DIVISION 4

STREET DESIGN STANDARDS

4.1 Introduction

Design procedures shall conform to accepted engineering practices, and shall be certified by a registered professional engineer, licensed by the State of Washington. All projects will be constructed in conformance with the current editions of the City of Lynden Engineering Design and Development Standards, WSDOT/APWA Standard Specifications for Road, Bridge and Municipal Construction, and such amendments that modify these specifications. Goals, objectives, and specifications from the Low Impact Development Technical Guidance Manual for Puget Sound, December 2012 (LID Manual) may be used to attain City of Lynden-infiltration requirements.

4.2 Street Classifications

The City of Lynden Municipal Code, Chapter 10.12 classifies all public streets within the City into three major road classifications: major arterial, secondary arterial, and access streets. These street classifications are to be used with the street design standards. Refer to the latest revision of the Municipal Code for current street classification. Total and effective impervious area can be significantly reduced by determining specific traffic, parking and emergency vehicle access needs and width capable of meeting those requirements. Table 4-1 details the conventional street standards. These standards can be reduced using LID techniques, with approval under a PRD or as part of a Developer Agreement associated with the project.

A. Major Arterial

Major arterials are defined by RCW 35.78.010 as transportation arteries which connect the focal points of traffic interest within a city; arteries which provide communications with other communities and the outlying areas; or arteries which have relatively high traffic volume compared with other streets within the City. Major arterials are to service existing and future commercial, industrial and HBD areas as well as other major traffic generators within the community (i.e. schools, hotels and recreational facilities). Residential arterials are streets that connect neighborhoods to focal points within the community and distribute traffic to/from major arterials. Residential arterials serve trips of moderate length and direct residential access and parking is discouraged. Residential arterials are not a major transportation corridor to connect areas outside of the City.

B. Secondary Arterial

Secondary Arterials are defined by RCW 35.78.010 as routes which serve lesser points of traffic interest within a city; provide communication with outlying districts in the same degrees or serve to collect and distribute traffic from the major arterials to the local streets.
C. Access Streets

Access Streets are defined by RCW 35.78.010 as land service streets and provide access to abutting property. They are tributary to the major and secondary thoroughfares and generally discourage through traffic.

All other public streets not listed in A, or B above are classified as Access Streets.

4.3 Other Roads

A. State Highways

The following streets are classified as State Highways:

1. Guide Meridian - SR 539
2. Badger Road - SR 546

Any project requiring access to or affecting a State Highway shall additionally obtain Washington State Department of Transportation (WSDOT) approvals for application, design, and construction requirements.

B. Private Roads

Road safety, function and reliability are best served if the road is owned and maintained by the City. However, recognizing that private roads may be occasionally allowed in Planned Residential Developments, provision is made for them in these standards.

Private roads, defined as those roads serving more than 20 average daily traffic (ADT), shall meet the following conditions:

1. Permanently established by tract or easement providing legal access to each affected lot, dwelling unit, or business and sufficient to accommodate required improvements as outlined in Table 4-1, and to include future use by adjacent property owners when applicable.

2. Designed to serve up to the maximum potential of dwelling units based on the ADT thresholds when the entire length of the private road system to the nearest public road is considered. The maximum potential is the number of dwelling units that can possibly be served by the road when physical barriers, zoning or other legal constraints are considered.

3. Accessible at all times for emergency and public service vehicle use.

4. Located so that land locking of present or future parcels will not occur.

5. Maintained by capable and legally responsible owner or homeowners association or other legal entity made up of all benefited property owners.

6. Covenants shall be required for maintenance of the private road binding
each lot owner and all subsequent lot owners.

7. Covenants shall be recorded by the Applicant and/or owner, in the land records of Whatcom County.

8. Clearly described on the face of the plat, short plat, or other development authorization and clearly signed as a private road.

### Table 4-1
**Geometric Cross-Section for New Construction and Reconstruction**

<table>
<thead>
<tr>
<th>Design Elements</th>
<th>Arterials (a)</th>
<th>Access Street (a)</th>
<th>Private Roads and Alleys (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right of Way (b)</td>
<td>80' (65' Res. min)</td>
<td>60' minimum</td>
<td></td>
</tr>
<tr>
<td>Minimum Roadway Width (c)</td>
<td>46'</td>
<td>36' (d)</td>
<td>30' (d)</td>
</tr>
<tr>
<td>Minimum Lane Width:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Exterior</td>
<td>12'</td>
<td>10'</td>
<td>10'</td>
</tr>
<tr>
<td>B. Interior Thru</td>
<td>11'</td>
<td>10'</td>
<td></td>
</tr>
<tr>
<td>C. Two-Way Left-Turn</td>
<td>11'</td>
<td>10'</td>
<td></td>
</tr>
<tr>
<td>D. Exclusive Turn</td>
<td>11'</td>
<td>10'</td>
<td></td>
</tr>
<tr>
<td>E. Parking Each Side</td>
<td>8' (e)</td>
<td>8' (e)</td>
<td>8' (f)</td>
</tr>
<tr>
<td>F. Class III Bicycle Lane</td>
<td>3' (k)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sidewalks:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Minimum Width</td>
<td>6' (g) (h)</td>
<td>5' (g) (h)</td>
<td>5' (g) (h) (i)</td>
</tr>
<tr>
<td>B. Buffer</td>
<td>4' (j)</td>
<td>4' (j)</td>
<td>3' (j)</td>
</tr>
<tr>
<td>C. Easement Each Side</td>
<td>10'</td>
<td>10'</td>
<td>10'</td>
</tr>
</tbody>
</table>

