

# FALLS CITY PUBLIC WORKS DESIGN STANDARDS

## DIVISION 2 - STREETS

(Replaces the Mt. Angel PWDS Div 2-Streets as adopted by the City)

<sup>1</sup> Denotes the current revision of City of Falls City or Mt. Angel standards as adopted by the City. Confirmation with the City regarding applicable standards is recommended prior to design.)

### **2.1 PURPOSE**

- A. In addition to the purposes outlined under Division 1 of the Falls City Design Standards<sup>1</sup>, as adopted by the City of Falls City, the purpose of these Standards is to:
1. provide design guidance criteria to the private sector for the design of public and private streets within the City;
  2. establish standard right-of-way widths and improvement requirements for the appropriate street classifications;
  3. require the use of design and materials to provide streets with a minimum practical design life of not less than 30 years.
  4. ensure the development of a street system which will:
    - a. be of adequate design to handle the traffic needs for the City of Falls City;
    - b. be designed in a manner to allow economical future maintenance;

Alternate materials and methods will be considered for approval on the basis of these objectives.

- B. These Standards cannot provide for all situations. They are intended to assist but not to substitute for competent work by professional design engineers.

### **2.2 APPLICABILITY**

- A. These Standards shall govern all construction and upgrading of all public and private streets in the City of Falls City and applicable work within its service areas.
- B. All properties shall be provided with access to a public or private street prior to or concurrently with the development of the property. This shall generally be interpreted to mean that permanent streets shall be provided for existing lots of record at the time development occurs, and for new legal lots of record created by partitioning or subdivision of land at the time of partitioning or subdivision.

### **2.3 SPECIAL ITEMS**

- A. The design of the following are considered special items and are not covered in detail in these Standards:
1. Commercial / Industrial entrances
  2. Signalized Intersections
  3. Bridges or Culverted Stream Crossings
- B. Review and approval of the above special items by the City Engineer shall be required. When requested by the City, full design calculations shall be submitted for review prior to approval.

## **2.4 APPROVAL OF ALTERNATE MATERIALS AND METHODS**

- A. Any alternate material or method not explicitly approved herein will be considered for approval on the basis of the objectives set forth in Paragraph 2.1, Purpose. Persons seeking such approval shall make application in writing to the City Engineer. Approval of any major deviation from these Standards shall be in written form. Approval of minor matters will be made in writing, if requested.
- B. Any alternate must meet or exceed the minimum requirements set forth in these Design Standards.
- C. The written application is to include, but is not limited to, the manufacturer's specifications and testing results, design drawings, calculations and other pertinent information.
- D. Any deviations or special problems shall be reviewed on a case-by-case basis and approved by the City Engineer. When requested by the City, full design calculations shall be submitted for review with the request for approval.

## **2.5 CONSTRUCTION DRAWINGS**

- A. Construction drawings shall conform to applicable requirements of Division 1 of the Falls City Design Standards<sup>1</sup> as adopted by the City of Falls City. *In Division 1, replace "City of Falls City" and "Polk County" for reference to Mt. Angel and Marion County respectively.* Contact the City Engineer for clarification and guidance regarding interaction between standards.
- B. Detail drawings shall be included on the construction drawings for all street system components including typical sections, curbs, sidewalks, handicap ramps, drainage facilities, etc.

## **2.6 STANDARD DETAILS**

The Falls City Standard Details<sup>1</sup> included in Appendix A are supplemental to the text of these design standards and show the City's minimum requirements for the construction of standard structures and facilities. In the case of conflicts between the text of these design standards and the standard details, the more stringent as determined by the City Engineer shall apply.

As required by Division 1 of the Falls City Design Standards<sup>1</sup>, all applicable standard details shall be included on the construction drawings.

## **2.7 EXISTING STREET CLASSIFICATIONS**

The Falls City Comprehensive Plan provides an "Inventory and Evaluation of the Street Network". The PWDS is not intended to reproduce the Comprehensive Plan; however the following describes the functional classifications of the street system:

- A. Arterial Streets - The City has designated the following streets as arterials within the city limits:
  - 1. N. Main Street,
  - 2. Mitchell Street,
  - 3. S. Main Street,
  - 4. Sheldon Avenue, and
  - 5. Bridget Street.
- B. Collector Streets - The City has designated the following streets as collectors within the city limits:
  - 1. Ellis Street,
  - 2. Lombard Street,
  - 3. Clark Street,
  - 4. Parry Street,
  - 5. Chamberlain Road,
  - 6. Montgomery Street, and
  - 7. Terrace Street.
- C. Local Streets - Local streets comprise the remainder of the City's street system. These streets provide direct access to the adjoining land uses and efficient connectivity to the City's collector streets.

## **2.8 OTHER JURISDICTIONS**

Other than the City, Polk County has jurisdiction over some of the streets or roads within the City Limits. In all cases, the City design standards shall be considered to be the minimum allowable standards for any streets within the City Limits. Polk County may have additional or more stringent requirements. Approval from Polk County will be required prior to construction activities on any street or road under their jurisdiction.

