
City of Amity
Yamhill County, Oregon

DIVISION 3:
STREET AND TRANSPORTATION SYSTEM
DESIGN STANDARDS MANUAL
Guidelines for Development



Effective: June 1, 2004

Section 1 – General Design Requirements

- 1.1 The purpose of this manual is to set standards for the design and construction of streets, sidewalks, and general transportation system improvements to serve new and future development. This manual may be updated periodically and the design engineer shall ensure that they have the latest version.
- 1.2 Persons planning to construct development must obtain a Development Permit from the City of Amity and pay the necessary engineering review fees in accordance with the “Engineering Policy – Guidelines for Development”. Other permits required may include a Public Works Construction Permit issued by Yamhill County, a 1200-C Erosion Control Permit from the Oregon Department of Environmental Quality (DEQ), ODOT, Corps of Engineers/Division of State Lands, and others as required by Federal, State, and County laws and regulations.
- 1.3 All surveys for development of public works facilities shall be performed under the direction of a Professional Engineer (PE) or Professional Land Surveyor (PLS) licensed in the State of Oregon. At least one Benchmark shall be established or located within the project limits. Elevations shall be referenced to the NGVD 29 datum. Survey shall be sufficient to accurately show existing facilities and topography.
- 1.4 Design drawings, specifications, and calculations shall be conducted by an Oregon licensed Professional Engineer.
- 1.5 The engineer preparing the plans shall make necessary arrangements for locates on all underground utilities in the vicinity for use in preparing the plans. Such utilities shall be shown accurately in the plans.
- 1.6 Materials and details shall conform to the requirements of this manual.
- 1.7 All applicable laws, codes, regulations, and permit requirements shall be complied with.

Section 2 – Design Plan Format

- 2.1 Engineering plans and specifications shall be prepared for all public works improvements. Plans shall be clear and legible and show all improvements in sufficient detail to allow for determination of compliance with City standards, and proper field construction. City engineer may require additional detail if deemed necessary.
- 2.2 Plans shall be computer generated in an AutoCAD compatible format.
- 2.3 The plans shall be submitted on 22 x 34-inch sheets unless otherwise pre-approved. Plans shall be blackline prints. Blue line copies are not acceptable. Letter size may not be less than 0.08-inches.
- 2.4 Plans shall be drawn to scale. The scale shall be 1-inch = 2, 3, 4, or 5-feet vertically and 1-inch = 10, 20, 30, 40 or 50-feet horizontally. Details may be drawn at larger scales for clarity. Plan scale shall be called out for each drawing. A graphical scale bar shall be included on each sheet.

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- 2.5 A north arrow shall be shown on each plan view sheet and other plan detail oriented differently than the main drawing on the sheet.
 - 2.6 A title block shall appear on each sheet of the plan set placed in the lower right-hand corner, across the bottom edge of the sheet, or across the right-hand edge of the sheet. Title block shall include the name of the project, the engineering firm, the owner, the sheet title, and the sheet number.
 - 2.7 The seal of the registered Oregon Professional Engineer responsible for the preparation of the plans shall appear on each sheet. Final Plans must be stamped and signed by a Professional Engineer licensed in the State of Oregon. Plan approval will not be granted until final signed sets are received. Approval by the City does not relieve the Applicant's Engineer from the responsibility of the design.
 - 2.8 Plans shall begin with a title sheet identifying the project and including a vicinity map showing the location of the project within the City. General notes and a sheet index should also be included.
 - 2.9 Plan views must show existing and proposed improvements and features within or adjacent to the project including survey monuments, edge of pavement, road centerline, buildings, curbs, gutters, sidewalks, culverts, ditches, streams, utility poles, and other surface improvements and features. The location of underground utilities including power, gas, water and sewer shall be shown as accurately as possible. Right-of-way, property lines, easements, street names, lot numbers, and other labels shall also be shown. Existing and finish grade contours (2 foot maximum) should be shown where possible.
 - 2.10 Plan shall show the location, stationing, and geometry of all sidewalks, paved streets, cul-de-sacs, and other transportation infrastructure. The location of existing and new sewer, water, and storm infrastructure components shall also be shown, where applicable. Matchlines shall be used when continuing to other sheets.
 - 2.11 At least one composite utility plan shall be included which shows all proposed improvements (water, sewer, streets, sidewalk, curb, culverts, storm drainage, etc.) in one plan view to help avoid or identify conflicts and designate horizontal separations and locations.
 - 2.12 Profile view with stationing and elevation shall be provided for street improvements. The existing grade and finished grades, at a minimum, will be shown on the profile.
 - 2.13 Detail drawings shall be provided for sidewalk ramps, signage, standard road sections, and others as required.
 - 2.14 Project specifications shall be provided covering materials and workmanship in accordance with this document and standard engineering practice. Specifications not detailed herein shall generally conform to 2002 Oregon Standard Specifications. All specifications shall be subject to City approval.
 - 2.15 Benchmark used to establish elevations shall be shown on the plans.
 - 2.16 Refer to the City's "Engineering Policy – Guidelines for Development" document for additional requirements and submittal procedures.

