Chapter 3

Streets

City of Kelso
Engineering Design Manual
Amended May 2021
Effective Date _____

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Streets

City of Kelso
Engineering Design Manual

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CHAPTER 3 – STREETS

3.00 General

A. Design Standards

Street infrastructure design shall comply with AASHTO, except as modified in this chapter.

B. Functional Classification

The functional classification of existing and proposed roads is established by the City on an individual basis using the existing land use and existing operational characteristics. The Director will maintain a map that classifies each roadway. Kelso classifies roads and streets as follows:

1. Principal Arterial

These facilities are the supporting elements of both the arterial routes and collector systems. Principal arterials, in combination with minor arterial routes, are intended to provide a high level of mobility for travel within the region. All trips from one sub-area through an adjacent sub-area traveling to other points in the region should occur on a Principal arterial.

Access is generally limited to intersections with other arterials and collectors; direct residential access is not permitted. Direct land access is discouraged, kept to a minimum, and controlled. The level of fixed route transit service is high.

2. Minor Arterial

The minor arterial system complements and supports the principal arterial system, but is primarily oriented toward travel within and between adjacent sub-areas. An adequate minor arterial system is needed to ensure that these movements do not occur on principal arterials. These facilities provide connections to major activity centers and provide access from the principal arterial systems into each sub-area.

They serve through traffic and provide direct access for commercial, industrial, office, and multi-family development, but generally, not for residential properties. Access to abutting lots is limited. Since minor arterials serve a more localized area, fixed route transit is moderate.

3. Collector

Collector streets connect local traffic within a subarea to arterial roads. Service to adjacent land uses is subordinate to traffic movement. Access to abutting properties and parking is controlled through the use of raised channelization, driveway spacing, bicycle and/or pedestrian lanes, and pavement markings. Typically, collector streets are not continuous for any great length, nor do they form a connected network by themselves. Since collector streets connect arterial networks

and also connect neighborhoods to commercial areas as well as each other, fixed route transit service is low. Access to abutting lots is limited.

4. Local:

Local streets serve to distribute traffic from collectors and provide direct access for abutting properties. Through trips are discouraged and parking is allowed.

5. Alleys

Alleys provide service access to adjoining properties through one-way traffic. Through trips and parking are not allowed. No fixed route transit usage and the focus is for service and localized access. Service to a very limited number of lots.

3.01 Access Standards

The Director has the authority to remove access, limit access and designate access locations on public streets under the jurisdiction of the City. Access Standards are as follows:

- One access will be permitted for each parcel zoned single family residential. Parcels with other zoning will be permitted access based on the results of an access plan prepared by the Applicant. Requests for more than one access per parcel shall be submitted with a design modification request and be supported by an analysis of traffic impacts up to and including a traffic impact study.

- When a parcel has multiple street frontages, access will be granted from the lesser classification street only.

- Where the parcel fronts multiple streets of the same classification, access will be granted to the street with the lowest volume or the street with the safest access point, at the discretion of the Director.

- Direct access onto arterial streets is not permitted if alternate access is available. If direct access to an arterial street is allowed, it shall be "right-in, right-out" only, and pavement markings and signs indicating Right Turn Only shall be installed.

- Access from Alleys. No access is permitted to alleys except where the intersecting and parallel streets are classified as Local, and the use is single family residential. When alley access is permitted, one alley access will be approved and the alley access will be the only access for the residence.

- Access requirements and conditions are further detailed in 3.02 *Intersections and Driveways.*

Access to streets and highways under Cowlitz County or State of Washington jurisdiction must be formally approved by those entities at the applicant's initiative and expense prior to approval of a Development application.

A. Street Access Request Process

1. Applications. Applicants may request a street access permit as part of an underlying Development application, or they may file separately for a street access permit if the access is being requested without relation to an underlying land use application.

2. Approval. The issuance or denial of the street access permit will be made administratively by the Director.

3. Submittal Requirements for Street Access Permit. In accordance with KEDM Section 1.04.

4. Permit Issuance. The following are required for permit issuance:

   a. The street access must comply with the design standards for the functional classification of the roadway proposed to be accessed.

   b. If the proposed access is an expansion or change of use of a pre-existing non-conforming access, the Applicant must demonstrate that the proposed access will not substantially adversely affect the safety of the street section that the proposed access will access through an interim access permit application (see below).

   c. In addition, the City may impose conditions upon the permit through the SEPA process to mitigate the specific adverse impacts created by the proposed access. The City may also further modify, restrict or eliminate the access at a future date due to change in use of the property, safety reasons, change in traffic volume, change in the accessing street configuration, or other reasons in the public interest.

5. Exceptions from Access Standards. Exceptions to the Access Standards may be approved by the Director for a street access permit upon a showing by the applicant of one or more of the following:

   a. Topography, right-of-way, existing construction or physical conditions, or other geographic conditions impose an unusual hardship on the applicant, and an equivalent alternative which can accomplish the same access management purpose is available.

   b. A minor change to a standard is required to address a specific design or construction problem, which if not enacted, will result in an unusual hardship.

   c. An alternative standard is proposed which is equal to or superior to these standards.

   d. Application of the standards of this chapter to the development would be grossly disproportional to the impacts created.

6. Suspension. The Director may suspend a street access permit, including interim access permits, where the applicant fails to comply with the conditions

and access standards of the street access permit. The street access permit can be reinstated upon compliance with conditions and access standards of the street access permit. If after 180 days the applicant has failed to comply with conditions, the Director may revoke the street access permit and cause the access to be closed.

3.02 Intersections and Driveways

A. General Requirements

1. All new development shall be served by a driveway. Standard driveway approaches and driveways, fitting the land use and complying with Kelso Standard Plans, are required for all driveways accessing onto a public (or private) right-of-way or easement. No more than two single family residences may be served by a driveway. Development of a public or private street (see section 3.10) is required when more than two single family residences are proposed to take access.

2. A private intersection opening may be used in lieu of a conventional driveway in commercial and industrial areas when traffic signalization is required, approved, warranted and provided, or where all of the following criteria are met:

   a. Projected private intersection opening usage is greater than two-thousand (2,000) vehicles per day.

   b. A minimum one-hundred (100) foot storage area is provided between the street and any turning or parking maneuvers within the development.

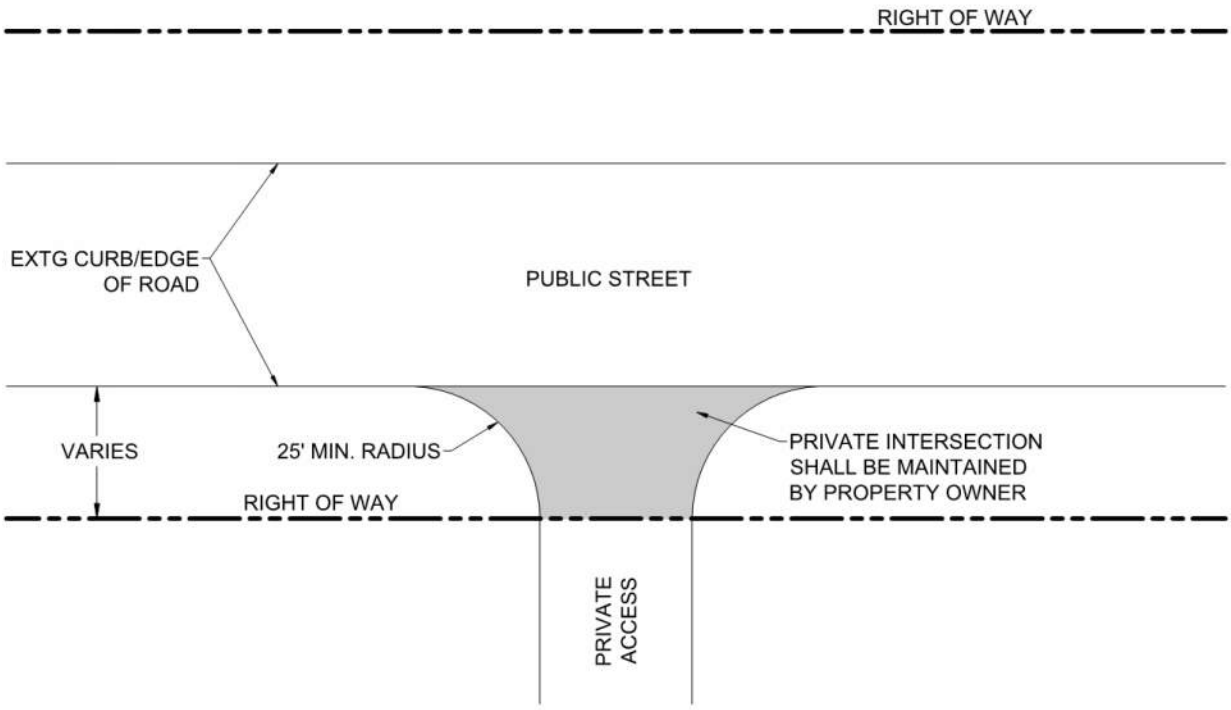
   c. The private intersection opening is at least two hundred (200) feet from any other intersection opening, including driveways on or off the property frontage, and whether the other intersection openings or driveways are under control of the applicant or not.

   d. Easement dedication for traffic control devices is provided.

   Maintenance of the private intersection curb and gutter and surfacing on the property owner's side of the public street is the property owner's responsibility.

Figure 3-1

Private Intersection on Public Street



B. Conditions of Approval

1. All abandoned driveway areas on the street frontage to be improved shall be removed and new curb, gutter, and sidewalk shall be installed.

2. No commercial, industrial or multi-family driveway will be approved where access in to or out of the driveway requires vehicles to back onto the sidewalk or street.

3. No driveway will be approved where backing onto a street might occur and the slope of the driveway is greater than ten percent (10%) within the first twenty (20) feet of the property line.

4. Left turns from and to a driveway may be restricted as a development condition, or in the future, if such maneuvers are found to be unsafe.

5. Driveways shall be aligned wherever practicable with existing driveways or intersections on the opposite side of the street.

6. All driveways shall be angled ninety-degrees (90°) to the street.

C. Intersection/Driveway Spacing. Intersections are divided into two categories for determining spacing requirements: signalized access spacing and unsignalized access spacing, which include both driveways and intersections.

1. *Signal Spacing*. Spacing for new signals shall be based on the findings of the Traffic Impact Study.

2. *Access Spacing*. Spacing of unsignalized roadway intersections and driveways, is described in Table 3.1a and 3.1b respectively, and will be measured from the centerline of the intersections or driveways. Distances from intersection corners for access driveways as described in Table 3.2 shall be measured between the nearest edges of the driveways, edge of roadway or curb line. Where the distance required from the corner is greater than the parcel frontage, the driveway shall be placed as shown in Fig. 3-2 below.

Table 3.1a
Unsignalized Intersection Spacing

When highest classification involved is:	Centerline Spacing between Intersections should be:	
	Desirable	Minimum
Arterial	≤500 feet	350 feet
Major Collector	350-500 feet	200 feet
Neighborhood Collector	250-350 feet	150 feet
Local	250-350 feet	150 feet

"Desirable" conditions shall be applied when sufficient space or street frontage is available.

Table 3.1b
Minimum Driveway Spacing
Arterials and Collectors

Speed on Adjacent Street	Desirable Conditions	Limiting Conditions
25	120	75
30	185	100
35	245	160`

"Desirable conditions" shall be applied when sufficient space or street frontage is available. If sufficient space or street frontage for desirable conditions is not available, then lesser distances, down to but not less than the numbers labeled on "limiting conditions," may be applied.

Driveways providing access to local streets must be spaced a minimum of 5 feet from the nearest property line and 10 feet from the nearest adjacent driveway measured from the

nearest edge (wing) of the driveway, except where a parcel fronts on the bulb of a cul-de-sac.

In the case of long or oddly shaped blocks, and to facilitate pedestrian access to parks, playgrounds, open space or schools, the Applicant shall construct pedestrian paths of not less than ten feet in width on a dedicated right-of-way or perpetually unobstructed easement of not less than twenty feet in width, to extend through the block(s) at location(s) deemed necessary by the Director.

D. Access from Alleys. When alley access is permitted, the driveway width to the residence shall conform to the Kelso Standard Plan for a residential driveway.

E. Corner Standards. Driveways on corner parcels shall be placed on the roadway with the lower classification. If both roadways have the same classification, the Director shall determine on which roadway the driveway shall be located. It may be necessary to perform a queuing analysis to determine if the queue on the roadway where access is being requested blocks the proposed access. Driveway locations for multi-family, commercial and industrial parcels shall be determined through the Site Plan Approval process.

Table 3.2

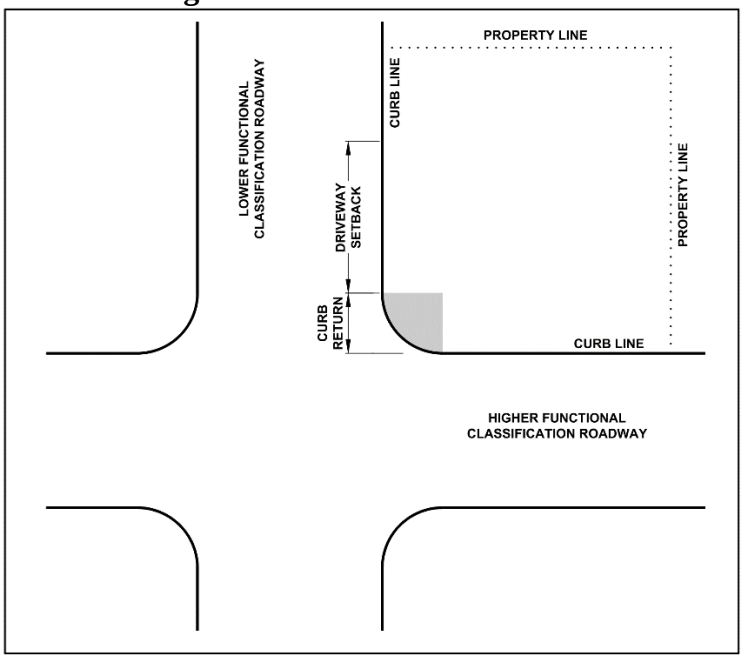
Minimum Distances from Corner Standards

Functional Classification	Minimum Access Set-back from Corner (ft)
Principal Arterial	**115**
Minor Arterial	**75**
Collector	**50**
Local	**30**

The corner point from which to measure is the curb return radius as shown in Figure 3-2. Where the distance required from the corner is greater than the parcel frontage, the driveway shall be placed at the furthermost distance from the intersection.

Additional setback, or a right-in/right-out driveway may be required to avoid interference with traffic operations from the 90th percentile queue length.

Figure 3-2: Corner Lot Setback



F. Sight Triangles for All Uses in All Zones. The corner areas of lots adjacent to street intersections as well as the corner areas adjacent to driveways and other access easements shall be kept clear of all obstructions. Sight distance shall be designed and preserved in accordance Section 3.14, *Sight Obstruction Requirements*.

G. Restrictive Median Curbs. Except for Local classified roadways, restrictive median curbs shall be used to restrict turning and crossing movements as follows, and at other locations as directed by the Director or as required by WSDOT for State highways:

1. If access spacing outlined in Tables 3.1a and 3.1b cannot be met, restrictive median curbs shall be installed of sufficient length to restrict left turn and crossing movements, or between full access intersections, whichever is greater.

2. At signalized intersections on principal arterials, the length of restrictive median curbs shall be equal to the minimum access set-back spacing distance shown in Table 3.2, regardless whether or not driveways exist.

