

## 6.0 STANDARDS FOR STREETS

### 6.1 RIGHTS-OF-WAY AND EASEMENTS

Public streets are owned and maintained by the City, and the Developer is required to dedicate or deed right-of-way, or otherwise convey public right-of-way and/or easements, as required to construct and maintain these public streets and appurtenances.

All portions of the traveled way, curbs, gutters, sidewalks, medians, drainage facilities, street lighting, traffic signals, roundabouts, traffic circles, traffic signage and other required improvements shall be located within said right-of-way.

Easements for the purpose of construction, access, maintenance, sight distance preservation, street slopes, street lighting, or for utility and storm drain system installations may be required in conjunction with new street and street improvements.

A non-exclusive 10' utility and street lighting easement shall be provided by all private development projects adjacent to all public streets except in the Downtown Overlay District.

Permanent on-site easements for access, maintenance, and construction are required for all public and private street systems serving more than one property located outside of public right-of-way. When easements are required, legal descriptions shall be submitted prepared and stamped by a Professional Land Surveyor. A title report, dated within the last thirty (30) days, covering the properties to be encumbered by the easements, shall accompany said description.

When off-site and/or on-site easements for the extension of public or private street, water, sanitary sewer, storm drainage or other utility systems are required, these shall be approved and recorded prior to approval of the Engineering Plans. The same conditions shall also apply regarding legal descriptions and title reports.

### 6.2 STREET TYPES AND GEOMETRICS

General design objectives and purpose by functional classification for City streets are listed in the Kent Transportation Master Plan (TMP). Based upon these classifications, the criteria for right-of-way, street width and other Geometrics are established by the City.

The TMP defines the following streets:

- Principal Arterial 7 - Lanes (See Standard Plan 6-2)
- Principal Arterial 5 - Lanes and Minor Arterial (See Standard Plan 6-3)
- Collector Arterials – Industrial Collector Arterial (See Standard Plan 6-4)

- Collector Arterials – Residential Collector Arterial (See Standard Plan 6-5)
- Collector - Residential Collector (See Standard Plan 6-6)
- Local Access Streets – Industrial/Commercial (See Standard Plan 6-7)
- Local Access Streets – Residential (See Standard Plans 6-11 through 13)

Local streets can be comprised of industrial/commercial streets and residential streets. These streets are based on the land use zoning adjacent to the street. There are also alleys and private streets.

Where appropriate and feasible, rights-of-way should be increased to accommodate the use of low impact development and materials to handle storm water, including landscaped medians facilitating natural storm water function and bio-filtration areas (rain gardens, swales, etc.).

### **6.2.A Arterial Streets**

Arterials generally support higher traffic volumes, much of which is generated outside of the immediate area or what is termed “through traffic.” Arterials support the travel of cars and trucks and other modes, including public transit, cycling and walking.

Removal of existing driveways may be required if adequate access can be provided by streets of a lower classification. In some cases the combination or consolidation of driveways from adjoining properties will be required with shared access easements or tracts to meet access management standards.

Driveway access to minor arterial and collector arterial streets will be managed to retain the traffic volume capacity of the roadway while allowing access to parcels not served by streets of a lower classification. Existing driveways may be required to be eliminated if adequate access can be provided by streets of a lower classification.

### **6.2.B Collector Streets**

Collectors serve a critical role in the roadway network by gathering traffic from local roads and funneling them to the arterial network. Collectors serve both land access and traffic circulation in lower density residential and commercial/industrial areas. They extend into residential neighborhoods. Collectors also distribute and channel trips between arterials and local streets and arterials.

### **6.2.C Local Streets**

These streets are designed for local traffic usage. They are typically the streets

in front of residential property and some commercial and retail uses. Two subcategories of local street classifications exist based upon the type of adjacent land-use. The sub-categories, and their functions, are:

1. Industrial/Commercial Street – These streets are designed to provide direct access from the abutting industrial or commercial land uses to the collector arterial classified streets. Access to these streets is typically not restricted for reasons of safety except at or near intersections.
2. Residential Street – These streets are designed to provide direct access to abutting land uses, from collector streets in a safe and efficient manner. The design parameters of these streets, (i.e., intersection spacing, horizontal curves criteria, and right-of-way assignment at intersections) will be used to minimize vehicle operating speeds and non-locally generated “cut-through” traffic. On-street parking will generally not be restricted, except at those locations necessary for public safety. A high emphasis will be placed on safely accommodating non-motorized and pedestrian traffic in the design of these streets.

Private streets fall within the residential street classification. However, the geometric requirements for private streets are different and can be found within Section 6.2.E Private Streets.

#### **6.2.D Alleys**

See Standard Plan 6-14. The horizontal and vertical geometric design criteria for residential streets shall be used to design alleys. Alleys must be designed within the following parameters:

1. An alley may serve a maximum of 30 dwelling units, have a maximum length of 400', and have no dead ends or cul-de-sacs.
2. The right-of-way or tract width shall be sufficient to construct the alley and related grading. The minimum tract width shall be 20' with a pavement surface width of 20' based on a 5' structure setback. For differing structure setback requirements, the alley surfacing width may be reduced to 18' minimum if designed to provide for safe turning access to properties.
3. Alleys shall be paved surface and have an inverted crown to control surface runoff.
4. Alleys shall connect to the public street system using a private street approach. See Standard Plan 6-46.
5. Alleys shall not intersect other alleys or half streets.
6. Alleys shall provide secondary access only to a property.

### 6.2.E Private Streets

See Standard Plan 6-15. Any streets serving, or proposed to serve nine (9) or fewer single-family dwelling units, or as otherwise determined by the Engineer, and certain streets within a planned unit development (PUD) or those of limited public benefit may be considered private streets. When streets directly adjoin other lots, those lots are counted when determining the number of lots served, including any potential new lots created through redevelopment consistent with the zoning designation.

Private streets may be approved only when they are:

1. Permanently established by tract providing legal access to each affected lot, dwelling unit, or business; and sufficient to accommodate required improvements, to include provision for future use by adjacent property owners when applicable; and
2. Built to the standards, as set forth herein; and
3. Accessible at all times for emergency and public service vehicle use; and
4. Not part of, or obstructing, the present or future public neighborhood circulation plan developed in processes such as the City's Comprehensive Plan, TMP, or Capital Improvement Program; and
5. Not going to result in land locking present or future parcels; and
6. Not needed as public streets to meet the street spacing requirement or to provide access to surrounding parcels for future development; and
7. Designed to serve a potential maximum of nine (9) single-family dwelling units, or as otherwise determined by the engineer, for the entire length of the private street system to the nearest publicly maintained street, when physical barriers, zoning or other legal constraints are considered; and
8. Maintained by a capable and legally responsible homeowners' association, or other legal entity made up of all benefited property owners; and
9. Clearly described on the face of the plat, short plat, binding site plan, site development permit or other development authorization and clearly signed as a private street, for the maintenance of which the City is not responsible; and
10. Connected to the public street system using a private street approach. See Standard Plan 6-46.

Parking on private streets is allowed on one side only. Parking is also prohibited on both sides within 60' of the intersection with the connecting street. This requirement may be reduced by the Engineer based on vehicle maneuvering diagrams provided by the Developer that shows a parking configuration that allows a Bus-40 vehicle to access the private street, if required.

The City will not accept existing private streets as public streets until they are constructed or reconstructed in conformance with current Kent City Code and these Standards.

Best management practices (BMP'S) shall be used when maintaining private streets.

Whenever a private street extends more than 150' from the nearest face of curb or edge of pavement of the connecting street, an approved cul-de-sac or hammerhead turnaround per Standard Plans 6-18 or 6-21 shall be constructed.

#### **6.2.F Public Half Streets**

See Standard Plan 6-13. Half streets may be permitted as an interim facility when:

1. Such street shall not serve as primary access to more than 30 dwelling units; and
2. Such alignment is consistent with or will establish a reasonable circulation pattern; and
3. There is reasonable assurance of obtaining the prescribed additional right-of-way through future development from the adjacent property with topography suitable for completion of a full-section street.
4. A half street shall meet the following requirements:
5. Right-of-way width of the half street shall be a minimum width of 32' and sufficient to construct the street and related grading; and
6. The half street shall have a crown section consistent with locating the centerline of the ultimate street section, as close as possible to the property line; and
7. Traveled way shall be surfaced the same as the designated street type to a width no less than 20', combined curb and gutter, sidewalk and planter strip shall be constructed per Standard Plan 6-13; and
8. Property line edge of street shall be finished with temporary curbing, shoulders, ditches, and/or side slopes in order to assure proper drainage,

bank stability, and traffic safety; and

9. Half streets shall not intersect other half streets or exceed these requirements unless otherwise approved by the Engineer.
10. Whenever a half street extends more than 150' from the nearest face of curb or edge of pavement of the connecting street, a temporary cul-de-sac or turnaround per Standard Plans 6-18, 6-21 and 6-22 shall be constructed.
11. When a half street is eventually turned to a whole street, the completing builder shall reconstruct the original half street as necessary to produce a proper full-width crowned street of a designated section per these Standards.
12. Obtaining any right-of-way or easements to accomplish the above shall be the responsibility of the Developer.

#### **6.2.G Cul-de-Sacs, Islands, and Hammerheads**

The following design parameters shall apply to cul-de-sacs, islands, and hammerheads:

1. Cul-de-Sacs: Whenever a dead end street extends more than 150' from the nearest face of curb or edge of pavement of the connecting street, a widened "bulb" shall be constructed as follows:
  - a. The minimum right-of-way radius across bulb section is 52.50' in a permanent or temporary cul-de-sac. Right-of-way may be reduced, provided utilities and necessary drainage are accommodated on permanent easements within the development, upon approval by the Engineer.
  - b. The minimum radius of surfacing across bulb is 45' to the face of curb. See Standard Plan 6-18.
  - c. Sidewalks shall be constructed around the cul-de-sac. Planter strips are not required.
  - d. Rolled curbs are allowed in cul-de-sacs.
  - e. A permanent cul-de-sac shall not be longer than 600', measured from center of the intersecting street, along the centerline of the roadway to the center of the cul-de-sac bulb. The Engineer will consider variances to this requirement on the basis of pertinent traffic planning factors such as topography, sensitive areas and existing development.



- f. If a public street temporarily terminates at a property boundary, serves or will serve more than nine (9) lots, or is longer than 150' from the nearest face of curb or edge of pavement of the connecting street, a temporary cul-de-sac bulb shall be constructed near the development boundary. The paved bulb shall be 90' in diameter with sidewalks terminated as shown on Standard Plan 6-22. In lieu of the temporary cul-de-sac, a temporary hammerhead turnaround may be provided as approved by the Fire Code Official.
  - g. Removal of the temporary cul-de-sac or hammerhead turnaround, and construction of the extension of the street infrastructure and driveways, shall be the responsibility of the Developer who extends the street. See Standard Plan 6-22.
  - h. The maximum cross slope in a bulb shall not exceed 6 percent in any direction.
  - i. Partial bulbs or eyebrows shall have a minimum paved radius and an island configuration, and the island shall be offset 4' from the edge of the street. See Standard Plan 6-19.
  - j. When a commercial access changes from a public to private designation, a public cul-de-sac shall be required, regardless of whether another fire access turnaround is provided elsewhere.
  - k. Parking shall not be allowed within a cul-de-sac.
2. Cul-de-Sac Island: A cul-de-sac island is an optional feature for any cul-de-sac when the bulb paved diameter is 90' or less; but it is mandatory when the bulb paved diameter exceeds 90'. If provided, the island shall have cement concrete vertical curb and gutter. Maximum island diameter shall be 15' and there shall be at least a 30' wide paved traveled way around the circumference, and no parking will be allowed. An island shall be landscaped per Section 6.13 Landscape Requirements on Public Right-of-Way. The landscaping must be maintained by the homeowners' association or other responsible entity or parties, including all benefited property owners. See Standard Plan 6-19.
3. Hammerheads: A hammerhead may be used to satisfy the turnaround requirements where a private street serves or will serve nine (9) or

fewer lots. The maximum profile grade of any leg of the hammerhead turnaround shall be 6 percent. Parking and driveways shall not be allowed within the hammerhead. See Standard Plan 6-21.

### 6.3 STREET IMPROVEMENTS

The City has developed a Transportation Master Plan indicating existing and proposed streets and their functional classifications. It shall be the responsibility of the Engineer to identify specific conditions for street improvements and/or right-of-way reservation required as a condition of development. All street improvements shall be consistent with the adopted Comprehensive Plan, City of Kent Subdivision Code and other applicable Kent City Codes. In accordance with Kent City Code 6.02, "Required Infrastructure Improvements", the Engineer is authorized to require the construction of off-site street and drainage improvements as a condition of issuing a permit with an "improvements valuation" above the annually adjusted threshold. Developer should contact the City Permit Center for current threshold amount. An appraisal may be used at the discretion and cost of the Developer.

As required by these Standards, or as a part of the SEPA review process, the required improvements and potential impacts of a proposed project shall be identified. The Developer shall be required to construct the improvements. In lieu of construction, and at the discretion of the Engineer, the mitigation of these impacts may be satisfied through the execution of an environmental mitigation agreement in which the Developer and his/her successors, agree to participate in the cost of construction of future off-site street and utility system improvements. If the future improvements are proposed to be funded by a Local Improvement District formed by the City in connection with a project identified in the City's Capital Improvement Plan, the Developer may be required to pay a fee in lieu of construction based on the Engineer's cost estimate form or execute a No-Protest Local Improvement District Covenant with the City.