(a) All public and private roads except alleys shall be constructed with vertical curb and gutter.
(b) No less than required for all design elements.
(c) Distance from face of curb to face of curb.
(d) Alleys can be reduced to 24 feet.
(e) Width to be determined based on ADT of road and future use. A 10-foot width shall be required when the lane is likely to become a traffic lane in the foreseeable future.
   Increase width of parking lanes on arterials to 10 feet if bicycle lane is not required.
(f) No parking required for private roads serving 2 lots or less
   Parking required one side only for ADT 30 - 150, minimum roadway width 30 feet
   Parking required both sides for ADT > 150, minimum roadway width 40 feet
(g) Must be in accordance with most current standards as required by the American Disabilities Act.
(h) Required both sides.
   Sidewalks fronting commercial property shall be 8 feet wide with a 80-foot or wider R-O-W.
(i) Sidewalks required one side for ADT 30 - 150.
(j) If R-O-W is available, increase width to 5 feet.
(k) May be eliminated if separate detached bicycle path is provided.
C. ¾ Streets

A ¾ street section may be used if approved by the City for the improvement of abutting off-site roadway. A ¾-street section shall consist of the construction of the full standard roadway on the project side of the road centerline, and on the opposite side of the road centerline the road shall be constructed to a 12’ paved width plus a 2’ wide gravel and crushed rock shoulder. The road section for the 12’ section shall match the full section. A full section may be constructed, with a latecomer’s agreement.

4.4 Surfacing

A. Arterial, Commercial, and Industrial Access Streets

The minimum street section shall be 5” Class B asphalt placed in two lifts, 3” crushed rock, and 12” Gravel Base per the gradation below. An acceptable alternate is 3” of Class B asphalt placed in 2 lifts, 5” Class E asphalt and 10” Gravel Base per the gradation below. Superpave may be required at the option of the City. Design mix shall be submitted to the City for approval. Other street sections may be approved, based upon a design by a licensed Geotechnical Engineer. All expenses for determining revised materials shall be borne by the Applicant and subject to review and approval by the City. Such pavement sections for major and secondary arterials, and commercial and industrial access streets shall be designed to accommodate ‘all weather traffic and frost depth’ using the current AASHTO Pavement Design Method or other accepted methodology that considers the load bearing capacity of the soils and the traffic-carrying requirements of the roadway. All weather roads are defined as road pavement sections and drainage required to assure no weight restrictions on roads during periods of thaw. Plans shall be accompanied by a pavement thickness design based on soil strength parameters reflecting actual field tests and traffic loading analyses. Design year shall be 20 years later than the year construction is completed. The analysis shall include the traffic volume and axle loading, the type and thickness of roadway materials and the recommended method of placement. Pavement sections shall not be less than those required for residential access streets. The subgrade and gravel base shall be certified by a licensed Geotechnical Engineer or certified testing lab prior to placement of asphalt. See Figure 4-2.

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Aggregate for Gravel Base

The maximum particle size shall not exceed ½ of the depth of the layer being placed. Gravel base shall meet the following requirements for grading and quality when placed in hauling vehicles for delivery to the roadway or during manufacture and placement into a temporary stockpile. The exact point of acceptance will be determined by the Engineer.

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>4” square</td>
<td>100</td>
</tr>
<tr>
<td>1-1/2” square</td>
<td>70-100</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Material</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot; square</td>
<td>35-80</td>
</tr>
<tr>
<td>U.S. No. 4</td>
<td>15-50</td>
</tr>
<tr>
<td>U.S. No. 40</td>
<td>20 max</td>
</tr>
<tr>
<td>U.S. No. 200</td>
<td>5.0 max</td>
</tr>
</tbody>
</table>

Sand Equivalent shall be 40 min.

All percentages are by weight. Gravel base material retained on a No. 4 sieve shall contain not more than 0.20 percent by weight of wood waste.

B. Residential Access Streets, Private Roads, Alleys and Offstreet Parking

The minimum section for Residential Access Streets, Alleys and Private Roads shall be 3 ½" Class B asphalt, placed in 2 lifts, 3" crushed rock, and 12" Ballast (WSDOT 9-03.9 with less than 5% passing the 200 sieve). The minimum section for offstreet parking shall be 2-1/2" Class B asphalt, 2" crushed rock and 10" ballast. Other street sections may be approved, based upon a design by a licensed Geotechnical Engineer. All expenses for determining revised materials shall be borne by the Applicant and subject to review and approval by the City. The subgrade and gravel base shall be certified by a Professional Geotechnical Engineer prior to placement of asphalt. See Figure 4-3A.

The minimum section may not be acceptable if there is any evidence of instability in the subgrade. This includes free water, swamp conditions, fine-grained or organic soil, slides, uneven settlement, or pumping resulting from construction equipment including loaded trucks. If any of these characteristics are present, the soil shall be sampled and tested sufficiently to establish a pavement design as specified in Section 4-4.A, “Arterials, Commercial, and Industrial Access Streets”, that will support the proposed use. Measures may include, but are not limited to, a stronger paved section, a strengthening of subgrade by adding or substituting fractured aggregate, asphalt treated base, geotextile, more extensive drainage or a combination of such measures. The soils test report and the resulting pavement design are subject to review and approval by the City.