## **2.9 DEFINITIONS AND TERMS**

- A. In addition to the definitions contained in Division 1 of the Falls City Standards<sup>1</sup>, the following definitions may apply particularly to street systems. Unless otherwise defined in these Design Standards, the following definitions and abbreviations shall apply whenever used. Other definitions as outlined in the Oregon Department of Transportation (ODOT) Oregon Standard Specifications for Construction shall also apply.
  - 1. Abbreviations: Acceptable abbreviations for pavement materials are as follows:
    - a) AC - Asphalt Cement
    - b) PCC - Portland Cement Concrete
  - 2. Alley: A thoroughfare not more than 20 feet and not less than 10 feet in width, which has been dedicated or deeded to the public for public use providing a secondary means of access to abutting property.
  - 3. Arterial Street: Intra- and Inter-community roadways connecting community centers with major facilities. In general, arterials serve both through traffic and local traffic. Access should be partially controlled with infrequent access to abutting properties.

4. Bike Lanes: A designated travel-way for bicyclists that is established within the roadway directly adjacent to the outside vehicular lane or on the shoulder.
5. Bike Path: A designated travel way for bicyclist which is completely separated from the vehicular travel lanes and is within independent right-of-ways.
6. Bike Route: A designated travel-way for bicyclists which can be shared with vehicular traffic. The roadway is designated with signs for bicycling (no pavement markings for the bike route or delineation of parking spaces is used).
7. Clear Vision Area: A triangular area on a lot at the intersection of two streets or a street and a railroad, the sides of which are lines measured from the corner intersection of the right-of-way lines. The third side of the triangle is a line across the corner of the lot joining the ends of the other two sides, where the lines at the intersections have rounded corners, the right-of-way lines will be extended in a straight line to the point of intersection.
8. Collector Street: A centrally located street for moving traffic from arterials to local streets.
9. Cul-de-sac (dead-end): A short street with one end open to traffic and the other terminated by a vehicle turn-around.
10. Downstream Intersection: The nearest intersection from a driveway located in the direction of traffic flow of the nearest lane of the abutting street.
11. Expansion Joint: A joint to control cracking in the pavement structure and filled with preformed expansion joint filler.
12. Frontage Road: A service road parallel and adjacent to an arterial street, providing access to abutting properties, but protected from through traffic.
13. Grade: The degree of inclination of a road or slope.
14. Half-Street: A portion of the width of a street, usually along the edge of a subdivision, where the remaining portion of the street could be provided during the development of adjacent property.
15. Intersection: The meeting point of two streets having at least three legs.
16. Local Street: Serves primarily to provide direct access to abutting land and offers the lowest level of traffic mobility. Through traffic movement is deliberately discouraged.
17. Longitudinal Joint: A joint which follows a course approximately parallel to the centerline of the roadway.
18. Minor Streets: See Local Street.
19. Natural Grade: The grade with the land in an undisturbed state.
20. One-Way Driveway: A driveway of either ingress or egress, but not both.
21. Parking Space: A designated space in a parking area for the parking of one motor vehicle.
22. Sidewalk: A right-of-way deeded, dedicated, and designated for the use of non-motorized vehicles and pedestrians.
23. Streets or Roads: Any public highway, road, street, avenue, alley, easement or right-of-way used or to be used for vehicle movement. Full street improvements include curb and sidewalk on both sides, storm drainage and fully improved in accordance with these standards.
24. Structures: Those structures designated on the standard plans as catch basins, manholes, etc. Detailed drawings of structures or devices commonly used in City work and mentioned in these standards are included in the standard construction

- specifications.
25. Superelevation: The vertical distance between the heights of the inner and outer edges of pavement on horizontal curves.
  26. Three-Quarter (3/4) Street: A  $\pm 75$  percent portion of the ultimate width of a street, but not less than 25 1/2 feet from face of curb to edge of pavement, usually along the edge of a development, where the remaining portion of the street shall be provided when adjacent property is developed. 3/4 street improvements include curb, piped storm drainage and sidewalk on one side, and drainage facilities on the non-curbed side of the street.
  27. Transition: The taper between portions of a street with different pavement widths.
  28. Transverse Joint: A joint which follows a course approximately perpendicular to the centerline of the roadway.
  29. Travelled Way: That portion of the roadway for the movement of vehicles, exclusive of shoulder and auxiliary lanes.
  30. Turnaround Area: A paved area of sufficient size and configuration that emergency vehicles may maneuver around to head in the opposite direction without having to move in reverse more than once.
  31. Turnpike Street: Any public street, road or right-of-way which has been paved for vehicular movement and does not have curbs, sidewalks or piped storm drainage facilities.
  32. Two Way Driveway: A driveway functioning as both an exit and entrance.
  33. Upstream Intersection: The nearest intersection from a driveway located in the direction opposite the traffic flow of the nearest lane of the abutting street.

## **2.10 MATERIALS**

### **A. General**

Unless otherwise approved by the City Engineer, materials shall conform to the minimum requirements outlined herein and as shown on the Standard Details. This listing is not intended to be complete nor designed to replace the City's Public Works Construction Standards (PWS).

