lanes shall be 12 feet wide. Type 2L arrows shall be installed in the lane 25 feet and 100 feet behind the stop bar, crosswalk or stopping area. Additional storage may be required for long vehicles or anticipated left turn queues longer than the minimum storage.

Centerline for channelization shall consist of two four-inch yellow lines with a four-inch separation. Type 2d lane markers shall be installed at 40-foot centers between the lines. Holding lines for additional lanes shall be eight-inch white lines with Type 2e lane marker on the inside of the lane at 20-foot centers. Edge lines for tapering thru traffic back to the original alignment shall consist of four-inch white lines.

Pavement markings for channelization shall be reflectorized hot or cold applied plastic. Extruded or sprayed markings shall be dressed with glass beads for initial reflectance. All materials shall have beads throughout the material to maintain reflectance while the material wears.

Where pavement widening less than 300 feet in length is abruptly ended and edge lines do not direct traffic to through lanes, Type 2e lane markers shall be installed at 10 foot centers near the end of the paved area at a 10:1 taper.

Crosswalks shall be installed at all intersections controlled by traffic signals and other areas approved by the Director of Public Works. Crosswalks shall consist of sets of longitudinal lines eight inches wide by 10 feet and with eight-inch separation. A set of these lines shall be installed between each lane, between the wheel tracks in each lane and at the pavement edges.

All pavement markings shall be laid out with spray paint and approved by the Director of Public Works before they are installed. Approval may require a three working day advance notice to have field layout approved by the Director of Public Works or to make arrangements to meet the Director of Public Works on site during the installation.

CHAPTER 5 ROADSIDE FEATURES

5.01 Rock Facings

A. Rock facings may be used for the protection of cut or fill embankments up to a maximum height of eight feet above the keyway in stable soil conditions, which will result in no significant foundation settlement or outward thrust upon the walls. See Drawing Details 501 - 504. For heights over eight feet above the keyway or when soil is unstable, a structural wall of acceptable design shall be used. As an exception, rock facing heights may exceed eight feet to a limited extent based on favorable soils analyses and a design by a geotechnical engineer or other professional engineer qualified in rock wall design, subject to approval by the Director. Terracing of rockeries subject to approval by the Director.

B. Materials

1. Size categories shall include:

Two-man rocks (200 to 700 pounds), 18"-28" in average dimension;
Three-man rocks (701 to 2000 pounds), 28-36" in average dimension; and
Four-man rocks (2001 to 4000 pounds), 36-48" in average dimension.

Four-man rocks shall be used for bottom course rock in all rock facings over six feet in height.

2. The rock material shall be as nearly rectangular as possible. No stone shall be used which does not extend through the wall. The quarried trap rock shall be hard, sound, durable and free from weathered portions, seams, cracks and other defects. The rock density shall be a minimum of 160 pounds per cubic foot, measured according to WSDOT Test Method 107 (Bulk Specific Gravity - S.S.D. basis). Additionally, rock subjected to the U.S. Army Corps of Engineers Test Method CRD-C-148 ("Method of Testing Stone for Expansive Breakdown on Soaking in Ethylene Glycol") must have less than 15 percent breakdown.

C. Keyway

A keyway consisting of a shallow trench of minimum 12-inch depth shall be constructed the full rockery length, and slightly inclined towards the face being protected. It shall be excavated the full rockery width including the rock filter layer.

The keyway subgrade shall be firm and acceptable to the Director of Public Works. See Drawing Details 501 - 504.

D. Underdrains

1. A minimum six-inch diameter perforated or slotted drainpipe shall be placed in a shallow excavated trench located along the inside edge of the keyway. The pipe shall be bedded on and surrounded by "Gravel Backfill for Drains" (WSDOT/APWA 9-03.12(4)) to a minimum height of 18 inches above bottom of pipe. A filter fabric shall surround the gravel backfill and shall have a minimum one-foot overlap along the top surface of the gravel. The Director may waive this requirement for fabric if shown that soils and water conditions make it unnecessary. See Drawing Details 501 - 504.
2. The perforated pipe shall be connected to the storm drain system or to an acceptable outfall.