All offstreet parking required by the City shall be hard surfaced with Class B asphalt, concrete or City approved low impact pervious surface treatment such as grass pavers.

**Permeable Pavement**

Permeable pavement may be used for hard surface ground cover areas unless infeasible, per infeasibility criteria stated in BMP T5.15 of the Ecology Manual. The routine application of sand and salt and resultant sediment deposition on arterial and collector streets to provide for safe passage during winter storm events precludes the use of permeable pavements on these streets. Projects that include less than 2,000 square feet of new or replaced impervious surface are exempt from this requirement.
C. Surfacing Construction Requirements

All main-line paving shall be performed using a self-propelled paver. Pavers shall meet the following requirements:

1. Pavers shall meet the minimum requirements as set forth in the WSDOT Standard Specifications for Road, Bridge and Municipal Construction, Section 5-04.
2. Pavers shall be self-contained power propelled units capable of advancing both the paver and the haul truck in a continuous forward motion during paving operations.
3. The minimum track length or wheel base shall be 8 feet as measured from center of the forward most hub, to center of the rear hub.

When construction timing or weather limitations prevent the placement of one or more lifts of asphalt pavement and the roadway is to be opened to traffic prior to placement of the final lift(s), asphalt transition wedges of a slope equal to or less than 10H:1V shall be placed at all transverse or longitudinal joints where the difference in grade is 1” or greater. Asphalt transition wedges shall be placed on top of construction paper and shall be completely removed leaving a vertical joint prior to subsequent lift(s) of asphalt being placed.
4.5 Lane Widths

In addition to the Standards shown in Table 4-1, the following minimum lane widths or the most current WSDOT requirements are recommended for construction and reconstruction of streets:

- Parking Lane 11’ minimum with Class III Bicycle Lanes
- Table 4.1
- 8’ minimum with Class IV shared lane on Secondary Arterials (with Council approval)
- Bus Lane 12’ minimum

Bus bays to be located as determined by the City, and designed per WTA Design Standards.

4.6 Horizontal Design Standards

A. Horizontal Curves

Design shall be based upon accepted engineering practices and the requirements listed in this manual. The AASHTO tables for curvature, or Chapter 6 of the WSDOT Design Manual may be considered accepted engineering practices to be used in conjunction with the design speed requirements that follow:

<table>
<thead>
<tr>
<th>Minimum Design Speed Requirements (mph)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Arterial</td>
<td>45</td>
</tr>
<tr>
<td>Secondary Arterial</td>
<td>45</td>
</tr>
<tr>
<td>Access Streets</td>
<td>35</td>
</tr>
</tbody>
</table>

B. Horizontal Stopping Sight Distance

Stopping sight distance is where sight obstructions such as bridges, walls, cut slopes, wooded areas, buildings, etc. exist on the inside of a curve. Use Figures 4-4 and 4-5 to check for adequate stopping sight distance.

4.7 Vertical Design Standards

A. Grades

Grades and vertical sight distance are subject to approval by the City to ensure proper drainage and/or safety for vehicles and pedestrians. Grades of roads shall not be less than 0.5%. The maximum gradient on any new or reconstructed road shall not exceed the following:

<table>
<thead>
<tr>
<th>Major Arterial</th>
<th>7% maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary Arterial</td>
<td>8% maximum</td>
</tr>
<tr>
<td>Access Street</td>
<td>10% maximum</td>
</tr>
</tbody>
</table>
B.  **Vertical Curves**

To achieve minimum stopping sight distance, vertical curve lengths shall be designed in accordance with Chapter 650 of the WSDOT Design Manual.

All vertical curves shall be symmetrical parabolic curves.

### 4.8 Intersections

#### A.  **Angles**

Proposed public streets shall intersect on another at 90 degree angles or as close to 90 degrees as topography permits but in no case shall be less than 70 degrees.

#### B.  **Corner Radii**

At public road intersections, the following minimum curbline radius is required:

<table>
<thead>
<tr>
<th>Intersection Type</th>
<th>Minimum Radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial Intersection - Any Street</td>
<td>35 Feet</td>
</tr>
<tr>
<td>Access Street to Access Street</td>
<td>25 Feet</td>
</tr>
<tr>
<td>Truck Route and/or Bus Turns</td>
<td>50 Feet</td>
</tr>
</tbody>
</table>

#### C.  **Minimum Center Offset at Adjacent Streets**

Spacing between adjacent intersecting streets, whether crossing or T-connecting, shall be as follows:

<table>
<thead>
<tr>
<th>Street Type</th>
<th>Minimum Offset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Streets Intersecting Each Other</td>
<td>125 Feet</td>
</tr>
<tr>
<td>Access Streets Intersecting Arterials</td>
<td>250 Feet</td>
</tr>
<tr>
<td>Arterials Intersecting Arterials</td>
<td>300 Feet</td>
</tr>
</tbody>
</table>

#### D.  **Line of Sight at Intersections for New Construction**

At any intersection of a private road/access point with a City road, or a City road with a City road or highway, there shall be a sight distance triangle which provides an unobstructed line of sight. The operator of a vehicle approaching an intersection at grade should have an unobstructed view of the whole intersection and of a length of the intersecting roadway sufficient for vehicle control. The AASHTO guideline presents four cases for intersection control, each of which results in different intersection sight-distance requirements:

1. **Case 1.**  No control, with vehicles adjusting speeds to avoid collision.  
   (Not allowed.)

