



Public Works Department

Engineering Design Standards

Adopted April 2020

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1 Introduction

The following Engineering Design Standards (Design Standards) were developed by the City of Warrenton Public Works Department. This document is intended to facilitate the planning, design and implementation of public infrastructure projects and related facilities.

These Design Standards apply to all new developments. The Design Standards cannot provide for all situations. They are intended to establish a consistent policy for implementing design of public improvements and related facilities, but do not substitute for competent work by design professionals. Engineers are expected to provide expertise and judgement from their respective disciplines. In addition to these standards, design consultants and engineers must comply with appropriate state and federal codes, safety regulations, environmental requirements and other applicable regulations. Note that this document refers to many other potentially applicable requirements but references herein do not necessarily comprise a comprehensive list.

Design professionals are encouraged to read this document prior to the project planning phase so that potential compliance issues may be identified and resolved early.

The Public Works Director or their designee, is authorized to interpret the criteria and grant variances where a particular application would cause undue hardship to an applicant. These standards are not intended to unreasonably limit any innovative or creative effort which could result in better quality, cost savings, or both. Refer to [Section 2.6](#) Design Exceptions of this manual for the request process.

Other permits and standards may be applicable to specific projects. The design professional bears the responsibility to obtain necessary permits and to comply with all applicable standards related to specific projects.

2 General Requirements

This chapter provides procedural requirements for public works projects, from design through construction. Requirements for preparation, submittal and review of required documents are included, along with administrative procedures for design exceptions, design approval, construction coordination and final project acceptance by the City.

2.1 Definitions and Abbreviations

AASHTO: American Association of State Highway and Transportation Officials.

ADA: Americans with Disabilities Act.

ADS: Advanced Drainage Systems, a manufacturer of storm water and sanitary sewer materials.

Alley: A narrow street through a block which affords only secondary means of access to abutting property at the rear or sides thereof.

All-Weather Surface: An improved roadway surface, with sufficient ballast and structural support to be used under all weather conditions. The uppermost layer of an all-weather surface may be concrete or asphalt pavement, or in some cases gravel.

Appurtenance: Equipment and/or accessories that are part of an operating system or subsystem.

APWA: American Public Works Association.

Arterial: A street of considerable continuity which is primarily a main traffic route for intercommunication among large areas; used predominantly for the movement of through traffic with less emphasis on access to abutting properties.

As-Builts: Plans signed, dated, and stamped by the design engineer indicating that the plans have been reviewed and revised, to reflect all changes made in the specifications and working drawings during the construction process, and show exact dimensions, geometry, and location of all elements of work completed.

ASCE: American Society of Civil Engineers.

Asphalt Institute: A United States based association of international petroleum asphalt producers, manufacturers and affiliated businesses.

ASTM: American Society for Testing and Materials.

AWWA: American Water Works Association.

Backflow: The flow of water or other liquids, mixtures or substances into the distribution pipes of the potable water supply from any source other than its intended source, and which is caused by back-siphoning or back-pressure.

Backflow Prevention Assembly: An effective assembly used to prevent backflow into a potable water system.

Boardwalk: Elevated walkway located over land or on submersible land, primarily for pedestrian use similar to a sidewalk or trail, not otherwise covered by pier or wharf.

Buildable Lot: See Lot, Buildable.

Building Code: The most current addition of the combined Specialty Codes.

Building Official: The officer or other designated authority charged with the administration and enforcement of the Building Code, or a regularly authorized deputy.

City: The City of Warrenton, Oregon.

Designee: The duly appointed Designee of the City of Warrenton.

City Water Service Line: Any pipe, valves and fittings leading from the water main to the water meter or customer water service line.

Clearing: Any activity that removes vegetative cover while leaving the root system intact.

Collector: Collectors serve a critical role in the roadway network by connecting traffic from Local Streets with the Arterial network. Major Collector routes are generally distinguished from Minor Collector routes by longer length; lower connecting driveway densities; higher speed limits; greater spacing intervals; and higher traffic volumes. While access and mobility are more balanced than on Arterials, new driveways serving residential units should not be permitted where traffic volume forecasts exceed 5,000 vehicles per day.

Community Development Director: The duly appointed Community Development Director, chief land use regulatory officer, or designated authority responsible for enforcement of the Development Code of the City of Warrenton.

Contractor: The person, partnership, firm or corporation licensed in Oregon contracting to do work under these Standards. The term shall also include the Contractor's agents, employees and subcontractors.

Cul de Sac: A short street or dead-end street having one end open to traffic and terminating in a vehicle turnaround. This definition includes circular and hammerhead style turnarounds.

Curb Ramp: A short, depressed section of curb and sidewalk, normally placed at street intersections, designated to facilitate travel of disabled persons.

Customer Water Service Line: Pipe, valves and fittings leading from the water meter or city water service line into the premises served or the point of ultimate use.

CWA: Clean Water Act, a federal law enacted in 1972 which establishes the structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters.

Design Engineer: A Professional Engineer licensed by the OSBEELS.

DEQ: Oregon Department of Environmental Quality.

Detention Facility: A storm water basin or structure where excess storm water is stored or held temporarily and then slowly drains when water levels in the receiving piping system or channel recede. A detention facility is typically dry between storm events.

Development Agreement: An agreement between the City and a private Developer as provided in ORS Chapter 94.

Developer: Any individual, company, partnership, joint venture, corporation, association, society or group that has made, or intends to make, application to the City for a development proposal, permit or approval.

Dock: A secured float or floats for boat tie-up or other water use.

Drain: A structure intended to receive only storm waters, surface run-off, and drainage.

Drain, Private: Privately owned drain that is not maintained by the City.

Driveway: Private vehicular travel way to a single property, that provides vehicular access from a public or private road.

Driveway Apron: A concrete section of depressed sidewalk constructed in the City right-of-way to provide a transition between the City street and a private driveway, that meets ADA requirements.

Dwelling Unit: Refer to Warrenton Development Code definitions for dwelling.

Easement: A grant of the right to use a piece of land for specific purposes.

Erosion: Movement of soil by water or wind.

Excavation: Removal of topsoil, gravel, sand, rock or any other type of soil material. Also includes removal of roots.

Existing: Buildings, facilities or conditions, which are already in existence, constructed or officially authorized prior to the adoption of these Standards.

Fence: An accessory structure, including landscape planting, designed and intended to serve as a barrier or as a means of enclosing a yard or other area, or other structure; or to serve as a boundary feature separating two or more properties.

Fill: Placement of topsoil, gravel, sand, rock or any other type of soil material.

Fill, Structural: Fill that is intended to support structures.

Fire Apparatus Access Road: A road that provides access for fire department vehicles and equipment from a fire station to a facility, building or portion thereof. This is a general term inclusive of all other terms such as fire lane, public street, private street, parking lot lane and access roadway.

Fire Code Official: The City's Building Official or other designated official appointed by the Warrenton City Commission who is charged with the administration and enforcement of the Oregon Fire Code.

Fire Lane: A road or passageway developed to allow the passage of fire apparatus. A fire lane is not necessarily intended for vehicular traffic other than fire apparatus.

GPM: Gallons per minute.

Grading: Any combination of excavation and/or fill activities.

Hammerhead: See cul de sac.

HDPE: High-density polyethylene.

Landscaping: Preservation, planting and maintenance of trees, shrubs, groundcovers, and lawns, and associated walkway, benches, decks, fences, fountains, sculptures, courts, plazas or interpretive displays.

Lot: A parcel or tract of land as shown on a legally recorded plat of a subdivision, or a parcel or tract of land under one ownership.

Lot, Buildable: A parcel or combination of parcels that meet the minimum standards for construction. This definition does not imply the site is suitable for a building.

Lot, Platted: A parcel or tract of land as shown on a legally recorded plat of a subdivision.

Lot, Tax: A parcel of land that is designated for tax purposes only.

Luminaire: A complete street lighting unit, including lamps, sockets, wiring, poles, foundations and other parts needed to hold the lamp in place, and protect it.

MUTCD: Manual on Uniform Traffic Control Devices.

Natural Outlet: Any non-manmade discharge into a watercourse, pond, ditch, lake or other body of surface water.

NAVD: North American Vertical Datum. Refers to NAVD 88, the North American Vertical Datum of 1988, which is the vertical control datum established in 1991 by the National Geodetic Survey for surveying in the United States.

NRS: Non-Rising Stem, a type of water valve operation.

NVGD: National Geodetic Vertical Datum. Refers to the Sea Level Datum of 1929, which was adjusted in 1947, and later renamed as the National Geodetic Vertical Datum of 1929 on May 10, 1973. NVGD was used by the National Geodetic Survey prior to 1991.

NW POINT: Northwest Public Oregon Intercity Transit.

OAR: Oregon Administrative Rules.

ODOT: Oregon Department of Transportation.

OFC: Oregon Fire Code.

OPSC: Oregon Plumbing Specialty Code.

ORS: Oregon Revised Statutes.

OSBEELS: Oregon State Board of Examiners for Engineering and Land Surveying.

Owner: Those individuals, partnerships, corporations or public agencies holding fee simple title to property, or a purchaser under a recorded instrument of sale. Owner does not include those holding easements, leaseholds, or purchasers of less than fee interest.

Pathway: A travel corridor provided for non-motorized use. Pathways typically accommodate both bicycles and pedestrians.

Pedestrian Zone: See Walking Zone.

Pier: A structure, usually of greater length than width and projecting from the shore into a body of water with direct access from land that can be either open deck or provided with a superstructure.

Planting Strip: A vegetated area located between the back of curb and sidewalk within the Walking Zone.

Platted Lot: See Lot, Platted.

POINT: Public Oregon Intercity Transit.

Private Drain: See Drain, Private.

Private Sewer: See Sewer, Private.

Private Street: See Street, Private.

Public Works Director: The duly appointed Public Works Director of the City of Warrenton.

PVC: Polyvinyl Chloride.

Retention Facility: A basin, structure or pond which stores water on a permanent or semi-permanent basis. Water often remains in a retention basin indefinitely, with the exception of volume lost to

evaporation or absorbed into soils. Retention facilities typically contain water between storms, as opposed to detention facilities which typically drain after the peak of the storm flow has passed and are usually dry between storms.

Right-of-Way: Land, property or interest therein, usually in a strip, acquired for public benefit and typically devoted to transportation purposes.

Riprap: A layer, facing, or protective mound of stones randomly placed to prevent erosion, scour or sloughing of a structure or embankment; also, the materials so used.

Roadway: See Street.

ROW: See Right-of-Way.

Sanitary Sewer: See Sewer, Sanitary.

SDR: Standard Dimension Ratio.

SDWA: Safe Drinking Water Act, the main federal law that ensures the quality of drinking water.

Sedimentation: Deposition of soil moved by water or wind from its site of origin.

SETD: The Sunset Empire Transportation District.

Sewer, Private: Privately owned sewer that is not maintained by the City.

Sewer, Sanitary: A pipe or conduit intended to carry liquid and water-carried wastes from residences, commercial buildings, industrial plants and institutions.

Shall: A requirement.

Sharrow: A shared lane marking, placed on the street pavement to indicate where bicyclists should position themselves in the travelled way.

Should: A requirement, unless it can be shown that to comply with the requirement would be unreasonable, impractical, or unfeasible. Economic hardship alone shall not be justification for noncompliance with the requirement, but may be considered in conjunction with other reasons for noncompliance.

Sidewalk: A concrete formed pedestrian walkway that is located adjacent to or offset from and parallel to a street.

Standard Details: City of Warrenton, ODOT and APWA standard detail drawings.

Storm Drain: A conduit intended to carry only storm waters, surface run-off, street wash waters and drainage.

Storm Sewer: See Storm Drain.

Street: The improved portion of a public right-of-way that is developed for multi-modal travel. Synonymous with the terms road, highway, avenue, lane, drive, and other similar designations. A Street includes both a vehicular zone and a walking zone.

Street, Private: Privately owned street that is not maintained by the City, or privately- maintained street improvements within the public right-of-way.

Sunset Empire Transportation District: Public transportation provider serving Clatsop County.

Surveyor: A Professional Land Surveyor licensed by the OSBEELS.

Tax Lot: See Lot, Tax.

Trail: A pedestrian walkway improved with rock, decking, bark chips or paved surfacing not otherwise covered by sidewalk or boardwalk.

Trestle: A complex bridge structure, usually wooden, that is used to support a transportation corridor over water, a ravine, etc.

TSP: The City of Warrenton Transportation System Plan.

Uni-Bell: The Uni-Bell PVC Pipe Association.

Utilities: Overhead or underground facilities such as towers, lines for communication and power transmission, sanitary sewers, storm drains, water lines, drains, gas lines, and other similar pipes, wires conduits, vaults, etc.

Vehicular Zone: The portion of a City street from face of curb to face of curb. The vehicular zone includes travel lanes for motorized vehicles and bicycles, and may also include median and parking areas.

Walking Zone: The portion of a City street behind the face of curb that provides sidewalk, roadside landscaping, and other amenities for pedestrian travel.

Water Main: Any pipe owned by the City of Warrenton laid in a street, alley or easement, and used or intended to be used for the transmission and distribution of water to customers.

Water Meter: Any device used for the measurement of water delivered to an individual location or user (service).

Water Service Line: Combined facility made up of both the city water service line and the customer water service line.

Water Service Line, City: See City Water Service Line.

Water Service Line, Customer: See Customer Water Service Line.

2.2 Code Compliance and Permitting

Private developments and public facilities must comply with all City codes, plans and permits. Copies of these documents can be found on the City's webpage www.ci.warrenton.or.us

No person shall do work affecting the public right-of-way without first obtaining a permit from the public works department. Public improvement permit application(s) for any work within current or future right-of-way and/or easements including but not limited to; public street, storm drainage, water, and/or wastewater improvements shall be approved/issued by the Public Works Department before commencement of any onsite building, grading, or construction activities. Separate permits may be required depending on the work being completed and the level of approval received.

Developers are also responsible for obtaining any necessary state and federal permits that may be required for construction near wetland areas, streams or other waterways, or if hazardous material are present on the property. The following agencies should be contacted to determine if state or federal permitting regulations apply:

- Department of State Lands
- Department of Environmental Quality
- US Army Corps of Engineers
- Environmental Protection Agency
- Oregon Department of Transportation
- National Marine Fisheries
- Oregon Department of Fish and Wildlife
- U.S. Fish and Wildlife Services

2.3 Construction Standards

The City has adopted the 2018 Oregon Standard Specifications for Construction with supplemental City General Conditions and Special Provisions. See Appendix B for City of Warrenton Special Provisions. These specifications shall be used for all City public works projects.

2.4 Design Submittal Requirements

Two sets of plans shall be submitted to the building and planning department for review. If design is for utility infrastructure outside the city limits, plans shall be submitted directly to the Public Works Department. Plans shall be twenty-two inches by thirty-four inches (22" X 34"). A scale of one inch equals twenty feet (1"=20') is preferred, one inch equals thirty feet (1"=30') and one inch equals ten feet (1"=10") are also acceptable. Other scales may be used only with the approval of the Public Works Director or their designee.

At minimum, interim plans shall be submitted for City review at the 60% design stage. Interim plan submittals at 30% and 90% are encouraged.

2.4.1 General Plan Requirements

The following general items shall be shown on all plan sets submitted:

- Cover Sheet:
 - project vicinity map
 - site plan of entire project
 - index of plan sheets
 - legend of symbols used
 - Surveyor and firm name with contact information
 - Elevations shall be referenced to the City of Warrenton datum (NAVD 88), with temporary and/or permanent benchmarks used along with their descriptions, elevations of benchmarks identified on the plans
 - contact number of all affected utility companies
 - any conditions of approval
 - include the complete legal description as it appears on the property's deed, the Clatsop County Tax Lot Number, owner's name(s) as it appears on the deed and mailing address
 - Net area of site in square feet or acres
 - Statement referencing Oregon Standard Specifications for Construction with City Special Provisions.
 - Oregon Utility Notification Center contact information
- Title block: shall be included on each sheet, placed on the lower right-hand corner of the sheet, across the bottom of the of the sheet or across the right-hand edge of the sheet
 - Project name
 - Name and firm of design engineer
 - Owner name and address
 - Sheet title
 - Page number
 - Revision block with revision description with design engineer approval (signature or initial) and date of revision
 - Design engineer name and contact information, responsible for preparation of the plans
 - Oregon Registered Engineer's Stamp and Signature on final plans
- North Arrow: On each sheet, as applicable. Arrow pointing to the top or right edge of the sheet.
- Tie property to at least two official record survey control corners, preferably section and /or quarter section corners
- Show all lot dimensions, width of easements, and ROW including bearings and distances.
- Standard notes: See Appendix A for required general notes

2.4.2 Utility Information

Subsurface utilities shall be depicted on design drawings per ASCE/CI 38-02 Quality Level C. Refer to ASCE Standard Guidelines for the Collection and Depiction of Existing Subsurface Utilities.

2.4.3 Street Plans

Street plans shall have both plan and profile views on the same sheet. Typical section, signing and striping information is also required.

Plan views shall contain the following information:

- Right-of-way, property lines, and easements (existing, proposed and construction).
- Section, township and range.
- Street centerline with 100-ft stationing.
- Horizontal alignment data for centerline, curb returns and cul-de-sacs, including tangent bearings.
- Curb/gutter elevations at intersections and cul-de-sacs.
- Location of existing and proposed underground and overhead utilities, roadways, driveways, sidewalks, structures, water courses, survey monuments, fences and vegetation within the right-of-way and outside right-of-way, if affected by construction.
- Location of any required street lights to be installed with project.
- Storm drainage facilities with station and offset referenced to street centerline.
- Existing contours and spot elevations, cut/fill limits. A minimum contour interval of 2 feet is required.
- Sidewalk ramp locations.

