YELM ENGINEERING SPECIFICATIONS AND STANDARD DETAILS

CHAPTER 2 TRANSPORTATION

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CHAPTER 2.00 TRANSPORTATION

2.00.010 General Considerations

The overall goal of this chapter is to encourage the uniform development of an integrated, fully accessible public transportation system that will facilitate present and future travel demand with minimal environmental impact to the community as a whole.

This chapter provides minimum development standards supplementing the applicable standards as set forth in Subsection 1.00.010.

2.10 STREETS

2.10.010 Design

Street design must provide for the maximum loading conditions anticipated. The width and grade of the pavement must conform to specific standards set forth herein for safety and uniformity.

A. Design Standards. The design of streets and roads shall depend upon their type and usage. The design elements of City streets shall conform to City standards as set forth herein and current standard specifications as set forth in Subsection 1.00.010. Standard street designs are shown on the drawings at the end of this chapter. A design exception may be granted by the City based on the following criteria:

   1. Reduction of carrying capacity as demonstrated by a Traffic Impact Analysis;
   2. When alternative methods of stormwater conveyance and treatment (other than swales) are proposed and in compliance with the Stormwater Manual;
   3. Future expansions / extensions of the proposed roadway are improbable due to physical constraints; and
   4. Meets the intent of Transportation Chapter 2.00
   5. Alternate structures may be used based on the criteria as outlined in Subsection 2.10.110.

B. Alignment. Alignment of major arterials, minor arterials and collectors shall conform as nearly as possible with that shown in the Comprehensive Plan.

C. Grade. Longitudinal (profile) street grades should conform closely to the natural contour of the land. In some cases a different grade may be required by the City. The minimum allowable grade shall be 0.5 percent. The maximum allowable grade shall be 15 percent.

D. Width. The pavement and Right-of-Way width depend upon the street classification. The table of Minimum Street Design Standards show the minimum widths allowed.

E. Street widths shall be measured from face of curb to face of curb on streets with cement concrete curb and gutter, and from flow line to flow line on streets with cement concrete rolled curb and gutter.

The following General Notes shall be included on any plans dealing with street design in addition to all applicable requirements in Subsection 1.00.010.

2.10.020 GENERAL NOTES (STREET CONSTRUCTION)

1. All workmanship and materials shall be in accordance with City of Yelm standards, and the most current copy of the State of Washington Standard Specifications for Road, Bridge, and Municipal Construction.
2. The contractor shall be responsible for all traffic control in accordance with MUTCD. Prior to disruption of any traffic, traffic control plans shall be prepared and submitted to the City for approval. No work shall commence until all approved traffic control is in place.
3. All curb and gutter, street grades, sidewalk grades, and any other vertical and/or horizontal alignment shall be staked by an engineering or surveying firm capable of performing such work.
4. Where new asphalt joins existing, the existing asphalt shall be cut to a neat vertical edge and tacked with Asphalt Emulsion type CSS-1 in accordance with the standard specifications. The new asphalt shall be feathered back over existing to provide for a seal at the saw cut location and the joint sealed with grade AR-4000W paving asphalt.
5. Compaction of subgrade, rock, and asphalt shall be in accordance with the standard specifications.
6. Subgrade inspection shall be performed by an approved testing firm and forms shall be inspected for line and grade by an engineer before pouring concrete.
7. Certification as to conformance shall be provided to the City prior to acceptance of work.
8. The Contractor/Developer shall furnish and install all permanent signing.

2.10.030 Functional Classification

City streets are divided into boulevards, major arterials, urban arterials, commercial and neighborhood collectors, local access commercial, and residential streets and alleys in accordance with regional transportation needs, the functional use of each serves and Transportation Policy No 11. Function is the controlling element for classification and shall govern Right-of-Way, road width, and road geometrics. The following list is provided to assist the developer in determining the classification of a particular street. Streets not listed are classified as residential local access streets. New streets will be classified by the City. The intersection commonly known as Five Corners is described as Yelm Ave. (SR 507)/Bald Hill Rd. SE/Morris Rd. SE/NE Creek St./SR 507.

Boulevard Swale or w/Central Island
Tahoma Boulevard

Major Arterials
First Street (south of Yelm Avenue)
SR-510 (Yelm Avenue East and West)
SR-507
SR-510 Alt (Y-3)

Urban Arterial
Killion Road SE
Bald Hill Road (Y-9 improvements)
First Street (north of Yelm Avenue)

Commercial Collectors
Canal Road (including Y-3 improvements)
Creek Street SE
Edwards Street NW (from Yelm Avenue to Coates Street SE)
Grove Road (including Y-3 improvements)
Morris Road SE
N. P. Road NW
Rhoton Road NW (from NE First Street to NW Rhoton Court)
Stevens Avenue NW
West Road SE
103rd Street NE (from Yelm Avenue to NE Creek Street)

Neighborhood Collectors
Burnett Road SE
Clark Road SE
Coates Street SE

Crystal Springs Road (including Y-6 improvements-upon opening of Y-3 west)
Cullens Road
Middle Road SE
Mill Road SE
Mosman Avenue SE
Mosman Avenue SW
Mountain View Road NW
Ordway Drive
Railway Street SE
Rhoton Road NW (from NW Rhoton Court to Canal Rd. SE)
Southwest Access (Y-7 improvements)
Vancil Road SE
Wilkensen Road
93rd Avenue SE
105th Avenue

Local Access Commercial
Edwards Street SW (from Yelm Avenue to Mosman Avenue)
Jefferson Avenue NE
Jefferson Avenue NW
Longmire Street NW (from Jefferson Ave NW to Yelm Ave W)
Longmire Street SW (from Yelm Ave W to Washington Ave SW)
McKenzie Avenue SE (from SR 507 to Second Street)
Railroad Street NW
Rice Street SW (from Washington Ave SW to NW Jefferson Avenue)
Solberg Street SW (from Washington Ave SW to NW Jefferson Avenue)
Third Street SE (from Washington Ave SE to NE Jefferson Avenue)

