City of West Linn
Public Works Design Standards

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SECTION FIVE – STREET REQUIREMENTS

5.0000 STREETS

5.0010 General Design Requirements

A. Performance Standards - All street designs shall provide for the safe and efficient travel of the public. Streets shall be designed to carry the recommended traffic volumes identified for each street classification.

B. Streets shall be designed to meet or exceed minimum guidelines. These guidelines are set forth in the "AASHTO Policy on Geometric Design of Highways and Streets" (latest edition). Traffic Control Devices shall conform to the "Manual on Uniform Traffic Control Devices for Streets and Highways", Federal Highway Administration, with Oregon Supplements, Oregon Department of Transportation (latest edition).

C. All vertical and horizontal curves shall meet the guidelines of the AASHTO Policy on Geometric Design of Highways and Streets and the design speed for each street classification. Where practical, the Design Engineer shall provide the decision stopping sight distance set forth in the AASHTO policy. But in no case shall less than the minimum stopping sight distance given be permitted.

5.0011 Right-of-Way and Pavement Width

A. Design Speeds for each street classification shall be as shown in ***Subsection 5.0018, Design Speed***. The design speed can be equal to the 85th percentile vehicle speed. If the street improvement will increase the 85th percentile vehicle speed, the value of the design speed will be determined by the City Engineer.

B. Refer to current adopted Transportation System Plan for right-of-way width for each street classification.

5.0012 On-Street Parking

Refer to current adopted Transportation System Plan for on-street parking provisions for each street classification.

5.0013 Access

All development shall be provided public street access. Access roads (public and/or private), driveways, and easements shall be as set forth in the current adopted Transportation System Plan and Community Development Code.

5.0014 Traffic Impact Analysis

A. The Community Development Code outlines the requirements for a Traffic Impact Analysis (TIA) report as determined by the type of development and its potential impact to existing street systems. A traffic analysis will generally be required for a development:

1. When it will generate 1,000 vehicle trips per weekday or more
2. When a development's location, proposed site plan, and traffic characteristics could affect traffic safety, access management, street capacity, or known traffic problems or deficiencies in a development's study area.

B. The report will be prepared by a traffic engineer licensed to practice in the State of Oregon. At a minimum, the report shall contain the following: TIA's are required to provide an objective assessment of the potential modal transportation impacts associated with a specific land use action (e.g., the development of vacant land, the redevelopment of an existing land use, a comprehensive plan amendment or zoning change). The analysis and the documentation provided by the applicant must help answer several important transportation related questions including:

1. Will the existing transportation system accommodate the proposed development from a capacity and safety standpoint?
2. What on-site and off-site transportation system improvements will be necessary to accommodate the proposed development?
3. How will access to the proposed development affect the traffic operations on the existing transportation system?
4. How will transportation impacts of the proposed development impact land uses, including commercial, institutional, industrial and residential uses within the development's influence area?
5. How will the proposed development meet current City Standards for roadway design?
6. How will the proposed development ensure the safe and efficient circulation on and adjacent to the site?
7. How will the proposed development provide needed connections to abutting parcels (developed or undeveloped) for motorized as well as non-motorized traffic?

C. The following information shall be included in each TIA submitted to the City. Additional information specified by the City in the scoping summary or through the pre-application meeting or other project meetings shall also be included.

1. Completed TIA checklist signed by the Professional Engineer responsible for the preparation of the TIA.
2. Table of Contents – Listings of all sections, figures, and tables included in the report.
3. Executive Summary – A summary of key points, findings, conclusions, and recommendations including a mitigation plan.
4. Introduction:
    a. Proposed land use action including site location, zoning, building size, and project scope.
    b. Map showing the proposed site, building footprint, access driveways, and parking facilities.
    c. Map of the study area that shows site location and surrounding roadway facilities.
5. Existing Conditions:
    a. Existing site conditions and adjacent land uses.
    b. Roadway characteristics of important transportation facilities and modal opportunities located within the study area, including roadway functional classifications, street cross-section, posted speeds, bicycle and pedestrian facilities, on-street parking, and transit facilities.
    c. Existing lane configurations and traffic control devices at the study area intersections.
    d. Existing traffic volumes and operational analysis of the study area roadways and intersections.
    e. Roadway and intersection crash history analysis.
    f. Intersection and stopping sight distance related to new and impacted driveways and intersections.
6. Background Conditions (without the proposed land use action)
    a. Approved in-process developments and funded transportation improvements in the study area.
    b. Traffic growth assumptions.
    c. Addition of traffic from other planned developments.

d. Background traffic volumes and operational analysis.