Section 3 – Street and Transportation System Design Requirements

3.1 Creation of Streets

- 3.1.1 No development may occur unless the development has frontage on or approved access to a public street currently open to traffic. A currently non-opened public right-of-way may be opened by improving it to City Standards.
- 3.1.2 Streets are to be created in a pattern of interconnection to reduce travel distance, provide multiple travel routes, and promote the use of alternative modes.
- 3.1.3 Streets (including alleys) within and adjacent to a development shall be improved to City Standards. In addition any new street or additional street width planned as a portion of an approved street plan shall be dedicated and improved in accordance with this article.
- 3.1.4 Streets are usually created through the approval of a subdivision or partition plat. However, the City Council may also approve the creation of a street by acceptance of a deed.
- 3.1.5 Where necessary to give access to or permit a satisfactory future subdivision of adjoining land, streets shall be extended to the boundary of the subdivision; and the resulting dead-end streets may be approved without a turnaround. Reserve strips and street plugs may be required to preserve the objectives of street extensions. Typically, the maximum allowable length of a temporary dead-end without a turnaround will be limited to 300-feet, unless otherwise approved by the City Engineer.
- 3.1.6 Creation of access easements.
 - A. In general, the creation of access easements between property owners is discouraged. However, there are some instances where an access easement is the only viable method of providing access to a developable lot. An access easement may be approved when the following criteria are satisfied:
 - 1. No more than two parcels or uses are to be served by the proposed access easement;
 - 2. There is sufficient room for public right-of-way due to topography, lot configuration, or placement of existing buildings, and,
 - 3. The City Engineer has determined that there is not a need for a public street with regard to the subject development and location.

3.2 Street Geometry - General

- 3.2.1 The location, width, and grade of streets shall be considered in their relation to existing and planned streets, topographical conditions, and the planned use of the land to be served by the streets.
- 3.2.2 Grades, tangents, curves, and intersection angles shall be appropriate for the traffic to be carried, considering the terrain.

- 3.2.3 As far as practical, streets other than minor streets, shall be in alignment with existing streets by continuations of the centerlines thereof. Staggered street alignment resulting in ‘T’ intersections shall, whenever practical, leave a minimum distance of 200 feet between the centerlines of streets having approximately the same direction, and otherwise shall not be less than 100 feet long.
- 3.2.4 Whenever possible, local streets will be aligned in the same direction as or parallel to the existing streets in the City to maintain the same “grid” layout. A variation of not more than 25 degrees may be allowable upon approval by the City Engineer.
- 3.2.5 Intersections
- A. Streets shall intersect one another at an angle as near to the right angle as is practicable considering topography of the area and previous adjacent layout.
 - B. Where not practicable, the right-of-way and street paving within the acute angle shall have a minimum of 30 feet centerline radius where such an angle is not less than 60 degrees.
 - C. The intersection of an arterial or collector street with another street shall have at least 100 feet of tangent adjacent to the intersection unless topography requires a lesser distance.
 - D. Other streets, except alleys, shall have at least 50 feet of tangent adjacent to the intersection unless topography requires a lesser distance.
 - E. Intersections which contain an acute angle of less than 80 degrees or which include an arterial street shall have a minimum corner radius sufficient to allow for a roadway radius of 20 feet and maintain a uniform width between the roadway and the right-of-way line.
- 3.2.6 Symmetrical street cross sections are preferred, with opposing curbs at the same grades.
- 3.2.7 Tilted, warped, super-elevated, or other cross sections are only allowed under specialized cases and as approved by the City Engineer.
- 3.2.8 All driveways must be located the maximum distance which is practical from a street intersection and in no instance shall the distance from an intersection be closer than the following as measured from the nearest curb return radius:
- A. Arterial Street 40 feet
 - B. Collector Street 20 feet
 - C. Local Street 10 feet

3.3 Cul-de-sacs

- 3.3.1 A cul-de-sac shall be as short as possible and no more than 600 feet long or serving more than 18 dwelling units. Wherever possible, a connection to a parallel side street should be used instead of a cul-de-sac.
- 3.3.2 Each cul-de-sac shall have a circular end with a minimum diameter of right-of-way width and paved to the widths discussed later in this section.
- 3.3.3 Cul-de-sacs are to be graded so that surface water is shed to the outer curbs and gutters. The finished pavement grade from the center point of the cul-de-sac to the gutter line shall be at least 2-percent (negative).

3.4 Grades and Curves

- 3.4.1 Grades on streets shall not exceed 6% on arterials, 10% on collector streets, or 12% on any other street.
- 3.4.2 Centerline radii of curves shall not be less than 300 feet on major arterials, 200 feet on collectors, and continuing residential streets, and 100 feet on other streets and alleys and shall be rounded to an even 10 feet.
- 3.4.3 Where existing conditions, particularly topography, make it otherwise impractical to provide buildable lots, the Planning Commission may accept steeper grades and sharper curves.
- 3.4.5 In flat areas, street grades shall have a minimum slope of 0.25 percent with curb and gutter and 0.4 percent with a full depth standard curb.