Profile views shall show the following information:

- Proposed street centerline profile (bold) with tangent grades, vertical curve data (including k value, length and beginning and ending stations and elevations) and high-low points.
- Original ground at centerline.
- Proposed (bold) and existing storm drainage facilities with information on type, inverts, rim/grate elevations, slopes, pipe material, and trench backfill.
- Existing utility crossings.
- Continuation of profile 200 feet beyond project limits if street is being reconstructed or if it may be extended in the future.

Typical cross-section shall show the following information:

- Dimensions of traffic lanes, shoulders, gutters, sidewalks, swales, depths of planting strips, easements, right-of-way, etc.
- Cross slope of all elements, such as pavement, sidewalks, planting strips, etc.
- A separate full-width roadway typical section, for each street or portion of the street that differs significantly. Station ranges shall be provided for each typical section.

The following signing and striping information shall be provided:

- Locations of all public and privately maintained signs to be installed, including signs details and/or MUTCD sign designation number, where applicable.

- Location and dimensions of all pavement markings.
- For simple projects, signing and striping information may be combined on the plan views, provided that information is legible and does not overcrowd the sheet. For collector facilities and local access streets that may intersect with City collector routes or State highway facilities, separate signing and striping plans may be required by the Public Works Director or their designee.

2.4.4 Water, Sanitary Sewer and Storm Drain Plans

Water, sanitary sewer and storm drain plans shall have plan and profile views. Profiles shall be to the same horizontal scale on the same sheet and drawn immediately below the corresponding plan view to a typical vertical scale of 1" = 5' with stationing increasing from left to right. In areas of significant elevation change, a vertical scale of 1" = 10' may be used. Public Works Director or their designee approval is required for any other proposed vertical scale.

Water, sanitary sewer and/or storm drain plans may be combined into a single set of utility plans, provided that information is legible. Utility design information may also be incorporated into street plans, provided that all required information can be provided legibly and without overcrowding the sheet. All new, existing and to be abandoned utilities shall be shown on plans.

Plan views shall contain the following information:

- Right-of-way, property lines, and easements (existing, proposed and construction).
- Pipe centerline with station and reference to street stationing where appropriate.
- Pipe material, length, invert elevation, and slope, per pipe section.
- Location of existing and proposed (bold) underground and overhead utilities, roadways, driveways, sidewalks, structures, watercourses, survey monuments, fences and vegetation within the right-of-way and outside right-of-way, if affected by construction.
- Existing and proposed contours and spot elevations. A minimum contour interval of 2 feet is required.

Profile views shall show the following information:

- Pipe invert profile with grades.
- Existing and proposed (bold) ground at centerline.
- Existing and proposed manholes, catch basins, field drains and inlets, with information on type, inverts, rim elevations, slopes, materials, and trench backfill.
- Existing and proposed water, storm drain, sanitary sewer, gas, power, cable and other utility crossings. Show separation requirements where appropriate.
- Continuation of profile 200 feet beyond project limits if sanitary sewer, water or storm drain may be extended in the future.

2.4.5 Storm Water Management System Plans

Structural detention and retention facility plans must show:

- Facility dimensions and setbacks from property lines and structures.
- Profile view of facility, including typical cross-sections with dimensions.
- All storm water piping associated with the facility, including pipe materials, sizes, slopes, and invert elevations at every bend or connection.
- Additional details determined by the Public Works Director or their designee, depending on individual site conditions.

For projects that include vegetated storm water management facilities, catch basin pre-treatment inserts of storm water retention/detention facilities, a stormwater management plan outlining the scope of activities, schedule and responsible parties for periodic inspection and maintenance of those facilities shall be included with the construction submittal. This stormwater management plan shall cover vegetation management, structural repairs, sediment removal/disposal and other activities necessary for the continued long-term function of the storm water facilities.

2.4.6 Additional Storm Water Design Documentation

Storm water documentation prepared in accordance with the ODOT Hydraulics Manual shall be submitted, including but not limited to a hydraulics report, bridge and culvert studies, supporting data, and other storm water design documentation, as applicable.

2.4.7 Refuse Enclosure Plans

Proposed refuse enclosures must be shown on site plans. Dimensions of enclosure, pad, gate with swing radius as well as dimensions of truck travel distance and turning radius (if required) for appropriate access.

2.5 Phased Project Submittals

For large developments intended to be implemented in phases over multiple years, a phased design submittal process will be considered by the Public Works Director or their designee on a case by case basis. Ultimate traffic volumes, water usage, sanitary sewer flows and storm water runoff shall be estimated for the entire project prior to approval of a phased approach. Design of each phase shall accommodate the ultimate build-out condition.

2.6 Design Exceptions

A documented design exception is required for any design or construction deviation from these City Design Standards. Exceptions may be granted by the Public Works Director or their designee upon evidence that such adjustments are in the public interest. Requirements for safety, function, fire protection, transit needs, appearance and maintainability based upon sound engineering and technical judgment must be fully met.

2.6.1 Design Exception Submittal Requirements

Design exception requests must be submitted in writing and shall include the following:

- Complete description of the desired modification.
- Identified sections of the Design Standards that are relevant to the proposed alternative.

- Reason for the request.
- Comparison between the specification/design standard and the modification addressing the performance, particularly in regard to public safety. Document nationally accepted design standards, such as AASHTO and ASTM, where applicable.
- Additional design exception considerations specific to individual topics are provided in the applicable chapter of the Design Standards.
- It is the responsibility of the applicant to provide sufficient, clear and accurate supporting information.

The Public Works Director or their designee will review the design exception request and may allow a modification if one or more of the following requirements is met:

- The specification or design standard does not apply in the particular application.
- Topography, right-of-way or other conditions specific to the site impose an undue economic hardship on the applicant and an equivalent alternative, which can accomplish the same design objective while not adversely affecting public safety, is available.

The Public Works Director or their designee will approve the application as is, approve with changes, or deny with an explanation.

2.6.2 Appeal Process

If the applicant is unsatisfied with the Public Works Director's decision, the appeal process is as follows:

- Written request addressed to the City Manager;
- If not resolved at the City Manager level, the applicant shall submit a written appeal to the City Commission.

2.7 Design Approval

Written acceptance of design plans and specifications by the Public Works Director or their designee is required.

2.8 Construction Surety

Prior to construction, the Developer shall provide a performance bond to protect against:

- Adverse construction events that may disrupt City systems and services;
- Failure to complete the project due to insolvency of the Developer or contractors; or
- The project's failure to meet approved design requirements or contract specifications.

A warranty is also required to guarantee against project defects for a designated period of time after project acceptance by the City Commission. Refer to the Oregon 2018 Standard Specifications for Construction and City Supplemental General Conditions for performance bond and warranty requirements.

Surety requirements covered by a City Commission-Approved Development Agreement may supersede the standards of this section.

2.9 Construction Submittal

A complete set of construction documents shall be submitted to the Public Works Director or their designee prior to beginning construction. The construction submittal package shall include:

- Two (2) copies of the construction plan set with design engineer's seal and original signature.
- Complete construction specifications and contracting documents, including cover sheet with design engineer's seal and original signature.
- List of construction materials approved by the design engineer and the City, including manufacturer, to be installed by the developer and accepted by the City. Including a final construction estimate, as certified by a Registered Professional Engineer, to calculate the construction design review fee.
- Copy of Public Work Director's design approval letter.
- Performance bond.

Construction activities shall not commence prior to City review of the construction submittal package and written authorization to proceed from the Public Works Director or their designee. The calculated construction design review fee must be paid prior to project authorization. The City will stamp the construction plans when the construction submittal is approved. The original construction plans bearing the City's stamp shall be kept at the project site and made available to City representatives upon request. All work completed in or effecting the ROW shall obtain a ROW permit from the appropriate agency (City, County, State).

2.10 Construction Coordination and Inspection

A preconstruction meeting is required unless waived by the Public Works Director or their designee. The Developer shall notify the Public Works Department at (503) 861-0912 to schedule the preconstruction meeting.

The following requirements apply during construction:

- Materials submittals are required and must be approved by the design engineer first, then accepted by the Public Works Director or their designee prior to construction of any facilities which are intended to be accepted by the City for public use. Refer to the Oregon 2018 Standard Specifications for Construction and City Supplemental General Conditions for material submittal requirements.
- Project inspection, monitoring of construction standards, and workmanship will be completed on a regular ongoing basis by the design engineer. They are responsible for determining that the work being done and the materials being used, meet the requirements of the approved plans and these specifications.
- The Public Works Director or their designee will need to observe the following construction work, and must be called at least two working days in advance to schedule an inspection for:

- Installation of new storm drains, sanitary sewer systems, and water facilities.
- Connections to existing storm and sanitary sewers, and existing water facilities.
- Forms for concrete curb, gutter and sidewalk
- Roadway subgrade, crushed rock base course and asphalt paving
- Subgrade and base rock compaction tests shall be performed by an independent testing laboratory during construction, and results provided to the Public Works Director or their designee.
- Pilings require inspection by a licensed professional engineer. Copies of all piling inspection reports shall be provided to the Public Works Director or their designee.
- The Public Works Department at (503) 861-0912 must be contacted to open or close any water valves, including hydrants, and must be called to schedule at least two working days in advance.

2.11 As-Built Documents

Upon construction completion, the following documents shall be submitted to the Public Works Director or their designee:

- As-built drawings showing actual constructed locations, true conditions or configuration of what has been built shall be submitted to the City for approval. Two paper copies shall be submitted along with an AutoCAD compatible file and high resolution PDF copy on CD or USB drive, in State Plane coordinates and use datum NAVD-88.
As-built drawings shall be twenty-two inches by thirty-four inches (22" X 34"). A scale of one inch equals twenty feet (1"=20') is preferred, one inch equals thirty feet (1"=30') and one inch equals ten feet (1"=10") are also acceptable. Other scales may be used only with the approval of the Public Works Director or their designee.
- Written certification from the Developer's engineer confirming that the project was constructed in accordance with approved plans and specifications.
- ODOT ADA inspection form for each ADA ramp or driveway
- Results from water & sewer line pressure test.
- Vacuum test results for sewer manholes.
- TV camera videos from sewer inspections.
- Compaction tests for trench backfill.
- Continuity tests for all tracer wire.
- City utility services will not be provided until as-built documents have been provided to, and accepted by, the Public Works Director or their designee.

2.12 Final Project Acceptance

Following receipt of as-built documents and test results, the Public Works Director or their designee will forward a project acceptance and street adoption recommendation to the Warrenton City Commission. The City will not assume maintenance responsibility for constructed facilities prior to Commission acceptance.

3 Transportation Facilities

This chapter provides information for the design of street improvements as well as non- motorized facilities and transit infrastructure. Transportation design plans are reviewed and approved by the Public Works Department. Design criteria for storm water facilities serving transportation corridors are discussed in [Chapter 5](#).

The following standards are based on the City’s adopted Transportation System Plan (TSP), and have been developed with the goals of improving motorist and pedestrian safety, and minimizing long term maintenance costs while also considering the initial cost of construction. The main purpose of these standards is to provide the requirements for geometric design of the streets to meet safety and construction guidelines, and to promote active transportation through integration of facilities for pedestrians, bicyclists and transit users.

Traffic impact studies for new developments may be required by the Public Works Director or their designee as provided in Chapter 16.256 of the Warrenton Municipal Code.

Compliance with these standards does not relieve the design engineer of the responsibility to apply conservative and sound professional judgment. These are minimum standards and are intended to assist, but not substitute for competent work by design professionals. The City may, at its sole discretion due to special conditions and/or environmental constraints, require more stringent requirements than would normally be required under these Standards.

This chapter is intended to be consistent with and a supplement to the following policies and standards:

AASHTO	American Association of State and Transportation Officials
ADA	Americans with Disabilities Act
APWA	American Public Works Association
ASTM	American Society for Testing and Materials
MUTCD	Manual on Uniform Traffic Control Devices
OAR	Oregon Administrative Rules
ODOT	Oregon Department of Transportation
OFC	Oregon Fire Code
TSP	Warrenton Transportation System Plan
WDC	Warrenton Development Code
WMC	Warrenton Municipal Code
WCP	Warrenton Comprehensive Plan

Where conflict exists between these Design Standards and the above referenced documents, the most stringent requirements shall take precedence.

3.1 City Streets

3.1.1 Street Classifications

The City has adopted the following multi-modal street classifications based on the context of the surrounding land use:

- Local Streets
- Collectors- Major and Minor
- Arterial- Principal and Minor

Refer to the TSP for a map showing the City's multi-modal street designations.

The Public Works Department will determine the classification of any new streets which are not indicated in the TSP prior to design.

3.1.2 Vehicular Zone

3.1.2.1 Vehicular Zone Cross Section

The vehicular zone width is defined as the horizontal distance from face of curb to face of curb, measured perpendicular to the centerline. The vehicular zone includes paved travel lanes for motorized vehicles and bicycles, and may also include median spaces and paved areas for on-street parking. The width of the vehicular zone shall be sufficient to allow for the safe passage of normal multi-modal traffic and emergency vehicles.

Local Road required lane widths are shown in **Table 3-1**. For additional details and requirements see WMC Chapter 16.136. Streets should be centered within the right-of-way; however, design exceptions may be considered due to topography or other physical constraints. The City's design exception process in [Section 2.6](#) will apply. Street width design exceptions require review and approval of both the Public Works Director or their designee and City Fire Code Official. Design exceptions may require approved fire suppression, such as fire sprinkler systems, to be installed in structures to be accessed, including garages.

Table 3-1. Lane Widths and Configuration in the Vehicular Zone

Type of Street	Standard Requirements	Right-of-Way Width	Curb-to-Curb Pavement Width	Motor Vehicle Travel Lanes ¹	On-Street Parking (both sides)	Curb	Planting Strip ²	Sidewalks
			<i>Local Roads</i>					
Local Road	Standard Requirements	60 ft.	36 ft. ⁴	12 ft.	8 ft.	Yes	5 ft.	5 ft.
Alleys	N/A	12 ft. - 24 ft.	12 - 24 ft.	N/A	None	None	None	None
Shared-Use Path³	N/A	10 ft. - 16 ft.	10 - 16 ft.	N/A	None	None	None	None

For full street design standards table reference Warrenton Municipal Code 16.136 Transportation Standards.

Notes:

¹ Parking on residential neighborhood streets is allowed and may be allowed on one side only in constrained areas or where approved by the City Engineer, resulting in a curb-to-curb width of 28 feet and overall right-of-way width of 48 feet.

² Median/flex lane and planting strips are optional depending on surrounding land use and available right-of-way.

³ Shared-use path requires 2-foot gravel shoulder and 10-foot minimum vertical clearance. If a shared-used path is put in place of a sidewalk and bike lane a 1-foot to 2-foot paved shoulder and a 5-foot planter strip is required between the path and the travel lane.

⁴ Existing streets that require reconstruction or additional improvements such as sidewalks can be built to a 32-foot standard.

3.1.2.2 Design Speed

The design speeds listed in **Table 3-2** have been selected for the various street classifications. Posted speed may differ and will be designated by the Public Works Director or their designee. Designers shall use the design speed to select horizontal and vertical alignments.

Table 3-2. Design Speed

City TSP Street Classification	Design Speed (mph)
Local Street	25
Minor Collector	25
Major Collector	35
Minor Arterial	35
Principal Arterial	45

3.1.2.3 Pavement Section

The pavement section may vary depending on soil conditions. If, in the opinion of the Public Works Director or their designee, soil subgrade conditions are potentially unsuitable, soil testing and pavement design will be required. The design engineer will have the responsibility for obtaining traffic figures for pavement design. The ODOT Pavement Design Guide and the Asphalt Institute method are acceptable pavement design references. Concrete streets shall be designed using the guidelines and requirements of the Portland Cement Association.

3.1.2.4 Crown

A minimum crown slope of two percent (2%) shall be provided. A standard center crown section is recommended, but an offset crown or a curb crown (shed) configuration may be permitted with approval of the Public Works Director or their designee for areas with steep side slopes. Maximum crown slope shall be four percent (4%). An inverted crown section with concrete gutter is typically not allowed, but may be considered for alleys with Public Works Director or their designee's approval.

3.1.2.5 Vertical Clearance

Vertical, unobstructed clearance over the traveled roadway width must be a minimum of 13 feet and 6 inches.

3.1.2.6 On-Street Parking

On-street parking shall be provided as shown in **Table 3-1**. The minimum dimension of a standard parallel on-street parking stall is 8 feet wide by 20 feet long. Smaller dimensions may be allowed when additional maneuvering area is available. Disabled on-street parking stalls may be required and must meet current ADA standards.

Where parking is restricted on one or both sides of the street, no-parking signs shall be installed by the Developer. A minimum of three (3) no-parking signs, equally spaced, are required per block. The City will maintain no-parking signs on public streets after the street is accepted by City Commission.

3.1.2.7 Signing and Striping

Street signing and pavement markings shall be designed in accordance with the current MUTCD and state supplements. Where required, the Developer shall install signing and striping. The City will maintain signing on public streets and striping after acceptance of the street by City Commission. A sign order approved by the Public Works Director or their designee is required for any new sign or pavement marking on existing facilities.

3.1.3 Walking Zone

The walking zone is defined as the portion of a City street behind the face of curb that provides sidewalk, roadside landscaping, and other pedestrian travel amenities.

3.1.3.1 Walking Zone Cross Section

Improvements required within the walking zone are shown in **Table 3-3**. Walking zone improvements are required on both sides of the street except for infill developments of three units or less, where walking zone improvements may be omitted from one side of the street with the Public Works Director or their designee's approval. Sidewalk and landscaped areas within the walking zone shall have a maximum cross-slope of two percent (2%), draining towards the street.