#### 6.3.A Minimum Public Street Improvements

Requirements for street improvements are mandated by Kent City Code 6.02. When public street improvements are required as a condition of development, and an abutting public street is not to current standards or is otherwise not adequate, the Developer is responsible for constructing the following minimum improvements on all public streets along their entire property frontage:

1. A half street improvement shall be provided that is equal to one-half of the final design pavement width or a minimum of 20', as measured from the centerline of right-of-way, or from the approved centerline as determined by the Engineer, to the face of the new cement concrete curb.
2. The street improvement for the frontage along the development shall include combined curbs and gutters, planting strips, street trees and landscaping, and cement concrete sidewalks depending on the street classification and the bike route classification. See Section 6.5 Driveways, Sidewalks and Non-Motorized Lanes or Trails, for additional information on



sidewalks and bike lane requirements.

3. The total combined pavement width shall be shown to have a design/remaining service life of at least twenty (20) years, in accordance with the AASHTO Guide for the Design of Pavement Structures, Part I and Part II.
4. The public street improvements shall also include street channelization and pavement markings; traffic signs; a stormwater drainage conveyance, detention, and treatment system; traffic signals when specified; an approved street lighting plan and an installed street lighting system meeting the requirements of these Standards. See Section 6.14 Street Illumination System, for additional information on street lighting design; utilities and other street-related appurtenances.
5. Depending upon the condition of the adjacent pedestrian system and the nature of the development, the Developer may also be required to install specific on-site and off-site pedestrian sidewalks, pathways, or shared pedestrian and bicycle facilities. All subdivisions are required to provide for neighborhood connectivity via street connections, pedestrian connections, bicycle facility connections, or some combination of these connecting facilities. At a minimum, the Developer is required to provide full improvements on the frontage of their property, and tapers, merges or connections to existing improvements beyond the project property boundaries.
6. All street improvements shall include provisions for street trees. The species of these street trees shall be selected from the list of approved street trees as shown in Appendix A, and placed as shown in Standard Plans 6-54 and 6-55.
7. Monument Installation: Per RCW 58.17.240, permanent control monuments are required to be installed at each and every controlling corner on the boundaries of the parcel of land being subdivided. The placement of street centerline and intersection monuments will be required to be installed at every change in direction of the centerline alignment and at every intersection including where new public streets intersect existing public streets. See Standard Plan 6-72a and 6-72b for street centerline and intersection monuments.
8. Prior to the recording of any short plat or subdivision, all surveying and the setting of all lot corners and monuments shall be complete.
9. Where utility system construction for the proposed development extends beyond the half street improvements, a full width overlay of the street may be required by the Engineer.

## 6.4 STREET DESIGN STANDARDS

### 6.4.A Street Design Summary

Tables 6.7 through 6.9 at the end of this chapter summarize the minimum design standards for the various functional classifications of streets in the City.

### 6.4.B Downtown Overlay District, The Meeker Street Corridor, and Relocation of Naden Avenue South

The Downtown Overlay District revises and adds additional criteria for the streets within the downtown area of Kent shown on Standard Plan 6-8a. See Kent City Code 15.09.046, Downtown Design Review.

Additionally, the Meet Me on Meeker Street Standards impose further design guidelines to the streetscape features, medians, and crosswalks for the Meeker Street Corridor. For that portion of the Meeker Street Corridor that also falls within the Downtown Overlay, the Downtown Overlay District Standards are superseded by the Meet Me on Meeker Street Standards with respect to the streetscapes, medians, and crosswalks within that corridor.

Street cross-sections within the Downtown Overlay vary from the typical street cross sections. See Standard Plans 6-8 through 6-10 and the following discussion for further information on sidewalks, Channelization, street lighting, and street furniture within the overlay.

### 6.4.C Downtown Overlay Design Standards

#### 1. Pedestrian Zones:

This is the area from the street-side edge of the sidewalk to the property line or building face. Street furniture is allowed within this zone. A minimum clear width for pedestrians of 8' shall be maintained throughout the pedestrian zone. This minimum clear width for pedestrians is reduced to 6.5' for Naden Avenue and shall be maintained throughout the pedestrian zone.

#### 2. Planter/Streetscape Zones:

This is the area from the back of curb to the street-side edge of sidewalk. Street furniture, street trees, landscape planters, street lights, traffic signs and pedestrian bollards are allowed within this zone. The minimum width of 5' shall be provided.

#### 3. Sidewalks:

Sidewalks shall be finished with 2' by 2' squares. The squares shall have an alternating brush finish (vertical, horizontal, and vertical, horizontal) and shall have a 2" smooth border tooled from the joint. See Standard Plan 6-36.

4. Crosswalks:

Crosswalks within the Downtown Overlay District shall be 12' wide and comprised of Portland Cement Concrete (PCC). The finish pattern shall be the same as for sidewalks. The crosswalk shall have a 1' smooth border. This border shall also extend from the mid-point of the corner to the inner intersection crosswalk border. No color shall be added to the material prior to placement. See Standard Plan 6-37.

5. Street Furniture:

All street furniture shall be manufactured by Fairweather Bench Company in Port Orchard, Washington, or as determined by Economic and Community Development Director.

Benches shall be made from 2" Schedule 40 pipe with steel straps. Steel shall conform to ASTM A36 hot rolled steel and shall be wheelabrated prior to fabrication. End frames shall be ductile cast iron. All surfaces shall receive a powder coat finish applied by the dry electrostatic process. Benches with backs shall be model Sitescape WPI-1001-PF surface mount, color Black. Benches without backs shall be 8' in length with center frame model #PL-1.5, Plaza Series, and color Black.

Picnic tables shall be made from 2" Schedule 40 pipe with steel straps. Steel shall conform to ASTM A36 hot rolled steel and shall be wheelabrated prior to fabrication. All surfaces shall receive a powder coat finish applied by the dry electrostatic process. Picnic table shall be model #F-7 or #F-8 Plaza Series, surface mount, color Black.

Trash receptacles shall be flared top trash receptacle with hinged dome top and 30-gallon galvanized liner, and shall be made from steel, and powder coat finish applied by the dry electrostatic process. Model #TR-12, surface mount, color Black.

Planters shall be 29" wide at the top and 25" wide at the bottom, of various heights (24" or 18") and fabricated with steel straps, with galvanized and powder coated liner. Steel shall conform to ASTM A36 hot rolled steel and shall be wheelabrated prior to fabrication. All surfaces shall receive a powder coat finish applied by the dry electrostatic process. Planters shall be model #PTR12, Plaza Series, color Black.

Bike racks shall be made from 2" Schedule 40 pipe 36" high and 38" long. Steel shall conform to ASTM A36 hot rolled steel and shall be wheelabrated prior to fabrication. All surfaces shall receive a powder coat finish applied by the dry electrostatic process. Bike racks shall be model #BR-1, 3 loops, color Black.

6. Pedestrian Bollards with Power Outlets:

Pedestrian bollards with power outlets shall be provided at each street tree location. The bollard shall be placed on the concrete sidewalk adjacent to the tree pit. The bollard shall not be placed further than 4' from the face of curb and is preferred to be placed centered laterally on the tree pit and within one foot of the edge of the tree pit, outside of the required Clear Zone. See Standard Plans 6-50 and 6-56.

Pedestrian bollards shall be surface mount, Fairweather, model #B-1-4" x 36" w-outlet modified, color Black. All bollards shall contain a grounded outdoor use outlet for street decorations. See Standard Plan 6-56.

7. Street Lights:

Street lights shall consist of Gardco Gullwing and Lumec Serenade DSX Series luminaire fixtures for the street and pedestrian lighting respectively, except on SR 516 (Willis Street) between SR 167 and Central Avenue where cobra head fixtures are required. Cobra head luminaires will not be allowed anywhere else within the Downtown Overlay District unless otherwise approved by the Engineer. See Section 6.14 for street lighting requirements.

#### **6.4.D Access Management Standard**

The City manages access through the use of medians, auxiliary lanes, driveway location and design, driveway separation, corner clearance, joint and cross access agreements, and alternative access from lowest classification Street. Unless otherwise approved by the Engineer, each vehicle shall be deemed to have a length of 25' for the purpose of calculating minimum storage lengths.

1. General Access Provisions:

In general, all properties abutting public streets are permitted reasonable access to the public street system. Driveways directly giving access onto arterials and collectors may be denied if alternate access to another arterial street is available. On properties with multiple public street frontages, the City will restrict vehicular access solely to the public street having the lower street classification, and/or to the safest access location. Retail, commercial or industrial driveways shall be prohibited from access to residential streets.

Coordinated access (via cross access, joint or reciprocal access agreements recorded with the County Auditor's office) with adjacent properties may be required of the Developer, where driveways are located on arterials and collectors or driveway separation and corner clearances cannot be achieved.

The design of driveways onto arterials and collectors may be required to restrict turning movements from or onto the arterial and collector streets, and may be required to be designed on a case-by-case basis. Factors to be considered in the design of turn-restrictive driveway geometrics will include, but are not limited to the following:

- Design vehicle
- Vehicular sight lines (See Standard Plan 6-52)
- Pedestrian sight lines (See Standard Plan 6-53)
- Pedestrian oriented development
- Driveway traffic volumes
- Public street traffic volumes and speeds
- Public street widths and channelization
- Driveway proximity to intersections, and to other driveways.

The Engineer may require any combination of these factors to be considered in the design of the driveway.

2. Access Type and Minimum Distance Allowed. Table 6.1 below shows the minimum Driveway separation and Intersection corner clearance based on street functional classification.

**Table 6.1**

**Access Separation Requirements**

Roadway Classification						
Access type	Princi- pal Arterial	Minor Arterial	Collector Arterial	Residen- tial Collector	Indust/ Comm.	Resi- dential
Minimum <b>Driveway to Driveway</b> Separation, measured closed edge to closest edge of driveway	300'	200'	200'	50'	100'	10' <sup>1,3</sup>
<sup>2</sup> Minimum <b>Corner Clearance</b> Standards, measured from the nearest edge of the driveway to the point of curvature on the curb return of the intersecting street	300'	200'	100'	100'	50'	20'

- 1 Residential driveways shall be a minimum of 5' from the nearest edge to the property line.
- 2 For parcels adjacent to a traffic signal, 300' shall be used unless a traffic study successfully demonstrates that the Intersection area of influence is less than 300'.
- 3 On a case-by-case basis in cul-de-sacs, driveways may be allowed less than a 10' separation.
4. See Standard Plan 6-1.
3. Commercial development proponents wanting more than one (1) driveway access to a public street will be required to justify the second driveway on the basis of development generated trips.
4. Where the driveway location does not meet minimum separation criteria, or where a safe driveway location cannot be obtained, the City will require appropriate mitigation measures to provide for a driveway as safe as feasible. Acceptable mitigation may take the form of turning movement restrictions or a joint-use driveway with the adjoining property owner.
5. The minimum protected driveway throat without any turning movements or parking allowed must be provided for the number of vehicles indicated below to prevent any potential turning conflicts within their lengths. These are the minimum lengths that will be permitted, unless an approved traffic study includes a site and project specific queuing study showing that either more or less throat length is required to serve the subject development.
  - a. For drive-thru banks: for a single window, there must be storage to accommodate a minimum entering queue of four (4) vehicles; banks having two (2) lanes need to accommodate a minimum entering queue of at least three (3) vehicles per window or eight (8) vehicles total; and banks having three (3) or more lanes shall have storage to accommodate a minimum of three (3) vehicles for each service lane or total vehicles equal to four (4) times the number of service lanes.
  - b. For vehicle wash facilities: facilities having a single service bay shall provide entering storage to accommodate a minimum of four (4) vehicles; facilities having multi-bay designs shall have a minimum entering storage space of at least three (3) vehicles for each service bay.
  - c. For fast-food restaurants with drive-thru window service: entering storage to accommodate a minimum of eight (8) vehicles per service



lane shall be provided. Storage lengths for fast food restaurants are measured from the order board to the first service window.

6. Service stations shall have a minimum entering and exiting storage length to accommodate a minimum of two (2) vehicles shall be provided between the pump islands and the public right-of-way. If an espresso stand is located on-site with drive-thru windows, the minimum espresso stand storage requirements will prevail.
7. Shopping centers having 50,000 square feet or more of gross leasing area shall have an entering and exiting throat length to accommodate a minimum of four (4) vehicles and shall be provided before any crossing or turning conflicts can be permitted between the parking lot and the public right-of-way. Shopping centers having 100,000 square feet or more of gross leasing area shall provide a site and project specific queuing analysis to determine their appropriate entering and exiting storage lengths.
8. All commercial developments having less than 50,000 square feet of gross leasing area shall have a minimum entering and exiting storage length to accommodate at least two (2) vehicles provided between the parking lot and the public right-of-way before any crossing or turning conflicts can be permitted. The City may require a site and project specific queuing analysis to determine the appropriate storage lengths when the commercial development includes one or more drive-thru facilities.
  - a. For all espresso stands with drive-thru windows, entering and exiting storage lengths shall accommodate a minimum of four (4) vehicles per window.
  - b. For pharmacies with drive-thru service: entering and exiting storage lengths shall accommodate a minimum of three (3) vehicles per service point.
  - c. For all other facilities, a minimum entering and exiting storage length of two (2) vehicles shall be provided before any crossing, or turning conflicts can be permitted between the parking lot and the public right-of-way line.

#### **6.4.E Traffic Calming**

All new residential streets shall include traffic calming measures. Minimum traffic calming measures shall include intersection neckdowns per Standard Plan 6-27 at connections to arterial and collector streets. Additional traffic calming measures may include, but are not limited to: curb bulb-outs, alternating parking on streets less than 32 feet wide, chokers, speed cushions, traffic circles or compact roundabouts, and raised Intersections.