7. Full Buildout Traffic Conditions (with the proposed land use action)
    a. Description of the proposed development plans.
    b. Trip generation characteristics of proposed project (including trip reduction documentation)
    c. Trip distribution assumptions.
    d. Full buildout traffic volumes and intersections operational analysis.
    e. Site circulation and parking.
    f. Intersection and site-access driveway queuing analysis.
    g. Recommended roadway and intersection mitigation measures (if necessary)
8. Conclusions and recommendations
9. Appendix – With dividers or tabs
    a. Traffic count summary sheets.
    b. Crash analysis summary sheets.
    c. Existing, Background, and Full Buildout traffic operational analysis worksheets with detail to review capacity calculations.
    d. Signal, left-turn, and right turn lane warrant evaluations calculations.
    e. Signal timing sheets depicting the timing and phasing used in analysis.
    f. Other analysis summary sheets such as queuing.

D. To present the information required to analyze the transportation impacts of development, the following figures shall be included in the TIS:
    1. Vicinity Map
    2. Existing Lane Configuration and Traffic Control Devices
    3. Existing Traffic Volumes and Levels of Service for each required time period
    4. Future Year Background Traffic Volumes and Levels of Service for each required time period
    5. Proposed Site Plan, including access points for abutting parcels and for those across the street from the proposed development
    6. Future Year Assumed Lane Configurations and Traffic Control Devices
    7. Estimated Trip Distribution/Assignment Pattern
    8. Trip reductions (pass-by trips at site access(es))
    9. Site-Generated Traffic Volumes for each required time period
    10. Full Buildout Traffic Volumes and Levels of Service for each required time period

E. Each TIA shall be prepared by or under direct supervision of a Professional Traffic Engineer registered in Oregon or a Professional Engineer registered in Oregon qualified to perform traffic engineering as defined by ORA 820-040-0030. The engineer must have background and experience in the methods and concepts associated with transportation impact studies. Each TIA shall be sealed and signed by the Professional Engineer prior to acceptance by the City for a technical review.

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

1. Institute of Transportation Engineers (ITE) *Trip Generation* (latest edition)
2. Specific trip generation studies that have been conducted for the particular land use for the purposes of estimating peak hour trip generating characteristics, subject to approval by the City Engineer prior to their inclusion in the transportation impact analysis.

G. The City of West Linn requires all intersections within the study area to maintain an acceptable level of service (LOS) upon buildout of the proposed land use action.

1. West Linn's minimum acceptable LOS is defined as follows for signalized intersections:
    a. LOS "D" or better for the intersection as a whole and no approach operating at worse than LOS "E" and a v/c ratio not higher than 1.0 for the sum of critical movements.
2. West Linn's minimum acceptable LOS is defined as follows for non-signalized intersections:
    a. LOS "E" or better for the poorest operating approach and with no movement serving more than 20 peak hour vehicles operating at worse than LOS "E". LOS "F" will be tolerated for minor movements during a peak hour.

H. Within the study area for each TIA, a crash history evaluation shall be conducted for the most recent three-year period. The intent of the evaluation is to identify any apparent trends in the data that reflect a safety issue that may be exacerbated by the proposed development and to identify mitigation to resolve the issue(s). At a minimum, the analysis shall summarize the number of crashed per year by type andseverity. Intersection crash rates shall be calculated and evaluated. The engineer shall access the overall results of the safety analysis.

