

CHAPTER 2 TRANSPORTATION

Table of Contents

TRANSPORTATION	5
2A GENERAL	5
2A.01 General	5
2A.02 Definitions.....	5
2B STREETS	6
2B.01 General	6
2B.02 Design Criteria	6
2B.03 Naming.....	9
2B.04 Signing and Striping.....	9
2B.05 Right-of-Way.....	10
2B.06 Private Streets	10
2B.07 Street Frontage Improvements	11
2B.08 Cul-de-sac.....	11
2B.09 Half-Street	11
2B.10 Medians	12
2B.11 Intersections.....	12
2B.12 Driveways	13
2B.13 Sight Obstruction.....	15
2B.14 Surfacing Requirements	15
2B.15 Temporary Street Patching.....	16
2B.16 Pavement Restoration.....	16
2C SIDEWALKS, CURBS AND GUTTERS	20
2C.01 General.....	20
2C.02 General Design Criteria	20
2C.03 Staking.....	21
2C.04 Testing.....	21

2D ILLUMINATION	22
2D.01 General.....	22
2D.02 Design Criteria.....	22
2D.03 Staking.....	24
2D.04 Testing.....	24
2E SIGNALS	24
2E.01 General	24
2E.02 Design Criteria	25
2E.03 Induction Loops	25
2E.04 Controller	25
2E.05 Staking.....	25
2E.06 Testing	26
2E.07 Check-Out Procedure.....	26
2F ROADSIDE FEATURES	26
2F.01 General	26
2F.02 Design Criteria	26
2F.03 Staking.....	27
2F.04 Testing	27
2F.05 Survey Monuments	27
2F.06 Bus Pullouts and Shelters.....	28
2F.07 Mailboxes.....	30
2F.08 Guard Rails	31
2F.09 Retaining Walls.....	31
2F.10 Street Trees.....	32
2F.11 Parking Lots	33
2G TRAFFIC IMPACT ANALYSIS	33
2G.01 General.....	33
2G.02 When Required	33
2G.03 Qualifications For Preparing TIA Documents.....	34
2G.04 References	34

2G.05 Scope of Work..... 35
2G.06 Existing Conditions 35
2G.07 Development Traffic 36
2G.08 Future Traffic 36
2G.09 Traffic Operations 37
2G.10 Mitigation..... 38
2G.11 Mitigation Fee Calculation..... 39

Table of Drawings

- 2-1 Sight Obstruction
- 2-2 Trench Pavement Restoration Detail
- 2-3 Pavement Restoration
- 2-4 Concrete Pavement Patch
- 2-5 Cement Concrete Curb & Gutter
- 2-6 Type 1 and Type 2 Cement Concrete Driveway
- 2-7 Sidewalk
- 2-8 Sidewalk Panel Spacing
- 2-9 Type I Curb Ramps
- 2-10 Type II Curb Ramps
- 2-11 Type III Curb Ramps
- 2-12 Type IV Curb Ramps
- 2-13 Minimum Paving Section
- 2-14 Typical Sections
 - a. Boulevard
 - b. Arterial – No Center Left Turn Lane
 - c. Arterial – With Center Left Turn Lane
 - d. Minor Arterial – 3-Lane Section with Left Turn Lane
 - e. Commercial Collector
 - f. Neighborhood Collector – Parking One Sides
 - g. Neighborhood Collector – Parking Both Sides
 - h. Local Access – No Parking
 - i. Local Access – Parking One Side
 - j. Private Road
- 2-15 Luminary Foundation
- 2-16 Mail Box Cluster
- 2-17 Striping Detail
- 2-18 Surface Monument/Monument Replacement Detail
- 2-19 Monument Case Installation
- 2-20 Pre-cast Concrete Monument
- 2-21 Bollard Detail

TRANSPORTATION

2A GENERAL

2A.01 General

- A. This chapter provides minimum Design Guidelines to encourage uniform development of an integrated, fully accessible public transportation system that will facilitate present and future travel demands with minimal environmental impact to the community as a whole.

2A.02 Definitions

- A. **Average Daily Traffic (ADT)** - The average number of vehicles passing a specified point during a 24-hour period.
- B. **Cul-De-Sac** – A street with a single common ingress and egress and with a circular turnaround at the end.
- C. **Half-Street** – A street constructed along an edge of development utilizing half the regular width of the right-of-way serving as an interim facility pending construction of the other half of the street by the adjacent owner.
- D. **Private Street** – A privately owned and maintained vehicular access tract serving private property.
- E. **Street or Road** – A public right-of-way, usually containing improved facilities for transportation and utilities. Definitions of Street Classifications are as follows:
1. **Boulevard** – A multi-lane thoroughfare separated by one or more medians. Boulevards provide distinct separation between slower traffic/parking activity and through traffic. Boulevards can serve a variety of land uses.
 2. **Commercial Collector** – A street that provides a connection between an arterial street and concentrated industrial and/or commercial land uses. The amount of through traffic is less than that of an arterial, and there is more accessibility to abutting land uses.
 3. **Local Access** – A street that provides access to abutting land uses and serves to carry local traffic to a collector.
 4. **Major Arterial** – A street that provides an efficient direct route for long distance travel within the region and different parts of the City. A street connecting freeway interchanges to commercial concentrations is classified as a major arterial. Traffic on major arterials is given preference at intersections, and some

access control may be considered in order to maintain capacity to carry high volumes of traffic.

5. **Minor Arterial** – A street that provides an efficient direct route for trips of moderate length at a somewhat lower level of travel mobility than major arterials. A street that augments and interconnects with major arterials is classified as a minor arterial. More emphasis is placed on land access for minor arterials as opposed to major arterials.

6. **Neighborhood Collector** – A street that distributes and collects traffic within a neighborhood and provides a connection to an arterial or other collector. Neighborhood collectors serve local traffic, provide access to abutting land uses, and do not carry through traffic. Their design is compatible with residential neighborhood centers.

F. **Traffic Impact Analysis (TIA)** – A report analyzing anticipated roadway conditions with and without proposed development, including an analysis of mitigation measures and a calculation of fair share financial contributions.

2B STREETS

2B.01 General

A. City streets are classified as arterials, collectors and local access streets in accordance with regional transportation needs and the functional use each serves. Function is the controlling element for classification and shall govern right-of-way, street width, and street geometries. The City will determine the classification of new & existing streets.

B. The layout of streets shall provide for the continuation of existing principal streets in adjoining subdivisions or of their proper projection when adjoining property is not subdivided. Minor streets, which serve primarily to provide access to abutting property, shall be designed to discourage through traffic. A traffic impact analysis may indicate that other design configurations would be preferable for a given project. Such alternatives may be required by the City if it is determined that strict compliance with the Design Guidelines are impractical or unreasonable in the circumstance.

2B.02 Design Criteria

A. 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. See Table 2-1, Minimum Street Design Criteria.

- B. The layout of streets will provide for the continuation of existing principal streets in adjoining subdivisions or of their proper projection when adjoining property is not subdivided. Minor streets, which serve primarily to provide access to abutting property, will be designed to discourage through traffic. See Table 2-1, Minimum Street Design Criteria.

**Table 2-1
City of Vader
Minimum Street Design Criteria**

DESIGN STANDARD	BOULEVARD	MAJOR OR MINOR ARTERIAL	COMMERCIAL COLLECTOR	NEIGHBORHOOD COLLECTOR	LOCAL ACCESS	PRIVATE
DESIGN LIMITATIONS	Access and intersections should be limited. No on-street parking.			N/A	N/A	N/A
MINIMAL STRUCTURAL DESIGN	See Standard Detail Number 2-13					
STANDARD RIGHT-OF-WAY	100' ¹	100' ^{1,6}	60' ¹	60' ²	60' ²	N/A
STANDARD PAVEMENT WIDTH	66' (may have a 14' median)	50' - 64'	40'	32' - 40'	28'-32'	20'
PARKING LANE	None Allowed	None Allowed	8' Both Sides ³	8' ₃	8'	N/A
MINIMUM/MAXIMUM GRADE	0.5% - 10.0%	05% - 10.0%	0.5% - 12.0%	0.5% - 15.0%	0.5% - 15.0%	0.5% - 15.0%
CURB & GUTTER	Both Sides					N/A
SIDEWALKS	Both Sides 6' (min)			Both Sides 5'	Both Sides 5'	One Side 5' ⁵
CUL-DE-SAC RADIUS (PAVEMENT WIDTH)	N/A	N/A	50'	50'	50'	Fire Department Standards
INTERSECTION CURB RADIUS	35'	35'	35'	25'	25'	25'
DESIGN SPEED (MPH)	40	40	35	30	25	N/A
MINIMUM CENTERLINE RADIUS	600'	600'	150'	150'	100'	N/A
STANDARD DETAIL	2-14.a	2-14.b 2-14.c	2-14.d	2-14.e 2-14.f	2-14.g 2-14.h	2-14.i

1. 10-foot utility easement abutting Right-of-Way on both sides.
2. 7-foot utility easement abutting Right-of-Way on both sides.
3. Parking one or both sides may be allowed.
4. Variation from minimum standards requires written approval from the City for proposed mitigation.
5. Curb w/ gutter and sidewalk for private roads encouraged.
6. Right-of-Way for SR-506 varies from 90- to 120-feet; see SR-506 Typical Section for detail.