Minimum traffic calming measures shall be determined by the Engineer in collaboration with the Developer based on the site's constraints such as topography, size, and location. All internal intersections within subdivisions with more than nine (9) lots shall include street bulb-outs. Streets longer than 500' shall incorporate at least one measure such as chokers, or speed cushions unless otherwise approved by the Engineer. See Standard Plans 6-24 through 6-30.

All landscaping shall be maintained by the adjacent homeowners, a homeowners' association or other responsible entity or parties including all benefited property owners. A maintenance agreement shall be included as part of the plat application.

## **6.5 DRIVEWAYS, SIDEWALKS AND NON-MOTORIZED LANES OR TRAILS**

The following standards outline the appropriate parameters for driveways, sidewalks and non-motorized lanes or trails.

### **6.5.A Driveways**

Driveway design standards are shown in the Standard Plans 6-42 through 6-48. The required radius and minimum protected driveway throat width shall be determined by a vehicle maneuvering diagram provided by the Developer for the appropriate design vehicle. Pedestrian and vehicular sight line requirements shall be met and shown on Engineering Plans per Standard Plans 6-52 and 6-53.

All driveways shall be designed with profile grade breaks, or transitions, constructed as vertical curves to ensure adequate clearance for all vehicles. The maximum change in longitudinal profile grade for a driveway shall be 12 percent in a sag condition, and 8 percent in a crest condition. The maximum longitudinal profile grade for driveways shall be 12 percent, unless otherwise required by existing conditions as approved by the Engineer. The minimum length of vertical curve shall be 5' per 1 percent change in profile grade. See Standard Plan 6-48.

The minimum separation between street light standards and single-family residential driveways shall be 5'. The minimum separation from all other driveways shall be at least 10'.

The minimum width for all driveways to commercial, multi-family residential or industrial land uses shall be 30' unless otherwise approved by the Engineer in order to accommodate higher volumes of pedestrians in a safe and convenient manner. The width of driveways to industrial and commercial properties shall be determined by a vehicle maneuvering diagram provided by the Developer using the appropriate design vehicle.

The use of one-way driveways as a part of the on-site circulation pattern is discouraged. One-way driveways are reviewed on a case-by-case basis for impacts to the City roadway system. If the use of one-way driveways is allowed, the minimum width of each one-way driveway shall be 20'. In addition, signs shall be posted at the Driveways indicating the permitted movement (i.e., "Entrance Only" or "Exit Only – Do Not Enter"). The Engineer may also require similar signs to be posted within the on-site parking areas or drive aisles.

1. Private Residential Driveways:

Driveways serving a single-family residential lot shall be considered Private Residential Driveways. Private Residential Driveways shall be constructed of hot mix asphalt or cement concrete pavement at least 12' in width at the curb line unless otherwise directed by the Fire Code Official. At a minimum, the pavement for the driveway shall extend 40' from the edge of pavement or back of sidewalk on the public or private street serving that driveway, or to the front face of the carport or garage, whichever is less. See Standard Plan 6-42.

2. Private Joint Use Residential Driveways:

Driveways serving two (2) single-family residential lots shall be considered private joint use residential driveways. Private joint use residential driveways must be constructed with hot mix asphalt or cement concrete pavement at least 16' in width, unless otherwise directed by the Fire Code Official. Private use joint driveways shall be centered within a private tract for ingress/egress and utilities that is at least 4' wider than the pavement width. At a minimum, the pavement for the driveway shall extend 40' from the edge of pavement or back of sidewalk on the public or private street serving that driveway, or to the front face of the carport or garage, whichever is less. See Standard Plan 6-47.

Residential driveways shall be a minimum of 5' from the nearest edge to the property line.

### **6.5.B Sidewalks**

An important element of the City's Transportation Master Plan is the provisions of facilities for pedestrian use. Sidewalks shall be provided on all new and improved public streets. Sidewalks shall be constructed of Portland Cement Concrete Class 3000, unless otherwise specified and required.

The minimum width for sidewalks varies depending on the functional classification of the street. See the Standard Plans for detailed information for the sidewalk widths based on roadway classification. In instances where building doors open directly to a public sidewalk, the minimum sidewalk width shall be 10'. No street trees will be allowed within 4' of a door opening to

a public sidewalk. These widths shall be exclusive of the width of any adjacent curbs, and shall be free of obstructions such as utility poles, street furniture and mailboxes.

Sidewalks will be required to be constructed on both sides of a street, and shall be placed as shown in the Standard Plans for the various street classifications. Where sidewalks are not adjacent to the curb, a landscaped planter strip or amenity zone between the street curb and the street-side edge of the sidewalk shall be provided.

The minimum thickness for Portland Cement Concrete sidewalks shall be 4", except at driveway approaches and cul-de-sacs where the minimum thickness required shall be 6" for residential driveways and 8" for commercial/industrial driveways. See Standard Plans 6-42 through 6-46.

All streets constructed with curbs, gutters, and sidewalks, shall have ADA compliant curb ramps provided at street intersections and other pedestrian crossings. These curb ramps shall be located and constructed in accordance with the requirements of the ADA Guidelines. All curb ramp widths shall be a minimum of 5'. The City and WSDOT currently recognizes the guidance from the Revised Draft Guidelines for Accessible Public Right-of-Way published by the Architectural and Transportation Barriers Compliance Board on November 23, 2005. The City requires detectable warning as truncated domes. Material shall be Federal Yellow pre-formed composite cast-in-place panels. On a project by project basis, use of wet applied product to form truncated dome may be allowed. Wet-embossed (stamped) concrete and painted dome patterns will not be allowed. Nor shall glue down or mechanically fastened systems be allowed.

Castings, boxes, vaults, and structures located within non-motorized travel area that are adjusted and/or installed shall have slip resistant surface. The following slip resistant coatings are approved for application on metal frame and lid:

- SlipNot Grade 3-course as manufactured by W.S. Molnar Company
- SafeTrax TH604 by Thermion Inc.
- Mebac1 (their most aggressive surface) as manufactured by IKG Industries

### **6.5.C Non-Motorized Lanes or Trails**

#### 1. Bike Lanes

Bike lanes are a portion of the street that has been designated for preferential or exclusive use by bicyclists. These lanes shall be 5' wide, located next to the curb, and designated with pavement markings according to the MUTCD. See Standard Plan 6-31.

2. Facilities Containing Bicycle Components:

All bicycle facilities shall be designed and constructed according to the latest version of the Guide for the Development of Bicycle Facilities, published by AASHTO and these Standards.

3. Shared Use Trails (Pedestrian and Bicyclist):

The minimum surface width of asphalt pavement is 10' for a two-way trail. Each trail shall include provisions for 2' wide gravel shoulders having cross-slopes no steeper than 2 percent on both sides of the trail. The minimum horizontal clearance shall be at least 3' from the edge of the asphalt paved trail to any trail-side obstruction.

Where trails are adjacent to ditches, creeks, or slopes equal to or steeper than 2H:1V, the gravel shoulder must be 5' wide with a minimum 4' high vinyl covered chain link fence, or 3.5' tall pedestrian rail system per Kent Standard Plan 6-41 where appropriate, as the means to ensure that bicyclists remain safely away from such trail-side hazards.

## 6.6 INTERSECTION DESIGN POLICIES

Intersection design policies are outlined in the tables below:

### 6.6.A Intersections Design

Table 6.2

	Design Criteria	Standard
1.	Angle of intersection measured at 10' beyond street right-of-way line with 90° being perpendicular	Minimum 85° Maximum 95°
2.	Minimum centerline radius (2-lane) for residential streets	55 Feet
3.	Minimum curb radius	
	Streets classified as arterial and collector streets.	35 Feet
	b. Residential or industrial/commercial street intersections where the highest classification involved is a residential collector	25 Feet
	c. Private street intersections where the highest classification involved is a residential street	20 Feet
4.	Minimum right-of-way line radius	25 Feet

At the intersection of two differently classified streets, the larger of the curb return radii specified in the street design table herein shall be used for establishing the right-of-way radius.

**6.6.B Intersections Spacing**

Minimum intersection spacing between adjacent intersecting streets, whether crossing or T-connecting, shall be as shown in Table 6.7

**6.6.C On Sloping Approaches**

At an intersection, landings shall be provided with a profile grade not to exceed 1' difference in elevation for a distance of 50' approaching an arterial, residential or commercial street, measured from future right-of-way line (intersected by the 2 percent profile grade extended from crowned street to right-of-way line) of intersecting street. See Standard Plan 6-23.

**6.6.D Roundabout Intersections**

When used in place of standard intersections, roundabout intersections shall be designed in accordance with current USDOT/FHWA guidelines and the WSDOT Design Manual.

**6.6.E Low Speed Curves**

Low speed curves are applicable to residential streets only as shown in Table 6.3 below.

**Table 6.3**

	<b>Radius (Ft)</b>	<b>Deflection Up to 75°</b>	<b>Deflection 75° &amp; Over</b>
1.	Minimum centerline radius (two-lane):	100'	55'
2.	Minimum curb radius:	80'	25'
3.	Minimum right-of-way line radius:	70'	25'

**6.6.F Offset and Skew Intersections**

The use of offset and skew intersections shall be avoided wherever possible, and when proposed, must conform to the requirements of these Standards. New intersections shall be designed to avoid intersection angles at Street centerline of less than 85 degrees, or more than 95 degrees. Offsets between intersections shall not measure less than what is shown in the Table 6.7.

**6.6.G Intersections Within a Horizontal Curve Alignment**

The use of intersections in or near a horizontal curve shall be avoided wherever possible, especially on the inside of a horizontal curve. Intersection/driveway sight triangle standards shall be met as required in these Standards.



### **6.6.H Intersection Pedestrian and ADA-Compliant Access**

ADA-compliant curb ramps shall be provided on each corner of an intersection from which pedestrian movement is permitted. Curb ramps shall be designed in accordance with these Standards and the ADA. See WSDOT Standard Plans for ADA-compliant curb ramp designs. All curb ramp widths shall be a minimum of 5'.

At those locations where sidewalks are not required and are not proposed to be installed, a concrete pedestrian refuge area may be required behind, and to either side of, the curb ramp. This refuge area shall extend a minimum of 4' clear behind the ramp, and 8' on both sides of the edges of the ramp.

Crosswalks are marked typically under the following conditions:

1. At signalized intersections; or
2. At designated school crossings; or
3. At locations approved by the Engineer.

### **6.6.I Curb Bulb-Outs**

Curb bulb-outs are required at all intersections where the street cross section at the intersection includes shoulders, on-street parking, or curb lanes wider than 12 feet. The Engineer will determine where curb bulb-outs are installed. Curb bulb-outs will generally be installed to minimize pedestrian crossing distances, define on-streets parking lanes, and provide traffic calming and reduced vehicle turning speeds.

### **6.6.J Intersection Turn Lane Vehicular Storage**

Intersection turn lane storage shall be a minimum of 50'. When a traffic study is required by the City, the turn lane storage shall be designed on the basis of the 95th percentile queue length during the PM peak hour for 20-year forecast volumes. The analysis shall use computer analysis software such as Trafficware's Synchro or PTV's Vissim, or approved equal as approved by the engineer. All roundabouts will be analyzed using Sidra Solutions Sidra software.

### **6.6.K Intersection Drainage**

Intersections should be designed to avoid the sheet flow of water across the intersection of all streets classified as arterial and collector streets. Where practical, runoff water should be carried under the intersection via catch basins and storm drains. Storm water shall be collected prior to a curb ramp and shall not be allowed to pool or puddle in front of or within a curb ramp. Where appropriate the use of low impact development design and materials to handle storm water is encouraged.

#### **6.6.L Intersection Right-of-Way Requirement**

The right-of-way requirements for intersection approaches may be increased for special intersection elements such as raised median channelization, multiple left-turn lanes, exclusive and/or right turn lanes, turn lanes to accommodate large wheel base vehicles, bus pullouts, etc.

#### **6.6.M Intersection/Driveway Sight Triangle Requirements**

Intersection/driveway sight triangle will be evaluated based upon the current edition of the AASHTO A Policy on the Geometric Design of Highways and Streets. See Standard Plan 6-52. Sight distance requirements for each approach will be those indicated in the appropriate table in the latest edition. The City may allow mixed-use developments to use wider sidewalks to accommodate sight lines at intersections on a case-by-case basis.

#### **6.6.N Intersection Channelization**

Intersection turn islands (right-turn islands) shall be constructed with raised curbs only when the resulting island encompasses an area of at least 100 square feet (exclusive of the area removed for pedestrian curb ramps), or if at least two of the sides of the island are a minimum of 15' long. The curbing shall be offset at least 2' from the right edge of the through travel lanes, and at least 4' from the left edge of the right-turn lane. The curb shall be combined curb and gutter in all new installations and pre-cast concrete mountable curb sections in all retrofit installations. A minimum radius of 2' shall be used for the island noses. Landscaping should not be installed in right-turn islands. The preferred surfacing materials shall be 4" thick section of broom-finished concrete or a 3" thick surface of asphalt concrete. Stamped colored concrete may be approved by the Engineer on a case-by-case basis, provided it is not used in a pedestrian pathway portion of the island.

Divisional center medians (used between left-turn lanes and opposing traffic lanes) shall be a minimum of 4' wide with a total length equaling the length of the left turn storage, opening length and turn pocket transition length. Curbing for the median shall be combined vertical curb and gutter.