I. For proposed residential developments, the TIA shall include a brief discussion of routes to the nearest schools. The applicant shall identify the primary walking/biking route between the proposed development and the nearest elementary, middle and high school. Specifically, the applicant shall describe the general bicycle and pedestrian environment between the proposed development and each school, including the presence and condition of pedestrian and bicycle facilities and the roadway environment (speed, lanes, etc.) along the routes. This section requires applicants to address the special need to link residential areas to area schools.

5.0015 Intersections

A. Connecting street intersections shall be located to provide for traffic flow, safety, and turning movements, as conditions warrant.

1. Arterial and Collector Intersections:
    a. Exclusive left and right turn lanes shall be provided where warranted;
    b. Designated crosswalks shall be provided at controlled intersections;
    c. Street alignments across intersections shall be continuous.
2. Neighborhood and Local Street Intersections: alignments shall facilitate local circulation and discourage non-local, through traffic.

B. Streets shall be aligned so as to generally intersect at right angles (90°). Angles of 75° and lower will not be permitted. Intersection of more than two streets at one point will not be permitted.

C. New streets shall intersect with existing street intersections so that centerlines are not offset. Where existing streets adjacent to a proposed development do not align properly, conditions may be required of the development to provide for proper alignment.

D. Intersection spacing must meet the minimum separation distance shown in the current adopted Transportation System Plan.

5.0016 Half-Street plus Travel Lane Construction

A. Half-streets will only be approved when the abutting or opposite frontage property is undeveloped and the full improvement will be provided with development of the abutting or opposite (upon right-of-way dedication) frontage property. Where such a street is justified, the right-of-way and pavement width will be determined by the City Engineer. In no case shall the pavement width required be less than that necessary to provide two lanes of traffic to pass at a safe distance.

B. A development adjacent to an unimproved street shall be responsible for constructing a pavement transition in accordance with these standards.

5.0017 Street Classification

All streets within the City shall have a designated classification shown in the current adopted Transportation System Plan.

5.0018 Design Speed

Design speeds for streets shall match the proposed or posted speed limit.

5.0020 Horizontal/Vertical Curves, and Grades

5.0021 Horizontal Curves

A. Horizontal curve alignments shall meet the minimum radius requirements for urban areas shown in the latest edition of the AASHTO Geometric Design of Highways and Streets (Green Book).

B. Request for design speeds less than 25 MPH will be determined/approved by the City Engineer based on topography, right-of-way, or geographic conditions for the applicant. Request must show that a reduction in centerline radius will not compromise safety.

5.0022 Vertical Curves

Vertical curve alignments shall meet the minimum requirements for the design speed shown in the latest edition of the AASHTO Geometric Design of Highways and Streets (Green Book). K value shall be shown for all vertical curves.

5.0023 Grades

A. Maximum grades for each street classification shall be as listed in the table below, except as approved by the City Engineer.

Arterial	8%
Collector	10%
Neighborhood Route / Local / Cul-de-sac	15%

B. Minimum grade for all streets shall be 0.0075 ft. per ft. however, in all cases street grades shall allow for proper and adequate drainage. Cul-de-sac "bulbs" shall have a minimum slope of 0.0075 ft. per ft. Any grade change of more than 1% shall be accomplished with vertical curves.

C. Standard street cross slope shall be in accordance with the standard street cross section. Maximum cross slope is 3.5% or as approved by the City Engineer.

5.0030 Pavement Design

A. All streets shall be constructed with asphaltic concrete pavement (ACP); however, Portland Cement Concrete (PCC) streets are permitted as approved by the City Engineer.

B. The Design Engineer shall provide a street structural design section with a 30 year design life for all arterial roadways and for all streets in industrial zones.

C. Pavement shall be designed using a nationally recognized procedure. The procedures contained in the ODOT Pavement Design Guide (latest edition) is preferred.

D. The approved Street sections (for non industrial zones) shall be as follows:

1. Local/Neighborhood streets – 4 inch of asphaltic concrete, consisting of two 2 inch lifts of Level 2, 1/2 inch ACP, with 12 inch Aggregate Base. PCC alternate equals 6 in. Plain Concrete Pavement (ODOT 00756) on compacted subgrade.