E. Rock Selection and Placement: Rock selection and placement shall be such that there will be minimum voids and, in the exposed face, no open voids over six inches across in any direction. The final course shall have a continuous appearance and be placed to minimize erosion of the backfill material. The larger rocks shall be placed at the base of the facing so that it will be stable and have a stable appearance. The rocks shall be placed in a manner such that the longitudinal axis of the rock shall be at right angles to the face. The rocks shall have all inclined faces sloping to the back of the facing. Each course of rocks shall be seated as tightly and evenly as possible on the course beneath. The rocks shall be placed so that there are no continuous joint planes either horizontally or vertically. After setting each course of rock, all voids between the rocks shall be chinked on the back with quarry rock to eliminate any void sufficient to pass a two-inch square probe. See Drawing Detail 501 - 504.

F. Rock Filter Layers: The rock filter layer shall consist of quarry spalls with a maximum size of four inches and a minimum size of two inches. This material shall be placed to a 12-inch minimum thickness between the entire facing and the cut or fill material. The backfill material shall be placed in lifts to an elevation approximately six inches below the top of each course of rocks as they are placed, until the uppermost course is placed. Any backfill material on the bearing surface of one rock course shall be removed before setting the next course.

G. Fill Rockery Facing Supporting Roadway Embankment: Embankment behind rockeries exceeding four feet in height above the keyway shall be reinforced with a geosynthetic fabric or geogrid specifically manufactured for soil reinforcement, designed on a project specific basis by a qualified engineer. See Drawing Detail 502.

H. Sidewalks Above Rockery Facings: When a sidewalk is to be built over a rock facing, the top of the facing shall be sealed and leveled with a cap constructed of cement concrete Class 3000 in accordance with the applicable provisions of Section 6-02 of the WSDOT/APWA Standard Specifications, but with reduced water content resulting in slump of not over two inches. See Drawing Detail 503.

I. Fences and Handrails

Fences or a metal handrail shall be installed when rockery is three feet or greater in height. See Drawing Details 501 - 504.

5.02 Side Slopes

A. Side slopes shall generally be constructed no steeper than 2:1 on both fill slopes and cut slopes. Steeper slopes may be approved by the Director upon demonstration that the steeper slopes, based on soils analyses, will be stable. Side slopes on projects funded by federal grants shall be constructed in conformance with Local Agency Guidelines.

B. Side slopes shall be stabilized by grass sod or seeding or by other planting or surfacing materials acceptable to the Director of Public Works.

5.03 Street Trees & Amenity Zones

A. Street trees and amenity zones should be incorporated into the design of road improvements for all classifications of roads. Such landscaping in the right-of-way shall be coordinated with off-street landscaping required on developer's property under the provisions of Chapter 20.50 SDC.

B. The design of amenity zones must be approved by the Director of Public Works and must include a landscaping plan in which plant maintenance, utilities and traffic safety requirements are discussed.

C. Existing trees and landscaping shall be preserved where desirable and placement of new trees shall be compatible with other features of the environment. In particular, maximum heights and spacing shall not conflict unduly with overhead utilities, or root development with underground utilities.

D. New trees shall not include poplar, cottonwood, soft maples, gum, any fruit bearing trees or any other tree or shrub whose roots are likely to obstruct sanitary or storm sewers.

5.04 Mail Boxes

- A. Mailboxes shall be clustered together where practical and where reasonably convenient to the houses being served.
- B. When mailboxes are located in the sidewalk, the sidewalk shall be widened to provide the full design width around the mailboxes.
- C. In the case of new street construction, or street reconstruction that requires mailboxes to be moved, the designer and builder shall coordinate with the Station Master or Postmaster at the nearest post office. Mailbox locations approved by the U.S. Postal Service shall be shown on approved street construction plans.
- D. Mailboxes shall be installed as shown on Details 514, 515, and 516.