Table 3-3. Required Walking Zone Improvements and Widths

Street Classification	Curb/Edge Width (Measured from Face of Curb)	Landscape Buffer Configuration and Width	Sidewalk Width	Total Walking Zone Width
Local Road	6"	5'	5'	10' 6"

3.1.3.2 Curb, Gutter and Edge Area

Standard curb is required on both sides of streets within the City of Warrenton. Rolled curb is not allowed unless approved through the design exception process described in [Section 2.6](#). All curbs shall receive a stamp for utility service crossing locations (e.g. "W" for water, "S" for sewer).

Curb and gutter is required on streets with longitudinal (flow line) slopes less than 1.5%.

Where curb is adjacent to landscaped areas, a 1-foot wide edge area with compacted backfill may be provided behind the curb to facilitate egress from parked vehicles. Where compacted materials cannot sustain adjacent plantings, hardscape or other surface treatments should be used in the edge area to discourage weeds.

3.1.3.3 Landscaped Buffer

A landscaped area shall be provided between the curb/edge area and the sidewalk as indicated in **Table 3-3**. The provisions of [Section 3.5](#) apply to any landscaping in the public right-of-way. Existing landscape buffers should be retained.

3.1.3.4 Sidewalk

Sidewalks are required on both sides of the street. Curb ramps meeting ADA requirements are required at all intersections (see ODOT Standard Drawings).

Placement of utility poles, hydrants and other obstructions should avoid sidewalk areas. Any sidewalk obstruction requires the prior approval of the Public Works Director or their designee and a minimum unobstructed clear passage width of 48 inches must be maintained around any obstruction.

The standard sidewalk longitudinal grade and cross slope shall comply with current ADA standards. The back of sidewalk grade shall be maintained parallel to the gutter grade at

driveways. In some locations where the elevation of the adjacent property is much lower than the street, a dip in the sidewalk may be permitted. In this case, the driveway shall have the standard ½ inch lip and slope at a one and three quarters percent (1.75% maximum) grade towards the street. The transition from the driveway back to the normal sidewalk grade shall be in accordance with ADA slope requirements.

Sidewalks shall be constructed of concrete. Alternative materials, such as asphalt or wood, require approval through the design exception process in [Section 2.6](#).

3.1.3.5 Differential Grade Sidewalks

Differential grade sidewalks will be evaluated by the Public Works Director or their designee on a case-by-case basis and may be allowed in certain situations where it is necessary to match existing improvements.

3.1.3.6 Grading Adjacent to Sidewalks

Chapter 16.152 of the Warrenton Municipal Code applies to grading activities for both publicly and privately developed transportation facilities. Slopes behind the sidewalk shall start one foot (1') beyond the edge of the sidewalk or curb and shall not be steeper than 1.5:1 (horizontal: vertical) in a cut condition and 2:1 for a fill condition with cohesive soils. Sand or other non-cohesive soils shall be sloped no steeper than 3:1.

If a grading plan is required for the site per the City’s Development Code, the Geologist/Geotechnical Engineer’s recommendations may replace the above slope requirements with the approval of the Public Works Director or their designee.

A pedestrian guardrail or barrier shall be installed when the slope within 2 feet of the back of a sidewalk exceeds 2:1 for a height of 30-inches or greater. Protection for pedestrians is recommended when slopes are vertical and exceed 18 inches in height. Pedestrian guardrail shall meet or exceed the minimum requirements of the current edition of the Building Code.

3.1.4 Horizontal Alignment of Streets

The centerline of street improvements shall coincide with the centerline of the public right- of-way unless approved by the Public Works Director or their designee.

Minimum centerline curve radius shall be as follows:

Table 3-4. Minimum Horizontal Curve Radius

<u>Design Speed (mph)</u>	<u>Minimum Horizontal Curve Radius (ft)</u>
25	100
30	350
35	500

Centerline radii of curves shall not be less than 500 feet on major collectors, 350 feet on minor collectors, or 100 feet on local streets, and shall be designed to an even 10 feet. For any development over 3 units, regardless of whether it is a subdivision, refer to the requirements of the Development Code Title 16 concerning General Regulations and Design Standards for Subdivisions and Land Partitions.

Super-elevation may be allowed for the purpose of reducing minimum required radius providing that it can be shown that there are no adverse impacts on access to adjacent property, storm drainage and intersections.

Sufficient sight distance must be provided to allow drivers time to avoid obstacles, other vehicles or people in their path. Sight distance shall be considered in horizontal alignment design. Stopping sight distances shall be provided in accordance with the following table:

Table 3-5. Stopping Sight Distance

<u>Design Speed (mph)</u>	<u>Required Stopping Sight Distance (ft)</u>
25	155
30	200
35	250

Adapted from AASHTO Table 3-1

3.1.5 Vertical Alignment of Streets

Minimum longitudinal grade of streets shall be one percent (1%). Maximum street grades are shown in the following table:

Table 3-6. Maximum Street Grades

Street Classification	Maximum Grade (%)
Local	15
Minor Collector	12
Major Collector	12
Minor Arterial	10
Principal Arterial	10

Vertical curves shall be provided at changes of grade exceeding two percent (2%) and shall provide the stopping sight distance required in **Table 3-5**. The grade of the through street at intersections shall be maintained through the intersection. Intersecting streets shall match the curb flow line of the through street and be provided with a landing area. The landing shall extend 25 feet from the pavement edge of the through street and have a grade of five percent (5%) or less. Alternative geometry may be necessary at intersections on steep slopes and shall be coordinated with the Public Works Director or their designee.

Streets shall be graded to provide adequate storm water drainage in accordance with [Section 3.1.11](#) and [Chapter 5](#). Accumulated storm water shall not be allowed to flow across travel lanes. Special care should be taken in the design of vertical curves to avoid long flat grades at the crest or sag of curves.

Curb or gutter grade information shall be provided in design plans for curb returns at intersections and for cul-de-sacs.

3.1.6 Roadway Intersections

3.1.6.1 Intersection Geometry



The interior angle between centerlines at intersecting streets shall be kept as near to ninety degrees (90°) as possible and in no case shall it be less than seventy-five degrees (75°). The centerlines of intersecting streets must be spaced at least 150 feet apart.

Horizontal point of curvature (PC) must be located a minimum of 25 feet from the right-of-way of intersecting streets.

An arterial or collector street intersecting with another street shall have at least 150 feet of tangent adjacent to the intersection unless topography requires a lesser distance. Other streets, except alleys, shall have at least 100 feet of tangent adjacent to the intersection.

The curb radius at the intersection of two streets shall be as shown in **Table 3-7**, unless otherwise approved by the Public Works Director or their designee.

Table 3-7. Design Curb Radius

Approach/Entering Street at Intersection 	No Parking or Bicycle Lane	With Bicycle Lane	With Parking Lane	Both Parking and Bicycle Lane
Exiting Street 	Design Curb Radius (ft)			
No Parking or Bicycle Lane	30	25	20	10
With Bicycle Lane	25	12	8	5
With Parking Lane	20	8	5	5

Both Parking and Bicycle Lane	10	5	5	5
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The intersection of more than two streets at any one point is not allowed.

Bulbed-out intersections for improved pedestrian crossings may be required at intersections specified by the Community Development Department or Public Works Department. Additional traffic calming measures may be required by the Public Works Director or their designee.

3.1.6.2 Clear-Vision Area

A clear-vision sight triangle must be maintained at the intersections of any two streets, at a street and a railroad crossing, or where a driveway enters a street. Refer to Chapter 16.132 of the WMC for specific requirements.

3.1.7 Illumination and Signalization

The Public Works Director or their designee will consider factors such as traffic, crash data, and roadway characteristics to support lighting installation decisions. AASHTO provides the threshold or minimum conditions of when to consider lighting. Refer to the ODOT Lighting Policy and Guidelines.

Street light locations shall be located at property lines and curb returns where possible. A minimum of one light shall be located at each residential local street intersection, each 3-legged intersection (all classifications), and at the end of each cul-de-sac or permanent dead-end street. Additional lights may be required at other street intersections. Residential subdivisions require street lights every 400 feet. Commercial and industrial developments require street lights every 250 feet.

The City accepts Pacific Power’s standard luminaires, and will pay for power and maintenance of street lights that have been approved by the Public Works Director or their designee, and installed by the electric utility company in City rights-of-way. Where specialty light fixtures are desired, financial responsibility for monthly power and maintenance costs shall be determined prior to design approval.

Signals shall be designed by a Professional Engineer in accordance with the ODOT Traffic Signal Design Manual.

3.1.8 Access to City Streets

Proposed driveway or private street access to a City street requires a permit from the City. State highway access requires a permit from ODOT.

3.1.8.1 Driveway Access

Driveways shall meet the requirements of Chapter 16.120 of the WMC. Driveways greater than 150 feet in length shall meet the design requirements for Private Streets provided in [Section 3.2](#).

Maximum and minimum driveway dimensions are detailed in **Table 3-8**.

Table 3-8. Driveway Apron Width

Property Frontage	Minimum width (ft)	Maximum width for single driveway (ft)
Single Family Multiple Family 2 or 3 units	10	24
Multiple Family 4 or 7 units	20	24
Multi-Family 8 or more units	24	30
Widths in this table do not include sloped wings.		

Single family, duplex and triplex units on corner lots may have one access per street. The maximum width for each driveway is 20 feet.

Each additional 100 feet of frontage for contiguous property is considered a separate frontage and shall meet the requirements above.

Requests for additional or wider driveways other than those allowed above must be approved through the design exception process (see [Section 2.6](#)).

Restrictions may be imposed on additional driveways, such as limited turn movements, shared access between uses, closure of existing driveways or other access management actions.

Design and construction of the driveway apron shall conform to ODOT standard drawings. Driveways shall meet applicable ADA guidelines.

3.1.8.2 Access from Alleys and Private Streets

Alley and private street connections to the public street shall be designed in accordance with WMC 16.120.

3.1.8.3 Controlled Access

Controlled or gated access is not permitted on public or private streets except as approved for emergency-only access or public utility access. Gated communities and gated neighborhoods are not allowed. Any proposed controlled access devices will be evaluated through the design exception process.

3.1.9 Cul-de-sacs

Dead-end streets over 150 ft in length shall terminate in an approved turnaround (see Appendix D of the Oregon Fire Code) to provide adequate emergency vehicle access. A dead-end street shall be no more than 200 feet long, shall not provide access to greater than 18 dwelling units, and shall only be used

when environmental or topographical constraints, existing development patterns, or compliance with other standards in this Code preclude street extension and through circulation. The maximum length of a dead-end street shall be 200 feet unless approved through the design exception process (see [Section 2.6](#)). This length shall be measured from the centerline of the intersecting street along the centerline of the dead-end street to the center of the turnaround.

All cul-de-sacs shall terminate with a circular turnaround. Circular turnarounds shall have a radius of no less than 40 feet from center to edge of pavement except that turnarounds that contain a landscaped island or parking bay in their center shall have a minimum radius of 45 feet. When an island or parking bay is provided, there shall be a fire apparatus lane of at least 20 feet in width.

The entire cul-de-sac or hammerhead must be contained within the public right-of-way and signed appropriately to restrict parking. Refer to [Section 3.1.2.7](#) for information regarding sign installation responsibilities.

3.1.10 Alleys

Alleys must be a minimum of 20 feet wide with a 12-ft curb radius at the intersection of the public road. Alleys shall be constructed using the pavement section required for residential local streets. Dead-end alleys will not be permitted. The City will not construct or maintain alleys.

3.1.11 Roadway Drainage

Storm water disposal from streets requires a collection and piping system. Roadway storm drain facilities shall be separate from the City's sanitary sewer lines. Discharge points for all roadway storm drains shall be approved by the Public Works Director or their designee. Refer to [Chapter 5](#) for storm water system Design Standards.

Bioswales and other storm water infiltration systems shall be employed only in collector streets in areas designated by the Public Works Director or their designee. Bioswales (where allowed) shall be designed in accordance with Chapter 14 Appendix B of the ODOT Hydraulics Manual. Landscaping of bioswales (where allowed) shall meet the standards provided in [Section 3.5](#).

3.2 Privately Maintained Streets

The City will not construct or maintain streets or access roads unless they meet all standards provided in [Section 3.1](#). In addition, the Warrenton Development Code discourages private streets. However, in cases where public street standards cannot be met, the Developer may elect to construct a privately maintained access road to serve an infill development.

With the approval of the Public Works Director or their designee, privately maintained streets may be allowed within an existing public right-of-way. Or, privately maintained streets may be developed exclusively within private property. In either case, the following conditions shall apply:

- The maximum number of dwelling units served by the access road shall be three. Streets serving more than three dwelling units must meet the requirements in [Section 3.1](#).
- Sidewalks are not required, but developer must pay a fee in lieu of constructing sidewalks

- The street or access road surface must be constructed of an all-weather surface, as approved by the Public Works Director or their designee and City Fire Code Official.
- Any new development on a private street shall have a fire suppression system approved by the Public Works Director or their designee and City Fire Code Official.
- The traveled way of a private road shall be designated as a fire lane under the Oregon Fire Code. Private streets must have a minimum of 20 feet unobstructed width with 14 feet of vertical clearance.
- With the approval of the City Fire Code Official, the travel surface of the access road may be reduced to 16 feet if two or three dwelling units will be served, or 14 feet if only one dwelling unit will be served. Refuse and recycling services will be required to be at the closest city cross street, if street is less than 24' wide. The total length of any access road with a reduced pavement width must be 400 feet or less. Access roads in excess of 400 feet must have a paved surface at least 20 feet wide.
- A standard turnaround shall be required at any dead-end. (See [Section 3.1.9](#))
- A maximum profile grade of 12% is allowed.
- All runoff from new access roads must be controlled and directed to appropriate storm drains or existing natural drainage channels. Connection to natural drainage requires Public Works Director or their designee's approval.
- Construction of privately-maintained streets within existing public rights of way must not obstruct or reduce access to existing homes.
- The Developer shall arrange for future maintenance and repair of the access road, through a recorded road maintenance agreement or other legal mechanism to ensure perpetual maintenance. The maintenance agreement shall be binding upon all subsequent property owners and shall clearly specify that the City may remove any road improvements as needed to construct, repair or maintain City utilities in the right-of-way. Restoration or repair of any roadway damage caused by City utility work will be the responsibility of the parties to the maintenance agreement.
- In areas where additional development is anticipated, a City-maintained standard street may someday be needed. Therefore, if a privately maintained access road is permitted within a public right-of-way, the Developer must also agree to financially participate in any future street improvements. Covenants shall be placed on lots within the development so that this responsibility passes to subsequent owners.
- Street improvements constructed in the public right-of-way shall be positioned to allow for future widening, if additional development is anticipated.
- Developers shall install their own signs in accordance with the MUTCD and City Standards, including a street identification sign at all intersections. Public Works Director or their designee approval is required when installing signs at intersections with public roads.

3.3 Non-Motorized Facilities

3.3.1 Sidewalks

Sidewalks in City street corridors shall be designed in accordance with [Section 3.1.3](#).

3.3.2 Bicycle Facilities

Bicycle facilities in City street corridors shall be designed in accordance with [Section 3.1.2.1](#).

3.3.3 Multi-Use Pathways

Multi-use pathways within the City are intended for non-motorized use by bicycles and pedestrians. As land is developed, publicly accessible multi-use pathways may be required by the City's Community Development Department, to facilitate non-motorized circulation and connectivity. ADA requirements apply to these facilities. Design of new multi-use pathways shall include logical connections to existing or planned pedestrian and bicycle facilities in street corridors.

General requirements for multi-use pathways are provided in **Table 3-9**. For additional design guidance, refer to the AASHTO Guide for the Development of Bicycle Facilities, and the Oregon Bicycle and Pedestrian Design Guide.

Table 3-9. Multi-Use Pathway Design Elements

Pathway Element	Requirements
Surfacing	Stable, firm and slip resistant. Asphalt or concrete are preferred. Other materials require Public Works Director or their designee approval.
Maximum Longitudinal Slope	4.5%
Maximum Cross Slope	1.5%
Clear Width	10' minimum; 12' preferred; in areas of significant walking or biking demand the clear width should be 16'.

3.3.4 Public Stairways

New pedestrian facilities and alterations to existing pedestrian facilities within the public right-of-way shall conform to ADA Standards. In cases where ADA compliance is technically infeasible, stairway access for pedestrians may be considered by the Public Works Director or their designee. Where allowed, public stairways shall conform to ADA requirements for general site and building elements.

3.3.5 Street Crossing

Enhanced street crossings are required on roadways with high traffic volumes and/or speeds in areas with nearby transit stops, residential uses, schools, parks, shopping and employment destinations. These crossings shall include treatments such as marked crosswalks, high visibility crossings, and/or curb extensions as determined by the Public Works Director or their designee.

3.4 Transit Facilities

Public transportation services within the City include bus service operated by Sunset Empire Transportation District (SETD) and intercity motor coach provided by the Northwest Public Oregon Intercity Transit (NW POINT).

Documented coordination with transit providers is required for design of street and other transportation facilities that are located within 100 feet of existing or planned transit routes and stops. ADA-accessible transit stop improvements, pedestrian connections to transit stop locations and furnishings such as shelters, benches, bicycle racks and/or other amenities may be required by the Public Works Director or their designee.

3.5 Landscaping within the Right-of-Way

In addition to the guidelines in this section, landscaping within the right-of-way must meet the requirements of WMC Title 16 Division 3.

3.5.1 General Requirements

Landscaping within the right-of-way may be a requirement of a development or installed at the request of property owners. If landscaping is a requirement of a development, it may only be removed if it is replaced elsewhere and approved by the Community Development Director and Public Works Director or their designee.