Local Access Residential
Flume Road SE
Fourth Street SE
100th Way SE
103rd Street NE (from NE Creek Street to Canal Road SE)
All remaining roadways within the Yelm UGA

MINIMUM STREET DESIGN STANDARDS

ROADWAY FEATURES	BOULEVARD	MAJOR ARTERIAL	URBAN ARTERIAL	COMMERCIAL COLLECTOR	NEIGHBORHOOD COLLECTOR	LOCAL ACCESS COMMERCIAL	LOCAL ACCESS RESIDENTIAL
STD DWG #	2-1 A & B	2-2	2-3	2-4	2-5	2-6	2-7
ADT	500 MIN	15000 MIN	6000-15000	6000-15000	500-6000	2000 MAX	500 MAX
DESIGN LIMITATIONS	No superelevation. Access and intersections should be limited. No on-street parking.			No superelevation No on street parking	No superelevation No on street parking	No superelevation	No superelevation
MINIMAL STRUCTURAL DESIGN	Special Design	Special Design	Special Design	4' AC 2' C.S.T.C. 8' Ballast	3' AC 2' C.S.T.C. 8' Ballast	4' AC 2' C.S.T.C. 8' Ballast	2' AC 2' C.S.T.C. 8' Ballast
MINIMUM RIGHT-OF-WAY	84' – 106' *2-1A* 82' – 106' *2-1B*	94'	72'	56'	56'	58'	56'
PARKING LANE	NOT ALLOWED					Both Sides	Both Sides
MINIMUM MAXIMUM PROFILE GRADE	0.5% - 8.0%	0.5% - 8.0%	0.5% - 8.0%	0.5% - 10.0%	0.5% -12.0%	0.5% - 15.0%	0.5% - 15.0%
CURB	Curb	Curb & Gutter	Curb & Gutter	Curb & Gutter	Curb & Gutter	Curb & Gutter	Rolled Curb & Gutter
PLANTER STRIP	Two sides – 7'	Two sides – 8'	Two sides – 8'	Two sides – 7'	Two sides – 7'	Two sides – 6'	Two sides – 6'
SIDEWALKS	Two sides - 5'	Two sides - 6'	Two sides - 6'	Two sides - 5'	Two sides - 5'	Two sides - 5'	One side - 5'
CUL-DE-SAC RADIUS (PAVEMENT WIDTH)	Not applicable					50'	38' (or 47' with landscaped island radius of 17')
*INTERSECTION CURB RADIUS	35'	35'	35'	35'	35'	35'	25'
DESIGN SPEED (MPH)	40	40	40	30	30	30	25
MINIMUM CENTERLINE RADIUS	Per AASHTO			150'	150'	150'	100'
NOTES *as measured to the face of curb or, in the case of Local Access Residential, to the gutter line of the rolled curb.							

2.10.040 Naming

Streets and roads shall be named according to specific criteria. All street addresses within the City shall be suffixed by the name of the quadrant within which the same is located. The City is divided into four districts as determined by the base lines described as follows:

A. North-South Base Line. Commencing on the centerline of State Highway 507 where said centerline first intercepts the southerly limits of the urban growth boundary; thence continuing northeasterly along said centerline of State Highway 507 within the corporate limits of the City where the same becomes the centerline of First Street N; thence continuing northeasterly along said centerline of First Street N through the City to the point where the same joins the centerline of Rhoton Road NW; thence continuing northerly along the centerline of Rhoton Road NW to the most northerly corporate limit of the City;

B. East-West Base Line. Commencing on the centerline of State Highway 510 where the same intercepts the westerly corporate limits of the City; thence proceeding southeasterly along said centerline of State Highway 510 into the City where the same becomes the centerline of Yelm Avenue; thence continuing southeasterly along the centerline of State Highway 507 (Yelm Avenue extended) lies adjacent to the corporate limits of the City. Section 12.20.050 YMC

The districts are described as follows:

1. Northeast (NE) shall indicate that portion of the City lying northerly of the east-west base line and easterly of the north-south base line;
2. Northwest (NW) shall indicate that portion of the City lying northerly of the east-west base line and westerly of the north-south base line;
3. Southeast (SE) shall indicate that portion of the City lying southerly of the east-west base line and easterly of the north-south base line;
4. Southwest (SW) shall indicate that portion of the City lying southerly of the east-west base line and westerly of the north-south base line.

C. The following street designations shall apply to public ways, street and road signs and addresses:

1. "Avenues" shall indicate public ways (excluding alleys) running generally easterly and westerly;
2. "Courts" shall indicate public ways in the form of a cul-de-sac,

which cannot be extended. Court shall be named or numbered and the address numbers thereon shall follow the address number of the street from which the court extends;

3. "Drives" shall indicate irregular or diagonal public ways (excluding alleys) not conforming to the grid pattern and not exceeding four City blocks in length;
4. "Lanes" shall indicate private ways in a private street subdivision;
5. "Loops" shall indicate a short loop-type public way which shall carry the name of the public way from which is originates;
6. "Places" shall indicate public ways (excluding alleys) running generally northerly and southerly, parallel to, but between streets and not connecting to avenues;
7. "Roads" shall indicate irregular or diagonal public ways not conforming to the grid pattern and exceeding four City blocks in length, which are arterial public ways;
8. "Streets" shall indicate public ways (excluding alleys) running generally northerly and southerly; and
9. "Ways" shall indicate public ways (excluding alleys) running generally easterly and westerly parallel to but between avenues and not connecting through streets. Section 12.20.070 YMC

An address number will be assigned to all new buildings at the time the building permit is issued. It is then the owner's responsibility to see that the house numbers are placed clearly and visibly at the main entrance to the property or at the principal place of ingress.