- C. Alignment. Alignment of major arterials, minor arterials and collectors shall conform as nearly as possible with that shown in the Comprehensive Plan.
- D. Grade. Street grade should conform closely to the natural contour of the land. In some cases the City may require a different grade. The minimum allowable grade shall be 0.5 percent. The maximum allowable grade shall be 8 – 15 percent depending on the street classification.
- E. Width. The pavement and right-of-way width shall depend on the street classification. Table 2-I, Minimum Street Design Criteria, shows the minimum widths allowed.

2B.03 Naming

- A. Street Names. Street names shall be designated according to approval from the City. The Developer must check with the Community Development Coordinator regarding the naming of streets. This should be done at the time the preliminary plat is submitted and again upon approval of the final plat. This will ensure that the name assigned to a new street is consistent with City policy.
- B. Addresses. An address number will be assigned to all new buildings at the time a building permit is issued. It is then the development permit holder's responsibility to make sure that the numbers are placed clearly and visibly at the main entrance to the property or at the principal place of ingress.

2B.04 Signing and Striping

- A. Street signs are defined as any regulatory, warning, or guide signs. The Developer is responsible for the cost of all street signs. Street signs shall comply with the latest edition of the U.S. Department of Transportation Manual on Uniform Traffic Control Devices (MUTCD).
- B. Pavement markings and street signs, including poles and hardware, shall be paid for, furnished and installed by the Developer under the City's direction, to establish and maintain uniformity. Should the work be performed by the City, the Developer must first submit a written request to the City and, the Developer will then be billed upon completion of the work.
- C. Standards for Sign Post Material:
 - 1. Post - 2"x length x 14 gauge perforated square tube
 - 2. Anchor - 2 ¼" x 36" x 12 gauge
 - 3. Sleeve - 2 ½" x 12" x 12 gauge

4. Corner Bolt with 2 bends and nut
5. Aluminum Drive Rivets – 3/8” for mounting signs

D. Criteria for Pavement Markings

1. Legends, arrows, symbols and crosswalks must be heat fused preformed thermoplastic Hot Tape or Premark.

E. Striping Material:

1. Arterial Streets – Dura-Stripe
2. Collector Streets – paint

2B.05 Right-of-Way

- A. Right-of-way width is determined by the functional classification of a street. Refer to Table 2-1, Minimum Street Design Criteria.
- B. Right-of-way requirements may be increased if a traffic impact analysis indicates that additional lanes, pockets, transit lanes, bus loading zones, operational speed, bike lanes, utilities, or other such improvements are required.
- C. Right-of-way shall be conveyed to the City on a recorded plat or by a right-of-way dedication deed.

2B.06 Private Streets

- A. Private streets may be allowed under the following conditions:
 1. Permanently established by tract or by lot providing legal access to serve not more than four dwelling units or businesses on separate parcels, or unlimited dwelling units or businesses situated on a single parcel and sufficient to accommodate required improvements, to include provisions for future use by adjacent property owners when applicable;
 2. Have a minimum 20-foot paved surface, and a sidewalk five (5) feet in width of such a design that prevents parking on the sidewalk;
 3. Accessible at all times for emergency and public service vehicle use;
 4. Will not result in the land-locking of present or future parcels nor obstruct public street circulation; and

5. Covenants have been approved, recorded, and verified with the City that provide for maintenance of the private streets and associated parking areas by the owner or homeowners association or other legal entity.

- B. Private Street Conversion. Conversion of a private street to a public street will be considered only if provision is made for the street(s) to meet all applicable public street standards, including right-of-way widths.

2B.07 Street Frontage Improvements

- A. All commercial and residential (including multi-family) development, plats, and short plats require street frontage improvements. Such improvements may include curb and gutter; sidewalk; street storm drainage; street lighting system; traffic signal modification, relocation or installation; utility relocation; landscaping and irrigation; and street widening per these guidelines. Plans shall be prepared and signed by a licensed civil engineer registered in the State of Washington.
- B. All frontage improvements shall be made across full frontage of property and on all sides that may border a City right-of-way.
- C. Exceptions. See Chapter 1 “Exceptions”.

2B.08 Cul-de-sac

- A. Streets designed to have one end permanently closed shall be no longer than 650-feet. At the closed end, there shall be a widened “bulb” having a minimum paved traveled radius as shown in Table 2-1, Minimum Street Design Criteria.

2B.09 Half-Street

- A. A half-street is an otherwise acceptable roadway section modified to conform to limited right-of-way on the boundary of property subject to development. A half-street, may be approved by the City when all of the following conditions are met:
 1. There is reasonable assurance of obtaining the prescribed additional right-of-way from the adjoining property suitable for completion of a full-section roadway; and
 2. Such alignment is consistent with or will establish a reasonable circulation pattern; and
 3. The right-of-way width of the half-street will equal at least 30-feet or 50 percent of the required right-of-way (whichever is greater); and
 4. The traveled way shall be surfaced the same as the designated street classification to a width not less than 24-feet; and

5. The half-street shall be graded consistent with the centerline of the ultimate roadway section along the property line; and
6. Property line edge of street shall be finished with permanent curb and gutter to insure proper drainage, bank stability and traffic safety; and
7. Required Frontage Improvements shall be installed in conjunction with the half-street.

2B.10 Medians

- A. A median shall be in addition to, not part of, the specified roadway width except on a road classified as a Boulevard. Medians shall be designed so as not to limit turning radius or sight distance at intersections.

2B.11 Intersections

- A. Traffic control shall be as specified in the most recent edition of the MUTCD or as modified by the City as a result of appropriate traffic engineering studies.
- B. Street intersections shall be laid out to intersect as nearly as possible at right angles. The angle of the intersection shall be between 75 degrees and 105 degrees. The preferred angle is 90 degrees. For safe design, the following types of intersection features should be avoided:
 1. Intersections with more than four intersecting streets;
 2. "Y" type intersections where streets meet at acute angles;
 3. Intersections adjacent to bridges and other sight obstructions;
 4. Offset intersections that are not conducive to side traffic flow.
- C. Spacing between adjacent intersecting streets should be as follows:

When highest classification involved is:	Minimum centerline offset should be:
Major Arterial	350 feet
Minor Arterial	300 feet
Commercial Collector	250 feet
Neighborhood Collector	250 feet
Local Access	200 feet

When different classes of streets intersect, the higher standard shall apply on curb radii.