3.5 Alleys

- 3.5.1 Alleys shall be provided in commercial and industrial districts, unless other permanent provisions for access to off-street parking and loading facilities are approved by the Planning Commission.
- 3.5.2 Corners of the alley intersection shall have a radius of not less than 12 feet.
- 3.5.3 The City may require adequate and proper alleys to be dedicated to the public by the land divider of such design and in such location as necessary to provide for the access needs of the subdivision, development, or partition.
- 3.5.4 Width of right-of-way and paving design for alleys shall not be less than 20 feet. Slope easements shall be dedicated as required by the City.
- 3.5.5 Where two alleys intersect, 10 feet corner cut-offs shall be provided.
- 3.5.6 Grades shall not exceed 21% on alleys and centerline radii on curves shall be not less than 100 feet.

3.6 Right-of-Way and Roadway Widths

- 3.6.1 All street width requirements shall be reviewed on a case-by-case basis by the City Engineer.
- 3.6.2 The width and classification of all streets must conform to any approved transportation master plan or recorded subdivision plat.
- 3.6.3 Unless otherwise indicated in an approved Master Plan or subdivision plat, the minimum design widths shall be as shown in the following table:

**Table 3.6.3A
Typical Design Widths**

Section	Type of Street	Minimum ROW Width (ft)	Minimum Roadway Width (ft)
A	Arterial Streets	88	64
B	Collector Streets	66	44
C	Commercial and Industrial other than Arterials	80	44
D	Local Residential Streets Serving 20 or More Dwelling Units	60	34
E	Local Residential Streets Serving 20 or Less Dwelling Units	50	28
F	Circular Ends of Cul-de-sacs (diameter)	114	90

- 3.6.4 Standard roadway designs and standard details can generally be used for residential streets and collectors streets. Standard sections are only to be considered minimum designs as actual soil conditions may require thicker base rock or pavement installations.

3.7 Design Capacities and Design Speeds

- 3.7.1 For the purposes of classifying and defining the design capacities of the various street types, the following table shall be used:

**Table 3.7.1
Typical Design Capacities and Speeds**

Type of Street	Design Capacity, Vehicles per Day	Design Speed, mph
Arterial	32,000	40-50
Collector	10,000	35
Commercial/Industrial other than Arterials	12,000	30
Local Streets serving 20 or More Dwellings	7,000	30
Local Streets serving 20 or less Dwellings	1,200	25
Cul-de-sacs	200	NA

3.8 Curb and Gutter

- 3.8.1 Curb tops shall be set slightly below adjacent ground so as to receive surface drainage.
- 3.8.2 Three-inch diameter weep holes shall be provided through the curbs with inverts one inch above gutter line, at the following locations:
 - A. Opposite existing or anticipated roof downspouts (minimum two per lot).
 - B. At 16 foot on center along low areas where curb top is above adjacent ground.
 - C. At 16 foot on centers adjacent to bank areas to receive ground water.
- 3.8.3 Curb shape to conform to standard details. No “glue-down” extruded curbs shall be allowed in the public right-of-way.
- 3.8.4 Machine extruded curbs, as well as formed and poured curbs, shall require a minimum of 2-inches of $\frac{3}{4}$ ” minus crushed rock base.
- 3.8.5 Maximum allowable tolerance for finished curbs shall be $\frac{1}{2}$ ” on alignment, and $\frac{1}{4}$ ” on grade at any point, providing a “bird bath” does not occur.
- 3.8.6 Provide drop curbs for driveways, curb radii, and ambulatory ramps with original curb pour when locations can be determined in advance.
- 3.8.7 No intruding structures, including, but not limited to, manholes, valves, and junction boxes shall be located within two feet of the curb or gutter, unless otherwise approved by City Engineer.
- 3.8.8 Type ‘C’ concrete curbs may be used on partial street sections or in special circumstances when approved by the City Engineer.
- 3.8.9 Valley gutters are not to be used except for in alleys or other special conditions, and only upon approval by the City Engineer.
- 3.8.10 Curb Return Radii
 - A. A WB-67 design vehicle shall be used when designing curb radii for all truck routes.
 - B. Unless otherwise required, or approved by the City Engineer, all other curb radii at public street intersections shall be designed in accordance with Table 3.8.10

TABLE 3.8.10
Minimum Radii and Design Vehicles for Determining Curb Radii

Primary Street Classification	Secondary Street Classification	Zoning	Minimum Radii (ft)	Design Vehicle
Local	Local	Residential	25	Emergency
Local	Local	Non-Residential	25	Emergency
Collector	Local	Residential	25	Emergency
Collector	Local	Non-Residential	25	WB-50
Collector	Local	Residential	25	Emergency
Collector	Collector	Residential	25	WB-50
Minor Arterial	Collector	All	35	WB-67
Minor Arterial	Minor Arterial	All	35	WB-67

3.9 Driveways

3.9.1 Driveways shall conform to the Standard Details.

3.9.2 Driveways may be deferred until lots are built upon, if approved by the City Planning Commission or City Council.

- A. If the developer chooses to delay the installation of a driveway approach, additional repair of curb and gutter, sidewalk, and other facilities may be required when the driveway is installed.
- B. The cost of installing a driveway approach and the associated repairs to curb and gutter, sidewalk, and other facilities will be borne, solely, by the developer.