5.05 Street Illumination

- A. Street lighting system designs shall be stamped by a licensed engineer experienced with lighting design and shall include the following: luminaire spacing, illumination level, uniformity ratio, line losses, power source, the electrical and physical layout, installation details, plans and specifications.
- B. Street lighting system design requirements are as follows:
 - 1. For City-owned arterial systems, street lighting design shall be based on WSDOT/APWA Standard Plans, and WSDOT/APWA Standard Specifications.
 - 2. As-built street lighting plans for City-owned systems shall be provided to the City on CD-ROM and on 22-inch by 34-inch mylars prior to final occupancy or final plat approval.
 - 3. Street lighting systems shall be designed to be accessible by a wheeled vehicle weighing 30,000 lbs.
 - 4. Luminaires in residential areas should be located near intersections, at street ends, at nonmotorized crossings, and mid-block of streets over 300 feet in length.
 - 5. Contractor cabinets equipped with electrical meters, time clocks, circuit breakers, and other required components are required on arterial installations of 5 or more street lights or as required by the Director of Public Works.

6. The exact location of the power source shall be indicated together with the remaining capacity of that circuit. System continuity and extension shall be provided.
- C. Street lighting system for residential streets shall be designed and constructed on a separate power source from the arterial lighting system. All street light maintenance, installation and power costs for residential street systems shall be paid for by the property owner, homeowner, or homeowner's association unless part of a City approved lighting program.
- D. Street lighting is encouraged but not required along private streets. Street lighting systems for private streets shall be designed and constructed on a separate power source from the public street lighting system. All street light maintenance, installation, and power costs for private street systems shall be paid by the property owner, homeowner, or homeowners' association.

5.06 Survey Monuments

- A. All existing survey monuments, which are disturbed, lost, or destroyed during surveying or building shall be replaced by a land surveyor registered in the State of Washington at the expense of the responsible builder or developer.
- B. Survey monuments shall be placed or replaced in accordance with recognized good practice in land surveying, and in conformance with Drawings Detail 519.

5.07 Roadway Barricades

Temporary and permanent barricades shall conform to the standards described in Section 6C-8 of the Manual on Uniform Traffic Control Devices (MUTCD) and City of Seattle Traffic Control Manual for In-Street Work (current edition).

- A. Type I or Type II barricades may be used when traffic is maintained through the area being constructed/reconstructed.
- B. Type III barricades may be used when roadways and/or proposed future roadways are closed to traffic. Type III barricades may extend completely across a roadway (as a fence) or from curb to curb. Where provision must be made for access of equipment and authorized vehicles, the Type III barricades may be provided with movable sections that can be closed when work is not in progress, or with indirect openings that will discourage public entry. Where job site access is provided through the Type III barricades, the developer/contractor shall assure proper closure at the end of each working day.
- C. In the general case, Type III permanent barricades shall be installed to close arterials or other through streets hazardous to traffic. They shall also be used to close off lanes where tapers are not sufficiently delineated.

- D. Type III barricades shall be used at the end of a local access street terminating abruptly without cul-de-sac bulb or on temporarily stubbed off streets. Each such barricade shall be used together with an end-of-road marker.

5.08 Bollards

When necessary to deny motor vehicle access to an easement, tract, or trail, except for maintenance or emergency vehicles, the point of access shall be closed by a line of bollards. These shall include one or more fixed bollards on each side of the traveled way and removable, locking bollards across the traveled way. Spacing shall provide one bollard on centerline of trail and other bollards spaced at minimum 50 inches on center on trails 10 feet wide or less measured from the center post in the center of the trail. Spacing shall be 60 inches on center on trails wider than 10 feet. Bollard design shall be in accordance with Drawing Detail 505 or other design acceptable to the Director of Public Works. No fire apparatus access roads shall be blocked in this manner without the concurrence of the Fire Marshal. Bollards shall be located at least 10 feet laterally from the paved edge of roadway.