2B.12 Driveways

- A. All driveways shall be constructed of Portland Cement Concrete (PCC) or hot-mix asphalt (HMA) from the right-of-way line to the edge of the street. Residential PCC driveways shall have a nominal concrete thickness of six (6) inches. All other PCC approaches shall be eight (8) inches thick.
- B. Joint-use driveways serving two adjacent parcels may be built on their common boundary with a formal written agreement between both property owners and with the approval of the City. The agreement shall be a recorded easement for both parcels of land specifying joint usage and maintenance responsibility.
- C. No commercial driveway shall be approved where backing onto the sidewalk or street would occur.
- D. No driveway shall be built within twenty (20) feet of the end of any curb return or within five (5) feet of any property line.
- E. The maximum driveway width for a single driveway onto an arterial or collector shall be:

<u>Frontage Width</u>	<u>Residential</u>	<u>Commercial</u>	<u>Industrial</u>
Up to 50-feet	24-feet	24-feet	30-feet
50- to 75-feet	24-feet	30-feet	40-feet
More than 75-feet	24-feet	30-feet	40-feet

- F. The maximum driveway width for each of two driveways onto an arterial or collector shall be:

<u>Frontage Width</u>	<u>Residential</u>	<u>Commercial</u>	<u>Industrial</u>
Up to 50-feet	Not permitted	Not permitted	Not permitted
50- to 75-feet	Not permitted	15-feet	20-feet
More than 75-feet	20-feet	24-feet	40-feet

- G. The maximum driveway width for a single driveway onto a local access street shall be:

<u>Frontage Width</u>	<u>Residential</u>	<u>Commercial</u>	<u>Industrial</u>
Up to 50-feet	24-feet	24-feet	Not permitted
50- to 75-feet	24-feet	26-feet	Not Permitted
More than 75-feet	24-feet	26-feet	Not Permitted

H. The maximum driveway width for each of two driveways onto a local access street shall be:

<u>Frontage Width</u>	<u>Residential</u>	<u>Commercial</u>	<u>Industrial</u>
Up to 50-feet	Not permitted	Not permitted	Not permitted
50- to 75-feet	20-feet	20-feet	Not permitted
More than 75-feet	20-feet	24-feet	Not permitted

I. The maximum driveway width for one-way driveways shall be:

<u>Frontage Width</u>	<u>Residential</u>	<u>Commercial</u>	<u>Industrial</u>
Up to 50-feet	14-feet	22-feet	30-feet
50- to 75-feet	14-feet	22-feet	30-feet
More than 75-feet	14-feet	22-feet	30-feet

J. A road approach or wider driveway may be approved by the City when a substantial percentage of oversized vehicle traffic exists, when divisional islands are desired, or when multiple exit or entrance lanes are needed.

K. Arterial Street Access. Driveways on arterial streets shall conform to the following:

1. No driveway may access an arterial street within seventy-five (75) feet (measured along the arterial) of any other such access to the street: on either side of the travel way but may be allowed at locations directly opposite another point of access.
2. No driveway access will be allowed to an arterial street within 150-feet of the nearest right-of-way line of an intersecting street.
3. Within the limitations set forth above, access to arterial streets within the City shall be limited to one driveway for each tract of property separately owned. Properties contiguous to each other and owned by the same person are considered to be one tract.
4. Driveways giving direct access onto arterials may be denied if alternate access is available. The City may permit deviations from this requirement if sufficient justification is provided.
5. Road approaches and/or ingress and egress tapers may be required in industrial and commercially zoned areas as directed by the City. Tapers shall be designed, per the most recent editions of the Washington State Department of Transportation (WSDOT) Highway Design Manual and/or “A Policy on Geometric Design of Highways and Streets” published by the American Association of State Highways and Transportation Officials (AASHTO).

2B.13 Sight Obstruction

- A. Sight clearance requirements take into account the proportional relationship between speed and stopping distance. The sight distance area is a clear-view triangle formed on all intersections by extending two lines of specified length, from the center of the intersecting streets along the centerlines of both streets and connecting those endpoints to form the hypotenuse of the triangle. Refer to Standard Details. The area within the triangle shall be subject to said restrictions to maintain a clear view on the intersection approaches.
1. Stop or Yield Controlled Intersection. Providing adequate sight distance from a street or driveway is one of the most important considerations to ensure safe-street and driveway operation. The Intersection Sight Distance criteria given in "*A Policy on Geometric Design of Highways and Streets*" published by AASHTO..
 2. Other factors such as vertical and horizontal curves and roadway grades also need to be taken into account. Such factors can require necessary modification to the intersection sight distance given in the above table.
 3. Sight distance is measured from a point on the minor road or driveway fifteen (15) feet from the edge (extended) of the major road pavement (or nearest traffic lane if parking is permitted) and from a height of 3.50 feet on the minor road to a height of object of 4.25 feet on the major road.
- B. Uncontrolled Intersection. Refer to AASHTO for criteria on Uncontrolled Intersection Design.
- C. Vertical Clearance. The area within the sight distance triangle shall be free from obstructions to a motor vehicle operator's view between a height of two and one-half (2.5) feet and ten (10) feet above the existing surface of the street.
- D. Exclusions. Sight obstructions that may be excluded from these requirements include; fences in conformance with this chapter, utility poles, regulatory signs, trees trimmed from the base to a height of ten (10) feet above the street, places where the contour of the ground is such that there can be no cross visibility at the intersection, saplings or plant species of open growth habits and not in the form of a hedge that are so planted and trimmed as to leave a clear and unobstructed cross view during all seasons, buildings constructed in conformance with the provisions of appropriate zoning regulations and pre-existing buildings.

2B.14 Surfacing Requirements

- A. Asphalt Pavements. The pavement sections shown in the Standard Drawings are minimum street sections. A geotechnical report may be required as directed by the City. One soil sample per each 500 LF of centerline, with a minimum of three (3) per project, representative of the roadway subgrade, shall be provided to determine a

statistical representation of the existing soil conditions performed by a professional engineer or geologist licensed by the State of Washington.

B. Sidewalks

1. Surfacing: four (4) inches Commercial Grade Concrete (3,000 psi);
2. Base: three (3) inches Crushed Surfacing Top Course.
3. Asphalt sidewalks will not be permitted unless otherwise approved by the City.

C. Concrete Driveway

1. Surfacing: six (6) inches Commercial Grade Concrete (3,000 psi) for residential, eight (8) inches Commercial Grade Concrete (3,000 psi) for all others;
2. Base: three (3) inches Crushed Surfacing Top Course.

D. Asphalt Driveway

1. Surfacing: three (3) inches Class B Hot Mix Asphalt (HMA) for residential, six (6) inches Class B Hot Mix Asphalt (HMA) for all others;
2. Base: four (4) inches crushed surfacing top coarse.

2B.15 Temporary Street Patching

- A. Temporary restoration of trenches shall be accomplished by using two (2) inches Class B HMA (when available) or two (2) inches medium-curing (MC-250) Liquid Asphalt (cold mix), two (2) inches Asphalt Treated Base (ATB), or steel plates.
- B. ATB used for temporary restoration may be placed directly into the trench, bladed and rolled. After rolling, the trench must be filled flush with HMA pavement to provide a smooth riding surface. Prior to beginning street trenching work, the Contractor shall ensure that all necessary material for temporary patching is stockpiled at the project site, both for completing and maintaining the patch.
- C. The Contractor shall maintain all temporary patches until such time as the permanent pavement patch is in place. Patches not properly maintained by the Contractor shall be repaired by the City at the Developer's, Contractor's and/or private utility's expense.

2B.16 Pavement Restoration

- A. Trench cuts in roadways greatly degrade the condition of the pavement, as well as reduce its design life. The most significant damage can be seen in newer pavements. Pavement restoration should result in the pavement being as good as, or better than, the pre-trench cut condition. This can be achieved by the prevention of trench cuts, thorough utility coordination, and high-quality pavement restoration.
 1. Trench Cuts in New Pavements. Trench cuts are not permitted in pavements that have been constructed or rehabilitated within five (5) years. "Rehabilitation" includes all surface treatments such as chip seal, slurry seal, and asphalt

overlay. If there is no other option but to cut into new pavement, prior approval must be obtained from the City. Pavement must then be restored in accordance with the following criteria.