The developer must check with the Building Official regarding the naming of streets. This should be done at the time the preliminary land division is submitted and again upon approval of the final land division. The Building Official will insure that the name assigned to a new street is consistent with policies of the City.

2.10.050 Signing

The developer shall furnish and install all signage. All permanent signing shall comply with the provisions as established by the MUTCD, WSDOT Standard Specifications for Road, Bridge, and Municipal Construction and the WSDOT Sign Fabrication Manual. Street designation signs will display the street name as determined in Subsection 2.10.040 YDS.

2.10.060 Right-of-Way

Right-of-Way is determined by the functional classification of a street. See drawing numbers 2-1 through 2-8 for specific widths. See "Minimum Street Design Standards Table" Subsection 2.10.030 YDS for radius requirements at cul-de-sac "bulb". Right-of-Way at "bulb" shall be increased accordingly.

Right-of-Way requirements may be increased if additional lanes, pockets, transit lanes, bus loading zones, operational speed, bike lanes, utilities, schools or other factors are required as determined by the City.

Right-of-Way shall be conveyed to the City on a recorded land division map or by a Right-of-Way dedication deed.

2.10.070 Medians

A median shall be in addition to, not part of, the specified roadway width except on a road classed as a boulevard. Medians shall be designed so as not to limit turning radius or sight distance at intersections. Pedestrian access, landscaping, and irrigation shall be installed when directed by the City.

2.10.080 Intersections

Traffic control will be as specified in the Manual on Uniform Traffic Control Devices (MUTCD), or as modified by the City as a result of appropriate traffic engineering studies.

Street intersections shall be laid out so as to intersect as nearly as possible at right angles (within 15 degrees).

For safe design, the following types of intersection features should be avoided:

- Intersections with more than four intersecting streets
- "Y" type intersections where streets meet at acute angles
- Intersections adjacent to bridges and other sight obstructions

Spacing between adjacent intersecting streets, whether crossing or "T" should be as follows:

When highest classification involved is	Minimum Centerline offset should be
Major Arterial/Boulevard	350
Urban Arterial	300
Commercial Collector	200

Neighborhood Collector	200
Local Access	150
Private Roadway	150

When different class streets intersect, the higher standard shall apply on curb radii. Deviations to this may be allowed at the direction of the City.

On sloping approaches at an intersection, landings shall be provided with grade not to exceed one foot difference in elevation for a distance of 30 feet approaching any arterial or 20 feet approaching a collector or local access street, measured from nearest Right-of-Way line (extended) of intersecting street.

2.10.090 Sight Obstruction

Sight distance at intersections and road approaches shall be in conformance with the most current WSDOT Design Manual and the AASHTO Green Book.

Within the sight triangle, cut slopes, hedges, fences, trees, signs, utility poles, or anything large enough to constitute a sight obstruction should be removed or lowered. Parking should also be eliminated and signs offset so sight distance is not obstructed.

Sight obstructions that may be excluded from these requirements include: existing utility poles, regulatory signs, trees trimmed from the base to a height of 10 feet above the street, and preexisting buildings.

A sight distance maintenance easement, if required, must be granted to the City for all improvements including commercial and residential development, and land divisions. The sight distance maintenance easement is based upon the sight distance triangle calculations in the most current WSDOT Design Manual and the latest edition of the AASHTO Green Book.

2.10.100 Driveways

A. All abandoned driveway areas shall be removed and the curbing and sidewalk or shoulder and ditch section shall be properly restored.

B. All drive approaches constructed within street right of ways shall be constructed of Portland Cement Concrete and shall be subject to the same testing and inspection requirements as curb, gutter, and sidewalk construction.

C. Grade breaks, including the tie to the roadway, shall be a maximum 8 percent on a crest and 12 percent in a sag.

D. Road approach type accesses shall only be allowed when justified through an accepted traffic analysis and report, and approved by the City Engineer.

E. Spacing criteria seek to achieve several objectives. One is to clearly identify which property the driveway is serving. Another is to leave a usable island between driveways for utility poles and traffic control devices.

F. An additional factor concerns the spacing of high-volume driveways where deceleration or acceleration lanes are required. Examples would include driveways into community and regional shopping centers as well as those into major industrial, commercial, and apartment complexes. At least several hundred feet between major driveways is desirable. Factors to be considered include the speeds and volumes of entering and leaving traffic, the speeds of through traffic, and the resultant merging movements upstream and downstream.

G. It is important that driveways be designed for the particular traffic characteristics anticipated and that upstream and downstream factors affecting a driveway location be considered in each instance. Drawing number 2-25 contains minimum spacing recommendations. All driveway spacing must be approved by the City.

H. Driveways giving direct access onto arterials may be denied if alternate access is available. Deviations of these standards may be permitted by the City.

2.10.110 Surfacing Requirements

The following are the surfacing requirements for each application listed.

A. Boulevard and Arterial Streets

The engineer will provide a pavement design. The design of the pavement shall include a study of the native soils, their behavior under load, and the design of a structural section to carry the anticipated loads under all climate conditions. In no event shall the structural section be less than the minimums shown below:

Surfacing:	4”	Class B Asphalt Concrete
Top Course:	2”	Crushed Surfacing Top Course
Base:	12”	Gravel Base

One soil sample per each 500 LF of centerline with 3 minimum per project representative of the roadway subgrade shall be taken to determine a statistical representation of the existing soil conditions at design grade.