3. At intersections with left turn lanes on principal arterials, minor arterials, and neighborhood collectors, the length of restrictive median curbs shall be equal to the left turn lane storage length, except as may be required by condition number 2 above.

H. Turn Lane Warrants

1. Turn lanes (left and right) may be warranted at unsignalized intersections, and shall be evaluated using appropriate left or right turn lane warrants standards adopted by the City or State, depending on which facility is being analyzed.

2. At signalized intersections, a TIA shall be used to determine required storage length for left or right turn lanes.

I. Driveway Design Criteria:

1. Width.

a. Two-way multi-family residential driveways shall have a minimum width of sixteen (16) feet and a maximum width of twenty-four (24) feet. Where intersection openings are approved, the width shall be as determined by the Director. One-way multi-family residential driveways shall have a minimum width of ten (10) feet and a maximum width of twelve (12) feet. Parking lots shall be designed to meet circulation needs within the parking lot without use of the public streets.

b. Two–way commercial/industrial driveways shall have a minimum width of twenty-four (24) and a maximum width of thirty-two (32) feet. Where intersection openings are approved, the width shall be as determined by the Director. One-way commercial/industrial driveways shall have a minimum driveway width of twelve (12) feet with a maximum width of sixteen (16) feet. Commercial/industrial driveways shall meet the separation requirements of Section 3.02. Parking lot circulation needs shall be met on site. The public right-of-way shall not be utilized as part of a one-way parking lot flow. A wider commercial/industrial driveway width may be approved by the Director where a substantial percentage of oversized vehicle traffic is anticipated and a written request and turning diagrams are submitted. The request shall include justification for the oversized vehicles and the design vehicle selection as well as detailed alternatives and considerations that were evaluated.

c. A single-family driveway shall have a minimum width of ten (10) feet and maximum width of twenty-four (24) feet.

d. Alley driveways shall match the width of the alley.

Driveway widths described above do not include the driveway wings or transition radius. See Kelso Standard Drawings.

2. Clearance from structures. No object (including fire hydrants, light or power poles, street trees) shall be placed or allowed within six (6) feet of the driveway wing and edge.

Where the building facade or other design element is less than ten (10) feet behind the sidewalk, both pedestrian and vehicular sight distance shall be maintained.

3. Sight Distance. Sight distance shall be designed in accordance Section 3.14, *Sight Obstruction Requirements*..

4. Surfacing. Surfacing for driveway approaches shall comply with the Standard Plans and Standard Specifications. Surfacing for driveways on private property shall be hard surfaced with permanent materials such as HMA, concrete or unit pavers.

5. Permeable Pavement. Use of permeable pavement for residential and commercial driveways is encouraged where feasible in accordance with City of Kelso stormwater requirements.

J. Angle between intersections.

The interior angle at intersecting streets shall be kept as near to ninety degrees (90°) as possible and in no case shall vary more than fifteen degrees (15°), from the ninety-degree (90°) angle. A tangent section shall be extended a minimum of fifty (50) feet each side of intersecting right-of-way lines. When possible, intersections shall align with any existing intersection on the opposite side of the street.

K. Intersection Curb returns:

Minimum curb radii at intersections shall be shown in Table 3.3 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 upper classified street.

Sidewalk access ramps (Curb Ramps) shall be provided at all corners of all intersections, regardless of curb type.

Table 3.3
Curb Return Radii (Feet)
Edge of Pavement/Curb –Minimums

Street Classification	Arterial Street	Collector Street	Local Streets
Arterial Streets	30	25	25
Collector Streets	30	20	20
Local Streets	30	20	15

L. Intersection Sight Distance.

Intersection sight distance shall comply with Section 3.14 *Sight Obstruction Requirements*.

M. Intersection Traffic Control

Intersection traffic control shall be as specified in the Manual of Uniform Traffic Control Devices (M.U.T.C.D.) or as modified by the Engineer as a result of appropriate traffic engineering studies. Traffic signal modification, relocation, or installation is required when roadway or driveway geometrics interfere with existing signal facilities, or would result in an un-signalized driveway, or intersection that meets signal warrants.

3.03 Street Widths

The figures below show the street width standards by the functional classification. The functional classification of streets are as shown on the City's functional classification map. If a street has not been classified, the City Engineer will determine the functional classification. Public utility easements beyond the right-of-way are typically required.

Lane configuration shall be determined following the review of the TIA, if applicable, and prior to construction drawing approval.

Additional right-of-way and pavement width may be required, in addition to that shown in Figures 3-2 through 3-8, to encompass cut and fill slopes, allow parking, LID BMP's, turn lanes, bike lanes, transit bus turn outs, median strips and other public improvements. Bioretention curb extensions may be located in the parking lane with approval of the Director to reduce the need for additional right-of-way.

Figure 3-3: Principal Arterial

Design Speed: 30 mph

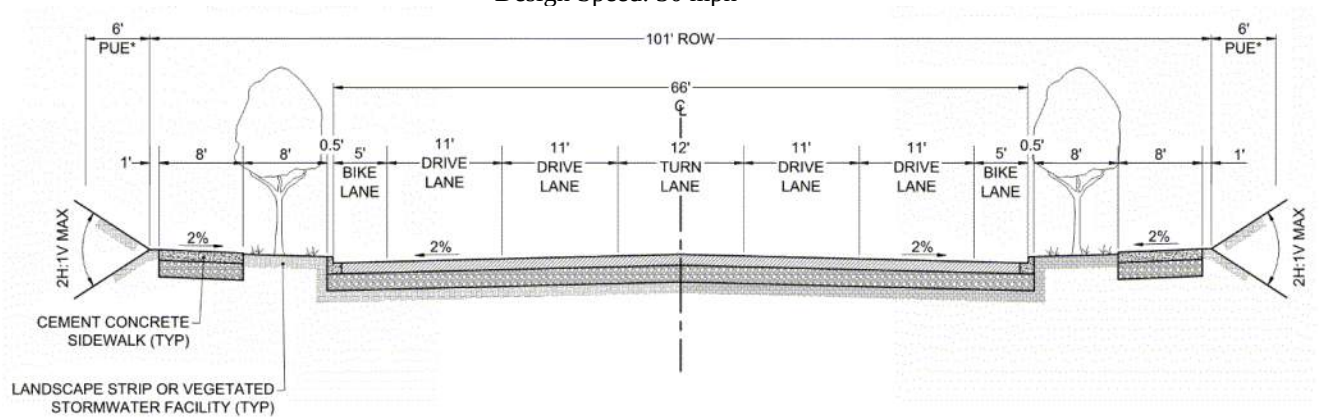


Figure 3-4: Minor Arterial

Design Speed: 30 mph

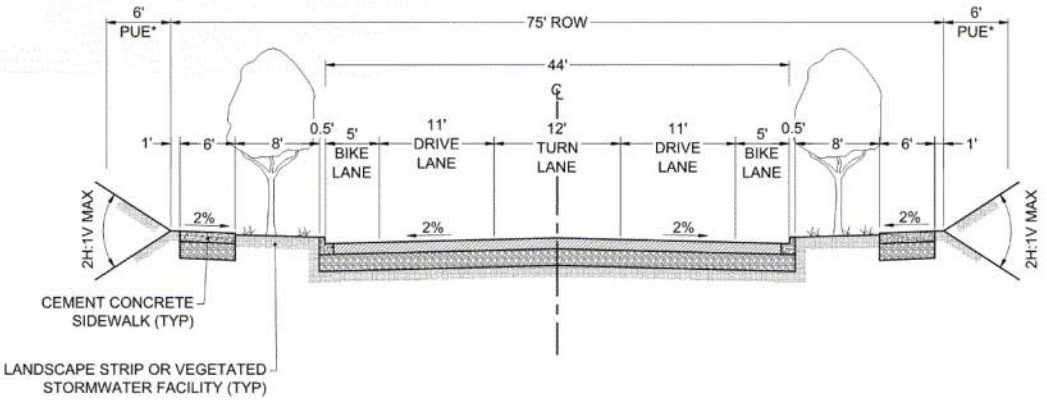


Figure 3-5: Collector

Design Speed: 25 mph

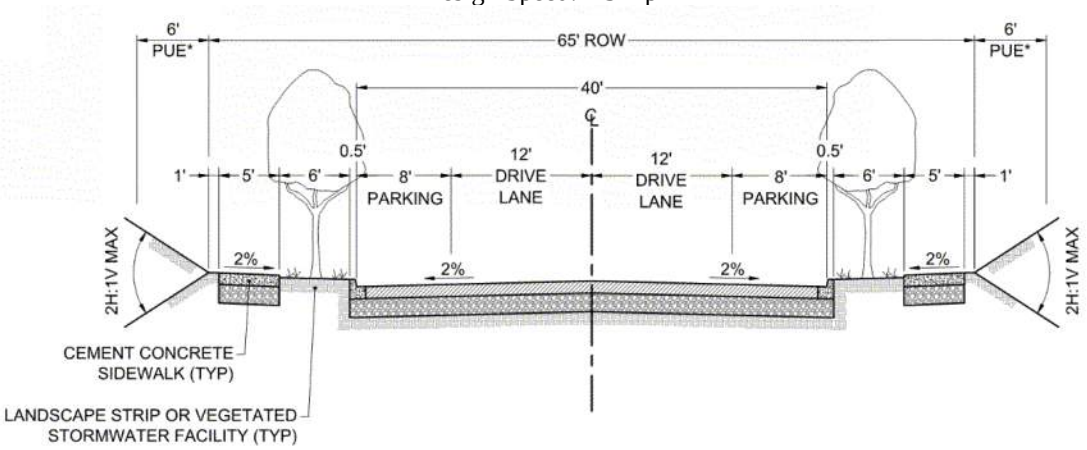


Figure 3-5a: Collector--Industrial Land Use

Design Speed: 30 mph

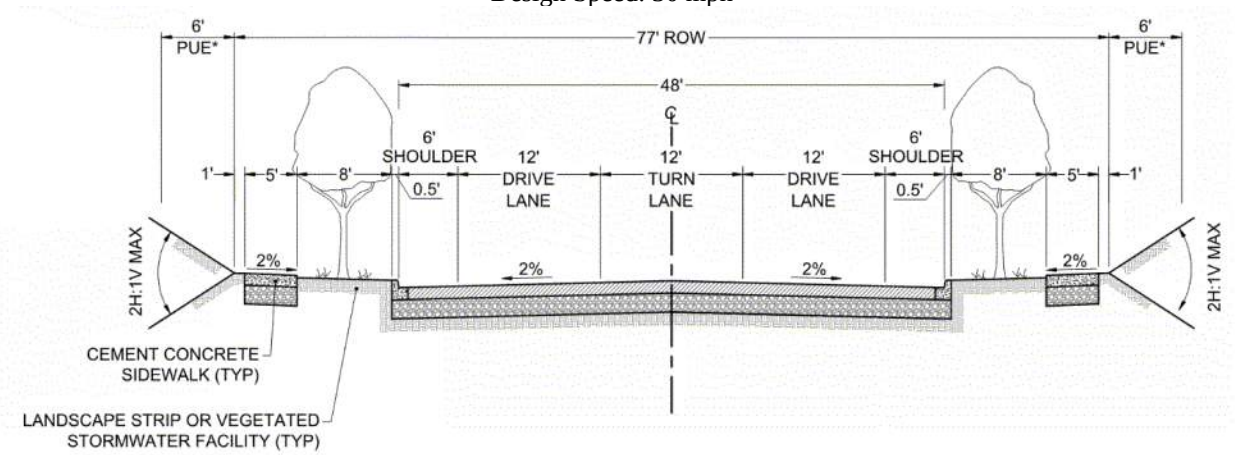


Figure 3-5b: Collector with Ditch--Industrial Land Use

Design Speed: 30 mph

* Sidewalk on only one side may be allowed pending findings of a pedestrian use study.

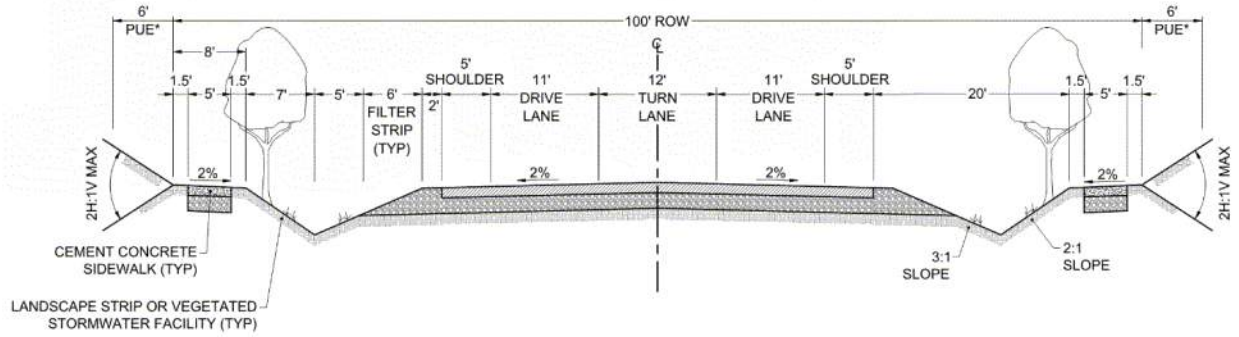


Figure 3-6: Local—Residential Area

Design Speed: 25 mph

***6' PUE. Utilities may be placed under the sidewalk in new subdivisions with approval of the Director if on-site bioretention is used to manage stormwater on residential lots.**

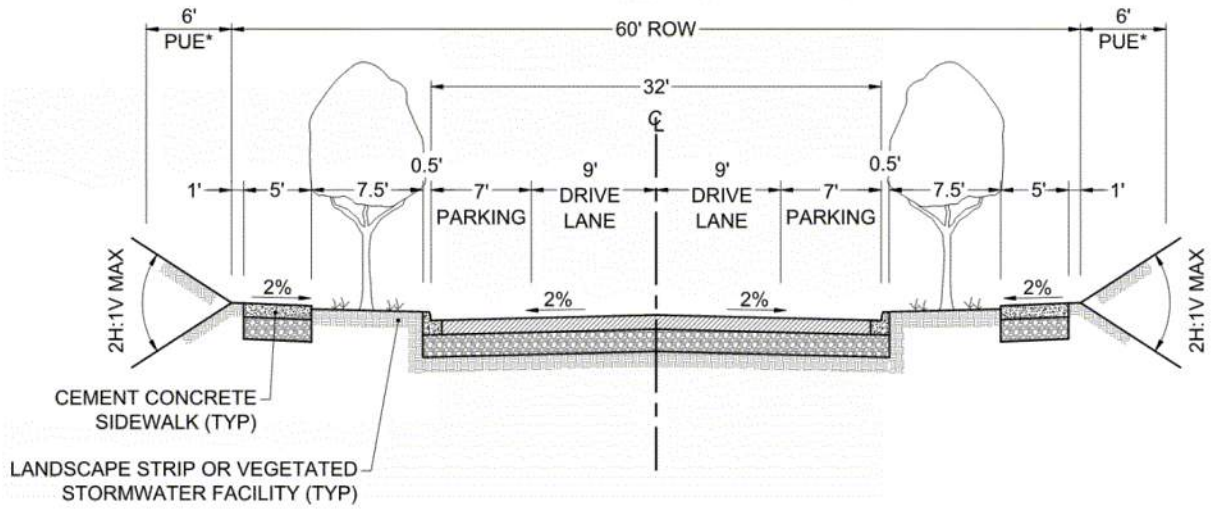


Figure 3-7: Local—Single Family Areas – 24'