3.9.3 Any driveway(s) serving property which is used for purposes other than single family residential or duplexes shall be designed as and built to the standards of a commercial driveway.

3.9.4 A concrete alley apron serving public right-of-way or alley shall be built to the standards of a commercial driveway.

3.9.5 Residential Driveway Approach Standards

- A. A residential driveway approach shall be constructed of Portland cement concrete, minimum of 6-inches in thickness, 3,000 psi field strength, with 2-inches (minimum) compacted ¾"-0" crushed rock base. No rebar or wire mesh is required for residential approaches.
- B. Transition flares shall also be constructed to the same standard as residential driveway approaches.

3.9.6 Commercial Driveway Approach Standards

- A. A commercial driveway approach shall be constructed of Portland cement concrete, minimum 8-inches in thickness, 3,500 psi field strength, with 2-inches (min) compacted $\frac{3}{4}$ "-0" crushed rock base, and placed with No. 4 rebar on 12-inch centers both ways at 2-inches above the bottom of the slab, or place 2 layers of 6x6x10 welded wire mesh at 2-inches above the bottom of the slab.
- B. Transition flares shall be constructed to the same standards for commercial driveway approaches.

3.9.7 No driveway approach slope shall exceed 15-percent.

3.10 Access Ramps

- 3.10.1 All pedestrian ramps shall conform to the current Americans with Disabilities Act (ADA) federal regulations and to the current Oregon Department of Transportation requirements.
- 3.10.2 Where applicable, ramp approaches shall be aligned with and be wholly contained within, the crosswalk markings.
- 3.10.3 Ramp approaches shall not be positioned directly in the path of catch basin grates.
- 3.10.4 Ramp approaches shall be directly aligned with one another with no offset through the intersection.
- 3.10.5 Ramp approaches shall be as close as possible to perpendicular to the street they are crossing in order to minimize the crossing distance.
- 3.10.6 Ramps shall be aligned to point directly to the ramp across the road that is intended to receive the pedestrian.
- 3.10.7 Obstructions including, but not limited to, mail boxes, water meters, valves, junction boxes, manholes, utility poles, trees, benches, fire hydrants, signs, and bus stops shall not be located within the ramp area or the flares.
- 3.10.8 Ramp flares may extend beyond the crosswalk markings.
- 3.10.9 Two ramps shall be provided at each curb radius to allow direct access from the ramps into the street.
- 3.10.10 At local residential street "T" intersections, driveway approaches designed and constructed to ADA standards may be used to provide pedestrian access provided they are constructed with no lip at the gutter bar.

3.11 Sidewalks

- 3.11.1 All development for which land use applications are required must include sidewalks adjacent to public streets. This requirement also applies to new single-family houses and duplexes if they are located on arterial or collector streets or on curbed local streets if there is an existing sidewalk within 500 feet on the same side of the street.
- 3.11.2 In the case of arterial or collector streets, sidewalks shall be built during their construction and considered during their reconstruction or rehabilitation. This provision shall also to local streets that serve commercial and multi-family development.
- 3.11.3 The provision of sidewalks may be waived where the street serves a use or combination of uses which generate fewer than fifty trips a day (based on ITE standards) and cannot be continued or extended to other properties. A waiver shall only be granted upon review and approval of the City Engineer.
- 3.11.4 Sidewalks are required on both sides of all streets.
- 3.11.5 Design, Width, and Location
- A. The required width for a sidewalk on an arterial or collector street is (7) feet. This width may be reduced to (6) feet if the sidewalk is separated from the curb by a landscaped planter strip at least five feet in width. In those instances when there is inadequate right-of-way, the sidewalk width can be reduced to five (5) feet.
 - B. In all cases, the right-of-way remaining outside of the sidewalk is to be landscaped and maintained by the adjoining property owner.
 - C. Sidewalks along residential and other local streets must be a minimum of five (5) feet in width. Sidewalk design may be setback or integral as determined by the developer, City Engineer, or funding agency.
 - D. If a setback sidewalk design is selected, a planter strip at least six (6) feet wide shall separate the sidewalk from the street (curb). If trees are to be planted in the planter strip, they must be of an approved variety.
 - D. Regardless of other provisions in this standard, any sidewalk project less than 200 feet in length and connects on either end to an existing sidewalk may be designed to match the existing pattern with the approval of the City Engineer. Generally, sidewalks shall be consistent with the existing sidewalk design in the same block. Transitions should be made at intersections whenever possible.
 - E. Where obstructions existing or are proposed (including, but not limited to mail boxes, utility poles, trees, planters, fire hydrants, signs, benches, bus stops, etc.), provisions must be made to maintain a minimum of four feet of unobstructed sidewalk width on local streets, and five feet on collector and arterial streets.

- F. Maintenance of sidewalks and planter strips shall be the continuing obligation of the adjacent property owner except where the lot backs onto an arterial street.
- G. Sidewalks shall be designed to parallel streets in line and grade and shall avoid unnecessary meandering from the curb line and elevation changes except as necessary to avoid significant trees or traverse topographic barriers.
- H. All sidewalks are to be a minimum of four (4) inches thick Portland cement concrete placed on a minimum of two (2) inches compacted $\frac{3}{4}$ "-0" crushed rock base.