The pavement design, signed and stamped by an engineer licensed by the State of Washington, shall be based on actual soils tests and submitted with the plans.

The following structural section may be used in lieu of a pavement design. The use of this section is subject to City Engineer approval of prepared subgrade.

B. Commercial Collector Streets

Surfacing:	4”	Class B Asphalt Concrete
Top Course:	2”	Crushed Surfacing Top Course
Base:	8”	Gravel Base
Alternate		
Surfacing:	4”	Class B Asphalt Concrete
Base:	8”	Asphalt Treated Base

C. Neighborhood Collector Streets

Surfacing:	3”	Class B Asphalt Concrete
Top Course:	2”	Crushed Surfacing Top Course
Base:	8”	Gravel Base
Alternate		
Surfacing:	3”	Class B Asphalt Concrete
Base:	6”	Asphalt Treated Base

D. Local Access Street

Surfacing:	2”	Class B Asphalt Concrete
Top Course:	2”	Crushed Surfacing Top Course
Base:	8”	Gravel Base
Alternate		
Surfacing:	2”	Class B Asphalt Concrete
Base:	6”	Asphalt Treated Base

E. Sidewalks

Surfacing: 4" Concrete Class 3000
Base: 1" Crushed Surfacing Top Course or well graded sand
*Asphalt sidewalks will not be permitted unless specifically approved by the City.
*Base may be omitted subject to City approval of prepared subgrade.

F. Driveway

Surfacing: 6" Concrete Class 3000
Base: 1" Crushed Surfacing Top Course or well graded sand
*Base may be omitted subject to City approval of prepared subgrade.

G. Class I Bike Path

Surfacing:	4" Concrete Class 3000
Base:	1" Crushed Surfacing Top Course
Alternate:	
Surfacing:	2 1/2" Class B Asphalt Concrete
Base:	4" Gravel Base

2.10.130 Temporary Street Patching

Temporary restoration of trenches shall be accomplished by using 2" Class B Asphalt Concrete Pavement when available or 2" medium-curing (MC-250) Liquid Asphalt (cold mix), 2" Asphalt Treated Base (ATB), or steel plates.

ATB used for temporary restoration may be dumped directly into the trench, bladed and rolled. After rolling, the trench must be filled flush with ATB to provide a smooth riding surface.

All temporary patches shall be maintained by the contractor until such time as the permanent pavement patch is in place. See subsection 2.10.140 (G) below.

If the contractor is unable to maintain a patch for whatever reason, the City will patch it and the developer will be billed for actual cost of labor and materials plus overhead.

2.10.140 Trench - Pavement Restoration

Trench restoration shall be either by a patch or patch plus overlay as required by the City Engineer.

A. All trench and pavement cuts shall be made by spade bladed jackhammer or sawcuts. The cuts shall be a minimum of 1 foot outside the trench width.

B. All trenching shall be backfilled with crushed surfacing materials conforming to Section 4-04 of the WSDOT/APWA Standard Specifications. The trench shall be compacted to 95 percent maximum density, as described in Section 2-03 of the WSDOT/APWA Standard Specifications.

   Replacement of the asphalt concrete or Portland Cement Concrete shall be of existing depth plus 1 inch or 3 inches, whichever is greater.

C. Tack shall be applied to the existing pavement and edge of cut and shall be emulsified asphalt grade CSS-1 as specified in Section 9-02.1(6) of the WSDOT/APWA Standard Specifications. Tack coat shall be applied as specified in Section 5-04 of the WSDOT/APWA Standard Specifications.

D. Asphalt concrete Class B shall be placed on the prepared surface in accordance with the applicable requirements of Section 5-04 of the WSDOT/APWA Standard Specifications, except that longitudinal joints between successive layers of asphalt concrete shall be displaced laterally a minimum of 12 inches unless otherwise approved by the City Engineer. Fine and coarse aggregate shall be in accordance with Section 9-03.8 of the WSDOT/APWA Standard Specifications. Asphalt concrete over 2 inches thick shall be placed in equal lifts not to exceed 2 inches each.

   All street surfaces, walks or driveways within the street trenching areas affected by the trenching shall be feathered and shimmed to an extent that provides a smooth-riding connection and expeditious drainage flow for the newly paved surface. Shimming and feathering as required by the City Engineer shall be accomplished by raking out the oversized aggregates from the Class B mix as appropriate.

   Surface smoothness shall be per Section 5-04.3(13) of the WSDOT/APWA Standard Specifications. The paving shall be corrected by removal and repaving of the trench only.

E. All joints shall be sealed using AR4000W.

F. When trenching within the roadway shoulder(s), the shoulder shall be restored to its original or better condition.

G. The final patch shall be completed as soon as possible and shall be completed within 30 days after first opening the trench. This time frame may be adjusted if delays are due to inclement paving weather, or other adverse conditions that may exist. However, delaying of final patch of overlay work is allowable only subject to the City Engineer's approval. The City may deem it necessary to complete the work within the 30 days' time frame and not allow any time extension. If this occurs, the Contractor shall perform the necessary work as directed by the City Engineer.

2.10.150 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a Professional Engineer or Professional Land Surveyor by the State of Washington.

The minimum staking of streets shall be as directed by the City Engineer or as follows:

A. Stake centerline every 50 feet in tangent sections and 25 feet in curved sections plus grade breaks, PVCs, PVTs, high points and low points, with cut and/or fill to subgrade.

B. Stake top of ballast and top of crushed surfacing at centerline and edge of pavement at the above-described intervals.

C. Stake top back of curb at the above-described intervals with cut or fill to finished grade.

2.10.160 Testing

Testing shall be required at the developers or contractors expense. The testing shall be ordered by the developer or contractor and chosen testing lab shall be approved by the City Engineer. Testing shall be done on all materials and construction as specified in the WSDOT/APWA Standard Specifications. Copies of testing reports shall be provided at no cost to the City Engineer upon request.