2. **Case 2.**  Yield control, with vehicles on the minor roadway yielding.

3. **Case 3.**  Stop control on the minor roadway
Case 4. Signal control

In Case 2, at an intersection where traffic is yield controlled only, there shall be a sight distance triangle which provides an unobstructed line of sight, Figure 4-4. The clear vision triangle shall be the area defined within boundaries determined by measuring twenty-five feet along both the major road pavement and the minor road pavement, and diagonally connecting the ends of the two lines.

In Case 3, at an intersection where traffic is controlled by stop signs on the minor road, the driver of the vehicle on the minor road shall have sufficient sight distance for a safe departure from the stopped position even though the approaching vehicle comes in view as the stopped vehicle begins its departure movements. There shall be a sight distance triangle, Figure 4-5, which provides an unobstructed line of sight from a point 8 feet (measured from behind the stop bar point A) to a point in the traveled way (point B) at least equal to the required sight distance, d. For purposes of line of sight calculations, the drivers eye is assumed to be 3.5 feet above the minor road pavement, with an object height assumed to be 4.25 feet above the major road pavement. Minimum sight distance values as tabulated in Table 4-2 assume a passenger vehicle and are based on flat road grades and right angle.

When the intersection is designed for a larger vehicle, or differing design grades or circumstances, utilize sight distance standards as outlined in the current edition of the WSDOT Design Manual, Chapter 1310.

<table>
<thead>
<tr>
<th>Design Speed, mph</th>
<th>Min. Sight Distance, d in ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>280</td>
</tr>
<tr>
<td>25</td>
<td>350</td>
</tr>
<tr>
<td>30</td>
<td>420</td>
</tr>
<tr>
<td>35</td>
<td>490</td>
</tr>
<tr>
<td>40</td>
<td>560</td>
</tr>
<tr>
<td>45</td>
<td>630</td>
</tr>
</tbody>
</table>

In Case 4, when traffic at the intersection is controlled by signals, the unobstructed view based on Case 3 procedures shall be available to the driver.

Within the sight triangle, cut slopes, hedges, trees, signs, utility poles, or anything large enough to constitute a sight obstruction shall be removed or lowered within the line of sight to a maximum height of 1.5 feet. Signs shall be offset so sight distance is not obstructed.

In circumstances that are different than those as presented in the Standards, the City may establish sight distance standards and requirements which generally conform with the intent of the sight distance guidelines as presented in the latest edition of the WSDOT Design Manual, Chapter 1310.

In order to verify acceptable sight distance, the City may require a developer to evaluate...
and document an existing sight distance condition. The evaluation and documentation of sight distance shall include adequate plan and profile drawings necessary to make a definitive determination. When the City determines from the evidence presented that a location has insufficient sight distance, the developer may be required to provide a plan to improve the sight distance to at least the minimum acceptable standard.

4.9 Clear Zone

A. Analysis

Clear zone is that roadside border area starting at the edge of the traveled lane that is available for safe use by errant vehicles. The available clear zone is the distance measured in feet normal to the highway beginning at the edge of the traveled way to the closest part of any fixed object. Traffic control signs and luminaries with breakaway supports are not considered hazardous for the purpose of defining the available clear zone distance. The required clear zone is a function of the posted speed, side slope, and traffic volume. Clear zone distances, as found in Chapter 700.04, “Road Safety”, of the WSDOT Design Manual shall be used as a guide for evaluation and placement of roadside features within the City right-of-way.

In urban conditions, with travel speeds of 35 mph or less, it is desirable to place any rigid object as far away as possible from the edge of the travel lane, such as beyond the sidewalk or at the edge of the right of way. Where this cannot be accomplished, the minimum clear zone distance is established at 10 feet beyond the edge of traveled way or 24 inches beyond the face of the curb.

For travel speeds greater than 35 mph, clear zone distances are contained within Chapter 700.04 of the WSDOT Manual.

B. Hazards

There are three general categories of hazards: embankment hazards, objects, and water.

1. Embankment Hazards

Evaluation of embankments for guardrail installations shall be in accordance with chapter 700.04 of the WSDOT Design Manual of the AASHTO Roadside Design Guide. Height and slope of embankments are the basic factors in determining barrier needs for a fill section. The preferred mitigation, over the installation of a traffic barrier, is the flattening of the side slopes where it is feasible.

2. Objects

When feasible, objects which are hazards as determined by the City Engineer, should be removed. Other mitigative measures include relocating an object outside of the clear zone, reducing the hazard such as using an appropriate breakaway feature, and installing a traffic barrier or earth berm.
3. Water

Open water with a depth of 2 feet or more and located within the clear zone shall be considered a hazard and require mitigation.

C. Traffic Barriers

Design of traffic barriers shall be in accordance with Chapter 710 of the current WSDOT Design Manual.

