

1 IN THE BOARD OF COUNTY COMMISSIONERS
2 FOR WASHINGTON COUNTY, OREGON
3

4 ORDINANCE No. 738
5

An Ordinance Amending Chapter 15.08 of the
Washington County Code to Adopt New Road
Design and Construction Standards; and
Repealing Ordinance 524.

6
7 The Board of County Commissioners of Washington County, Oregon, ordains:

8 SECTION 1

9 A. The Board of County Commissioners of Washington County, Oregon, finds that the
10 road standards set forth in Washington County Code Chapter 15.08 are in need of revision in the
11 interest of the health, safety and welfare of the residents of Washington County, Oregon.

12 B. The Board of County Commissioners finds that the specified provisions of Exhibit
13 “A” attached hereto and by this reference incorporated herein, entitled “Washington County Road
14 Design and Construction Standards” should replace the relevant portions of Washington County
15 Code Chapter 15.08 as the road standards for Washington County, Oregon.

16 C. The Board of County Commissioners finds that this revision of the road standards is
17 exempted from the provisions of the Washington County Charter Chapter X, and therefore does
18 not require any general or individual land use notice.

19 D. The Board of County Commissioners finds that it is in receipt of all matters and
20 information necessary to consider this Ordinance in an adequate manner, and that this Ordinance
21 complies with the Oregon Revised Statutes and County law, including the Washington County
22 Charter.

1 SECTION 2

2 The provisions of Washington County Code Chapter 15.08 enacted by Ordinance 524
3 hereby are repealed in their entirety, provided, however, that they shall remain in effect as required
4 to implement the transition provisions of Section 3. Exhibit "A," titled "Road Design and
5 Construction Standards," dated February 2011 hereby is adopted.

6 SECTION 3

7 The provisions of this Ordinance shall apply to all applications and plan submittals
8 received by the County on or after the effective date. All applications and plan submittals received
9 prior to the effective date and deemed complete by the County shall be subject to the provisions of
10 Ordinance 524. In addition, applications and plan submittals received prior to the effective date
11 and deemed incomplete shall be subject to the provisions of Ordinance 524, provided that the
12 required additional information is submitted and they are deemed complete within 60 days of the
13 effective date.

14 SECTION 4

15 A. The reference documents in this ordinance, listed under "References" in Exhibit
16 "A" hereto, may be modified at any time by the Board by Resolution and Order, to incorporate
17 updated references, substitute new references as they become available, or as otherwise deemed
18 appropriate by the Board.

19 B. The County Engineer may modify at any time the documents listed under
20 "Appendices" in Exhibit "A" hereto, to reflect revisions and updates adopted independent of this
21 Ordinance. The documents listed under "Appendices" include maps, forms and similar resource
22

1 information provided for the convenience of the user, and subject to change independent of this
2 Ordinance.

3 C. The County Engineer may revise the document submittal requirements of Chapter 2
4 of Exhibit "A" at any time to prescribe a different or additional form or format, including but not
5 limited to: paper or electronic format; number of copies of submittals; size and scale of submittals;
6 and any other non-substantive revision that would aid in review or analysis of plans.

7 D. Revisions to appendices or submittal requirements by the County Engineer shall be
8 effective upon publication by stating all such revisions in writing, making copies of the revisions
9 available to the public, mailing notice of the revisions to interested persons, and incorporating the
10 revisions on the county's web site. The County Engineer shall maintain a record of all authorized
11 changes to Exhibit "A" adopted under this section by the Board and the County Engineer. The
12 County Engineer shall take all steps deemed appropriate to make such record available to the
13 public, including but not limited to publication and distribution of a codified version of the Road
14 Design and Construction Standards including such changes, and maintaining the codified version
15 in electronic form on the county web site.

16 SECTION 5

17 If any section, subsection, sentence, clause, phrase or portion of this Ordinance, including
18 Exhibit "A" attached hereto, is held invalid or unconstitutional by a court or body of competent
19 jurisdiction, such portion shall be deemed a separate, distinct, and independent provision and such
20 holding shall not affect the validity of the remaining portions of this Ordinance.

1 SECTION 6

2 The Office of County Counsel is authorized to codify this Ordinance and to make any
3 technical changes, not affecting its substance, as are reasonably necessary to accomplish
4 codification.

5 ENACTED this 15 day of February, 2011, being the 2nd reading and 1st
6 public hearing before the Board of County Commissioners of Washington County, Oregon.

7 BOARD OF COUNTY COMMISSIONERS
8 FOR WASHINGTON COUNTY, OREGON

9 **ADOPTED**

Andy Omer
CHAIR

Barbara Hejtmanek
RECORDING SECRETARY

12 READING

PUBLIC HEARING

13 First February 1, 2011
14 Second February 15, 2011
15 Third _____
16 Fourth _____
17 Fifth _____
18 Sixth _____
19 Seventh _____
20 Eighth _____
21 Ninth _____
22 Tenth _____

February 15, 2011

19 VOTE: Aye Duyck, Rogers, Schouten, Malinowski, Terry

20 Nay _____

21 Recording Secretary: Barbara Hejtmanek

22 Date: February 15, 2011



**Washington County
Department of Land Use and Transportation**

Road Design And Construction Standards

**EXHIBIT "A"
To Ordinance No. 738**

February, 2011

WASHINGTON COUNTY ROAD DESIGN AND CONSTRUCTION STANDARDS

EXECUTIVE SUMMARY

These Standards provide engineering design and construction requirements for transportation and bridge improvements under Washington County's jurisdiction. The provisions of these standards and specifications are intended to provide a safe and reliable transportation system and to preserve, protect, and improve the public transportation infrastructure.

These Standards are intended to ensure the long-term viability of the transportation system and avoid unnecessary and excessive maintenance and replacement costs.

These Standards are based on modern design principles as well as practical construction methods. They replace the 1998 edition adopted in Ordinance 524, and are intended to be consistent with the requirements established in the *Washington County 2020 Transportation Plan* and the *Washington County Community Development Code*.

Building a transportation facility within a built environment is challenging. To achieve a sustainable system with livability requires a balance between competing interests. Exceptions must occasionally be made to these standards while maintaining safety and efficiency. Section 220 provides a process for allowing an exception to these standards.

The Washington County Comprehensive Plan, the Community Plans, 2020 Transportation Plan and the Community Development Code provide guidance in the development of livable communities through which the roadways pass. The road standards specify the technical requirements for the design and construction of the transportation system improvements within road right-of-way. In concert, these documents provide the balance of qualities which create aesthetic and livable communities.

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CHAPTER 1

100 General

110 Definitions

The following terms shall have the following meaning in this Ordinance. In some cases, further information is given.

ADA	American with Disabilities Act
ADT	Average Daily Trips
Alley	A street primarily intended to provide secondary access to a public road, or to the side or rear of lots or buildings. Alleys are not intended for through traffic.
AASHTO	American Association of State Highway and Transportation Officials
County Engineer	Washington County's County Engineer
County Engineer's Staff	Washington County's Engineering staff acting on behalf of the County Engineer.
Curbed Center Median	An area in the roadway between opposing travel lanes that is defined by a curb.
DBH	(Diameter at Breast Height): Diameter of a tree measured at 4.5 feet above ground level.
Department	The Washington County Department of Land Use and Transportation.
Director	The Director of the Department of Land Use and Transportation.
Edge of Road	Face of curb or boundary of paved roadway at the gravel shoulder or boundary of unpaved roadway at the top of ditch
Engineer	The Engineer of record responsible for the design of improvements within the road right-of-way who shall be a Professional Engineer licensed to practice in the State of Oregon.
Ground Cover	A densely growing plant that is used to cover bare soil by forming a continuous mass of low foliage.
Half Street	Improvements of one-half (1/2) of an existing road in accordance with the Community Development Code, Transportation Plan, and applicable County standards. One-half (1/2) of the road shall mean the area between the right-of-way centerline and the ultimate right-of-way line.

Interim Improvement	An improvement that is a portion of the Ultimate Improvement, as prescribed by the Transportation Plan. An interim improvement is consistent with the ultimate improvement such that it does not require removal to construct the ultimate improvement.
Intersection	Refers to two (2) or more roads meeting at a point. For design purposes, an intersection is not formed by naming two (2) approaches of a continuous road at a curve or some other point with different road names.
Land Development Permit Process	Refers to the County or City process in which an applicant receives approval for a land development, and which may require construction of a road and other related conditions.
LIDA	Low Impact Development Approaches (See Clean Water Services)
NAVD; NGVD	North American Vertical Datum; National Geodetic Vertical Datum
ODOT	Oregon Department of Transportation
ORS	Oregon Revised Statutes
Perimeter Area	The area between the back of sidewalk and the right-of-way or easement for public travel line (whichever is farther back)
Planter Strip Area	The area between the sidewalk and the back of curb.
Road	The entire right of way of any public or private way that provides ingress to or egress from property by means of vehicles or other means or that provides travel between places by means of vehicles. "Road" includes, but is not limited to: <ul style="list-style-type: none"> (a) Ways described as streets, highways, throughways or alleys; (b) Road related structures that are in the right of way such as tunnels, culverts or similar structures; and (c) Structures that provide for continuity of the right of way such as bridges.
County Road	A road established as part of the County road system by action of the Board of County Commissioners. See ORS 368.001(1).
Public Road	A road dedicated for use by the public but not established as a County road. Maintenance is the responsibility of the adjoining property owners. See ORS 368.001(5).
Shrub	A low-growing woody perennial plant having several major stems from the same base.

Street Tree	Approved trees planted in Planter Strip Areas, Perimeter Areas, tree wells, or within five (5) feet of the back of sidewalk.
Transportation Plan	The Washington County Transportation Plan, as set forth in A-engrossed Ordinance 588, and which is an element of the County Comprehensive Plan.
Ultimate	As used in these standards, refers to an improvement, location, grade, or other matter, that is necessary to construct the full improvement prescribed in the Transportation Plan.

120 General Requirements

120.010 Design Standards

Engineering plans for public transportation improvements shall conform to these Standards; the Community Development Code; the Notice of Decision in the County’s land development permit process, including any conditions of approval; the conditions of approval of any applicable City land development decision; and any other relevant approvals.

120.020 Construction Specifications

Construction activities shall comply with the *Oregon Standard Specifications for Construction (see References)* except as noted in these Standards or approved through a design exception request to the County Engineer. The requirements of these standards include all text, exhibits, standard drawings, and all matters specifically incorporated by reference.

120.020.1 Scope

These standards are applicable to all construction of roads and related facilities under the jurisdiction of Washington County, including public and private projects.

130 Road Requirements

130.010 Functional Classification

The functional classification of existing and proposed roads is established by the Transportation Plan, Policy 10.

The Transportation Plan classifies roads as:

- a. Principal Arterial
- b. Arterial road
- c. Collector road
- d. Neighborhood Route
- e. Local road
- f. Commercial/ Industrial Road
- g. Special Area Neighborhood Route
- h. Special Area Collector Road
- i. Special Area Local Road
- j. Special Area Commercial Road

As used in these standards, the functional classification terms listed below shall include the following meaning unless otherwise specifically identified:

When the term “collector” is used, it shall include “Special Area Collector” facilities.

When the term “neighborhood route” is used, it shall include “Special Area Neighborhood Route” facilities.

When the term “local” road or road is used, it shall include “Special Area Local Road” facilities.

When the term “commercial/industrial road” is used, it shall include “Special Area Commercial Road” facilities.

Exhibits 1-12 are to be used for the design of roads under the jurisdiction of Washington County.

130.020 Accesses

A Right-Of-Way permit is required to establish the location or to construct an access within the road right-of-way.

A separate Right-Of-Way permit is not required when the access is constructed in conjunction with the roadway improvements of an approved and permitted subdivision or development, and the Facilities Permit includes the subject access.

130.030 Half-Street Improvements

Half-street improvements may include any or all of the following elements:

- a. Dedication of right-of-way and easements;
- b. Grading and subgrade preparation;
- c. Construction or reconstruction of roadway paving, which may include:
 - 1. Turn lanes and bike lanes where required by the applicable standards and
 - 2. A minimum ten (10) feet of additional roadway paving width beyond the centerline of the right-of-way, if determined necessary by the County Engineer's staff;
- d. Construction or reconstruction of concrete curb and gutter;
- e. Pavement markings where required;
- f. Construction or reconstruction of concrete sidewalk paving;
- g. Construction, reconstruction or extension of underground storm drainage, fire, water or sanitary sewer facilities;
- h. Relocation of existing utilities where required;
- i. Illumination at access points and along roadways where required; and
- j. Street trees where required.
- k. Other improvements as required through a development review process.

130.040 Width

Exhibits 1-6 summarize road width standards by functional classification. Public utility and sidewalk easements beyond the right-of-way are required in some instances. For rural roads and interim urban roads, minimum six (6) foot wide shoulders are required.

130.050 Number of Lanes

The number of travel lanes, between intersections, is defined by the Transportation Plan. Additional width may be required at intersections in accordance with the Transportation Plan. Additional right-of-way may be needed with the additional width requirements.

130.060 Design Speed

The minimum design speed for each road classification is shown in Exhibits 1-6.

130.070 Easements

Easements, adjacent to the right-of-way, may be needed.

Sidewalk and utility easement requirements are shown in Exhibit 1-6 for the various functional classes.

Easements for special features such as, but not limited to, walls, slopes, or other unique items may also be required.

Sidewalk easement width shall be determined during plan review and shall be measured to the back of the sidewalk. This applies to all road classifications.

130.080 Sight Distance

The sight distance shall conform to the requirements as shown in the Community Development Code.

130.090 Lane Restrictions During Construction

Arterial roads shall not have lane restrictions between 6:30 AM to 9 AM, and 3:30 PM to 6:30 PM.