2. **Transverse Utility Crossings.** Transverse utility crossings must be bored or completed by another trenchless method. Bore pits must be restored in accordance with the following criteria.
3. **Pavement Restoration Requirements.** Trench cuts, bore holes, and miscellaneous pavement repairs shall be made in accordance with the Standard Details. Pavement shall be restored across the entire lane. In addition, the patch shall be made perpendicular to the closest affected road edge with a single, straight, continuous cut along the entire width of the required restoration. Minimum restoration width is five (5) feet.
4. **Lane Width Restoration Requirements.** For longitudinal utility trench cuts in pavements over five years old, a minimum two-inch overlay or full-depth pavement reconstruction is required for the following widths:
 - a. **One-lane overlay or reconstruction** – When trench cut or patch is within one travel lane.
 - b. **Two-lane overlay or reconstruction** – When trench cut or patch is within two travel lanes.
 - c. **Additional overlay or reconstruction** – When the remaining pavement area to the edge of existing pavement on either side is less than one travel lane. No longitudinal joints shall be allowed in the wheel path.
5. All trench and pavement cuts shall be made uniformly by wheel or saw cutting. The cuts shall be a minimum of one-foot outside the trench width. If the edge of the trench line degrades, ravel or is non-uniform, additional saw cutting shall be required prior to final patch or paving.
6. If the existing material is determined by the City to be suitable for backfill, the Contractor may use the native material except that the top eight (8) inches of trench shall be 2-1/2 inch minus ballast. If the existing material is determined by the City to be unsuitable for backfill, the Contractor shall use imported backfill material conforming to the Standard Specifications. All trench backfill materials shall be compacted to 95 percent density. Backfill placement and compaction shall be performed in six (6) inch lifts.
7. When the trench width is eighteen (18) inches or less and is within the travel-way, the trench shall be backfilled with control density fill (CDF), in accordance with the Standard Specifications. CDF may be required in wider trenches within the travel-way if site conditions dictate.

8. Replacement of the HMA or Portland Cement Concrete shall conform to the most current edition of the WSDOT/APWA Standard Specifications.
9. Tack Coat. Tack shall be applied to the existing pavement along the edge of cut and shall be emulsified asphalt grade CSS-1 as specified in the Standard Specifications.
10. Hot Mix Asphalt (HMA) Pavement Class B. HMA Pavement shall be placed on the prepared surface by an approved paving machine and shall be in accordance with Standard Specifications, except that longitudinal joints between successive layers of pavement shall be displaced laterally a minimum of twelve (12) inches, unless otherwise approved by the City. Fine and coarse aggregate shall be in accordance with Standard Specifications. HMA over two (2) inches thick shall be placed in equal lifts not to exceed two (2) inches each.
 - a. The preferred means of connection to existing asphalt/HMA pavement at the centerline, lane edges, and overlay ends is through grinding. Grinds can be a few inches off centerline to avoid existing stripping. Feathering may be an option when grinding is not feasible, with the approval of the City. The affected surfaces within the trenching area may be feathered and shimmed to an extent that provides a smooth-riding connection and expeditious drainage flow for the newly paved surface.
 - b. Surface smoothness shall be in accordance with Standard Specifications. The paving shall be corrected by removal and repaving of the trench only.
 - c. HMA pavement for wearing course shall not be placed on any travel-way between October 15 and April 1 without written approval of the City.
 - d. Asphalt for prime coat shall not be applied when the temperature is lower than 50 degrees Fahrenheit without written approval of the City.
11. Final Patch. The final patch shall be completed as soon as possible but no later than 30 calendar days after the trench is first opened. Time extensions due to inclement weather or other adverse conditions shall be evaluated on a case-by-case basis. However, any delays must have prior approval of the City.
12. Staking. All surveying and staking shall be performed by an engineering or surveying firm licensed by the State of Washington and capable of performing such work.
13. Testing. Testing shall be required at the Developer's or Contractor's expense. The Developer or Contractor is responsible to order all required testing. The testing lab shall be approved by the City prior to the commencement of any testing. Testing shall be done on all materials and construction as specified in the Standard Specifications and with the frequency as specified herein.

14. CITY OF VADER TESTING AND SAMPLING FREQUENCY GUIDE

<u>ITEM</u>	<u>TYPE OF TESTS</u>	<u>MINIMUM NO.</u>	<u>FREQUENCY</u>
GRAVEL BORROW	GRADING & SE	1 EACH	1 – 4,000 TON
SAND DRAINAGE BLANKET	GRADING	1 EACH	1 – 4,000 TON
CSTC	GRADING, SE & FRACTURE	1 EACH	1 – 2,000 TON
CSBC	GRADING, SE & FRACTURE	1 EACH	1 – 2,000 TON
BALLAST	GRADING, SE & DUST RATIO	1 EACH	1 – 2,000 TON
BACKFILL/SAND DRAINS	GRADING	1 EACH	1 – 2,000 TON
GRAVEL BACKFILL FOR:			
FOUNDATIONS	GRADING, SE & DUST RATIO	1 EACH	1 – 1,000 TON
WALLS	GRADING, SE & DUST RATIO	1 EACH	1 – 1,000 TON
PIPE BEDDING	GRADING, SE & DUST RATIO	1 EACH	1 – 1,000 TON
DRAINS	GRADING	1 EACH	1 – 100 TON
PCC STRUCTURES: (Sidewalk, curb and gutter, foundations)			
COURSE AGGREGATE	GRADING	1 EACH	1 – 1,000 TON
FINE AGGREGATE	GRADING	1 EACH	1 – 500 TON
CONSISTENCY	SLUMP	1 EACH	1 – 100 CY
AIR CONTENT	AIR	1 EACH	1 – 100 CY
CYLINDERS (28 DAY)	COMPRESSIVE STRENGTH	2 EACH	1 – 100 CY
CEMENT:			
	CHEMICAL & PHYSICAL CERTIFICATION	1	1 – JOB
HOT MIX ASPHALT PAVEMENT:			
BLEND SAND	SE	1 EACH	1 – 1,000 TON
MINERAL FILLER	S.G. & PI, CERTIFICATION	1	1 – JOB
COMPLETED MIX	FRACTURE, SE, GRADING	1 EACH	1 – 1,000 TON
	ASPHALT CONTENT COMPACTION	2 EACH	5 – 400 TON
ASPHALT TREATED BASE:			
COMPLETED MIX	SE, GRADING	1 EACH	1 – 1,000 TON
	ASPHALT CONTENT COMPACTION	1 EACH	5 – Control Lot*
ASPHALT MATERIALS	CERTIFICATION	1	1 – JOB
RUBBERIZED ASPHALT	CERTIFICATION	1	1 – JOB
COMPACTION TESTING:			
EMBANKMENT	COMPACTION	1 EACH	1 – 500 LF
CUT SECTION	COMPACTION	1 EACH	1 – 500 LF
CSTC	COMPACTION	1 EACH	1 – 500 LF
CSBC	COMPACTION	1 EACH	1 – 500 LF
BALLAST	COMPACTION	1 EACH	1 – 500 LF
TRENCH BACKFILL	COMPACTION	1 EACH	1 – 500 LF

SE = Sand Equivalency

* A control lot shall be a normal day's production. For minor quantities 200 tons or less per day, a minimum of two (2) gauge readings shall be taken.

2C SIDEWALKS, CURBS AND GUTTERS

2C.01 General

- A. Sidewalk, curb and gutters are to be constructed along all streets that abut the development property. When properties are located at the end of a block, the Developer may be required to install sidewalk, curb and gutter around the corner of the side street to a logical point of discontinuation, as determined by the City. Curbs and gutters shall also be included with such sidewalk construction, unless otherwise authorized by the City. Sidewalks shall be designed to accommodate any necessary traffic control signs while still providing a minimum five (5) foot unobstructed walking area. Plans for construction of sidewalks, curbs and gutters are to be submitted as part of the street plans when applicable.
- B. Typical sidewalk, curb, and gutter location shall be at the edge of proposed or existing pavement. The sidewalk shall be aligned in a relatively straight configuration and make smooth transitions around curves and corners. Alternate locations may be proposed, including the incorporation of parking and planting strips. The City may approve such alternative after he determines that strict compliance with the criteria is impractical or unreasonable in the circumstance.
- C. The owner of the property that abuts a sidewalk is responsible for all repair, maintenance, and upkeep of said sidewalk. The City is not liable for any damage or injuries caused by a sidewalk in need of repair.