In addition, the City Engineer shall be notified before each phase that street construction commences (i.e. staking, grading, subgrade, ballast, base, top course, and surfacing).

2.20 SIDEWALKS, CURBS, AND GUTTERS

2.20.010 Sidewalks

Sidewalks shall be constructed of Concrete Class 3000 4 inches thick. Sidewalks along streets with rolled curb and gutter shall be 6 inches thick. When the sidewalk, curb, and gutter are contiguous, the width of the sidewalk shall be measured from back of curb to back of sidewalk.

A. See "Minimum Street Design Standards Table" Subsection 2.10.030 YDS for sidewalk requirements.

B. In addition to the requirements of the Access Board ADA PROWAG, the design and construction of all sidewalks, curbs, gutters, and walkways shall meet the following minimum standards:

   The width of sidewalks shall be as shown in the street design drawings. Those sidewalks designated in the comprehensive bike plan of the City as bike paths shall, in addition, meet the minimum width requirements established for said bike paths. The City shall require that the design of all sidewalks provides for a gradual rather than an abrupt transition between sidewalks of different widths or alignments.

C. Joints shall be placed at sufficient intervals to control transverse cracking.

D. Monolithic pour of curb and sidewalk will not be allowed.

E. For driveway requirements, see Subsection 2.10.140 YDS.

2.20.020 Curb; Curb and Gutter; Rolled Concrete Curb and Gutter

Cement concrete curb, cement concrete curb and gutter, or rolled concrete curb and gutter (see standard road sections) shall be used for all street edges unless otherwise approved by the City. All curbs, gutters, and rolled concrete curb and gutter shall be constructed of concrete Class 3000 as shown on drawing number 2-13.

Form and subgrade inspection by the City are required before curb and gutter are poured as part of public roadways.

2.20.030 Curb Ramps

In addition to the requirements of the Access Board ADA PROWAG, all sidewalks must be constructed to provide for curb ramps in accordance with the standards of state law.

Curb Ramps shall be constructed of concrete Class 3000. Form and subgrade inspection by the City are required before curb ramp is poured.

2.20.040 Staking

All surveying and staking shall be performed by an engineering, or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a Professional Engineer or Professional Land Surveyor by the State of Washington.

The minimum staking of curb, gutter, and sidewalk shall be as follows:

A. Stake top back of curb every 50 feet in tangent sections and 25 feet in curved sections plus grade breaks, PVCs, PVTs, high point and low points, with cut or fill to finished grade.

B. The developer shall provide additional staking if necessary in order to construct curb, gutter, sidewalk, or other concrete items to minimum standards.

2.30 BIKEWAYS

2.30.010 General

Bikeway or Urban Trail construction is required in conjunction with any new development, redevelopment, or land division approval, when the need for such a bikeway is indicated. See drawing numbers 2-14 and 2-15 for bike routes and classifications.

2.30.020 Design Standards.

The design of bicycle paths shall depend upon their type and usage. Bikeway surfacing shall be as outlined in Subsection 2.10.160 YDS.

All minimum design standards as set forth in Subsection 1.00.010 YDS shall apply.

Normally, bikeways are shared with other transportation modes, although they may be provided exclusively for bicycle use. Bikeways are categorized in the WSDOT Design Manual, Section 1020.02.

Class I, II, III or IV Bikeways, as appropriate, shall be provided:

A. Wherever called for in the Future Bikeways map (drawing number 2-14) located in the back of this Chapter, or

B. When traffic analysis or traffic planning indicates substantial bicycle usage which would benefit from a designated bicycle facility as determined by the City except where noted herein.

2.30.030 Staking and Testing

Staking and testing shall be done in accordance with street staking and testing as outlined in Subsections 2.10.190 and 2.10.200 YDS.

2.40 ILLUMINATION

2.40.010 Design Standards

A street lighting plan submitted by the applicant and approved by the City shall be required for all street light installations. Type of installation shall be as set forth in WSDOT/APWA/IES Standard Specifications, and as directed by the City except where noted herein.

All public street light designs shall be prepared by an engineering firm capable of performing such work. The engineer shall be licensed by the State of Washington. All developments shall submit the lighting plan. Line loss, spacing, and uniformity ratio calculations shall also be submitted. The calculations shall be performed following the methodology outlined in the latest edition of the WSDOT Traffic Manual. After the system is completed and approved, a set of "as built" Record Drawings shall be submitted to the City as a permanent record.

Intersections and cul-de-sacs within new residential developments will be illuminated with one 100-watt LED equivalent lamp mounted on a 30-foot pole. No other illumination is required. Concrete poles may be used inside subdivisions and shall be set plumb and have a consistent mounting height. Intersections with any street designated other than a local access residential will be illuminated according to the requirement of that higher street classification.