4.10 Vertical Clearance

A minimum vertical clearance of 16.5 feet shall be provided for all overhead obstacles measured from the crown of the street to the lowest portion of the obstacle. The minimum vertical clearance over sidewalks shall be 8 feet, and 10 feet over bikeways.

4.11 Road Width Transition Tapers

The need for road width transition tapers in conjunction with development proposals will be determined by the City on a case by case basis. The WSDOT Design Manual will be used as a guide in evaluating such proposals. The minimum length for transitions from wider to narrower width pavements in the direction of travel shall be 150 feet. Where new streets intersect with existing streets, the City shall determine the required tapers, radii and turning lanes.

4.12 Speed Change Lane Design

The need for speed change lanes in conjunction with development proposals will be determined by the City on a case by case basis. The current WSDOT Design Manual will be used as a guide in evaluating such proposals.

4.13 Survey Monuments and Corners

A “monument” shall be used to permanently mark a surveyed location. The size, shape and design of the monument is to be in accordance with Figures 4-6 and 4-7.

A. All existing survey control monuments which are disturbed, lost, or destroyed during surveying or construction shall be replaced at the expense of the responsible applicant, by a land surveyor registered in the State of Washington. Any removal or destruction of survey monuments shall be in accordance with WAC 332-120.

B. All existing survey control monuments which are covered over by a street improvement shall be raised to the new finished surface.

C. At un-monumented street intersections, new survey control monuments shall be established in the centers of all intersecting rights-of-way as part of any street improvement project. Additional survey control monuments shall be installed at
the developer's expense if requested by the City. All survey control monuments are to be in accordance with Figure 4-6 and 4-7. Case and cover monuments (Figure 4-6) are to be utilized where monuments fall in pavement in arterials.

D. Survey control monuments shall be set in accordance with Figure 4-6 and 4-7 for all PC, PT, center of cul-de-sac, and intersection points. The point of intersection (PI) will be acceptable in lieu of a PC and PT for plan road curves, provided that such PI falls within the paved roadway or sidewalk.

E. Intersection points of a plat boundary with the centerline of a road R/W centerline shall be monumented in accordance with Figures 4-6 and 4-7.

F. Standard steel reinforcing bars shall be 24 inches in length and at least 1/2 inch in diameter or at least 3/4-inch I.D. for iron pipe. Such pipe or rebar shall be permanently tagged with the Land surveyor's registration number.

G. Boundaries of final plats and short plats shall be established with standard steel reinforcing bars or iron pipe except that boundary corners that consist of section or one-quarter section corners shall be established in accordance Figures 4-6 and 4-7.

H. In the case where a property corner is occupied by any obstruction, an offset standard steel reinforcing bar shall be provided along one of the boundary lines. Offset concrete monuments shall only be set to witness section and one-quarter section corners.

I. A Land Corner Record or Record of Survey shall be filed by a Licensed Land Surveyor in accordance with all federal, state, county, and city laws, regulations and standards. The City shall be provided with a mylar copy.

4.14 Curbs and Gutters

Vertical Cement Concrete Curb and Gutter shall be used for all curbed roadways and shall be 24 inches wide. All concrete shall be air entrained concrete Class 3000. Construction shall be in accordance with DOT/APWA Specification 8-04 and Figure 4-8. Engineered notching of curbs can, with City approval, be incorporated into LID BMPs such as rain gardens and bio-infiltration swales to increase on-site infiltration.

Extruded Cement Concrete or Asphalt Curb may be used for private parking areas, and driveways which will not become part of the City road system.

Where new cement concrete curb and gutter is constructed to connect to existing curbed roadway, care shall be taken to assure that no abrupt offsets in line or grade shall be constructed which will be unsightly or impede flow in the gutter line.

Curb returns at driveway entrances may be used for commercial and industrial properties. A continuous concrete gutter section shall be constructed through the driveway between curb returns unless catch basins are provided at one or both curb returns as required to
4.15 Curb Ramps

Curb ramps shall meet current ADA requirements. Curb ramps shall be provided at all pedestrian crossings (WSDOT Standard Plans). One ramp shall be used on each curb return on access roads and unsignalized intersections with a curb radius of 35 feet or greater. At signalized intersections, a curb ramp shall be aligned with each crosswalk. Ramps shall also be provided across driveways where radius returns border the driveway. Wheelchair ramps will be constructed in accordance with the current version of WAC 236-60. Wheelchair ramps shall be installed before final inspection and approval of construction.

4.16 Sidewalks

Sidewalks shall be constructed in accordance with WSDOT/APWA Standard Specifications for Road, Bridge, and Municipal Construction, Section 8-14. Figures 4-9A, 4-9B, 4-9C and 4-10 are the current requirement; however, the latest version of WSDOT Standard Plans must be used for ADA requirements. All concrete shall be air-entrained concrete Class 3000. Developers shall construct all sidewalks at the time streets are constructed, and before final inspection and approval of construction. LID techniques should be considered.

Repair and replacement of sidewalk and/or curb shall be in accordance with Lynden Municipal Code (LMC) 12.08.010.

A. Private Roads

1. For private roads ultimately serving 2 or less residential lots (20 ADT or less), the road is classified as a driveway and concrete sidewalks are not required.

2. For private roads ultimately serving 3 or more residential lots (30 to 150 ADT), concrete sidewalks shall be provided on one side of the street. See Table 4-1 and Figure 4-3B.