In the case of conflicts between the provisions of these design standards and the PWS, the more stringent as determined by the City Engineer or his representative shall apply. Acceptable materials shall be as outlined in these Design Standards.

It is not intended that materials listed herein are to be considered acceptable for all applications. The design engineer shall determine the materials suitable for the project to the satisfaction of the City Engineer.

### **B. AC Pavement**

AC \_\_\_\_\_ pavement shall conform to Section 00744 (Minor Hot Mixed Asphalt Concrete [MHMAC] Pavement) and Section 00745 (Hot Mixed Asphalt Concrete [HMAC] Pavement) Oregon Standard Specifications for Construction, standard duty mix, Class C or Class B as specified.

### **C. Granular Base Rock**

Granular base rock shall conform to Section 00640 (Aggregate Base & Shoulders) and Section

00641 (Aggregate Subbase, Base and Shoulders) Oregon Standard Specifications for Construction. Typical gradation shall be as follows:

Base Rock: 1-1/2"-0

Leveling Rock: 3/4"-0

Alternate single size 1"-0 aggregate as approved by the Engineer.

D. Concrete (Cast-in-Place)

All concrete shall conform to Section 00440, (Commercial Grade Concrete) Oregon Standard Specifications for Construction

E. Street Lights

Unless otherwise approved by the City, street light poles and arms shall be fiberglass poles designed to produce a 25-foot mounting height, shall be grey or brown in color, have a natural finish, and be of the direct burial type.

Unless otherwise approved by the City Engineer, all luminaries shall be Cobra head drop lens type using a 100 watt high pressure sodium light source with an acrylic lens and photoelectric control relay with a 6 foot mounting arm. The fixture shall produce a medium distribution, semi-cutoff, Type II lighting pattern.

All street lighting materials, including wire and installation procedures shall meet current requirements for maintenance by the local electric utility company.

**2.11 IMPROVEMENT STANDARDS BY STREET CLASSIFICATION**

A. The table below summarizes the improvement standards for each road classification.

IMPROVEMENT REQUIREMENTS		
Street Classification	Min. Right-of-Way Width	Curb to Curb Width
Arterial	60'	40'
Collector	60'	40'
Local (Residential)	50'	32'
Residential Cul-de-sac (Length > 200 ft)	50'	30'
Residential Cul-de-sac (Length < 200 ft)	45'	30'
Cul-de-sac Bulb (Residential)	51' radius	48' radius
Alleys	20	20

B. The number of travel lanes for arterial and major collector roads shall be determined by the volume of traffic. The City may require additional turning lanes based on situational analysis or a traffic engineer's report evaluating the need for additional turning lanes.

- C. Additional pavement and right-of-way width may be required to accommodate turning lanes, parking, landscape/parking strips and bike lanes.

**2.12 STREET DESIGN AND MINIMUM SECTIONS**

- A. The street design shall result in streets that:
  1. are of adequate design to handle the traffic needs of the City,
  2. are designed in a manner to allow economical future maintenance, and,
  3. provide a minimum practical pavement design life of 30 years for all streets.
- B. The minimum pavement section for public streets shall conform to the following table. These pavement sections are based on sub-grade compacted to 95% of AASHTO T-180 (Modified Proctor).

MINIMUM PAVEMENT SECTIONS		
Street Classification	AC Pavement Thickness (inch)	Base rock Thickness (inch)
Arterial	4	15
Collector	4	15
Local (Local )	3	10
Cul-de-sac (Residential)	3	9
Alley	3	9

- C. The City reserves the right to require an engineer designed pavement section in lieu of the standard section. This will typically be required for streets for which the City Engineer has reason to suspect unsuitable soil conditions, high percentage of trucks, where overlays are proposed, or any other conditions that may significantly affect the pavement structure design.

Where required by the City, the design of overlays shall include non-destructive falling weight deflectometer tests or other tests approved by the City Engineer and the preparation of an engineering analysis of street improvements required for the design life required with all anticipated traffic, including truck traffic.

- D. Unless otherwise approved by the City Engineer, pavement designs shall be based on AC pavement conforming to Section 00745 (HMAC) Oregon Standard Specifications for Construction and compacted to a minimum of 91 % of maximum density as determined by the Rice Standard Method.