Luminaire pole spacing, uniformity ratio, and line loss calculations will be determined by using the following design criteria:

2.40.020 Design Criteria.

AVERAGE MAINTAINED HORIZONTAL ILLUMINATION (FOOT CANDLES)			
AREA CLASS			
Road Class	Residential	Industrial	Commercial
Local	0.4	0.8	1.0
Collector	0.6	1.0	1.2
Arterial	0.8	1.4	1.6
Boulevard	0.8	1.4	1.6
Uniformity ratio: 6:1 average: minimum for local 4:1 average: minimum for collector 3:1 average: minimum for arterial and boulevard			

Dirt Factor (DF)=0.85, Lamp Lumen Depreciation Factor (LF) = 0.73 Maintenance Factor (MF) = DF x LF = 0.62 Lamp Load Factor (LLF) = 1.2 Minimum Weak Point Light = 0.2fc except residential local street Average illumination at intersections 1.5 times the illumination required on the more highly illuminated street except on local access residential streets. Poles shall be located using a "staggered spacing" pattern across the roadway or the "same side of the roadway spacing" pattern.			
Mounting Height:			
Local	30 feet		
Collector	35 feet		
Arterial	40 feet		
Boulevard	40 feet		
Lumens			
400 Watt initial lamp lumens = 50,000			
200 Watt initial lamp lumens = 22,000			
150 Watt initial lamp lumens = 16,000			
100 Watt initial lamp lumens = 9,500			

Line loss calculations shall show that no more than five percent voltage drop occurs in any circuit. Lamps shall be high pressure sodium. Pole foundations shall be installed per WSDOT Standard Plans J-1b.

The pole mast arm shall be designed to place luminaire over the near edge of traveled way. The luminaire mast arm shall be Type I (See WSDOT Standard Plans J-1a) or City approved equal. Poles shall be manufactured by one of the following companies: General Electric, Lexington, HapCo, or Valmont.

All luminaires will be flat lens, medium cut off, IES Type III distribution, General Electric Power Door, or City approved equal.

All street light electrical installations including wiring conduit, and power connections shall be located underground.

The General Notes on the following page need to be included on any plans dealing with street light design in addition to all applicable requirements as set forth in Subsection 1.00.010.

GENERAL NOTES (STREET LIGHT CONSTRUCTION)

1. All workmanship, materials, and testing shall be in accordance with the most current Washington State Department of Transportation/American Public Work Association Standard Specifications for Road, Bridge, and Municipal Construction, National Electrical Code, and City of Yelm Engineering Specifications and Standard Details unless otherwise specified below. In cases of conflict the most stringent guideline shall apply. When the most stringent guideline is not clear, the City will make the determination. The Electrical Contractor shall be familiar with all above stated publications and guidelines as they will be strictly enforced by the City.

2. All safety standards and requirements shall be complied with as set forth by the State of Washington, Department of Labor and Industries.

3. The contractor shall be responsible for all traffic control in accordance with the Manual on Uniform Traffic Control Devices. Prior to disruption of any traffic, traffic control plans shall be prepared and submitted to the City for approval. No work shall commence until all approved traffic control is in place.

4. A pre-construction meeting shall be held with the City and Electrical Inspectors prior to the start of construction.

5. All approvals and permits required by the City shall be obtained by the contractor prior to the start of construction.

6. It shall be the responsibility of the contractor to have a copy of an approved set of plans on the construction site at all times.

7. All surveying and staking shall be done by a surveying or engineering firm licensed in the State of Washington.

8. Temporary erosion control/water pollution measures shall be required in accordance with section 1-07.15 of the WSDOT/APWA Standard Specifications and the Drainage Design and Erosion Control Manual for Thurston Region Washington. At no time will silts and debris be allowed to drain into an existing or newly installed facility.

9. If construction is to take place in the County Right-of-Way, the contractor shall notify the County and obtain all the required approvals and permits.

10. The contractor shall be fully responsible for the location and protection of all existing utilities. The contractor shall verify all utility

locations prior to construction by calling the Underground Locate Line at 1-800-424-5555 a minimum of 48 hours prior to any excavation. The contractor will also be responsible for maintaining all locate marks once the utilities have been located.

11. Electrical permits and inspections are required for all street lighting installations within the City. The Contractor is responsible for obtaining said permits prior to any type of actual construction. These permits are available through Washington State Labor and Industries.

12. Prior to installation of any materials the Electrical Contractor shall submit for approval by the City two copies of material catalog cuts, specifications, shop drawings and/or wiring diagrams. Any materials purchased or labor performed prior to such approval shall be at the Contractor's risk. Mounting heights, arm length, power source, luminaire type and bolt patterns shall follow Subsection 2.40.020 YDS. Modifications of any portion of the lighting system will not be allowed without prior approval by the City.

13. A rated Service Disconnect shall be provided for every branch circuit. Light branch circuit breakers shall be 40-amp minimum. The location and installation of the disconnect shall conform to the National Electric Code (NEC) and City of Yelm Standards. The Service Disconnect shall be of a type equal to a "MYERS" MEUGL-M100C-UM or a "UNICORN" CPIIIB-0111A Service, 120/240 VAC, CALTRANS TYPE 3B or City approved equal, with two lighting relays, one three position test switch (Auto/Off/Manual) and one photocell. The photocell shall face north unless otherwise directed by the City.

14. Service Entrance Conductors shall be a minimum size of #6 copper. All lighting wire shall be stranded copper with a minimum size of #8 with insulation suitable for wet locations. Phasing Tape will not be allowed. All wire shall be installed in schedule 40 PVC conduit with a minimum diameter of 1-1/4 inches. All conduit shall be installed in the "Utility Ditch" or as otherwise directed by the City. A bushing or bell end shall be used at the end of every conduit. All splices shall be in the nearest junction box. Wire nuts will not be allowed. All splices will be made with Type C copper fittings, centered and encased in a 3-M Scotchcast epoxy kit, rated at 600 Volts, type 82-A1, 82-B1 or City approved equal. If more than one circuit passes through a Junction Box each is to have a PCV sleeve clearly identifying the circuit. (WSDOT Standard Specification 8-20.3). A 500-volt megger test will be performed by the City on each circuit between conductor and ground prior to acceptance of the lighting system. The insulation resistance shall not be less than 6 megaohms to ground 2,500 feet and over nor less than 8 megaohms under 2,500 feet. A functional test will be performed

by the City, in which it is demonstrated that each and every part of the system functions as specified or intended herein. (WSDOT Standard Specifications 8-20.3(11).