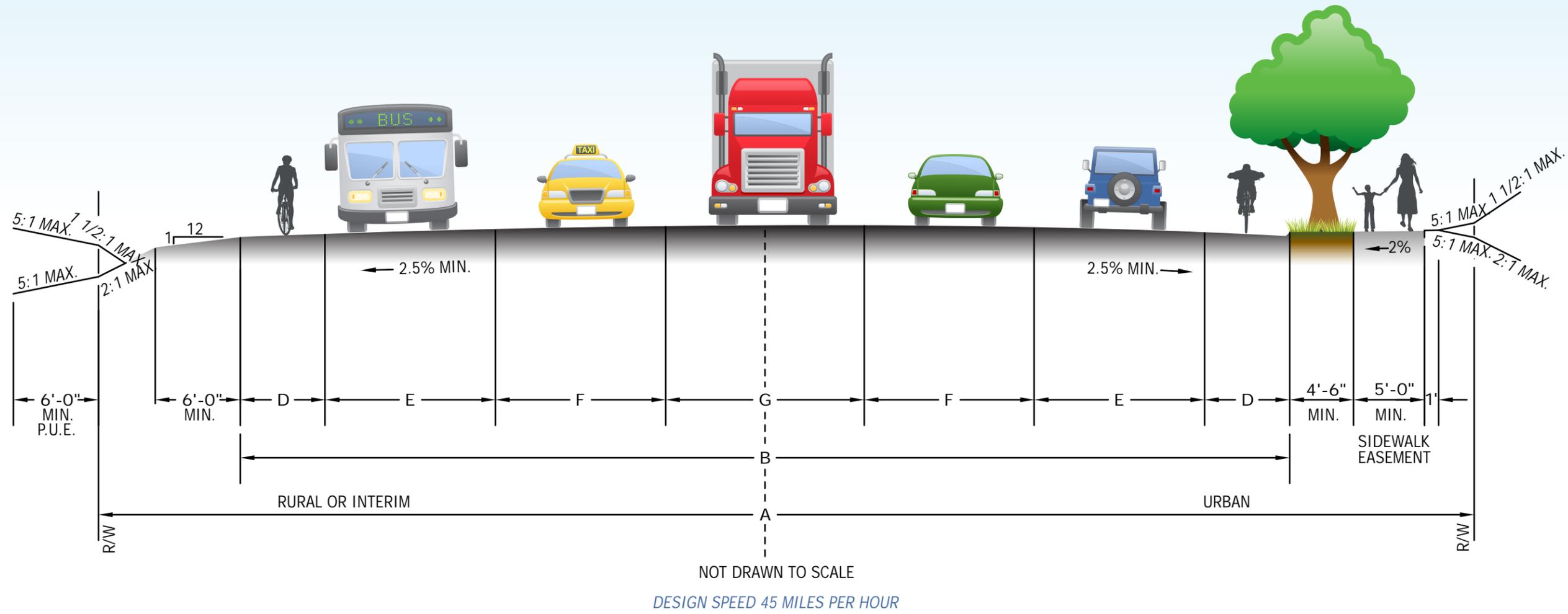
Collectors, and Neighborhood Routes with an ADT greater than 1000, shall not have lane restrictions between 7:00AM to 8:30 AM, and 4:00 PM to 6:00 PM.

130.100 Road Restoration

All road construction projects shall include road restoration. Road restoration shall return all existing infrastructure affected by the construction activities, including haul routes, to original or better condition. Infrastructure may include, but is not limited to, the road surface, base and subgrade, drainage facilities, signs, safety appurtenances, bicycle and pedestrian facilities, vegetation or landscaping and any other feature.

Restoration of road surfaces may require extensive rehabilitation, including, but not limited to slurry seal, overlay, grind and inlay, and full depth reclamation with cement treatment.

Arterial Road Section



Road Classification	Washington County Designation	Right of Way (Feet)	Paved Width (Feet)	Number of Lanes	Bike Lane / Paved Shoulder	Curb Travel Lane	Travel Lane(s)	Center Turn Lane	Parking Allowed
Arterials		A	B		D	E	F	G	
	A-1	122	98	7	6	12 + 12	12	14	NONE
	A-2	98	74	5	6	12	12	14	NONE
	A-3	90	60 * ‡	4	6	12	12	0	NONE
	A-4	90	50 *	3	6	0	12	14	NONE

*GRAVEL SHOULDERS AND DITCHES ALLOWED FOR THESE WIDTH ONLY. STANDARD INTERIM SECTION
‡ P.U.E.'S REQUIRED OUTSIDE OF R/W IF SHOULDERS AND DITCHES ARE USED.

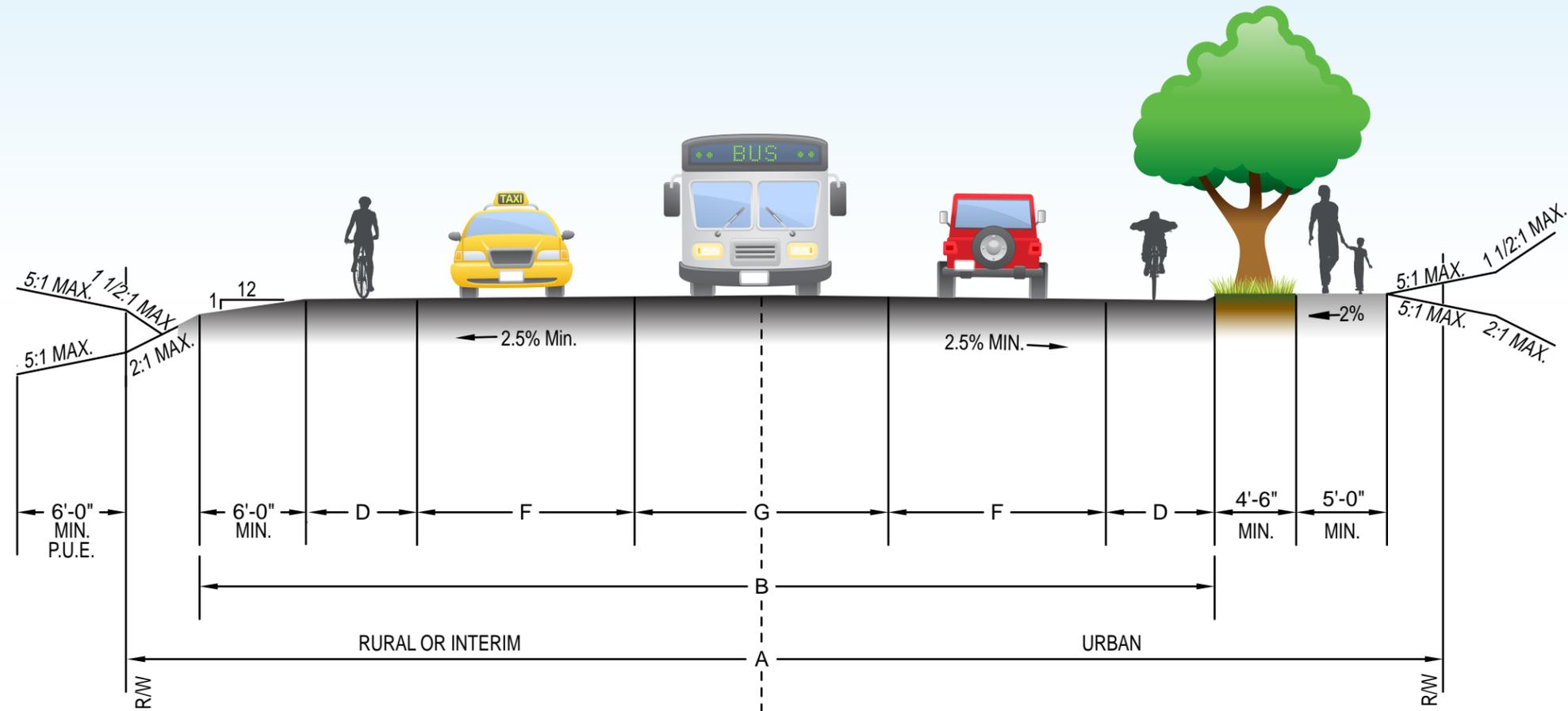
The applied "Washington County Designation" is determined by the county's transportation plan and the land use decision. See Appendices A and B for maps of County arterial roads.

Arterial Road Section
Washington County Exhibit#: 1
Effective Date:

Washington County
Department of Land Use
& Transportation
Engineering Section



Collector Road Section



NOT DRAWN TO SCALE

DESIGN SPEED 35 MILES PER HOUR

Road Classification	Washington County Designation	Right of Way (Feet)	Paved Width (Feet)	Number of Lanes	Bike Lane/ Paved Shoulder	Travel Lane	Center Turn Lane	Parking Allowed
Collectors		A	B		D	F	G	
	C-1	74	50	3	6	12	14	NONE
	C-2	**	36 †	2	6	12	0	NONE

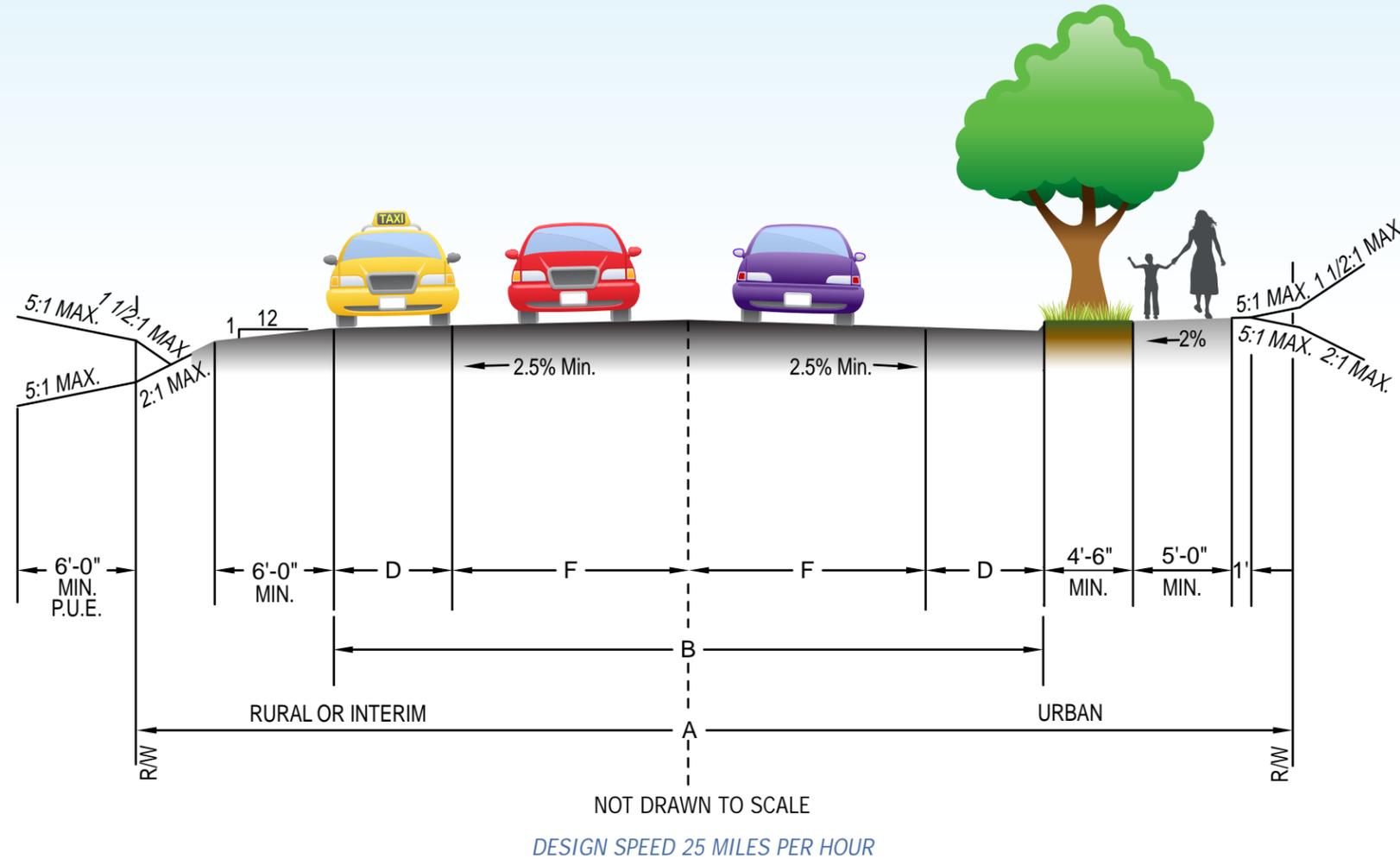
*GRAVEL SHOULDERS AND DITCHES ALLOWED FOR THESE WIDTHS ONLY. STANDARD INTERIM SECTION

** USE ULTIMATE R/W FOR PAVED WIDTH IDENTIFIED IN THE TRANSPORTATION PLAN, IF NOT KNOWN USE 74 FOOT R/W, IN RURAL AREAS 60' OF RIGHT OF WAY IS REQUIRED.

† P.U.E.'S REQUIRED OUTSIDE OF R/W IF SHOULDERS AND DITCHES ARE USED.

The applied "Washington County Designation" is determined by the county's transportation plan and the land use decision. See Appendices C and D for maps of County collector roads.