Design Speed: 25 mph

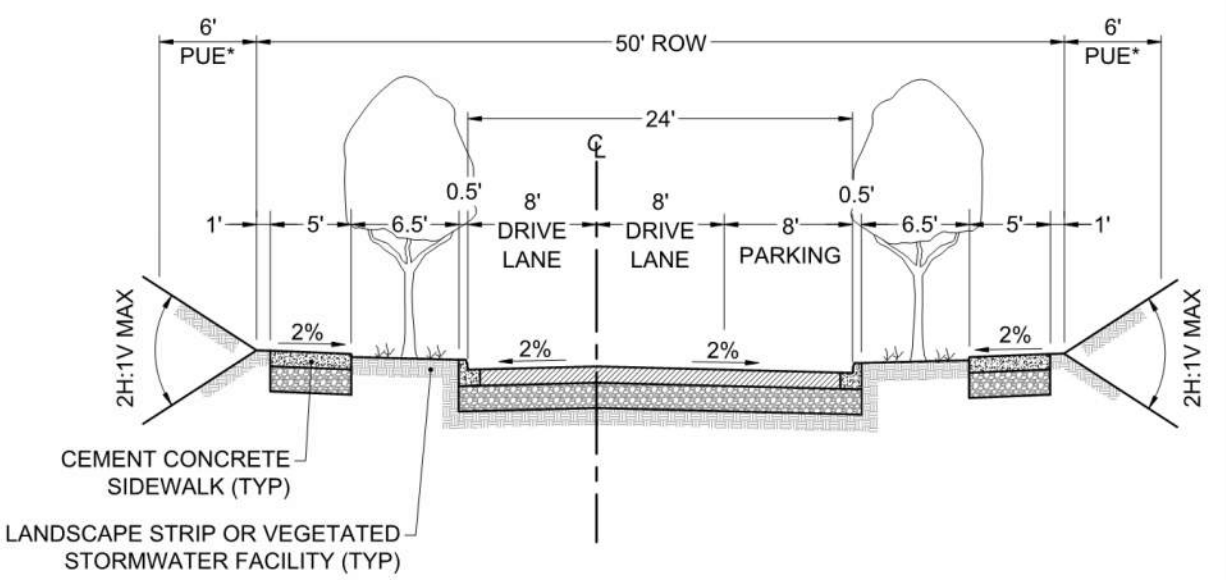
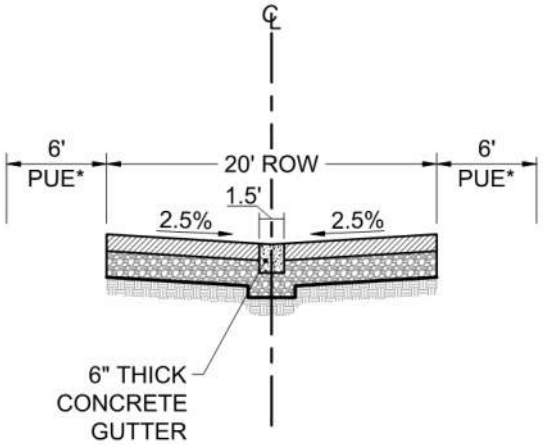


Figure 3-8: Alleys: Commercial & Industrial

Design Speed: 15 mph



3.04 Surfacing Requirements

The pavement structure thickness ("Minimum Surfacing Requirements") identified in the Tables below by street classification shall be constructed unless a site-specific pavement design is prepared. Asphalt concrete pavement shall be hot mix asphalt (HMA), Class 3/8 inch, PG 58H-22. The mix design of the HMA shall be selected using the 20 year truck volume estimate determined by the TIA converted to equivalent single axle loads (ESAL's).

Base rock shall be crushed surfacing base course. The top 4" of the base rock section may be crushed surfacing top course. Base repair to remove existing base rock and thicken the base rock section will be required if the base rock is deflecting and/or pumping under fully loaded truck traffic prior to or during paving.

The Geotextiles for subgrade stabilization shall be installed prior to constructing the base rock section.

Table 3.4
Principal Arterial
Minimum Surfacing Requirements

	Hot Mix Asphalt Thickness	**Base Rock Thickness**
	0.83'	1.50'

Table 3.5
Minor Arterial
Minimum Surfacing Requirements

	Hot Mix Asphalt Thickness	**Base Rock Thickness**
	0..67	1.50'

Table 3.6
Collector Street
Minimum Surfacing Requirements

	Hot Mix Asphalt Thickness	**Base Rock Thickness**
	0.60'*	1.50'

* 0.67 is required if the street is a bus route or fronts commercial or industrial zoned land.

Table 3.7
Local Street and Alley,
Minimum Surfacing Requirements

	Hot Mix Asphalt Thickness	**Base Rock Thickness**
	0.35'*	1.50'

***** 0.60' thickness is required if the street is a bus route or fronts commercial or industrial zoned land. Concrete street thicknesses will be as directed by the City Engineer.

3.05 Design Speed

The minimum design speed for each street classification shall be as shown in Figures 3-3 through 3-8.

3.06 Horizontal Alignment

A. General

1. Horizontal alignment shall be designed in accordance with AASHTO guidelines.

2. Superelevation may only be used with the written approval of the Director. Where superelevation is used, street curves shall be designed in accordance with AASHTO guidelines, except that a maximum superelevation rate of 0.04 shall be used.

3. Off-set crown cross-sections are not acceptable as superelevation sections.

B. Street Design in Residential Areas

1. Streets shall be aligned to promote connectivity by providing for continuation of streets in adjoining development and accommodating future opening of streets to possible adjoining development.

2. Streets shall be oriented within twenty-five degrees of east-west to the maximum extent possible to enhance solar access to residences. If other considerations such as topography and contours or connection with existing higher classification streets adversely affect this standard, then alternatives may be considered. This may include assurance that the majority of lots have their axes oriented north-south regardless of the angle of incidence of lot lines with street rights of way lines.

3. To minimize driveway access on higher volume streets, a buffer strip may be used and a separated service or marginal access road may be utilized.

3.07 Vertical Alignment

A. Vertical curves shall be designed in accordance with AASHTO and the following requirements:

1. Minimum street gradients shall be one-half percent (0.5%);

2. Maximum street gradients shall not exceed fifteen percent (15%) for local streets in residential areas. Maximum street grades shall not exceed ten percent (10%) for local streets in industrial/commercial use areas and for collector streets, and not exceed seven percent (7%) for arterial streets;

5. All streets shall be designed and constructed so that the pedestrian route crossing any new, overlaid or widened street at an intersection, whether the crosswalk is marked or not, complies with ADA Guidelines. For intersection legs where there is Stop control or a traffic signal, the longitudinal pedestrian crossing slope from street corner to street corner shall not exceed 5%, and the cross slope of the pedestrian crossing shall not exceed 2%. Where there is no Stop control or traffic signal, the longitudinal pedestrian crossing slope shall not exceed 5% and the pedestrian crossing cross slope shall not exceed 5%;

6. Commercial and industrial driveways shall not exceed two (2) feet difference in elevation for a distance of thirty (30) feet measured from the back of sidewalk, or the back of curb if no sidewalk exists, approaching an arterial street, or twenty (20) feet approaching a collector or local street.

7. Grade breaks of more than one percent (1%) shall be accommodated with vertical curves;

8. At street intersections, the crown of the major (higher classification) street shall continue through the intersection. The roadway section of the minor street will flatten to match the longitudinal grade of the major street at the projected curb line;

9. Street grades, intersections, and super elevation transitions shall be designed to not allow concentrations of storm water to flow across the travel lanes; and

10. Streets intersected by streets not constructed to full City standards shall be designed to match both present and future (as far as practicable) vertical alignments of the intersecting street. The requirements of KEDM shall be met for both present and future conditions.

B. The following standards shall govern vertical alignment with respect to flood elevations:

Table 3.8
Vertical Alignments and Flood Plains

Functional Classification	Vertical Standard
Arterial Streets	Travel lanes at or above the 50-year flood elevation but not lower than 6-inches below the 100-year flood elevation.
All other streets	Travel lanes at or above the 25-year flood elevation but not lower than 6-inches below the 50-year flood elevation.

3.08 Transitions

Street width transitions from a narrower width to a wider width shall be designed with a ten to one (10:1) taper. Street width transitions from a wider width to a narrower width shall be designed in accordance with AASHTO Standards or a ten to one (10:1) taper whichever is greater. Delineators, as defined by the MUTCD and approved by the City, shall be installed to define the configuration.

In locations where a tapered transition is infeasible, a type III barricade shall be installed at the end of the wider section of the street and a taper shall be designed and delineated as approved by the Director.

3.09 Dedications and Guarantees

A. Right-of-way shall be deeded for streets and other improvements in accordance with dimensions given in the Figures in this Chapter to accommodate motorized and non-motorized transportation, landscaping, utility, drainage, LID BMP's, and buffer requirements.

If the Fire Marshal and Director approve a narrower pavement width in accordance with Figure 3-6, right-of-way width may be reduced accordingly with Director approval.

B. Public utility tracts and/or easements for all public systems shall be provided as required. Specific requirements for sewer, water, and storm drainage easements are detailed in the relevant chapters. Particular design features of a road may necessitate slope, wall, or drainage easements. Such easements may be required by the Director in conjunction with dedication or acquisition of rights-of-way and other

standard easements (temporary construction, right-of-entry, sidewalk, pedestrian, street lighting, and traffic control devices, etc.)

C. Public Access Easements or Tracts.

Where it is necessary to facilitate pedestrian circulation between neighborhoods, schools, shopping, or other activity centers, public access easements or tracts shall be dedicated.

Improvements to Public Access easements shall include a sidewalk or trail consistent with other non-motorized facilities in the area; width as approved by the Director. Fences shall be constructed along Access easements in residential areas where buildings will be located nearer than fifty (50) feet to the edge of the easement. Traffic diverters or bollards shall be installed at the direction of the Director.

Public Access easements or tracts shall be a minimum of fifteen (15) feet wide. If the easement is over one-hundred and fifty (150) feet in length, the width shall be twenty (20) feet. Structure setbacks shall be a minimum of five (5) feet from the edge of the easement or tract.

D. All subdivisions and short plats shall deed additional right-of-way, as a condition of approval of the subdivision or short plat, where the existing right-of-way for a public street is not adequate to incorporate necessary frontage improvements for public improvements, public safety and to provide compatibility with the area's circulation system.

No buildings or other structures are allowed within the right of way, public utility tracts or public easements.

3.10 Private Streets

A. Criteria for Authorization. Private streets may be permitted only if they meet all the following conditions:

1. A design modification for the private street has been approved by the Director;

2. Covenants have been approved by the Director and recorded with the County Auditor that provide for maintenance of the private streets and associated parking areas by owners in the development. Private streets shall be maintained by a legally responsible owner(s) in the development to be served by the proposed private street or by the homeowner's association. "Maintenance" shall include, but not be limited to, cleaning, repairs, and replacement of streets, shoulders, signs, and storm drainage facilities, and vegetation control. . Covenants shall:

a. include a periodic maintenance schedule;

b. be enforceable by any property owner served by that road;

c. include a formula for assessing maintenance and repair costs and establish minimum annual assessments;

d. include remedies for noncompliance with the terms of the agreement, right of use easements and other considerations;

e. be attached to the deed of all properties served by the private road.

3. Provisions are made for the streets to be open at all times for emergency and public service vehicles;

4. The private street will not obstruct public street circulation;

5. The private street will ultimately serve no more than five (5) single family lots or the streets serve commercial or industrial facilities where no circulation continuity is necessary; and

6. The Director determines that no other access is available and the private street is adequate for the area it is to service, and

7. The private street does not connect two public roads.

B. Public Utilities. A public easement shall be provided for public utilities located within the private street.

C. Notice. The following statement is required on the face of any plat or short plat and in the CCRs for the development: "The City of Kelso has no responsibility to improve or maintain the private roads contained within, or private roads providing access to the property described in this plat."

D. Easements. Private streets shall be constructed within easements with a minimum width of thirty (30) feet. Easements shall be widened as necessary to include all cuts, fill, turnouts and turnarounds as required. Private street easements shall include provisions allowing access for public safety and public service vehicles and personnel.

E. Turnarounds. Turnarounds shall be provided at the end of all private streets longer than one-hundred and fifty (150) feet and at one-thousand feet intervals along the length of a private street where no intersecting roadway exists. Turnarounds shall accommodate a full-size fire truck.

F. Grading. All filling and grading associated with the construction of a private street shall be conducted in accordance with the requirements of the current WSDOT Standard Specifications for Roads and Bridges. A geotechnical report shall be submitted to and approved by the Director prior to beginning any land clearing, filling or grading. Such report shall identify materials to be used, compaction rates and methods, maximum allowable slopes, and erosion control methods. Where the

requirements of the Standard Specifications and those of the geotechnical report conflict, construction shall comply with the most stringent requirements.

G. Sight Distance. Private streets shall be designed and constructed so that sight distance complies with KEDM. In addition, any improvements to state, county, city or other private roadways needed to comply with sight distance requirements of the state, county or city at intersections with the proposed private street are a condition of development and shall be designed, constructed and funded by the Developer.

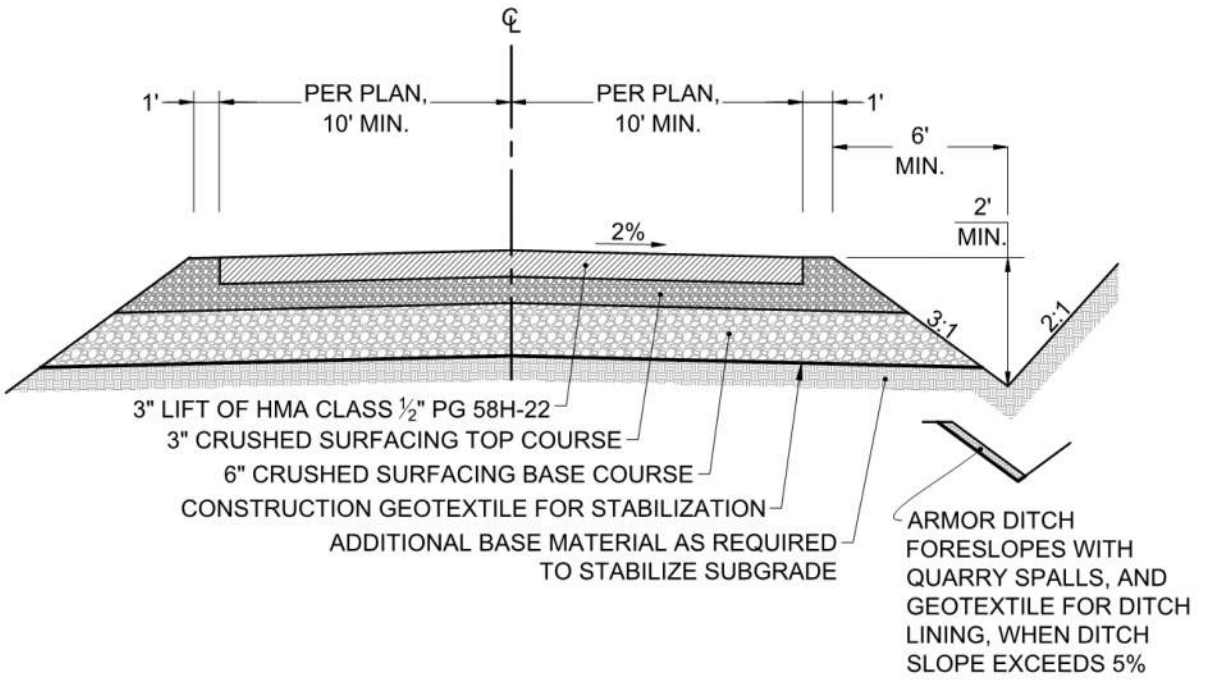
H. Horizontal and vertical design shall comply with the KEDM requirements for public streets except as noted below.