#### **6.6.O Traffic Signal Equipment**

Traffic signal controller cabinets, when installed as a part of a signal installation, shall be installed so that the door to the cabinet opens towards the intersection whenever possible. A clearance of 7' shall be provided from the face of curb to the controller cabinet. Poles shall be located no more than 5', as measured to the pole centerline, from the edge of the nearest curb ramps on that quadrant of the intersection with accommodations for ADA accessibility to all pedestrian crossing buttons. See Standard Plan 6-38.

#### **6.6.P Railroad Crossings for New Construction**

Adjacent driveways shall be located at least 100' from any railroad crossings

measured from the centerline of the track to the nearest edge of the driveway. Intersections shall not be located within 200' of a railroad crossing, measured from the centerline of track to the nearest intersection curb return. At those locations where this separation cannot be provided, special traffic control measures may be required to be installed in the individual approaches to the intersection. Such measures may include, but not be limited to, the installation of the applicable railroad crossing warning signs, median barriers, and the installation of traffic signals interconnected to automatic crossing protection devices. Where the crossing is immediately adjacent to the intersection, the Engineer may require special intersection design and crossing protection to enhance the safety of vehicles traveling through or turning at the Intersection.

Sight distance requirements for the railroad crossing will be those indicated in the appropriate table in the latest edition of the AASHTO Policy on the Geometric Design of Highways and Streets. All removable obstructions shall be removed or relocated from the defined sight triangle, except for warning signs, luminaire poles, or other officially established traffic control devices. Where these sight distance requirements cannot be met because of pre-existing, or non-removable obstructions (buildings, for example) automatic crossing protection shall be installed.

#### **6.6.Q Intersection Geometric Design**

Every intersection shall be designed to accommodate the design vehicle appropriate for the lesser classified street forming the intersection. All elements of the intersection, including turning lanes medians, and islands, shall be designed so that the design vehicle will not encroach onto curbs, sidewalks, traffic control devices, islands, center medians, or encroach into the travel lanes of opposing flow traffic.

#### **6.6.R Vehicle Maneuvering Diagrams**

The Vehicle Maneuvering Diagrams (VMD) shall clearly show the outermost and innermost wheel paths and vehicle overhangs of the specified design vehicle using the intersection for entering or leaving a project site, traversing the site, backing into a dock, or otherwise maneuvering for delivery. The VMD shall show the design vehicle using the curb lane in multiple lane roadways or driveways to enter and leave the site.

The VMD shall show that the appropriate design vehicle wheel paths/vehicle overhangs are without encroachment into:

1. An opposing lane of traffic in a public street. The outside wheel paths shall be at least 1' inside the curb or edge of outside traffic lane when entering and exiting the site on a 2- or 3-lane street.
2. An opposing lane of a two-way driveway. Adjacent wheel paths of entering and exiting design vehicles should show at least 3' of minimum separation within driveways.

3. Any parking stalls. No design vehicle wheel path shall be within 3' of any required parking stalls.
4. Areas outside of the reinforced concrete driveway approach apron and protected driveway throat. The inside wheel paths for entering and exiting design vehicles should be at least 3' inside the reinforced concrete driveway approach apron.

The VMD shall show required minimum protected driveway throat lengths prior to exiting the development, and shall show that no portion of the minimum throat length will be within the driveway aisle abutting required parking stalls. All commercial and industrial project sites shall provide a throat length adequate to accommodate the volume and type of vehicle utilizing the site, so as to prevent the backup of any vehicles into the adjacent street. Sites which will experience more than 1,000 vehicles per peak-hour, and sites with a heavy percentage of truck traffic will require a traffic study documenting the minimum protected throat length to accommodate the expected queue.

The VMD shall clearly identify the applicable design vehicle(s) used to prepare the VMD. The applicable design vehicle shall be based on the typical delivery vehicle serving the site as approved by the Engineer. See the Standard Plans 6-101 through 6-105 for turning movements radii associated with the various design vehicles.

When no specific design vehicle is specified for a development, the appropriate design vehicle shall be the BUS-40 design vehicle. The BUS-40 design vehicle is used for service vehicles such as garbage trucks, and fire trucks.

## 6.7 BRIDGE CROSS SECTION

Bridges shall be structurally designed to WSDOT Standards. The street section across a bridge or major culvert shall remain as shown in the Standard Plans with the exception that turn lanes, planter strips and utility strips may not be required. Turn lanes shall be reduced using the MUTCD taper formulas and a 15' taper will be required for pedestrian sidewalks or multi-use trails to bring the sidewalk adjacent to the curb and eliminate the planter strip. All tapers shall occur off of the bridge or culvert structure.

All utility systems shall be in steel casings and placed between the structural beams using approved hangers so that piping is hidden from view. No carrier lines, casings, or conduits will be allowed on the outside of the structural beams. All known utilities and future upgrades shall be accounted for in the design. In addition, two (2) 4" and two (2) 2" diameter conduits and one (1) 8" diameter steel casing shall be installed for future use. Design of the utility system hangers shall be for a full pipe condition for all utilities crossing a bridge.

## 6.8 STREET MEDIAN CHANNELIZATION

Median channelization may be required to be installed as a part of any project. In general, median channelization will not be required or approved for local residential streets or for arterial streets where the resulting median would be less than 600' long, inclusive of any turn lane storage area. Exceptions may include the gateway entrance into development or installation of median channelization at intersections to prevent left-turn access into or out of properties in the immediate vicinity of an intersection. Median channelization must be at least 4' wide in order to accommodate any necessary traffic control devices and/or street lights.

Approval of the installation of medians will be made by the Engineer. Design plans which include median installation must be accompanied by an access plan for the impacted properties. This access plan shall denote the ownerships, uses of the directly impacted properties, and the resulting changes to the access to and from these properties.

If median channelization is required and approved with landscaping on residential collector and residential streets, the landscaping must be maintained by the homeowners association or other responsible entity or parties including all benefited property owners and a landscape maintenance agreement with the City will be required. All costs of maintenance including irrigation shall be the responsibility of the homeowners. The maintenance agreement will include the responsibility to maintain adequate sight distance for vehicular traffic, and shall be recorded with the County Auditor's Office. Type IV landscaping shall be provided including an irrigation system with separate meter per Standard Plan 3-15. All plantings shall not restrict sight distance of the vehicles using the street at plant maturity. The landscaping shall not include large rocks, boulders, or other fixed obstructions. Street trees shall be selected from the approved street tree list shown in Appendix A. Placement of landscaping shall be such that adequate sight distance, per these Standards and AASHTO requirements, will be maintained. All landscaped medians shall be provided with fully automatic, underground irrigation systems.

No left-turn access breaks in a "continuous" center median island will be permitted within the intersection spacing limits as shown in Section 6.6.B.

## 6.9 CUL-DE-SAC/HAMMERHEAD STANDARDS

Provisions for vehicle turnarounds must be made for either temporary or permanent non-through street conditions. The minimum radius for a cul-de-sac shall be 45', as measured from the center of the cul-de-sac to the face of curb. The maximum cross section profile grade for a cul-de-sac is 6 percent. Cross grades greater than 2 percent may only be used when the existing topography exceeds 10 percent in profile grade. See Standard Plan 6-18.

A hammerhead turnaround may be permitted if:

- The street is a private street and is more than 150' from the nearest face of curb or edge of pavement of the connecting street to its most distant point



- The street is a public street that will be extended in the future

Parking and driveways are not allowed within a turnaround. See Standard Plan 6-21.

The maximum length of a non-through street, either permanent or temporary, shall be 600' measured from the centerline of the connecting street to its most distant point.

## 6.10 FIRE APPARATUS ACCESS ROADS

Fire apparatus access roads are required to serve all buildings that have exterior walls located more than 150' from the nearest face of curb or edge of pavement of the connecting street. The distance is measured by an approved route around the exterior of the building that a fire personnel would take, and does not allow topographical or property separation conditions that would make it impossible to advance hose lines to the proposed building along that route. Fire apparatus access roads may also be required to serve properties such as wrecking yards, lumber yards, parking lots and similar uses on lots where structures or buildings may not exist.

All fire apparatus access roads shall be a minimum of 20' in width and shall have an unobstructed height of no less than 13'-6". The width of the road will be increased to support aerial fire apparatus and hydrant operations.

The minimum inside turning radius for fire apparatus access roads is 30' and a minimum outside turning radius of 50'.

Any fire apparatus access road in excess of 150' from the nearest face of curb or edge of pavement of the connecting street may be provided with a turnaround at the end meeting the requirements of Section 6.9 Cul-de-Sac/Hammerhead standards.

Fire apparatus access roads must be designed for 30-ton loading, capable of supporting emergency vehicles on an all-weather basis. This means that it must have a firm gravel base with hot mix asphalt concrete pavement or cement concrete pavement above the gravel base, and it must be designed so that it will not deteriorate under adverse weather conditions and fire vehicle traffic.

Installation of underground structures under or within 10' of fire apparatus access roads shall be designed using the fire authority's load criteria that shall accommodate the loading of fire authority's aerial apparatus.

The maximum profile grade for paved surface fire apparatus access roads is 12 percent, unless otherwise approved by the Fire Code Official. Structures that have access at 12 percent profile grade or greater are required to have sprinkler systems per NFPA standards.

Paved fire apparatus access roads for structures may be accepted up to a maximum profile grade of 15 percent when all structures have sprinklers.



The fire apparatus access roads must be constructed prior to the construction of combustible portions of the building, or the storage of combustibles on non-building lots.

Variances to these fire apparatus access roads standards may be made at the sole discretion of the Fire Code Official and the Engineer according to Section 1.17 Design Variances.

## **6.11 ROADSIDE APPURTENANCES**

### **6.11.A Mailboxes**

Mailboxes shall be located as approved by the US Postal Service and the Engineer in accordance with Standard Plan 6-70 and WSDOT Standard Plans H-70.10-01 and H-70.20-01. Both the Postmaster and the City require that the location of community mailboxes and the number of units be shown on the project plans.

Mailboxes along the edge of all arterial streets shall be a “break-away” design meeting the crash test criteria of NCHRP 350. Single units shall be mounted per WSDOT Standard Plan H-70.10-01. Multiple mailbox units shall be mounted on a commercially available tubular support system designed to function in either a break-away or bend-away basis. See Standard Plan 6-70. When mailboxes or mailbox clusters are installed in a sidewalk, the sidewalk shall be constructed per Standard Plan 6-40.

Prior to the final placement of any mailbox support, the postmaster for the local area shall be contacted and given the opportunity to field verify the final location for accessibility. Additional mailbox reference tools are available at [www.USPS.com/Manage/Mailbox.htm](http://www.USPS.com/Manage/Mailbox.htm), and WSDOT Standard Specification 9-32.

The use of concrete filled metal pipe for mailbox support, or the use of horizontally framed wooded members to support multiple mailboxes is prohibited.

### **6.11.B Fencing or Pedestrian Rail**

Permanent chain link type fencing or pedestrian rail shall be required for pedestrian protection, as well as protection against unauthorized entry for, but not limited to, the following:

1. All City owned and operated facilities, including but not limited to: pump stations, wells and sewage lift stations. Security fence shall be 6' high vinyl coated (black). See Kent Standard Plans 5-22 and 5-23.
2. Adjacent to a slope 2:1 and steeper ditch, bridge, retaining wall, or other permanent facility where the lowest elevation of the facility is greater than

30" below the finished elevation of the pedestrian facility. Fencing or railing as required shall be a minimum of 3-5' high where protection of pedestrian is required.

3. All fencing shall conform to Kent Standard Plan 5-22 and 5-23 unless otherwise required. The location of required fencing and access gates shall be shown on the plans.
4. In no case shall two (2) chain link or wood fences be placed parallel and less than 5' from each other. For example, fences for a rock wall cannot be placed within 5' of a fence for a subdivision boundary, yard or storm detention facility. Approved safety railing may be used in lieu of fencing, as approved by the Engineer.
5. Pedestrian Rail Standard Plan 6-41 is required at the back of all sidewalks with a vertical drop greater than 2'-6".

#### **6.11.C Structural Retaining Walls and Rock Facings**

Structural walls over 2' in height shall contain an aesthetic surface treatment approved by Planning Services. Examples would be a natural stone finish, keystone type walls, or ecology block with aesthetic natural stone finishes. No outward facing perimeter walls over 3' in height will be allowed within perimeter building setbacks. No structural wall shall be allowed over 8' in height, except adjacent to public right-of-way.

In no case shall a mechanically stabilized retaining wall utilizing straps or webbing extending under a public street or within right-of-way be allowed unless otherwise approved by the Engineer.

Rock facings may be used for the protection of cut or fill embankments up to a maximum height of 4' above the keyway in stable soil conditions, where no significant foundation settlement or outward thrust upon the walls.

Rock facings and rock walls shall be constructed in accordance with the WSDOT Standard Specifications. See Standard Plans 6-60 through 6-63.

#### **6.11.D Guardrail**

All guardrail installations shall be designed per WSDOT Design Manual and the associated traffic barrier details within Section C of the WSDOT Standard Plans. For Pedestrian Rail see Section 6.11.B.

#### **6.11.E Bus Stops**

Bus stops and bus turnout lanes must be provided at those locations designated by the Engineer and King County Metro Transit.

The pavement section for bus pullouts and bus turnout lanes shall be

constructed to the requirements of WSDOT Standard Plans for Bridge Approach Slabs. The bus pullouts shall be at least 12' in width. Bus pullout designs shall be consistent with transit agency plan requirements.

Bus turnout lanes shall be provided where bus queuing or staging is required by the transit agencies operations.