Landscaping within the right-of-way must be maintained by the adjacent property owner. Irrigation in the right-of-way must comply with the OPSC and also be maintained by the adjacent property owner.

3.5.2 Clearance

Landscaping within the right-of-way must meet the Clear-Vision Area requirements in Chapter 16 of the WMC. Vegetation must be maintained so all branches and foliage are removed to a height of 8 feet above the grade and 14 feet above the roadway.

3.5.3 Street Tree Installation

Both underground and overhead utilities need to be considered when choosing the type and location of landscaping. A root barrier shall be installed to prevent heaving of the sidewalk or roadway and may be required when underground utilities are located near the root system. A 24" deep barrier is required adjacent to public sidewalks and a 36" deep barrier is required adjacent to the roadway. Barrier specifications shall meet requirements of DeepRoot® UB 24-2 and UB 36-2, or approved equal.

Street trees installed within Collector or Local streets require tree grates. Grates must have removable rings to accommodate the growing width of the tree trunk. Potted trees may be allowed within sidewalk buffer areas if the pots are constructed for permanent installation.

3.5.4 Suggested Types of Trees

Native vegetation is recommended to reduce watering and maintenance requirements. Trees should not be fruit bearing to avoid debris on the sidewalk. A list of acceptable tree types for planting in the public right-of-way may be obtained from the City's Community Development Department.

3.6 Transportation Facility Construction and Maintenance Responsibilities

Developers are responsible for constructing, signing and striping new street facilities and improving existing roadways as required for developments such as subdivisions and commercial buildings. Maintenance of roadway improvements within dedicated right-of-way is the responsibility of the Developer (or designated private parties) until formal acceptance of the roadway by City Commission. Any non-standard roadway within the right-of-way that is not accepted by the City Commission must be maintained by the Developer (or designated private parties) in perpetuity or until the roadway is improved and accepted by City Commission. Maintenance responsibility needs to be documented, recorded and a copy provided to the City prior to any final inspections or occupancy of the associated development.

Transportation facilities within the vehicular zone of street corridors that are located within the public right-of-way and that are formally accepted by City Commission are maintained by the City. This includes pavement, gutter, signing, striping and signalization. State highways are maintained by ODOT.

Transportation facilities within the walking zone of street corridors are maintained by adjacent property owners.

Private roads and alleys must be maintained in perpetuity by the Developer, adjacent property owners, homeowner's association or other designated party. A maintenance agreement shall be submitted to the City with any new development project.

Table 3-10. Maintenance Responsibilities

Facility	Location	Accepted by City Commission	Maintenance Responsibility
Standard street vehicular zone improvements	Public Right-of-way (ROW)	Yes	City
Standard street walking zone improvements	Public ROW	Yes	Private ¹
Sub-standard street, private street or alley	Public ROW	No	Private ¹
Multi-use pathway	Public ROW, easement or tract	TBD ²	TBD ²
State highway	State ROW	N/A	ODOT
¹ Developer, owners of properties served by the street, or other designated parties.			
² To be determined prior to design approval			

3.7 Formal Acceptance of Transportation Facilities

Warrenton Code provides for acceptance of new street facilities by City Commission. Only improvements that have been constructed in accordance with City standard specifications (2018 Oregon Standard Specifications for Construction) and inspected and approved by the Public Works Director or their designee, shall be recommended for Commission acceptance by the Public Works Director or their designee. Upon City Commission approval, the City will provide a formal letter of acceptance. The City will not maintain or repair any facilities until they have been formally accepted.

4 Sanitary Sewers

This chapter provides information for the design of public sanitary sewers. Public sanitary sewer design plans are reviewed and approved by the Public Works Department.

All new common sanitary sewers serving more than one lot of record must be public sanitary sewers. If allowed by the City, private sanitary sewers constructed on private property within a single lot of record must be designed according to the Oregon Plumbing Specialty Code.

The following sanitary sewer design standards have been developed with the goals of proper sizing for current and future flows, correct installation for long life, ease of access for maintenance and repair while taking into account construction costs.

Compliance with these standards does not relieve the design engineer of the responsibility to apply conservative and sound professional judgment. These are minimum standards and are intended to assist, but not substitute for competent work by design professionals. The City may at its sole discretion due to special conditions and/or environmental constraints, require more stringent requirements than would normally be required under these standards.

This chapter is intended to be consistent with and a supplement to the following documents:

APWA American Public Works Association

ASTM American Society for Testing and Materials

OAR Oregon Administrative Rules

OPSC Oregon Plumbing Specialty Code

DEQ Oregon Department of Environmental Quality Water Quality Program Rules¹

City of Warrenton Sewer Ordinances and Policies

Where conflict exists between these Design Standards and the above referenced documents, the most stringent requirements shall take precedence.

4.1 Design Flows

The entire basin to be served by a sanitary sewer must be taken into account when developing design flows for new or replacement sanitary sewers. In Warrenton, basin sizes are generally small and slopes sufficient to allow an 8-inch diameter line to adequately serve most areas.

Flow calculations prepared by a Professional Engineer are required for all lines serving 10 or more EDU's

¹ Oregon Department of Environmental Quality, *Water Quality Program Rules - Division 052*
<http://www.deq.state.or.us/regulations/rules.htm>

and all commercial or industrial facilities with flows in excess of 3,600 gallons per day (gpd). **Table 4-1** includes suggested residential sanitary sewer flow generation rates for sanitary sewers up to 12 inches in diameter.

Table 4-1. Suggested Flow Generation Rates

Average Flow Generation	120 gallons per capita per day (gpcd)
Peak Flow Factor**	1.8 to 4

**Peak flow factors are referenced from OAR52 Appendix A and vary depending on the type and size of the development.

The sanitary sewer flow rates above are suggested. The design engineer should use judgment to determine if they are appropriate for the pipe being designed. The design engineer shall provide a map of the basin served by the sanitary sewer and take into account existing and potential connections. Future connections shall be estimated by the existing lot layout or zoning of undeveloped areas. An estimate of infiltration and inflow shall be included in the design flows. Surcharging shall not be designed into the system for flows up to the expected peak.

4.2 Sanitary Sewer Pipes

4.2.1 Sanitary Sewer Pipe Material

The standard pipe material to be used for sanitary sewers is PVC meeting the requirements of ASTM D3034 SDR35. High-density polyethylene (HDPE) pipe with fused joints is also acceptable. All HDPE pipe shall be de-beaded. Minimum wall thickness class of HDPE pipe is SDR 26. Other pipe materials may be considered where appropriate and must be approved by the Public Works Director or their designee. Tracer wire shall be a minimum 12-gauge, solid core, green-coated copper wire with thermoplastic insulation recommended for direct burial, and shall be installed with all sanitary sewer pipes with Pro-Trace® TW connectors (if required).

4.2.2 Sanitary Sewer Main Pipe Size

Sanitary sewers shall be sized to adequately handle the expected flows. The minimum sanitary sewer diameter is 8 inches. For dead-end lines up to a maximum length of 250 feet, that have no possibility of future extension and serve less than 6 single family homes or have limited flow, 6 inch lines will be allowed providing that they can be shown to have sufficient capacity and flow velocity.

4.2.3 Sanitary Sewer Pipe Slope

Sanitary sewers shall be sloped to provide a minimum velocity of 2 feet per second (fps) for the average daily flow using a Manning’s roughness coefficient of 0.013 or greater. In no case shall the slope be less than shown in **Table 4-2**.

Table 4-2. Minimum Pipe Slopes

Pipe Diameter (inches)	Minimum Slope (%)
6	0.75
8	0.40
10	0.35
12	0.30

Slopes shown are an absolute minimum. Calculations shall be provided to show that minimum flow velocity requirements can be met. Sizing pipes larger than needed for the anticipated flow to allow installation at a reduced slope is not acceptable. Sanitary sewer diameters may not be reduced in a downstream direction even if steeper slopes allow a smaller diameter pipe to have sufficient capacity for the design flow.

Flow velocities greater than 10 fps under daily peak flows should be avoided. A velocity over 10 fps in sanitary sewer pipes requires special consideration for pipe scour control (and manhole scour, see [Section 4.3.4](#)). Pipe restraints or anchors may be required for pipe slopes in excess of 20%.

4.2.4 Sanitary Sewer Depth

Sanitary sewers shall be installed with a minimum of 36 inches of cover from the top of the pipe to the finish surface. The depth should be sufficient to provide for access by gravity from all adjacent properties in the area whether proposed or existing. Sanitary sewer main depth shall be designed to avoid conflict with other existing and proposed utilities as provided in [Section 4.4.2](#). Conflicts between sanitary sewer laterals and other utilities must also be taken into account in the design.

4.2.5 Sanitary Sewer Laterals

Sanitary sewer laterals shall be a minimum of 4-inch diameter for residential areas and 6-inch diameter for commercial areas and shall be perpendicular to the sewer main. Side sewer stubs shall have a minimum slope of 2% and extend from main line to the property line. Sanitary sewer laterals shall be marked at property line with a green OMNI Marker™ by Tempo, provided by the Public Works Department or by GPS coordinates. Sanitary sewer laterals shall have at least 36 inches of cover in all traveled ways and not less than 2 feet of cover in other areas. Sanitary sewer lateral materials must meet the requirements of [Section 4.2.1](#).

4.3 Manholes and Cleanouts

4.3.1 Location

Manholes shall be installed at the following locations:

- All changes of pipe size, direction, alignment and grade
- At the upstream end of the pipe

- Maximum spacing of 500 feet
- Each intersection or junction of sanitary sewer mains
- Any intersection of a service or private sewer of 8 inches or larger

Manhole placement within the street right-of-way should allow easy access without blocking both traffic lanes. Manhole covers shall not be located in the normal wheel path for the street nor within a crosswalk. Place manholes to avoid surface runoff or storm water ponding. In certain situations, a stainless manhole inflow protector may be allowed in manholes that may be susceptible to runoff or ponding, as approved by the Public Works Director or their designee.

4.3.2 Standard Manhole

Manholes shall be 48 inches in diameter for main sizes up to 24 inches. For line sizes in excess of 24 inches, the design engineer shall submit manhole designs. A maximum of two sanitary sewer laterals may be connected directly to the manhole as long as channels are provided. A minimum 0.1 foot drop in inverts across the manhole is required where the angle between the upstream and downstream pipe is less than 90 degrees. Provide at least a 0.2 foot drop in inverts where the outlet pipe is 90 degrees from the inlet pipe, or where manholes larger than 48 inches have been approved for use by the Public Works Director or their designee. Designs for connections to existing manholes shall show the location of the cover and ladder and the elevations of all pipe inverts, channels, ledge and rim. When different size pipes enter/exit a manhole, the elevation of the crowns of the pipe shall match.

Steps for manholes may be steel-reinforced plastic conforming to AASHTO M 199 (ASTM C478) and AASHTO T 280 (ASTM C497). The steel shall be deformed reinforcing bar conforming to AASHTO M 31 (ASTM A615) Grade 60, No. 4 minimum. The plastic material surrounding the reinforcing steel bar shall be injection molded, with a textured, non-slip surface and a minimum thickness over the steel of 1/16 inch. Voids in the plastic will be cause for rejection of the step.

Flat top manholes shall be used when there is less than 6 feet from the pipe invert to the top of the manhole.

4.3.2.1 Manhole Channels

All channels are required to be smooth, trowel finished, and conform to the shape of the intersecting sewers. All manholes shall have a channel guide grouted in for the ease of use of the City's CCTV system (6-inches round by 26-inches long).

4.3.3 Drop Manhole

The maximum permitted channelized drop across a manhole is 24 inches. Drops in excess of 24 inches are not allowed unless approved through the design exception process. Inside drops are only permitted when adequate room is available within the manhole and when site conditions make an outside drop extremely difficult to construct. An inside drop must use a Reliner® Inside Drop Bowl for gravity with an addition of a Force Line Hood for force main lines. All hardware must be stainless. Only one inside drop is permitted in each manhole. Inside drops require approval by the Public Works Director or their designee.

4.3.4 Manhole Scour Protection

Internal manhole scour protection, such as HDPE flat plate (1/4 inch thick), epoxy coating or energy dissipation mechanisms shall be provided whenever entering flows exceed 10 feet per second. Scour protection treatments require approval by the Public Works Director.

4.3.5 Manhole corrosion protection

When it is necessary to protect against H₂S corrosion in manholes, each manhole that is newly installed is required to have epoxy or fiberglass armoring completed before testing.

4.3.6 Manhole odor control

To prevent premature collapse of pipelines and manholes, and to minimize odor problems and employee hazards, the H₂S content of force mains shall be designed to remain below 0.1mg/l at 20° C at the point of discharge into the gravity sewer system. H₂S controls shall be provided to meet this standard where warranted and shall be designed for year-round operation, as necessary.

4.3.7 Connections to Existing Manholes

When connecting new lines to existing manholes, the manhole wall must be core drilled cleanly, sealed with LINK-SEAL® and grouted or sealed with a Kor-N-Seal® boot to prevent groundwater inflow and infiltration.

4.4 Sanitary Sewer Alignment

Sanitary sewer main lines shall have a straight alignment with a constant grade between manholes. Curved alignment will not be allowed unless there are no reasonable alternatives and must be approved by the Public Works Director or their designee. Sanitary sewer alignment shall be in a street right-of-way whenever possible. Sanitary sewer lines shall be located no closer than 10 feet from the right-of-way or easement line.

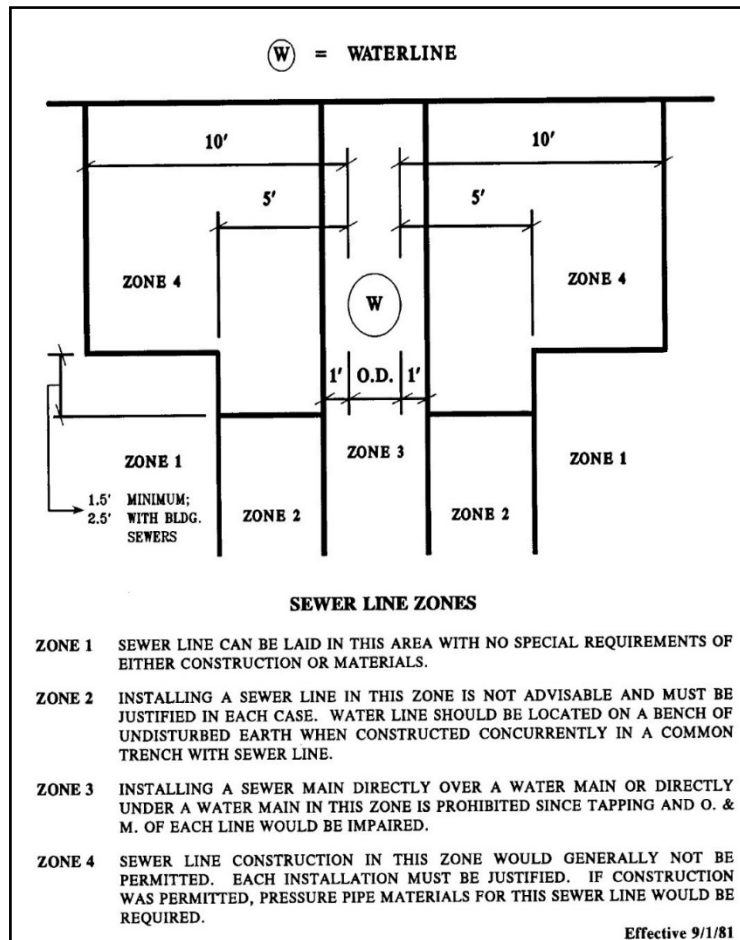
4.4.1 Sanitary Sewer Easements

If due to topographic constraints the sanitary sewer must run along the alignment of a property line, adequate access must be provided. A minimum 20-foot wide sanitary sewer easement is required for legal access and an adequate surface is required for physical access. A wider sanitary sewer easement may be required based on the depth of the pipe. Sanitary sewer pipe shall be located in the center of the easement. The sanitary sewer alignment must be graded to permit travel by utility trucks and backhoes. The sanitary sewer alignment should be offset from the property line to avoid conflicts with survey monuments. The easement description must include language requiring city approval for placement of fences or other improvements to the easement area prior to installation, and hold the City harmless for any damage to or removal of fences, retaining walls, trees or other improvements constructed in the easement area. Easements need to be dedicated on the final plat or recorded easement document prior to City acceptance.

4.4.2 Clearance from Other Utilities

Separation of parallel water and sanitary sewer lines shall meet the requirements of OAR 340-052 Appendix A, as shown in **Figure 4-1**.

Figure 4-1. Sanitary Sewer Line Separation from Parallel Water Lines²



Water and sanitary sewer line crossings shall be in accordance with OAR 340-052 Appendix A. Sanitary sewer/water line crossings shall be as near to 90 degrees as practical.

A minimum of 18 inches of clearance is required from the top of the sanitary sewer line and the bottom of the water line. If at least 18 inches of separation cannot be maintained, the crossing shall meet the requirements of OAR 340-052 Appendix A.

Adequate separation is required from other utilities. All clearances listed below are from edge of pipe to edge of pipe (**Table 4-3 and 4-4**):

² Oregon Administrative Rules, Chapter 340, Division 52, Appendix A, September, 1981.

Table 4-3. Minimum Horizontal Clearance from Sanitary Sewer

Utility	Min. Distance (ft)
Cable TV	5
Gas	5
Power	10
Storm	5
Telephone, Fiber Optic	10

Table 4-4. Minimum Vertical Clearance from Sanitary Sewer

Utility	Min. Distance (ft)
Cable TV	1
Gas	1
Power	1
Storm	1
Telephone, Fiber Optic	1

4.5 Sanitary Sewer Connections

In accordance with the most current Warrenton Sewer Ordinance, each residential, commercial or industrial building is required to have a separate connection to the public sanitary sewer. Private sewers serving more than one lot are not allowed, unless the lots are combined as one buildable lot of record as approved by the City. See OPSC, Section 721 for exceptions.