Neighborhood Route Section



Road Classification	Washington County Designation	Right of Way (Feet)	Paved Width (Feet)	Number of Lanes	Bike Lane	Parking Lane	Travel Lane(s)	Parking Allowed
Neighborhood Routes		A	B		D	D	F	
	NR-1	60	28* †~	2	0	0	14	NONE
	NR-2	60	32* †~	2	0	8	12	ONE SIDE
	NR-3	60	36	2	0	8	10	BOTH SIDES
	NR-4	60	36	2	6	0	12	NONE
	NR-5	50 ~	28	2	0	0	14	NONE
NR-6	50 ~	32	2	0	8	12	ONE SIDE	

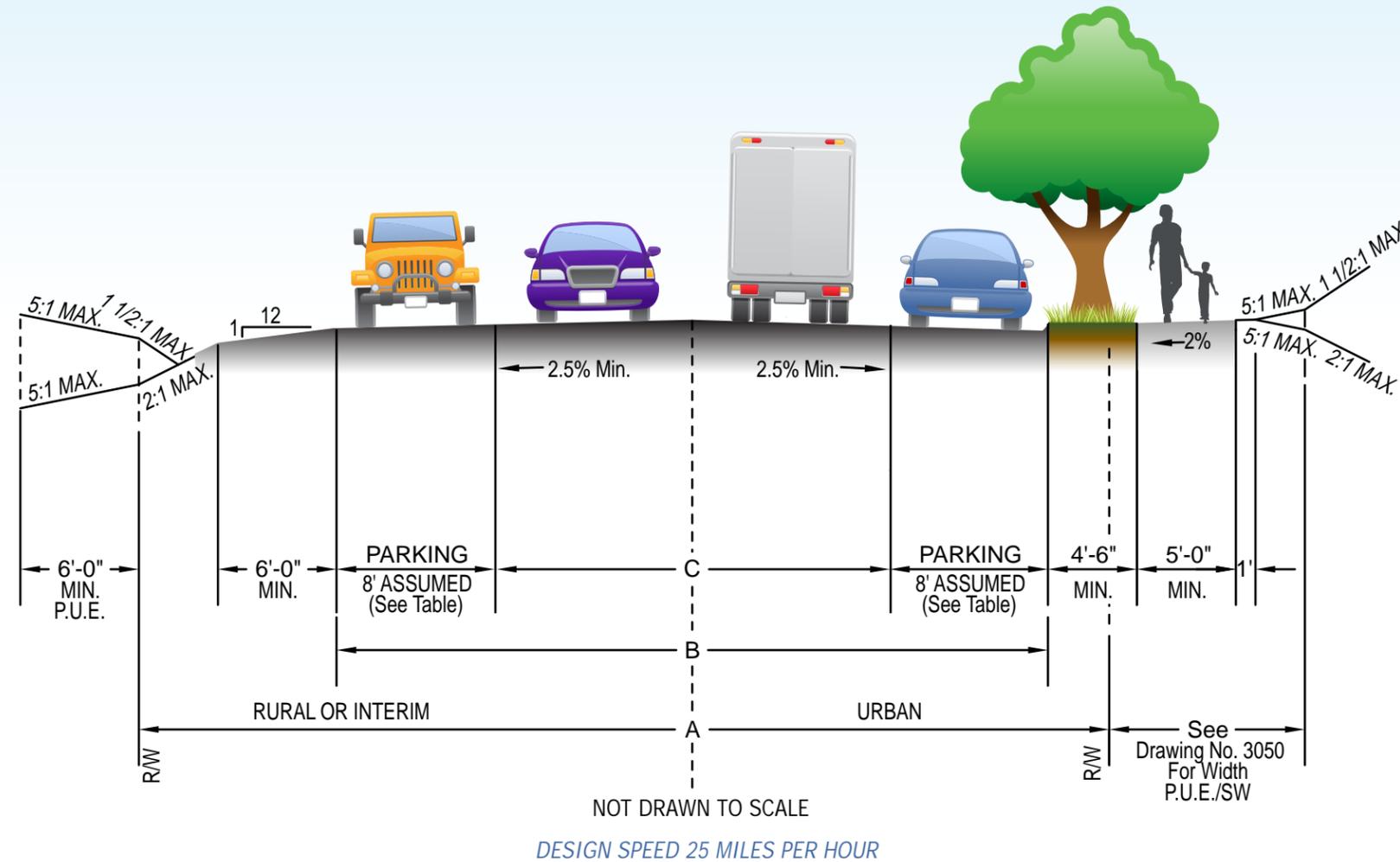
*GRAVEL SHOULDERS AND DITCHES ALLOWED FOR THESE WIDTHS ONLY. STANDARD INTERIM SECTION.

† P.U.E.'S REQUIRED OUTSIDE OF R/W IF SHOULDERS AND DITCHES USED.

~ FOR THESE SECTIONS, 60 FEET OF R/W FOR 200 FEET FROM THE INTERSECTIONS WITH ALL COLLECTOR OR ARTERIALS SHALL BE DEDICATED AND A 36 FOOT SECTION BUILT AT SUBJECT INTERSECTIONS.

The applied "Washington County Designation" is determined by the county's transportation plan and the land use decision.

Local Road Section (Minimum)



Road Classification	Washington County Designation	Right of Way (Feet)	Paved Width (Feet)	Traveled Way	Parking Allowed
Local Roads(Standard)		A	B	C	
	L-1	50	24*	24	NONE
	L-2	38	32	16	BOTH SIDES
	L-3	34	28***	12	BOTH SIDES
L-4	30	24	16	ONE SIDE	
Local Roads (Alternate) ¹	L-5	26	20	20	NONE

* GRAVEL SHOULDERS AND DITCHES ALLOWED FOR THESE WIDTHS ONLY. STANDARD INTERIM SECTION.

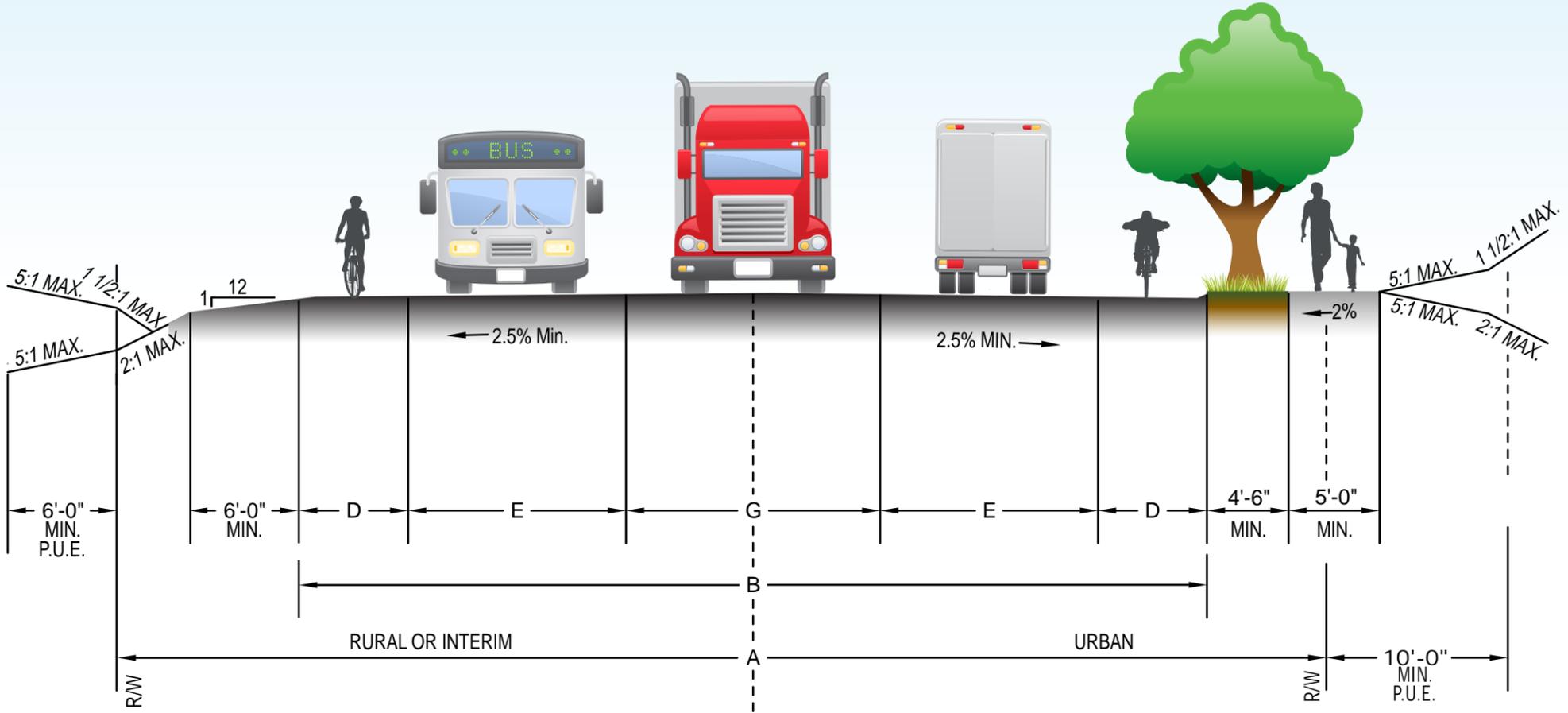
*** PARKING SHALL BE PROHIBITED WITHIN 50' OF A PUBLIC STREET INTERSECTION.

1) USE OF THE DESIGN STANDARDS FOR ALTERNATE LOCAL ROADS REQUIRES APPROVAL THROUGH THE LAND USE PROCESS.

USE OF NEIGHBORHOOD TRAFFIC MANAGEMENT DEVICES ARE PERMITTED ON THE MODIFIED LOCAL ROADS AND SHALL BE PLACED AS DETERMINED THROUGH THE LAND USE PROCESS AND SHALL MEET THE STANDARDS FOR NEIGHBORHOOD TRAFFIC MANAGEMENT DEVICES AS SPECIFIED HEREIN.

The applied "Washington County Designation" is determined by the county's transportation plan and the land use decision.

Commercial and Industrial Road Section



NOT DRAWN TO SCALE
DESIGN SPEED 25 MILES PER HOUR

Road Classification	Washington County Designation	Right of Way (Feet)	Paved Width (Feet)	Number of Lanes	Bike Lane / Paved Shoulder	Parking Lane	Travel Lane(s)	Center Turn Lane	Parking Allowed
Commercial or Industrial Roads		A	B		D	D	E	G	
	CI-1	54	40	2	0	8	12	0	BOTH SIDES
	CI-2	**	34*	2	0	8	13	0	ONE SIDE
	CI-3	56	42	3	0	0	14	14	NONE
	CI-4	62	48	3	0	8	13	14	ONE SIDE
	CI-5	64	50	3	6	0	12	14	NONE
CI-6	64	50	4	0	0	12	0	NONE	

*GRAVEL SHOULDERS AND DITCHES ALLOWED FOR THESE WIDTHS ONLY. STANDARD INTERIM SECTION
 ** USE ULTIMATE RIGHT-OF-WAY FOR PAVED WIDTH IDENTIFIED IN THE TRANSPORTATION PLAN; IF NOT KNOWN USE 64 FOOT RIGHT-OF-WAY.

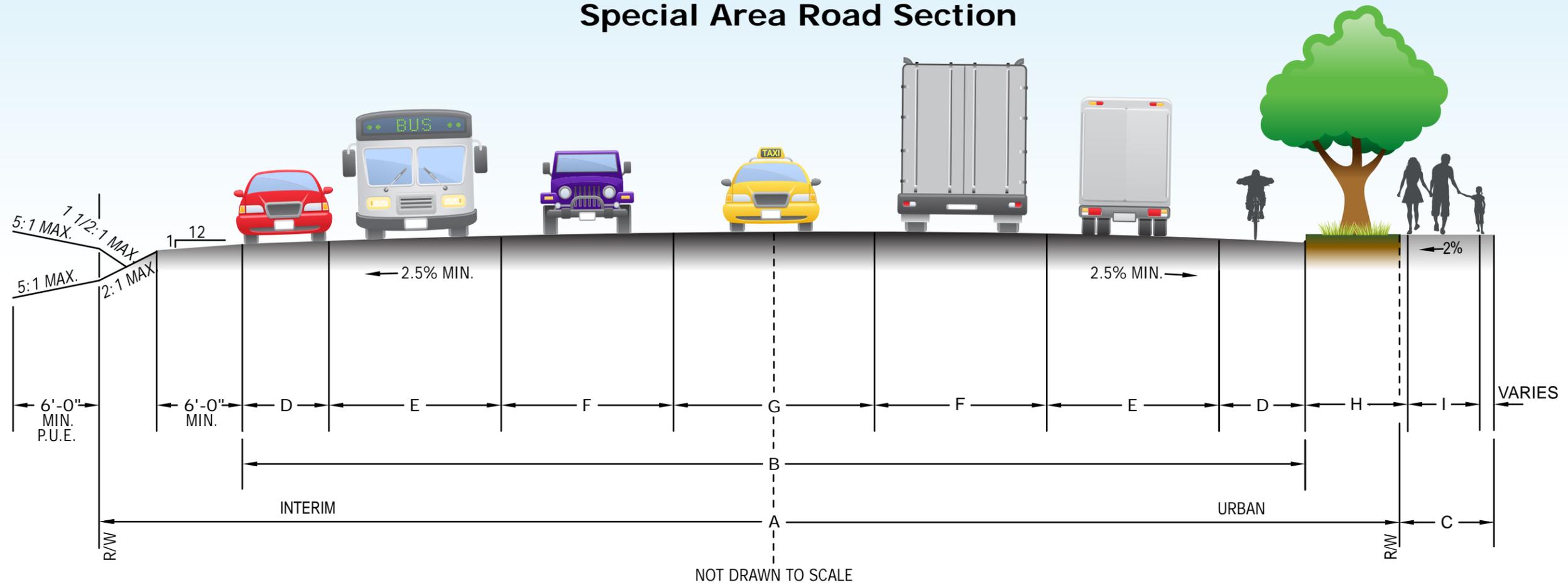
The applied "Washington County Designation" is determined by the county's transportation plan and the land use decision.