#### **6.11.F Conduit for Future City Use**

Conduit shall be provided behind the sidewalk for future fiber optic communication. One (1) 4" diameter Schedule 80 PVC conduit shall be provided at the back of sidewalk and at least one (1) handhole per property and/or building. Conduit shall be provided the length of the property and shall have a handhole provided at the property line for future connections. Tracer wire and pull rope shall be placed inside all conduit installations.

### **6.12 TRAFFIC CONTROL DEVICES**

The following standards shall apply to all traffic control devices:

#### **6.12.A Traffic Signs**

The Developer shall provide all traffic control signs including, but not limited to, street name signs, regulatory signs (including "stop", speed limit signs, "no parking" signs), warning signs, and barricades, as required by the Engineer, based on the approved Engineering Plans.

All traffic control signs shall conform to the standards of the latest edition of the MUTCD, as modified by WSDOT. All traffic control sign installations shall conform to the location and placement standards noted in MUTCD and shall include the appropriate pavement markings.

#### **6.12.B Pavement Markings**

The location of the required pavement markings shall be shown on the Engineering Plans, and must be approved by the Engineer.

All pavement markings, including, but not limited to, pavement striping, raised pavement markers, and delineators shall be installed as a part of all projects. The location and quantity of the required pavement markings shall be shown on the plans for all street classifications. See Standard Plans 6-73 through 6-81.

Pavement markings shall be in accordance with the most current edition of the WSDOT Standard Specifications.

Paint shall only be used when applying the following applications:

- Long duration temporary pavement markings

- Painted curbs

Type A (Liquid Hot Applied Thermoplastic) plastic material shall be used when applying the following pavement markings.

- Plastic Crosswalk Lines
- Plastic Stop Lines

Type B (Pre-Formed Fused Thermoplastic) plastic material shall be used when applying the following pavement markings.

- Plastic Bike Lane Symbols
- Plastic Speed Bump Markings

Type D (Liquid Cold Applied Methyl Methacrylate) plastic material shall be used when applying the following pavement markings.

- Profiled Plastic Lane Lines
- Plastic Flat Long Lines
- Plastic Wide Lane Lines
- Plastic Bike Lane Lines
- Profiled Plastic Double Yellow Centerlines
- Profiled Plastic Two-Way Left Turn Lane Lines
- Plastic Traffic Arrows
- Plastic Traffic Letters
- Plastic Railroad Crossing Markings

Painted striping and curbing paint shall be installed using Low VOC Solvent Based Paint meeting the requirements of WSDOT Standard Specifications Section 9-34.

Type A plastic material shall be BC2000 series or approved equal meeting the requirements of Section 9-34 and the following requirements. Type A plastic materials shall be capable of being applied at a temperature between 375°F to 450°F (190°C to 230°C) and to the required thickness without excessive

overspray, running or deformation of the edges. Type A plastic materials shall be capable of bearing traffic within 5 minutes after application, 10 minutes when pavement surface temperature is at or above 130°F (54 °C), and show no deformation or flaking at temperatures between -10°F to 140°F (-23 °C to 60°C). The marking compound shall contain glass beads and shall have top dressing of glass beads applied.

Type B plastic material shall have glass beads homogeneously blended throughout the material with a securely bonded protruding exposed layer of beads that provide immediate and required retroreflectivity. No additional glass beads shall be needed to be dropped on the material during application to obtain the required retroreflectivity.

Type D plastic material shall meet the requirements of WSDOT Standard Specification Section 9-34. Glass beads shall be as recommended by the material manufacturer.

MMA AREA MARKINGS WITH CORUNDUM (Type D - Liquid Cold Applied Methyl Methacrylate with Corundum) plastic material shall be used when applying the following pavement markings.

- Plastic Bike Lane Lines applied in sidewalk
- Plastic Bike Lane Symbols
- Plastic Green Bike Lane
- Green bike crossing
- All other pavement markings installed in sidewalks and pedestrian pathways for the purpose of directing cyclists.

MMA AREA MARKINGS WITH CORUNDUM shall meet the requirements of Section 8-22.3(A). No glass beads are required.

MMA AREA MARKINGS WITH CORUNDUM is designed to meet the non-slip requirements needed for cyclist and shall be mixed and installed in accordance with the Manufacturer's specifications conforming to the following requirements:

Materials used to create MMA AREA MARKINGS WITH CORUNDUM shall consist of MMA AREA MARKING Pre-pigmented Methyl Methacrylate Resin, MMA AREA MARKING hardwearing aggregate and catalyst. MMA AREA MARKINGS are available through Ennis-Flint, or an authorized distributor of Ennis-Flint.

MMA AREA MARKING's will have the following performance properties:

Density	18.5 +/- 0.5	Lbs. / Gallon
Solids	>99%	ASTM D2205
Build Thickness	90 +/- 10	Mils
VOC	<100	Grams/Liter
Pot Life	~15min	AASHTOT237
Skid	>60	ASTM E303
Hardness	50-60	ASTM D2240
Water Absorption	<0.25%	ASTM D570

Keep materials in dry, protected areas, between 40°F to 80°F. Keep out of direct sunlight and protected from open flame.

Finished Color: E-F Bike Lake Green or White as specified in the contract plans.

Resin:

Resin shall have the following properties:

Density	12.8 +/- 0.35	Lbs/Gal
Tensile	>2000 psi	ASTM D638
Elongation	>70%	ASTM D638
Flash Point	>50°F / 10°C	ASTM D1310

Resin must be supplied in compliant metal pails that have UN1A2Y1.9/100 rating.

**Aggregate:**

Hardwearing Aggregate shall be provided by the manufacturer and will have a hardness of 9 on the Mohs scale. Aggregate shall be a neutral, light color that will not affect the color of the finished product, and will have a mesh sizing of 24 Grit.

Aggregate must be supplied in 25.5 +/- lbs. (11.7 +/- 0.23kg) pre-packaged bags or pails.



**Catalyst:**

Catalyst shall come in a powder form and be supplied in bulk at the maximum usage rate of 0.51 +/-0.2 lbs (0.23 +/- 0.09 kg) per mixed pail of resin and aggregate.

**Application:**

Ambient and surface temperature for installation shall be between 40-100°F, and should be 5°F above the dew point temperature with less than 75% relative humidity.

Clean the intended application area thoroughly. All loose particles, dirt, sand dust, etc. must be removed. Broom and use a power blower or compressed air. The surface must be clean, dry and free of all dust, oil, debris and any other material that might interfere with the bond between marking and the surface to be treated.

All concrete curing compounds shall be completely removed from concrete surfaces prior to installation by shot blasting or grinding. Existing concrete surfaces shall be wire brushed, but may require shot blasting or grinding dependent on condition.

Clean areas containing chemical contaminants such as vehicle fluids, using a degreasing solution, and ensure removal of contaminants and degreasing solution well in advance of the application.

Existing pavement markings that are to be left in place, utilities, drainage structures, curbs and any other structure within or adjacent to the treatment location shall be masked to protect from application. Existing pavement markings conflicting with the surface treatment must be removed by grinding or water blasting. Extra care must be taken to thoroughly remove the dust and debris caused from grinding.

Installed pavement marking must be 100% cured, which will be a hardened solid state, before opening the marked area to traffic.

Typically, MMAX AREA MARKINGS WITH CORUNDUM material applied to new HMA pavement requires a pavement cure period of 15 days and MMAX AREA MARKINGS WITH CORUNDUM material applied to new Portland cement concrete pavement requires a pavement cure period of 30 days. Raised Pavement Markers shall meet the requirements of WSDOT Standard Specification Section 8-09.2.

All materials shall be selected from material listed in the Washington State Department of Transportation qualified product list (QPL).

The Engineer may require different material from those listed above to coincide with Kent maintenance practices.

### **6.12.C Construction Area Traffic Control**

The Developer shall be responsible for providing and maintaining all traffic control devices and flag persons required for maintaining public safety and traffic control in construction areas. No work may begin until a traffic control plan has been submitted and approved by the Engineer. Traffic control plans must be prepared by a licensed Professional Engineer or a certified Traffic Control Supervisor in accordance with WSDOT and MUTCD Standards. Traffic control shall be maintained at all times when construction is in progress on all streets and alleys in the construction area. Project signs shall be installed by the Contractor when required on City projects.

Construction activities on arterial streets are only permitted between the hours of 9:00 A.M. and 3:30 P.M., unless otherwise approved by the Engineer.

### **6.12.D Traffic Signal Systems**

Installation of traffic signal systems shall be required based on the warrants established in the latest edition of the MUTCD. Approval of any particular project will be conditional upon assurance of financial participation in, or actual installation of, the signal system where projected traffic volumes indicate that the traffic volume warrants will be met; or, where the projected operation of an intersection in an unsignalized configuration will be at or below a level-of-service "E." Financial participation or construction of the traffic signal shall be based on the percentage of traffic from the development versus the total traffic volume from the street of connection to the development. In any event, the Engineer shall approve the participation level based on this criterion.

One (1) 4" and two (2) 2" diameter PVC Schedule 80 conduits with pull ropes terminating in Type 2 junction boxes shall be installed under each leg of the intersection for future traffic signal installation, as required by the Engineer.

Any damage to traffic signal systems, detection loops, and/or interconnect cables shall be repaired and restored to operation within five (5) working days. If not completed within the stated time frame, the City may choose to complete the repairs at the Developer's cost. Costs shall include all labor at overtime rates, overhead, equipment, materials, and any other associated charges. The costs shall be based on the latest cost schedule prepared and approved annually by the Engineer.

## **6.13 LANDSCAPE REQUIREMENTS ON PUBLIC RIGHT-OF-WAY**

Landscaping within the right-of-way in planter strips or behind sidewalk shall be provided by all new subdivisions and short subdivisions, commercial/industrial projects or any other development which impact new public streets or abut existing public streets.

### 6.13.A Landscaping Standards

The Developer shall design and construct the required landscaping as follows:

1. Street trees shall be required on all streets. The approved street tree list is provided in Appendix A. This list is subject to periodic updating by the City. See Standard Plan 6-55 for planting details. All landscaping in the planter strips or behind the sidewalks shall be in accordance with Kent City Code 15.07.
2. Required landscape areas shall be provided with adequate drainage. All new landscape areas shall incorporate soil amendments as follows: the uppermost twelve (12) inches of soil shall be tilled and two (2) inches of composted material shall be fully incorporated into the tilled soil; or to specifications as otherwise provided in the Stormwater Management Manual of Western Washington, Department of Ecology, dated August 2012, or as subsequently amended. Compaction of landscaping areas from vehicles and heavy equipment shall be avoided after tilling.
3. Maintenance of landscaped areas, including irrigation systems, ornamental plantings and other landscape elements, on right-of-way shall be the responsibility of the abutting property owner or homeowners association unless otherwise approved by the Engineer.
4. Permission by the Engineer shall be required before any plant may be planted or removed from right-of-way.
5. Plant location and spacing must meet all sight obstruction requirements. Plantings shall not obstruct the visibility of any fire hydrant or traffic control device. The street trees may be spaced at irregular intervals in order to accommodate sight distance requirements for driveways, intersections or traffic control devices.
6. Street trees shall have a minimum clearance of 8' over pedestrian ways and 14' over streets at maturity. Street trees shall be centered a minimum of 3' from the back of curbs and 2' from sidewalks unless otherwise approved by the Engineer. See Standard Plan 6-52 and 6-54.
7. Tree grates shall be required for all street tree plantings in the Downtown Overlay District.

8. Temporary irrigation systems may be required for the minimum 2-year establishment period.
9. The street trees shall have a minimum 1.5" to 2.5" caliper measured 6-12" above the root crown at the time of planting. All trees shall be container-grown, balled and burlap or tree bag unless otherwise approved by the Engineer. No bare root trees will be allowed.
10. The minimum tree pit size in a tree well shall be 4' x 4' minimum.
11. All plant materials shall be inspected and approved by the City prior to installation.
12. All new landscape areas shall incorporate soil amendments as established in Kent City Code 15.07.040 and the KSWDM,

### **6.13.B Landscaping Maintenance Requirements**

1. A maintenance agreement shall be signed prior to engineering plan approval, as described in Section 1.15.L, stipulating the minimum maintenance and quality standards. Landscaping shall be maintained in a safe, healthy, and attractive manner during the 2-year plant establishment period. Landscaped areas shall be kept free of weeds and litter, and material maintained in good growing condition.
2. Regular monthly maintenance procedures for April 1 through October 1 shall be as follows:
  - Litter pickup
  - Mowing turf
  - Edging turf
  - Weeding planting beds
  - Sweeping of sidewalks
  - Irrigation of all plant materials
  - Fertilization as needed per manufacturer's specifications
  - Pruning to required heights and widths
  - Pest and disease control
3. During the 2-year maintenance period, if any portion of the landscaping dies, the Developer shall replace the plant material within thirty (30)

days of notification. If the landscape material is not replaced within the specified time period, the City may use whatever portion of the required assignment of funds pursuant to Section 1.12.C needed to replace the dead landscaping. If the remaining assignment of funds is not enough to cover the costs, the City will initiate collection against the financial guarantee. The City may use either City employees or private contractors to complete the work.

## **6.14 STREET ILLUMINATION SYSTEM**

A street lighting system meeting these Standards shall be provided by all new subdivisions and short subdivisions, commercial/industrial projects or any other development which constructs new public streets or abut existing public streets.

The illumination system shall include energy efficient luminaires and shall conform in all respects with the technical requirements of these Standards, the WSDOT Standard Specifications, IESNA, National Electrical Safety Code, and the National Electrical Code. Street light system installations which do not meet the requirements of the National Electric Code will not be accepted. See Standard Plans 6-86 through 6-92.