3.12 Bikeways

- 3.12.1 Where bikeways are required or planned, bikeways should be separated from other modes of travel, including pedestrian.
- 3.12.2 Minimum widths for bikeways shall be six (6) feet where adjacent to a curb (one-way) and ten feet when not on the roadway (2-way).

3.13 Utilities

- 3.13.1 Utilities shall be located outside of the paved area if at all possible to avoid future street cuts.
- 3.13.2 On all phased (interim) street improvements, the necessary utilities shall be stubbed across the interim improvements to insure that cuts are not necessary when the road is expanded to its full width.
- 3.13.3 Except for sanitary sewer, storm sewer, and water, underground utilities intended to provide direct service to adjacent properties with future connections shall not be located in the full-width paved section of a street to be constructed. If all service connections are existing and extend beyond the full-width section of a partially improved (or interim) street, underground utilities can be located in the future paved section of the street, if approved by the City Engineer.
- 3.13.4 Underground utilities being constructed along newly paved streets shall not be located under the existing pavement unless approved by the City Engineer.
- 3.13.5 Underground utilities that must cross an existing paved street shall not be installed by any method which cuts the pavement or undermines the aggregate base of the street unless approved by the City Engineer.
- 3.13.6 All underground utilities shall be installed at a minimum bury depth of thirty (30) inches as measured from the finished grade to the top of utility.
- 3.13.7 When new curbing is being placed, (in conjunction with new utility mains or service laterals), a stamp shall be placed in the top of the curb to mark the located where each water and/or sewer service crosses the curb. The method of marking

the curb shall be approved by the City Engineer and noted on the approved construction plans. An imprinting stamp is preferred that is capable of leaving an impression directly into the curing concrete. A “W” shall be used for a water service and an “S” shall be used to designate a sewer service. The stamped impressions should be a minimum of two (2) inches in height, placed on the top of the curb.

3.14 Trenching and Street Cuts

3.14.1 The City will not allow, without prior approval from the City Engineer, any street cuts on newly paved or resurfaced streets (paved within the past 12 months).

3.14.2 All approved street cuts in streets of higher functional classification than local residential shall be backfilled with Controlled Density Fill (CDF or CLSM as specified in OSS Section 00442) meeting the material requirements of the supplier. However, the City Engineer may require CDF on residential local streets if conditions warrant.

Section 4 – Construction Provisions

- 4.1 All work within the public right-of-way shall be conducted by a licensed and bonded contractor. This requirement shall be stated on the construction drawings.
- 4.2 City shall be notified at least 3 working days in advance prior to commencing construction work.
- 4.3 Traffic control shall be signed, flagged and conducted in a manner conforming to ODOT standards (Manual of Uniform Traffic Control Devices, MUTCD) and approved by Yamhill County, where appropriate. If road closures or detours are anticipated, prior approval from City, ODOT, and County officials must be obtained, as appropriate.
- 4.4 Safety Requirements. The contractor is responsible for observing the safety of the work and all persons and property coming into contact with the work. The contractor shall conduct his work in a manner complying with the requirements prescribed by OSHA.
- 4.5 Progress. Construction shall proceed in a systematic manner to minimize public inconvenience and disruption of services. All excavations, embankments, stockpiles, waste areas, etc. shall be kept protected. All roads, ditches, etc. shall be kept free from debris and shall be continually cleaned during the work. Dust control measures shall be employed as required and directed by the City.
- 4.6 Protection of Existing Improvements. Contractor shall contact the Utility Notification Center (1-Call) at least 48 hours in advance of digging operations to get approximate locations for buried utilities. Exact locations of buried facilities may not be known or shown and contractor is responsible to pot-hole carefully in advance of the work to avoid such facilities. Contractor shall coordinate with all utilities and notify them immediately in the event of any damage. Contractor shall protect, repair, and replace any damaged utilities as directed by the persons responsible for such utility. All landscape, grass, shrubs, signs, pavements, mail boxes, driveways, culverts, gravel surfacing, fencing, etc. shall be protected from damage and returned to conditions as good, or better than existed

- prior to construction. All costs for protection, repair, and replacement of all existing items shall be borne entirely by the contractor. Contractor shall obtain a release from any property owners for any claims of injury or property damage prior to final acceptance of the work by the City.
- 4.7 All existing survey monuments and control shall be protected, including individual property corner stakes. Any such monuments destroyed or altered during construction shall be restored by the contractor or developer in accordance with ORS.
- 4.8 Any temporary disruption to water or sewer service must be coordinated with, and approved by the City and kept to the minimum length of time necessary. The City shall be notified at least 2 working days in advance of when an approved shut-down is desired. Contractor shall not operate any valves or hydrants without City approval.
- 4.9 Compaction testing equipment (nuclear gauge) shall be furnished and operated by the contractor or an independent testing firm shall be retained by the contractor or developer to perform compaction testing. Testing shall conform to the ODOT Manual of Field Testing Procedures (MFTP). Compaction testing shall be conducted in the presence of the City's inspector. Sufficient tests will be taken to ensure that the materials and compaction efforts being used are adequate to obtain the required density. Several tests shall be taken on each lift placed during the first day of backfill operations. Additional tests will be taken periodically during the work. Alternate materials or methods will be required if adequate compaction is not being obtained.
- 4.10 Construction staking will be provided by the Developer's Engineer for establishing the alignment and grade of the transportation system to be constructed. Offset stakes shall be placed at no more than 100 foot intervals along the alignment. Grade staking, stationing, and other field layout shall be as required.