I. Typical Section. Private streets shall comply with the typical section below. The thicknesses shown below are minimum required thicknesses. Depending on soil conditions, additional base rock may be required for stabilization.

J. Construction Requirements. Private streets shall comply with the KEDM construction standards.

Figure 3-9: Private Street

2-5 Residential Units



1. The maximum grade for private streets shall be fifteen percent (15%);

2. Private streets shall be designated by a sign at each intersection complying with MUTCD standards stating the name of the road and “Private Roadway”.

3. Intersections with state roadways shall at a minimum comply with the requirements for city intersection above and shall require WSDOT approval prior to construction.

4. Any bridge or culvert on a private roadway shall be constructed to the most current AASHTO and/or WSDOT standards, whichever is more restrictive.

3.11 Street Frontage Improvements

A. Street frontage improvements may include, but are not limited to:

1. curb and gutter;

2. sidewalk and ADA ramps;

3. stormwater conveyance;

4. stormwater quality/quantity facilities;

5. street lighting system;

6. utility undergrounding (relocation may be required);

7. street construction and/or widening;

8. traffic signal modification, relocation or installation;

9. landscaping and irrigation may also be required.

Half-street improvements shall be reconstructed from the center line of the proposed street width.

B. Frontage improvements for corner parcels shall include full half street frontage improvements on arterial streets. In addition, each non-arterial street fronting the parcel will be evaluated to determine whether half street improvements will be required. .

C. Frontage improvements shall include a two (2) inch inlay of the street paving on the other side of centerline from the new development if construction invades the opposite side of the street.

D. Full half-street frontage improvements along arterial streets are required for subdivisions under 4 lots and site plans under five thousand (5,000) square feet The new frontage improvements shall at a minimum match the predominant characteristics/conditions of the existing frontage improvements of the majority of the parcels on the street.

The Director will determine the predominant characteristics/conditions of the existing frontage improvements by considering the frontage conditions of all the parcels fronting the street . If less than fifty percent (50%) of the frontage length of

the street (both sides) has full or partial frontage improvements, the subject development shall meet the predominant characteristics/conditions as determined by the Director. Where fifty percent (50%) or more of the frontage length of the street has full improvements, or the potential for development or redevelopment, full half-street frontage improvements will be required.

In situations where the Director finds that other pending or approved unconstructed developments on the same street frontage would cause the calculation described above to exceed fifty percent (50%) or where other recorded covenants requiring frontage improvements exist, or where it is determined that deferral of the requirement to build full half-street improvements will cause an adverse public impact or create unsafe conditions, the Director may require full half-street frontage improvements.

E. In addition to the requirements above, an approved half-street improvement shall conform to the following:

1. Minimum finished pavement width shall be 24 feet for arterials, collectors, and for local streets where the proposed development is industrial or commercial ("industrial/commercial streets"), and 20 feet for local streets where the proposed development is residential.

2. Intersection improvements shall be adequate to provide turn lanes, where warranted. Additional right of way may be required. Minimum pavement widths approaching the intersections shall be as follows:

   a. Arterials, collectors and industrial/commercial streets: 40 feet paved width, or the required width for the street (whichever is greater), for 250 feet as measured from centerline of the intersecting street;

   b. Local: 36 feet paved width, or the required width for the street (whichever is greater), for 150 feet as measured from centerline of the intersecting street.

F. The following minimum standards shall apply to the development of a single family residential dwelling unit on an unimproved right of way (existing plats) :

1. The existing right-of-way width, HMA width, and sidewalk status shall be extended to match that of and connect to the nearest paved street.

2. An improved turn-around shall be provided in accordance with Section 3.12 *Street Ends*, if the lot to be developed is located at the end of any road that is over 150 feet in length.

3.12 Street Ends, Cul-de-Sacs and Hammerheads

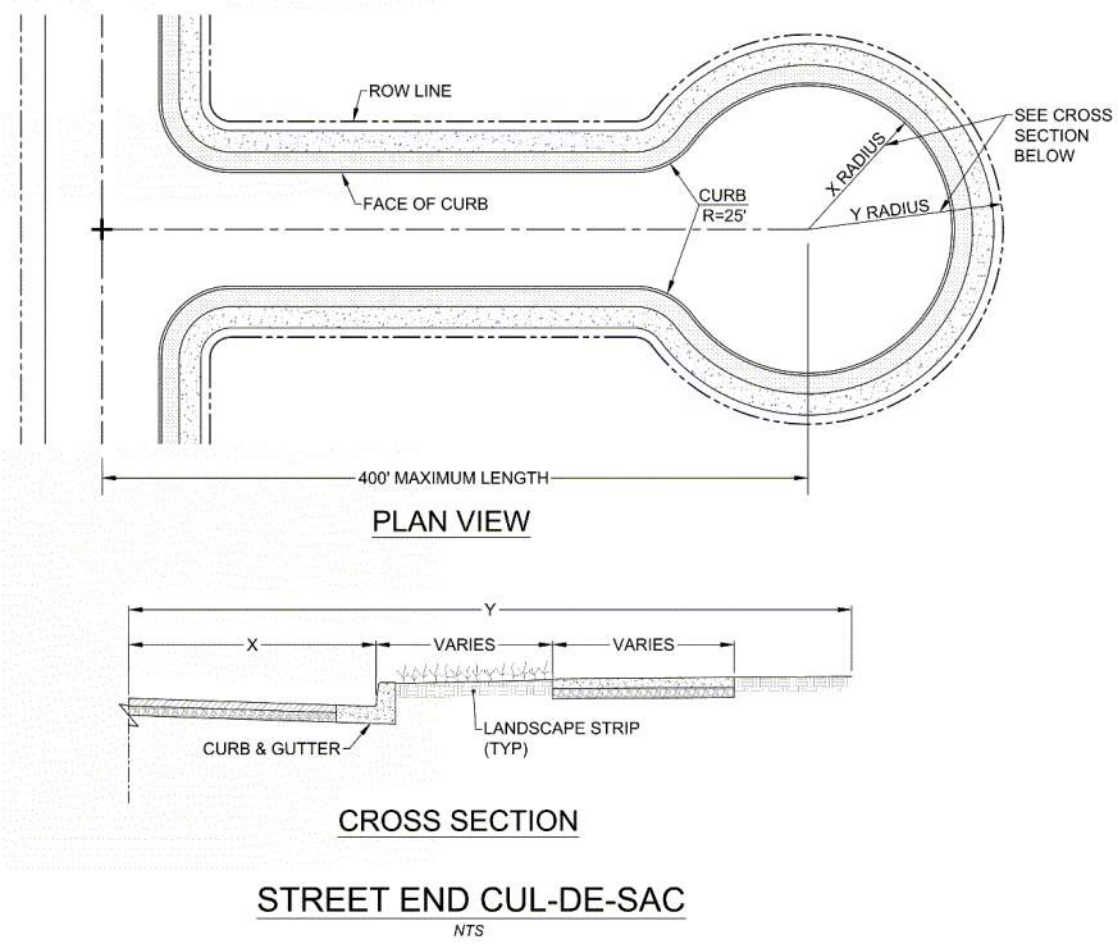
A. Street end cul-de-sacs:

Street end cul-de-sacs shall be provided at all public and private street ends on all streets that are longer than one-hundred fifty (150) feet, measured from the centerline of the

intersecting road to the center of the cul-de-sac bulb. The maximum length cul-de-sac shall be four-hundred (400) feet. Cul-de-sacs may include a planting circle in the center of the cul-de-sac bulb if the bulb radius is increased to accommodate it, and fire department vehicles can turn in the bulb without traversing over the planting circle.

1. No dead-end street will be allowed that obstructs public street circulation.
2. All street end cul-de-sacs shall be paved in accordance with local street standards.
3. All requirements for utility/landscape strips and sidewalk for the adjacent street section apply.
4. The minimum cul-de-sac bulb and right of way radius shall be as shown below. The minimum curb radius for transitions into cul-de-sac bulbs shall be as shown in the figure.
5. The minimum distance from center of the street end cul-de-sac to the subdivision boundary is one-hundred fifty (150) feet.

Figure 3-10.1: Street End Cul-de-Sac



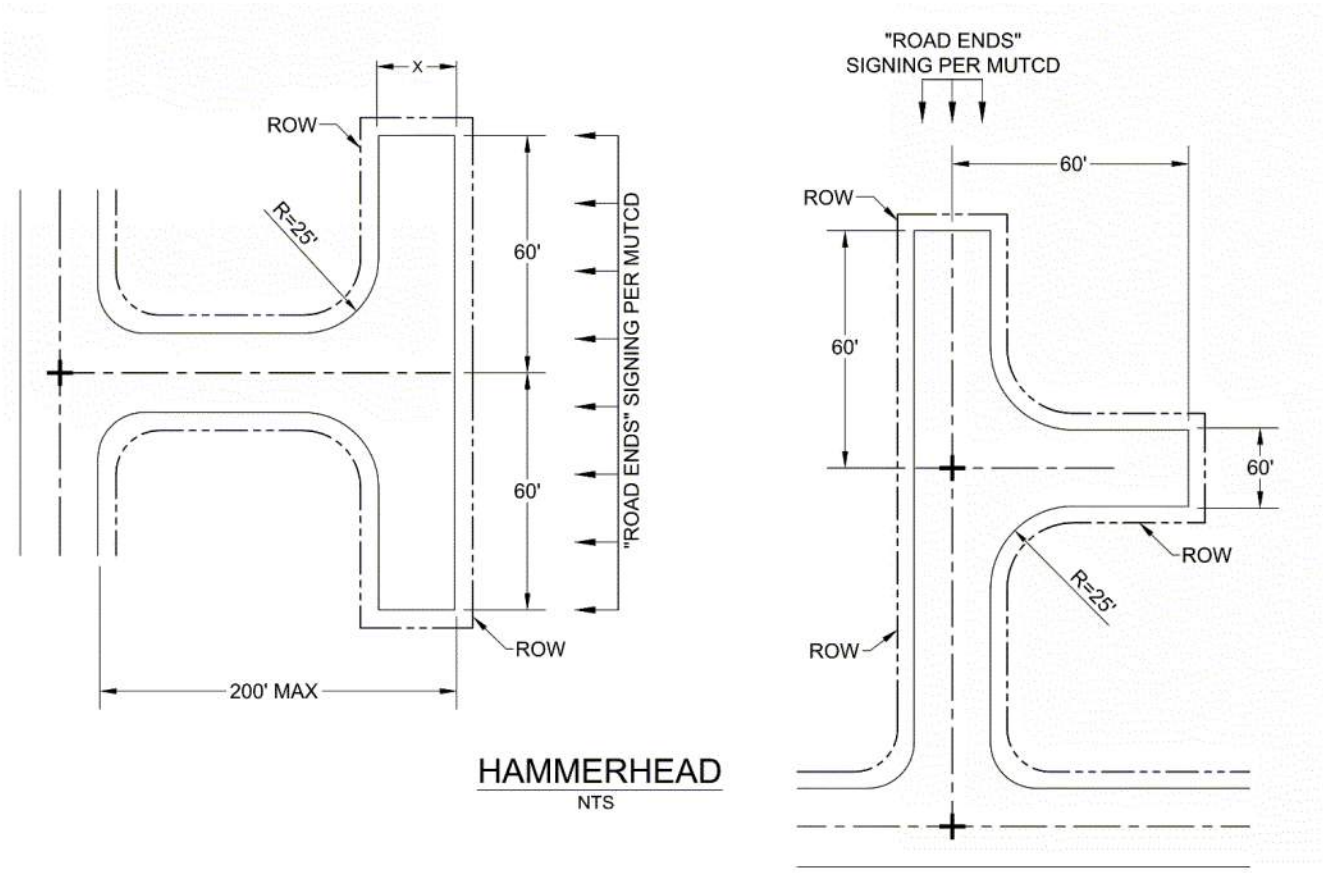
X: 40’ for local streets in residential areas
60’ for commercial and industrial areas

Y: 50’ for local streets in residential areas
75’ for commercial and industrial areas

B. Hammerheads:

Hammerheads may be used on private streets 200 feet long or less in lieu of a cul-de-sac. The hammerhead shall be signed "No Parking." A driveway shall not be used as part of the hammerhead.

Figure 3-10.2
Hammerhead



C. Temporary Dead Ends:

Where a street is temporarily dead ended, a turn-around shall be built. The turn-around shall be either a cul-de-sac or a hammerhead as directed by the Director.

A Type III barricade with signage complying with MUTCD denoting "ROAD ENDS" and "No Parking" shall be placed at the temporary street end as shown in Figure 3-14.

D. Street end cul-de-sacs and hammerheads will be allowed only on local streets and commercial/industrial streets.

E. An Eyebrow cul-de-sac or Knuckle cul-de-sac may be used on a local street in a residential area where expected ADT will not exceed five-hundred (500) vehicles per day or as otherwise approved by the Director. Minimum outside curb radius and minimum right-of-way radius for both types of cul-de-sacs is shown below.

Geometry will be evaluated and may be modified on the basis of turning requirements for Fire Department vehicles.