**2.13 OVERLAYS**

- A. All AC pavement overlays shall include non-woven fabric specifically designed for use with AC pavement.
- B. The standard minimum overlay thickness shall be 2-inches. In no case shall the overlay thickness be less than 1 1/2-inches. This minimum thickness shall be increased as necessary to provide the required cross slopes, with smooth transitions between all variations in cross slope.
- C. Design of overlays shall be based on an analysis of the existing pavement condition by a registered professional engineer experienced in the design of pavements, and shall result in the minimum practical design life as specified. Unless otherwise approved by the City Engineer, testing of the existing pavement shall include the following as a minimum.
  - 1) Coring of the street at maximum 50 foot intervals to establish the thickness and condition of existing pavement and aggregate base.
  - 2) Non-destructive falling weight deflectometer tests on the existing pavement proposed for overlay.
  - 3) Preparation of an engineering analysis of overlay thickness required to provide the specified design life with all anticipated truck traffic.
- D. Areas of existing pavement and base rock which exhibit deflection or alligator cracking or have otherwise failed shall be excavated and replaced with new compacted base rock and AC pavement prior to the overlay. Base rock and AC pavement repair thicknesses shall match standard section thicknesses. All cracks greater than 1/8-inch in width shall be cleaned out and filled with an asphalt emulsion slurry and sand, or other method approved by the City Engineer. All crack sealing, skin patching and plugging of dig-out areas must be approved by the City Engineer prior to the placement of the final fabric and overlay.
- E. Overlay fabric shall be Petromat as manufactured by Amoco Fabrics & Fiber Company, or approved equivalent. Hot oil tack coat (PBA-5 or approved equivalent) shall be used prior to placement of the overlay fabric. Use of emulsion tack coats shall be prohibited.
- F. Asphalt overlays shall be feathered to match existing paving, catch basins, gutter pans and other structures which cannot be raised to grade. The minimum thickness at the edge of the feather shall not be less than 1/4-inch. Unless otherwise approved by the City Engineer, all existing manholes, valve boxes and other structures shall be raised to grade before the overlay. Structures raised to grade following placement of the overlay shall have the pavement saw cut around the structure as required by the City Engineer and a PCC concrete patch placed around the structure.

## **2.14 HORIZONTAL ALIGNMENT**

- A. Horizontal centerline alignments of improvements shall be parallel with the centerline of the right-of-way. Centerline of the proposed street extensions shall be aligned with

the centerline of corresponding existing streets.

- B. Unless required to match curvature of existing right-of-ways, horizontal curves shall be to an even 5 feet, and shall meet the minimum requirements listed below:

MINIMUM HORIZONTAL CURVE RADIUS	
Street Classification	Minimum Horizontal Curve Centerline Radius
Arterials	300 feet
Collectors and Continuing Residential Streets	200 feet
Cul-de-sac	160 feet
Alleys and Private Streets	100 feet
NOTE: Horizontal curve lengths shall conform to the minimums outlined herein, or the length required by the ODOT Highway Design Manual – Chapter 8 - Urban Highway Design (Non-Freeway) required by AASHTO for the posted speed, whichever is greater.	

- C. Staggering or T intersections at collectors and arterials shall be avoided within 300 feet of an opposing intersection. Intersections of local streets shall not be offset staggered less than 200 feet from an opposing intersection.
- D. Streets intersecting an arterial or collector street but not continuing through the arterial or collector street along the same horizontal alignment (i.e., a staggered or tee intersection) shall not be located within 300 feet of another street intersecting the opposite side of the arterial or collector street. Similarly, opposing-intersections of local streets shall be separated by not less than 200 feet.

**2.15 MONUMENTATION**

- A. Monumentation in accordance with ORS 92.060 Subsection (2) and/or 209.155 shall be completed before the City will accept street improvements. Monuments shall be set under the direction of a registered Professional Land Surveyor. A record of survey must then be filed in compliance with ORS 209.250 and any additional requirements set forth by the City.
- B. Any existing or new street or property survey monuments within the street improvement areas shall be set in approved monument boxes. Monument box

submittals shall be provided to the City Engineer for review and approval.

- C. The following centerline monuments shall be set as a minimum:
  - 1) All centerline - centerline intersections.
  - 2) The centers of all cul-de-sacs.
  - 3) Curve points in accordance with ORS 92.060 and 209.155.
- D. All public utilities within the right-of-way shall be placed in positions that do not interfere with record monuments.

## **2.16 VERTICAL ALIGNMENT AND STREET GRADES**

- A. Street grades shall be designed to allow drainage to the curb or drainage areas within the public right-of-way. To the extent practicable, street drainage should also serve as drainage for lots. In general, this requires the curbs of new streets be set a minimum of 6-inches below existing grade.
- B. Streets intersecting with a greater functional classification street or streets intended to be posted with a stop sign shall be designed with a “landing”. Landings are the portion of the street within twenty (20) feet of the curb line of the intersecting street at full improvement width. Landings shall have a maximum average longitudinal slope of five percent (5%).
- C. Unless otherwise approved in writing by the City Engineer and applicable City planning authorities, street grades shall not exceed the following:
  - 1. Arterials = 6%
  - 2. Collectors = 10%
  - 3. All others = 10% except as noted below
    - Grades steeper than 10% require special approval by the Fire Chief.
    - Grades steeper than 12% require special approval by the Fire Chief and City Engineer.
- D. Minimum center line street gradients shall be 0.5% along the crown and curb for all streets.
- E. Streets intersecting with streets not constructed to full City standards shall be designed to match both present and future vertical alignments of the intersected street. The requirements of this manual shall be met for both present and future conditions.
- F. Grade changes of more than one percent (1%) shall be accomplished with vertical curves. Vertical curve K-values shall conform to the values listed below. The vertical curve K-value shall be defined as the length of the vertical curve divided by the algebraic difference between the tangent street grades ( $K = L/A$ ).