2. Collectors – 5 inch of asphaltic concrete, consisting of one 2 inch lift of Level 2, 1/2 inch ACP, one 3 inch lift of Level 2, 3/4 inch ACP, with 14 inch Aggregate Base. PCC alternate equals 7 inch Plain Concrete Pavement (ODOT) section 00756 on compacted subgrade.

3. Arterial – 6 inch of asphaltic concrete, consisting of one 2 inch lift of Level 2, 1/2 inch ACP, one 4 inch lift of Level 2, 3/4 inch ACP, with 14 inch Aggregate Base. PCC alternate in accordance with a City Engineer approved pavement design.

4. Each lift shall meet the testing and placement requirements of (ODOT) section 00744. be tested, approved and accepted prior to the next one being placed over.

5. Aggregate base shall consist of 1-1/2" -0 crushed rock with 2 inch of 3/4" -0 leveling course.

E. Geosynthetics may be required on any street type depending on soil and weather conditions or as directed by the City Engineer.

5.0040 Concrete Curb

A. Curb and/ or Gutter, shall be constructed as shown in the approved cross-section.

B. Control joint spacing in curbs shall be at a 15 ft. maximum at all curb return points and at driveway curb-drop transition points.

5.0041 Curb Return Radius

A. Curb return radius at street intersections shall be designed to accommodate all expected traffic. Curb extensions and/or special crosswalk/sidewalk features designed to enhance pedestrian safety may be required to encourage pedestrian usage. Standard curb radii required are as shown in the table below.

Intersection	**Radius**
Arterial – Arterial	35 ft.
Arterial – Collector	25 ft.
Arterial – Neighborhood Route or Local Street	20 ft.
Collector – Collector	25 ft.
Collector – Neighborhood Route or Local Street	15 ft.
Neighborhood Route – Neighborhood Route	15 ft.
Local Street – Local Street	15 ft.

B. Larger curb radii may be required on streets serving commercial/industrial properties for vehicle movements.

5.0050 Sidewalks

A. All sidewalks and curb ramps shall be constructed in accordance with standard details to provide accessibility for pedestrians with disabilities.

B. All sidewalk shall be constructed of 4 in. of Portland Cement Concrete over 2 in. of aggregate base on compacted subgrade. At driveways and curb ramps, all sidewalk shall be 6 in. of Portland Cement Concrete over 2 in. of aggregate base on compacted subgrade.

C. Sidewalks shall be within the dedicated right-of-way, unless a public access easement is granted and approved.

D. Pedestrian curb ramps shall have yellow truncated domes that extend the full width of the ramp and cover the first 2 ft. of the ramp closest to the street. Sidewalk joints shall be finished with a 3 in. shine in new construction, or if construction is infill work, finish shall match existing pattern. A light broom finish is required on all sidewalk and curb ramps perpendicular to the direction of travel.

E. Any damaged, cracked, or broken sidewalk panels shall be removed and replaced in whole. No partial repairs.

F. All structures in the sidewalk area shall be located to provide a minimum unobstructed width of 48 in. horizontal. Where mailboxes or other objects are within the sidewalk area, the walk shall be widened to provide adequate clearance, or be aligned to go around any obstacles. Alternate alignments and widths must be approved by the City Engineer. A 7 ft. vertical clearance above the sidewalk shall be maintained.

5.0060 Bikeways

The need for bikeways shall be determined by the City's Transportation System Plan. Bikeway facilities should meet the requirements of the following documents:

1. AASHTO, "Guide to Development of Bicycle Facilities", the AASHTO guide should be consulted for geometric design such as sight-distance, and horizontal and vertical curves
2. ODOT, "Oregon Bicycle & Pedestrian Plan", latest edition
3. "Manual on Uniform Traffic Control Devices" (MUTCD) with Oregon supplements by Oregon Transportation Commission
4. NACTO (National Association of City Transportation Officials), "Urban Bikeway Design Guide"

5.0061 Bikeway Location, Width

Bikeway dimensions shall be as shown in the approved street cross section.

5.0062 Design Criteria

A. All bikeways should have a standard cross slope of 2% and a maximum cross-slope of 5%. On curved alignments, the cross-slope shall be to the inside of the curve.