2C.02 General Design Criteria

- A. General. The minimum width of sidewalk shall be five (5) feet. When the sidewalk, curb and gutter are contiguous, the width of the sidewalk shall be measured from the back of the curb and gutter to the back of the sidewalk. In commercial areas, sidewalks may be required to extend from the curb to the property line.
- B. Arterial Streets. Sidewalks, curbs and gutters shall be required on both sides of arterial streets interior to the development. Sidewalks, curbs and gutters shall also be required on the development side of arterial streets abutting the exterior of said development.
- C. Local Access Streets. Sidewalks, curbs and gutters shall be required on both sides of local access streets interior to the development. Sidewalks, curbs and gutters shall also be required on the development side of local access streets abutting the exterior of said development including cul-de-sacs.
- D. Design and Construction. The design and construction of all sidewalks, curbs, gutters and walkways shall be in accordance with the Standard Specifications, Standard Details and as supplemented by the following:

1. Sidewalks shall be constructed of Commercial Grade Concrete (3,000 psi) four (4) inches thick except, in a driveway section at which point the concrete thickness must meet driveway standards.
 2. The width of sidewalks shall be as shown in the street design drawings.
 3. Design of all sidewalks shall provide for a gradual rather than an abrupt transition between sidewalks of different widths or alignments.
 4. Form and subgrade inspection by the City is required before the sidewalk is poured.
 5. Monolithic pour of curb, gutter and sidewalk will not be allowed.
 6. Sidewalks must meet all ADA requirements including detectable warnings.
- E. Curbs and Gutters. Cement concrete curbs and gutters shall be used for all street edges unless otherwise approved by the City. All curbs and gutters shall be constructed in accordance with the Standard Drawings.
- F. Access Ramps. Sidewalks shall be constructed to provide for access ramps in accordance with State law. Access ramps shall be constructed of Commercial Grade Concrete. Form and sub-grade inspection by the City is required before the access ramp is poured.

2C.03 Staking

- A. All surveying and staking shall be performed by an engineering or surveying firm licensed by the State of Washington and capable of performing such work.

2C.04 Testing

- A. Testing shall be required at the Developer or Contractor's expense on all materials and construction as specified in the most recent edition of *WSDOT/APWA Standard Specifications*.
- B. At a minimum, one (1) slump test and two (2) test cylinders shall be taken once per day. All other testing frequencies shall be as specified in the Testing and Sampling Frequency Guide, contained herein. In addition, the City shall be notified before each phase of sidewalk, curb and gutter construction commences.

2D ILLUMINATION

2D.01 General

- A. A street lighting plan is required on a separate plan sheet for all developments. Type of installation shall be as set forth in the most recent edition of *WSDOT/APWA Standard Specifications*, Illumination Standards Table in this chapter, and as directed by the City. All public streetlight designs and plans shall be prepared by an engineer licensed by the State of Washington, and capable of performing such work.

2D.02 Design Criteria

- A. The installation of streetlights is required along the frontage of all development projects. Streetlights shall be located in accordance with the design criteria contained herein, and as approved by the City.
- B. Intersections shall be illuminated to 1.5 times the highest foot-candle requirement of the streets surrounding the intersection. Except in residential and intermediate classes, local and collector streets intersecting other local and collector streets shall not be subject to the 1.5 times illumination factor provided a luminaire is placed at the intersection.
- C. Energy efficient fixtures shall be incorporated into the streetlight system whenever practical. Poles shall be opposite across the roadway or on one side of the roadway. Conduit and junction boxes shall be installed along the extent of the frontage
- D. For the purposes of this section, area classes are determined by zoning as follows:

<u>Commercial</u> Multi-family, high density Central business district Freeway commercial General commercial Neighborhood commercial	<u>Industrial</u> Heavy industrial Light industrial
<u>Intermediate</u> Essential public facilities Commercial office/mixed use	<u>Residential</u> Single family, low density Single family, medium density Multi-family, medium density

AVERAGE MAINTAINED HORIZONTAL ILLUMINATION (FOOT CANDLES)				
ROAD CLASS	AREA CLASS			
	Residential	Intermediate	Industrial	Commercial
Local	0.2	0.6	N/A	N/A
Collector	0.5	0.7	0.8	0.9
Arterial	0.7	1.0	1.2	1.4
Boulevard	0.7	1.0	1.2	1.4

Uniformity ratio: 6:1 average: minimum for local
 4:1 average: minimum for collector
 3:1 average: minimum for arterial and boulevard

Dirt Factor: 0.85

Lamp Lumen Depreciation Factor: 0.73

Weak Point Light: 0.2 fc (except local residential street)

- E. Line loss calculations shall show no more than a 5 percent voltage drop, in any circuit from the source to the most distant luminaire. Branch circuits shall serve a minimum of four (4) luminaries.
- F. Pole foundations shall be per Standard Details. Luminaire poles shall conform to the Standard Specifications, except as modified herein. Light standards shall be tapered aluminum with satin ground finish. The diameter at the base of the pole shall not exceed nine (9) inches and the minimum thickness of the pole shall be ¼-inch. Mounting height shall be 26- to 30-feet as directed. Pole arms shall be davit style, single-arm, minimum ten (10) feet in length. Longer davit arms may be allowed or required for site-specific design issues. The shaft shall be heat treated after welding on the based flange to produce T6 temper. The pole and davit arm shall be designated to support streetlight luminaries with a minimum weight of 60 pounds and a minimum effective protected area (EPA) of 1.5 square feet. Poles shall be designed to withstand a 100mph (AASHTO) wind loading with a 1.3 gust factor with luminaire and mast arm attached, without permanent deformation or failure. Minimum wall thickness shall be 0.188 inches. Poles shall be equipped with a removable metal ornamental pole cap secured to the shaft with stainless steel screws. Poles shall have a minimum 3 ½ by 6-inch hand hole, with cover, near the base and shall be equipped with a grounding lug. The pole shall also be equipped with a dedicated 120V, 20 AMP circuit with a recessed weatherproof GFI power receptacle that meets all applicable guidelines and standards. The receptacle shall be located thirteen (13) feet above the base of the pole.
- G. All luminaries shall be flat lens, medium cut off, IES Type II distribution and shall comply with all standards as established by the Public Utility District No. 1 of Lewis County. Unless otherwise required by PUD #1, luminaries shall be: 200 watt,

catalog # GEMDCL2OSA11FMC31. Higher wattage luminaries may be considered if necessary to achieve lighting requirements.

- H. All streetlight electrical installations including wiring conduits and power connections shall be located underground.
- I. New street lighting shall be designed and installed in such a way as to blend with any utility pole-mounted lighting that may exist along the frontage of adjacent properties, but also to accommodate future integration of conforming streetlights along the roadway. To this end, when streetlight(s) are required along a property, conduit(s) and junction box(es) shall be installed along the entire frontage, as appropriate, to allow for the interconnection of future streetlight installations. This requirement may be waived with approval of the City, based on the site-specific conditions of the property in question.
- J. Alternate streetlight designs may be allowed or required by the City to accommodate the unique characteristics of a particular street or neighborhood. For example, special lighting may be deemed appropriate along a street that is part of a designated Historic District. The use of any alternate street lighting must be approved in writing by the City.

2D.03 Staking

- A. All surveying and staking shall be performed by an engineering or surveying firm licensed by the State of Washington and capable of performing such work. A pre-construction meeting shall be held with the City prior to commencing staking.
- B. The minimum staking of luminaries shall be as follows:
 - 1. Location and elevation to the center of every pole base
 - 2. Location and elevation of each service disconnect.

2D.04 Testing

- A. All luminaries shall be subject to an electrical inspection. Lamp, photo controls, and fixtures shall be warranted for a period of one year.

2E SIGNALS

2E.01 General

- A. 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.

2E.02 Design Criteria

- A. 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.
- B. An engineering firm licensed by the State of Washington and capable of performing such work shall prepare all public signal designs.

2E.03 Induction Loops

- A. Induction loops shall be constructed per *WSDOT/APWA Standard Specification*, *WSDOT Standard Plan*; and the following:
 - 1. Loops shall not be cut into final lift of new asphalt.
 - 2. Loops shall be pre-formed in crushed surfacing top course (CSTC) before paving or shall be cut in existing asphalt or leveling course to sub base before intersection is overlaid.

2E.04 Controller

- A. Controllers shall be a microprocessor based, solid state, digital timed NEMA, eight-phase traffic actuated signal controller providing up to eight (8) phases of signal control, internal pre-emption, time base coordination, internal time-of-day programming, and data base management by an IBM PC. When required by the City, the integration of traffic counting equipment shall be accommodated, by the controller.
- B. For the purpose of interchangeability of parts and simplification of maintenance, the City has standardized its traffic signal controllers.

2E.05 Staking

- A. All surveying and staking shall be performed by an engineering or surveying firm licensed by the State of Washington and capable of performing such work. A pre-construction meeting shall be held with the City prior to commencing staking. The City shall inspect the staking prior to construction.
- B. The minimum staking of signals shall be as follows:
 - 1. Location, with cut or fill, to center of all pole bases.
 - 2. Location of junction box(es).
 - 3. Location of all corners of controller base(s).