Figure 3-10.3
Eyebrow Cul-de-Sac

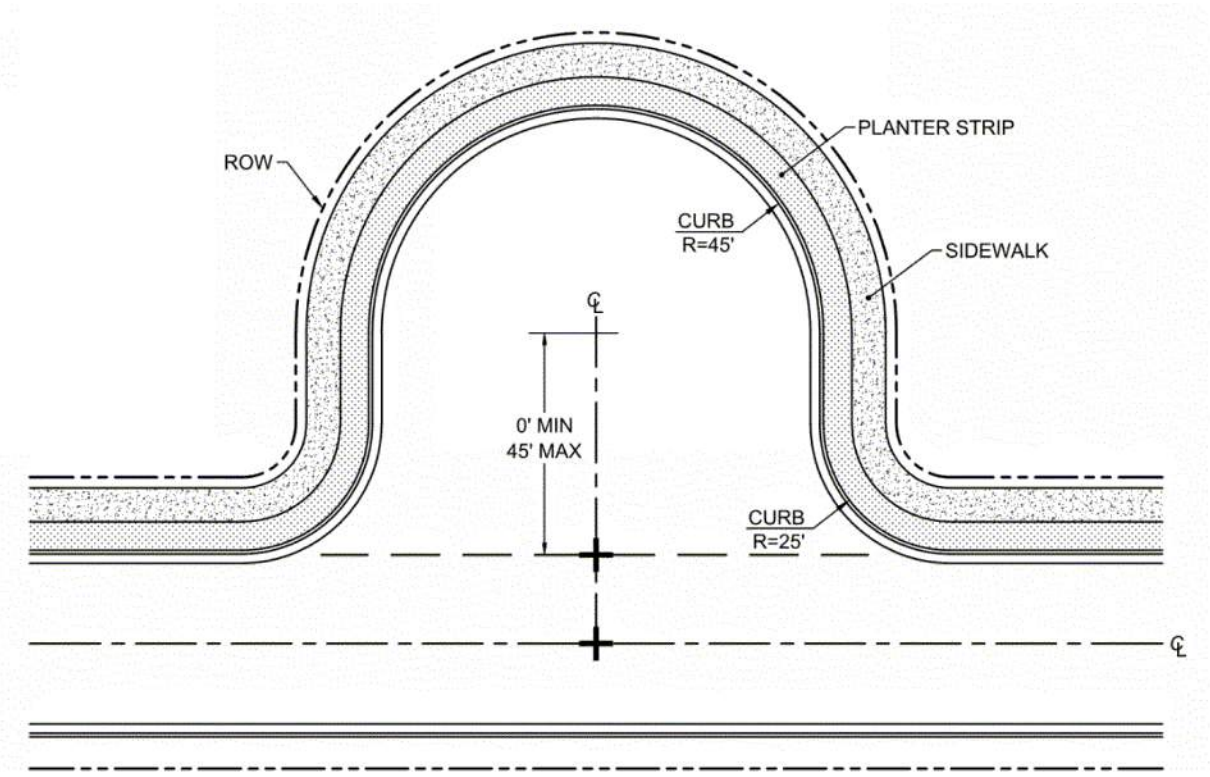
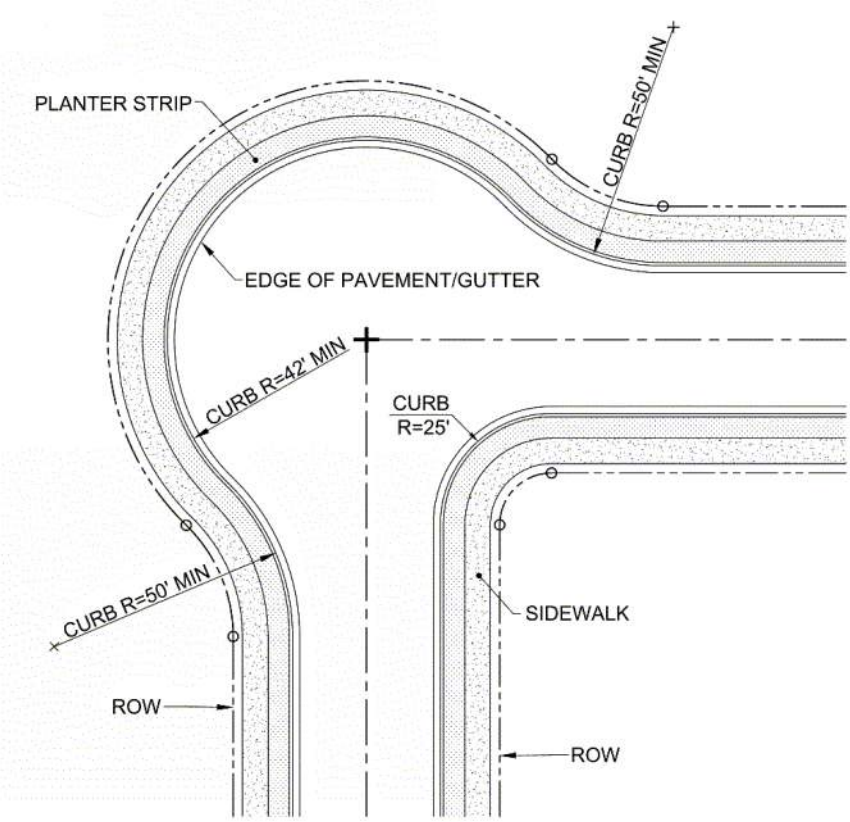


Figure 3-10.4
Knuckle Cul-de-Sac



3.13 Medians

Medians will be evaluated on an individual project basis.

3.14 Sight Obstruction Requirements

A. Sight distance shall be maintained at all driveways, buildings, or garage entrances, and where structures, wing walls, etc. are located adjacent to, or in close proximity to, a pedestrian walkway.

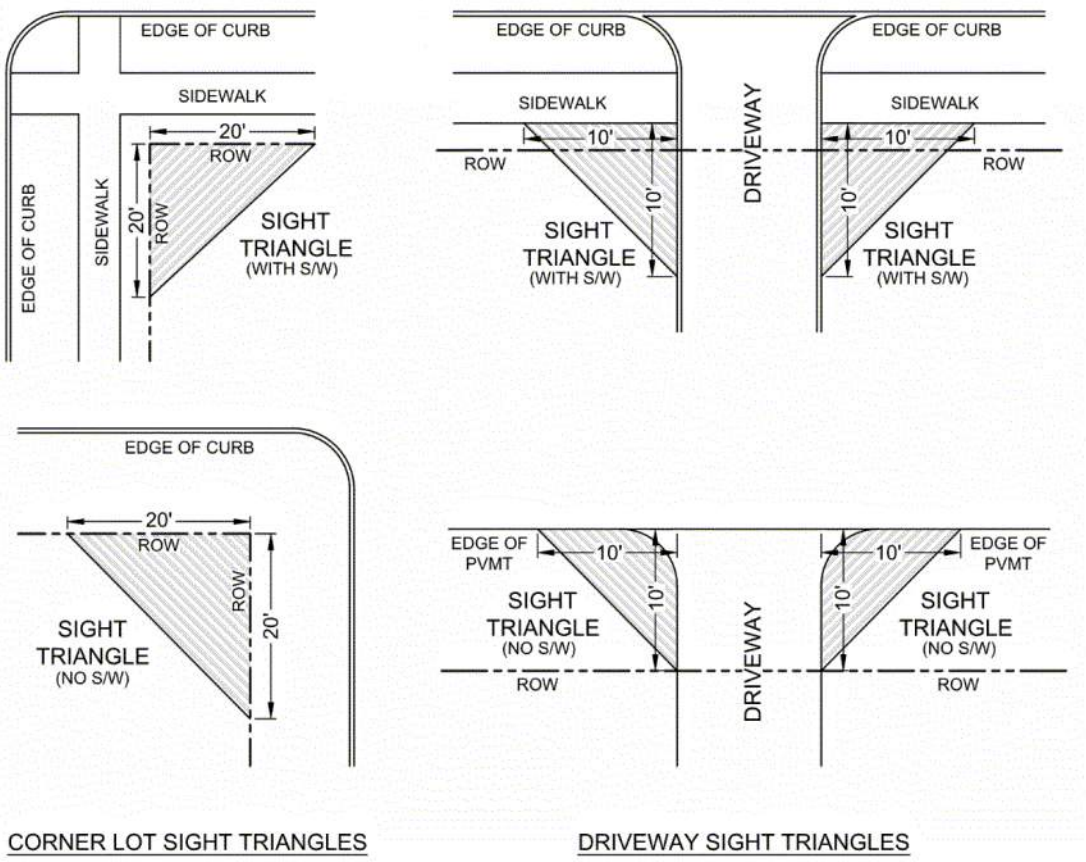
B. Sight lines to traffic control devices (signs, signals, etc.) shall not be obscured by trees, landscaping, street furniture, marquees, awnings, or other obstructions. Sightlines shall also comply with AASHTO guidelines.

C. Sight Triangles for All Uses in All Zones. The corner areas of lots adjacent to street intersections and corner areas adjacent to driveways and other access easements shall be kept clear of sight obstructions. Buildings, structures, objects or vegetation over thirty-six inches in height, measured from the gutter

grade, or edge of street grade in the absence of a gutter, adjacent to the potential sight obstruction, will be considered sight obstructions. Sight triangle dimensions and locations are as described in the Sight Triangle figure below.

Figure 3-11

Sight Triangles



Sight triangles do not apply in zoning districts with zero lot line setbacks.

3.15 Survey Monuments

Street monuments shall be placed at every intersection, centerline angle points, points of curvature and other points required by the Director. Street monuments shall be set between two (2) and four (4) inches below finished street grade with a cast iron monument case and cover complying with the requirements of WSDOT Standard Plan A-10.30-00, except use the valve box from Kelso Standard Plan KW-250 for the case, delete the concrete collar, and provide the cover with only the word "MON" engraved or molded into the surface.

3.16 Sidewalks

A. All sidewalks shall be designed and constructed in accordance with ADA Guidelines and the Kelso Standard Plans. Where there is a conflict between the ADA Guidelines and Kelso Standard Plans, the stricter standard shall prevail.

3.17 Landscaping in the Right-of-Way, Easements, and Access Tracts

A. Plantings placed in the right-of-way, including street trees, landscape strips, and bioretention facilities, shall be maintained by the abutting property owner, except plants within a bioretention curb extension in the parking lane shall be maintained by the City.

B. Any existing vegetated areas within the right-of-way that are disturbed by construction activity shall be restored to their original condition or better by the Applicant.

C. Any plantings or other improvements placed within the right-of-way by abutting property owners are subject to removal when the right-of-way is needed for public use. The property owner is responsible for removing any landscaping or other improvements upon official notice by the City. The property owners will be responsible for the relocated plantings.

D. Plantings within the right-of-way shall comply with the following provisions:

1. No trees shall be planted within thirty (30) feet of an intersection, measured from the closest curb.

2. All street trees shall be selected from Table 3.9 below.

Table 3.9
Street Tree List

Scientific Name	Common Name
Acer buergeranum	Trident Maple
Acer circinatum	Vine Maple
Acer griseum	Paperbark Maple
Acer negundo 'Flamingo'	
Acer palmatum	Japanese Maple
Acer tataricum	Tataricum Maple
Arbutus menziesii	Madrone
Arbutus unedo	Strawberry Tree
Cercis Canadensis	Eastern Redbud
Clerodendron trichotomum	Harlequin Glorybower Tree
Cornus florida	Flowering Dogwood
Cornus kousa	Korean Dogwood
Crataegus x lavallei	Lavalle Hawthorn
Crataegus phaenopyrum 'Washington'	Washington Hawthorn
Fraxinus excelsior 'Aureafolia'	Golden Desert Ash
Fraxinus pennsylvanica 'Johnson'	Leprechaun Ash
Koelreuteria paniculata 'Fastigiata'	Pyramidal Goldenrain Tree
Laburnum sp.	Goldenchain Tree
	*
Oxydendrum arboretum	Sourwood
Prunus x blireiana	Bliereana Plum
Prunus cerasifera 'Newport'	Newport Plum
Prunus cerasifera 'Thundercloud'	Thundercloud Plum
Sorbus Americana 'Dwarfcrown'	Red Cascade Mountain Ash
Styrax japonica	Japanese Snowbell
Syringa reticulate	Ivory Silk Japanese Tree Lilac
Zelkova serrata Schmidtlow	Wireless Zilkova

* Tupelo (Nyssa sylvatica) may only be used as a street tree within a bioretention BMP. See Table 3.10 for the Bioretention Plant List.

3. Where existing landscaping maintained by the City exists, every effort shall be taken to protect and preserve the existing vegetation during construction. Plants shall be relocated or removed only upon approval of the Public Works

Department. Damaged landscape areas shall be restored prior to final plat approval or issuing a final occupancy permit, whichever comes first.

4. In areas where an existing landscaping concept or pattern has been established or approved, all new landscaping shall conform to the intent of the concept. Plantings shall be of a similar variety, size, and spacing to those already established and/or approved for the area.

5. All trees planted in street rights of way with adjacent sidewalk shall be at least six (6) feet in height at the time of planting, be maintained at all times with seven (7) feet of clearance to the lowest branches above the sidewalk and 10' above the street, mature to a height less than thirty (30) feet, be centered between curb & sidewalk if located within the utility/landscape strip, and be planted and maintained in accordance with the WSDOT Standard Specifications.

6. No low growing vegetation shall extend beyond the curb or edge of pavement if there is no curb.

7. Approval from the Engineering Department must be received before trees are planted in the street rights of way.

8. Cut and fill slopes shall be hydro-seeded or seeded and mulched with tackified mulch to provide a soil holding vegetative cover.

9. Prior to final plat approval, or issuance of final occupancy, whichever comes first, the applicant shall plant the landscape strip and/or bioretention area in the right-of-way as follows:

    a. Landscaping. Plant in accordance with the landscaping plan. For grass strips, either seed or sod is acceptable;

    b. Bioretention Areas.

        i. Plants shall be selected from the Bioretention Plan List (Table 3.10), and planted in accordance with the approved landscaping/planting plan. No plants with a mature height over 3' are allowed in the sight triangles.

        ii. Plantings in bioretention areas shall be irrigated by the Applicant for the first two years. Irrigation plans shall be included in the landscaping/planting plans. If there will be automatic in-ground irrigation for the bioretention areas, show typical details in the plans. If manual watering is proposed instead, the plans shall include the watering schedule, method of watering and responsible party performing the watering. Provision of power and a water service and meter for the irrigation system is the responsibility of the Applicant.

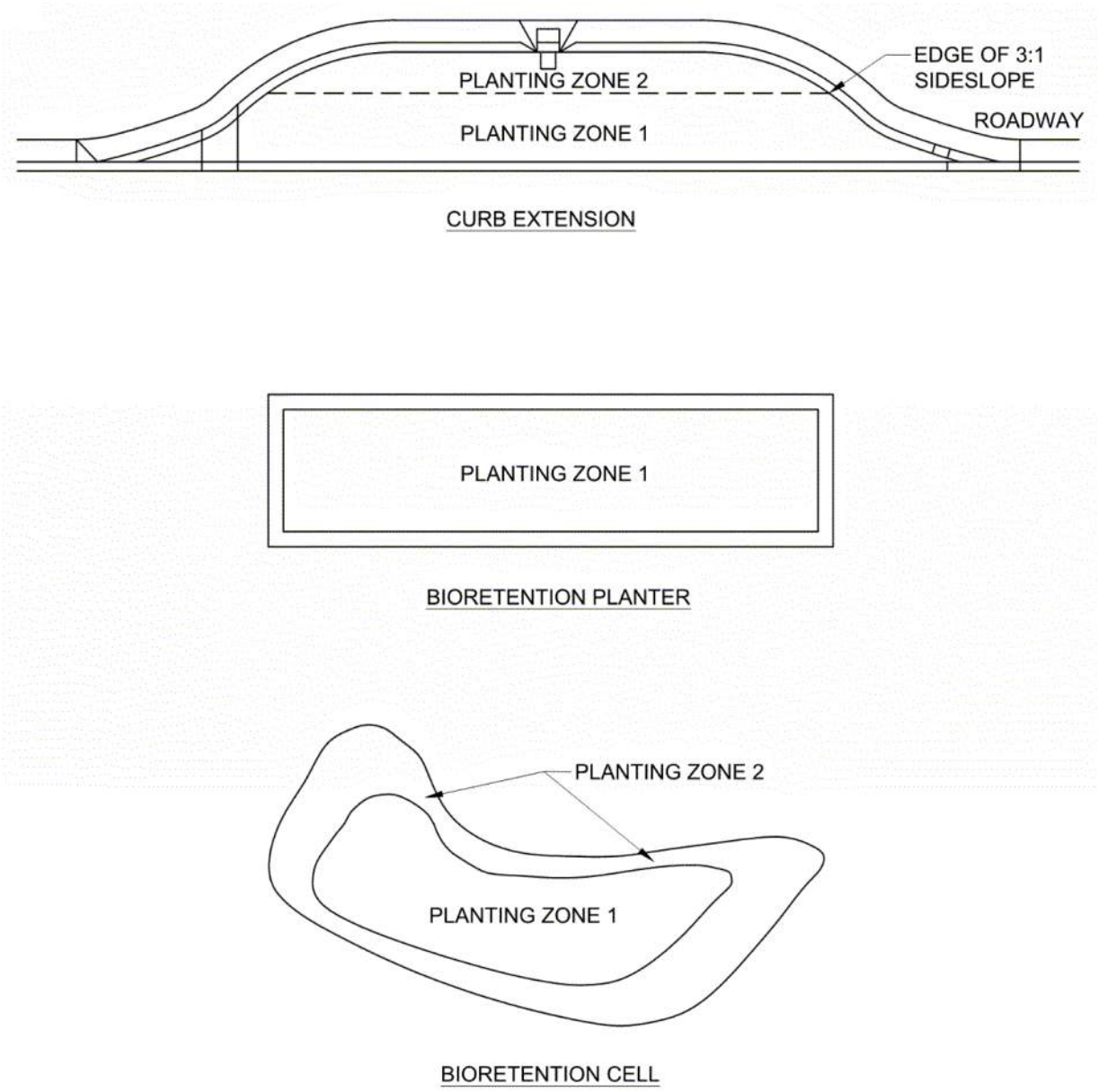
    c. 'As-builts' of the landscaping and in-ground sprinkling system shall be submitted after the last inspection but before final occupancy or plat approval is granted.