DESIGN CONTROL FOR VERTICAL CURVES BASED ON STOPPING SIGHT DISTANCE		
Design Speed MPH	Crest Vertical Curve, Minimum K-value	Sag Vertical Curve, Minimum K-value
20	10	20
25	20	25
30	30	35
35	40	45
40	60	55
45	80	70

- G. Street grades, intersections and super-elevation transitions shall be designed to not allow concentrations of storm water to flow across travel lanes.
- H. Slope easements shall be dedicated or obtained for the purposes of grading outside of the right-of-way or to ensure that roadway fill slopes are not disturbed.

**2.17 CROSS SECTIONS AND CROSS SLOPES**

- A. **General**
  1. Cross-slope of the street section shall not be less than two percent (2%), and shall not exceed five percent (5%). Unless precluded by cross slope limits, the crown of the street shall be the same elevation as the top of the curbs.
  2. Symmetrical street cross sections with opposite curbs at the same level are preferred.
  3. Off-set crown cross-sections are acceptable only where required due to side hill lies and to match existing facilities. Off-set crowns shall not exceed 12 inches between the high curb and the low curb.
  4. Shed roof or inverted crown sections are not acceptable for public streets.

**2.18 GRADING WITHIN PUBLIC RIGHT-OF-WAY**

- A. Grading for local street and commercial/industrial classifications shall not exceed the following slopes:
  1. From curb to 1 foot behind the sidewalk: Two percent (2%) upward.
  2. From 1 foot behind sidewalk to property line: 5H:1V upward or downward.
  3. Within the street frontage public utility easement: 5H:1V upward or downward.
  4. Outside of right-of-way and private utility easement: 2H:1V up or down outside the public utility easement.

- B. Side slopes may be increased to 2H:1V up or down within 2 feet from the back of the sidewalk with approval from the City Engineer and affected utilities.

## **2.19 CURBS AND GUTTERS**

- A. All streets shall include curbs on both sides except in the situations of interim width improvements. The minimum curb gradients shall be as outlined under Section 2.16, 'Vertical Alignment'.
- B. The standard curb for City Streets shall be Falls City Standard Detail Drawing<sup>1</sup> No.210 Type A curb and gutter for all road classifications.
- C. The ends of all curbs shall be tapered downward to prevent damage to vehicle tires.
- D. A six (6) inch curb exposure is normally required on residential streets and streets with curb and gutter. A seven (7) inch exposure is required on all streets where Falls City Standard Detail Drawing<sup>1</sup> No.211 Type C curbs are allowed.
- E. Three (3) inch diameter curb weep-holes shall be provided through curbs with inverts 1- inch above the gutter line, at the locations outlined below. Drain pipe shall be provided under all sidewalks to connect to all curb weep-holes. The location of all weep-holes shall be shown on the drawings as outlined in Falls City Standards Division 1.
  - 1. Opposite existing or anticipated roof drain downspouts (minimum 2 per lot).
  - 2. At 16 foot on center along low areas where curb top is above adjacent ground.
  - 3. At 16 foot on center adjacent to bank areas to receive groundwater.
- F. When new curbing is being placed, a stamp shall be placed to mark where each water and sanitary sewer service lateral crosses the curb line. The curbs shall be marked on the top of the curbs with an imprinting stamp a minimum of 2-inches high. The impression for a water service shall be the letter "W". The impression for a sewer or effluent sewer service shall be the letter "S".

## **2.20 SIDEWALKS**

- A. Drain pipe shall be installed under sidewalks to connect to all curb weep-holes.
- B. Handicap access ramps meeting current ADA standards shall be provided at all corners of intersections where crossing is permitted, regardless of curb type, and at the ends of all sidewalks.
- C. Handicap access ramps shall be located so as to avoid conflict with storm drain catch basins.

- D. Sidewalks shall be constructed of concrete, and shall be a minimum of 4-inches thick except at driveway crossings, which shall be a minimum of 6-inches thick. Sidewalks shall be a minimum of 5 feet in width. The location of sidewalks within the public right-of-way shall be as approved by the City during the design process.
- E. Water meters, utility poles, etc. are not permitted within sidewalks unless authorized in writing by the City.
- F. Where clustered mailboxes or other objects larger than single mailboxes are within a sidewalk, the sidewalk shall be widened to provide clearance equal to the required sidewalk width. In no case shall the sidewalk clear space be less than 48 inches. All existing mailboxes shall be set on new posts at the time of sidewalk construction.
- G. Sidewalks, to be constructed in conjunction with street improvements provided as part of a development, may be deferred at the City's option until building construction except for the following situations:
  - 1. Arterial or collector streets fronting corner lots.
  - 2. Sidewalks along streets from which access is restricted to the fronting lot.
  - 3. Sidewalks fronting existing structures.
  - 4. Offsite sidewalks not abutting the property within the development.