4. Location of service disconnects.
5. Locations of conduit crossings.

2E.06 Testing

- A. Each signal shall be subject to all necessary electrical inspections as well as the requirements set forth in the WSDOT Design Manual and the WSDOT/APWA Standard Specifications.
- B. Controller and cabinet testing may be required by WSDOT District 4 laboratory and/or the City. All specifications and material samples shall be submitted to the City for review and approval prior to installation.
- C. A signal system will 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.

2E.07 Check-Out Procedure

- A. The Contractor shall call for an intersection "check-out" after completing the installation of the controller cabinet and all other signal equipment complete with wiring connections. All parts and workmanship shall be warranted for one year from date of acceptance.
- B. New signals shall operate without any type of failure for a period of 30 days. The Contractor shall have a qualified individual 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 will restart the 30-day "check-out" period.

2F ROADSIDE FEATURES

2F.01 General

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

2F.02 Design Criteria

- A. 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 Criteria as set forth in Section 1.11.

2F.03 Staking

- A. All surveying and staking shall be performed by an engineering or surveying firm licensed by the State of Washington and capable of performing such work. A pre-construction meeting shall be held with the City prior to commencing staking.

2F.04 Testing

- A. Testing shall be required at the Developer 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*.

2F.05 Survey Monuments

- A. All existing survey control monuments that are disturbed, lost, or destroyed during surveying or construction shall be replaced at the expense of the responsible builder or Developer with the proper monument as outlined below by a land surveyor registered in the State of Washington.

1. Major Arterial; Minor Arterial; Bus Routes and Truck Routes. A pre-cast concrete monument with cast iron monument case and cover installed per these guidelines is required.
2. Commercial Collector; Neighborhood Collector; and Local Access. A cast-in-place concrete surface monument with sufficient ferrous metal embedded to allow for detection by a magnetic detection device per these guidelines is required. Cap shall be per the Standard Detail.

- B. Required Monument Locations:

1. All intersections;
2. At the PC and PT's of all horizontal curves;
3. At PI of all horizontal curves of streets where the PI lies within the limits of the traveled roadway;
4. At all corners, control points and angle points around the perimeter of subdivisions as determined by the City;
5. At all section corners, quarter corner, and sixteenth corners within the right-of-way; and
6. The monument case shall be installed after the final course of surfacing has been placed.

2F.06 Bus Pullouts and Shelters

- A. Nothing in these guidelines shall preclude the local transit provider from conducting on-street drop-offs and pickups. The intent of these provisions is to provide general guidelines for the installation of new bus facilities and ensure their proper design and integration with the City's transportation network. They must also meet the needs of the transit provider and the community at large.
- B. When bus pullouts and/or shelters are deemed necessary in accordance with the provisions provided herein, the installation of these facilities shall be the responsibility of the Developer. The following criteria shall be applied to bus stop facilities for new developments:
1. Provide paved walkways with a hard all-weather surface linking various sections of subdivisions and developments to peripheral streets with bus stops.
 2. Provide access ramps and other facilities consistent with barrier-free design standards along walkways leading to bus stops.
 3. Separate roads and parking areas from pedestrian pathways by grade separations, landscaping, and other devices. A minimum four (4) to six (6) foot planting strip shall be provided to buffer sidewalks or walkways from streets and parking areas around bus stops and shelters.
 4. Provide pedestrian-friendly features such as lighting, signs, and trash receptacles as warranted by anticipated use.
 5. New development street systems should be designed to minimize pedestrian travel to bus stops.
- C. Frequency & Spacing for Public Transit Stops. The City and local transit provider will consider the following general guidelines to determine frequency and spacing of improved stops on any given public transit route:
1. When determining the physical location of a bus pullout and/or shelter, consideration shall be given to vehicle and pedestrian safety, impacts to adjacent property owners, and operational efficiency of the transit service.
 2. Bus pullouts can be initially located at an average of four (4) to six (6) stops per route-mile along local residential segments of a route.
 3. Additional stops may be added if warranted, but shall not exceed the basic stop spacing guidelines of eight (8) to ten (10) stops per mile and no two stops may be located within 600-feet of one another.
 4. Site designs for businesses, residential subdivisions, and multi-family developments along transit routes shall accommodate transit use. This may

include the location of a building entrance near a transit stop, pedestrian walkways, sheltered or unsheltered transit stops, and/or a bus pullout.

D. Placement and Design of School Bus Stops. The City and the Winlock School District will use the following criteria to jointly determine the placement and design of school bus stops:

1. A school bus stop shall be required for each new residential subdivision or apartment complex where school children are to be boarding or disembarking, unless it is determined that adjacent facilities already exist for the site.
2. Location of school bus stops shall be designed with safety as a paramount concern. Major arterials with high traffic counts should be avoided when possible and only used when bus pullouts are available and significant protection provided for children.
3. School bus stops shall be designed to complement the residential environment and provide convenient location and access for neighborhood children including sidewalk access.
4. Every effort shall be made to make school bus stops and sidewalk access to school bus stops a safe and friendly pedestrian environment.
5. The local transit provider and the Winlock School District should make every effort to coordinate the location of bus stops. However, separate bus facilities may be necessary for both service providers.

E. Physical Location Requirements. The physical location of all bus pullouts shall be primarily determined by the following considerations: maximizing safety, operational efficiency, and minimizing impacts to adjacent property. Bus pullouts may be required on all arterial and commercial collector roads for safe bus berthing and to minimize impacts of bus stops on traffic flow. Additionally, bus pullouts may be required on local access roads if road geometry requires, such as determined by the City. Maintaining adequate separation between driveways/intersections and bus pullouts can increase the safety and efficiency of both the roadway and the transit service. When locating a bus pullout in reference to existing driveways or a driveway in reference to an existing bus pullout, the following guidelines shall be taken into consideration:

1. On local roads, bus pullouts shall be located a minimum of 55-feet (75-feet preferred), from any driveway as measured from the closest driveway edge to the pullout loading area. On arterial roadways, bus pullouts shall be located in accordance with the site distance requirements noted in Section 2B.13 of this chapter. These location requirements shall serve as a general guide.
2. Alternative distances may be considered if sufficient engineering data is provided demonstrating that adequate site distance is maintained, pedestrian safety is

protected and vehicular traffic is not hindered. The final determination for a bus pullout location must be approved by the City.

3. Bus pullouts should not be located where the transit vehicle can block sight distance from a driveway or intersection.
 4. Driveways should not be located within the taper of the pullout.
- F. Transit and School Bus Stop Signage. All designated public transit and Winlock School District bus stops shall be identified in some fashion. This may include pavement marking and bus stop signs. Contact the local transit provider for details on their sites.
- G. Shelters. Passenger shelters may be required at bus pullouts and transfer centers. Shelters may also be required at bus stops as determined by the local transit provider and the City.
- H. Passenger shelters for public transit sites and school sites shall be transparent for passenger visibility and safety, provide protection from the elements, and be reasonably vandalism resistant for easy maintenance.
- I. The Developer shall provide a concrete pad approximately 12 x 10 feet and 6 inches thick. The pad shall extend in from the curb or edge of the pavement at a specific location designated by the City. The pad shall be constructed in accordance with the design standards for sidewalks as noted in Section 2C of this chapter.
- J. Upon completion of the pad, the local transit provider will construct the shelter. The Developer shall be responsible for all appropriate costs associated with the shelter installation. A final Certificate of Occupancy will not be issued until all shelter costs have been reimbursed to the transit provider.

2F.07 Mailboxes

- A. During construction, existing mailboxes shall be accessible for the delivery of mail or, if necessary, moved to a temporary location. Temporary relocations shall be coordinated with the U.S. Postal Service. The mailboxes shall be reinstalled at the original location or, if construction has made it impossible, to a location as outlined below and approved by the U.S. Postal Service.
1. Bottom or base of box shall be 36- to 42-inches above the road surface.
 2. Front of mailbox shall be 18-inches behind vertical curb face or outside edge of shoulder.
 3. New developments. Clustered mailboxes are required (contact the U.S. Postal Service for details). Refer to Standard Details.
 4. Mailboxes shall be set on posts strong enough to give firm support, not to exceed 4 x 4-inch wood or one 1-1/2 inch diameter pipe, or a material and design with

comparable breakaway characteristics.