B. Residential Subdivisions - Urban Areas

1. Concrete sidewalks shall be provided on both sides of all streets.

C. Commercial/Industrial Developments - Urban Areas

1. Concrete sidewalks shall be provided on both sides of all streets.

D. Width

1. All sidewalks shall be a minimum of 5 feet wide, with appropriate buffers. Reduction of sidewalk widths should be used to meet LID hard surface.
reduction requirements when feasible:

2. Sidewalks fronting commercial property uses shall be a minimum of 8 feet wide with 80’ right-of-way or greater. See Table 4-1.

3. At bus stops, a landing pad meeting current ADA Standards and WTA requirements shall be provided for wheelchair operations.

E. Thickness

Concrete sidewalks shall be minimum 4 inches in depth, minimum 6 inches in depth when across residential driveways, and minimum 8 inches in depth when across commercial or industrial driveways.

F. Buffer

Buffers or planting strips (grass only) are required on all roads except in areas to be reconstructed where there are no existing buffers, such as streets in commercial zones, in areas where existing sidewalks without buffers are to be extended and there is no clean break such as an intersection to provide a transition, or where existing right of way is limited and there is not physically room for a buffer because additional right of way cannot be obtained. A minimum 4 foot buffer separation between the back of the curb and the sidewalk is required. If R-O-W is available, a minimum buffer of 5 feet is required. (See Table 4-1). Species, size and location of street trees shall be in accordance with applicable planning requirements. Root barrier shall be as manufactured by DeepRoot, product UB 18-2 or as manufactured by NDS, product EP or RP series root barrier, 18-inch minimum depth. See Figures 4-19A and 4-19B for placement and installation. The following is a list of approved tree species:

**Recommended Trees For The City Of Lynden**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Formal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Small Trees</strong></td>
<td></td>
</tr>
<tr>
<td>Accolade Flowing Cherry Tree</td>
<td>Prunus</td>
</tr>
<tr>
<td>Akebono Cherry Tree</td>
<td>Prunus</td>
</tr>
<tr>
<td>Amangowa Cherry Tree</td>
<td>Prunus</td>
</tr>
<tr>
<td>Autumnn Flowering Cherry Tree</td>
<td>Prunus subhirtella autumnalis</td>
</tr>
<tr>
<td>Shogetsu Flowering Cherry Tree</td>
<td>Prunus</td>
</tr>
<tr>
<td>Whitcomb Flowering Cherry Tree</td>
<td>Prunus</td>
</tr>
<tr>
<td>Yoshino Cherry Tree</td>
<td>Prunus</td>
</tr>
<tr>
<td>Bliereana Flowering Plum Tree</td>
<td>Prunus</td>
</tr>
<tr>
<td>Hollywood Flowering Plum Tree</td>
<td>Prunus</td>
</tr>
<tr>
<td>Thundercloud Flowering Plum Tree</td>
<td>Prunus</td>
</tr>
<tr>
<td>Redspire Flowering Pear Tree</td>
<td>Pyrus calleryana and var</td>
</tr>
<tr>
<td>Liset Flowering Crabapple Tree</td>
<td>Malus floribunda</td>
</tr>
<tr>
<td>Robinson Flowering Crabapple Tree</td>
<td>Malus floribunda</td>
</tr>
<tr>
<td>Kasteara Tree</td>
<td>Cercidiphyllum japonicum</td>
</tr>
</tbody>
</table>
Flowering Ash Tree  
Columnar Ginko Tree  
Lavallei Howthorn Tree  
Golden Honey Locust Tree  

Recommended Trees For The City Of Lynden (Continued)

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Formal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silverbell Tree</td>
<td>Halesia monticola</td>
</tr>
<tr>
<td>Snowdrop Tree</td>
<td>Styrax japonica</td>
</tr>
</tbody>
</table>

Medium Trees

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Formal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crimson Maple Tree</td>
<td>Acer platanoides</td>
</tr>
<tr>
<td>Sycamore Maple Tree</td>
<td>Acer pseudo platanus</td>
</tr>
<tr>
<td>Red Sunset Maple Tree</td>
<td>Acer rubrum</td>
</tr>
<tr>
<td>Sugar Maple and var</td>
<td>Acer saccharum</td>
</tr>
<tr>
<td>River or Paper Birch Tree</td>
<td>Betula jacquemontil</td>
</tr>
<tr>
<td>Little Leaf Linden Tree</td>
<td>Tilia cordata</td>
</tr>
</tbody>
</table>

Large Trees

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Formal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kwanzan Cherry Tree</td>
<td>Prunus</td>
</tr>
<tr>
<td>Mt. Fuji Flowering Cherry Tree</td>
<td>Prunus</td>
</tr>
<tr>
<td>Norway Maple Tree</td>
<td></td>
</tr>
<tr>
<td>Scanlon Red Maple Tree</td>
<td></td>
</tr>
<tr>
<td>Pin Oak Tree</td>
<td>Palustris Quercus</td>
</tr>
<tr>
<td>Red Oak Tree</td>
<td>Quercus rubra</td>
</tr>
<tr>
<td>Dawyck Upright Beech Tree</td>
<td>Fagus</td>
</tr>
</tbody>
</table>

4.17 Cul-de-Sacs

Generally, all residential parcels should be accessible from two directions. However, with the approval of the City, cul-de-sacs will be allowed for roads with a total length less than 450 feet from centerline of accessing street to farthest extent of surfaced traveled way. The cul-de-sac shall be designed in accordance with Figure 4-12. LID planning can provide opportunities to reduce hard surfaces by permitting smaller radii in cul-de-sacs with concurrence by the Fire Department and the local Solid Waste franchise service provider, and school districts.