Commercial and Industrial Road Section
 Washington County Exhibit#: 5
 Effective Date:

Washington County
 Department of Land Use
 & Transportation
 Engineering Section



Special Area Road Section



Road Classification	Washington County Designation	Right of Way (Feet)	Easement Width (Feet)	Paved Width (Feet)	Number of Lanes	Bike Lane ⁵	Parking Allowed	Parking Lane Width	Travel Lane (Way) ¹	Center Turn Lane	Design Speed	Planting Strip	Sidewalk Width	Area Traffic Management
S.A. Collector		A	C	B		D		D	E / F	G		H	I	
	SAC-1 ⁵	40	9	34	2	5	NONE	N/A	12	NONE	35 MPH	4.5	5	ALLOWED
	SAC-2 ⁵	52	9	46	3	5	NONE	N/A	12	12	35 MPH	4.5	5	ALLOWED
	SAC-3 ⁵	40	9	34	2	5	NONE	N/A	12	NONE	35 MPH	0	9	ALLOWED
S.A. Neighborhood Route	SAC-4 ⁵	52	9	46	3	5	NONE	N/A	12	12	35 MPH	0	9	ALLOWED
	SAMC-1	44	9	38	2	SHARED	BOTH SIDES	8	11	NONE	25 MPH	4.5	5	REQUIRED
S.A. Commercial	SAMC-2	44	9	38	2	SHARED	BOTH SIDES	8	11	NONE	25 MPH	0	9	REQUIRED
	SACM-1	46	9	40	2	SHARED	BOTH SIDES	8	12	NONE	25 MPH	0	9	ALLOWED
	SACM-2	58	9	52	3	SHARED	BOTH SIDES	8	12	12	25 MPH	0	9	ALLOWED
S.A. Local (Standard)	SACM-3	70	9	64	4	SHARED	BOTH SIDES	8	12	NONE	25 MPH	0	9	ALLOWED
	SAL-1	38	10	32	N/A	SHARED	BOTH SIDES	8	(16)	NONE	25 MPH	4.5	5	REQUIRED
	SAL-2 ³	34	10	28	N/A	SHARED	BOTH SIDES	8	(12)	NONE	25 MPH	4.5	5	REQUIRED
S.A. Local (Alternate)	SAL-3	30	10	24	N/A	SHARED	ONE SIDE	8	(16)	NONE	25 MPH	4.5	5	REQUIRED
	SAL-4 ²	26	10	20	N/A	SHARED	ONE SIDE	8	(12)	NONE	25 MPH	4.5	5	REQUIRED
	SAL-5 ^{2,4}	16	0	16	N/A	SHARED	NONE	N/A	(16)	NONE	15 MPH	0	0	NONE

1) TRAVEL WAY WIDTH () DENOTES THE TOTAL PAVED WIDTH AVAILABLE FOR TRAVEL AFTER ON-STREET PARKING.
 2) USE OF THIS STANDARD REQUIRES PRIOR LAND USE APPROVAL.
 3) FOR CUL-DE-SAC OR BLOCK LENGTH > 300 FT., PARKING SHALL BE PROHIBITED WITHIN 50 FT. OF AN INTERSECTION.

4) ALLEY
 5) VERTICAL CURB (DWG NO. 2020) SHALL BE USED WITH A 5 FT. BIKE LANE.

The applied "Washington County Designation" is determined by the county's transportation plan and the land use decision.



CHAPTER 2

200 Submittal, Review and Road Standards Exceptions Procedures

210 Submittal Requirements

210.010 General

Submittal requirements consist of design plans, grading plans (where required), erosion control plans (where required), landscape plans (where required), drainage calculations, and other information as required to determine compliance with these standards for a proposed improvement. Designs submitted shall be stamped by a Registered Professional Engineer licensed to practice in the State of Oregon.

A road engineering plan submittal/review checklist has been provided in appendix E.

Responsible Persons

The applicant for land development approval, facility permit, or other applicable permit or approval, shall be responsible for fulfillment of all requirements of these standards. The applicant may act through its designated Engineer. It is the responsibility of the applicant to notify the county of its designated Engineer and if there is a change in its designated Engineer.

210.020 Review Procedure

Three (3) sets of complete plans shall be submitted to the Department for an initial basic review. The purpose of this review is to check that all the required information has been submitted. The required information includes drainage calculations, and a list of requested exceptions to these Road Standards. If the submittal is complete, a detailed review will begin. If the submittal is not complete, notification will be given by the County to the Engineer specifying what is needed. Applications will be handled based on a first-in, first-out priority, based on the date they are determined to be complete.

Upon completion of the detailed review by the Department, staff will return one (1) set of plans with "Red Line" comments and calculations to the Engineer. The Engineer shall revise its plans to respond to the County's red-line comments and calculations. After the Engineer has completed all revisions, submit six (6) revised plan sets consisting of four (4) full size plan sets and two (2) 11"x 17" half scale plan sets

together with the original “Red Line” plans to the County for approval. When the final submittal has been reviewed and approved, one (1) set will be stamped “Approved by Washington County Land Use and Transportation” and will be returned to the applicant/Engineer with the facility permit application packet.

This plan review and approval is valid for two (2) years from the date of the approval stamp. Extensions may be granted by the County Engineer’s staff if a Development Permit extension, as provided in the Washington County Community Development Code, has first been approved.

210.030 Design Plan Format

English units of measure shall be used.

The plans shall be submitted on sheets 22”x34”.

Vicinity Maps shall be located on the first sheet of all plans and shall show the location of the project with respect to the nearest major road intersection.

The following note shall be on the first sheet of the plan set: “This design complies with ORS 92.044 (7) in that no utility infrastructure is designed to be within one (1) foot of a survey monument location shown on a subdivision or partition plat. No design exceptions nor final field location changes shall be permitted if that change would cause any utility infrastructure to be placed within the prohibited area.”

A north arrow shall be shown on each plan view sheet and adjacent to any other drawing which is not oriented the same as other drawings on the sheet.

The scale shall be 1”=2’, 4’, 5’, or 10’ vertically and 1”=10’, 20’, 40’, 50’ or 100’ horizontally for all drawings except structural drawings. A bar scale shall be provided on all plan view sheets.

Letter size shall not be smaller than 0.10 of an inch high.

A title block shall appear on each sheet of the plan set and shall be placed in the lower right-hand corner of the sheet, across the bottom edge of the sheet or across the right-hand edge of the sheet. The title block shall include the names of the project, the engineering firm, the owner, the County file number and the sheet title.

The Engineer shall stamp each sheet except for landscape plans.

A registered Landscape Architect shall prepare and stamp landscape plans. A single family dwelling on a residential lot is exempt from this requirement.

The description and date of all revisions to the plans shall be shown on each sheet affected, and shall be approved and dated by an Engineer as evidenced by signature or initial.

The location, elevation, and datum of a Washington County bench mark shall be shown. Temporary bench marks shall also be shown on the plans. Washington County bench marks are those permanent marks that have been approved and accepted by the County Surveyor's Office and made available on the county web site. The current county vertical control is on NGVD 1929(47). No other marks or datums may be used without permission of the County Surveyor.

The County Surveyor may approve the use of NAVD 88 vertical datum if the following conditions are met:

- a. Establish a permanent bench mark at or near the site, the character of the monument and the location to be specifically approved by the County Surveyor.
- b. Provide, and show on the plans, the elevation of the mark in both NGVD 29(47) and NAVD 88 datums. The NGVD 29(47) datum shall be determined with reference to an existing Washington County bench mark.
- c. The mark shall not be marked or labeled.
- d. The professional land surveyor responsible for determining the elevations shall submit, to the County Surveyor's office, a copy of the description, elevations and a location map.

210.030.1 Plan View

Plan Views shall show the following:

Right-of-way, property, tract, and easement lines;

Subdivision name, lot numbers, road names and other identifying labels. Road names are subject to the approval of the County;

Location and stationing of existing and proposed road centerlines and curb faces within at least 200 feet of the project boundaries;

Horizontal curve data of road centerlines and curb returns;

Utilities and vegetation in conflict with the construction or operation of the road and drainage facilities;

Location, stationing and size of drainage facilities. Drainage facility stationing shall be located in relationship to the road stationing at all manholes or other key locations. Show drainage facilities both above and below the project;

Match lines with sheet number references and centerline stationing;

Top of curb elevations along curb returns at quarter-points;

Location of the low points of road grades and curb returns;

Proposed and existing locations of sidewalks, mailboxes, sidewalk ramps, and driveway approaches;

Crown lines along portions of roads transitioning from one typical section to another;

Centerline stationing of all intersecting roads;

Location and description of existing survey monuments, including but not limited to, section corners, quarter corners and donation land claim corners;

Legend;

Any additional information that the County Engineer's staff deems necessary.

210.030.2 Profile View

Profile Views shall show the following:

Stationing, elevations, vertical curve data and slopes for center of roads. For off-set or superelevation cross-sections, both curbs shall be profiled. Where curbs are not to be constructed, centerline of road and edges of pavement shall be shown;

Superelevation diagrams shall be provided with the road centerline profile drawing;

Original ground profile along the centerline and if necessary at the edges of the right-of-way if grade differences are significant;

Centerline of existing roads for a distance of at least two hundred (200) feet each way at intersections with proposed roads. Show original ground profile(s) beyond existing roads if necessary;

For roads that may be extended, show the extended profile at least two hundred (200) feet for local and neighborhood route roads and as required for roads with higher classifications. Extensions shall be designed to be compatible with the restraints of the terrain;

Vertical alignment of roads;

The top of curb for all cul-de-sacs, eyebrows and intersection curb returns;

All proposed drainage facilities, their types, all invert and top elevations, slopes, materials, bedding and backfill;

Existing drainage facilities, including off-site facilities, upstream and downstream, that affect the design (e.g., downstream restrictions that back water on to project site);

Profiles for ditch and creek flowlines shall extend a minimum of two hundred (200) feet beyond the project, both upstream and downstream. Typical cross sections at fifty (50) foot intervals shall also be submitted;

All existing and proposed sanitary and storm lines crossing the profile.

210.030.3 Landscape

Landscape plans shall illustrate a comprehensive overview of the existing and proposed vegetation with respect to transportation features, utility structures and any other road related appurtenances.

Landscape plans shall specify hardy and drought-resistant plant materials. See plant list in appendix G. Selection, quantity, and size shall be compatible with soil types, required spacing, proximity to roadways and sidewalks, size of plantable area, topography, utilities (overhead, underground and at-grade), structures, and compatibility with vegetation proposed to remain.

Landscape plans shall be designed without the need for permanent irrigation.

The landscape plan shall include and identify the type, size and location of all vegetation to be preserved, removed, or installed. Vegetation includes, but is not limited to shrubs and ground cover, as well as trees and tree groups with a DBH of six (6) inches or more.

The landscape plan shall illustrate the type, size and location of trees or tree groups with a DBH of six (6) inches or more within the road construction project limits.

210.030.4 Other Plan Sheets

Site grading plans.

Roadway Illumination design plan.

Traffic signal design drawings.

Composite signing and striping plan.

A separate composite plan view with street trees, signing and street lights.

210.040 Other Requirements

Other information to be shown on the design drawings or included with the plan submittal:

- a. Road classification;
- b. Design speed;
- c. Superelevation;
- d. Average Daily Trips (ADT) or Design Hourly Volume (DHV).
- e. Structural design plans and calculations for proposed structures (i.e., walls, box culverts, bridges, etc.).
- f. The design assumptions for each road (i.e., traffic coefficient, R-value, etc.).
- g. Typical road structural sections for both summer and winter construction.
- h. Other information as required

210.050 Drainage Calculations

Within the Clean Water Services District (CWS) areas, drainage systems are also subject to CWS requirements.

Drainage calculations shall be presented in a clear, concise and complete manner. These calculations shall address all runoff into the drainage system; areas contributing flow to each inlet must be computed separately and each inlet with contributing area shall be designated and shown on an accompanying contour map work sheet.

210.060 As-Built Plans

Following acceptance of construction by the County, two (2) sets of drawings marked "As-Built" on each page shall be submitted for preliminary review. The drawings shall describe any and all revisions to the previously approved construction plans and be of a quality and contrast suitable for reproducing and microfilming. If the as-built submittal is not acceptable, the County will return the drawings and provide the Engineer notice of what is requested for re-submittal. Only complete sets will be accepted, the County will not accept individually corrected sheets.

210.070 Revocation of Approval

Approval of "red line" and "as-built" plans may be revoked as provided in Section 230.

220 Design Exceptions

220.010 General

Any application for an approved exception to the standards and specifications in these Standards must be submitted as a Design Exception under this section. See form in appendix F.

The County Engineer may approve a design exception request so long as it does not conflict with the Community Development Code, the County or City Land Development Permit Decision, or any other relevant approvals, except as expressly provided herein. If the requested exception involves public safety, the County will rule in the direction of safety.

220.020 Exception Process

220.020.1 Criteria for Exception

The County Engineer may grant an exception to the adopted specifications or standards when any one of the following conditions is met:

- a. The specification or standard does not apply in the particular application;
- b. Topography, right-of-way or other geographic conditions impose an economic hardship on the applicant and an equivalent alternative is available which can accomplish the same design objective;
- c. A minor change to a specification or standard is required to address a specific design or construction problem which if not allowed will result in an undue economic hardship.

220.020.2 Submittal

Requests for a design exception shall be submitted in writing to the County Engineer. See Design Exception form in appendix.