5.09 Guardrail/Embankment Heights

Guardrail installations shall conform to WSDOT/APWA Standard Plan C-1, Beam Guardrail Type 1 and C-2, Guardrail Placement. End anchors shall conform to WSDOT/APWA Standard Plan C-6, Beam Guardrail Anchor Type 1.

Evaluation of embankments for guardrail installations shall be in accordance with Figure 710-6 of the WSDOT Design Manual.

5.10 Traffic Control Signing

- A. The Director of Public Works shall review and approve all traffic control devices. All traffic control devices shall conform to the *MUTCD* and City of Seattle Traffic Control Manual for In-Street Work (current addition).
 - 1. All signs such as street name, parking, stop, dead end, speed limit, and nonmotorized indicators will be field-located by the Inspector. It is the responsibility of the property owner to ensure that signs are maintained in good condition until the development and right-of-way are accepted by the City. Any damaged signs will be replaced by the property owner at her/his expense.
 - 2. All channelization and pavement markings such as raised pavement markers, paint, thermoplastics, etc., shall be pre-marked by a City-approved striping contractor, and the layout approved by the Inspector, prior to permanent installation by the contractor.

3. Installation of all permanent traffic signing within the public Right-of-Way shall be installed by the City at the developer's expense.
4. Temporary traffic control to insure traffic safety during construction activities shall be provided by the developer and installed per MUTCD standards and City of Seattle Traffic Control Manual for In-Street Work (current edition) or as directed by the inspector.

CHAPTER 6 RESERVED

CHAPTER 7 DRAINAGE

7.01 General

- A. Designs: Drainage facilities shall be designed consistent with the 1998 King County Surface Water Design Manual (urban environments only) and Chapter 20.60, subchapter 3 of the SMC and the City of Shoreline Surface Water Design Code. Structures shall be placed and constructed as shown in the Detail Drawings.
- B. Specifications: Materials, construction, and testing are specified in the WSDOT/APWA Standard Specifications. The Director of Public Works may amend, delete, or add specifications or Detail Drawings.

CHAPTER 8 UTILITIES

8.01 Standard Utility Locations Within the Right-of-Way

Utilities within the right-of-way on new roads or on roads where existing topography, utilities or storm drains are not in conflict shall be located as shown in typical sections, Drawing Detail 201 and 202, and as indicated below. Where existing utilities or storm drains are in place, new utilities shall conform to these Guidelines as nearly as practicable and yet be compatible with the existing installations. Above ground utilities located within intersections shall be placed so as to avoid conflict with placement of curb ramps.

- A. Gas and Water Lines:
 1. Designated Side of Centerline:
GAS: 5 to 10 feet South and West.
WATER: 5 to 10 feet North and East.

2. Depth: 24 inches minimum cover from finished grade, ditch bottom or natural ground.
- B. Individual water service lines shall:
1. Be placed with minimum 24-inch cover from finished grade, ditch bottom or natural ground.
 2. Use road right-of-way as necessary to make side connections.
 3. For any one connection, not extend more than 60 feet along or through the right-of-way, or the minimum width of the existing right-of-way.
 4. Water meter boxes, when placed or re-placed, shall be located on the right-of-way line immediately adjacent to the property being served, unless otherwise approved by the Director. Meter box locations within the right-of-way may be approved by the Director of Public Works based on site conditions which make routine service access difficult or impractical.
- C. Sanitary Sewers: In the general case, five feet south and west of centerline; depth 96-inch minimum cover from finished grade, ditch bottom or natural ground.
- D. In the case of individual sanitary sewer service lines, which are force mains, the pipe shall:
1. Be minimum two inches I.D., or as required by the utility to maintain internal scouring velocity.
 2. If nonmetallic, contain wire or other acceptable proximity detection features; or be placed in a cast iron or other acceptable metal casing.
 3. Be placed with minimum three-foot cover from finished grade, ditch bottom or natural ground, within 10 degrees of perpendicular to road centerline, and extend to right-of-way line.
 4. Be jacked or bored under road unless otherwise approved by the Director of Public Works.
- E. Sanitary sewer and water lines shall be separated by a minimum of 10 feet in accordance with good engineering practice such as the Criteria for Sewage Work Design, Washington Department of Ecology, latest edition.
- F. Gravity systems, whether sanitary or storm drainage, shall have precedence over other systems in planning and installation except where a non-gravity system has already been installed under previous approved permit and subject to applicable provisions of such permits or franchises.