Table 3.10
Bioretention Plant List

Common Name	***Botanical Name***	**Ht.**	**Expo-sure**	**Size**	**Qty / Spacing**	**Remarks**
Select plants based on zone. See Figure 3-15 for illustration of zones.						
ZONE 1: PONDING AREAS / WET TO MOIST						
TREES Trees optional in Zone 1. Use only in 6' width minimum facilities						
Tupelo	*Nyssa sylvatica*	30'	Sun/Part Shade	1 1/2" Gal	1 per 100 sf	Brilliant and varied fall color
SHRUBS Shrubs optional in Zone 1. Use only in 6' width minimum facilities						
Redtwig Dogwood	*Cornus sericea*	6'	Sun to Shade	#1 Cont.	4 per 100 sf	
Clustered Wild Rose	*Rosa pisocarpa*	6'-8'	Sun/Part Shade	#1 Cont.	4 per 100 sf	Adaptable to drought and inundation. Fruit persists.
Hardhack	*Spiraea douglasii*	4'-7'	Sun/Part Shade	#1 Cont.	4 per 100 sf	Purple spiked flowers in summer.
EMERGENTS (GRASSES)						
Sough Sedge	*Carex obnupta*	1'-5'	Sun/Part Shade	#1 Cont.	1' O.C., triangular	Very successful bioretention plant. Adaptable to drought and inundation.
Sawbeak Sedge	*Carex stipata*	10"-3'	Sun/Part Shade	#1 Cont.	1' O.C., triangular	
Orange Sedge	*Carex testacea*	20"	Sun/Part Shade	#1 Cont.	1' O.C., triangular	Orange-brown leaves provide color variation. Useful adjacent to curb or sidewalk where shorter plants are desired.
Fox Sedge	*Carex vulpinoidea*	24"	Sun/Part Shade	#1 Cont.	1' O.C., triangular	
Soft Rush	*Juncus effusus var. pacificus*	1'-2'	Sun/Part Shade	#1 Cont.	1' O.C., triangular	
Dagger-leaf Rush	*Juncus ensifoloius*	12"-18"	Sun/Part Shade	#1 Cont.	1' O.C., triangular	Useful adjacent to curb or sidewalk where shorter plants are desired. Seed heads provide interest.
Spreading Rush	*Juncus patens*	36"	Sun/Part Shade	#1 Cont.	1' O.C., triangular	
Slender Rush	*Juncus tenuis*	6"-2.5'	Sun/Part Shade	#1 Cont.	1' O.C., triangular	
Small fruited Bullrush	*Scirpus microcarpus*	24"	Sun/Part Shade	#1 Cont.	1' O.C., triangular	
BULBS						

Common Name	***Botanical Name***	**Ht.**	**Expo-sure**	**Size**	**Qty / Spacing**	**Remarks**
Great Camas Lily	*Camassia leichtlinii*	12"	Sun/Part Shade	1/2" bulb	group of 3 bulbs, 4" O.C.	
Common Camas	*Camassia quamash*	24"	Sun/Part Shade	1/2" bulb	group of 3 bulbs, 4" O.C.	
ZONE 2: SIDESLOPES / MOIST TO DRY						
TREES						
Tupelo	*Nyssa sylvatica*	30'	Sun/Part Shade	1 1/2" CAL	30'	Brilliant and varied fall color
Vine Maple	*Acer circinatum*					
SHRUBS, GRASSES, HERBACEOUS						
Kelsey Redtwig Dogwood	*Cornus sericea*	20"	Sun/Part Shade	#1 Cont.	3' O.C.	
Tufted Hairgrass	*Deschampsia cespitosa*	36"	Sun/Part Shade	#1 Cont.	2' O.C.	Use where not adjacent to curb or sidewalk
Autumn Glory Hebe	*Hebe 'Autumn Glory*	18"	Sun/Part Shade	#1 Cont.	2' O.C.	
Dull Oregon Grape	*Mahonia nervosa*	24"	Part Sun/Part Shade	#1 Cont.	2' O.C.	
Creeping Oregon Grape	*Mahonia repens*	12"	Sun/Part Shade	#1 Cont.	1' O.C.	
Birchleaf Spirea	*Spiraea betulifolia*	24"	Sun/Part Shade	#1 Cont.	2' O.C.	
Snowberry	*Symphoricarpos albus*	36"	Sun/Part Shade	#1 Cont.	3' O.C.	
BULBS						
Great Camas Lily	*Camassia leichtlinii*	12"	Sun/Part Shade	1/2" bulb	group of 3 bulbs, 4" O.C.	
Common Camas	*Camassia quamash*	24"	Sun/Part Shade	1/2" bulb	group of 3 bulbs, 4" O.C.	
GROUNDCOVER						
Kinnikinnick	*Arctostaphylos uva-ursi*	6"	Sun/Part Shade	#1 Cont.	2' O.C.	
Creeping Raspberry	*Camassia quamash*	6"	Sun/Part Shade	#1 Cont.	2' O.C.	

Figure 3-12: Bioretention Planting Zones



3.18 Street Illumination

Street lighting is required for all public streets and at the intersections of public and private streets.

Street lighting is not required on private streets.

Applicant shall replace existing above ground wiring and power connections for lighting systems mounted on power poles with a new lighting system serviced by underground wiring and power connections if the system will not conflict with essential distribution lines.

The lighting design shall include a lighting analysis. The lighting design shall comply with Table 3.11.

Table 3.11

Maintained Illuminance Table

Maintained Illuminance Values (L Ave) of Candelas per Square Meter			
Street Classification – Zoning	Average Maintained Illuminance	Ave to Min	Max to Min
Arterial-Commercial/Industrial	1.7	3 to 1	5 to 1
Arterial-Residential	0.9	3 to 1	6 to 1
Collector-Commercial/Industrial	1.2	4 to 1	5 to 1
Collector-Residential	0.6	4 to 1	8 to 1
Local-Commercial/Industrial	0.9	6 to 1	10 to 1
Local-Residential	0.4	6 to 1	10 to 1

Residential local streets may use the spacing table below to layout light poles locations. The following applies to the LED fixtures.

a. For streets 28’ wide and less, the Type II distribution LED cobra head luminaire shall produce between 2400 and 3000 at no more than 29W.

b. For streets 32’ – 36’ wide, the Type II distribution LED cobra head luminaire shall produce between 3800 and 4000 lumens at no more than 42W.

Use the following placement table. The table below assumes the luminaires are placed per the Standard Plans.

Table 3.12

Local Residential Luminaire Spacing

Luminaire Placement--Alternating Sides (Preferred)				
Road Width, feet	LED Lumens	Distribution Type	Pole Height, feet	Maximum Pole Spacing, feet
28 and less	2400-3000	Type 2	20	102
32-36	3800-4000	Type 2	20	123
Luminaire Placement--One Side only				
28 and less	2400-3000	Type 2	20	109
32-36	3800-4000	Type 2	25	122

At least two street lights shall be placed at each arterial street intersection. On all other streets, at least one street light is required at each intersection. Street light poles shall be placed to meet IES lighting requirements or approved spacing table. Poles shall be staggered on each side of the street and located on the inside of curves to the greatest extent practicable.

Street lights shall be centered on lot lines whenever possible, so long as required illumination levels and uniformity ratios can also be achieved.

Lighting design shall be adjusted to minimize conflicts with existing and/or planned street trees.

The street light system shall be accessible for public maintenance by a wheeled vehicle weighing at least twenty-thousand pounds (20,000 lbs.).

All wiring, conduit, and power connections shall be located underground. Exceptions to allow above ground installation of wiring and power connections may be considered in residential areas where the existing lighting system is overhead, or in the absence of lighting, the existing power system is overhead. .

3.19 Traffic Control and Special Service Signs

The Applicant shall design and install permanent traffic control and temporary work zone traffic control. Traffic control includes signing, delineation and traffic signals.

Permanent and temporary work zone traffic control shall comply with MUTCD. See below for Special Service signing provisions.

A. Signing.

Sign types may include, but are not be limited, to street name, parking, stop, dead end, regulatory speed and pedestrian advisory.

B. Delineation:

Delineation includes, but is not limited to, painted and thermoplastic pavement markings, raised pavement markers and flexible guide posts for travel and turn lanes, parking, and pedestrian and bicycle facilities.

C. Traffic Signals.

Where warranted, traffic signal improvements may include new traffic signals or modifications to existing signals. The design shall be performed by a licensed civil engineer experienced in traffic signal design. Qualifications and applicable experience of the engineer shall be submitted and approved by the Director prior to beginning the design work.

E. Specific Service Signs. A Specific Service sign is a guide sign complying with MUTCD chapter 2F which provides road users with business identification and directional information for services and for eligible attractions.

1. Application for a Specific Service Sign. Any entity wishing the City to place a Specific Service sign for the business within the city limits of the City of Kelso must be a legal owner of an active/open business located in the City of Kelso. Application for a Specific Service sign may be made by the business owner with the Director on a form provided by the City. The application shall state the owner of the business, identify the business by its official corporate name or name under which it is doing business, state the directional information for services or attractions provided by the business, state the arterial or state route within the confines of city limits upon which the sign is requested to be placed. Failure to provide the required information shall result in a denial of the application. If the sign is proposed to be located on a State Route, the Applicant must also apply for a permit from WSDOT. The WSDOT permit for the sign must be approved prior to City approval of the Specific Service sign application.

2. Application and Maintenance Fees. Fees for Special Service Signs shall be in accordance with the Kelso Master Fee Schedule. The Maintenance fee shall be paid to the City on the anniversary of the installation of the Specific Service sign. Failure to make timely payment of the annual Maintenance fee may result in the removal of the Specific Service sign by the City.

3. Limitations on Specific Service Signs. Each business owner shall be limited to two Specific Service signs per business. Specific Service signs shall be placed only along arterial roadways in the City limits.

3.20 Right of Way Obstructions

Right of way obstructions are above ground objects located between the edge of the street and the right of way line that could be unsafe to motorists when struck.

A. All obstructions shall be located a minimum of two and one half (2.5) feet behind the face of the curb to the face of the object. Where no curb exists the distance from the edge of the street to the face of the object shall be at least six (6) feet.

B. Obstructions shall not be located in the sidewalk area except where the sidewalk is widened around the obstruction to the satisfaction of the Director.

3.21 Non-City Owned Utilities

A. Non-City owned utilities shall relocate their existing facilities at City expense when a conflict results between their facilities and proposed public infrastructure improvements funded by the City. Utility installation and relocation costs needed as part of, or as a result of, required public infrastructure improvements are the responsibility of the Applicant. Power, telephone, cable TV, illumination and other wired or cabled infrastructure shall be installed underground.

B. Utilities required for development shall be installed and/or relocated prior to paving.

C. New single-family plats and short plats shall include common or individual non-exclusive perpetual utility easements a minimum six (6) foot wide to serve each lot. Additional easements for distribution and transmission lines or utility facilities may be required.

D. The Applicant shall make the necessary arrangements with utility providers and other appropriate persons for utility installations and relocations.

3.22 Speed Humps

For the purposes of this section, the term “applicant” shall mean the person who files the application for the proposed speed humps.

Installation of speed humps on city streets is subject to the following policy and approval process:

A. Where Speed Humps May Be Installed

Speed humps may be installed only on streets having all of the following characteristics:

1. No more than two travel lanes

2. Overall pavement width not greater than 28 feet;

3. In street sections having grades of 3 percent or less at the location of each hump;

4. On streets where the speed limit is 25 miles per hour or less;

5. The street is functionally classified as local;

6. The street is residential in nature;

7. The street section proposed for speed humps has an average daily traffic volume of 750 vehicles or less;

8. In street sections where the minimum safe stopping sight distance can be provided at 25 mph or the posted speed limit whichever is less;

9. Where 85% of the vehicles during a 24-hour period are traveling at a speed 5 mph or greater over the speed limit.

10. In street sections where no raised crosswalks exist, and the nearest raised crosswalk is not less than 400 feet away ;

10. On existing streets only with the documented approval of at least sixty percent (60%) of the property owners within the approval area, which is defined as adjacent to the series of speed humps or within 500 lineal feet of the outermost speed humps as measured along each roadway centerline, including connecting roadways;

11. On new streets in new subdivisions at the direction of the City Engineer when approved during the development review process; and

12. On critical or frequent emergency vehicle response routes that meet all of the above criteria, only a modified speed hump, referred to as a speed cushion that reduces emergency vehicle delay, may be installed.

B. Deviation from Speed Hump Criteria

Deviations from the criteria under Where Speed Humps may be Installed may be made by the City Engineer upon completion of a site-specific traffic study and consultations with the Fire Department and Police Department

C. Location Limitations

1. Speed humps shall not be placed within a severe horizontal or vertical curve; wherever possible, speed humps shall be placed on tangent rather than curved sections of the roadway.

2. Speed humps shall not be placed on streets where long wheel-base trucks constitute greater than 5% of the total vehicle volume.

3. Speed humps shall be 250’-400’ apart.

4. Speed humps shall not be placed at locations or in streets where there are other traffic safety factors that discourage the use of speed humps, as determined by the City Engineer. The City Engineer, or designee, shall have the sole discretion to deny requests for speed humps.

5. Speed humps shall not be placed at or near locations where previously existing speed humps were removed by the petition method defined in this Resolution, within a preceding three-year period.

D. Placement, Location and Design of Speed Humps

The placement, location and design of speed humps shall be as determined by the City Engineer or designee.

E. Cost of and Payment for Speed Humps

The actual full cost of preliminary investigation, traffic study, design and construction of the speed humps, including but not limited to, permit fees, design costs and construction costs, shall be paid by the Applicant. The cost of construction shall be estimated by the City Engineer at the time the application is approved.

In the case of new streets in new subdivisions, the Developer shall be responsible to pay for the actual full cost of the speed humps.

All speed humps shall be constructed and maintained by the City.

F. Process for Speed Hump Installation

1. Prior to submittal of a permit application, the Applicant must request a preapplication conference with the City Engineer. The date, time, and place of the conference shall be at the mutual agreement of the participants. Such conferences are intended as an informal discussion and review to assist the applicant in the applicable city standards and the review process and to evaluate if the request meets the City’s speed hump policy.

2. The City Engineer shall review the request to determine if the proposed location(s) for the speed humps meets the speed hump policy.

3. If the policy criterion appears to be met, the City Engineer shall meet with the requestor to discuss and refine, as necessary, the locations and number of speed humps.