These street lighting criteria and guidelines apply to all public street lighting systems. All costs for purchase of materials and installation of the street lighting system shall be borne entirely by the Developer.

Should property owners with private streets decide that they want street lights, the City shall review their lighting design for concurrency with these Standards. Street light designs not meeting these Standards will not be accepted by the City.

All public street classifications shall have street light systems owned and operated by the City except for systems on residential streets if they are owned by Puget Sound Energy. The Developer shall design and construct the system to these Standards.

See Section 1.7.B.4 Street Light Plans for design submittal requirements.

### **6.14.A Street Lighting Criteria and Guidelines**

The calculated street light spacing shall be decreased by 10%. This is to account for future relocations of street lights for revisions to existing or new driveways and similar improvements after the street lighting system is installed.

The face of curb overhang by a street light luminaire with a mast arm shall not be less than 2'.

Street trees can significantly interfere with the efficient lighting of streets, and shall not be permitted within 30' of any street light on arterial streets or within

20' on residential streets. See Standard Plan 6-54. Where street trees and street lights have a conflict the street tree shall be placed at the back of the sidewalk and not deleted.

Street light criteria based on street widths and roadway classifications are provided in Table 6.4 below.

**Table 6.4**

Roadway Classifications	Typical Min Mounting Heights (ft)	Typical Lamp Wattage	Required Max. Uniformity Ratio (avg/min lux)	Desired Max Uniformity Ratio(max/min lux)	Required Average Maint'd Footcandles
Principal Arterials	40	400	3:1	6:1	1.5
Minor Arterials	40	400	3:1	6:1	1.5
Industrial Collector Arterials	40	250	3:1	6:1	1.0
Residential Collector Arterials	40	200	3:1	6:1	1.0
Commercial/Industrial Streets	40	200	3:1	6:1	0.8
Residential Collector Streets	14	70	4:1	NA	0.7
Residential Streets	14	70	6:1	NA	0.4

Private street intersections and gathering areas shall be lit to public residential street lighting standards. Light levels between these areas can be less than residential street light requirements, but in no case can the light level exceed residential requirements. See Table 6.6 for typical spacing requirements.

**6.14.B Street Light Luminaires**

Only Ael Autobahn Gardco, Phillips, and Lumec street light luminaire fixtures shall be used in all City-owned street light systems, unless otherwise approved by the Engineer. King 118R allowed for PSE lighting. The Gardco Gullwing 618 and Lumec luminaires are to be used exclusively within the Downtown Overlay District. Only Lumec and King 118R luminaires may be used on all residential streets.

The only pre-approved street lighting luminaires are as follows:

For LED Equivalent of the 400 Watt HPS Luminaire:  
ATBM H MVOLT R3 NL P7

For LED Equivalent of the 250 Watt HPS Luminaire:



ATBM D MVOLT R3 NL P7

For LED Equivalent of the 200 Watt HPS Luminaire:  
ATBM C MVOLT R3 NL P7

For LED Equivalent of the 100 Watt HPS Luminaire:  
ATBS E MVOLT R3 NL P7

For LED Equivalent of the 100 Watt HPS Lumec DSX Luminaire:  
S56C1-55W32LED4K-R-ACDR-LE3-240-SFX-FN1-GN8TX

For LED Equivalent of the 100 Watt HPS King Luminaire:  
K118R-B2PR-III-60-SSL-1042-120-K18-PEBC-SST-GN-#1

Other street lighting luminaires may be submitted for approval, PROVIDED that they possess the same serviceability characteristics as the pre-approved models, and the submittal is accompanied by photometric calculations showing that they are photometrically equivalent to the approved products.

1. All luminaires shall have:
  - a. LED equivalent to high pressure sodium lamps;
  - b. 120/240 volts;
  - c. Luminaire efficacy rating (LER);
  - d. Type III IES light distribution;
  - e. Cobra head or Gullwing fixtures shall be provided with a flat glass lens and cutoff optics; and
  - f. Post top fixtures shall be provided with no less than semi-cutoff optics. These fixtures shall have the capability of being retro-fit to no upright, zero light above the 90 degrees vertical plane in the future. The retro-fit shall be in the form of a decorative feature that can be added on top of the fixture. It is encouraged that only post tops with cutoff or full cutoff optics be used. In addition, post tops shall minimize light glare for drivers (vertical light between 72 degrees and 90 degrees vertical.)

2. All lamps for street light systems shall be LED equivalent to high pressure sodium lamps (HPS) with a rated service life at 10 hours per start equal to 24,000 hours and shall have a clear finish. These LED lamps shall also meet one of the following criteria:

**Table 6.5**

<b>Lamps (Watts) HPS Equivalent</b>	<b>Min. Initial Lumens</b>
70	6,400
100	9,500
150	16,000
200	22,000
250	28,000
310	37,000
400	50,000

The maximum calculated voltage drop shall not exceed 5 percent per circuit.

All privately owned street lighting systems shall provide a contact service cabinet or separate load center.

New public street light systems, with no load center within 1,000', shall provide a 100A to 150A load center sized to meet the circuit requirements. Cabinets shall have a photoelectric control mounted on top. Residential street systems owned by Puget Sound Energy are not required to have service cabinets installed. Conduits and wiring shall be provided from the load center to the property edges for future connection into the street light system.

### **6.14.C Street Light Standards**

All street light standards (poles) used in City owned street light systems are shown below. All others must be approved by the Engineer on a case-by-case basis.

1. Hapco Series 21 and Series 22 aluminum street light standards and mast arms

2. Valmont Series 21 and Series 22 aluminum street light standards and mast arms
3. Items 1 and 2 above are pre-approved products. All others require written approval of the Engineer prior to ordering. When completing gaps or extending existing street light systems, the poles shall be the same as the existing poles.
4. Pedestrian poles in the Downtown Overlay District shall be made from one piece of seamless 4" round tube of extruded aluminum with a wall thickness of 0.125", decorative base cover and polyester powder coat finish, Lumec model APR4F-12-GY-LBC3-GN8, color Dark Forest Green.
5. Breakaway couplers for street light standards shall conform to PrecisionForm, Inc. Model PFI 200-1A Coupler or approved equal.

#### **6.14.D Street Light Calculations**

When street lighting systems are designed according to these Standards and the criteria provided herein, no additional documentation or calculations will be required. Should an alternate system which does not follow these criteria be proposed, calculations shall be submitted to the Engineer for review and approval. The supporting documentation and calculations will include, and consider, the following elements:

1. Existing street light characteristics, and/or the location of street intersections along the streets being improved.
2. The mounting height and the bracket or arm length.
3. The street lighting system configuration.
4. The luminaire, IESNA light distribution pattern (IESNA electronic file shall be called out), and lamp used, including initial lumens.
5. The light loss factor (LLF) used in calculations. (LLF = 0.76 unless otherwise approved by the City)
6. The maximum illumination, the minimum illumination, and the average illumination.

7. The uniformity ratios for: avg lux / min lux; and for max lux / min lux.
8. The curb overhang for luminaires located on the outside of streets in feet, and/or the curb overhang for luminaires located within medians in feet.
9. The width of the median(s) in feet.
10. Street tree information, including, but not limited to, spacing/ location within medians and along the outside of streets.
11. Voltage drop calculations for each circuit.

## 6.15 Street Light Criteria

Table 6.6

### Principal Arterial Streets

Street Layout	Mounting Height (ft) <sup>5</sup>	Spacing <sup>1,2,3</sup> (ft)	LED Lamp (Watts)	Maximum Uniformity Ratio (Avg/Min)	Maximum Uniformity Ratio (Max/Min)	Illum Level End-of-life (ft-candles)	Min Centerline Pole setback from face of curb (ft)	Fixture Type
Standard 7-Lanes, 80' width	40	272 (2R_STG)	400/164	3:1	6:1	1.5	3.5	Cobra- head
With Bike Lanes, 90' width	40	240 (2R_STG)	400/164	3:1	6:1	1.5		Cobra- head
Standard 7-Lanes, 80' width	40	276 (2R_OPP)	400/164	3:1	6:1	1.5		Cobra- head
With Bike Lanes, 90' width	40	240 (2R_OPP)	400/164	3:1	6:1	1.5		Cobra- head

**Minor Arterial Streets**

Street Layout	Mounting Height (ft) <sup>5</sup>	Spacing <sup>1,2,3</sup> (ft)	LED Lamp (Watts)	Max Aver: Minimum Uniform Ratio	Max: Minimum Uniform Ratio	Illum Level End-of-life (ft-candles)	Min Centerline Pole setback from face of curb (ft)	Fixture Type
Standard 5-Lanes, 58' width	40	340 (2R_STG)	400/164	3:1	6:1	1.5	3.5	Cobra- head
With Bike Lanes, 68' width	40	308 (2R_STG)	400/164	3:1	6:1	1.5		Cobra- head
Standard 5-Lanes, 58' width	40	223 (2R_OPP)	250/95	3:1	6:1	1.5		Cobra- head
With Bike Lanes, 68' width	40	200 (2R_OPP)	250/95	3:1	6:1	1.5		Cobra- head

**Industrial Collector Arterial Streets**

Street Layout	Mounting Height (ft) <sup>5</sup>	Spacing <sup>1,2</sup> (ft)	LED Lamp (Watts)	Max Aver: Minimum Uniform Ratio	Max: Minimum Uniform Ratio	Illum Level End-of-life (ft-candles)	Min Centerline Pole setback from face of curb (ft)	Fixture Type
Standard 44' width	40	240 (2R_STG)	250/95	3:1	6:1	1.0	3.5	Cobra- head
Standard 44' width	40	188 (2R_STG)	200/81	3:1	6:1	1.0		Cobra- head

**Residential Collector and Arterial Streets - 2 or 3 Lanes**

Street Layout	Mounting Height (ft) <sup>5</sup>	Spacing <sup>1,2</sup> (ft)	LED Lamp (Watts)	Max Aver: Minimum Uniform Ratio	Max: Minimum Uniform Ratio	Illum Level End-of-life (ft-candles)	Min Centerline Pole setback from face of curb (ft)	Fixture Type
Standard 36' width	40	280 (2R_STG)	250/95	3:1	6:1	1.0	3.5	Cobra- head
With Bike Lanes 46' width	40	240 (2R_STG)	250/95	3:1	6:1	1.0		Cobra- head

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Street Layout	Mounting Height (ft)	Spacing <sup>1,2,3</sup> (ft)	LED Lamp (Watts)	Max Aver: Minimum Uniform Ratio	Max: Minimum Uniform Ratio	Illum Level End-of-life (ft-candles)	Min Centerline Pole setback from face of curb (ft)	Fixture Type
Standard 58' Minor Arterial	35/14	175/14 (2R_STG/2R_OPP)	250/70	3:1	6:1	1.5	3.5	Gullwing/ Lumec DSX
Standard 40' Res. Col. Art.	35/14	238/14 (2R_STG/2R_OPP)	250/70	3:1	6:1	1.0		Gullwing/ Lumec DSX
Bike Lane 50' Res. Col. Art.	35/14	200/14 (2R_STG/2R_OPP)	250/70	3:1	6:1	1.0		Gullwing/ Lumec DSX
Standard 40' Local Comm.	35/14	238/14 (2R_STG/2R_OPP)	250/70	3:1	6:1	1.0		Gullwing/ Lumec DSX
Bike Lanes 50' Local Comm.	35/14	200/14 (2R_STG/2R_OPP)	250/70	3:1	6:1	1.0		Gullwing/ Lumec DSX

### Industrial / Commercial Street – 2 or 3 Lanes

Street Layout	Mounting Height (ft) <sup>5</sup>	Spacing <sup>1,2</sup> (ft)	LED Lamp (Watts)	Max Aver: Minimum Uniform Ratio	Max: Minimum Uniform Ratio	Illum Level End-of-life (ft-candles)	Min Centerline Pole setback from face of curb (ft)	Fixture Type
Standard 32' width	35	254 (2R_STG)	200	3:1	6:1	0.8	3.5	Cobra- head
With Bike Lanes 42' width	35	228 (2R_STG)	200	3:1	6:1	0.8		Cobra- head

### Residential Streets 6

Street Layout	Mounting Height (ft)	Spacing <sup>1</sup> (ft)	LED Lamp (Watts)	Max Aver: Minimum Uniform Ratio	Max: Minimum Uniform Ratio	Illum Level End-of-life (ft-candles)	Min Centerline Pole setback from face of curb (ft)	Fixture Type
Standard 28' width	(14.0)	105 (32)	(70)	6:1	NA	0.4	3	(Lumec DSX)
Standard 32' width	(14.0)	90 (31)	(70)	6:1	NA	0.4	3	(Lumec DSX)

Footnotes:

1. "Spacing" is the spacing between street lights on the same side of the road.



2. 2R\_STG – Street lights on both sides of the street with a staggered configuration.
3. 2R\_OPP – Street lights on both sides of the street with an opposing configuration.
4. Downtown Overlay District street lighting is a combination of both Gullwing and Lumec DSX street lights. As determined by Kent Economic and Community Development Department the first number refers to the Gullwing street light Kent Standard Plan 6-88 and the second number refers to the Lumec DSX street light Kent Standard Plan 6-87.
5. Mounting height increases by 6" when breakaway couplings are used or required on Hafco style poles.
6. Post top fixture light standards are detailed on Standard Plan 6-87.

## PRIVATE STREETS

Private street intersections and gathering areas shall be lit to residential street light standards.