- G. Electric utilities, power, telephone, fibre-optic cable, cable TV: The City requires undergrounding for all projects that do not meet the exemptions stated in Chapter 13 and Chapter 20 of the SMC. Underground utilities with 36 inch minimum cover, either side of road, at plan location and depth compatible with other utilities and storm drains. For projects that meet the undergrounding exemptions in the SMC, every new placement and every replacement of existing utility poles and other utility structures above grade shall conform to the following:
1. Utility poles or other obstacles may be placed within the right-of-way and shall be as far back as conditions allow from the traveled way or auxiliary lane.
 - a. On shoulder type roads, poles or obstacles shall be located back of ditches unless protected by concrete barrier, suitable impact attenuating device or placed more than three and one-half feet behind face of guardrail, as allowed by an approved variance from the Engineering standards.
 - b. On vertical curb type roads with a speed limit less than 40 miles per hour, poles or obstacles shall be placed clear of sidewalks and at least eight and one-half feet from face of curb in business areas and five and one-half feet from curb face in residential areas. On urban roads with a speed limit of 40 miles per hour or greater, poles and obstacles shall be placed as directed by the City.
 - c. Notwithstanding the other provisions regarding pole locations described in these standards, no pole shall be located so that it poses a hazard to the general public. Utilities shall place and replace poles with primary consideration given to public safety.
 2. The constraints on pole and obstacle locations will not apply to locations not accessible by moving vehicles, "breakaway" structures whose break-off resistance does not exceed that of 4" x 4" wood post or a 1-1/2-inch standard (hollow) iron pipe or to "breakaway" fire hydrants installed to manufacturer's specifications.
 3. Deviations from the pole and obstacle clearance criteria may be allowed when justified by suitable engineering study considering traffic safety. This deviation will only be considered for a Utility. Up to three contiguous damaged or weakened poles may be replaced at existing locations under permit in accordance with emergency procedures, however, sequential permits resulting in continuous replacement of a pole line shall not be allowed. A pole or other obstacle, which incurs repeated damage from errant vehicles, shall be relocated or protected.

4. Locations of poles shall also be compatible with driveways, intersections, and other road features (i.e., they shall not interfere with sight distances, road signing, traffic signals, culverts, etc.). To the extent possible, utilities shall share facilities so that a minimum number of poles is needed.
 5. Where road uses leave insufficient overhang, anchor, and tree-trimming space for overhead utilities, consideration will be given to vary from the Guidelines or for the acquisition of additional easements and/or right-of-way for this purpose. Costs incurred for said acquisition shall be borne by the developer, builder, or other party initiating the road construction. The associated cost of relocating the utility shall not be borne by the City.
- H. Notwithstanding other provisions, underground systems shall be located at least five feet away from road centerline and where they will not otherwise disturb existing survey monumentation.

8.02 Underground Utility Installation

- A. General: The WSDOT/APWA Standard Specifications, particularly Section 7-17.3(3) will generally apply unless otherwise stated below. Construction shall be in conformance with conditions outlined in the Right-of-Way Use Permit. Undergrounding of utilities is required pursuant to section 20.70.470 SDC.
1. Trench restoration shall be accomplished with a patch or an overlay as required by the Director of Public Works. Cement concrete pavement must be patched with cement concrete. A full overlay will be required for all trenches that occur in a street that has been overlaid within the past 5 years.
 2. If a patch is used, the trench limits shall be sawcut prior to final patch.
 3. All trench and pavement cuts shall be made by sawcuts or by grinding. The sawcuts or grinding shall be a minimum of 1 foot outside the trench width.
 4. If the Right-of-Way Use Permit requires an overlay, then the contractor may use a jackhammer or drum grinder for the cutting of the existing pavement.
 5. If the existing material is determined by the Inspector to be suitable for backfill and the trench is not perpendicular to a travel lane or driveway, the contractor may use the native material as long as the top 8 inches is crushed surfacing material.
 6. Backfill compaction shall be performed in 8- to 12-inch lifts. The compaction tests shall be performed in maximum increments of 2 feet. The test results shall be given to the Inspector for review and approval prior to paving. Material testing will be required for trench backfill (native or imported), asphalt, and concrete. Testing shall be performed by a certified