15. Each luminaire pole shall have an in-line, fused, water tight electrical disconnect located at the base of the pole. Access to these fused disconnects shall be through the hand-hole on the pole. The hand-hole shall be facing away from on-coming traffic. Load side of in-line fuse to luminaire head shall be cable and pole bracket wire, 2 conductor, 19 strand copper #10 and shall be supported at the end of the luminaire arm by an approved means. Fuse size, disconnect installation and grounding in pole shall conform to WSDOT Standards.

16. City approved pull boxes or junction boxes shall be installed per WSDOT Standard Plan J-11a in all street lighting installations. Junction Boxes shall be incorporated into the back edge of sidewalk or as directed by City. A Junction Box shall be located within 10 feet of each luminaire pole and at every road crossing. No conduit shall be installed in the roadway except at designated road crossings. Conduit entering the Junction Box shall be perpendicular to the sides of the box and a minimum of 6 but no more than 8 inches below the lid. Boxes shall be clearly and indelibly marked as Lighting Boxes by the legend "L.T." or "LIGHTING". All J-Boxes shall be supported by a minimum 6-inch crushed gravel pad. A 3/8 inch expansion joint shall be installed between concrete sidewalk and Junction Box.

17. All lighting poles shall be as specified in Subsection 2.40.020 YDS. In existing developed areas, the City may require the use of other poles to establish uniformity within the developed area. After installation and before acceptance by the City all poles shall be free of dents and marks. Sonotube shall be removed to below ground level. Pole bases shall be grouted and all luminaire heads shall be plumb and level.

18. Cement concrete bases shall follow WSDOT Standard Plan J-1b. Conduit shall extend between 3 and 6 inches above the concrete base.

19. Any modification to approved lighting plans shall be reviewed and approved by the City prior to installation. Any approved modifications shall be shown on a Mylar asbuilt supplied to the City after the lighting installation is completed and before final acceptance. It shall be the responsibility of the Electrical Contractor to ensure these as-builts are provided to the City.

2.40.030 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or

surveyor directing such work shall be licensed by the State of Washington.

The minimum staking of luminaires shall be as follows:

A. Location and elevation to the center of every pole base.

B. Location and elevation of each service disconnect.

2.40.040 Testing

All illumination systems shall be subject to an electrical inspection which shall include megger testing and functional test. Lamp, photocell and fixture shall be under warranty for a period of one year.

2.50SIGNALS

2.50.010 General

Signals shall be installed per the requirements set forth herein. This work shall consist of furnishing and installing a complete and functional traffic control system of controllers, signals and appurtenances as required by the City.

2.50.020 Design Standards.

Signal systems shall be designed in accordance with the specifications as set forth in the WSDOT Design Manual and the WSDOT/APWA Standard Specifications unless otherwise authorized by the City.

All public signal designs shall be prepared by an engineering firm capable of performing such work. The engineer shall be licensed by the State of Washington. All applicable requirements set forth in Subsection 1.00.010 shall be included.

2.50.030 Induction Loops.

Induction loops shall be constructed per WSDOT/APWA Standard Specification 8-20.3(14)C and Standard Plan J-8a.

2.50.040 Staking.

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed by the State of Washington.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

The minimum staking of signals shall be as follows:

A. Location, with cut or fill to center of all pole bases.

B. Location of junction box.

C. Location of all corners of controller base.

D. Location of service disconnect.

2.50.050 Testing.

All signals shall be subject to any necessary electrical inspections as well as requirements as set forth in the WSDOT Design manual and the WSDOT/APWA Standard Specifications.

A signal system shall not be approved or accepted by the City until the signal has performed correctly to the City's satisfaction for a 30 day "check-out" period as outlined below.

Controller and cabinet shall be tested by WSDOT’s Laboratory in Tumwater and/or the City. All specifications and material samples shall be submitted to the City for review and approval prior to installation.

2.50.060 Check-out Procedure

The contractor shall call for an intersection check-out after completing the controller cabinet installation along with all other signal equipment complete with wiring connections. All parts and workmanship shall be warranted for one year from date of acceptance.

New signals shall operate without any type of failure for a period of 30 days. The contractor shall have a person available to respond to system failure within 24 hours during the 30-day "check-out" period.

Failure of any control equipment or hardware within the "check-out" period shall restart the 30-day "check-out" period.

2.60 ROADSIDE FEATURES

2.60.010 General

Miscellaneous features included herein shall be developed and constructed to encourage the uniform development and use of roadside features wherever possible.

2.60.020 Design Standards.

The design and placement of roadside features included herein shall adhere to the specific requirements as listed for each feature, and, when applicable, to the appropriate standards as set forth in Subsection 1.00.010.

2.60.030 Staking.

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a Professional Engineer or Professional Land Surveyor by the State of Washington.

2.60.040 Testing.

Testing shall be required at the developer's or contractor's expense on all materials and construction as specified in the WSDOT/APWA Standard Specifications and with a frequency as specified in the WSDOT Construction Manual.

2.60.050 Survey Monuments.

A. All existing survey control monuments that will be disturbed, covered or destroyed during construction shall be referenced prior to construction and replaced or raised after construction by a Professional Land Surveyor licensed by the State of Washington. All applicable RCWs and WACs will be complied with, including but not limited to, WAC 332-120, WAC 332-130, and RCW 58.09. The monuments shall be replaced with a cast in place monument (drawing number 2-16) at the expense of the responsible builder or developer.

B. Major Arterial, Minor Arterial, Bus Routes, and Truck Routes require a pre-cast concrete monument (Standard Plan H-7a) with cast iron monument case and cover (Standard Plan H-7) installed per WSDOT standards is required.