Section 5 – Street and Transportation System Materials

- 5.1 All materials shall be newly manufactured. No rebuilt, reconditioned or used material will be allowed.
- 5.2 Oregon Standard Specifications (OSS) – Means the 2002 Oregon Standard Specifications for Construction produced by ODOT and APWA, including latest revisions. In general, all paving materials, workmanship, and technical data shall conform to the OSS if not specified otherwise.
- 5.3 Portland Cement Concrete Pavement
- 5.3.1 Concrete shall conform to OSS Section 00440, Commercial Grade Concrete. Compressive field strength shall not be less than 3,300 psi at 28 days.
- 5.3.2 Maximum aggregate size shall be 1½-inches.
- 5.3.3 Slump shall be between 2 and 4 inches and shall not exceed 5 inches.
- 5.3.4 Prior to constructing a roadway or street using Portland cement concrete, the mix design for the concrete shall be provided to the City Engineer for review and

acceptance. Included in the mix design will be a description of the proportions for the ingredients of the mix, including:

- A. Air entraining admixtures.
- B. Chemical admixtures.
- C. Each size of aggregate.
- D. Fly ash.
- E. Other admixtures
- F. Water

5.3.5 Concrete used for public street construction will, generally, meet the requirements of Oregon Standard Specifications for Construction (ODOT-OSS), 2002 Edition, Section 2001.

5.4 Asphalt Concrete Pavement

- 5.4.1 Asphalt concrete pavement used for public street improvement projects shall meet or exceed the requirements of OSS Edition 2002, Section 00744.
- 5.4.2 AC pavement on all projects within the City shall be Level 2 HMA mixtures with qualities typical of what has traditionally be designated a Class B asphalt concrete mix.
- 5.4.3 In the case of an overlay or patching materials are required, a finer asphalt mix (traditionally referred to as Class C) may be utilized.
- 5.4.4 For areas of higher traffic volume, heavy traffic (weight) ratings, or other special traffic loading, a specific pavement design will be required to be submitted to the engineer for review and approval.

5.5 Base Rock and Surfacing Rock

- 5.5.1 Base rock used to construct a foundation for AC pavement construction shall be 1"-0 crushed rock or crushed gravel conforming to the requirements of OSS Edition 2002, Section 00640.
- 5.5.1 Base rock used for gravel surfacing, shoulders, and other surfacing shall be 1"-0 crushed rock or crushed gravel conforming to the requirements of OSS Edition 2002, Section 00640.

5.6 Overlay Fabric

5.6.1 An engineering geotextile fabric shall be utilized for all overlays. The fabric shall be needle-punched, non-woven polypropylene fabric, fused on one side only and having the following minimum physical properties:

Weight, oz/sq. yd.	3.8
Tensile strength (per ASTM D-1682)	90
Elongation at break, %	55
Asphalt retention, gal/sq yd	0.25
Min. melting temp, °F,	350

5.7 Asphalt Tack Coat

5.7.1 Tack coat shall meet the requirements of OSS, 2002, Section 00730.

5.7.2 Acceptable tack products include CSS-1, CSS-1h, CMS-2, CMS-2S, CMS-2h, CRS-1, CRS-2, HFRS-2, or HFMS-2.

5.7.3 The Contractor shall provide a submittal to the City Engineer, for approval, of the type of tack material to be utilized on the project.

Section 6 – Street and Transportation System Installation (Workmanship)

6.1 Clearing and Grubbing

6.1.1 Clear improvement area of all surface vegetation, stumps, roots, downed timber, brush, weeds, grasses, and deleterious matter necessary to accommodate permanent construction.

6.1.2 Protect existing utilities, street surfaces, landscaping, adjacent private development, and survey monuments from damage unless approved by the City Engineer. Any damage to existing infrastructure shall be repaired immediately.

6.1.3 Dispose of clearing and grubbing waste off project site at a location approved by the City Engineer. Clearing debris cannot be utilized as fill on the project site.

6.1.4 Grub areas under new street sections, curbs, sidewalks and driveways to remove all stumps, roots, buried vegetation, and debris to a depth of at least 8-inches below subgrade. Larger debris that may affect the integrity of the finished road should be removed regardless of depth or as directed by the City Engineer.

6.2 Earthwork and Embankment

6.2.1 Excavate to subgrade lines and grades as required by the approved plans.

6.2.2 Advise and coordinate earthwork with utility companies prior to beginning excavation to confirm utility locations and depths and potential conflicts or minimum cover issues. Required relocation of utilities shall be identified during design.