2F.08 Guard Rails

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

2F.09 Retaining Walls

A. General.

1. Rock walls may be used for erosion protection of cut or fill embankments up to a maximum height of eight (8) feet in stable soil conditions that will result in no significant foundation settlement or outward thrust upon the walls. For heights over six (6) feet or when soil is unstable, structural wall of acceptable design stamped by a licensed structural engineer shall be used.
2. In the absence of such a rock wall design, walls having heights over six (6) feet or walls constructed in conditions where soil is unstable are required to be a pre-engineered structural wall having a design approved by the City. Structural walls shall be designed by a professional engineer, licensed in the State of Washington and qualified in retaining wall design. Structural walls require issuance of a Building Permit from the City prior to construction.
3. Any rock wall over 30-inches high in a fill section will require the design of a geo-technical engineer. The geo-technical engineer shall continuously inspect the installation of the wall as it progresses and submit inspection reports, including compaction test results and photographs taken during construction, documenting the techniques used and the degree of conformance to the geo-technical engineer's design.
4. Terraced walls shall be reviewed and approved on a site-specific basis. Use of terraced walls in the right-of-way, must be approved by the City.

B. Material. The rock material shall be as 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 170 lbs per cubic foot.

C. Foundation. The rock wall shall be started by excavating a trench with a depth below sub grade of one-half the base course or one (1) foot, whichever is greater.

D. Rock Placement. Rock selection and placement shall be such that there shall be minimum voids and, in the exposed face, no open voids over six (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 stable

and have a stable appearance. The rocks shall be placed in a manner such that the longitudinal axis of the rock shall be at right angles or 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. Backfill. The wall backfill shall consist of 1-1/2 inch washed rock 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. Drainage. Perforated drainage pipe and filter fabric shall be installed as per the Standard Drawings. This pipe requirement may be waived by the City if, the Developer is able to demonstrate, to the City's satisfaction, that no subsurface water problems exist.

2F.10 Street Trees

- A. In order for Developers or property owners to plant trees, shrubbery or other vegetation that may attain a height of more than 30-inches within the right-of-way, they must first apply for and obtain a right-of-way permit from the City. The application must include information on the type of tree or plant and the proposed location placement.
- B. Certain varieties of trees are prohibited from being planted within a City right-of-way. Such trees are excluded from the right-of-way to protect utilities and infrastructure or to minimize visual obstructions and interference. Trees not to be planted within a City right-of-way specifically include the following:
 - Alder; Apple (fruiting); Ash, Mountain; Birch, White; Cherry (fruiting); Chestnut; Cottonwood; Elm, American; Hawthorne; London Plane; Maple, Big leaf; Maple, Oregon; Maple, Silver; Oak, Pine; Pagoda; Pear (fruiting); Plum (fruiting); Poplar; Sycamore; Walnut; Willow; and any other species of tree with a propensity to produce large or extensive root systems that may interfere with or damage underground utilities or public infrastructure including streets, curbing, and sidewalks.
- C. Also prohibited from being planted within the right-of-way are any other species of plants or trees that can create an obstruction or potential obstruction to traffic, pedestrian visibility or safe public use of the right-of-way.

2F.11 Parking Lots

- A. A Right-of-way Permit is required prior to surfacing a non-surfaced designated parking area that will access a public right-of-way.
- B. Stormwater retention shall be provided and shall follow the criteria as set forth in the Stormwater Management Plan and as addressed in Chapter 3 of these guidelines.
- C. Parking lot circulation and signing needs shall be met on site. The public right-of-way shall not be utilized as part of a one-way parking lot flow.
- D. All requirements for construction of parking lots shall be determined through the Development Plan Review process, including capacity and configuration. Parking lot ingress and egress shall be evaluated to determine traffic controls necessary to ensure vehicle safety to and from the public right-of-way.
- E. Parking lot surfacing materials must meet the requirements for a permanent all-weather surface. Asphalt concrete pavement and cement concrete pavement satisfy this requirement and are approved materials. Gravel surfaces are not acceptable or an approved surface material type. Combination grass/paving systems are approved surface materials 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 shall be irrigated and maintained.

2G TRAFFIC IMPACT ANALYSIS

2G.01 General.

- A. A Traffic Impact Analysis (TIA) is a specialized study of the impacts that a specific type and size of development will have on the surrounding transportation system. The TIA is an integral part of the development review process. It is specifically concerned with the generation, distribution, and assignment of traffic to and from a new development or a re-development.
- B. These guidelines have been prepared to establish the requirements for a TIA. If a TIA is required for a project, the City will be the contact for matters relating to the TIA. The City will also be responsible for reviewing and accepting TIA's as well as approving measures to mitigate impacts.

2G.02 When Required

- A. The need for a TIA shall be based on: the size of the proposed development, existing street and intersection conditions, traffic volumes, accident history, community concerns, and other pertinent factors associated with the proposed project.

- B. A TIA shall be required if a proposed development meets one or more of the following conditions:
1. The proposed project generates more than ten (10) vehicles in the peak direction of the peak hour on the adjacent streets and intersections. This includes the summation of all turning movements that affect the peak direction of traffic.
 2. The proposed project generates more than 25 percent of the site-generated peak hour traffic through a signalized intersection or "critical" movement at a non-signalized intersection.
 3. The proposed project is within an existing or proposed transportation benefit area. This may include Transportation Benefit Districts (TBD), Local Improvement Districts (LID), or local/state transportation improvement areas programmed for development reimbursements.
 4. The proposed project may potentially affect the implementation of the street system outlined in the transportation element of the Comprehensive Plan, the Six-Year Transportation Improvement Program, or any other documented transportation project.
 5. If the original TIA was prepared more than two (2) years before the proposed project completion date.
 6. The increase in traffic volume as measured by ADT, peak hour, or peak hour of the "critical" movement is more than ten (10) percent.
- C. Even if it is determined that a TIA is not required, the City may require the Developer to have a Trip Generation Study (TGS) conducted. TGS's shall be used to forecast project-generated traffic for an established future horizon.

2G.03 Qualifications For Preparing TIA Documents

- A. The TIA shall be prepared by an engineer licensed in the State of Washington and with special training and demonstrated experience in traffic engineering. The applicant shall provide the City with the credentials of the individual(s) selected to perform the TIA for approval prior to initiating the analysis.

2G.04 References

- A. In conducting TIA's and TGS's, the method for determining capacity shall be as described in the most recent version of the "Transportation Research Board Highway Capacity Manual", and the method for determining project-generated traffic volumes shall be as forecasted using the most recent edition of "Institute of Transportation Engineers Trip Generation Manual".

2G.05 Scope of Work

- A. The level of detail and scope of work of a TIA may vary with the size, complexity, and location of the proposed project. A TIA shall be a thorough review of the immediate and long-range effects of the proposed project on the City's transportation system. The analysis shall include the following elements, as applicable:
1. Provide a reduced copy of the site plan, showing the type of development, street system, right-of-way limits, access points, and other features significant to the City's transportation system. The site plan shall also include pertinent off-site information such as locations of adjacent intersections and driveways, land-use descriptions, and other features of significance.
 2. Provide a vicinity map of the project area showing the transportation system to be impacted by the development.
 3. Discuss specific development characteristics such as the size and type of development proposed (single-family, multi-family, retail, industrial, etc.), internal street network, parking spaces provided, zoning, and other pertinent factors attributable to the proposed project.
 4. Discuss project completion and occupancy schedule for the proposed project. Identify horizon year(s) for traffic analysis purposes.

2G.06 Existing Conditions

- A. Discuss street characteristics including functional classification, bicycle path corridors and traffic control at study intersections, number of traveled lanes, lane width, and shoulder treatment. A figure should be used to illustrate existing transportation facilities.
- B. Identify safety and access problems including discussions on accident history, sight distance restrictions, traffic control, and pedestrian conflicts.
- C. Utilize all available traffic data from the City and surrounding jurisdictions, if applicable. If data is unavailable, the individual or firm preparing the TIA shall collect the necessary data to supplement the discussions and analysis in the TIA.
- D. Conduct manual peak hour turning movement counts at study intersections if traffic volume data is more than two (2) years old. A copy of the reduced data shall be included with the TIA. The peak hour(s) to be counted and analyzed shall be the time period(s) when the combination of proposed project traffic and existing traffic is highest. A study intersection is any arterial/collector intersection impacted by ten (10) or more proposed project trips during the peak hour(s) analyzed by the TIA. The City may require that the study also include additional intersections or areas.