4. Based on the proposed location of the speed humps, the City Engineer shall determine the area requiring property owner approval (approval area). Typically, the approval area shall be an area including properties adjacent to the humps and at least 500 feet beyond the outermost speed humps, and including properties with residents on connecting roadways who reside within

500 lineal feet of the speed humps, as measured along the roadway centerlines. The City Engineer will provide a letter of interest for the requestor to circulate to property owners in the approval area, which will also include the estimated cost of construction of the speed humps. The City will provide the requestor a map of the approval area. It will be the requestor's responsibility to determine the identity and location of the property owners in the approval area and to obtain signatures of sixty percent (60%) prior to submittal of the application.

5. The person requesting a speed hump ("Applicant") shall submit an application for a permit to construct a public improvement as required under KMC 12.10. The City Engineer may amend the permit application and process as set forth in this Chapter for speed humps. Application for speed humps shall be submitted in writing to the City Engineer of forms prepared by the City along with payment of a $1000 permit fee. An Applicant must be a property owner of property on the street(s) proposed for speed humps and must submit with the application signed letters of interest dated within six (6) months of the date of application from property owners representing at least sixty percent (60%) of the properties in the approval area indicating their approval of a speed hump in that location. Only one signature is required from each property ownership, and that signature shall be presumed to represent the entire property.

6. If the City finds the application complete and the letters of interest sufficient, the City Engineer will gather and review traffic data for the requested location, including vehicle speeds, traffic volume, and crash history and process the permit application.

7. If traffic data supports the request for speed humps and the criteria of this policy is met, the City Engineer shall approve the permit and prepare an agreement between the City and the Applicant wherein the Applicant agrees to pay the full actual cost of constructing the speed humps within 30 days of billing and agrees to a lien on their property for the unpaid balance should full payment not be made. The City Engineer will send the permit approval and agreement to the Applicant. The Applicant shall have 60 days to accept the permit, sign the agreement and submit payment to the City of the estimated construction cost of the speed humps. In the case of new development, payment shall be submitted to the City prior to final plat approval, project acceptance, or issuance of the certificate of occupancy.

8. After payment has been made to the City, construction of the speed humps will be scheduled and completed. The schedule for construction of the speed humps shall be determined at the sole discretion of the City Engineer, contingent upon weather, staff workload, traffic considerations, and contractor availability.

9. Following completion of construction of the speed humps, the City will refund any funds paid in excess of the actual cost or will bill the Applicant for the remainder of the actual construction cost. The Applicant will be given 30 days to pay the full amount of the bill after which time a lien will be placed on the property of the Applicant for any unpaid balance due.

10. The City's construction of the speed humps and the Applicant's payment therefore shall not create any duty of the City to maintain the speed hump at that location or any right of the applicant to have a speed hump at that location. The City retains the right to remove any speed humps installed at any location if it determines, in the sole discretion of the City Engineer, that the speed hump is harming the public health, safety or welfare.

G. Speed Hump Removal

Speed humps must be in place for at least twelve months before they become eligible for removal by request.

Speed humps may be removed by the City with the documented approval of such removal request by at least sixty (60%) of the property owners of the approval area, as defined previously in this Chapter.

Speed humps may be removed by the City as traffic volume increases and exceeds an average traffic volume of 2000 vehicles per day, or the street's functional classification is changed to a higher functional classification from residential or collector street, at the location of the speed humps.

After a speed hump is installed, applicants or petitioners who paid for installation of the speed hump shall not be eligible for any refund of their monies paid, regardless of the reason for removal of the speed hump(s).

H. Process for Speed Hump Removal

1. Requests for speed hump(s) removal shall be submitted to the City Engineer by a property owner living on the street with the speed humps and in the "property owner area of approval" as described above.

2. The City Engineer shall determine the area requiring property owner approval of the removal request (approval area), as defined previously in this Chapter..

3. The City shall prepare a letter of interest for speed hump removal for the requestor to circulate for signatures and will provide the requestor a map of the approval area. It will be the requestor's responsibility to determine the identity and location of the property owners in the approval area.

4. The requestor shall then circulate such letter of interest and obtain signatures from property owners representing at least sixty percent (60%) of the properties in the approval area indicating their approval of the removal of the speed hump in that location. Only one signature is required from each property ownership, and that signature shall be presumed to represent the entire property.

5. If sixty percent (60%) or more of the owners of the approval area sign the petition in support of removing the speed hump(s), the City shall remove the speed hump(s), signs, and pavement markings. Removal of speed hump(s), signs and pavement markings shall be at the City's expense.

3.23 Parking Facilities

A. Access Standards

1. One access to the public right-of-way is allowed for a parking lot. Joint use of required access ways may be permitted at the discretion of the City.

2. Parking lots shall have direct access to the public right of way.

3. Access and parking spaces shall be designed so that no backing movement by a vehicle is necessary to access the public right-of-way. Single family and duplex lots are exempt from this requirement.

4. Tandem parking may be approved for a single-family residence, individual dwelling units of a multifamily structure or in limited single-tenant office-type applications.

B. Design Standards

1. All driveways and other parking areas shall be hard surfaced with permanent materials such as HMA, concrete or unit pavers, and shall be designed to dispose of surface water and pollutants from motor vehicles in accordance with the provisions of the Kelso Municipal Code and the KEDM. Use of permeable pavement is encouraged where feasible.

2. Please note that the Downtown Design Overlay and the West Kelso Overlay contain additional parking design standards unique to those specific areas.

3. Parking lots shall be designed according to the following table. Space depth shall be measured exclusive of access drives and aisles, and car overhangs.

Table 3.13

Parking Stall and Aisle Dimensions

Parking Angle	Curb Length	Space Width	Space Depth	Paved Aisle Width	Direction of Travel
0 degrees	20 feet	8.5 feet	N/A	24 feet	Two-way
45 degrees	12 feet	8.5 feet	18 feet	13 feet	One-way
45 degrees	13 feet	8.5 feet	18 feet	24 feet	Two-way
60 degrees	9.8 feet	8.5 feet	18 feet	18 feet	One-way
60 degrees	9.8 feet	8.5 feet	18 feet	24 feet	Two-way
90 degrees	8.5 feet	8.5 feet	18 feet	24 feet	Two-way

5. Where parking stalls are marked, grades shall not exceed six percent. Driveways and driving lanes between separate groups of parking shall not exceed fourteen percent. Parking lots on sloping lots shall be laid out so that parked cars lie perpendicular to the slope. Where existing grades on property proposed for a parking lot exceed ten percent, the City may require a topographic survey to show existing and proposed grades. In no case shall grades be less than one-half of one percent.

6. Driveways and parking lots may be provided with lighting that is mounted on poles or building surfaces with lamp positions not exceeding twenty feet in height. All light fixtures shall be hooded or shielded so that the lamp is not visible from adjacent properties or public rights-of-way.

7. Where properties abut lots with a dissimilar use ie: industrial next to a single-family home, a sight obscuring fence shall be installed. The fence must either be blocked on the more intensive use side with vegetation and or a solid fence must be installed. The vegetation element is not required for fencing between similar uses such as industrial next to industrial unless required elsewhere in the code.

8. Parking and loading areas within the LI and GI zones shall comply with the following additional standards:

    a. On-street parking or staging of trucks, equipment or goods on public streets is prohibited.

    b. Where practicable, primary vehicular access shall avoid streets or easements that primarily serve residential uses.

    c. No new access shall be allowed onto public streets if it is possible for a development to share an access drive an existing facility.

    d. Entrances and exits to and from parking and loading facilities shall be clearly marked with appropriate directional signage where multiple access points are provided.

    e. Internal circulation shall be designed for safety and efficiency by reducing conflicts between vehicular and pedestrian traffic, combining circulation and access areas where possible, providing adequate truck maneuvering, stacking, and loading areas and accommodating emergency vehicle access.

    f. To reduce noise and visual conflicts with neighboring properties and public streets, loading facilities shall be located internal to the site or where conflict with neighboring properties will be reduced. Loading facilities shall not face nonindustrial properties.

    g. Loading docks and doors facing a public street shall be offset from the access drive and shall be screened from the street.

9. Circulation and Walkways in Multifamily and Nonresidential Development.

a. Parking lots and driveways shall provide well-defined, safe and efficient circulation for motor vehicles, bicycles and pedestrians.

b. Landscaped islands with raised curbs shall be used to define entrances from public rights-of-way, define pedestrian walkways from the public rights-of-way to all buildings, define ends of parking aisles and indicate the pattern of circulation. Raised curbs may be cut to allow runoff to enter bioretention facilities where used in the landscape design.

c. Pedestrian walkways, complying with ADA, shall be provided around buildings to the extent necessary to assure safe access to the building from parking areas and the public right-of-way. Where appropriate, as determined by the Director, pedestrian walkways may be required to assure safe access to adjacent properties.

d. Internal walkways shall be surfaced with nonskid hard surfaces, meet ADA accessibility requirements and be designed to provide a minimum of five feet of unobstructed width. Where walkways cross vehicular driving lanes, the walkways shall be constructed of contrasting materials or with maintained painted markings. Walkways shall be curbed and raised six inches above adjacent vehicular surface grade, except where the walkway crosses vehicular driving lanes or as needed to meet ADA accessibility standards.

C. Landscape Standards. Onsite parking areas shall be landscaped in accordance with the following provisions:

1. All parking lot landscaping will be designed in accordance with the provisions of the Kelso Municipal Code and the KEDM and may contribute to the required landscaped area requirement.

2. All required landscaping for the parking lot may be used to manage on-site stormwater with bioretention facilities or dispersion BMPs, if feasible, in accordance with the Chapter 2 of the KEDM. Where bioretention is used, required tree and plant spacing may be relaxed to accommodate the facilities so long as public safety is not compromised.

3. Parking lot landscaping shall be designed in such a manner so as to:

a. Divide and break up large expanses of paving;

b. Guide traffic flow and direction;

c. Promote pedestrian and vehicular safety;

d. Preserve existing trees and vegetation, when practical.

4. Landscape islands shall be installed to break up the parking lot into rows of not more than 20 contiguous parking spaces or 10 spaces in one row.

a. A landscape island is required at the end of each row of parking spaces .

b. The minimum width for a landscape island that is parallel to a parking space shall be at least 9' x 18'. Each landscape island or area shall contain a minimum of one (1) shade tree and a combination of five (5) deciduous and evergreen shrubs or groundcover.

c. Each row of parking spaces shall be separated from one another by a minimum six (6) foot landscape island that extends the entire length of the row of parking spaces. Such landscape island shall contain two (2) shade trees and ten (10) shrubs distributed per 45 linear feet.

d. Six (6) foot wide pedestrian walkways, running parallel or perpendicular to the landscape islands shall be provided for convenient pedestrian access to the building entry(s) and throughout the parking lot.

5. All parking areas, drives, or other vehicular areas shall be bounded by a continuous landscape border a minimum of five (5') feet wide. The landscape border shall provide breaks, as necessary, to allow for access by pedestrians to the site and to sidewalk via the walkways referred to above. The landscaped border shall consist of at least one (1) shade tree or one (1) ornamental tree and ten shrubs distributed per 25 linear feet of perimeter, or 1 evergreen tree and 5 shrubs distributed per 25 linear feet of perimeter

a. Parking lots and drives or other vehicular areas that extend to within 50 feet of a public right-of-way shall be provided with a landscape screen between the parking lot, drive, or other vehicular area and the right-of-way a minimum of ten (10') feet in width and containing a minimum of one (1) shade tree and ten (10) shrubs distributed per 25 linear feet of street frontage or 1 evergreen tree and 5 shrubs distributed per 25 linear feet of street frontage.

3.24 Traffic Impact Analysis (TIA)

1. Purpose. The TIA is an analysis prepared to determine the traffic impacts of a given development.

2. Timing. A TIA shall be submitted with the land use application as required in KEDM Section 1.04.

3. Contents. The TIA will typically include the following, however, the Director may require more or less depending on the size and/or anticipated impacts of the development as required in KEDM, Section 3.01:

a. Analysis approach and methods - The TIA approach and methods shall be guided by the following criteria:

(i) Study Area – As a rule, the analysis must include any intersection or roadway segment, regardless of jurisdictional boundaries, to which at least 50 project trips would be added during the peak hour of trip generation . Projects just meeting the minimum threshold for traffic impact analysis will normally require analysis of only the intersection(s) or roadway segment(s) adjacent to the site. Larger developments will require the analysis of more

intersections. Some larger developments will require application of the urban area traffic model which is developed and maintained by the Cowlitz-Wahkiakum Council of Governments. In addition to off-site intersections, it is important that the TIA address the intersections/driveways proposed to provide access to the site. The Director must approve the study intersections and roadways.

(ii) Study Horizon Years – The study horizon year shall be the year the project is to be completed and operational. If the project requires a zone change, the horizon year shall be five (5) years from the date of the study, and include a "no-build" analysis for comparative purposes.

(iii) Analysis Time Period – Both the morning and evening weekday peak hours, 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m., shall be analyzed, unless the proposed project is expected to generate no trips, or a very low number of trips, during either the morning or evening peak periods. If this is the case, the requirement to analyze one or both of these periods may be waived by the Director. Where the peak traffic hour in the study area occurs during a different time period than the normal morning or afternoon peak travel periods (for example mid-day), or occurs on a weekend, or if the proposed project has unusual peaking characteristics, it is up to the discretion of the Director if those time periods should be included for analysis.

(iv) Geometrics and Traffic Control – Existing roadway geometric conditions within the study area shall include, but not be limited to, intersection and driveway spacing, roadway width, traffic lanes, turn lanes, medians, curb and gutter, speed limits, horizontal and vertical curvature, traffic control devices, and traffic signal phasing (if traffic signals are present). The discussion of existing geometric conditions shall include locations of driveways and intersections across the street from the development, and how this may impact traffic operations.

(v) Sight Distance – To identify potential safety issues associated with site access and egress, sight distance at intersections (stopping sight distance and corner sight distance) measurements shall be conducted at the proposed site driveway(s). The measured sight distance shall be compared to minimum requirements, as established by the American Association of State Highway and Transportation Officials (AASHTO). A summary of sight distance analysis should be presented in tabular form and included in the TIA.

(vi) Traffic Volumes – Where seasonal traffic data is available and when directed by the City's representative, the traffic volumes for the analysis hours shall be adjusted for the peak season .

(A) Data Collection Requirements – All data shall be collected in accordance with the latest edition of the ITE Manual of Traffic Engineering Studies.

(B) Turning Movement Counts – Manual turn movement counts shall be collected at all study area intersections and driveways to determine the base traffic conditions. These turning movement counts shall be conducted during the weekday (Tuesday through Thursday) between 7:00 a.m. – 9:00 a.m. and 4:00 p.m. – 6:00 p.m. and for other periods depending upon the proposed and/or surrounding land uses. Historical turning movement counts may be used if the data is not more than 12 months old at the time of the TIA. In high traffic locations where congestion is present or traffic peaks early or late, extended or altered count periods may be required. Turning movement counts may be required during other periods as directed by the City's representative.

(C) Daily Traffic Volumes – Daily traffic volumes shall be provided as 24-hour volumes (one hour increments), and peak period volumes (15 minute increments). The analysis shall be based on traffic counts that are no more than 12 months old (or less if there are significant changes in traffic patterns). If current traffic volume data is not available from the City, the consultant shall be responsible to collect all necessary data. The estimation of existing peak hour turning movements based on automatic machine counts is not acceptable.

(D) Pedestrian and Bicycle Volumes – Pedestrian and bicycle data shall be included with all peak period intersection turn movement counts. Pedestrian data shall be collected for each crossing movement of each leg of the intersection, while bicycle data shall be collected by approach leg of the intersection.