Requests for an exception to access spacing requirements shall be submitted in writing to the Development Services Division, for decision by the County Engineer. Access standards are set by the Community Development Code, with the County Engineer delegated the authority to grant exceptions under the same criteria stated above in Section 220.020.1.

All requests shall state the applicable standard, the desired exception, the reason for the request and a comparison between the applicable specification or standard and the exception as to function, performance and safety. If an exception is requested due to economic hardship, the request shall contain a statement on the impact to project cost with and without the exception. The request for exception shall be prepared by an Engineer and shall be stamped and signed by the Engineer.

Any approved exception to these Standards shall be documented and should reference nationally accepted guidelines, specifications, or standards. The approval of an exception shall not compromise public safety or the intent of these standards. An exception shall be approved only if the County Engineer finds that the alternative proposed by the Engineer meets the criteria in 220.020.1 and will provide equivalent or better function, performance, and safety.

220.020.3 Review

The request for design exception will be reviewed by the County Engineer who will make one of the following decisions within fourteen days:

Approve as requested;
Approve with changes; or
Deny with an explanation

Approval of a request in one project shall not constitute a precedent for other projects.

220.020.4 Appeal

The Applicant may appeal the County Engineer's decision to deny an exception to the Director. The appeal shall be submitted in writing within fourteen (14) days of the County Engineer's decision. The appeal shall be in writing, state the relevant facts, applicable provisions of these Standards, specific grounds for appeal, the relief sought, and shall include all information on which the applicant relies. The applicant shall have the burden of proving that an error was committed, or that the requested exception meets the criteria of 220.020.1 and equals or exceeds the applicable standard as to function, performance, and safety.

The Director shall review all the information submitted with an appeal. The Director may request additional information from the Engineer, the County Engineer, or both, and may meet with the parties. The Director shall render a decision in writing in the same format as provided in 220.020.3. The Director's decision shall be final.

220.030 Responsibility for Exceptions

The Engineer shall be responsible for informing the County Engineer, in writing, at the time of submittal of plans, of any desired exceptions to these standards. Only those exceptions so noted and expressly approved by the County Engineer, in writing, shall be lawful and permitted, notwithstanding approval of the overall "red-line" or "as-built".

230 Revocation of Design Approval

230.010 General

The County Engineer may revoke any prior approval of “red line” or “as-built” plans for any of the following reasons:

- a. The construction of the improvement does not comply with the approved plans;
- b. The “as-builts” fail to conform to the development approval or contain exceptions to the “red-line” plans or these standards which were not specifically brought to the attention of the County Engineer and expressly approved in writing.

230.020 County Actions

Upon revoking an approval, the County may take one or more of the following actions:

- a. Refuse to accept the road as a public or County road;
- b. Refuse to grant access permits or approve any road encroachments;
- c. Cite one or more of the following: the Engineer, the development applicant and/or the owner of the property pursuant to Section 240.
- d. Take enforcement action as authorized by the development code, if the basis for revocation is a violation of the land use approval or conditions;
- e. Take such other action or seek such other remedy as may be provided by law, including but not limited to equitable relief.

240 Violation

240.010 General

It shall be a violation of this Ordinance to:

Submit for approval “red line” or “as-built” drawings that do not conform to this ordinance, the development code or the development approval

without first expressly informing the County Engineer's staff in writing of said non-conformities and obtaining the County Engineer's staff approval;

Construct a road or other public improvement that does not conform to these standards, unless an exception is first granted in writing by the County Engineer.

240.020 Responsibility

The Engineer, development applicant and owner of the property approved for development shall be jointly and severally responsible for compliance with this ordinance and an action for enforcement may be brought against each.

240.030 Penalty

In addition to any other remedy provided in this ordinance or by law, the penalty for violation of this ordinance shall be \$5,000. Each non-conformity shall be a separate offense. A citation may be issued and prosecuted pursuant to the County Uniform Citation Procedures, County Code Chapter 1.08.

CHAPTER 3

300 Technical

310 Surveying

310.010 General

This document, the 2008 Oregon Standard Specifications for Construction and ORS 209.140-155, define the requirements for protection of existing survey monuments during any construction and for setting new survey monuments following construction of new streets and roads.

310.020 Existing Survey Monuments

Any monuments that may be subject to destruction or disturbance shall be protected in accordance with ORS 209.140, 150, and 155.

Whenever an existing section corner, quarter corner or donation land claim corner monument or accessory, appears to be in danger of damage or destruction by any construction, the Engineer shall notify the County Surveyor in writing, not less than ten (10) working days prior to construction. The County Surveyor shall reference the monument prior to construction and replace it following construction. The County Surveyor may require a deposit for the anticipated cost and shall be reimbursed for all expenses from said replacement by the party responsible for the construction.

As per ORS 209.150 and 155, no person shall willfully or negligently remove, destroy or deface any existing survey monument. If damage cannot be avoided, the monument shall be referenced and replaced, under the direction of a Professional Land Surveyor, according to state law. A copy of the field notes referencing such monuments shall be provided to the County Surveyor if requested by the County Surveyor. Failure to comply with this provision is subject to penalty according to ORS 209.990.

310.030 New Survey Monuments

Centerline monuments, as shown in the Standard Drawings, shall be installed at all centerline intersections of roads (including intersections with existing roads), point of curvature and point of tangency of each curve, and at all centers of cul-de-sacs, turn-arounds, or as required by the County Surveyor to sufficiently monument the right-of-way.

Monuments shall be set by a registered Professional Land Surveyor or by the County, at the option of the County. If monuments are set by a Professional Land Surveyor, they shall file a record of survey complying with ORS 209.250 and any additional requirements set forth by the County Surveyor. If a monument box is used, or required to be used by the County, it shall be not less than twelve (12) inches inside diameter and shall be approved by the County Surveyor before its installation. The County Surveyor may approve an eight (8) inch inside diameter box.

320 Road Design

320.010 Subgrade Evaluation

Soil testing to obtain the strength characteristics of the soil is required for all roads for analysis and design of the road structural section. Soil tests shall be taken from undisturbed samples of the subgrade materials that are expected to be within three (3) feet of the planned subgrade elevation. One sample is needed for each one thousand (1,000) feet of roadway and for each visually observed soil type. Soil tests are required for a minimum of two (2) locations. Test results shall be correlated to the resilient modulus for asphalt pavement design.

Recommendations for both summer and winter construction shall be included. Both sections shall be included in the construction plans.

For Portland Cement Concrete:

The selected design structural strength of the soil shall be consistent with the subgrade compaction requirements. That is, the strength and compaction moisture content at optimum to slightly over optimum needs to be specified. The soils report shall address subgrade drainage and ground water considerations for year round conditions.

320.020 Structural Design

320.020.1 General

This section applies to the design of the road structural section and nonstructural concrete applications.

Structures not included in the Standard Drawings of this document shall be designed and constructed in accordance with the requirements of the AASHTO Load and Resistance Factored Design (LRFD) Bridge Design Specifications as

modified by ODOT's 2005 Bridge Design and Drafting Manual (BDDM).

320.020.2 Structural Section

Roads may be constructed of:

Full depth asphaltic concrete (AC), or Asphaltic concrete on a base of crushed rock or treated subgrade, or Portland cement concrete (PCC) on a base of crushed rock, treated subgrade, or hot mix asphalt concrete (HMAC).

Structural Section will be designed using the ODOT Pavement Design Guide with the following modifications:

Equivalent Single Axle Loads (ESAL) Annual Conversion Factors for TriMet busses (Table 1; Section 5.1 Traffic Analysis) are:

	Flexible pavement		Rigid Pavement	
	One Way Traffic Data	Two Way Traffic Data	One Way Traffic Data	Two Way Traffic Data
TriMet Bus	723	361.5	950	475

Added Layer Coefficients (Table 3; Section 5.4):

Material	Layer Coefficient (per 1 inch of thickness)
Cement treated subgrade (treated in place)	0.10
STB®* or approved equal	0.10

Use of cement treated aggregate base (CTB) is not allowed.

When using STB®, or approved equal, a minimum 2" aggregate layer shall be provided under the Asphalt Cement pavement and extended under the curb for drainage.

Use a twenty (20) year design life.

* STB® (Special Treated Base) a proprietary lime treated material produced by Baker Rock Resources

320.020.3 Asphalt Pavement Design

The wearing surface of hot mix asphalt concrete (HMAC) roads shall be Level 2, 1/2 inch dense graded HMAC, for local roads and Level 3, 1/2 inch dense graded HMAC, for arterials, collectors, and commercial roads. Minimum total thickness of asphalt concrete pavement section shall be three (3) inches. A minimum of two lifts is required with a minimum lift thickness of 1-1/2 inches and a maximum lift thickness of three (3) inches.

Asphalt Concrete shall be designed using the ODOT Contractor Mix Design Guidelines for Asphalt Concrete.

All pavements will be tested for compaction and the compaction requirement for any level of mix and any lift shall be 92% of Moving Average Maximum Density (MAMD).

The compaction level requirement for Level 2, Level 3, and Level 4 job mix formulae designs is as follows:

Level 2 mix, 75 gyrations
Level 3 mix, 100 gyrations
Level 4 mix, 125 gyrations

Warm Mix Asphalt (WMA) additive or process may be used. Additives or processes shall be approved by the County prior to use. When using WMA the minimum temperature behind the paver shall be 185 degrees Fahrenheit.

320.020.4 Portland Cement Concrete Pavement Design

Minimum thickness of Portland Cement Concrete shall be six (6) inches. Minimum mix design shall be Class 4,000 – 1-1/2” paving concrete.

320.020.5 Nonstructural Concrete

Nonstructural concrete used within the right-of-way shall be commercial grade concrete. For pavements, a mix design will be required.

320.030 Vertical Alignment

Alignments shall meet the following requirements:

Minimum tangent road gradients shall be one-half (0.5) percent along the crown and curb.

Maximum road gradients shall be fifteen (15) percent for neighborhood routes, and local roads, and ten (10) percent for all other roads. Grades in excess of these maximums must be approved through the design exception process by the County Engineer.

Within a minimum twenty (20) feet of the ultimate design edge curb line of the intersecting road, the slope of the chord of the vertical curve shall measure five (5) percent or less, for one or more of the following conditions:

- a. Local roads intersecting with a neighborhood route or higher functional classification road or
- b. Stop controlled intersection approaches

Grade changes with an algebraic difference greater than one (1) shall be accomplished with vertical curves.

Road grades, intersections and superelevation transitions shall be designed to not allow concentrations of storm water to flow over the pavement.

Off-set crowns are allowable per Standard Drawing 3030.

Roads intersected by interim roads (not constructed to ultimate standards) shall be designed to match both present and ultimate vertical alignments of the intersecting roads. The requirements of this standard shall be met for both present and ultimate conditions.

Vertical curves shall conform to the values found in Exhibit 7 and 8.

Grade breaks up to an algebraic difference of one (1) may be applied at the point of vertical curvature and the point of vertical tangency.

Slope easements shall be dedicated or obtained for the purposes of grading outside of the rights-of-way.

Design of sag vertical curves may use shorter curves with the installation of additional road lighting.

Design of a 15mph sag vertical curve is allowed at the intersection of a local road with a local road or a local road with a neighborhood route. The 15mph design speed is only allowed on the intersecting stop-

controlled local road approach. This is based on the reasonable speed of a vehicle turning from the through road to the intersecting road.

Exhibit 7

DESIGN CONTROLS FOR **CREST** VERTICAL CURVES BASED ON STOPPING SIGHT DISTANCE

DESIGN SPEED	K
15	3
20	7
25	12
30	19
35	29
40	44
45	61
50	84
55	114

Exhibit 8

DESIGN CONTROLS FOR **SAG** VERTICAL CURVES BASED ON STOPPING SIGHT DISTANCE

DESIGN SPEED	K*
15	10
20	17
25	26
30	37
35	49
40	64
45	79
50	96
55	115

WHERE:

$$K = L/A$$

A = Algebraic Difference in grades, percent.

L = Length of vertical curve, feet.

The minimum sag vertical curve length is defined by:

$$L = AV^2/46.5$$

Where V = road design speed

* Values may be reduced if road lighting is present for sag vertical curves. AASHTO Roadway Lighting Design Guide shall serve as a guide.

320.030.1 Superelevations

See Exhibit 9 for superelevation guidance.

Superelevation transitions will be designed with two-thirds of the transition in the tangent section and one-third of the transition in the curve section.

320.030.2 Vertical Clearance to Overhead Structures

The vertical, plumb distance between the ultimate design roadway surface and the bottom of any structure or device spanning any portion of the roadway shall be no less than 17 feet. If a structure is proposed to be constructed over a section of roadway which is a sag vertical curve, the minimum clearance will be based on a WB-67 vehicle (assume a minimum vehicle height of 14 feet). The minimum vertical clearance will be the greater of 17 feet or the distance measured from the top of the vehicle to the ultimate design roadway surface as the vehicle traverses under the structure, plus 1 foot.

320.040 Horizontal Alignment

Alignments shall meet the following requirements:

Centerline alignment of improvements shall be parallel to the centerline of the right-of-way.

Centerline of proposed road extension shall be aligned with the existing road centerline.

Horizontal curves in alignments shall meet the minimum radius requirements as shown in Exhibit 9.