All taps shall be machine drilled only. Service saddles shall be at least 24 inches from the manhole wall or adjacent service. Design service laterals within 5 feet of the center of the property being served. Sanitary sewer lateral saddles shall be Romac® CB or a cut-in tee designed specifically for the sewer main pipe material. Inserta-tee® are not allowed for connections. Sanitary sewer laterals must not protrude into the sewer main.

A number of older homes in Warrenton are connected to common private sewers. The OPSC requires that two buildings under different ownership must have their own separate connections to the public

sewer. New connections will not be permitted on these private lines. Any modifications to these existing systems will be required to separate the common sewers.

4.5.1 Connection of Sanitary Sewer Laterals

The **cost** of new lateral connections or extensions is the responsibility of the property owner. Single Family residential services will be installed by the City, all other services will be installed by the developer with a licensed and bonded contractor and inspected by the City. When a new sewer lateral is installed, the connection to the main must be inspected by video to check for pipe protrusion. The video recording must be provided to the Public Works Department prior to project sign-off.

City responsibility for sanitary sewer maintenance is limited to public sanitary sewer mains. Sanitary sewer laterals from the point of connection at the sanitary sewer main (including the connection fitting and any damage to the sewer main from the connection), back to the building are the responsibility of the property owner.

When an existing sewer tap/lateral, which is not currently in use, is to be utilized in design. A sealed/signed statement from the design engineer and digital copy of the video must be submitted with the plans indicating that the existing sewer tap/lateral has been physically located and has been flow tested, TV'd, etc. to ensure the serviceability. This must be received prior to plan approval and prior to any permit issuance.

4.5.1.1 Backwater Valves

Depending on the relationship between the finished floor elevation (basements) and the nearest upstream manhole or near force main break points, properties may be required to have an approved backwater valve on the sanitary sewer lateral at the property boundary, outside of the ROW. Backwater valves shall have an access from the surface for cleaning by the homeowner.

4.5.2 Connection of New Sanitary Sewer Mains

Connections of new sanitary sewer mains to existing pipes must be done with a manhole. There is a possibility of surcharging in some existing sanitary sewer lines, particularly the interceptor. This must be taken into account when designing new connections and measures such as storage or backflow prevention, constructed to avoid problems.

4.5.3 Pre-Treatment Requirements for Sanitary Sewer Connections

All commercial users shall produce an environmental survey. This form is available on the city's website.

4.5.3.1 Food Service Establishments

Warrenton Municipal Code section 13.08 prohibits the introduction of mastics, oil, grease or petroleum products into the public sanitary sewer by any user connected to the sanitary sewer system. Industrial, commercial and/or retail operations, regardless of size, that generate petroleum/animal/vegetable fats, oils or grease (FOG) waste, must pre-treat wastewater prior to discharging to the public sanitary sewer. Pre-treatment systems are reviewed and approved by the City Building Official. Ongoing maintenance and repair of pretreatment systems to ensure proper function is the responsibility of the property owner.

Pretreatment systems shall be sized to maintenance standards. The City recommends installation of grease interceptors that are large enough to hold the quantity of grease produced by the facility over a 90-day period. This reduces the life cycle cost of cleaning and pumping of the grease interceptors, and in most cases, will pay for the larger size grease interceptor many times over.

4.5.3.2 Industrial users

Where necessary and as determined by the City, any user of the sewer system shall provide, at their own expense, such preliminary treatment as may be necessary to reduce objectionable characteristics or constituents within the City's prohibited discharges, that may cause pass through or interference, or to comply with water quality standards.

Due to the varying unique requirements from individual industrial facilities; plans, specifications, and any other pertinent information relating to proposed preliminary treatment facilities shall be submitted for the approval of the Public Works Director or designee on a case by case issue.

Industrial facilities shall install a control vault to facilitate the observation, measurement, and sampling of the process wastewater from the facility prior to mixing with other users' wastewater. Such a control vault, when required, shall be 24 hour accessible and constructed in accordance with plans approved by the City. The control vault shall be installed and maintained by the owner at his/her expense. After installation is complete, the owner shall provide the City with keys necessary to access the vault.

Any open connections to the Sanitary sewer system shall at a minimum have a Canopy and curbing to totally prevent rainwater from entering the sanitary sewer system.

Sanitary users producing any of the following flows or loadings into the City's POTW shall apply for an Industrial Waste Discharge permit and shall be regulated under the City's pretreatment program.

- Users with peak sanitary discharge flows equal to or greater than 25,000 gpd.
- Users with peak sanitary loading equal to or greater than 110 lbs per day five-day biological oxygen demand (BOD5).
- Users with peak sanitary loading equal to or greater than 125 lbs per day total suspended solids (TSS).
- Any industry subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR
- Any other facility determined by Treatment Plant staff as having a reasonable potential for adversely affecting the plants operation.

4.6 Low Pressure Sewer Systems

The City of Warrenton Commission has a clear preference for its sewers to be conventional gravity systems but it also recognizes that this is not always possible and therefore will permit the limited use of Low Pressure Sewer Systems within the City, where conventional gravity sewers are not environmentally or physically feasible.

The Public Works Director or their designee (authorized representative) will be responsible for approving all new low pressure sewer installations.

The Public Works Director or their designee (authorized representative) will be responsible for investigating if a land owner/tenant has inadvertently, through introducing banned substances (as set out in the home owner's manual) or willfully, damaged a low pressure system, including downstream systems. They will also determine whether the land owner/tenant will be billed for the repairs to the unit and the relevant cost.

4.6.1 Design of Low Pressure Sewer Systems

UNDER DEVELOPMENT

4.6.1.1 Public System

4.6.1.2 Private System

4.7 Wastewater Pump Stations

Pump stations will be evaluated on a case-by-case basis by the Public Works Director or their designee. Pump station design plans require DEQ approval in addition to City approval. Wastewater pump stations must be designed by an Oregon Registered Professional Engineer and must meet DEQ standards for design and construction of wastewater pump stations. Operation and maintenance manuals meeting DEQ guidelines must also be provided.

4.7.1 General Requirements

The following specifications describe the general requirements for the design and construction of sanitary sewer pump stations and wet wells. Details may vary, depending upon site specific conditions. Plans and specifications will be submitted to the City for review and approval, prior to submission of plans to the Department of Environmental Quality (DEQ).

Submittals will include calculations for initial sewage flows and final "build-out" sewage flows, size and description of the drainage basin. Provide a system pump curve illustrating the varying range of flow conditions from initial flows to build-out, along with the changes in pipe 'C' roughness.

Pressure and/or leakage tests of the wet well and piping shall be required, complying with industry standard testing requirements.

Completion of work and final acceptance by the City will require the submission of three complete sets of pump curves, startup data, equipment submittals, operating and maintenance instructions, as-built plans, final O&M Manual, certification of completion from the design engineer, and warranties from the equipment suppliers to the City of Warrenton. The above required information shall be bound in three ring binders and delivered to the City of Warrenton before final acceptance of the project. As-built documents shall meet the standards in [Section 2.11](#) of this plan. All manufactures recommended spare parts are to be provided before final acceptance of the project.

4.7.2 City Water

Provide a 1.5" water service for wash down of the pump station site, with an approved water meter meeting requirements in [Section 6.9.1](#) of this plan. Include a 1.5-inch reduced pressure backflow

prevention (RPBP) assembly Watts #009. RPBP will be installed in a "Hot Box", size number LB3000, mounted on a 4" concrete slab sized for the hot box. A 1 inch rubber hose of appropriate length to hose down entire site and wet well. Wash down connection shall be installed no more than 10 feet from the wet well.

4.7.3 Check Valve and Pigging Vault

A concrete vault shall be included for the purpose of placing gate valves, check valves, pressure gauges and pig launching port. The Pig launching port shall be set up to serve as a bypass connection for emergency or maintenance pump arounds. The vault shall be precast concrete large enough to fit all the required equipment. The top of the vault shall have a lockable access hatch that is cast into the lid. The vault lid shall be 4 inches to 6 inches above the finish grade to prevent ground water from entering the structure. A 4-inch gravity drain shall be placed at the low end of the vault, connected to the wet well with a check valve on the discharge pipe.

Each pump will have a check valve followed by a gate valve. There will be a 90-degree elbow that connects directly to a flanged cross fitting. The down stream side of the cross will be the discharge of the combined pump pressure main. The other side of the cross will be the pig launching port. This port will be fitted with a 4" square nut valve and a 90-degree elbow facing straight up. The end of this elbow shall be fitted with a Dixon 4" Type B quick disconnect cam lock fitting and a type DP cap to accommodate a 4".

A oil filled stainless steel pressure gauge shall be provided prior to the check valve for the pump. There shall be an annual seal installed on the pipeline to accommodate the pressure gauges. All hardware shall be Stainless steel. All exposed metal facilities shall be epoxy coated for corrosion control.

4.7.4 Transfer Switch

An automatic transfer switch shall be provided to allow for electrical service from a generator, in the event of the loss of electrical service. The automatic transfer switch shall be of a make and model compatible with the manufacturer of the generator.

Provide an Appleton Powertite™ Style-2 part# ADJA1034200RS Receptacle on the outside of the building, connecting to the transfer switch, for the purpose of connecting the City's portable generator.

4.7.4.1 Flow meter

Flow meters shall be provided in a designated metering vault. Shall be ABB process master ip 64 rated for continual submergence. The meter must be installed in such a way so the discharge pipe is always full. Must have remote display, located in the pump station control building. The pump shall use 4-20mA remote sensing for telemetry integration.

4.7.5 Control Panels

The control system shall be designed to operate two (2) submersible pumps (duplex control pumps as indicated on the drawings).

The control function shall provide for the operation of the pumps under normal conditions and shall alternate the pumps on each pump down cycle to equalize the run time. In the event the incoming flow

exceeds the pumping capacity of the lead pump, the lag pump shall automatically start to handle the increased flow. As the flow decreases, the pumps shall cut off at the elevations of existing floats.

The control shall function as described below. The equipment listed below is a guide and does not relieve the panel supplier from supplying a system that will function as required.

The control enclosure shall be a NEMA 4X Fiberglas rated, UL approved. The enclosure shall be the smallest necessary to house the specified devices, shall be a wall mount type. The door shall open a minimum of 180 degrees. A dead front shall be mounted using a continuous hinge and a lexan window for viewing dead front mounted devices, the sub-panel shall contain cut outs for mounted equipment and shall provide protection from live internal wiring. Breakers shall be mounted to allow operation of breakers without entering the compartment. Control panels enclosures shall include an electrical heater with thermostat control.

All control switches, indicator lights, elapsed timers, duplex receptacle and other operational devices shall be mounted on the external surface of the dead front. All devices shall be permanently identified and same identification shall be made on the "As-built" drawings.

4.7.6 Electrical Supply

The basic supply power shall be three (3) phase. Each location shall be site specific as to 230-VAC or 460-VAC supplied. All connections shall be 'fused' as per local codes.

Circuit breakers shall be heavy duty thermal magnetic or motor circuit protectors and shall be adequately sized to meet the pump motor operating characteristics. Three (3) circuit breakers shall be installed to provide for the control circuit, duplex receptacle; alarm circuit shall be individually controlled by adequately sized circuit breakers.

Motor starters shall be VFD, constant torque or designed with a pump de-clogging feature to prevent motor damage at start-up, rated with individual overload protection in each leg. Hertz settings shall be a maximum of 60-htz and the minimum of 40-htz. Follow Manufacturer's recommendations for the "Down Ramp" from 60 to 40-htz's. and, provide "Up Ramp" at pump start at 40-htz.

Control transformers shall be provided as required for 120-VAC and/or 24 VAC control circuits. Transformer shall be fused on the primary and secondary circuits.

A line voltage rated adjustable phase monitor shall be installed to sense low voltage, loss of power, reversed phasing and loss of a phase. Control circuit shall de-energize upon sensing any of the faults and shall automatically restore electrical service upon return to normal power.

Provide a remote mounted "Alarm" light, which shall be a weatherproof, shatterproof, red light fixture with a 40-watt, 120-VAC, bulb. The alarm light shall be energized by the high level, overflow alarm level control, and phase monitor.

Pumps and connected electrical cable shall be explosion-proof.

4.7.7 Control System

The control system shall be designed to operate two (2) submersible pumps. A Variable Frequency Drive (VFD) and a Submersible Liquid Level Transducer will control the pumping operation.

The control function shall provide for the operation of the pumps as the water level in the wetwell increases and decreases. The submersible level transducer and the Variable Frequency Drive (VFD) will control operation of the pumps. As the water level rises the pump/motor speed will increase and the pumping rate will increase until pumping down to shut-off.

The electrical control equipment will be housed in the existing brick building adjacent to the wetwell. The Contractor will provide adequate lengths of electrical cable(s) to reach between the pump and the disconnect panel to be located on the outside wall of the building. The installation contractor will provide the disconnect panel on the outside of the building.

The electrical control equipment shall be placed inside the brick or fiberglass building. The control equipment can be wall mounted if they are specifically designed for wall mounting. Otherwise the electrical controls shall be housed within UL approved enclosure(s). The enclosure(s) shall be the smallest necessary to house the specified devices. The enclosure shall be a wall mount type. The door shall open a minimum of 180 degrees. A dead front shall be mounted using a continuous hinge and a lexan window for viewing dead front mounted devices, the sub-panel shall contain cut outs for mounted equipment and shall provide protection from live internal wiring. Breakers shall be mounted to allow operation of breakers without entering the compartment. Control panels enclosures shall include an electrical panel heater with thermostat control.

All control switches, indicator lights, elapsed timers, duplex receptacle and other operational devices shall be mounted on the external surface of the dead front.

All devices shall be permanently identified, and same identification shall be made on the "As-built" drawings.

The control system shall provide for the automatic and manual control and alternation of the pumps to maintain a pumped down condition of the wet well. Levels shall be sensed by mercury float switches adjusted to the levels shown on the plan. The four float switches shall be "off", "lead", "lag" and "alarm".

As the level in the wet well rises, the lead pump as determined by the alternator, shall start and pump the station to the "off" position. In the event the incoming flow exceeds the capacity of the lead pump, the "lag" pump shall start and both pumps shall run to the "off" level. The alternator shall switch when the "off" level is reached.

If the level should continue to rise in the wet well to the "alarm" level, alarm functions shall be activated.

Dead front door shall have mounted, for each pump, a three position Hand/Off/Auto switch, green "Run" indicator, three (3) elapsed time meters to record pump operation for each pump and for dual

pump operation (6 digits and tenths, non-re-settable) and red seal failure indicator, if provided, with pumps selected.

The alternator shall be solid state with Lead/Lag/Auto and Test switches. The unit shall be 120-VAC and provide DPDT ten (10) amps rated dry contracts as required.

Panel shall be built by a **UL** listed shop for industrial controls, per all governing codes, and tested to assure proper operation of all components before shipping.

All component parts in the control panel shall be permanently marked and identified as they are indicated on the "as-built" drawings. All wiring shall be identified with wire markers at each end as close as practical to the end of the wire.

Pumps and connected electrical cable shall be explosion-proof.

A typical pump wiring diagram and control panel wiring

4.7.8 Power Generator

A generator shall be provided for electrical power to operate the pumps and telemetry, in the event of the loss of electrical service. Natural Gas is preferred but diesel is acceptable.

The generator shall be a Cummins® brand sound attenuated, sized for the KW required for the operation of the sewer pump station at maximum dual pumping operation conditions.

Installation of all gas piping shall be in accordance with installation practices of Northwest Natural Gas Company.

The generator will be placed inside the control building or at the exterior wall of the control building, on a minimum 4-inch thick concrete slab, protected with a cyclone fence and gate. The placement of the generator will be determined by the City based on the characteristics of the pump station site.

4.7.9 Control Building

A wood framed building with fiber cement siding, minimum 8'x8' with 8-foot high eaves, shall be included, to house the sewer pump electrical panel, telemetry, the automatic transfer switch, and protect maintenance personnel and equipment during inclement weather conditions. The roof shall include a 2x6 framed "hip" style, 19/32" sheathing, 30-lb. building paper, architectural grade 3-tab 20-year roofing, vinyl gutters and downs.

All electrical control boxes placed on the exterior of the control house shall be stainless NEMA 4X rated.

Color scheme for the building and roofing shall be submitted to the City, for approval. The interior is open, no wall or ceiling covering. The control equipment can be wall mounted if they are specifically designed for wall mounting.

All wiring between the control building and the wetwell, transformers, vaults, and other appearances will be placed underground, in conduits. Conduits will enter the building up through the concrete slab floor, at the wall line.

Three (3) **110**-volt duplex outlets will be provided within the building.

Access to the control building will be made through a single 3' wide x 6'8" tall exterior door, solid core, steel, three hinges, outside swing. Additional blocking and/or framing shall be included to reinforce the door casing from possible vandalism.

Door lock shall be keyed to the same key blank as other control buildings in the City.

4.7.11 Wet Well

Size will vary depending upon final "build-out" flow conditions.

The concrete wet well shall be a minimum of 6-foot in diameter. A hatch sized so that the pumps can be removed safely, shall be cast into the concrete lid, prior to delivery to the site.

All joints and penetrations of the wet well shall be water-tight. Penetrations with the gravity sewer pipe must be core drilled cleanly, sealed with LINK-SEAL® and grouted or sealed with a Kor-N-Seal® boot to prevent groundwater inflow and infiltration.