### 6.16 PAVEMENT DESIGN AND CONSTRUCTION

When existing public streets are required to be improved or widened by the City, the Developer may use the existing asphalt pavement surface as part of the required minimum pavement depth and width. The improved street shall have a remaining service life of twenty (20) years. The Developer shall cold mill (grind) and overlay, at a minimum depth of 2", one half of the street fronting the development unless otherwise directed by the Engineer. The improved pavement section may consist of all new pavement or a portion of existing pavement and new pavement overlay to achieve the required remaining service life of twenty (20) years.

Pavement analysis and design shall be consistent with Part II and Part III of the AASHTO Guide for Design of Pavement Structures, latest edition, and the pavement analysis report shall provide all of the necessary information required by the design guide.

In addition to the pavement analysis and design discussed above, the completed street improvement shall provide a 2 percent transverse side slope from the existing centerline crown point.

When the existing crown location does not coincide with the required street centerline, or the 2 percent transverse side slopes of existing pavement are not available, the Developer is required to grind and provide an asphalt overlay at a minimum depth of 2" to achieve the 2 percent transverse side slope.

Prior to construction of the asphalt overlays, any failed pavement sections within the

improvement limits will also be removed and permanently patched by the Developer according to the requirements of these Standards. See Standard Plans 6-64 through 6-69.

When an existing asphalt pavement is used, the Developer shall remove by saw cut at least the outer 1' of the existing asphalt pavement to provide a strong and straight edge for the new asphalt to match. The actual outside line for this asphalt pavement removal will be determined on-site by the Engineer to ensure that all inadequate and failing pavement is removed.

When an asphalt overlay occurs adjacent to an existing concrete curb and gutter, the Developer is required to install the new asphalt pavement flush with the existing curb and gutter. The Developer will do this by cold milling (grinding) a minimum 4' wide strip of pavement immediately abutting the concrete curb and gutter. The minimum depth of this grinding shall be 2" and shall leave a minimum 2" of existing pavement in place. Should there be less than 2" of remaining asphalt pavement, the Developer shall remove and replace the outer 4' of asphalt pavement.

When the surface of the existing street pavement is determined, by the Engineer, to be too rough or irregular, the Developer shall provide an asphalt overlay, cold milling, or a combination of the two, to provide an acceptable riding surface for the improved public street.

#### **6.16.A Pavement Design**

See the Standard Plans for detailed pavement design information and minimum pavement sections. Portland cement concrete streets may be considered as an acceptable alternative to asphalt concrete streets for most street classifications. Specific approval by the Engineer is required prior to design of concrete streets.

Porous pavements may also be considered for low traffic volume private residential streets and driveways. Porous pavement is a permeable paving material which allows stormwater to percolate through the pavement to the gravel base. The pavement consists of a uniform, open-graded coarse aggregate, cemented together with either concrete or asphalt. Water reaching the gravel base either infiltrates into the soil or is routed to the conveyance systems via underdrains. The Developer must sign a maintenance agreement with the City confirming that the development will be required to bi-annually vacuum sweep the pavement surface followed by a high pressure wash.

#### **6.16.B Pavement Construction**

All pavement construction shall be in accordance with the WSDOT Standard Specifications except as modified herein.

When asphalt concrete is placed in lifts, tack coat in accordance with the WSDOT Standard Specifications shall be used unless the lifts are placed on the same day, and approved by the Engineer.

In areas where soft subgrades require stabilization, approved geotextile fabric and/or soil stabilizing may be used. Imported ballast material may also be necessary.

No paving shall begin prior to the approval of the mix design by the City. Submit mix design verification certifications to the City for approval. The following are acceptable certification forms.

- WSDOT Mix Design Evaluation Report from the current WSDOT QPL;
- Proposed HMA mix design on WSDOT Form 350-042 with the seal and certification (stamp & signature) of a valid licensed Washington State Professional Engineer; or
- Mix Design Report for the proposed HMA mix design developed by a qualified City or County laboratory that is within one year of the approval date.

Use of additives that reduce the optimum mixing temperature or serve as a compaction for producing HMA are not allowed without prior authorization by the City.

Use of material transfer device or vehicle (MTD/V) will be required for the final lift when the length of paving is at least 1000 feet long.

1. Arterials

HMA Class ½"PG 58V-22 meeting the WSDOT Standard Specifications shall be used. The minimum number of ESALs for the design and acceptance of the HMA shall be 11 million.

2. Non-Arterials

HMA Class ½"PG 58H-22 or 58V-22 meeting the WSDOT Standard Specifications shall be used. The minimum number of ESALs for the design and acceptance of the HMA shall be 5 million.

### **6.16.C Materials Certifications and Compaction Tests**

All construction activities shall meet the materials certifications and compaction testing requirements on the WSDOT Standard Specifications and the WSDOT Construction Manual.

Compaction tests shall be performed by an approved geotechnical or testing firm under the direction of a Professional Engineer registered in the State of Washington under contract with the Developer. Copies of the reports shall be furnished to the Inspector.

## 6.17 ALL UTILITIES WITHIN CITY RIGHT-OF-WAY

Utility systems to be located within existing and proposed right-of-way shall be constructed in accordance with current franchise and/or permit requirements, and in compliance with these Standards. In their use of the right-of-way, utilities will be given consideration in accordance with the traffic-carrying requirements of the street which are, namely, to provide safe, efficient and convenient passage for motor vehicles, pedestrians, bicycles, and other transportation uses. Aesthetics shall be a consideration. Underground installation of electric and telecommunication utilities will be strongly encouraged, particularly in urban development. Utilities are subject to City codes and policies relating to drainage, erosion/sedimentation control and sensitive areas as set forth in the Chapter 5 of these Standards and the City's current Surface Water Design Manual.

Placement of permanent structures or objects for franchised utilities that block ready access to City utilities and the connected appurtenances shall not be allowed, unless otherwise approved by the Engineer.

It is the responsibility of the Developer to verify the location of all existing and proposed underground and aerial utilities prior to design. The Developer shall coordinate the design with the respective utility. Those existing utilities in conflict with any of the project street improvements shall be relocated at the Developer's expense.

All properties adjacent to a new street shall be provided with water, sanitary sewer, storm drainage, and private utility service in such a manner as to avoid future street improvements and the associated disruptions to traffic. The number and location of service "stub outs" to be installed shall be based upon the lot configuration of the properties adjacent to the proposed street improvements. All overhead electrical and/or communication utilities shall be placed underground if the criteria for undergrounding are met per the requirements of the Kent City Code 7.10.

All permits for new placement and replacement of existing utility poles, and other utility system structures above grade, shall be accompanied by written certification from the utility's Professional Engineer or from an agent authorized by the utility. They must certify that the installations conform to these Standards, and that the proposed work is in conformity with sound engineering principles relating to highway safety.

### 6.17.A Standard Utility Locations Within the Right-of-Way

Utilities within the right-of-way on new streets, or on streets where existing topography, utilities or storm drains are not in conflict, shall be located as indicated below. Where existing utilities or storm drains are in place, new utilities shall conform to these Standards as closely as practicable and still

be compatible with the existing installations. Above-ground utilities located within intersections shall be placed so as to avoid conflict with placement of curb ramps and signal poles. Mains and service connections to all lots shall be completed prior to placing of surface materials.

In any case, underground utilities shall be located such that its excavation does not impact retaining wall and bridge support structures.

1. Gas and Water Lines:

a. Curb and gutter section:

Preferable: 1.5' back of curb, or at distance which will clear root masses of street trees if these are present or anticipated. Otherwise: In the street as close to the curb as practical without encroachment into the storm drainage system.

b. Designated side of centerline:

GAS: Preferable south and west.

WATER: Preferable north and east.

c. Depth: 36" minimum cover from finished grade, ditch bottom or natural ground.

2. Individual water service lines and side sewers shall:

a. Be placed with minimum 24" cover per Standard Plan 3-10 from finished grade, ditch bottom or natural ground.

b. Use right-of-way only as necessary to make side connections.

c. For any one connection, do not extend more than 60' along or through the right-of-way, or the minimum width of the existing right-of-way.

d. Water meter boxes, when placed or replaced, shall be located per the requirements of Section 3 of these Standards.

3. Sanitary sewers:

a. In general, 5' south and west of centerline; depth 36" minimum cover from finished grade, ditch bottom or natural ground.

b. Side sewers shall be provided to all adjacent lots or parcels.

- c. Side sewers shall be placed perpendicular to street centerline.
- d. Existing parcels with potential for future development based on the existing zoning shall be provided with a minimum 8" diameter pipe from the manhole to the cleanout at the right-of-way line at the lowest point adjacent to the main along the parcel frontage.

4. Force main sanitary sewers:

In the case of individual sanitary sewer service lines which are force mains, the pipe shall:

- a. Be a minimum 2" inside diameter, or as required by the utility to maintain internal scouring velocity.
- b. If nonmetallic, contain wire or other acceptable proximity detection features; or be placed in a cast iron or other acceptable metal casing.
- c. Be placed with minimum 36" cover from finished grade, ditch bottom or natural ground, within 10 degrees of perpendicular to street centerline, and extend to right-of-way line.
- d. Bored under street, unless otherwise approved by the Engineer.
- e. Sanitary sewer and water lines shall be separated 10' horizontally and 1.5' vertically in accordance with the latest edition of DOE's Criteria for Sewage Work Design. See Kent Development Sections 3.6.B, 4.4.E, and 4.7.B for additional explanation.
- f. Gravity systems, whether sanitary or storm drainage, shall have precedence over other systems in planning and installation, except where a non-gravity system has already been installed under previous approved permit and subject to applicable provisions of such permits or franchises.

5. Utilities:

Electric utilities, power, telephone, cable TV, fiber optic conduit: Shall be underground with 36" minimum cover, either side of street, under or behind the sidewalk, at plan location and depth compatible with other utilities and storm drains. Otherwise, every new placement and every replacement of existing utility poles and other utility system structures above grade shall conform to the following:



Utility poles, traffic signal poles or other approved essential roadside obstacles may be placed within the right-of-way, and shall be as far back from the traveled way or auxiliary lane as practicable. When allowed, they shall be located as follows:

- a. On shoulder-type or mountable curb streets, installation of new or relocated poles or obstacles shall be located behind existing ditches and in accordance with the criteria in this section and Standard Plan 6-50. Placement of a guard rail or traffic barrier between the traveled way and the pole or obstacle shall not satisfy this requirement, unless the guard rail or barrier already exists for other purposes and the pole provides a minimum of 3.5' separation from the barrier. Variances will be considered only when other reasonable alternatives do not exist.
- b. On vertical curb-type streets with a speed limit less than 40 mph, poles or above grade or vertical obstacles shall be placed clear of sidewalks and at least 10' from face of curb to face of obstacle in commercial/business areas and in the planter strip at 3' from face of curb to face of obstacle in residential areas. On urban streets with speed limits of 40 mph or greater, hazardous objects shall be placed as close to the right-of-way line as practicable, and a minimum of 10' from the edge of the traveled way, face of curb or edge line to the face of obstacle and in accordance with Standard Plan 6-50.
- c. Notwithstanding other provisions regarding pole locations described in these Standards, no pole shall be located so that it poses a hazard to the general public. Utilities shall place and replace poles with primary consideration given to public safety. Existing utility poles in locations that do not comply with these Standards that are damaged through vehicle collision, shall be considered a hazard by the City and be relocated by the utility, at their expense, in accordance with these Standards. Additionally, existing utility poles that do comply with these Standards and are damaged through vehicle collision more than three (3) times in any 10-year period shall be relocated by the responsible utility, as approved by the Engineer, at their expense.
- d. Every effort shall be made to meet these Standards during emergency replacement of existing utility poles and other structures. After a pole has been replaced, all utilities sharing that pole shall have a maximum of 30 days to relocate their facilities to the new pole and remove the old pole.

- e. The above constraints on pole and obstacle location will not apply to locations not accessible by moving vehicles, "Breakaway Structures" whose break-off resistance does not exceed that of a single 4" x 4" wood post or a 1.5" standard (hollow) iron pipe, or to "breakaway" fire hydrants installed according to manufacturer's specifications.
- f. For franchised utility permits, the utility must request any variance from pole and obstacle clearance criteria in accordance with Section 1.17 Design Variances. Up to three (3) contiguous damaged or weakened poles may be replaced at existing locations in accordance with emergency procedures. However, sequential permits resulting in continuous replacement of a pole line shall not be allowed. A pole or other obstacle, which incurs repeated damage from errant vehicles, shall be relocated outside the clear zone. See Standard Plan 6-51.
- g. Locations of poles shall also be compatible with driveways, intersections, street trees, underground utilities, and other street features (i.e., they shall not interfere with sight distances, street signing, traffic signals, culverts, etc.). To the extent possible, utilities shall share facilities so that a minimum number of poles are needed.
- h. Where street uses leave insufficient overhang, anchor, and tree-trimming space for overhead utilities, additional easements and/or right-of-way may be required to accommodate the utilities. The costs associated with additional easements and/or right-of-way for this purpose shall be borne by the Developer, utility, builder, or other party initiating the improvement. The associated cost of relocating the utility system shall not be borne by the City.
- i. Notwithstanding other provisions, underground systems shall be located at least 5' away from the street centerline. Additionally, the underground systems shall not disturb existing survey monuments, unless there is no reasonable alternative. See WAC 332-120 for additional requirements.

#### **6.17.B Utility Underground Installations**

All hard surface street crossings shall be jacked or bored. Exceptions will be on a case-by-case basis with the approval of the Engineer. The current WSDOT Standard Specifications, Sections 7-08 and 7-08.3(3) will generally apply, unless otherwise stated.