- E. A figure shall be prepared showing existing average daily traffic (ADT) and peak hour traffic volumes on the adjacent streets and intersections in the study area. Complete turning movement volumes shall be diagramed or illustrated and included in the TIA. The figure shall represent the existing traffic volumes for analysis purposes.

2G.07 Development Traffic

- A. This element of the TIA shall identify the limits of the study area. The study area shall include all pertinent intersections and streets impacted by development traffic.
- B. The threshold requirement of development traffic of ten (10) vehicles in the peak direction of the peak hour on the adjacent streets and intersections will apply. The threshold requirement of the development generating 25 percent or more of site-traffic through a signalized intersection or "critical" movements at a non-signalized intersection will also apply. Each arterial/collector intersection and street impacted as described shall be included in the study area for analysis purposes.
- C. A figure illustrating the proposed trip distribution for the proposed project shall be included in the TIA. The TGS shall be displayed in a tabular format on the figure with peak-hour traffic volumes assigned to the study area in accordance with the trip distribution.
 - 1. Trip Generation. Site-generated traffic of proposed projects shall be estimated using the latest edition of the "Institute of Traffic Engineers Trip Generation Manual". Variations of trip-rates will require the approval of the City. Trip-rate equations shall be used for all land-use categories where applicable. Average trip-rates shall be allowed for those land-uses without trip-rate equations. Site traffic shall be generated for daily A.M. and P.M. peak-hour periods. A "pass-by" traffic volume discount for commercial centers shall not exceed 25 percent unless approved by the City.
 - 2. Trip Distribution. Trip distribution methodology shall be clearly defined and discussed in detail in the TIA. For large development projects, the City may require a regional trip distribution map. The TIA shall identify other transportation modes that may be applicable, such as transit use, bicycle and pedestrian facilities.

2G.08 Future Traffic

- A. Future Traffic Conditions Not Including Site Traffic. Future traffic volumes shall be estimated using information from existing transportation forecasts or models, other planned or programmed "on-line" development, and/or transportation projects, or by applying an annual growth rate to the existing traffic volumes as defined in the Vader Comprehensive Plan. The future traffic volumes shall be representative of the

horizon year(s) for project development. Forecasted non-project traffic shall be added to existing traffic and illustrated in a figure.

- B. Future Traffic Conditions Including Site Traffic. The site-generated traffic shall be assigned to the street network in the study area based on the approved trip distribution. The site traffic shall be combined with forecasted traffic volumes, not including site traffic, to show the total traffic conditions estimated at development completion and at the future horizon year. A figure shall be required showing daily and peak period turning movement volumes for each traffic study intersection. Refer to the Sample TIA Figure, included herein. In addition, a figure shall be prepared showing future traffic conditions, not including site traffic volumes, with site-generated traffic added to the street network.
- C. Unless the City specifically authorizes another future horizon year for a development, the initial target year for determining future traffic shall be five (5) years after the development has been occupied or in full operation for twelve (12) months.

2G.09 Traffic Operations

- A. A Level of Service (LOS) analysis shall be conducted for each “screen line” in the study area. The “screen lines” and level of service information shall be developed in conjunction with the City Comprehensive Plan. The methodology and procedures for conducting the capacity analysis shall follow the guidelines specified in the most recent version of the "Transportation Research Board Highway Capacity Manual". The LOS for each “screen line” shall include the following conditions:
 - 1. Existing peak hour traffic volumes
 - 2. Future traffic volumes not including site traffic
 - 3. Future traffic volumes including site traffic
- B. LOS results for each traffic volume scenario shall be summarized in a single table. The LOS table shall include results for A.M. and P.M. peak periods, if applicable. The table shall show LOS conditions with corresponding vehicle delays for signalized intersections and reserve capacity or delay for the “critical” movements at non-signalized intersections. For signalized intersections, the LOS conditions and average vehicle delay shall be provided for each approach and the intersection as a whole, in an appendix that contains all LOS calculation sheets.
- C. The LOS analyses for existing signalized intersections shall include existing phasing, timing, splits and cycle lengths in the analysis as observed and measured during the peak hour traffic periods.

- D. If the proposed project is scheduled for completion in phases, the TIA shall conduct a LOS analysis for each separate development phase. The incremental increases in site traffic from each phase shall be included in the LOS analysis for each proceeding year of development completion. A figure is required for each horizon year of phased development.
- E. If the proposed project impacts a coordinated traffic signal control system currently in operation, the TIA shall include an operational analysis of the system. Timing plan and proposed modifications to the coordination system is required. For non-signalized intersections, the "Highway Capacity Manual" methodology shall be used.
- F. The computer software package(s) used for capacity analysis applications shall be approved by the City. The City may require that a copy of the computer worksheets, along with an electronic version compatible with the City and the City's consultant engineer, of each capacity analysis, be submitted concurrently with the TIA to the Public Works Department.

2G.10 Mitigation

- A. The TIA shall include a proposed mitigation plan. The mitigation may be either the construction of necessary transportation improvements or contributions to the City for the proposed project's fair share cost of identified future transportation improvements, as identified in the City's Comprehensive Plan or Capital Facilities Plan. Levels of Service "E" and "F" shall be used as the threshold for determining appropriate mitigating measures on roadways and intersections in the study area. Mitigating measures shall be required to the extent that the transportation facilities operate at a LOS "C" (LOS-C) condition or better upon completion of the development.
- B. The following guidelines shall be used to determine appropriate mitigating measures of traffic impacts generated by proposed projects.
 - 1. The cost for the mitigation shall be entirely born by the proposed project. However, in the event that more than one development is being proposed within the study area, a Latecomers Agreement for reimbursement of mitigations costs may be proposed by the project under consideration.
 - 2. City projects involving transportation facilities programmed for improvements, and having an adverse traffic impact, shall be mitigated by, providing a proportionate share of the local costs for the improvements. This share shall be based on the percentage of proposed project traffic generated through the intersection. The percentage shall be based on the total projected peak hour traffic volumes for the horizon year of the transportation facility, or as defined by the ordinance establishing the cost-sharing mechanism for off-site street improvements.

3. Non-signalized intersections that currently operate at less than Level of Service "C" (LOS-C) shall be analyzed for traffic signal and intersection improvements. If three or more traffic signal warrants are satisfied, signal and intersection improvements shall be required as a mitigating measure for the proposed project. If at least three (3) signal warrants are not satisfied by the proposed project's horizon year, the TIA shall determine if traffic signal warrants and intersection improvements would be needed within a five (5) year period after the proposed project's horizon year. If so, the proposed project would then be required to provide a proportionate share cost of future traffic signal and intersection improvements.
4. When an off-site street improvement(s) is not scheduled to be installed in the near future, the City may allow a Developer required to share in the costs of such improvement(s), to post a bond in the amount of the Developer's pro-rata share of such improvements. Any Developer desiring to post a bond with the City in the amount of the pro-rata share of improvement costs must submit a request in writing to the City, along with all applicable justification or information supporting the request. City staff will submit all request(s) to the City Council who will then make a decision at a regularly scheduled council meeting. All decisions made by the Council are considered final.

2G.11 Mitigation Fee Calculation

- A. The formula for calculating a Developer's mitigation fee or proportional share of an off-site street improvement is derived by dividing the Project Generated Traffic by the Future Traffic with the Project. In order to determine the Developer's pro-rata costs of an off-site street improvement, and this value is multiplied by the Project Costs. Mathematically this formula is written as follows:

$$\text{PGT/FTP} \times \text{PC} = \text{DMF}$$

PGT = Project Generated Traffic
 FTP = Future Traffic with the Project
 PC = Project Cost
 DMF = Developer's Mitigation Fee

- B. The City has established a participation threshold of ten (10) trips per peak hour. The ten (10) trips per peak hour sets the minimum level at which a Developer shall be required to participate. As part of the TIA and/or TGS, intersections and traffic locations shall be identified when there can be ten (10) or more new peak-hour generated trips.