Exhibit 9

DESIGN SPEED/CENTERLINE RADIUS-MINIMUMS

ARTERIALS, ALL COLLECTORS AND ALL RURAL ROADS

Design Speed(MPH)	Slope/R min.					
	(e)-4%	(e)-2.5%	(e) 0%	(e)2.5%	(e) 4%	(e) 6%
25	335'	300'	255'	220'	205'	185'
30	500'	445'	375'	325'	300'	275'
35	710'	630'	530'	455'	420'	380'
40	970'	855'	710'	610'	560'	510'
45	1285'	1125'	930'	795'	730'	660'
50	1665'	1450'	1190'	1010'	925'	835'
55	2240'	1920'	1550'	1300'	1190'	1060'
60	3000'	2525'	2000'	1655'	1500'	1335'

ALL NEIGHBORHOOD ROUTES, ALL LOCAL ROADS, AND ALL
COMMERCIAL/INDUSTRIAL ROADS

Design Speed(MPH)	Slope/R min.					
	(e)-4%	(e)-2.5%	(e) 0%	(e)2.5%	(e) 4%	(e) 6%
25	195'	185'	165'	150'	145'	135'
30	330'	305'	270'	245'	230'	215'
35	530'	475'	415'	370'	345'	320'

NOTES:

The radii in Exhibit 9 may not provide adequate intersection sight distance per Section 120.060. The Engineer may need to consider larger radii or sight distance easements to meet the county's intersection sight distance standards.

For Exhibit 9, off right-of-way runoff shall be controlled to prevent concentrated cross flow in superelevated sections.

If superelevation is used, road curves shall be designed up to a superelevation rate of 0.04 ft/ft. A superelevation of 0.06 ft/ft may be allowed if the curve is long enough to provide an adequate superelevation transition.

On local roads, requests for design speeds less than 25 mph may be considered through the design exception process based on topography, right-of-way, alternative design features previously approved through the land development permit process or geographic conditions which impose an economic hardship on the applicant. Requests must show that a reduction in centerline radius will not compromise safety. Additional sign posting may be required for designs below 25 mph. In no case shall the design speed for alternative designs be less than 20 mph for local roads and 15 mph for alleys.

320.050 Transitions

When required, transitions into dedicated turn lanes and islands shall use 10 (ten) degree reverse curves, $R=5729/D$ where R is the radius in feet and D is degree of curvature.

Pavement width transitions from a narrower width to a wider width shall be designed with a three (3) longitudinal to one (1) lateral taper. Delineation, as approved by the County, shall be installed to define the configuration.

For pavement width transitions from a wider width to a narrower width, the length of transition taper shall be determined as follows:

45 MPH or greater: $L = S \times W$
Less than 45 MPH: $L = (W \times S^2) / 60$

Where L = minimum length of taper (ft.)

S = Design speed (MPH)

W = Edge of pavement to Edge of pavement offset width (ft)

Delineators, as approved by the County, may be installed to define the configuration. Maximum delineator spacing is the numerical value of the design speed, in feet (i.e. thirty-five (35) foot spacing for thirty-five (35) MPH).

In situations where a tapered transition from wider to narrower pavement cannot be provided, a barricade shall be installed at the end of the wider section of the road and a painted taper shall delineate the edge of the driving lane, as approved by the County. The barricade

shall conform to the Standard Drawing 6020. If the wider section does not provide an additional travel lane, a barricade is required with the painted transition optional.

Prior to incorporating a barricade into the design, evaluate intersection sight distance for driveway and road intersections. Intersection sight distance shall be certified for the affected accesses.

320.060 Intersections

The minimum requirements for intersections are:

The interior angle at intersecting roads shall be kept as near to ninety (90) degrees as possible and in no case shall it be less than seventy-five (75) degrees.

A tangent section shall be carried a minimum of thirty-five (35) feet each side of intersecting curb lines.

The area of influence of an intersection includes the curb returns and, where these facilities are required, the road segment from the intersection to the entry transitions of the dedicated turn lanes.

Curb radii at intersections shall be as shown in Exhibit 10 for the various functional classifications. The right-of-way radii at intersections shall be sufficient to maintain at least the same right-of-way to curb spacing as the lower classified road.

Sidewalk curb ramps shall be provided at all corners of all intersections, regardless of curb type, and shall conform to the Standard Drawings.

Grades and cross-slopes of sidewalks and crosswalks must meet ADA requirements.

320.070 Clear Zones

The engineer is responsible for meeting AASHTO guidelines.

For uncurbed roadways, apply the guidance in the AASHTO Roadside Design Guide.

For curbed roadways, in no case shall the horizontal clearance from face of curb to the face of non-breakaway obstacles be less than 2.0ft.

Exhibit 10

TURNING RADII (FEET)

Edge of Pavement/Curb - Minimums*

Road Classification	Arterial Road	Collector Road	Neighborhood Route Road	Transit Road	Commercial Industrial Road	Local Road
Arterial Road***	55	40	30	40	40	25
Collector Road***	40	40	30	40	40	25
Neighborhood Route Road ***	30	30	30	30	30	25
Transit Road***	40	40	30	40	40	25
Commercial Industrial Road***	40	40	30	40	40	25
Local Road**	25	25	25	25	25	<u>15</u>

* If bike lane or on-road parking exists, above radii maybe reduced by five (5) feet.

** On 28' Local Roads, parking shall be prohibited within 50' of a public road intersection.

*** Note: Curb return radii shall anticipate truck turning requirements and larger radii may be required.

330 Drainage Design

330.010 General

The following and the Clean Water Services (CWS) Design and Construction Standards establish the requirements for the design of drainage facilities within their service boundary.

Outside CWS service boundary, the CWS Standards, and the ODOT Hydraulics Manual, shall provide design guidance.

These requirements shall apply to all storm drainage facilities in existing and proposed County Road rights-of-way, public rights-of-way, public drainage easements and tracts of common ownership in unincorporated areas. Storm drainage facilities include, but are not limited to ditches, culverts, inlets, drainage structures, swales, Low Impact Development Approaches (LIDA) and detention facilities, creeks and rivers.

330.020 System Components

Inlets, manholes, pipes and culverts (see Standard Drawings 1080, 1081 and 1082 for culverts) shall be designed and constructed in conformance with the requirements of the CWS Design and Construction Standards and this document within the CWS service boundary. Outside the CWS service boundary the County will review and approve the design and construction of drainage system components using the CWS Design and Construction Standards and the ODOT Hydraulics Manual as design guidance.

The following County requirements supplement or clarify the CWS Standards.

On Local roads and Neighborhood Routes, tee connections from the mainline storm sewer to catch basins and inlets may be used per the CWS standards. On Arterial and Collector Roads, tee connections from the mainline storm sewer to catch basins and inlets may only be used when the mainline storm sewer is 36 inches diameter or larger, or the connecting lateral is no longer than 3 feet. In all cases, manholes shall be required at the low point of the road and in intersections. Tee connections for private area drains, subgrade drains and wall drains may be allowed but connection to a public drainage structure is preferred.

CG-30 and CG-48 type inlet catch basins, are required on all urban curbed county roads. Where sidewalk is curbtight, inlet manhole lids shall have no more than 2 holes. Where utility conflicts prevent designs with these inlets, the Engineer may propose another inlet design through the design exception process (see section 220). Catch basins (CG-2) are allowed at the low point of the roadway.

Water quality facilities for private development are not allowed within the ultimate right-of-way for the road classification.

LIDA facilities for roadways, located within the right-of-way, require a maintenance agreement between the storm water jurisdiction and the County.

330.030 Ditches and Culverts

Proposed roadside ditches shall be properly sized to pass all required flows, have a maximum depth of no more than two (2) feet as measured from the shoulder of the road and side slopes no steeper than 2 horizontal to a 1 vertical. Proposed roadside ditch improvements that do not meet these requirements shall be piped.

Urban roadside ditch culverts shall have mitered ends meeting the slope requirements in Standard Drawing 1082.

Rural installations shall require miter design based on design speed.

330.040 Standard Drawings

Drainage structures shall conform to the applicable detail drawings of the Clean Water Services Design and Construction Standards within CWS service boundary or, where appropriate, of the Oregon Standard Drawings.

340 Ancillary Facilities

340.010 Bikeways

Bikeways shall be required in accordance with the Community Development Code and Transportation Plan.

Bicycle facilities shall meet the requirements of this document and the AASHTO's Guide for the Development of Bicycle Facilities, as amended and adopted by ODOT's Highway Design manual, Chapter 11, Pedestrian and Bicycle, 2003. The design of the horizontal

alignment, grade, sight distance, intersections, signing, marking, structures, drainage and lighting shall conform to these standards.

Structural sections of bicycle facilities on roads shall conform to the road structural section. Off road bicycle facilities shall be constructed over a sterilized, compacted subgrade with one of the following structures:

- Four (4) inches of asphalt concrete (full depth), or
- Three (3) inches of asphalt concrete with four (4) inches of three-quarter inch (3/4) minus crushed rock base, or
- Four (4) inches of Portland cement concrete with two inches (2) of three-quarter inch (3/4) minus crushed rock base.

When bikeways are adjacent to curbs all inlets shall be type CG-30 or type CG-48.

There are no requirements for separate bicycle facilities on local roads or Neighborhood Routes. It is assumed that all local roads adequately accommodate bicycle riders, without a special bike lane designation.

340.020 Cul-de-sacs, Eyebrows and Turnarounds

The following specifies the minimum requirements for cul-de-sacs, eyebrows, and turnaround areas. Other turnaround geometrics may be used when conditions warrant and County Engineer's staff approves the design and application of its use.

Cul-de-sacs, eyebrows and turnaround areas shall be allowed only on local roads and commercial/industrial roads.

Cul-de-sacs shall not be more than six hundred (600) feet in length. The length of a cul-de-sac shall be measured along the centerline of the roadway from the near side ultimate face of curb of the nearest through traffic intersecting road to the farthest point of the cul-de-sac ultimate face of curb.

The minimum curb radius for cul-de-sac bulbs shall be forty-five (45) feet and the right-of-way radius shall be sufficient to maintain at least the same right-of-way to curb spacing as in the adjacent portion of the road.

Cul-de-sacs, eyebrows and turnaround areas shall have a ten (10) foot continuous public utility easement and a sidewalk easement extending outside the right-of-way around these features.

The minimum curb radius for transitions into cul-de-sac bulbs shall be twenty-five (25) feet and the right-of-way shall be sufficient to maintain the same right-of-way to curb spacing as in the adjacent portion of the road. See Standard Drawing 2210.

Alternative turnaround designs shall conform to the Oregon Fire Code Metro Code Committee Fire Code Applications Guide, Fire Apparatus Access, Dead-End Roads and Turnarounds as revised April, 2006, or as approved by the local fire district's fire marshal.

An Eyebrow Corner may be used on a local road where expected ADT will not exceed five hundred (500) vehicles per day. See Standard Drawing 2220.

340.030 Private Roads

Requirements for private roads are contained in the Washington County Community Development Code.

340.040 Stub Roads

Stub roads allow for future extensions. Reserve strips at the terminus of the right-of-way are prohibited. A barricade and future development sign will be installed in accordance with the Standard Drawings.

340.050 Curbs and Grading

The requirements for curbs and cross-slope grading for roads are:

Urban arterial and collector roads shall include curbs on both sides except in the situations of interim width improvements. Emergency mountable curb and gutter shall be required on urban arterial and collector roads. See Standard Drawing 2010.

Interim width urban roads shall have six (6) foot wide shoulders with a minimum 2' paved width adjacent to the road at the road cross-slope. The paved shoulder section shall be the same structural section as the rest of the road.

Rural roads shall have eight (8) foot wide shoulders with the same material, structural section, and cross-slope as the roadway.

Grading outside the improved areas shall be as shown in Exhibits 1-6.

Cross-slope of the road section shall be no less than two and one-half (2.5) percent and no greater than five (5) percent. Whenever possible,

the crown of the road shall be the same elevation as the top of the curbs.

340.060 Sidewalks

Sidewalks shall be constructed according to Standard Drawing 2110. The location and width of the sidewalks shall be as required by the Comprehensive Plan. Curbside sidewalks may be allowed as determined and approved in the Development's Notice of Decision. ADA requirements shall be met.

Property corners located within the sidewalk shall be monumented, to the County Surveyor's specifications by a licensed surveyor following the installation of the sidewalk.

In the instances where it is required to install sidewalks and a permanent sidewalk cannot be constructed or standards met, a temporary walkway may be constructed and a deposit made to the County equal to the cost of the sidewalk at ultimate line and grade, including any supporting structures. The temporary sidewalk may consist of Asphaltic Concrete or Portland Cement Concrete to a width, location and structure approved by the County Engineer's staff.

The standard five (5) foot wide sidewalk shall be constructed a minimum of four (4) feet from the back of curb to the front edge of the sidewalk except as specified in the special area road section.

Locations with mail boxes and other roadside furniture shall provide for a minimum 5 foot wide sidewalk clearance. Construct in accordance with Standard Drawing 2120.

340.070 Driveways

Driveways shall conform to the Standard Drawings 1010, 1020, 1030, 1040, 1050, 1060, 1080, 1081, and 1082.

Driveways shall not be permitted on roads with existing or proposed motor vehicle access restrictions and as set forth in the Washington County Community Development Code or applicable City Code.

The spacing requirements shall conform to the requirements of the Community Development Code.

Surface runoff shall not be allowed to flow over commercial driveways or sidewalks.

On roads without curbs, the driveway shall be of the same material as the roadway from the edge of the roadway to the right of way line or 15' from the edge of the roadway, whichever is greater.

340.080 Raised Medians, Islands and Traffic Separators

Raised medians are allowed on certain roads as defined in the Transportation Plan.

Raised medians include traffic separators and islands. See Standard Drawings 2300, 2310, and 2315.

The raised median shall be set back at least two (2) feet from the adjacent travel lane stripe.

Road lighting shall be sufficient to provide illumination of the raised median.

Natural or manmade objects shall not physically or visually interfere with vehicle or pedestrian traffic in the traveled way.