The concrete base shall be a minimum 12-inches thick and of sufficient size to prevent floatation. The wet well shall be placed on a base, utilizing a minimum of 12-inches of 3 inch rock. Provide buoyancy calculations.

4.7.12 Site Requirements

The site will be graded to provide surface water drainage away from the wet well and control building.

Bollards may be required to protect the equipment from traffic.

The City will provide an identifying nomenclature for the drainage basin that the station is serving. Reference shall be placed on all documents related to the station.

The site around the wet well and control building, and the access to the wet well and control building from the street, will be constructed of either concrete or asphalt pavement, designed to support maintenance equipment. Add information regarding fencing of whole site.

The pump station shall be on a sufficient size piece of property to allow for access to the site by maintenance equipment. The pump station will not be within public right-of-way. The pump station site will be on property to be owned by the City; or, on private property with an exclusive easement to the City for continued operation and maintenance of the sewer pump station.

4.7.13 Pumps, Piping, and Controls

The submersible pumps shall be specifically designed to pump sanitary sewerage waste solids at heavy consistencies without plugging or dewatering of the solids. The initial pumps to be installed will be two (2) submersible pumps described as follows:

- Each pump shall have minimum two (2) cutting vanes.
- Mechanical seals shall be
- Pumps shall be UL listed explosion proof, Class 1, group D, Division 1.
- All electrical motors shall be three (3) phase operating.
- The pumps will be designed to be removed by a lifting chain. The chain will be constructed of 316-stainless steel. The lifting chain will be equipped with stainless steel circular rings near the base, top of the chain, and two additional rings evenly spaced along the run. Or, the lifting rings may be replaced with similar equipment, meeting with the approval of the City Engineer.
- The pump power cord shall be suspended from the underside of the lid with the use of cradle with rounded edges, not from a cable or wires that will cause wear. The minimum length of the power cord shall be 30-feet.
- Cords will be suspended from a stainless steel rack attached with stainless steel bolts.
- A stainless waterproof electrical splice box will be placed at the outside edge of the wet well lid to allow for removal of the pumps. The power cords from the splice box to the control building will be placed in conduit. Sealant will be placed in the conduit, to prevent the passage of fumes between the wet well and control building.
- Moisture and temperature sensors shall be available to detect water in the stator or seal chambers and thermo overload. When the sensor is activated the pump motor will stop and an alarm shall be enabled.
- A guarded submersible level Transducer with 4-20ma output will be used for the control of the pumps. Float switches will be used as backup for the transducer to warn of high water alarms and high water controls of the pumps to override in case of a transducer failure. A stainless waterproof electrical splice box will be placed at the outside edge of the wet well lid to allow for removal of the floats. The cords for the floats between the splice box and the control building will be placed in conduit. Sealant will be placed in the conduit, to prevent the passage of fumes between the wet well and control building.
- Pump Manufacturer or Agent shall provide start-up and test of each pump and float switches after receiving notification that electrical service has been completed.

- The discharge piping within the wet well and through the vaults shall be ductile iron. All elbows and mechanical fittings will be ductile iron, restrained with the use of mega-lugs. All hardware shall be stainless. All exposed metals shall be painted with an epoxy.

4.7.14 Telemetry Equipment

The city requires use of Mission Communications MyDro M850. The Mission Managed SCADA system relies on remote terminal units (RTUs), cellular carriers, server infrastructure and a sophisticated alarm notifications system. Installation logistics vary by project and must be detailed by the specifying engineer. Typical alarm parameters; pump 1 run, pump 2 run, phase monitor, override/high level, pump 1 overload, pump 2 overload, pump 1 seal temp, and pump 2 seal temp. Typical analog inputs are level and flow.

System Components:

- Remote terminal units to collect and transmit data from Project site to central server location.
- Cellular communications via Mission specified carriers between remote terminal units and central server location.
- Central server location to receive, record, and analyze telemetry reported by remote terminal units.
- Alarm notification system to alert operating personnel about system alarms and malfunction conditions.
- Secure web-based user interface to access recorded data, generate system reports, and control local equipment through remote terminal unit.

RTU Factory assembled and programmed data collection and reporting device, contained within electrical enclosure designed for 25 year life expectancy.

Include Type 4X enclosure for indoor or outdoor applications for protection against corrosion, windblown dust and rain, splashing water, and hose-directed water. The NEMA 250, Type 4X enclosure, with an outdoor watertight enclosure with front sun shield to reduce internal temperature and with accommodation for housing 12 V, 5Ahr back-up battery.

Provide electronic key reader, accessible without opening RTU enclosure to record personnel site visits to RTU. Sound audible tone confirming key reading. If RTU is mounted inside another panel, electronic key reader must be accessible without opening dead front or shutting power or access to other power.

4.8 Sanitary Sewer System Testing

All new sanitary sewer pipes and manholes must be tested for watertightness prior to City acceptance, using a DEQ-approved method. (Refer to Appendix A of OAR 340-052)

In addition, new sewer pipes must be thoroughly flushed and inspected by video, after trench backfilling is complete and prior to City acceptance. Flushing and cleaning shall be done immediately prior to the

video inspection; only that water remaining from cleaning shall be present in the system. This includes testing for deflection and video confirmation that the line is free from sags, irregular joints and connections, obstructions, restrictions or other anomalies that may cause solids to accumulate. The video shall be started no greater than 2 feet from center of manhole and shall pan and view up each service lateral. A ½-inch target ball shall be placed in front of the camera. The video shall include a visual footage, meter recording and any problems revealed during the inspection shall be noted during the video and on the written narrative. After repairs have been made, the line shall be re-inspected and re-tested. The video shall be recorded in color on a CD or DVD format. The video shall be submitted to the Public Works Department for approval prior to final paving.

Provide a written narrative description on each video inspection recording. Include the following minimum information in the narrative: the beginning and the end of the video, the site location or street address, access point identifications, the total footage of the pipe inspected, the company name, the operator's name and the date, time and weather conditions. Make note of all joints, lateral connections, and other conditions within the pipe.

All tracer wire shall be tested for proper connection. Manhole to manhole, sewer main to sewer lateral and cleanouts shall be checked. This verification shall be performed upon completion of rough grading and again prior to final acceptance of the project.

Pump station startup inspection and testing shall be performed to manufacturer's specifications in the presence of the Public Works Director or designated representative. Testing documentation must be included in the O&M manual and provided to the Public Works Director or their designee for approval prior to City acceptance.

5 Storm Water Management Systems

5.1 General Guidelines

Plans for temporary and permanent storm water management shall be provided for every street improvement and land development proposal. Refer to WMC, chapter 16.140 for general requirements for Stormwater and Surface Water Management.

In areas where storm drains exist within 100 feet of proposed residential development or 200 feet of proposed commercial/industrial development, the storm drain shall be extended to serve the new development. The Public Works Director or their designee may require longer line extensions and/or additional design parameters for larger developments that have the potential to significantly impact the City's infrastructure. The City will accept maintenance of new storm drains installed within dedicated street rights-of-way, provided that construction is in accordance with City standards.

In addition to adhering to the standards provided below, storm water designs should identify the potential overland flow path in the event the storm water infrastructure becomes plugged or fails, and provide safeguards to minimize property damage.

Runoff from streets and other impervious surfaces may not be directed to a natural drainage channel, without prior approval of the Public Works Director or their designee. Riprap or other energy dissipation facilities may be required at storm water discharge points to prevent erosion.

5.2 Storm Water Design Documentation

Hydraulics reports and other storm water design documentation shall be prepared in accordance with the ODOT Hydraulics Manual.

5.3 Temporary Storm Water and Erosion Control

Management of storm water during construction shall adhere to the Oregon Department of Environmental Quality's Construction Stormwater Best Management Practices Manual.

A plan for temporary slope stability and erosion control, along with a plan for permanent slope stability, erosion control and plant establishment, is required as part of the construction submittal. A grading permit must be obtained from the Building Department before any site work, including clearing and grubbing, begins.

5.4 Permanent Storm Water Management System

5.4.1 Flow Calculations and Sizing Methodology

Runoff calculations and pipe sizing performed by a registered engineer are required and shall be based on anticipated build-out. All future anticipated impervious surfaces in the development such as streets, walkways, driveways, roofs, patios, etc. shall be accommodated when designing storm water improvements. Culverts and other drainage facilities shall be large enough to accommodate potential runoff from the entire upstream drainage area, whether inside or outside the development.

Refer to the ODOT Hydraulics Manual for acceptable hydrologic methods for calculating peak flows. Selection of methodology is at the discretion of the design engineer.

Calculations should be confirmed using a second analysis method, also selected at the discretion of the designer.

5.4.2 Inlets, Catch Basins and Storm Water Pre-Treatment

Inlets and catch basins in the public right-of-way shall be constructed per ODOT drawings. Inlets and catch basins on private property shall comply with Plumbing Code requirements.

Pre-treatment of storm water destined for conveyance in a public storm drain system is not standard for the City but may be required by certain funding sources for public projects. If required, pre-treatment may be accomplished through the use of biofiltration swales, catch basin inserts, or other methods approved by the Public Works Director or their designee which are designed to remove oil and grease, trash, debris and sediment. If catch basin inserts are used, filter systems shall encapsulate contaminants and shall be designed for easy installation, removal and disposal. Any catch basin inserts proposed for use on public facilities require approval of the Public Works Director or their designee.

5.4.3 Storm Drain Manholes

Storm drain manholes shall meet the requirements of [Section 4.3](#). Channelization is not required in storm drain manholes. A sump is required with a 12" minimum depth.

5.4.4 Storm Drain Pipes

The City allows the use of the following materials for storm drain piping:

- Pipe meeting ASTM D3034 SDR 35 specifications
- High-density polyethylene (HDPE) pipe with fused joints. Joints shall be de-beaded.
- Dual wall corrugated HDPE pipe with smooth interior wall (for example, ADS N-12 piping for diameters of 24" and less; and ADS SaniTite for diameters of 30" and larger.)

Storm drain piping shall otherwise meet the requirements of [Section 4.2](#), except that the minimum storm drain pipe size shall be 12 inches.

Tracer wire shall be a minimum 12-gauge, solid core, green-coated copper wire with thermoplastic insulation recommended for direct burial and shall be installed with all storm sewer pipes with Pro-Trace® TW connectors (if required).

5.4.5 Connection of Private Drains to the Public Storm Drain

Private drains may be connected directly to the public storm water system, if approved by the Public Works Director or their designee. Drain pipes 10-inch diameter and larger, shall be connected at a nearby manhole or catch basin rather than directly to public storm water pipelines. All connection points shall be approved by the Public Works Director or their designee.

For private developments adjacent to Mixed Use and Residential Streets, small private drains for individual lots may be piped under the sidewalk and through the curb, for discharge to the street gutter,

provided that the street cross section does not allow sheet flow across the travelled way. Gutter discharge points shall be approved by the Public Works Director or their designee. The Public Works Director or their designee may require connection to the public storm water system where gutter discharge has the potential for detrimental effects.

5.4.6 Vegetated Storm Water Facilities

Refer to the water quality section of the ODOT Hydraulics Manual for swale sizing and design guidelines.

If infiltration is planned to reduce the volume of storm water directed to the public storm sewer, at least one onsite infiltration test shall be conducted to estimate the rate of infiltration before selecting and sizing infiltration facilities. Selection of a standard infiltration test procedure shall be at the discretion of the designer, provided that the method selected is appropriate for the facility being designed. Refer to technical guidance published by the Oregon State Extension office³.

For new subdivisions, maintenance of vegetated storm water areas within the public street right-of-way is the responsibility of the Developer and the subsequent property owners' association. This includes keeping any storm water treatment and conveyance elements within planted areas in a state of good repair. In existing City streets where a vegetated storm water treatment area is installed to help the City meet storm water management goals, the City will assume responsibility for maintaining the vegetated area.

5.4.7 Retention and Detention Facilities

The City's preference is unrestricted conveyance of storm drainage to the Columbia or Skipanon River without the use of detention or retention structures. Therefore design efforts shall first seek to address any limiting downstream capacity impediments within the City's storm water conveyance system. The following treatments require Public Works Director or their designee approval and will be considered for storm water detention or retention only when it is not feasible to resolve downstream capacity issues in the public storm drain system.

5.4.7.1 Basin

Storm water retention and detention basins are uncommon in Warrenton and will be considered by the Public Works Director or their designee on a case by case basis. If allowed, basins intended as storm water management facilities shall meet the design criteria provided in the ODOT Hydraulics Manual.

5.4.7.2 Detention Flow Control Structures

Structural detention facilities such as tanks, vaults and oversized pipes shall be designed to prevent surcharge of downstream piping systems during storm events.

The following criteria apply to detention tank, vault, and oversized pipe design:

³ "Infiltration Testing", Low Impact Development Fact Sheet, Document Number ORESU-G-11-008; Oregon Sea Grant, Corvallis, OR

<http://extension.oregonstate.edu/stormwater/sites/default/files/Infiltration%20Testing.pdf>

- All areas within a tank or vault shall be within 50 feet of a rectangular hatch with a 30 x 36 minimum opening. All access openings shall have solid locking lids.
- All privately owned and maintained facilities shall be located to allow easy maintenance and access.
- Minimum size for a public detention pipe shall be 36 inches.
- The minimum internal height of a vault or tank shall be 3 feet, and the minimum width shall be 3 feet. The maximum depth of the vault or tank invert shall be 20 feet.
- Where the tank or vault is designed to provide sediment containment, the structure shall be designed with a sump to facilitate cleaning.
- Pipe materials shall conform to [Section 5.4.4](#)
- Detention vaults shall be constructed of structural reinforced concrete (3000 psi, ASTM 405). All construction joints shall be provided with water stops.
- In soils where groundwater may induce flotation and buoyancy, measures shall be taken to counteract these forces with concrete ballast, earth backfill, concrete anchors, or other counteractive measures. Calculations demonstrating stability shall be submitted to the Public Works Director or their designee.
- Tanks and vaults shall be placed on stable, consolidated native soil with suitable bedding. For installation in fill slopes, a geotechnical analysis shall be performed to confirm stability and determine construction practices.

Flow control structures must be approved by the Public Works Director or their designee and must meet the following design criteria:

- Refer to the ODOT Hydraulics Manual for orifice and weir flow control equations.
- Weir structures must be enclosed in a catch basin, manhole, or vault and must be accessible for maintenance.
- The control structure shall be designed to pass the 100-year storm event as overflow, without causing flooding of the contributing drainage area.

5.4.8 Storm Drain System Easements

Where a development is traversed by a watercourse, wetland, drainage way, channel or stream, the City may require a dedication of a storm water easement or drainage right-of-way conforming substantially with the lines of such watercourse and such further width as will be adequate for conveyance and maintenance.

If due to unavoidable constraints the storm drain system must run along a property line, adequate access must be provided. A minimum 20-foot wide storm drain easement approved by the City is required for legal access and an adequate surface is required for physical access. Wider easements may be required for deeper pipes. Storm drain systems must be centered within the easement. The storm drain alignment must be graded to permit travel by utility trucks and backhoes. The easement description must hold the City harmless for any damage to or removal of fences, retaining walls, trees or other improvements constructed in the easement area. Easement needs to be dedicated on final plat or recorded easement document prior to acceptance of the storm drain system by the City.

5.4.9 Operation and Maintenance Plans

A plan outlining the scope of activities, schedule and responsible parties for periodic inspection and maintenance of permanent storm water facilities shall be prepared and included with the construction submittal. This plan shall cover vegetation management, structural repairs, sediment removal and other activities necessary for the continued long- term function of the storm water facilities.

5.4.10 Storm Drain System Testing

All new storm drain pipes and manholes must be tested for watertightness prior to City acceptance using a water exfiltration test procedure.

In addition, new storm drain pipes must be thoroughly flushed and inspected by video, after trench backfilling is complete and prior to City acceptance. This includes video confirmation that the line is free from sags, irregular joints and connections, obstructions, restrictions or other anomalies that may cause solids to accumulate.

All tracer wire shall be tested for proper connection. Manhole to manhole, storm main to storm lateral and cleanouts shall be checked. This verification shall be performed upon completion of rough grading and again prior to final acceptance of the project.

6 Water Systems

This chapter provides information for the design of public water systems. Private water systems must be designed according to the Oregon Specialty Plumbing Code. Public water design plans are reviewed and approved by the Public Works Department and the Oregon Health Authority Drinking Water Program.

The following water design standards have been developed with the goals of proper sizing for current and future flows, correct installation for long life, ease of access for maintenance and repair while taking into account construction costs.

Compliance with these standards does not relieve the design engineer of the responsibility to apply conservative and sound professional judgment. These are minimum standards and are intended to assist, but not substitute for competent work by design professionals. The City may, at its sole discretion due to special conditions and/or environmental constraints, require more stringent requirements than would normally be required under these standards.

This chapter is intended to be consistent with and a supplement to the following documents:

SDWA	Safe Drinking Water Act
CWA	Clean Water Act
APWA	American Public Works Association
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
OAR	Oregon Administrative Rules
ORS	Oregon Revised Statutes
OFC	Oregon Fire Code
OPSC	Oregon Plumbing Specialty Code
	City of Warrenton WMC 13.04

Where conflict exists between these Design Standards and the above referenced documents, the most stringent requirements shall take precedence.

6.1 City Pressure Zones

Contact the Public Works Department for pressure information.

6.2 Design Flow Rates

Water system design shall meet distribution needs for projected maximum peak hour demand (PHD) plus fire flow within a given service area. New water systems shall allow for future extensions beyond

present development that are consistent with the Development Code. Flow testing at peak demand may be required by the Fire Department.

An appropriate peak hour factor shall be used for water system design.