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- 6.2.3 Protect existing utilities from damage during excavations. Any utilities damaged during excavation not designated for removal shall be replaced “in kind” at the developer’s expense.
 - 6.2.4 Where excavation is required, along edges of pavement or trenches, any raveled or deteriorated pavement edges shall be saw cut clean and straight.
 - 6.2.5 Over-excavate to remove soft or otherwise unsuitable subgrade material when directed by City Engineer. Backfill with imported base rock or approved native backfill at 95 percent of maximum density (AASHTO T99) as directed by the Engineer. City Engineer may require that a geotextile fabric be utilized to provide additional subgrade stabilization.
 - 6.2.6 In street embankment areas, all sod, vegetative matter, and debris to be stripped away from under subgrade before embankment is placed.
 - 6.2.7 Where rock excavation is required, efforts shall be made to remove rock without blasting whenever possible. If blasting is determined to be required, a blasting plan must be submitted to the City Engineer, for approval. The blasting plan must include a certificate of insurance for the blasting work, the amount of and type of explosives that are to be used, the methods for placement and ignition, planned safety precautions, and all other pertinent information. Blasting shall not commence until the City Engineer has provided written clearance for the use of explosives within the City Limits.
 - 6.2.8 Approved excavated materials may be used directly in street embankment and site fill grading areas where provided for on the approved plans. Unsuitable material including broken pavement, rubble, large rocks, and debris shall be disposed of off site by Contractor as approved by the City Engineer.
 - 6.2.9 Topsoil should be selectively excavated and segregated to be used for curb backfill and planting strip area surfacing.
 - 6.2.10 Shape and grade all cut and fill slopes. Final slopes shall be smooth, uniform, and compacted in conformance to lines and grades required by plans.
 - 6.2.11 Rough grade subgrade prior to utility crossings to 0.20 foot vertical and 0.50 foot horizontal tolerance to design cross section and grades.
 - 6.2.12 After utility crossings and curb installations, fine grade subgrade to within 0.10 feet vertically of design grade at any point.
 - 6.2.13 All embankment material to be placed in compacted lifts, not to exceed 6-inches in thickness.
 - 6.2.14 Condition fill material with water to attain optimum moisture content prior to placing in embankment. Additional sprinkling of subgrade may be required to achieve compaction and for dust control.