Hammerheads may be allowed when roads are to be extended in the future, subject to approval by the City Council.

4.18 Traffic Barriers

Design of traffic barriers shall be in accordance with Chapter 710 -of the most current version of the WSDOT Design Manual.
4.19 Illumination

Design of illumination for all roadways shall be in accordance with IES RP-8-00 recommendations, and as required by the City of Lynden. Illumination design including lighting plans, calculations, and specifications shall be prepared by INTOLIGHT/PSE and submitted to the City for approval. As a minimum, illumination shall be designed as follows:
Table 4-3
Illumination Design

<table>
<thead>
<tr>
<th>Road Classification</th>
<th>Average Footcandles</th>
<th>Uniformity Ratio</th>
<th>L_{avg} to L_{min}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Business District*</td>
<td>2.0</td>
<td></td>
<td>3 to 1</td>
</tr>
<tr>
<td>Major Arterial</td>
<td>1.7</td>
<td></td>
<td>3 to 1</td>
</tr>
<tr>
<td>Secondary Arterial</td>
<td>1.2</td>
<td></td>
<td>3 to 1</td>
</tr>
<tr>
<td>Access Street</td>
<td>0.6</td>
<td></td>
<td>5 to 1</td>
</tr>
<tr>
<td>Private Roads</td>
<td>0.4</td>
<td></td>
<td>6 to 1</td>
</tr>
</tbody>
</table>

* Includes commercial zones with high traffic volumes.

**Design Parameters:**
- Mounting Height = Determined by Lighting Design
- Lamp Type = High-Pressure Sodium

Increase light level by 50 percent at Intersections where more than one light standard is installed.

For existing access streets and residential streets being improved, intersection lighting on Puget Sound Energy poles is acceptable. New residential streets being constructed in conjunction with a plat shall show streetlights on the lighting plan at intersections, near the neck of a cul-de-sac, and at specified locations requiring added safety.

Luminaires shall be chosen from the list approved by the city, which includes the following:
- King k112 Post top
- King k424 Post top
- Cooper Dayform Post top
- GE Cobrahead Flat Lens Medium Cutoff Type III

Each luminaire shall utilize a photo-cell unless controlled by a service cabinet. Photocells shall be DTL Photocells and the lamp shall be Sylvania Lumalux Plus.

Poles shall be located outside of the clear zone as discussed in Section 4.9. Applicant shall contact INTOLIGHT/PSE for further information. All street lights shall be owned and maintained by INTOLIGHT/PSE.

4.20 Signing

All public street signing shall be in accordance with the current edition of the Manual of Uniform Traffic Control Devices. Signing for public facilities shall be installed by the City and paid for by the Developer. Sheeting for control signs shall be high intensity material. Private, off premises directional signs shall not be allowed within City right-of-way, except those specifically allowed under Chapter 19.33 LMC.
4.21 Striping and Raised Pavement Markings

Striping and pavement markings shall be in accordance with the current edition of the Manual of Uniform Traffic Control Devices. All crosswalks and stopbars shall be striped with thermoplastic material. Striping shall be designed to current City Standards and shown on the drawings - (See Figures 4-14 through 4-17).

4.22 Utility Installation

A. General

1. Utility companies or municipal corporations desiring to construct and/or maintain their facilities within the City right of way are required to obtain a franchise with the City of Lynden unless specifically exempted by State law. An Encroachment Permit is also required for all street obstruction or excavation in City right-of-way.

2. All work and materials shall conform to the requirements as set forth in the City of Lynden “Project Manual for Engineering Design and Development Standards”.

3. Utility installations shall be located to minimize need for later adjustment, to accommodate future roadway improvements and to provide service access to such installations with minimum interference to roadway traffic. Refer to Figure 4-1 for typical utility locations.

4. Electric utilities, power, telephone, cable TV, and fiber optics lines shall be installed underground, at a depth compatible with other utilities and storm drains.

5. Generally boring is required for utility crossings. In some cases open cutting may be allowed if approved by the City. Open cutting will not be allowed in pavement installed within the previous 5 years. When trenching through existing pavement, the open cut shall be a neat-line cut made by saw cutting a continuous line a minimum of 1 foot outside the trench limits unless against an existing curb. Utility Trench Restoration shall be in accordance with Figure 4-18.

6. Gravel shoulders disturbed by excavation shall be replaced full depth with ballast and 2 inches of crushed surfacing top course in accordance with DOT/APWA Specification 9-03.9(3) as modified.

7. Quality control monitoring of subgrade backfill and embankment materials shall be by certified independent testing laboratory approved by the City and paid for by the Developer. A minimum of one test shall be taken within every 200 feet of trench length and at depths of 50 percent of trench depth and at the surface, or as required by the City. Testing of Controlled Density Fill shall be in accordance with WSDOT 2-09.3(1)E.
Compaction of laterals or service line trenches shall be tested where required by the City.