- 1. New Street Construction, Reconstruction and Widening:
  - a. Cuts on traveled way:

When approved, the open cut shall be a neat-line cut made by saw cutting a continuous line. Trench sides shall be kept as nearly vertical as possible. Compaction and restoration must be done as detailed below and immediately after the trench is backfilled, so as to cause least disruption to traffic. The asphalt or cement pavement shall be cut a minimum of 1' beyond all edges of the trench. See Standard Plans 6-64 through 6-69.

On crossings required to be opened to traffic, and prior to final trench restoration, steel plates shall be installed by the contractor, as directed by the Engineer.

b. Cuts parallel and traverse to street alignment:

The entire trench backfill depth must meet 95 percent of the maximum density compaction as determined by the compaction control tests described in Section 2-03.3(14)D of the WSDOT Standard Specifications. Also reference Section 2.4 and 2.5 of these Standards.

Regardless of trench depth, the backfill material shall meet the requirements for gravel borrow per Section 9-03.14(1) of the WSDOT Standard Specifications. When the material remaining in the trench bottom is unsuitable, the excavation shall be continued to such additional depth and width as required by the Inspector.

After backfill and compaction, an immediate hot mix patch shall be placed and maintained in good drivable condition acceptable to the Engineer. On asphalt pavement, a permanent hot mix patch the same thickness as the existing asphalt or a minimum of 3", whichever is greater, shall be placed and sealed with a paving grade asphalt within seven (7) calendar days on arterial streets and in the downtown area overlay, and within thirty (30) calendar days on all other streets. Cement concrete pavement shall be restored in accordance with Section 5-05.3(22) of the WSDOT Standard Specifications within the same time parameters stated above.

Backfill material outside the street prism may be the excavated material as long as it is free of wood waste, debris, clods and/or any rocks exceeding 6" in any dimension and meets the compaction requirements of Section 2-03.3(14)C of the WSDOT Standard Specifications.

2. Existing Streets:

a. Cuts on traveled way:

All hard surface street crossings shall be jacked or bored. No cuts in concrete roadway allowed without approval of Engineer. Exceptions will be on a case-by-case basis with the approval of the Engineer, if it can be shown that boring is not feasible due to conflicts or soil conditions, or unless the utility system, including drainage structures, can be installed just prior to reconstruction or overlay of the street by a City Capital Improvement Project.

When approved, the open cut shall be a neat-line cut made by saw-cutting a continuous line. Trench sides shall be kept as nearly vertical as possible. Compaction and restoration must be done as detailed below and immediately after the trench is backfilled, so as to cause least disruption to traffic. The asphalt or cement pavement shall be cut a minimum of 1' beyond all edges of the trench. See Standard Plans 6-64 through 6-69.

b. Cuts parallel to street alignment:

In cuts parallel to the street alignment, the entire trench excavation and restoration shall meet the requirements of Section 6.17.B.1b of these Standards. The restoration shall include, but is not limited to, repairing all failures and cracking of the paved surface, repairing failures caused by the construction activity, rebuilding the cross slope to uniformity, and overlaying the area where the pavement was removed.

c. Cuts transverse to street alignment:

1) Without exception, the entire trench shall be backfilled with CSTC meeting the requirements of Section 9-03.9(3) or controlled density fill (CDF) meeting the requirements of Section 2-09.3(1)E of the WSDOT Standard Specifications. Backfill shall be placed and compacted mechanically in 6" lifts to 95 percent of the maximum density as determined by the compaction control tests described in Section 2-03.3(14)D of the WSDOT Standard Specifications. If the capability can be demonstrated, based on compaction equipment or quality of backfill to achieve 95 percent density in thicker lifts, the depth of backfill lifts may be increased up to 1'. 2) After backfill and compaction, an immediate hot mix patch shall be placed and maintained in a drivable condition acceptable to the Engineer. On asphalt pavement, a permanent hot mix patch the same thickness as the existing asphalt or a minimum of 2", whichever is the greater, shall be placed and sealed with a paving grade asphalt within seven (7) calendar days on arterial streets and within the downtown area overlay, and within thirty (30) calendar days on all other streets.

Cement concrete pavement shall be restored in accordance with Section 5-05.3(22) of the WSDOT Standard Specifications within the same time parameters stated above.

d. Pavement restoration:

For pavement restoration see 6.16.A and Standard Plans 6-64 through 6-69.

### 6.17.C Final Adjustment of Utility Facilities

All utility system covers which are located on proposed asphalt streets, shall be temporarily placed at subgrade elevation prior to placing crushed surfacing material.

Final adjustment of all covers and access entries shall be made within thirty (30) days of final paving, following final paving as follows:

1. Saw-cutting of the pavement around lids and covers. Opening should not be smaller than 12" and larger than 18" beyond the radius of the cover.
2. Removing base material, surfacing course, and frame; adding raising bricks and grout; replacing frame and cover matching the finished profile grade of the surrounding pavement. Final adjustment of all covers and access entries shall be completed within thirty (30) days of final paving, and prior to final inspection outlined in Section 2.2.A.11 of these Standards.
3. Fill and mechanically compact material around the structure and frame with crushed surfacing material or ATB to within 8" of the top.
4. Fill around the structure and frame with 8" minimum thickness of reinforced cement concrete Class 4000.
5. Lids and covers shall meet all ADA requirements including but not limited to non-slip surfacing and shall be H-20 load rated.

## **6.18 Final Cleanup**

In addition to restoration of the of the street as described above, the responsible Developer shall perform cleanup of adjacent areas in compliance with Sections 1-04.11 and 8-01 in the WSDOT Standard Specifications. In particular:

### **6.18.A Streets**

Streets shall be cleaned and swept, both during and after the installation work. The contractor shall remove any track-out material by the end of the work day, when the material causes a safety issue, or when required by the Engineer.

### **6.18.B Disturbed Soils**

Disturbed soils shall be finished graded, seeded and mulched after installation of utilities. In limited areas, seeding and mulching by hand, using approved methods, will be acceptable.

### **6.18.C Ditch Lines**

Ditch lines with soil susceptible to erosion and subject to rapid flows will require seeding, matting, netting, check dams, or rock lining to control erosion.

### **6.18.D Downstream Drainage**

Any silting of downstream drainage facilities, whether ditches or pipe and catch basins, which results from the construction activity shall be cleaned out and the site restored to a stable condition as part of site cleanup.

### **6.18.E Temporary Control Materials and Fencing**

Remove all temporary erosion and sediment control materials and fencing and dispose of properly, when authorized by the Engineer.



## 6.19 Roadway Design Standards

Table 6.7

Design Parameter	Arterial Roadways		Collector Roadways			Local Roadways		
	Principal	Minor	Arterial		Residential	Industrial/ Commercial Street	Residential Street	Private Streets
			Industrial	Residential	-			
Standard Plan <sup>1</sup>	6-2, 6-3	6-3	6-4	6-5	6-6	6-7	6-11, 6-12	6-15
Design Capacity (ADT)	30,000-50,000	20,000-30,000	<15,000	<5,000	<3,500	5,000-10,000	<1,000	<90
Design Speed (mph) <sup>2</sup>	35-60	35-45	30-35	30-35	30-35	30-35	25	25
Intersection Spacing <sup>20</sup>	2600'	1300'	600'	600'	300'	300'	200'	200'
Intersection Tangent <sup>3</sup>	150'	150'	100'	100'	100'	100'	50'	10'
Gradient Maximum	9% <sup>4</sup>	12%	12%	12%	12%	12%	12% <sup>8</sup>	15% <sup>5</sup>
Gradient Minimum	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%

Design Parameter	Arterial Roadways		Collector Roadways			Local Roadways		
	Principal	Minor	Arterial		Residential	Industrial/ Commercial Street	Residential Street	Private Streets
			Industrial	Residential	-			
Curb Return Radius <sup>6</sup>	35'	35'	35'	35'	25'	35'	25'	20' <sup>8,9</sup>
Geometric Design Vehicle	WB-40	WB-40	WB-62	BUS-40	BUS-40	WB-62	BUS-40	BUS-40
Driveway Corner Clearance <sup>7</sup>	300'	200'	100'	100'	100'	50'	20'	20' <sup>8,9</sup>
Dwy to Dwy Separation <sup>10</sup>	300'	200'	200'	200'	50'	100'	10'	10'

**Table 6.8**  
**Arterial and Collector Streets Design Values**

Design Speed (mph) <sup>2</sup>	30	35	40	45	50	55	60	
Min. horizontal curvature for 6% Stopping Sight Distance, radius (ft) (max allowable on arterials) <sup>11</sup>	275	380	510	650	835	1,065	1,340	
Stopping sight distance (ft)	200	250	305	360	425	495	570	
Intersection/Driveway sight distance (ft)								
Right turn movement <sup>12</sup>	290	335	385	430	480	530	575	
Left-turn movement (to cross 1 lane) <sup>13,14</sup>	335	390	445	500	555	610	665	
Passing sight distance (ft) for 2 lane street	1090	1280	1470	1625	1835	1985	2135	
<b>Vertical Curve Length (Open Road Conditions)*</b>								
'K' sag (min) <sup>15,16</sup>	37	49	64	79	96	115	136	Table 3-36 AASHTO "Green Book"
'K' crest (min) <sup>15</sup>	19	29	44	61	84	114	151	Table 3-34 AASHTO "Green Book"

Where 'K' = Rate of Vertical Curvature = 
$$\frac{\text{Length of Vert Curve (L) Ft}}{\text{Algebraic Difference (A) \%}}$$

\* Only road conditions consider vehicle headlights only. See note 16 where street illumination is provided.

**Table 6.9  
Local Streets Design Values**

Design Speed (mph) <sup>2</sup>	25	30
Min. horizontal curvature for normal crown section, radius (ft) <sup>17,18</sup>	180	330
Stopping sight distance (ft)	155	200
Intersection/Driveway sight distance		
Right turn movement (ft) <sup>9</sup>	240	290
Left-turn movement (to cross 1 lane) <sup>10,11</sup>	280	335

**FOOTNOTES FOR TABLES 6.7, 6.8 AND 6.9**

1. The horizontal widths may be increased to accommodate bio-swales, special mid-block or intersection geometric configurations, and bus turn-outs.
2. The design speed is equivalent to the posted speed plus 5 mph.
3. Distance is measured from the Point of Curb Return (PCR) to the centerline Point of Curvature (PC) or Point of Tangent (PT).
4. The design maximum of 9 percent for streets classified as principal arterials is based upon criteria from the WSDOT. This design maximum may be exceeded for routes not anticipated to be reclassified as State Highways, or for which no practical/economic alternative exists.
5. Street gradients that exceed 12 percent, up to the design maximum of 15 percent, must be approved by the Fire Code Official. Approval may include the requirement that fire suppression sprinkler systems be installed in all residential structures that have their sole access from that street.
6. At the intersection of two dissimilarly classified streets, the larger curb return radius shall be used. Two-centered or three-centered curves should be used on oblique angle intersections, or in order to accommodate a WB-62 vehicle.
7. Distance is measured from the near side of the driveway to the ultimate location of the P.C.R. of the adjacent intersecting street. City approval of driveways within this buffer zone may be contingent upon driveway geometrics that restrict turns to either right-in or right-out only. Reciprocal access agreements with the adjoining property owners may also be required as a condition of location approval.
8. Residential driveways shall be a minimum of 5' from the nearest edge to the property line.

9. On a case-by-case basis in cul-de-sacs, driveways will be allowed with less than a 10' separation.
10. For parcels adjacent to a traffic signal, 300' shall be used unless a traffic study demonstrates that the intersection area of influence is less than 300'.
11. The superelevation rate may be increased with the approval of the Engineer. Superelevation rates of 0.06 should not be exceeded on routes that are anticipated to have significant truck traffic in the travel stream, or on streets that are anticipated to have on-street parking permitted. Superelevation should not be used on local residential streets.
12. Intersection/driveway sight distance shown is for a stopped passenger vehicle to turn right onto a two-lane roadway with grades of 3 percent or less. The time gap used in calculation of the right turn sight distance is 6.5 seconds. For other conditions the time gap must be adjusted and required sight distance re-calculated. (See AASHTO "A Policy on Geometric Design of Highways and Streets").
13. Intersection/driveway sight distance shown is for a stopped passenger vehicle to turn left onto a two-lane roadway with no median and grades of 3 percent or less. The time gap used in calculation of the left-turn sight distance is 7.5 seconds. For other conditions the time gap must be adjusted and required sight distance re-calculated. (See AASHTO "A Policy on Geometric Design of Highways and Streets").
14. On multi-lane roadways: For left-turns onto a two-way roadways with more than two (2) lanes, add 0.5 seconds for passenger cars and 0.7 seconds for trucks to the time gap for each additional lane from the left, in excess of one, to be crossed by the turning vehicle.
15. The rate of vertical curvature 'K' value derived from the length of vertical curve per percent change in the algebraic difference of the adjacent grades are based on design values listed in AASHTO's "A Policy on Geometric Design of Highways and Streets," AKA "The Green Book," latest edition.
16. The AASHTO "passenger comfort curve" for sag curve design, where the length of the sag curve is determined by the equation below is an acceptable alternative if adequate supplemental street illumination is provided. ("A" = the algebraic difference in roadway longitudinal gradients, "V" = Design Speed)

$$L = \frac{A \times V^2}{46.5}$$

17. For residential streets with lower design speeds, this value may be reduced upon approval by the Engineer. Superelevation and upgraded street drainage may be used to reduce this minimum.
18. For "L" or 90 degree turns, the centerline radius can be reduced to 55'.

19. See Standard Plan 6-1 Intersection Geometry Reference for more information.
20. Distance is measured from center of intersection to center of intersection.

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## 6.20 STREET SYSTEM STANDARD PLANS

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