The style and design of the raised median shall be site specific. The raised median shall be designed to be safe for the design speed. Raised median designs shall be subject to County Engineer's staff approval.

340.090 Fences

Fencing constructed within the public right-of-way shall be 4 ft. or 6 ft. high chainlink with brown vinyl coating and brown powder coated posts, rails and appurtenances. Fence specifications shall be equal to Oregon Standard Drawings for CL-4R and CL-6R chainlink.

Fall hazard protection: Within the public right-of-way, any drop greater than 30 inches shall be protected with fencing or railing, meeting Section 1013, Guards, of the 2010 Oregon Structural Specialty Code (OSSC). This also applies to culvert headwalls, culvert ends, wing walls and retaining walls.

340.100 Guardrails

The following specifies the minimum requirements for the location and type of guardrails:

Guardrails shall be designed and constructed per Oregon Standard Drawings.

The decision of whether to install a guardrail or not shall be based on information found in AASHTO publication, Roadside Design Guide.

340.110 Retaining Walls

Retaining walls shall be used if slopes flatter than 1 1/2H:1V cannot be achieved.

Retaining walls shall be constructed to a height where the retained slope is no more than 1 1/2H:1V

Retaining walls supporting the road (fill walls) shall be located within the right-of-way. Access easements shall be granted for inspection and maintenance of the retaining walls.

Fill walls within the right-of-way shall accommodate future utilities. No grids or tiebacks shall be in the top 5' of walls within the right-of-way unless the grids or tiebacks are protected by a concrete cover.

No rockery walls are allowed to support the roadway prism.

Vertical drops 30" and greater shall have fall protection fencing meeting the above requirements in section 340.090, Fences:

Retaining walls that support private property above and along the frontage of roadways (cut walls) shall be located outside the right-of-way.

340.120 Subgrade Drainage

Subgrade road drainage must be considered in the design of each road. Subgrade drains shall be designed and constructed per the results and recommendations of the soils report. In the event that no subsurface drainage is required based on the soils report, a transverse perforated drain pipe shall be installed below the lowest subbase rock section at the low point of each sag vertical curve. The subgrade drains are for the purpose of collecting and conveying subgrade water only, not surface runoff. They are not to be considered part of the storm drainage system for storm drain pipe sizing purposes or for storm drain maintenance.

Subgrade drains shall connect to and drain into the public storm drainage system at inlet structures, manholes or road side ditches. See Standard Drawing 5010. Surcharge from the storm drainage system shall not be allowed to back up into the subsurface drains.

Alternatives to subsurface drainage measures may be used if approved by the County Engineer's staff.

340.130 Landscape

Landscaping for public transportation facility improvement projects is intended to provide erosion control, environmental mitigation, traffic calming, and aesthetic value to the extent that it can be managed and maintained to the Board-adopted level of service.

340.130.1 General

Landscape materials shall be chosen from the Department's current lists of approved trees, shrubs, ground cover and wildflower mix, (see appendix G). At maturity, street trees shall not conflict with overhead utilities. Plant material shall not be invasive or noxious.

Landscape material shall be selected and installed in such a way so as not to create a hazard.

Landscape material and any ancillary devices (i.e. stakes, guy wires, cages, etc) shall be selected and installed in such a way so as to never block, impede, interfere, damage or otherwise hinder any travel lane, sidewalk, curb, gutter, sight distance, drainage facility, traffic control device, street light, utility, structures or any other natural or man-made object.

New landscaping shall be installed according to the *American Standard for Nursery Stock* (2004 ed).

Existing landscaping, that is approved for preservation, shall be protected during construction.

340.130.2 Locations

Perimeter Areas:

Perimeter areas shall be planted with approved street trees, ground cover, shrubs and / or wildflower mix.

Planter Strip Areas:

Planter strip areas shall be planted with approved street trees, and ground cover, shrubs and / or wildflower mix.

Wide Sidewalks:

Wide sidewalks shall have approved street trees installed within tree wells. Other approved landscaping may be allowed.

Curbed Center Medians:

Curbed center medians shall be textured Portland cement concrete, pavers, or planted with an approved shrub or ground cover.

340.130.3 Materials and Installation

Street Trees

Street trees shall be provided along each segment of roadside frontage that is improved to ultimate width and the frontage includes new or existing sidewalks.

Street trees shall typically be installed at 35 foot intervals with root barriers on four (4) sides. However, the actual number of trees installed and their physical locations shall be a function of mature canopy spread and avoiding conflicts with other features and requirements including but not limited to utility locations, sign locations, access points, sight distance and other roadside appurtenances.

Street trees may be installed in the public right-of-way or on private property no farther than five (5) feet from the back of sidewalk.

Street trees shall have a minimum trunk caliper of one and one-half (1-1/2) inches DBH. Street trees shall have a minimum branch height of six (6) feet.

Street trees shall be non-fruiting.

Ground Cover

Ground cover shall be provided along each segment of roadside frontage that is improved to ultimate width and includes new or existing sidewalks.

Ground cover shall be planted and seeded to achieve 100% areal coverage.

Shrubs

Shrubs shall be supplied in minimum one (1) gallon containers or equivalent balled and burlap or bare rootstock in accordance with sizes and conditions specified in the *American Standard for Nursery Stock (2004 ed)*.

Wildflower Mix

Wildflower mixes shall be commercially available according to the Oregon Standard Specifications for Construction. Seeding shall promote maximum vegetative cover to minimize weed establishment.

Pavers

Pavers shall be pre-cast interlocking concrete blocks installed per manufacturer's recommendations.

Mulch

Mulch shall meet Oregon Standard Specifications for Construction, for materials and installation and shall be free of noxious weed seeds or plants and which contain no substance detrimental to plant life.

340.140 Traffic Management Devices

Traffic Management devices are permitted on local roads and Neighborhood Routes under two circumstances:

A. New Construction – If required as a condition of approval in the land development permit process, and reviewed by the local fire marshal. These devices should be considered and may be required by the County Engineer's staff where excessive speed or cut through traffic is predictable.

The following traffic management devices may be approved for new construction:

- a. Curb extensions, see Standard Drawing 2230
- b. Medians
- c. Speed cushions, see Standard Drawings 6060-6063

Colored or textured pavements are not allowed. Pavers and thin surface treatments will not be allowed.

The installation of curb extensions requires the Engineer to examine the impacts of curb extensions to emergency vehicles. Of special concern is the turning radius at intersections.

If final engineering plans are submitted for approval where curb extensions or medians are proposed but are inconsistent with a project's land use approval, those plans shall not be approved.

B. Existing roads modified by development - Additional traffic management devices are available such as: speed cushions, intersection diverters, traffic circles, and raised crosswalks. Use of these measures (and other traffic management devices) shall be reviewed by the Traffic Engineering Section and by the local fire marshal and approved by the County Engineer through the design exception process. If such a request is submitted prior to development review, the exception will be subject to subsequent land development permit approval. If the exception request is submitted after development review, it will be forwarded to the Development Services Division for review. If Development Services determines that it is consistent with the development approval and determined not to have significant land use impact, it will then be reviewed as a design exception request.

340.150 Traffic Calming

The County Engineer's staff may require traffic management devices on local and neighborhood route roads, where issues of speeding or cut-through traffic are predictable.

340.160 Utilities

340.160.1 Dry Utilities

Utilities shall be located outside of the paved road if at all possible to avoid future cuts in paved roads. See Standard Drawing 3040. On all phased (interim) road improvements, the necessary utilities shall be stubbed across the interim improvements to assure cuts are not necessary when the road is expanded to its full width.

Underground utilities intended to provide direct service to adjacent properties with future connections shall not be located in the full-width paved section of a road to be constructed. If all service connections are installed and extended beyond the full-width section prior to paving the road, underground utilities can

be located in the paved section, if approved by the County Engineer's staff.

Underground utilities being constructed along existing paved roads shall not be located under the existing pavement unless approved by the County Engineer's staff. Underground utilities that must cross an existing paved road shall not be installed by any method which cuts the pavement unless approved by the County Engineer's staff. The County Engineer's staff may require an overlay or inlay of part or full road width when any pavement cut is made.

Underground utilities shall be buried a minimum depth of thirty (30) inches as measured from finished grade to top of utility.

Utility poles shall be installed behind the sidewalk when possible.

Utility poles to be relocated within the proposed improvement areas must be removed from the clear zone prior to placing sidewalk, curb, base rock and paving.

Whenever possible, manholes, valves, vaults and other structures shall be located out of wheel paths and ADA ramps. If they are located in sidewalks, solid lids with no holes shall be used.

All above ground structures and facilities shall meet the requirements for clear zones in section 320.170.

340.160.2 Wet Utilities

Sanitary and storm sewer systems, waterlines and gas lines shall be installed per the appropriate special service district standards. The County Engineer's staff may require an overlay or inlay of part or full road width when any pavement cut is made.

All above ground structures and facilities shall meet the requirements for clear zones in section 320.170.

Whenever possible, manholes, valves, vaults and other structures shall be located out of wheel paths, bicycle lanes, ADA ramps and driveways. If they are located in sidewalks, lids with a maximum of 2 holes shall be used.

Pipes to be abandoned shall be removed or filled, as approved by the Engineer.

350 Roadway Illumination

350.010 General

Roadway lighting plans will be prepared to meet the land development permit conditions of the specific project and the roadway classifications within the project. Design responsibility lies with the Project Design Engineer.

350.020 Plan Submittal

Plans shall be prepared in accordance with the requirements of Section 210 above, with the following additional requirements:

Numerically identify each luminaire and standard and locate by centerline station and offset from centerline. Provide the information in table form.

Specify light source (fixture and type), wattage, luminaire arm length and mounting height.

Provide illumination levels in tabular format, including average foot-candles, average to minimum ratio, maximum to minimum levels and lamp lumen depreciation factor. Provide an electronic file of the photometric calculations.

Conduit sizes, wire sizes, locations of electrical service and connection details.

Junction box type and location.

General lighting installation notes, including the type, manufacturer and specification of proposed equipment. All equipment must be included in the most current PGE (Portland General Electric) approved street lighting equipment list.

The Engineer shall stamp and sign the illumination plans as part of the complete project plan set.

350.030 Design Standards

Roadway illumination on County roadways will be designed to the levels identified in Exhibit 11. Where not specifically shown in the

table, the Engineer may refer to information provided in the Standard Practice for Roadway Lighting, Illuminating Engineering Society of North America (IESNA), RP-8-00.

If glare shields are to be used, then the design must account for the modified photometric distribution.

The light distribution pattern selected shall be that which gives the most cost-effective luminaire spacing for the design light level. Light dispersion above the 90° (horizontal) plane shall meet the dark sky requirements.

When illumination projects are within the incorporated areas of a city, adjustments to the specific design requirements may be made in cooperation with the city.

350.030.1 Luminaires, Luminaire Poles and Mast Arms:

Luminaires shall be High-Pressure Sodium Vapor (HPS) cobra-head fixtures with flat lenses and full cutoff optics unless prior approval is granted.

The following types of luminaire poles and arms (if included in the current PGE approved street lighting equipment list) will be acceptable for street lighting in Washington County:

- Round shaft poles and mast-arms
- Metal davit style poles and mast-arms

Other types of poles and mast-arms must have prior approval of the County Engineer through the design exception process before acceptance on the proposed plans.

The designated lighting pole and fixture of a new lighting installation shall consider adjoining systems and shall be consistent with adjoining systems when practical and economically feasible.

Alternative energy sources shall be considered where applicable and practical. Such sources shall specifically include solar energy applications as they become practical for road lighting levels of power and output.

350.030.2 Pedestrian Conflict Area Classifications

The classifications in this section are used solely for the purpose of determining appropriate roadway illumination.

Three classifications of pedestrian night activity levels and the types of land use with which they are typically associated are given below:

High—Areas with significant numbers of pedestrians expected to be on the sidewalks or crossing the streets during darkness. Examples are downtown retail areas, near theaters, concert halls, stadiums and transit terminals.

Medium—Areas where lesser numbers of pedestrians utilize the streets at night. Typical are downtown office areas, blocks with libraries, apartments, neighborhood shopping, industrial, older city areas and streets with transit lines.

Low—Areas with very low volumes of night pedestrian usage. These can occur in any of the cited roadway classifications but may be typified by suburban single family streets, very low density residential developments, and rural or semi-rural areas.

350.030.3 Roadways

Use Exhibit 11 for design light levels on roadways.

350.030.4 Intersections

Use Exhibit 12 for design light levels at intersections.

Exhibit 11

**Roadway
Design Light Levels Table
Average Maintained Illuminance
(Assumes R2/R3 Pavement Classification)**

Road Class	Pedestrian Conflict Area	Average Illuminance (foot-candles) (> or =)	Uniformity Avg. to Min. (< or =)	Fixture (Typical Type and Watts)	Mounting Height (Maximum in ft.)
Arterial	High	1.7	3:1	200 W HPS	35
	Medium	1.3	3:1	200 W HPS	35
	Low	0.9	3:1	200 W HPS	35
Collector	High	1.2	4:1	200 W HPS	35
	Medium	0.9	4:1	200 W HPS	35
	Low	0.6	4:1	200 W HPS	35
Neighborhood Route / Local	High	0.9	6:1	Wattage to be determined	To be determined by designer
	Medium	0.7	6:1	Wattage to be determined	To be determined by designer
	Low	0.4	6:1	Wattage to be determined	To be determined by designer

Mixed Land Uses: For arterials and collectors that traverse areas of mixed land use, the use with the largest area shall determine the pedestrian conflict area.

Exhibit 12

Intersections of Continuously Lighted Roads

Recommended lighting design values for intersections in areas of continuous roadway lighting are outlined in *IESNA RP-8, Table 9*. Lighting design values are given for the illuminance method only.