independent testing laboratory. The cost of testing is the responsibility of the franchise utility or contractor. The number of tests required shall be the same as for asphalt density testing, or as directed by the Inspector.

7. Temporary restoration of trenches for overnight use shall be accomplished by using cold mix, asphalt-treated base (ATB), or steel plates. ATB used for temporary restoration may be dumped directly into the trench, bladed out, and rolled. After rolling, the trench must be filled flush with asphalt to provide a smooth riding surface.
8. If steel plates are being used to cover trenches temporarily, cold mix shall be added to provide suitable transition from roadway to top of steel plate.
9. ATB shall be placed to the compacted depth as directed by the Director of Public Works. Asphalt cement shall be paving asphalt AR-4000W. Materials shall conform with Section 9-02.1(4) of the WSDOT Standard Specifications.
10. Tack shall be emulsified asphalt grade CSS-1 as specified in Section 9-02.1(6) of the Standard Specifications and shall be applied to the existing pavement and edges of sawcuts as specified in Section 5-04 of the Standard Specifications.
11. Asphalt concrete Class B shall be placed on the prepared surface by an approved paving machine and shall be in accordance with the requirements of WSDOT Section 5-04 of the Standard Specifications, except that longitudinal joints between successive layers of asphalt concrete shall be displaced laterally a minimum of 12 inches, unless otherwise approved by the Inspector. Fine and coarse aggregate shall be in accordance with WSDOT Section 9-03.8 of the Standard Specifications. Asphalt concrete over 2 inches thick shall be placed in equal lifts not to exceed 2 inches each.
12. Cuts for trenches in all street surfaces, walks, and driveways shall be either ground or sawcut. Ground joints shall be feathered and shimmed to provide a smooth surface. Feathering and shimming shall be accomplished by raking out the oversized aggregates from the Class B mix. Surface smoothness shall conform to WSDOT Section 5-04.3(13) of the Standard Specifications. The paving shall be corrected by removal and repaving of the trench only.

B. Utility Cuts On Existing Traveled Roads

1. In trenching through existing pavement, the open cut shall be a neat-line cut made by saw cutting a continuous line ONLY. Trench sides shall be kept as nearly vertical as possible. Compaction and restoration must be done as detailed and immediately after the trench is backfilled, so as to cause least

disruption to traffic. Cement concrete pavement shall be cut one foot outside the edge of the trench on each side.

2. In cuts parallel to road alignment:

- a. All trench backfill under roadway shall be mechanically compacted to 95 percent of maximum density except for trenches over eight feet in depth. Throughout the length of any pipe run, manhole to manhole, in which any part is over eight feet deep, backfill at depths over four feet shall be compacted to 95 percent maximum density by either water settling (see Subsection 8.03C below) or mechanical compaction. The top four feet of the trench line shall then be mechanically compacted to 95 percent. All densities shall be determined by testing specified in Section 2-03.3(14)D of WSDOT/APWA Standard Specifications.
- b. In any trench in which 95 percent density cannot be achieved with existing backfill, the top four feet shall be replaced with gravel base as specified in the WSDOT/APWA Standard Specifications, Section 9-03.10. This new material shall then be mechanically compacted to 95 percent.
- c. Restoration of a trench within an asphalt pavement shall include a minimum of six and one-half inches of crushed surfacing material and asphalt concrete Class B the same thickness as the existing asphalt pavement or a minimum of two inches, whichever is the greater. Pavement shall then be overlaid full width with a minimum of one inch compacted asphalt concrete Class B. The length of the cut will be determined by the Inspector after a review of surrounding pavement condition. Cuts/overlays may not terminate at a failing roadway segment. Any exceptions to this overlay requirement will be on a case-by-case basis, subject to approval by the Director of Public Works, considering the existing conditions of the pavement. Concrete pavement shall be restored consistent with Section 6-02 of the WSDOT/APWA Standard Specifications. Any concrete pavement traffic lane affected by the trenching shall have all affected panels replaced.