## **2.21 INTERSECTIONS**

- A. The interior angle at intersecting streets shall be kept as near to ninety degrees (90°) as possible and in no case shall it be less than seventy-five degrees (75°).
- B. Sidewalk access ramps meeting current ADA standards shall be provided at all corners of intersections where crossing is permitted, regardless of curb type.
- C. Streets intended to be posted with a stop sign or streets intersecting with a greater functional classification street shall provide a landing conforming to the requirements outlined under Section 2.16, Vertical Alignment and Street Grades.
- D. The intersection of an arterial or collector street with another street shall have a minimum 100 feet centerline tangent adjacent to the intersection as measured from the curb line of the intersected street. Other streets shall have at least 50 feet of tangent adjacent to the intersection.
- E. Curb radii at intersections shall be as shown below for the various functional classifications. The right-of-way radius at intersections shall be sufficient to maintain the same right-of-way to curb spacing as the lower classified street.
- F. All newly platted or newly approved streets shall be signed with a name approved by the City.

MINIMUM INTERSECTION CURB RADIUS			
STREET CLASSIFICATION	Arterial Street	Collector Street	Local Street
Arterial Street	35 FEET	-	-
Collector Street	30 FEET	30 FEET	-
Local Street	28 FEET	28 FEET	28 FEET

**2.22 CLEAR VISION AREA**

- A. Clear vision areas shall be maintained at each access to a public street and on each corner of property at the intersection of two streets.
- B. No fence, wall, hedge, sign, or other planting or structure that would impede visibility between three (3) feet and eight (8) feet shall be established in the clear vision area. Measurement shall be made from the top of curb or, where no curb exists, from the street edge grade.
- C. The clear vision area shall consist of a triangular area, two sides of which are right-of-way lines or a right-of-way line and access easement line. Where right-of-way lines have rounded corners, the right-of-way lines shall be extended in a straight line to the point of intersection and so measured. The third side of the triangle shall be a line connecting the non-intersecting ends of the other two lines.
- D. For single use residential driveways, the clear vision area shall consist of a triangular area, two sides of which are the curb line and the edge of the driveway. Where no curbs exist, the future location of the curb based on full street improvements shall be used.
- E. The following measurements shall establish the clear vision areas:

<b>CLEAR VISION AREA MEASUREMENTS</b>	
Type of Intersection	Measurement Along Each Lot Line or Drive Edge'
Controlled Intersection (Stop sign/signal)	20 feet
Uncontrolled Intersection (60' r/w)	30 feet
Uncontrolled Intersection (<60' r/w)	40 feet
Commercial / Industrial Driveways	20 feet
Common Use Residential Driveways & Alleys	20 feet
Single Residential Driveways	10 feet
'At the intersection of different classification streets, the measurement shall apply to the measurement along the right-of-way line as specified for each street classification.	

- F. The preceding provisions shall not apply to the following:
1. A public utility pole.
  2. A tree trimmed (to the trunk) to a line at least eight (8) feet above the level of the intersection.
  3. An official warning sign or signal.
  4. A place where the natural contour of the ground is such that there can be no cross visibility at the intersection.

### **2.23 CUL-DE-SACS, TURNAROUNDS**

- A. Cul-de-sacs shall be as short as possible and shall have a maximum length of 400 feet long and serve no more than 18 dwelling units unless otherwise approved by the City.
- B. The Falls City standard details<sup>1</sup> show typical configurations for cul-de-sac turnaround areas. Cul-de-sac geometric dimensions shall conform to the standards listed herein.
- C. Other turnaround geometries may be used when conditions warrant and the City Engineer approves the design and application of its use.
- D. The minimum curb radius for transitions into cul-de-sacs bulbs shall be 28 feet and the right-of-way radius shall be sufficient to maintain the same right-of-way to curb spacing as in the adjacent portion of the street.
- E. The finished pavement grade from the center point of cul-de-sac turnarounds to the curb shall not be less than two percent negative (-2%).

## **2.24 STUB STREETS**

- A. Stub streets allow for future extensions. If a reserve strip is required by the City at the terminus of the right-of-way, the reserve strip shall be conveyed to the City by recorded deed. The reserve strip shall be at least one foot in width and extend the full length of the right-of-way.
- B. A paved turn around shall be provided for stub streets with lengths greater than 150 feet.
- C. Barricades shall be placed at the end of all stubbed roads without a cul-de-sac turnaround.

## **2.25 TRANSITIONS**

- A. Street width transitions from a narrower width to a wider width shall be designed with a 10:1 taper. Delineators, as approved by the City, shall be installed to mark the edges of the transition.
- B. Street width transitions from one width to a narrower width, or lane alignment transitions shall be designed with the length of transition taper as follows:  
$$L = S \times W$$

Where            L = minimum length of taper (feet)  
                      S = Designated Speed (MPH)  
                      W EP to EP offset width
- C. Delineators, as approved by the City, may be installed to define the configuration. Maximum spacing of delineators shall be the numerical value of the design speed, in feet (i.e. thirty-five (35) foot spacing for thirty five (35) MPH).
- D. In situations where a tapered transition cannot be provided, a barricade shall be installed at the end of the wider section of the street and a taper shall be appointed and delineated as approved by the City. The barricade shall conform to MUTCD Standards.