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- 6.2.15 All subgrade, embankment, and backfill of over-excavation lifts shall be compacted to 95-percent of maximum density per AASHTO T-99 test method. City engineer shall approve the condition of subgrade and shall certify testing results prior to placing rock or base materials.
- 6.2.16 Place top soil backfill behind curbs and dress back disturbed planting strip area, smooth and uniform to the property lines. Compact until firm as evidenced by insignificant deflection under wheel or track loads.
- 6.3 Concrete Curb and Gutter
- 6.3.1 Top of curb stakes to be set at intervals not to exceed 50 feet and at critical radii and grade points, on offset line as required by the Contractor.
- 6.3.2 Form and poured curbs can be set on compacted subgrade or base rock. Machine laid curbs are required to have a minimum 2-inch lift of compacted base rock.
- 6.3.3 Concrete curb and gutters shall conform to the dimensions shown on the standard detail drawings.
- 6.3.4 Construct drop curbs for driveways and bike paths where required or as directed by the City Engineer.
- 6.3.5 Install curb weep-holes where required and in conformance with the standard details.
- 6.3.6 Construction tolerance for curb and gutter is 1/2" on line and 1/4" on grade.
- 6.3.7 Include 1/2" curb expansion joints at intervals not to exceed 45 feet, at radius points, and at all abutting concrete construction. Cold cutting curb joints on 10' intervals may be allowed in lieu of the above.
- 6.3.8 Construct 1/8" minimum weakened plane contraction joints at intervals not to exceed 15 feet.
- 6.3.9 Contractor shall notify City Engineer for form or grade inspection prior to pouring. Any curb or gutter found to be deficient by the City Engineer shall be removed and replaced at the Contractor's expense.
- 6.4 Sidewalks and Driveways
- 6.4.1 Expansion and contraction joints shall conform to the requirements of the OSS, 2002.
- 6.4.2 Sidewalk edges shall be tooled with a 1/4" radius tool.
- 6.4.3 A broom or burlap finish shall be applied in a workmanlike manner. An effort shall be made to match adjacent finishes of existing sidewalk if the finish meets the requirements of OSS, 2002.
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- 6.4.4 Sidewalks shall be sloped $\frac{1}{4}$ " per foot up and away from curb to facilitate water draining over the top of the curb.
 - 6.4.5 Sidewalks and driveways shall be laid on prepared subgrade, compacted to 95 percent of maximum density per AASHTO T-99 test method or on compacted $\frac{3}{4}$ "-0 rock fill.
 - 6.4.6 Rock base shall be placed and compacted to refill curb excavation where sidewalks are to be constructed adjacent to curbs.
 - 6.4.7 Sidewalks shall be constructed to within $\frac{1}{2}$ " on-line and $\frac{1}{4}$ " on grade tolerance for smooth, uniform alignment and grade.
 - 6.4.8 Driveways and sidewalks across driveways shall have a minimum concrete thickness of 6-inches. Normal sidewalks shall have a minimum thickness of 4-inches.
 - 6.4.9 Install 3" diameter roof drain pipe under sidewalks where required in alignment with curb weep holes.
 - 6.4.10 Restore top soil and dress back disturbed surfaces within planting strip in manner approved by the City Engineer.
- 6.5 Base Rock and Surfacing Rock
- 6.5.1 Rocking shall not be performed prior to City Engineer approval of the subgrade conditions.
 - 6.5.2 Compact base rock to 95 percent of relative maximum density per AASHTO T-99.
 - 6.5.3 The maximum compacted thickness of each lift of base rock shall be 6-inches.
 - 6.5.4 Surfacing rock (shoulders, gravel streets, etc) shall be placed in a single lift with a minimum thickness of 2-inches compacted thickness.
 - 6.5.5 Soft or spongy subgrade shall be removed, and the excavation backfilled with approved subgrade materials or base rock compacted to 95-percent of maximum density per AASHTO T-99.
 - 6.5.6 Water shall be applied as necessary to facilitate compaction and aid in dust control.
- 6.6 AC Pavement
- 6.6.1 Paving should only commence after City Engineer approved rock surface and compaction, the weather conditions are appropriate, and all other preparations have been made. Any AC pavement that is placed in less than ideal conditions or without City Engineer approval may not be accepted.
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- 6.6.2 Cut edges of existing pavement clean and straight and apply a tack coat where new pavement will join existing.
 - 6.6.3 Apply a tack coat to manhole frames, valve boxes, catch basins, curbs, gutters, other pavements, or any other component that the new pavement should remain in contact with.
 - 6.6.4 Adjust all rims of manholes, catch basins, valve boxes, etc. to conform to finished pavement grade. No such structure shall be paved over.
 - 6.6.5 Finish pavement lines and grades shall conform accurately with lines and grades shown on plans and staked in field. Tolerance on grade is 3/8 inch on 16' straightedge at any point.
 - 6.6.6 Finished pavement thickness shall be as specified on the approved plans. Minimum thickness of pavement shall be 4 inches (2 – 2" compacted lifts).
 - 6.6.7 Blend pavement to meet catch basin inlets, existing pavements, valve boxes, manholes, and similar structures.
 - 6.6.8 Traffic should be kept off fresh pavement until it has adequately cooled and set up.
 - 6.6.9 Maintain barricades, warning signs, and flaggers for safety during construction.
- 6.7 AC Pavement Overlays
- 6.7.1 When an AC overlay is required, the surface of the existing road shall be cleaned of all loose debris, gravel, vegetation, or other.
 - 6.7.2 Cracks greater than 1/8" in width are to be filled with a bituminous sealing product meeting the requirements of ASTM D3405 and AASHTOM301 and as approved by the City Engineer.
 - 6.7.3 Patch existing AC pavement areas as required by and identified by the City Engineer. Excavation shall be required where identified or directed by the City Engineer. New base material and AC pavement to be placed in the repair areas per Section 6.6 of this specification.
 - 6.7.4 A tack coat shall be applied to assist the overlay to adhere to the existing surface. The application rate of the tack coat shall be, at a minimum, 0.25 gallons per square yard throughout the overlay area. Application of tack coat will be made by distributor equipment wherever possible, with hand spraying kept to a minimum.
 - 6.7.5 The temperature of the tack material shall be such to facilitate a uniform spray pattern as recommended by the manufacturer. Spray nozzles shall be kept clear and open to avoid "holidays" in the pattern.

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- 6.7.6 The width of the tack spray pattern shall be the width of the paving fabric role plus 6 inches on each side. Overspray, drools, or spills shall be removed from the road surface to avoid flushing, bleeding, or fabric movements.
 - 6.7.7 Adequate tack shall be applied to the road to saturate the fabric to form a membrane but shall not be excessive to cause a slippage plane or flushing of the overlay.
 - 6.7.8 The fabric is to be placed in the tack coating with a minimum of wrinkles prior to the sealant cooling. The fabric should be unrolled with the bearded or fuzzier side down. Excessive wrinkles should be cut and laid flat. The City Engineer shall observe the placement of the tack and fabric and approve the installation prior to the overlay placement.
 - 6.7.9 Overlays of the fabric shall be minimized though an overlap of 6 to 8 inches is appropriate to insure full closure of a pavement joint. Transverse joints should be “shingled” in the direction of traffic to prevent edge pickup. Additional sealant may be required to secure these edges as necessary.
 - 6.7.10 Placement of the AC overlay should closely follow fabric lay-down. In the event that the tack coat bleeds through the fabric before the hot mix is placed, it may be necessary to blot the sealant by spreading sand or hot mix over the affected areas.
 - 6.7.11 AC Pavement should be machine laid and compacted per OSS, 2002 and Section 6.6 of this specification.
 - 6.7.12 Feather all AC pavement onto existing pavement not receiving overlay. Rake out coarse aggregate on payment feather. Surface of pavement to be a smooth, well-sealed, tight mat.