6.3 Water Pipes

6.3.1 Water Pipe Size

Water distribution main sizes shall generally conform to the following:

- **4-inch** – May only be used with approval of the Public Works Director or their designee in residential zones on dead-end streets less than a centerline distance of 250-feet measured from the center of the intersection street to the radius point of the cul-de-sac and that serves 12 or fewer single-family residences. All 4-inch mains shall be connected to a looped minimum 6-inch main. Fire hydrants are not permitted on 4-inch lines. All 4-inch lines shall terminate with a standard blow-off.
- **6-inch** – Minimum size residential subdivision distribution water main for the grid (looped) system, limited to single family residential. A 6-inch line shall not be permanently dead-ended. Looping of the distribution grid shall be at least every 600 feet.
- **8-inch** – Looping of the distribution grid shall be at least every 600 feet. Minimum size for permanently dead-end mains supplying fire hydrants and mains in residential subdivisions. Dead-end pipe length shall not exceed 600 feet.
- **10-inch and larger** – As required for mains in subdivisions, industrial areas, and commercial areas.

Standard design velocity in distribution mains shall not exceed 10 feet per second (fps) for maximum PHD. Designs that propose occasional short term velocity increases of an additional 2 fps to meet required fire flows may be considered by the Public Works Director or their designee.

For portions of the water system with mid-range to low-static pressures, required flows may not be achievable while still maintaining a minimum system residual of 40psi. Oversizing of waterlines may be required to achieve the required flows.

Standard pipe sizes for distribution mains are 8", 10", 12" and sometimes 18".

Standard sizes for transmission mains are 18" and 24". In some instances, 12" distribution mains are designed to serve as transmission mains.

Design exceptions to standard sizes may be allowed in cases of a bridge crossing or other conditions where a standard size would be infeasible or would limit the capacity below what is needed.

Water main, service line and meter sizes must be approved by the Public Works Department.

6.3.2 Water Pipe Material

Approved water distribution pipe material includes Ductile Iron, PVC and HDPE pipe.

- HDPE pipe, 4-inches to 36-inches shall conform to AWWA C906. All HDPE water pipe shall have a standard dimension ratio no greater than 11.
- Ductile iron pipe shall be Class 52, cement mortar-lined with push-on or mechanical type joints, and conform to AWWA C151.
- PVC pipe, 4-inches to 60-inches shall conform to AWWA C900 and Uni-Bell standards. All PVC pipe shall have a dimension ratio no greater than 18, with an outside diameter identical to cast iron pipe.

Service lines are not to be smaller than 1-inch in size. Service lines 1-inch up to 2-inch in size are to be MUNICIPEX® cross-linked polyethylene (PEX) conforming to AWWA C904-06. 2-inch service lines may be MUNICIPEX®, HDPE or PVC. Service lines larger than 2 inches can be ductile iron, HDPE or PVC.

Tracer wire shall be 12-gauge, solid core, blue-coated copper wire with thermoplastic insulation recommended for direct burial, and shall be installed with all PVC and HDPE water pipe with Pro-Trace® TW connectors (if required).

6.3.3 Water Pipe Depth

The minimum cover over buried water mains shall be 30 inches within the road right-of-way from finish grade. Maximum depth for buried water mains shall be 42 inches unless otherwise approved by the Public Works Director or their designee. All bored street crossings require the approval of the Public Works Director or their designee, and shall be encased in a sleeve.

6.4 Water Line Alignment

The distribution system mains shall be looped at all possible locations. All developments will be required to extend mains across existing or proposed streets for future extensions of other developments. All terminations shall be planned and located such that new or existing pavement will not have to be cut in the future when the main is extended.

Dead-end mains that are permanent or that will be extended in the future shall be provided with a properly sized blow-off. Prior to the blow-off assembly, a properly sized inline main valve must be installed for isolation. Blow-off locations within unimproved ROW should include an above ground marker, similar to a blue fiberglass utility marker.

The installation of permanent or long-term, dead-end mains greater than 250-feet, upon which fire protection depends, and single mains serving relatively large areas will not be permitted unless otherwise approved by the Public Works Director or their designee.

No more than 20 single-family residences shall be served from an un-looped waterline, unless approved by the Public Works Director or their designee.

Unless otherwise directed or approved by the Public Works Director or their designee, water mains shall be located within the public right-of-way for ease of maintenance and access, control and operation of the facility, and to permit required replacement and/or repair. Water mains should be 16 feet minimum away from any foundations or 20 feet minimum away from any trees.

6.4.1 Water Line Easements

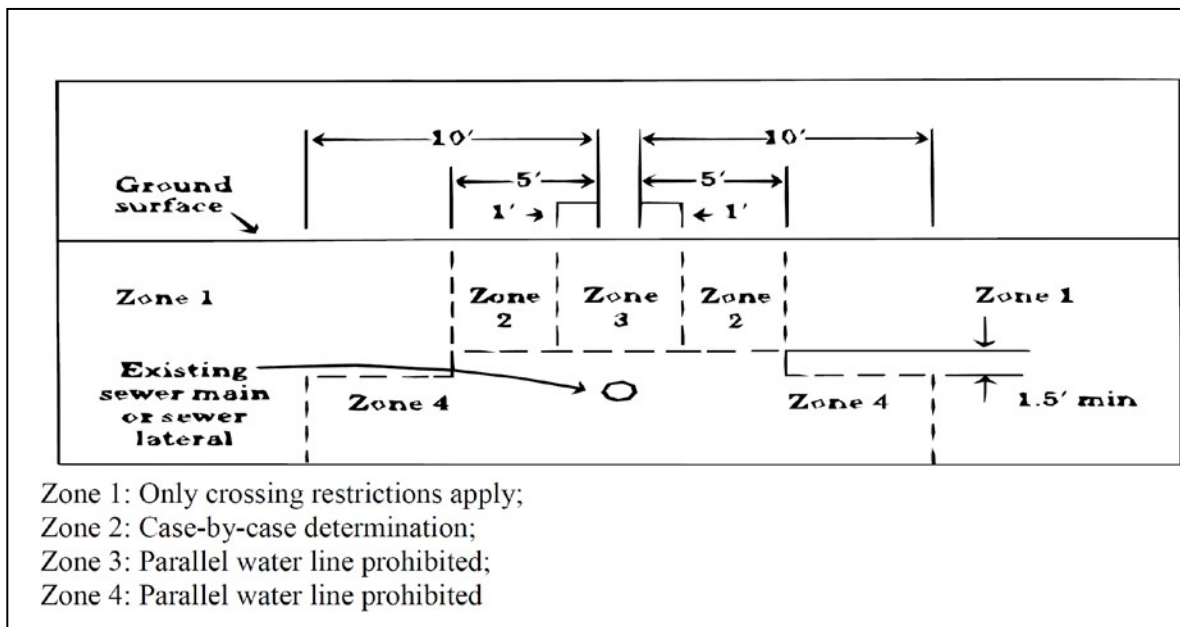
If due to unavoidable constraints the water main must run along a property line, adequate access must be provided. A minimum 20-foot wide water easement approved by the City is required for legal access and an adequate surface is required for physical access. Wider easements may be required for deeper pipes. Water lines must be centered within the easement. The water alignment must be graded to permit travel by utility trucks and backhoes. The easement description must hold the City harmless for any damage to or removal of fences, retaining walls, trees or other improvements constructed in the easement area. Easement needs to be dedicated on final plat or recorded easement document prior to acceptance of the water line by the City.

6.4.2 Clearance from Other Utilities

Water and sanitary sewer line crossings shall be in accordance with the OAR 333-061-0050(9). Sanitary sewer/water line crossings shall be as near to 90 degrees as practical. The bottom of the water line shall be 1.5 feet or more above the top of the sanitary sewer line and one full stick of water line shall be centered at the crossing.

Horizontal separation of parallel water and sanitary sewer lines shall meet the requirements of **Figure 6-1**. In areas where separation requirements are unable to be met, construction shall comply with OAR 333-061-0050(9)(B & C) and will require Public Works Director or their designee’s approval.

Figure 6-1. Water Line Separation from Parallel Sanitary sewer Lines⁴



⁴ Oregon Administrative Rules 333-061-0050, Construction Standards Figure 1, http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_333/tables_333/333-061-0050_1-25.pdf

No new utility pole shall be located within 5 feet of an existing hydrant or within 8 feet of an existing water line.

Adequate separation is required from other utilities. All clearances listed below are from edge-to-edge of each pipe:

Table 6-1. Minimum Horizontal Clearance from Water Main

Utility	Min. Horizontal Distance from Water Main (ft)
Cable TV	5
Gas	5
Power	5
Storm	5
Telephone, Fiber Optic	5

Table 6-2. Minimum Vertical Clearance from Water Main

Utility	Min. Vertical Distance from Water Main (ft)
Cable TV	1
Gas	2
Power	1
Storm	1
Telephone, Fiber Optic	1

6.5 Valves

Gate valves are required on water lines from 2" to 12" diameter and shall meet the requirements of AWWA C509 or C515.

Butterfly valves are required on water lines larger than 12" diameter and shall meet the requirement of AWWA C504. Valves shall be 2" square nut Non-Rising Stem (NRS) operating, unless specified otherwise. Valves must be tested to ensure proper movement prior to installation.

Isolation valves at branch connections in a looped water line system shall be provided. The number of valves as required shall provide a means for isolation every branch by closing one or more valves. Main

lines valves shall be spaced every 500 to 600 feet and placed in locations, which allow appropriate water main isolation. Main line valves at line intersections shall be flanged directly to the tee or cross fittings.

Fire Hydrant isolation valves shall be flanged to the tee or 90° elbow.

Vancouver style model 910 with notches and a traffic rated lid and labeled “W” or “water.” All valve boxes shall have self-centering guides. Manufacturer cast valve box notches shall be aligned with direction of main.

6.6 Fittings

All connections and fittings shall meet the requirements of NSF 61. All ductile iron mechanical joint fittings shall meet the requirements of AWWA C153. All flanged fittings and cast iron mechanical joint fittings shall be manufactured domestically, meet the requirements of AWWA C110 and C111 and shall have a minimum working pressure rating of 350 psi. All fittings shall be factory cement mortar lined and coated, meeting the requirements of AWWA C104.

6.7 Fire Hydrants

Required fire flows are determined by the City’s Fire Code Official.

The distribution of hydrants shall be based upon the required average fire flow for the area served. Design coverage shall result in hydrant spacing that meets the current version of Oregon Fire Code Appendix C – Fire Hydrant Locations and Distribution. Additional hydrants shall be placed as required by the Fire Department, Building Division and/or Public Works Department.

No fire hydrant shall be installed on a main of less than 8-inch inside diameter. The hydrant lateral shall be a minimum of 6 inches nominal diameter. Each fire hydrant shall have an auxiliary valve and valve box that will permit repair of the hydrant without shutting down the main supplying the hydrant. The auxiliary valve shall be a resilient-wedge gate valve. Fire hydrant laterals between valve on main and hydrant must be ductile iron pipe.

Private fire hydrants are limited to large commercial or industrial developments where public access is not feasible, or as approved by the City’s Fire Code Official.

All fire hydrants will be located at the back of the existing or proposed sidewalk, or in the planter strip. Where there is no sidewalk, fire hydrant shall be located a minimum of 5 feet from the face of curb. If any public hydrant encroaches on private property, an easement must be provided to the City. In general, fire hydrants will be located at or near the point of curvature of the curb return or at a common property line. The pumper port of each fire hydrant shall be perpendicular to the curb line or shoulder as applicable.

No hydrant shall be installed within 5 feet of any above-ground utility, nor shall any utility install facilities closer than 5 feet to an existing hydrant. Hydrants shall not be blocked by parking, fences or other obstructions.

Hydrants shall be Mueller Super Centurion 250 A-423 or an approved equal with a recirculation oil lubrication system. All fire hydrants shall be painted yellow. Private hydrants must be maintained in accordance with the Oregon Fire Code. Installation of hydrant extensions will not be allowed, unless approved by the Public Works Director or their designee.

Unless connected to a fire line/fire sprinkler service, fire hydrants shall be placed on the same side of the right-of-way as the waterline serving the fire hydrant. Other proposed locations must be approved by the Public Works Director or their designee.

Guard posts, a minimum of 3-feet high, shall be required for protection from vehicles when necessary (see Oregon Fire Code). Such protection shall consist of 6-inch diameter steel pipes 6-feet long, filled with concrete, buried a minimum of 3-feet deep in concrete and located at the corners of a 6-foot square with the hydrant located in the center. Use of posts other than at the 4 corners may be approved by the Public Works Director or their designee.

Marking of fire hydrants will require Blue Stimsonite two sided markers (2-way Blue 88AB) to be attached to the road surface with Thermoset 2 part epoxy (EP_308 hardener Part B+EP-308 Epoxy Resin Part A). The markers are required to be placed in the closest lane to the hydrant, right of the centerline. If the hydrant is placed on a corner, markers shall be placed on both streets.

6.8 Combination Air/Vacuum Release Valves

Combination air/vacuum release valve units are required on all transmission and distribution lines, at all high points in grade and at other points as determined by the Public Works Director or their designee.

6.9 Water Service Lines

Water service line refers to the combined facility made up of both a “City service line” and a “customer service line.” The City service line extends from the water main to the water meter. The customer service line extends from the water meter to the point of use. Customer service lines shall meet the standards of the current edition of the OPSC. Water service line taps shall not be closer than 5 feet to any other tap, on any water main. No water services are permitted on dead-end lines unless a blow off is provided at the end of the main.

6.9.1 City Service Lines and Meters

Allowable water service line sizes are 1-inch, 2-inch, 4-inch, 6-inch, 8-inch, 10-inch and 12-inch. Corresponding meter sizes are shown in **Table 6-3**. A minimum of 30 inches of cover is required for all water service lines. All water meters 3-inches and larger require a bypass line with approved water meter. Water service lines will be reviewed for impacts on the distribution system and shall not be greater in size than the distribution main.

Domestic service lines 1-inch and 2-inch shall extend from the main to behind the curb, with an approved meter curb stop and meter box located at the termination of the service connection. Meter boxes shall be located 12 inches inside the public or street right-of-way. Whenever possible, individual service connections shall terminate in front of the property to be served along the street frontage where property is addressed. Meter boxes should be located outside a vehicle travel way and 12-inches inside

the public or street right-of-way. Water service via an easement across a separate parcel under separate ownership, or capable of being sold off, is not allowed unless otherwise approved by the Public Works Director or their designee.

Water meters will be Master Meter® brand Bottom Load Multi-Jet (BLMJ) with Allegro registers in the City of Warrenton radio frequency. Meters larger than 2 inch will be Master Meter® brand Octave Ultrasonic Meter, with a pit module in the City of Warrenton radio frequency. The Public Works Department can provide the appropriate part numbers and frequency of each meter size and type.

Water meter boxes for meters up to and including 2 inch will be Armorcast® with 20K rated solid lids. The Public Works Department can provide the appropriate part number.

For services 4-inch and larger (3-inch and larger meters), a design drawing must be submitted to the City showing the vault and fitting requirements with the expected flow (normal and peak hour demand) requirements and proposed usage. Meter vaults shall be placed at the entrance to the property being served, unless otherwise approved by the Public Works Director or their designee. A sump pump shall be installed and maintained in the meter vault (of all meters larger than 2-inch) by the property owner, discharging to a storm drain or other location approved by the Public Works Director or their designee. The owner shall be responsible for all permits, costs and maintenance associated with providing power and pump to the meter vault for the sump pump.

Multiple service connections to a premise shall be laid out to follow a logical sequence of addresses to facilitate matching of service connection to building(s). On-site water lines shall be laid out to facilitate a logical matching of service connection to building and address. Each meter must have its own service line and connection to a water main.

Water meters on fire service detector loops shall be installed at accessible locations acceptable to the Public Works Director or their designee, and radio for reading shall be provided as required to allow the meter to be read without entering the building.

Where an active cathodic protection system is encountered, the service line material shall be HDPE.

Table 6-3. General Design Criteria for Water Service and Meter Sizing

Water Service Size (inches)	Meter Size (inches)	Max Design Flow (GPM)*
1	5/8 x 3/4	30
1	1	50
2	1 ½	100
2	2	160
4	3	320

4	4	500
6	6	1,000
8	8	1,600
Larger than 8	Reviewed and approved on a case-by-case basis.	
<i>*Continuous flow not to exceed 30% of max design flow for ¾-inch to 2-inch disk meters. Continuous flow not to exceed 50% of max design flow for all compound meters.</i>		

6.9.2 Fire Service Lines

Water system design shall provide adequate flow for fire protection during projected maximum water usage and consumption. Required water system demands shall be met while maintaining the minimum operating pressures of 20 psi required by the State of Oregon (OAR 333-061-0050). Refer to the most current edition of the Oregon Fire Code for fire flow requirements.

There are 4 categories of private fire services: (1) hydrants, (2) fire sprinkler lines, (3) combination hydrant and fire sprinkler lines, and (4) combination hydrant, fire sprinkler and domestic service lines. **Table 6-4** provides general design criteria for fire line and fire sprinkler system services.

The City portion of a fire service line shall extend from the main to the property line and end with a vault, approved metering device, and valves. An approved backflow prevention assembly is required for the property being served and must be located at the property line. The property owner is responsible for maintenance.

Fire lines serving only fire sprinkler systems shall be metered by an approved detector meter on the approved backflow assembly. Valves controlling fire suppression water supplies shall be monitored in accordance with the Oregon Fire Code.

Whenever possible, the fire service shall be located along the street frontage where the parcel is addressed.

Fire sprinkler systems for one- and two-family dwellings shall be served through a standard metered service. The fire sprinkler system may be served through the domestic service for the same residence. The combined domestic, irrigation, and fire sprinkler flow demands may not exceed the City of Warrenton allowable flow for that particular size of service and meter.