B. When bikeways are integrated with a gutter, all inlet grates shall be designed to protect the bicyclist from the grate or opening.

5.0063 Construction

A. All bikeways shall be constructed of 3 in. of asphaltic concrete pavement, consisting of one 3 inch. lift of Level 2, 1/2 inch ACP with 6 inches of Aggregate Base.

B. When drainage such as side ditches are located parallel with a bikeway, the ditch centerline shall be at least 5 ft. from the edge of the pavement. Ditch side slope adjacent to the bikeway shall be no steeper than 2:1 when measuring the horizontal distance to the vertical distance.

C. When culverts cross bikeways, the ends of the pipe shall be no closer than 5 ft. from the edge of the bikeway.

5.0070 Driveways

A. Access to private property shall be permitted with the use of curb cuts. Curb cuts are measured between the tops of the driveway wings.

B. On arterial and collector streets, one driveway curb cut per site frontage will be allowed. Driveways serving residential development shall be designed to prevent vehicles from backing onto arterial and collector streets. Double frontage lots and corner lots may be limited to access from a single street, typically the lower classification street. If additional driveways are approved by the City Engineer, restrictions may be imposed, such as limited turn movements, shared access between uses, closure of existing driveways, or other access management actions. Commercial developments with frontage greater than 250 ft. may request an additional driveway.

C. Driveways shall conform to the applicable standard drawings and meet the following cross-section.

   1. Portland Cement Concrete Driveways: 6 in. of Portland Cement Concrete over 2 in. of aggregate base on compacted subgrade.

   2. Asphalt Pavement Driveways: 3 in. of asphaltic concrete, consisting of one 3 in. lift of Level 2, 1/2 inch ACP with 6 inches of Aggregate Base on compacted subgrade.

   3. Maximum driveway slope in the right-of-way shall be no more than 15%, unless otherwise approved by the City Engineer.

D. Expansion joints are not allowed in the right-of-way.

E. Sidewalk and bikeways shall be continuous through all driveways.

F. Width and Location of Curb Cuts

   1. Minimum curb cut width shall be 16 ft.

   2. Maximum curb cut width shall be 36 ft., except along arterial streets in commercial zones in which case the maximum curb cut shall be 40 ft.

   3. No curb cuts shall be allowed closer to an intersecting street right-of-way line than the following:

      a. On an arterial when intersected by another arterial, 150 ft.

      b. On an arterial when intersected by a collector, neighborhood route or local street 100 ft.

      c. On a collector when intersecting an arterial, 100 ft.

      d. On a collector when intersected by another collector, a neighborhood route or local street, 35 ft.

      e. On a neighborhood route when intersecting any other street, 35 ft.

      f. On a local street when intersecting any other street, 35 ft.

   4. There shall be a minimum distance between any two adjacent curb cuts on the same side of a public street except for one-way entrances and exits, as follows:

      a. On an arterial street, 150 ft.

      b. On a collector street, 75 ft.

      c. Between any two curb cuts on the same lot on a neighborhood route or local street, 30 ft.

   5. Curb cuts shall be kept to a minimum and consolidation of commercial driveways is preferred.

   6. Adequate line of sight pursuant to engineering standards should be afforded at each driveway.

   7. Curb cuts shall be a minimum of 5 ft. from the property line, unless a shared driveway is installed.

8. For street classification of collector and above, driveways adjacent to street intersections shall be located beyond the required queue length for traffic movements at the intersection. If this requirement prohibits access to the site, a driveway with restricted turn movements may be required.

9. Shared driveways and internal access within commercial, industrial, and multi-family areas are encouraged to reduce the access points to the higher classified roadways; to improve internal site circulation; and to reduce local trips or movements on the street system. Shared driveways or internal access between uses will be established by means of common access easements at the time of development.

10. Multi-family access driveways will be required to meet the same access requirements as commercial driveways if the multi-family site generates 100 or more trips per day.