3. In cuts transverse to road alignment:

- a. In general, utility trenching through existing pavement across the road alignment will be discouraged. It will not be permitted unless it can be shown that alternatives such as boring or jacking are not possible due to conflicts or soil conditions, or unless the utility can be installed just prior to reconstruction or overlay of the road.

- b. The entire trench shall be backfilled with CDF meeting the requirements of Section 9-03.9(3) of the WSDOT/APWA Standard Specifications. Steel plate(s) shall cover CDF for 48 hours prior to pavement placement. Backfill shall be placed and compacted mechanically in six-inch lifts with a City inspector present. If the capability can be demonstrated, based on compaction equipment or quality of backfill to achieve 95 percent density in thicker lifts, the depth of backfill lifts may be increased up to one foot. After backfill and compaction, an immediate cold mix patch shall be placed and maintained in a manner acceptable to the Director of Public Works. On asphalt pavement, a permanent hot mix patch the same thickness as the existing asphalt or a minimum of two inches, whichever is the greater, shall be placed and sealed with a paving grade asphalt within 30 calendar days. Cement concrete pavement shall be connected to existing concrete pavement with rebar and restored with an eight-sack mix, using either Type II or Type III cement, within 30 calendar days.

C. Controlled Density Backfill (CDF):

As an alternative to mechanical compaction, trench backfill above the bedding and below the base course or ATB may be accomplished by use of controlled density backfill (CDF) in a design mixture approved by the Director of Public Works. On crossings required to be opened to traffic prior to final trench restoration, steel plates may be used as approved by the Director of Public Works.

D. Testing:

1. Consistent with the above and prior to placing any surface materials on the roadway, it shall be the responsibility of the developer to provide density test reports certified by a professional engineer. Compaction of all lifts of asphalt shall be at an average of 92% of maximum density as determined by WSDOT Test Method 705. The number of tests required per square foot of trenching shall be as follows:
 - a. One test for less than 50 square feet of trenching area
 - b. Two tests for 50 to 100 square feet of trenching area
 - c. Three tests for 100-plus to 300 square feet of trenching area
 - d. One test for every 200 square feet over 300 square feet of trenching area or every 100 lineal feet of trench, if applicable

Compaction of laterals or service line trenches shall be tested where directed by the Director of Public Works. Testing of CDF shall be in accordance with ASTM D4832.

2. Regardless of the compaction method, backfill below four feet must test to be not less than 90 percent maximum density and the upper four feet of backfill must test not less than 95 percent maximum density. Where this cannot be achieved, all affected backfill in the top four feet shall be removed and replaced by gravel base and mechanically compacted to 95 percent as in B.2 above.

Testing shall be performed by a certified independent testing laboratory. The cost of testing is the responsibility of the franchise utility or contractor. The testing is not intended to relieve the contractor from any liability for the trench restoration.

8.03 Final Utility Adjustment (To Finish Grade)

- A. All utility covers, which are located on proposed asphalt roadways, shall be temporarily placed at subgrade elevation prior to placing crushed surfacing material.
- B. Final adjustment of all covers and access entries shall be made following final paving by:
 1. Saw-cutting or neat-line jack hammering of the pavement around lids and covers. Opening should not be larger than 12 inches beyond the radius of the cover.
 2. Removing base material, surfacing course, and frame; adding raising bricks; replacing frame and cover no higher than finished grade of pavement and no lower than one-half inch below the pavement.
 3. Filling and mechanically compacting around the structure and frame with crushed surfacing material or ATB, or pouring in five inch minimum thickness of cement concrete Class 4000 to within two inches of the top.
 4. Filling the remaining two inches with asphalt concrete Class B hot mix, compacted and sealed to provide a dense, uniform surface.
 5. Final adjustment of all covers and access entries shall be completed within 30 days of final paving.