## **2.26 SUBSURFACE DRAINAGE**

- A. Subsurface street drainage must be considered in the design of each street. Subsurface drains shall be designed and constructed per the standard drawing details or the recommendations of the soils report.
- B. Subsurface drains shall connect and drain into the storm drainage system at catch basins, curb inlets, gutter inlets, manholes or road side ditches. Surcharge from the storm drainage system shall not be allowed to back up into the subsurface drains. Alternative subsurface drainage measures may be used if approved by the City.

**2.27 PARKING LOTS**

- A. Minimum pavement sections for parking lots over compacted subgrade shall conform to the following:

PARKING LOT MINIMUM PAVEMENT SECTIONS		
Classification	Pavement Thickness (inch)	Base rock Thickness (inch)
Parking Lot Access Route	3 (AC)	10
Parking Lot	2-1/2 (AC)	7

- B. Access routes through parking lots, which are to be used by delivery trucks, service vehicles, fire trucks, or automobiles in excess of 500 vehicles per day, shall conform to the minimum access route section outlined above.
- C. The dimensions for the design and layout of parking facilities shall conform to the requirements listed in the Zoning and Development Ordinance.
- D. Parking lots and associated driveways shall maintain adequate drainage facilities to prevent water ponding or ice formation. In general, this requires a minimum cross slope of two percent (2%) perpendicular with contour lines. In no case shall cross slopes less than one percent (1%) be allowed at any point. All drainage facilities shall conform to the requirements of Falls City Division 3 Design Standards<sup>1</sup>.
- E. Storm runoff calculations shall be prepared using ODOT Rainfall-Intensity-Duration-Frequency (IDF) curves that are appropriate the subject location. Contact the City Engineer for clarification and guidance regarding storm runoff requirements.
- F. Curves and corners within the parking facilities shall have a minimum curb radius of 15 feet except for emergency access lanes, where a minimum curb radius of 28 feet shall be required.
- G. Bumper guards or wheel barriers shall be installed so that no portion of a vehicle projects into the right-of-way or over the adjoining property.
- H. Driveways on residential corner lots shall be located on the lower classification street. Unless otherwise approved or directed in writing by the City, driveways on multi-family, commercial and industrial lots shall also be located on the lower classification street.

## **2.28 DRIVEWAY SPACING**

- A. No more than one driveway per property shall be permitted in residential zones except for duplexes.
- B. Where possible, driveways for corner properties shall be located on the lowest classification street and as far from the intersection as possible.
- C. Residential driveways of adjoining properties shall have a minimum of 15 feet clear between the edges of the driveways.
- D. Location of all driveways serving commercial, industrial or multifamily facilities shall be approved by the City.
- E. Driveways shall be separated from an intersection by a minimum of 30 feet or one-half the lot frontage, whichever is greater.

## **2.29 DRIVEWAYS AND DRIVEWAY APPROACHES**

- A. Driveways shall conform to Falls City Standard Details<sup>1</sup>. Curb removal for driveways shall be by saw cutting.
- B. Driveway approaches shall be constructed to meet current ADA standards at all locations where sidewalks cross or will cross the driveway.
- C. Driveway approaches on curbed streets shall be constructed of concrete, and shall be a minimum of 6-inches thick.
- D. All driveways shall have a minimum ten (10) foot paved approach from the back of sidewalk location.
- E. Multiple use driveways shall be paved completely.
- F. Common driveways serving multiple lots and flag lot driveways over 150 feet in length shall be provided with an emergency turnaround meeting the requirements of the Police and Fire Departments.
- G. Maximum slope of driveways shall not exceed 15%.

## **2.30 PRIVATE STREETS, COMMON DRIVEWAYS AND FLAGLOTS**

- A. Private streets serving more than 4 residences shall be constructed to public street standards.
- B. A turn-around shall be required for any private residential street which has only one outlet and which is in excess of 150 feet long or which serves more than two residences. Non-residential private streets serving more than one ownership shall

provide a turnaround if in excess of 150 feet long and having only one outlet. Turn-arounds for private streets shall be either a circular turn-around with a minimum paved radius of 35 feet, or a tee or hammerhead turnaround conforming to current Oregon Fire Code standards.

- C. Pavement sections and widths for common driveways, flag lot drives or partition access easements shall conform to the following:

MINIMUM PAVEMENT WIDTH AND SECTIONS			
Classification	Minimum Paved Width <sup>1 2</sup>	Pavement Thickness (inch)	Base Rock Thickness (inch)
Common Drives serving 2 lots	20 ft.	2 ½ (AC)	8
		6 (PCC)	2
Flag Lot Driveway serving 1 lot	12 ft	2 ½ (AC)	6
		6 (PCC)	2
Partition Access Easement	20 ft	2 ½ (AC)	6
		6 (PCC)	2

1-Wider pavement widths may be required by the local fire chief.  
2-Paved width shall be measured from the face of curb where curbs exist.