5.0080 Street Lighting, Trees, Names and Signage

5.0081 Street Lighting/Small Wireless Facilities

A. A complete street lighting system shall be the responsibility of the developer. All streets fronting the property shall provide adequate lighting as determined by the City Engineer. All developers will be required to submit a lighting plan to the City Engineer that conforms to Illuminating Engineering Society (IES) Standards except as modified by the City.

B. For new subdivisions or land use actions requiring street light installation, all plans for street lights shall be submitted with the construction plan submittal. Approvals for street light plans will be issued as part of the construction plan package.

C. Required street lights shall be acquired through Portland General Electric (PGE).

1. Standard street light luminaires (Schedule 95) and poles (Schedule 91) shall be PGE owned, maintained, and energized under PGE Option A.

2. Standard street light luminaires shall be LEDway by BetaLED or a PGE-approved equal as determined by the City Engineer. No Cobrahead luminaires are permitted. Decorative luminaires and poles (PGE-approved, Schedule 91, Option B) may be submitted to the City Engineer for review and approval on a case-by-case basis or may be required by the City Engineer to match existing areas or for special circumstances.

3. Standard luminaire and pole color shall be Bronze. Standard pole height 30’ with 6’ mast. Alternatives will require the City Engineer’s review and approval.

4. Streetlight luminaire and poles for new development will be determined by the City Engineer.

D. It is the policy of the City to light streets to the IES Standards listed below:

Street Classification	**Zoning Classification**	**Average Maintained Illumination**	**Uniformity Average to Minimum**
Arterials	Non-Residential Residential	1.1 foot-candles 0.8 foot-candles	3 to 1
Collector	Non-Residential Residential	0.8 foot-candles 0.5 foot-candles	4 to1
Neighborhood Route and Local	Non-Residential Residential	0.6 foot-candles 0.4 foot-candles	6 to1

E. Small Wireless Facilities:

1. Small Wireless Facility color shall be Bronze. Standard pole height 30' with 6' mast. Alternatives will require the City Engineer's review and approval.

5.0082 Street Trees

Street trees in the public right-of-way, or within the yard setback and/or buffer area immediately adjacent to the right-of-way, will be required of development in accordance with the City's Municipal Code. The particular species will be reviewed and approved as part of overall project submittals. Review the City's Tree Technical Manual for a list of species that are acceptable street trees for each context.

5.0083 Street Names, Traffic Control Signage, and Pavement Markings

Street names for all new development will be approved by the City prior to recording of the final plat. The development shall pay for all street name and traffic control signage prior to the signing of the final plat by the City. All new signage and pavement markings shall be installed in accordance with City Standards and MUTCD guidelines.

5.0084 On-Street Accessible Parking

A. On-street accessible parking spaces shall be provided along all blocks where parking spaces are marked or metered. The number of accessible parking spaces provided on a block perimeter will meet the minimum requirements of Table R214 of the Public Rights-of-Way Accessibility Guidelines.

B. In residential areas without marked or metered parking, a property owner may submit a written request to the Public Works Department for an accessible parking space designation along their property frontage.

1. The request must confirm that the area meets all of the following conditions:
    i. The property is located outside of a marked or metered zone.
    ii. There is no off-street parking on the property. Examples of off-street parking include parking lots, parking structures, garages, carports, driveways without carports or garages or any other parking space on private property.
    iii. There are no more than 2 accessible parking spaces already on the block face or within 500 feet of curb from the requestor address.
2. The request must also contain the following information:
    i. Property owner, address, and contact phone number
    ii. Copy of State-issued Disabled Person Parking Permit placard

C. The location of accessible parking markings and signage will be determined by Public Works.

5.0090 Cul-de-sacs and Closed-End Streets

A. A standard cul-de-sac turnaround shall be provided at the end of a public street that does not provide looped circulation. Where a cul-de-sac is not feasible, as approved by the City Engineer, all closed-end streets shall terminate with one of the following turnaround configurations:

1. Hammer Head Turnaround
2. "T" Turnaround
3. "Y" Turnaround

B. The minimum outside curb radius for cul-de-sac bulbs shall be 45 ft.

C. A temporary turnaround is required for future street extensions that exceed 100 ft. A “No Outlet” (MUTCD W14-2a) sign shall be installed in advance, along with three Type 4 (MUTCD OM4-3) object markers at the end of all closed end streets.