8.04 Final Cleanup, Restoration of Surface Drainage and Erosion Control

In addition to restoration of the road as described above, the responsible utility shall care for adjacent areas in compliance with Sections 1-04.11 "Final Cleanup" and 8-01 "Roadside Seeding" in the WSDOT/APWA Standard Specifications. In particular:

- A. Streets and roads shall be cleaned and swept both during and after the installation work.

- B. Disturbed soils shall be final graded, seeded and mulched after installation of utility. In limited areas seeding and mulching by hand, using approved methods, will be acceptable.
- C. Ditch lines with erodible soil and subject to rapid flows may require seeding, jute matting, netting, or rock lining to control erosion.
- D. Any silting of downstream drainage facilities, whether ditches or pipe and catch basins, which results from the utility installation shall be cleaned out and the work site restored to a stable condition as part of site cleanup.

CHAPTER 9. CONSTRUCTION CONTROL AND INSPECTION

9.01 Notification and Inspection

- A. Any developers, utilities, or others intending to trench in existing or proposed traveled City roads shall notify City of Shoreline Public Works Department office not less than one working day prior to doing the work. This notification shall include:
 - 1. Location of the work
 - 2. Method of compaction to be used
 - 3. Day and hour when compaction is to be done
 - 4. Day and hour when testing is to be done
- B. When trenching occurs within the street shoulder, the shoulder shall be restored to its original or better condition within 30 days of first opening the trench.
- C. The final Patch shall be completed within 30 days of first opening the trench. Delays must be approved by the Inspector.

9.02 Traffic Control in Development Construction

- A. Interim Traffic Control: The developer/contractor shall be responsible for interim traffic control during construction on or along traveled City roads. When road or drainage work is to be performed on City roads that are open to traffic, the developer/contractor will be required to submit a traffic control plan for approval by the Reviewing Agency prior to beginning the work. Traffic control shall follow the guidelines of Section 1-07.23 of the WSDOT/APWA Standard Specifications. All barricades, signs and flagging shall conform to the requirements of the MUTCD Manual and City of Seattle Traffic Control Manual for In-Street Work (current addition). For more specific requirements for barricades, see WSDOT Section 5.07 and Drawing No. 5-003. Signs must be legible and visible and should be removed at the end of each work day if not applicable after construction hours.
- B. Temporary Road Closures and Detours: When temporary road closures cannot be avoided the developer/contractor shall post "To Be Closed" signs a minimum of five days prior to the closing. The types and locations of the signs shall be shown on a detour plan. A detour plan must be prepared and submitted to the Public Works Department at least 10 working days in advance, and approved prior to closing any City road. In addition, the developer/contractor must notify, in writing, local fire,

school, law enforcement authorities, Metro transit, and any other affected persons as directed by the Director of Public Works at least five days prior to closing.

- C. Haul Routes: If the construction of a proposed development is determined by the City to require special routing of large trucks or heavy construction equipment to prevent impacts to surrounding roads, residences or businesses, the developer/contractor shall be required to develop and use an approved haul route.

When required, the haul route plan must be prepared and submitted to the City and approved prior to beginning or continuing construction. The haul route plan shall address routing, hours of operation, signage and flagging, and daily maintenance.

If the developer/contractor's traffic fails to use the designated haul route, the City may prohibit or limit further work on the development until such time as the requirements of the haul route are complied with.

- D. Haul Road Agreement: When identified as a need by the SEPA review process or by the Director of Public Works, a haul road agreement shall be obtained by the franchised utility, developer or property owner establishing restoration procedures to be performed upon completion of the haul operation.