- D. As a minimum, all grading for flag lot drives shall be completed by the developer at the time of street and utility construction.

### **2.31 STREET LIGHTING**

- A. Street lighting shall be provided as part of the street design process. Street lights shall be located as near as possible to lot line extensions and not in the middle of lots.
- B. Spacing and location of street lighting shall be approved by the City Engineer based on a photometric design. The design and installation of street lights shall be paid for by the developer.
- C. Street lights shall be installed a minimum of 1 foot behind curb line sidewalks.
- D. Street lights may be installed between the curb and property line sidewalks provided the street light is a minimum of 3-feet behind the face of curb and 1 foot from the sidewalk.
- E. Street lights shall be placed at all street intersections. Unless otherwise approved by the City Engineer, street light spacing shall not exceed 200 feet or 3 lot widths, whichever is less. As noted in Falls City Division 1<sup>1</sup> paragraph 1.1(d) of these standards, lesser spacing must be used whenever required by the photometric design.

### **2.32 BARRICADES AND GUARDRAILS**

- A. Guardrails shall be provided on all streets with downhill slopes which drop 6 feet or more at greater than 3H:1V slopes.
- B. Guardrail installation shall be based on Oregon Standard Specifications for Construction - Part 00800 Permanent Traffic Safety and Guidance Devices.
- C. Guardrails shall be designed and constructed per ODOT Roadway Engineering Highway Design Manual and RD 400 series drawings.
- D. Barricade installation shall be based on the "Manual of Uniform Traffic Control Devices." Basically red and white reflectorized Type DI barricades shall be used at the end of a street. White and black reflectorized Type DT barricades shall be used at the end of a street widening which does not taper back to the existing pavement width. White and black reflectorized Type II barricades shall be used at the end of the sidewalk or pedestrian/bike path.

### **2.33 BIKEWAYS**

- A. Bikeway locations shall be determined by the City. Bikeway facilities shall meet the requirements of this document and the latest edition of the ODOT Bicycle and Pedestrian Plan.
- B. A bikeway may be constructed adjacent to the curb within the pavement area.
- C. Structural sections of bikeway facilities on streets shall conform to that of the street or be integral with the curb. Bikeways not within a street shall be constructed upon compacted subgrade, to one of the following pavement section designs:
  - 1. 4-inches of asphalt concrete over 2-inches of compacted base rock, or
  - 2. 2 1/2-inches of asphalt concrete over 4-inches of compacted base rock, or
  - 3. 4-inches of Portland cement concrete over 2-inches of compacted base rock.
- D. Design Standards regarding horizontal alignment, grade, sight distance, intersections, signing, marking, structures, drainage and lighting shall conform to ODOT Standards and shall be approved by the City Engineer. When bikeways are integrated with a curb, all inlet grates shall be designed to protect the bicyclist from the grate or opening.

### **2.34 STREET SIGNS**

- A. Street signs shall be installed on all new public and private streets. Street names for all newly platted streets shall be approved by the City.
- B. Sign material shall conform to ODOT Specifications and City Standards. Location and type of signs shall conform to the ODOT and City Standards.

- C. Signs along County right-of-ways shall be approved by the County as appropriate.
- D. All signs shall be installed and paid for by the developer. Street names and sign types shall be approved by the City prior to placement of the sign order.

### **2.35 CUTTING EXISTING STREETS**

- A. No street in the City of Falls City shall be cut within 5 years of construction or reconstruction unless approved by the City Engineer and, authorized in writing by the City Council. This time period may be extended in one (1) year increments by resolution by the City Council on a case-by-case basis.
- B. In the event that the City allows a street to be cut within the time limit outlined herein, the trench in AC pavement streets shall be restored as follows:
  - 1. The trench shall be backfilled full depth with a slurry backfill (control density fill) approved by the City Engineer. The mix design shall be submitted to the City and approved prior to cutting the street.
  - 2. The trench edges shall be over-cut square and straight to a minimum width of 6-inches from each edge of the trench following completion of the backfill and prior to the final patch work.
  - 3. An asphalt wearing course of Class B mix shall be placed in two lifts to a minimum compacted depth of 4-inches or the depth of the existing pavement, whichever is greater.
  - 4. An overlay of Modified Class C mix to seal the cut area shall be placed following the completion of the trench patching. The overlay shall cover the cut area to a minimum compacted depth of 1-1/2 inch and extend a minimum of 40 feet beyond the cut area in each direction along the street. Unless otherwise approved by the City Engineer, the overlay shall encompass the entire paved width of the street.
  - 5. The overlay shall meet all requirements outlined in PWDS Section 2.13, Overlays. An 18 inch strip of Petromat fabric shall be installed over all trench patch joints.

If this work is performed by a private party, a maintenance bond for the cost of the original construction and repair shall be posted with the City stating that the party shall be responsible for the condition of said pavement patches for a period of two (2) years, and during that time shall repair to the City's satisfaction any of the patches which become settled, cracked, broken or otherwise faulty."

- C. Street cuts in PCC concrete streets shall be restored as required by the City Engineer.