5.0100 Alleys and Private Residential Streets/Accessways

5.0101 Alleys

A. To serve development, alleys allow for efficient lot use, support front yard pedestrian orientation and landscape spaces, and reduce lot coverage by driveways. Alleys serve as a common driveway for access, utilities, and deliveries.

B. Alleys may be allowed with approval by the City Engineer. When approved, alley dimensions shall be a minimum16 ft. wide paved surface with 2’ aggregate shoulders inside a 20 ft. wide right-of-way.

C. Pavement design for alleys shall meet the same criteria as a local street.

5.0102 Private Accessways

Typically, private accessways are provided for multi-family developments such as condominiums and apartments. The standards for private accessways include:

1. Closed-end accessways which exceed 100 ft. in length shall be provided with an approved turnaround.
2. "Private Street" signage shall be placed at the connection with the public street to clearly identify the private accessway.
3. The private accessways shall follow the Driveway Standard Detail at any connections to public streets. Private accessways shall meet the minimum pavement design of local streets.

5.0110 Local Street Design for Adverse Topography

A. The Design Engineer may utilize an "offset" or unequal crown section when the existing ground slope exceeds 8% across the roadway section.

B. The offset crown design shall meet the following conditions:

1. Minimum distance from "crown" to face of curb is 10 ft.
2. Maximum cross-slope of pavement is 5%.
3. Maximum differential in top of curb elevation from one side to the other is 1 ft.

C. The existing ground "side-slope" criteria are based on the relationship of the slope of the ground to the transverse slope of the roadway profile. This relationship shall be met for the entire length of the roadway alignment utilizing an offset crown.

5.0120 Medians

When medians are used, the following criteria must be met:

1. Street lighting shall be sufficient to provide illumination of the median.
2. Objects such as trees, shrubs, signs, light poles, etc., shall not physically or visually interfere with vehicle or pedestrian traffic or traveled way. Medians and objects within the median can be site specific and will be subject to City approvals.
3. Medians in the public right-of-way are maintained by the Public Works Department. Planting and irrigation plans for medians shall be submitted to the Engineering Division for review and approval. Inspections of planting and irrigation systems shall be coordinated directly with the Public Works Department Street Supervisor. Irrigation of medians shall be designed to water lawn areas and shrub areas separately.

5.0130 Guardrails

A. The decision of whether to install guardrails shall be based on the information found in the AASHTO publication, AASHTO "Roadside Design Guide, latest edition."

B. Guardrails shall be designed and constructed per ODOT's Standard Drawings.

5.0140 Pavement Transitions

A. In the direction of vehicular traffic, street width transitions from a narrower width to a wider width shall be designed with a three to one taper. Delineators, as approved by the City, shall be installed to define the configurations.

B. In the direction of vehicular traffic, street width transitions from a wider width to a narrower width and the length of transition taper shall be determined as shown below.

$L = S \times W$ for S = 45 MPH or greater $L = \frac{S^2 \times W}{60}$ for S less than 45 MPH	Where L = minimum length of taper (ft.) S = Design speed (MPH) W = EP to EP offset width EP = Edge of pavement to center line

C. Delineators, as approved by the City, may be installed to define the configuration. Maximum spacing of delineators shall be the numerical value of the design speed, in ft. (e.g. 35 ft. spacing for 35 MPH).

5.0150 Monument Boxes

Monument boxes shall be installed and be in accordance with all Clackamas County surveyor specifications and requirements.

5.0160 Bicycle Parking

A. The Public Works Department installs, maintains, and determines locations of bicycle parking within the right-of-way.
B. All bicycle parking shall follow the standard detail WL-BI010.
C. Property owners and residents may request bicycle parking by sending a written request to the Public Works Department.

5.0170 Private Streets

Private streets must meet the identical requirements of public or City streets with respect to design and construction standards; however, the City has no maintenance responsibilities for private streets.