(vii) Crash Data – Within the study area for each TIA, a crash history evaluation shall be conducted for the most recent three-year period. The intent of the evaluation is to identify any apparent trends in the data that reflect a safety issue that may be exacerbated by the proposed development and to identify mitigation(s) to resolve the issue(s). At a minimum, the analysis shall summarize the number of crashes per year, location of crash (intersection), direction of the vehicles, type of crash, severity and fatalities. Any pedestrian

and/or bicycle collisions within the corresponding analysis period shall be identified separately. Calculate intersection crash rates at each intersection using the formula below.

The intersection crash rate based on vehicles entering the intersection is calculated as:

$$R = \frac{1{,}000{,}000 \times C}{365 \times N \times V}$$

Where:

R = Crash rate for the intersection expressed as crashes per million entering vehicles (MEV)

C = Total number of intersection-related crashes in the study period

N = Number of years of data

V = Traffic volumes entering the intersection daily

The Director shall assess the overall results of the safety analysis and may request a crash diagram be drawn.

(viii) Traffic Volume Forecasts – Future traffic volumes, including an estimate of the percentage of trucks, shall be estimated using information from traffic models, or applying an annual growth rate to the base-line traffic volumes. The future traffic volumes shall be representative of the horizon year for project development. If the annual growth rate method is used, the Director must give prior approval to the growth rate. In addition, any nearby proposed approved development projects shall be taken into consideration when forecasting future traffic volumes. The increase in traffic from proposed approved projects shall be compared to the increase in traffic by applying an annual growth rate. This information will be provided by the Director. If modeling information is unavailable, the greatest traffic increase from either the approved developments, the application of an annual growth rate, or a combination of an annual growth rate and approved developments, shall be used to forecast the future traffic volumes. It is up to the discretion of the Director to select the appropriate methodology from information provided for all methods from the applicant.

(ix) Analysis Scenarios – To determine the potential traffic impacts of a proposed development the following scenarios shall be analyzed in the TIA when appropriate:

(A) *Existing Conditions* - Existing traffic operations based on recent traffic count data.

(B) *Existing + Approved Conditions* - Projected traffic operations reflecting changes to existing traffic volumes due to relevant approved developments. Approved development traffic is defined as traffic generated by all developments approved by local jurisdictions or submitted to local jurisdictions for approval within the development vicinity at the time of the TIA submittal.

(C) *Existing + Approved Conditions + Project* - This scenario is similar to scenario B with the addition of the proposed project traffic at study area intersections. If the development is expected to be completed beyond 12 months after the TIA is submitted, the Director may require an additional scenario of analysis, which would include regional growth on traffic beyond existing levels. This scenario would have an appropriate growth applied to existing traffic volumes to forecast the planning horizon (build-out) year.

(x) Trip Generation – To determine the impacts of a proposed development on the surrounding transportation network, the trip generation characteristics of that development must be estimated. Trip generation characteristics should be obtained from one of the following acceptable sources:

(A) Institute of Transportation Engineers (ITE) *Trip Generation* manual (latest edition).

(B) Specific trip generation studies that have been conducted for the particular land use for the purposes of estimating peak hour trip generating characteristics, subject to approval by the Director prior to their inclusion in the TIA.
In addition to new site generated trips, several land uses typically generate additional trips that are not added to the adjacent traffic network. These trips include pass-by, diverted and internal trips, and are considered to be separate from the total number of net new trips generated by the proposed development. The procedures listed in the (ITE) *Trip Generation Handbook* should be used where appropriate to account for pass-by, diverted and internal trips. The Traffic Engineer shall not use any pass-by, diverted or internal trip

reductions without prior approval of the method or data sources by the Director.

(xi) Trip Distribution and Assignment – Projected trips shall be distributed and added to the projected non-site traffic on the roadways and intersections under study. The specific assumptions and data sources used in deriving trip distribution and assignment shall be documented in the TIA and approved by the Director prior to submittal of the TIA. The site-generated traffic shall be assigned to the street network in the study area based on the approved trip distribution percentages. Trip assignments shall be rounded to the nearest five percent (5%). Graphic presentations, as well as discussions in text, of the trip assignment shall be documented in the TIA.

(xii) Capacity Analysis – An intersection capacity analysis is required as part of the TIA submittal. The software used for this analysis shall be the latest edition of the Highway Capacity Software (HCS), or a comparable software analysis program that is based on the *Highway Capacity Manual* methodology.

Peak hour Level-of-Service (LOS) shall be calculated for each study intersection (existing and proposed). In most cases, the weekday morning (AM) and weekday evening (PM) peak hours shall be included in the analysis. For certain types of development (e.g., recreation facilities, churches, some retail uses) some peak hours may be added (e.g., midday or weekends) or eliminated (e.g., AM peak hour for low traffic generators) from the analysis, if approved by the Director. Unless determined otherwise by the Director, compliance with the LOS standards will be based solely on weekday AM and PM peak hour traffic analysis results. For unsignalized intersections, appropriate MUTCD (*Manual on Uniform Traffic Control Devices*, FHWA) peak hour signal warrants must also be checked for each scenario.

The results of the above analysis shall be summarized in tabular form identifying the average delay, Level-of-Service (LOS), and volume-to-capacity (V/C) ratios for the study intersection. All intersections and specific turning movements with a LOS D or worst shall be clearly identified.

(xiii) Queue Analysis – Queue lengths shall be calculated for each lane of all approaches to signalized intersections for the 95^{th} percentile queue during the peak hour of analysis. Queue lengths shall also be calculated for unsignalized locations, such as site driveways, where standing queues can interfere with other movements, especially if such interference can contribute to safety deficiencies. Appropriate analysis methods should be used that account for the actual arrivals

of vehicles at an intersection. The methodology for queuing at unsignalized intersections or driveways must be approved by the Director prior of the TIA.

(xiv) Left/Right Turn Storage Analysis – Left-turn and right-turn storage bay analyses must be performed at all study intersections and project driveways identified in the traffic study scope. Storage at signalized intersections shall be calculated utilizing the Poisson method with 95% confidence and a 150 second wait. Storage at unsignalized intersections and driveways with either a dedicated left turn lane or a two-way-left-turn-lane shall be calculated utilizing the graphs found in the Washington State Department of Transportation's Design Manual.

For signalized intersections, queue lengths shall be based on average vehicle length of twenty-five (25) feet, or longer where appropriate.

(xv) Traffic Simulation – For a major development, a simulation using SimTraffic or other approved software shall be performed to show existing traffic flows and future traffic flows if directed by the Director.

(xvi) Access and Site Circulation Analysis – Describe the proposed access to the site for all travel modes. This includes identifying the existing and/or proposed access locations from the public street system and the expected use of each access (pedestrian/bicycle entrance, truck delivery access, etc.). Also describe any proposed roadways within the site and the internal street system configuration.

Summarize the access spacing evaluation of the proposed site driveways. Provide the applicable City standards for each frontage roadway and site driveways. This analysis shall be conducted for both existing and proposed site access locations.

Provide a detailed evaluation of the proposed site plan associated with on-site circulation needs for all modes of travel. Include the following elements:

- Determine if the number of driveways can adequately and safely accommodate the peak hour vehicle demand.
- Evaluate driveway and cross street alignment and possible conflicts of movement.

- Evaluate the need for separate turn lanes to accommodate vehicles exiting the site and the potential for on-site vehicle queues to impact internal circulation.

- Review the internal roadway system to verify that emergency vehicles and trucks (potential demand based on land use) can be accommodated. For developments with a potential for generating large trucks, provide a turn template analysis of the site plan in the technical appendix.

- Identify how pedestrian and bicycle trips are accommodated between building entrances and parking lot areas. Delineate internal pedestrian and bicycle circulation clearly on the site plan. Discuss potential conflicts between pedestrians, bicycles and motor vehicles and how they will be minimized and mitigated. Identify any land uses (if within one-half mile of site) that would likely generate pedestrian and bicycle trips in association with the proposed project. For example, a proposed subdivision located near a park. Clearly show pedestrian and bicycle connections to off-site destinations on the site plan.

(xvii) Mitigation Requirements – For every significant impact, the TIA must identify and discuss mitigation measures at conceptual level that will be implemented by the proposed development. The TIA may identify a mitigation measure or develop a range of mitigation measures for each impact to improve the performance of the transportation system. Mitigation measures shall be specific and feasible actions that will actually improve adverse traffic conditions, and shall comply with the City's design standards. The mitigation measures shall improve conditions or correct capacity deficiencies to acceptable levels of service. The TIA shall discuss whether the measure reduces the impact to a less-than-significant level, and report the conditions after the implementation of the mitigation measure.

An effective measure shall adequately avoid, minimize, rectify, or compensate an impact. It shall be consistent with local plans and policies.

Mitigation measures may include traffic control devices and roadway design features. The Consultant shall determine the need for new traffic control devices, and roadway design features based on the City's engineering policies and procedures.

In addition, mitigation measures shall address vehicular queues, progression quality, and other factors that affect traffic conditions

that are not part of the LOS analyses. They shall consider traffic operations at intersections and driveways.

b. Report Format –

(i) The consultant shall provide a flash drive which contains the following:

(A) A PDF version of the TIA

(B) A separate folder containing graphic files (i.e. JPG, BMP, TIFF format) of all graphics included in the TIA

(C) A separate folder containing the electronic files (i.e. SYNCHRO, HCS) for all analysis.

(D) A separate folder containing the electronic files for new traffic counts. The file format shall be .CSV. The count interval for both daily and peak counts shall be 15 minutes.

(ii) The consultant shall furnish three (3) paper copies of the TIA report stamped by the Traffic Engineer to the City. The following is the order and format for the TIA report.

1. EXECUTIVE SUMMARY
- a. Purpose of Report and Study Objectives
- b. Site Location and Study Area
- c. Development Description
- d. Principal Findings
- e. Conclusions including mitigations

2. TABLE OF CONTENTS

3. LIST OF FIGURES

4. INTRODUCTION
- a. Explanation of the project
- b. Area map showing development site location
- c. Complete project site plan, with buildings identified as to proposed use. Driveways located on adjacent property and across the street from the proposed project shall be shown on the site plan.
- d. Project schedule, and stages or phases, if applicable

5. EXISTING CONDITIONS
- a. Study Area
- b. Existing Land Use Map. As a minimum, general land uses identified shall include residential, industrial, and commercial.
- c. Roadway System
- d. Pedestrian/Bicycle Facilities
- e. Transit
- f. Sight Distance

g. Existing Land Use

6. EXISTING TRAFFIC DATA

a. Traffic Counts
b. Pedestrian Counts (if necessary)
c. Bicycle Counts (if necessary)
d. Times Collected
e. Locations
f. Types - Daily, Morning, and Afternoon Peak Periods (two hours minimum, and others as required)
g. Crash analysis
   1. Analysis Years
   2. Tabular Crash Report containing the following information:
      a. Types of Crashes
      b. Severity (Fatal, Injury, Property Damage Only)
      c. Vehicular direction of travel
      d. Time of Day
      e. Day of Week
   3. Crash diagrams

7. EXISTING TRAFFIC OPERATIONS

a. Level of Service -.Morning Peak Hour, Evening Peak Hour (and other as required)
b. Traffic Signal Warrant Analysis
c. Queue Analysis

8. EXISTING TRAFFIC OPERATIONS + APPROVED CONDITIONS

a. Level of Service -.Morning Peak Hour, Evening Peak Hour (and other as required)
b. Traffic Signal Warrant Analysis
c. Queue Analysis

9 TRIP GENERATION

a. Trip Generation
b. Pass-by Traffic (if applicable)

10. TRIP DISTRIBUTION AND ASSIGNMENT

a. Trip Distribution
b. Trip Assignment

11. EXISTING TRAFFIC OPERATIONS + APPROVED CONDITIONS + PROPOSED PROJECT

a. Level of Service – Morning Peak Hour, Evening Peak Hour (and other as required)
b. Traffic Signal Warrant Analysis
c. Queue Analysis
d. Left/Right Turn Storage Analysis
e. Traffic Simulation

12. ACCESS AND SITE CIRCULATION ANALYSIS

a. Site access

b. Site access sight distance
c. Access spacing
d. Internal site circulation

13. SUGGESTED TRAFFIC MITIGATIONS

a. Traffic Control Needs
b. Intersection Channelization Mitigation
c. Pedestrian/Bicycle Considerations
d. Neighborhood Traffic Mitigation

14. CONCLUSION AND RECOMMENDATIONS

15. TECHNICAL APPENDIX

a. Traffic Volume Counts
    1. Average Daily 24 Hour Traffic Volumes
    2. Peak Hour Turning Movement Volumes (AM, PM and other as required)
b. Capacity Analyses Worksheets
    1. Existing Condition
    2. Existing + Approved Conditions
    3. Future +Existing + Approved Conditions
    4. Future +Existing + Approved Conditions + Proposed Project
c. Traffic Signal Warrant Analysis
d. Accident Data and Summaries
e. Miscellaneous Addendum

Appendix 1: Standard Plans

Standard Plan Index

Title	Standard Plan No.
Standard Street Plans	
Trench Backfill and Restoration – Arterial Streets	KST-010-21
Trench Backfill and Restoration – Local and Collector Streets	KST-020-21
Trench Backfill and Restoration – Cement Concrete Pavements	KST-030-21
Trench Backfill and Restoration - Unpaved Areas	KST-040-21
Types of Joints For Concrete Sidewalks, Curb Ramps, and Pavements	KST-050-21
Cut-in Curb Drain	KST-060-21
Sidewalks	KST-070-21
Cement Concrete Driveway Approach	KST-080-21
Asphalt Driveway Approach, No Curb	KST-090-21
Sidewalk Widening Around Obstructions	KST-100-21
Cement Concrete Valley Gutter	KST-110-21
PCC Pavement Isolation Joints	WSDOT A-40.15-00
Supplemental to Standard Plan WSDOT A-40.15-00	
Cement Concrete Curbs	WSDOT F-10.12-04
Supplemental to Standard Plan WSDOT F-10.12-04	
Cement Concrete Curb and Gutter Pan	WSDOT F-10.16-00
Supplemental to Standard Plan WSDOT F-10.16-00	
Parallel Curb Ramp	WSDOT F-40.12-03
Combination Curb Ramp	WSDOT F-40.14-03
Perpendicular Curb Ramps	WSDOT F-40.15-04
Single Direction Curb Ramp	WSDOT F-40.16-03
Supplemental to Standard Plans WSDOT F-40.12-03, F40.14-03, F40.15-04, F-40.16-03	
Detectable Warning Surface	WSDOT F-45.10-02

Title	Standard Plan No.
Standard Traffic Plans	
Street Name Sign	KTR-010-21
Ground-Mounted Sign Placement	WSDOT G-20.10-02
Supplement to WSDOT G-20.10-02	
Steel Sign Support Types ST-1 - ST-4 Installation Details	WSDOT G-24.50-05
Supplemental to WSDOT G-24.50-05	
Steel Light Standard	WSDOT J-28.10-02
Steel Light Standard Placement (Fixed Base)	WSDOT J-28.24-01
Steel Light Standard Placement Miscellaneous	WSDOT J-28.26-01
Steel Light Standard Foundation Types A & B	WSDOT J-28.30-03
Supplemental to WSDOT J-28.30-03	
Steel Light Standard Base Mounting	WSDOT J-28.40-02
Steel Light Standard Pole Base and Hand Hole Details	WSDOT J-28.50-03
Steel Light Standard Wiring Details	WSDOT J-28.70-03
Locking Lid Standard Duty Junction Box Types 1 & 2	WSDOT J-40.10-04