Recommended Illuminance for the Intersection of Continuously Lighted Urban Streets (Based on the values in Table 2 for R 2 and R3 pavement classifications)

Illuminance for Intersection				
Functional Classification	Average Maintained Illuminance at Pavement by Pedestrian Area Classification			E_{avg} / E_{min}
	fc			
	High	Medium	Low	
Arterial/Arterial	3.4	2.6	1.8	3.0
Arterial/Collector	2.9	2.2	1.5	3.0
Arterial/Local	2.6	2.0	1.3	3.0
Collector/Collector	2.4	1.8	1.2	4.0
Collector/Local	2.1	1.6	1.0	4.0
Local/Local	1.8	1.4	0.8	4.0

For purposes of this section, neighborhood routes are included in local classifications.

Isolated Intersections and Isolated Traffic Conflict Areas

Recommended lighting design values for isolated intersections and isolated traffic conflict areas when using the illuminance method are detailed in *IESNA RP-8, Table D1*.

Illuminance Method – Recommended Maintained Values

Road Classification	Pavement Classification			Maximum Uniformity Ratio E_{avg} / E_{min}	Maximum Veiling Luminance Ratio L_{vmax} / L_{avg}
	R1	R2 & R3	R4		
	fc	fc	fc		
Isolated Traffic Conflict Area	0.6	0.9	0.8	4.0	0.3

350.030.5 Other Conflict Points

For other conflict points involving any continuously lit arterial or collector, the average illuminance shall be 1.5 times the average illuminance applicable to the roadway section from Exhibit 11.

350.030.6 Pedestrian Lighting

The pedestrian scale lighting should be adequate to illuminate pedestrian facilities that are a part of transit oriented districts, town centers and plazas, off-street pathways and multi-use paths, or other areas identified in the Transportation Plan or Community Plan. Typically, this lighting is positioned over the sidewalk, rather than the street, at equal to or less than 16 feet above the sidewalk. Design information can be found in the RP-8 publication of the Illuminating Engineering Society of North America, "American National Standard Practice for Roadway Lighting." Illumination at midblock crossings will be evaluated on a case by case basis.

350.040 Design Exceptions

A request for design exception to these lighting standards shall follow the procedures of Section 220.

360 Alternate Local and Special Area Roads

360.010 Alternate Local Roads

Alternate local roads are intended to provide a flexible design standard to respond to mixed use developments. It is the intent of this standard to provide general guidelines to the minimum widths and other design criteria. Use of alternate local road designs shall occur when required or approved as part of a result of a land development permit action that includes a provision specifically requiring design to one of the alternate local road standards. The road and sidewalk width, landscape features, and neighborhood traffic management devices set forth in the land development permit action shall be followed in road design.

Minimum standards shall be adequate to meet the requirements of the ADA and to allow emergency vehicular access. All alternate local road designs shall be approved by the fire marshal. Alleys will require special consideration as to the intended use; special consideration shall be given to utilities, garbage trucks and emergency vehicle access.

360.020 Special Area Roads

360.020.1 General

The Washington County Special Area road design standards are intended to provide standards for public roads in high density and mixed use land use areas as described in the County Comprehensive Plan. Special Area roads are intended to provide multi-modal access and circulation to development within special land use areas. While vehicle volumes may be high, operating speeds are anticipated to be low, and the design should accommodate bicycle lanes and wide pedestrian walkways.

360.020.2 Application

The special area road design requirements apply to public roadways in: Light Rail Station areas, Town Center areas, and other mixed land use areas as designated in the Transportation Plan or Community Plans.

This section is intended to provide additional detail to, and design requirements for, the Special Area Road sections found in Exhibit 6. For road design elements not specifically described in this section, the standard County design elements will apply. In cases of conflict between this section and Exhibit 6 or other sections of the Road Standards, this section will control.

360.020.3 Right-of-Way

The rights-of-way listed in Exhibit 6 for special area roads do not assume the presence of neighborhood traffic management devices such as medians. When neighborhood traffic management devices are used, right-of-way should extend three feet behind the curb face, except when curb extensions are used. When curb extensions are used, right-of-way should remain three feet behind the standard curb face extended through the curb extension area.

360.020.4 Paved Width

The paved widths listed in Exhibit 6 for special area roads do not assume the presence of neighborhood traffic management devices such as medians or curb extensions. When neighborhood traffic management devices are used, the curb to curb paved width may be different than is specified in Exhibit 6.

360.020.5 Sidewalk and Utility Easements

Sidewalk and utility easements for Special Area Roads shall be of sufficient width to provide for the required sidewalk and planter strip, with a building built to the sidewalk edge. Utilities along these roads generally will be installed below the sidewalks.

360.030 Specific Requirements by Road Classification

360.030.1 Special Area Collectors

Exclusive turn lanes are allowed only at intersections with arterial roads.

In order to keep the road narrow and limit conflicts with bicycles, on-road parking is generally not allowed on these facilities. If on-road parking is desired, the design must be approved through the design exception process and must incorporate design features intended to limit conflicts, for example, separated on-road parking with a landscape median.

Neighborhood traffic management devices on these facilities should be limited to medians and curb extensions. Because of high traffic volumes the use of other neighborhood traffic management devices should only be considered if those devices are safe and do not encourage traffic to use roads of lower functional classification. Speed cushions are not allowed on these facilities.

360.030.2 Special Area Neighborhood Routes

Exclusive turn lanes on these facilities are generally not allowed but may be allowed by the County Engineer through the design exception process only when a special area neighborhood route intersects an arterial and left turn warrants are met.

Neighborhood traffic management devices are required on new special area neighborhood routes. Curb extensions may be placed at intersections with other special area neighborhood routes and local roads. Raised medians may be used at intersections with collectors or as allowed above.

360.030.3 Special Area Commercial Roads

The required number of lanes for a Special Area Commercial Road shall be established through the land development permit process.

On road parking is required for these facilities. The parking spaces may be delineated. Washington County will not maintain the delineation.

360.030.4 Special Area Local Roads

Neighborhood traffic management devices may be required on new Special Area Local Roads. Curb extensions may be placed at intersections with other public roads where on-road parking is allowed.

360.040 Neighborhood Traffic Management

Traffic Management devices are permitted on local roads and Neighborhood Routes under two circumstances:

- a. New Construction – If required as a condition of approval in the land development permit process, and reviewed by the local fire marshal. These devices should be considered and may be required by the County Engineer's staff where excessive speed or cut through traffic is predictable.

The following traffic management devices may be approved for new construction:

1. Curb extensions, see Standard Drawing 2230
2. Medians
3. Speed cushions; see Standard Drawings 6060-6063

Colored or textured pavements are not allowed. Pavers and thin surface treatments will not be allowed.

The installation of curb extensions requires the Engineer to examine the impacts of curb extensions to emergency vehicles. Of special concern is the turning radius at intersections. A detail is included; see the Curb Extension Standard Drawing.

If final engineering plans are submitted for engineering approval where curb extensions or medians are proposed but are inconsistent with a project's land use approval, those plans shall not be approved.

- b. Existing roads modified by development - Additional traffic management devices are available as such as: speed cushions, intersection diverters, traffic circles, and raised crosswalks. Use of these measures (and other traffic management devices) shall be reviewed by the Traffic Engineering Section and by the local fire marshal and approved by the County Engineer through the design exception process. If such a request is submitted prior to development review, the exception will be subject to subsequent land use approval. If the exception request is submitted after development review, it will be forwarded to the Development Services Division for review. If Development Services determines that it is consistent with the development approval and determined not to have a significant land use impact, it will then be reviewed as a design exception request.

360.050 Traffic Calming

The County Engineer's staff may require traffic calming devices on local and neighborhood route roads, where issues of speeding or cut-through traffic are predictable.

CHAPTER 4

400 Construction Specifications

410 Construction Inspection

410.010 General

Road, bridge, drainage or utility construction shall commence only after approval of the construction plans and issuance of a Facility Permit, Access Permit, or any other required permit, and posting of any required financial assurance. All public construction falling under the jurisdiction of the Department shall be inspected by an Oregon registered Engineer or a qualified individual under the supervision of an Oregon registered Engineer. The Department will not authorize work to begin on public improvements without designation of an inspecting Engineer by the owner or developer or the County.

If the owner or developer does not designate an inspecting Engineer, the County may perform inspection services at owner's or developer's request or may select from the Engineers who have indicated a desire to perform such services. All inspection costs including required testing shall be paid by the owner or developer directly through service contracts or agreements. The County will require inspection costs be included in the performance assurance and administration deposit as determined by the complexity of the construction and in accordance with prevailing fee schedules.

An Engineer whose firm, or any member of the firm, has a corporate, partnership or any form of real property interest in the development for which the improvements are required cannot be the designated inspecting Engineer. The inspecting Engineer's relationship to the project must be solely that of a professional service nature.

The inspecting requirements of this chapter are not applicable to individual sidewalk, driveway or utility permits. The County may perform those inspections at its discretion.

410.020 County Responsibilities

Inspecting services provided by the County shall include:

- a. Liaison between the inspecting Engineer and the County;

- b. Monitoring of work progress and performance testing as deemed desirable;
- c. The performance of administrative and coordination activities as required to support the processing and completion of the project;
- d. The issuance of stop work orders upon notifying the inspecting Engineer of the County's intention to do so.
- e. Items 2 through 10 of Section 410.030 when the applicant has chosen the County as the inspection option.

410.030 Inspecting Engineer's Responsibilities

The inspecting Engineer of record must be registered to practice engineering in the State of Oregon. The Engineer must personally perform all responsibilities marked by an (*) in this section and must supervise all individuals performing delegated activities. Material testing not performed by the inspecting Engineer must be accomplished by a recognized testing firm using certified material testers or another registered Engineer.

The following minimum responsibilities are required of the designated inspecting Engineer:

- 1.* Execute a form accepting responsibility for inspection;
- 2. Maintain a project diary which contains at least the following information:
 - A. Job number and name of Engineer and designees;
 - B. Date and time of site visits;
 - C. Weather conditions, including temperature;
 - D. A description of construction activities;
 - E. Statements of directions to change plans, specifications, stop work, reject materials or other work quality actions;
 - F. Public agency contacts which result in plan changes or other significant actions;
 - G. Perceived problems and action taken;
 - H. General remarks;
 - I. Final and staged inspections;
 - J. Record all material, soil and compaction tests.
- 3. The inspecting Engineer shall obtain and use a copy of County approved construction plans and specifications;
- 4. Review and approve all pipe, aggregate, concrete, AC and other materials to ensure their compliance with County standards;

- 5.* Submit all plan or specification changes in writing and obtain County approval prior to implementation;
6. Monitor and concur in construction activities to ensure end products meet County specifications;
- 7.* Perform or have performed material, composition and other tests required to ensure County specifications are met;
8. Periodically check that curb, storm sewer work and pavement and detention pond grades are in accordance with approved plans;
9. For pavement construction, perform the following stage inspections and record date of each:
 - A. Curbs are built to line and grade;
 - B. Subgrade meets grade and compaction specifications;
 - C. Base rock meets grade and compaction specifications;
 - D. Leveling course meets grade and compaction specifications;
 - E. Wearing course meets grade and compaction specifications.

The County shall be given twenty-four (24) hour notice of impending stage inspections.

- 10.* Periodically certify to the County the amount of work completed to enable release of monies or a reduction of assurance amount;
- 11.* File with the County a completion report which contains:
 - A. The original of the project completion certification;
 - B. A complete copy of the project diary initialed by the inspecting Engineer;
 - C. 2 (two) complete sets of as-built plans;
 - D. The results of material tests, compaction tests and soil analysis as detailed in the project diary.
12. Call to the County's attention within two (2) working days all plan changes, changes in construction, change in materials, stop work orders or errors or omissions in the approved plans or specifications.

REFERENCES

1. Washington County, Washington County Transportation Plan, Ordinance 588, 2002.
2. Washington County. Washington County Community Development Code.
3. Oregon Department of Transportation, Oregon Standard Specifications for Construction 2008.
4. Oregon Department of Transportation. Oregon Standard Drawings. 2008.
5. Oregon Department of Transportation. Bridge Design and Drafting Manual (BDDM). 2005.
6. Oregon Department of Transportation. Hydraulics Manual, Part 1 & 2. 2005.
7. Oregon Department of Transportation. Pavement Design Guide. 2007.
8. Oregon Department of Transportation. Contractor Mix Design Guidelines for Asphalt Concrete. 2005
9. American Association of State Highway and Transportation Officials. A Policy on Geometric Design of Highways and Streets. 2004. Exhibits 3-72 and 3-75.
10. American Association of State Highway and Transportation Officials. Roadside Design Guide. 2002.
11. American Association of State Highway and Transportation Officials. Roadway Lighting Design Guide. 2005.
12. American Association of State Highway and Transportation Officials. Load and Resistance Factored Design (LRFD), 5th edition, 2010.
13. American Association of State Highway and Transportation Officials. Guide for the Development of Bicycle Facilities. 3rd edition, 1999.
14. Illuminating Engineering Society of North America. Roadway Lighting. RP-8-00, June 1999.
15. Clean Water Services. Design and Construction Standards, CWS Resolution and Order No. 07-20, June 1, 2007, as amended through July 28, 2009.
16. Americans With Disabilities Act of 1990, including ADA Amendments Act of 2008 and applicable administrative rules (ADA).
17. American Nursery & Landscape Association. American Standard for Nursery Stock. 2004
18. Oregon Fire Code Metro Code Committee Fire Code Applications Guide, revised April 2006

STANDARD DRAWINGS

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1000 Driveways

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