8. The City shall be notified not less than two working days prior to actual construction or trenching work in existing or proposed traveled City roads.

9. The applicant or responsible utility shall restore roadway as specified herein and restore adjacent areas in accordance with WSDOT Specification 1-07.16.

10. Infiltration systems meeting D.O.E. standards for quality and quantity may be utilized for treating dedicated rights-of-way provided the facility is located within dedicated right-of-way outside the street prism a minimum of 8 feet from the centerline of pipe to the back of the curb and does not include non-right-of-way drainage.

B. Road Cuts

1. All trench backfill under roadway shall be mechanically compacted to 95 percent of maximum density. All densities shall be determined by testing, as specified in current WSDOT/APWA Specification 2-03.3(14)D or ASTM D-1557 and as amended herein.

2. Backfill shall be 95% compacted gravel base as specified in WSDOT Specification 9-03.10.

3. Restoration of a trench within an asphalt pavement shall include a minimum of six inches of Class B asphalt concrete (not including overlay) placed in a minimum of 2 lifts. See Figure 4-18.

4. Petrovac or other approved material shall be placed over the full length of the joint. A pre-level asphalt course may be required prior to the overlay.

C. Controlled Density Fill

Controlled Density Fill may be required by the City in lieu of backfill material in situations where even a small amount of trench settlement cannot be tolerated such as installation of transverse trenches on arterial roads. Controlled density fill shall be used as fill above the bedding and below the base course. The design mixture shall be in accordance with WSDOT 2-09.3(1)E.

4.23 Parking Lots

Permanent storm water facilities in connection with shall be provided for parking lots shall be provided, and shall follow the criteria as set forth in Division 8 of these standards.

Plans and specifications are required by the Public Works Department, and shall be submitted for review and approval by the City with respect to storm water facilities.
matching street and/or sidewalk grades, access locations, parking layout, and to check for
future street improvement conformity and City zoning regulations. Parking lot surfacing
materials shall satisfy the requirement for a permanent all-weather surface. Asphalt
concrete pavement and Portland Cement Concrete pavement satisfy this requirement and
are approved materials. Generally, gravel surfaces are not acceptable or approved surface
material types. Low-impact design LID elements such as porous pavements may be
required used per -based on the DOE Ecology Manual -SWMWW minimum requirements
for parking areas. Combination Engineered grass/paving systems are approved surface
material types, however, their use requires submittal of an overall parking lot
paving plan showing the limits of the grass/paving systems and a description of how the
systems will be irrigated and maintained. If the City determines the grass/paving system
is not appropriate for the specific application, alternate approved surfacing materials shall
be utilized. The City will determine minimum requirements for parking lot capacity.
Parking shall be laid out in accordance with Figure 4-16C of these standards. Parking
lots, including fire lanes, shall be marked in accordance with Figure 4-16C of these
standards.

4.24 Traffic Impact Analysis

Traffic impact analyses are required by the City in order to assess the impacts of
development proposals on the City’s street system. The analysis shall be submitted with
SEPA documents, or if the project is SEPA exempt, at the time of application. Traffic
Impact Analysis Requirements and Forms are included as Figure 4-21.
4.25 Mail Boxes

Mailboxes shall be clustered together when practical and when reasonably convenient to the houses served. Location and installation of mailboxes shall be in accordance with U.S. Postal Service requirements and approved by the City. Any necessary widening or reconfiguration of sidewalks, or special turnouts shall be as required by the U.S. Postal Service.

4.26 Bikeway

Bicycle facilities shall be designed in accordance with the following referenced standards, regulations and policy:


4. RCW 35.75.060.

5. All arterials are to be designed and constructed under the assumption that they will be used by bicyclists and that sidewalks are not a substitute for bicycle facilities.

Bikeways are generally shared with other transportation modes, although they may be provided exclusively for bicycle use. Bikeways are categorized below based on degree of separation from motor vehicles and other transportation modes. This classification does not denote preference of one type over another. Bikeways are categorized as follows:

Class I Bikeway (Bike Trail): A separate paved multipurpose trail for the principal use of bicycles and other non-motorized modes. Bike paths are a minimum width of 8 feet.

Class II Bikeway (Bike Lane): A portion of the road that is designated by signs and/or pavement markings for exclusive bicycle use. Bicycle lanes may be signed as part of a directional route system. Bicycle lanes are to be one-way facilities and carry bicycle traffic in the same direction as adjacent motorized traffic. The minimum width of the bike lane is 5 feet wide on a curbed road and a minimum four feet wide as a shoulder bike lane.

Class III Bikeway (Bike Route): A road that provides a widened paved outer curb lane to accommodate bicycles in the same lane as motor vehicles. Lane width shall be increased at least 3 feet.

Class IV (Shared Roadway With No Designation): A publicly maintained facility that is not designated with signs and/or pavement markings as a bikeway, but is accessible to bicyclists.
See Figure 4.2 for Class III Bikeway.

4.27 As-Built Certification

As-built certification as outlined in Division 3, shall be required from the Applicant certifying that the facility has been constructed as shown on the as-built plans and meets approved plans and specifications. As-built drawings shall be prepared and submitted to the Lynden Public Works Department for approval. When approved, one original mylar set and two blueline sets shall be submitted together with a copy in digital format using Autocad Version 2000 or later.