C. Commercial Collector, Neighborhood Collector, and Local streets require a poured-in-place concrete surface monument (see drawing number 2-16) per City standards is required.

D. Monument Locations. Appropriate monuments as outlined in B or C above shall be:

1. At all street intersections;
2. At the PC and PTs of all horizontal curves or at the PI if it lies in the traveled roadway;

E. The monument case shall be installed after the final course of surfacing has been placed.

2.60.060 Guard Rails

For purposes of design and location, all guardrails along roadways shall conform to the criteria of the WSDOT Design Manual as may be amended or revised.

2.60.070 Retaining Walls

A. Rock walls may be used for erosion protection of cut or fill embankments up to a maximum height of 8 feet in stable soil conditions which will result in no significant foundation settlement or outward thrust upon the walls. All retaining walls with heights over 6 feet or when soil is unstable, a structural wall of acceptable design stamped by a licensed structural engineer shall be used. Rock walls over 6 feet high shall be subject to inspection by a geotechnical engineer as outlined in the following paragraph.

Any rock wall over 30 inches high in a fill section shall require an engineered design by a geotechnical engineer. The geotechnical engineer shall continuously inspect the installation of the wall as it progresses and shall submit inspection reports, including compaction test results and photographs taken during the construction, documenting the techniques used and the degree of conformance to the structural engineer's design.

In the absence of such a rock wall design, walls having heights over 6 feet or walls to be constructed in conditions when soil is unstable require a structural wall having a design approved by the City if outside the Right-of-Way. The design of structural walls shall be by a structural engineer qualified in retaining wall design. Structural walls require issuance of a Building Permit prior to construction.

B. The rock material shall be as nearly rectangular as possible. No stone shall be used which does not extend through the wall. The rock material shall be hard, sound, durable and free from weathered portions, seams, cracks and other defects. The rock density shall be a minimum of 160 pounds per cubic foot.

C. The rock wall shall be started by excavating a trench having a depth below subgrade of one half the base course or one foot (whichever is greater).

D. Rock selection and placement shall be such that there will be minimum voids and, in the exposed face, no open voids over 6 inches across in any direction. The final course shall have a continuous appearance and shall be placed to minimize erosion of the backfill material. The larger rocks shall be placed at the base of the rockery so that the wall will be stable. The rocks shall be placed in a manner such that the longitudinal axis of the rock shall be perpendicular to the rockery face. The rocks shall have all inclining faces sloping to the back of the rockery. Each course of rocks shall be seated as tightly and evenly as possible on the course beneath. After setting each course of rock, all voids between the rocks shall be chinked on the back with quarry rock to eliminate any void sufficient to pass a 2-inch square probe.

E. The wall backfill gravel shall consist of quarry spalls with a maximum size of 6 inches and a minimum size of 4 inches or as specified by a licensed engineer. This material shall be placed to a 12 inch minimum thickness between the entire wall and the cut or fill material. The backfill material shall be placed in lifts to an elevation approximately 6 inches below the top of each course of rocks as they are placed, until the uppermost course is placed. Any backfill material on the bearing surface of one rock course shall be removed before setting the next course.

F. Perforated drainage pipe and filter fabric shall be installed as per drawing number 2-18. This pipe requirement may be waived by the Engineer upon a showing by the developer that no subsurface water problem exists.

2.60.080 Parking Lots

Standards for Parking Lot Construction.

A. Materials and Workmanship. Materials and workmanship for all parking lot construction, regardless if a parking lot construction permit is required, must comply with City adopted standards and specifications. 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. Gravel surfaces are not acceptable or approved surface material types. Combination grass/paving systems are approved materials types, however, their use requires submittal of an overall parking lot paving plan

showing the limits of the grass/paving system sand a description of how the systems will be irrigated and maintained. If the City Engineer determines the grass/paving system is not appropriate for the specific application, alternate approved surfacing materials shall be utilized.

B. Other types of surfacing materials will be considered subject to the approval of the City Engineer prior to construction.

C. Non-Compliance--Removal--Lien. In the event that the construction covered under this section is not performed in accordance with the established specifications and the construction is not corrected as directed by the City Engineer, such construction may be removed and/or corrected by the City. Upon the failure of the owner to take such corrective steps as outlined within thirty days if notice in writing by the City Engineer, costs of such removal and/or correction or reconstruction as performed by the City shall be charged to the owner of the real property involved and shall become a lien against the premises until paid.

D. Parking area construction shall include:

1. Surfacing. All parking areas shall be surfaced with asphalt, concrete or similar pavement so as to provide a permanent all-weather surface that is durable and dust-free and shall be so graded and drained as to properly dispose of all surface water. Gravel surfaces are not acceptable or approved surface material.

2. Subgrade Preparation. The subgrade shall be prepared for surfacing following the requirements outlined in Section 2-06 of the WSDOT Standard Specifications. Erosion/sedimentation control facilities shall be provided.

3. Stormwater Runoff. All stormwater runoff shall be retained and disposed of on site or disposed of in a system designed for such runoff and which does not flood or damage adjacent properties.

4. Stall Markings. Asphalt or concrete surfaced parking areas shall have parking stalls marked by surface paint lines or suitable substitute traffic marking material. Painted stall markings need not extend the full depth of the stall. If less than the full depth of the stall is painted, the combined stall depths and aisle width shall not be less than the appropriate unit parking depth. Wheel stops are required where a situation exists whereby a parked vehicle would encroach on an adjacent property or Right-of-Way or to protect landscaping. See drawing number 2-24 for approved stall markings and wheel stop locations.

E. No certificate of occupancy shall be issued until all parking facilities are completed and approved unless otherwise allowed by the Director of Public Services.

TRANSPORTATION - LIST OF DRAWINGS