Table 6-4. General Design Criteria for Fire Line and Fire Sprinkler System Services

Fire Service Size (inches)	Double Detector Check Valve Assembly or Reduced Pressure Assembly (inches)	Max Design Flow (GPM)*
1	$\frac{3}{4}$	30
1	1	50
2	1 $\frac{1}{2}$	100
2	2	160
4	4	500
6	6	1,000
8	8	1,600
10	10	2,500
Larger than 10	Reviewed and approved on a case by case basis	
*Continuous flow not to exceed 30% of max design flow for $\frac{3}{4}$ -inch to 2-inch disk meters. Continuous flow not to exceed 50% of max design flow for all compound meters.		

6.9.3 Fire Vaults

A vault for a 3-inch and larger approved backflow prevention assembly will be required. The vault drawing will be included on construction drawings submitted to the City.

6.10 Backflow Prevention

An approved backflow prevention device is required for any system with potential to backflow, such as commercial, some residential and stand-alone fire suppression systems. Refer to the City WMC 13.04 for requirements pertaining to backflow prevention. Installation of backflow prevention devices shall conform to the OPSC when located on private property.

6.11 Boosters Stations

Booster stations must be designed by an Oregon Registered Professional Engineer and will be evaluated on a case-by-case basis by the Public Works Director or their designee. Contact the Public Works Department for specifications on booster station controls and appurtenances required by the City.

6.12 Water System Testing

All new water systems (including lines, valves, hydrants and services) shall be individually pressure tested, chlorinated, and tested for bacteria. All testing shall be performed in accordance with AWWA C600 and C651, in the presence of a City Inspector and the design engineer. Contact the Public Works Department 48 business hours in advance for inspections. Testing documentation must be provided to the Public Works Director or their designee for approval prior to City acceptance.

All tracer wire shall be tested for proper connection. Valve to valve, water main to water service and water meters shall be checked. This verification shall be performed upon completion of rough grading and again prior to final acceptance of the project.

7 Refuse and Recycling Routing and Enclosures

This chapter provides information for the design of refuse and recycling routing and enclosures. Proper design and sizing of the refuse and recycling route and enclosure will assist in preventing employee/driver injury and/or property damage and will allow collection trucks to safely access and lift containers without ground or aerial obstructions.

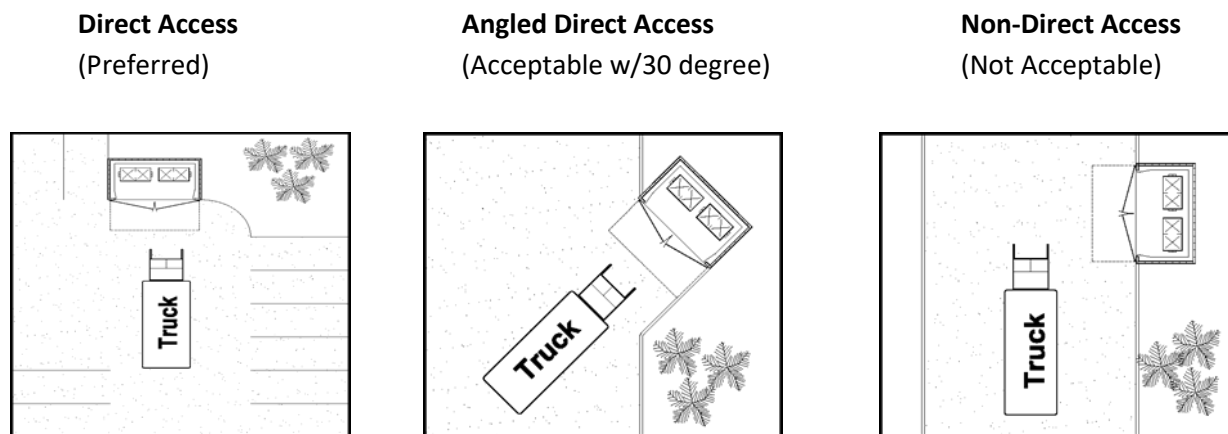
7.1 Access

All containers and enclosures are required to have direct access for collection trucks. Direct access means the collection truck can drive directly at the container and insert the forks (“stab”) into the sides/pockets of the container without having to move the container, see **Figure 7.1**. A minimum road width of 24 feet is required for access to and from the enclosure. A maximum angle of 30 degrees from the center line of the collection truck route to the enclosure is allowed. Enclosures shall be located away from entrances and exits so the collection truck does not create a safety hazard by blocking in-bound or out-bound traffic. Trash enclosures cannot be installed behind parking spaces.

It is difficult and dangerous for a collection truck to back up. Providing a turnaround or separate exit that allows the truck to move forward rather than backwards is required. Maximum backup distance is 50 feet for any maneuver and must be in a straight line. Collection routes through a site shall be configured for the collection truck to travel through a site once without back tracking. Turning radius must be adequate for a 3-axle truck. The overall length, including the forks is 36 feet. Minimum outside turning radius is 46.5 feet. Please detail this on your plans.

An asphalt or concrete driveway with 50 feet of straight, direct access that leads to and from the enclosure to the container is required and should be built in accordance with [Section 3.1](#) and be able to withstand trucks weighing up to 62,000 lbs. Gross Vehicle Weight (GVW). Collection trucks require at least 14 feet of vertical clearance over the entire approach to and from the enclosure and 32 feet above the enclosure itself or wherever the container will be serviced.

Figure 7.1 Enclosure access



7.2 Enclosure Design

Enclosures with poor or no accessibility, enclosures with atypical orientations, and enclosures that require a driver to move or push a container for servicing are not recommended and will require special approval from the Public Works Director or their designee. Enclosures shall be placed in accordance with applicable Fire Code.

7.2.1 Enclosure and Apron Concrete Pad

A concrete stress pad shall be installed at the same dimensions as the enclosure, as well as 8 feet of additional apron extending out past the enclosure opening. The concrete pad shall be engineered to withstand 20,000 lbs. of direct force from a single truck axle. The enclosure and apron pad shall slope 1/8 inch per foot away from the enclosure pad.

7.2.2 Construction and Design

The enclosure shall be designed specifically for refuse and recycling containers and bins. The enclosure cannot be used for general storage or any other purpose.

Generally, the material should match the exterior surface of the building but see the City of Warrenton Development Code and Community Development Department for current standards. Some options of materials include: Reinforced masonry or concrete block, wood, and cyclone fencing with slats to block visibility.

The height of the enclosure shall be a minimum of 6 feet, or if the containers are greater than 6 feet in height, at least 6 inches above the top of the container.

The inside dimensions will depend on the number of containers required. The minimum inside dimensions for an enclosure will be 18 feet wide by 10 feet in depth, which will fit two containers 80 inches in width, side-by-side. The enclosure must be large enough to provide a 2-foot clearance from the interior walls to each side of the containers. With at least 3-inch distance between each container.

Enclosures shall contain a bumper curb at ground level inside the enclosure, bumper rail or bollards on back wall to prevent damage from container impacts.

The gate width shall be the same width as the inside dimension of the enclosure with no posts in the middle. A separate, pedestrian entrance that meets current ADA standards is encouraged from the side or 3-foot staggered gate entrance. The gate and pedestrian entrance should have frames of solid metal. Bolts, not screws shall be used to secure the gate(s) to the poles or walls. A means to secure gate doors both opened and closed, e.g. cane bolt w/sleeve and latch between doors and sleeve in pavement, shall be provided. Gates shall have a 4-inch clearance from the finished pad or apron. Gates in the opened position shall not infringe on the traffic aisles and open to at least 180 degrees when secured open.

The corners of the enclosure where the door hinges are attached shall be protected with brightly colored bollards with reflective taping at the top. Gates may be attached to bollards.

The area around and inside the enclosure should be provided with adequate lighting.

The area directly in front of the enclosure gates shall have “NO PARKING” painted on the ground and signs permanently affixed to the gates stating the same.

7.2.3 Storm Water Collection

All properties should make plans to comply with the Federal Clean Water Act. The property owner shall ensure that no other materials are stored within the enclosure that could potentially cause contamination to stormwater.

7.2.4 Wastewater Pollution Prevention

Approval from the Public Works Director or their designee must be received if the enclosure will also be used to house a grease waste container. Special provisions for having enclosure drains connected to sanitary sewer will be required, including being connected to the facilities grease interceptor.

7.3 Drop Box and Compactor

The size of the concrete pad for drop boxes and compactors shall be at least 12 feet wide and at least 5 feet longer than the length of the drop box or compactor and a minimum of 6 inches thick. The pad shall be located a minimum of 2 feet from any perimeter wall or structure and in a location that conforms to local Fire Code provisions.

Access to the front of a drop box or compactor pad shall be a length of 50 feet and a width of 12 feet. Loading dock areas that accommodate drop boxes or compactors shall have guide rail and bumper stop placed at ground level or at dock level, where the rear of the drop box or compactor is to rest, to protect any enclosure, wall, or structure from damage due to loading or unloading. Reflective “No Parking” signs shall be placed in a prominent location on or near the collection areas to provide unobstructed and safe access for servicing the receptacles.

Compactors shall be compatible with collection equipment and weight limits prescribed by State and Local law. The local franchised hauler shall be consulted for equipment compatibility.

Appendix A – Standard Notes

Standard notes are to be included on all plan sets submitted. Sections not included in the work may be omitted with approval from the Public Works Director or their authorized representative.

General Notes:

No person shall do work affecting the public right-of-way without first obtaining a permit from the Public Works Department. Work affecting the right-of-way includes, but is not limited to, construction, reconstruction, grading, oiling, repair, opening or excavation of a sidewalk, street, curb, driveway, culvert or ditch in a public right-of-way, but does not include the construction of improvements performed under City contract.

Construction shall conform to the Oregon Specifications and Standard Drawings for Construction and as revised by the City of Warrenton. Any condition not described in the permit shall be per submitted plans and to all applicable requirements of APWA, AWWA, DEQ, EPA, DSL, and ODOT Construction Standards.

It shall be the responsibility of the Contractor to verify all utility locations prior to construction and arrange for the relocation of any in conflict with the proposed construction. The locations, depth, and description of existing utilities shown were compiled from available records and-or field surveys. The City or utility companies do not guarantee the accuracy of the completeness of such records. Additional utilities may exist within the work area.

Oregon law requires that the rules adopted by Oregon Utility Notification Center be followed. Those rules are set forth in OAR 952-001-0090. The contractor is responsible to call 1-800-332-2344 for locates prior to excavation. Any damage to City or private services shall be repaired by the contractor with own repair materials.

The contractor shall make provisions to keep all existing utilities (including non-locatable) in service and protect them during construction. Contractor shall be responsible for the immediate notification of damage to utilities and the repair or replacement of damaged utilities using materials and methods approved by the utility owner. No service interruptions shall be permitted without prior written agreement with the utility owner/provider.

The contractor shall pothole and verify location and depth of all existing utilities prior to the start of construction. The contractor shall take all necessary field measurements and otherwise verify all dimensions and existing construction conditions indicated and or shown on the plans. Should any error or inconsistency exist, the contractor shall not proceed with the work affected until reported to the design engineer for clarification or correction.

All project elements shall be constructed per approved project drawings; specifications; federal, state and local permits; and preconstruction meeting notes.

The contractor shall keep an approved set of plans on the project site at all times.

All DSL, DEQ, ODOT, and OHA permits and regulations will be the responsibility of the developer.

Project inspection on private projects is the responsibility of the developer. The City Warrenton requires the design engineer to monitor construction standards and workmanship.

Project Plans shall always have an engineer-of-record performing the function of design engineer. If the design engineer is changed during the course of the work, the City shall be notified in writing and the work shall be stopped until the replacement engineer has agreed to accept the responsibilities of the design engineer. The new design engineer shall provide written notice of accepting project responsibility to the City within 72 hours of accepting the position as design engineer.

Infrastructure through neighboring property is allowed only when recorded access easements are granted by owners. Recorded easements shall be submitted to Public Works prior to the start of the warranty period.

Subdivision projects are required to have utility location plan.

All public, private and franchise utilities shall be in place prior to project final approval and acceptance, e.g. all street lights must be in and operational.

All survey monuments on the project's site or that may be subject to disturbance within the construction area, or the construction of any off-site improvements shall be adequately referenced and protected prior to commencement of any construction activity. If the survey monuments are disturbed, moved, relocated, or destroyed as a result of any construction, the contractor shall, at their cost, retain the services of a registered professional land surveyor in the state of Oregon to restore the monument to its original condition and file the necessary surveys as required by Oregon State Law.

Grading and Fill/Excavation Permits or Private Service Plumbing Permits shall be required when work is performed on private property. Owner, engineer, or contractor must contact the City of Warrenton Planning and Building Department, prior to construction.

The contractor is required to meter construction water through a City hydrant water meter. Water used during construction for dust control or other procedures shall be with a permit and fee. Certain hydrants are available, permits for connection and flow are required from the Public Works Department, and backflow devices shall be present.

All existing streets and sidewalks to be cleaned and or protected daily. City has the right to enforce cleaning and safety issues. The contractor can be fined or charged for Public Works time and material. Trench excavation on existing roadways need to be cold patched and kept smooth with existing asphalt at end of each day.

Contractor shall erect and maintain temporary traffic control per the "Manual on Uniform Traffic Control Devices" (MUTCD), Part 6, and deviations to the MUTCD as adopted and modified by ODOT. Should work be in an existing public right of way that is open to traffic, the contractor shall submit a

traffic control plan with ROW permit to appropriate City, County, and State personnel for approval. Approvals shall be obtained prior to start of work.

Any inspection by the City, County, State, Federal Agency or design engineer shall not, in any way, relieve the contractor from any obligation to perform the work in compliance with the applicable codes, regulations, city standards and project contract documents.

Tracer wire installation shall be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency signal, and without distortion of signal caused by more than one wire being installed in close proximity to one another.

Tracer wire systems must be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed. One foot of excess/slack wire is required in all tracer wire access points after meeting final elevation.

All new tracer wire installations shall be located using typical low frequency (512 Hz) line tracing equipment, witnessed by the design engineer or Public Works Department, prior to acceptance of ownership. This verification shall be performed upon completion of rough grading and again prior to final acceptance of the project.

Upon completion of construction, the contractor shall submit "redline drawings" to design engineer for preparation of record drawings. "Redline drawings" document all deviations and revisions to the approved plans; they also record a description of construction materials actually used (pipe material, etc.). From the information contained on these redline drawings, as well as any notes recorded by the design engineer, the design engineer shall prepare and submit record drawings to Public Works Engineering Development Services. Record drawings are required for any public improvements. City acceptance of any public improvements are tied to the submittal of these record drawings. CAD-generated plans shall also have electronic record drawings submitted to the City in compliance with the digital mapping requirements. Comply with section 2.11 *As-Built Documents* of the City of Warrenton Engineering Design Standards.

Street Plan Notes:

Standard monolithically poured 6" curb and 18" gutter section shall be constructed. Sub-grade AASHTO-T99 compaction tests completed every one-hundred feet with test reports given to Public Works.

The full street section shall have a minimum of 4" Asphalt Concrete in two 2" lifts. The top layer shall be 12.5 mm (1/2") dense mix for the surface wearing course with the lower lift either 19 mm (3/4") dense hot mix asphalt concrete (HMAC) or 12.5 mm (1/2") dense mix.

Roadway structure of twelve inches of 1" or 3/4" – 0" inch compacted base rock. An additional 12" layer of 3" cobble sub-base with geotextile layer may be used during wet weather or winter construction periods.

All cuts in asphalt paving, Portland cement paving, concrete curbs, gutters and sidewalks shall be saw cut at least three inches deep unless excepted as a condition of the permit.

Trench compaction of 1" or ¾"-0" backfill in public utilities. Street saw cut and restoration are required. Tack coating and sand sealing of edges of pavement cut is required.

Mailbox units mounted in sidewalk shall have a sweep provided behind the obstruction so that 4 feet of clear passing distance is maintained. Location to be coordinated with the United States Post Service Office for Warrenton.

New ADA ramp(s) with Truncated Domes texture pattern is required on all street corners. The contractor shall provide the pattern panels for the ramps. Damage to ADA ramps or sidewalks during construction or building construction shall be the responsibility of the contractor to repair.

All street name signs shall be installed by contractor to APWA, MUTCD and City standards. Signs poles mounted in grade, curbs or sidewalks have V-lock anchors.

All street markings such as Stop Bars or Crosswalks etc., shall be installed by contractor following the most current addition of the MUTCD and be made of thermoplastic material per APWA standards.

Streetlight poles and luminaries shall be installed prior to final approval.

Sidewalk portions to be (re)constructed for full frontage or where broken and missing. Two inches of compacted ¾"-0" base rock under concrete, with ¼" fiber board expansion joint at ends, dummy tool construction joints every 5 feet also matching score marks in any existing adjacent curb and gutter. An 8-inch thickness in commercial (6" residential) driveway aprons is required. All sidewalk widths are determined by the street classification. The sidewalk shall be a minimum of four inches thick and six inches thick at the driveways. Each lot shall have a driveway approach with three-foot curb transitions with sidewalk sweep around the back of the access per the attached plan set.

Newly constructed curbs shall be stamped with the capital letter "D" for storm, "S" for sanitary, and "W" for water at the location of each underground service crossing. Letters shall be three (3) inches in height and embossed a minimum of one-quarter (1/4) inch deep.

Street lighting Notes:

Street lights to be Fiberglass Poles (provided by PP & L) with LED 6,200 lumen rating (minimum) lamps and installed on foundations per Pacific Power & Light requirements.

All street lights to have individual pull box (J-Box), (provided by the utility company), installed within 2 to 4' from the base of the pole.

All street lights to be 2' from back of curb where recessed or no sidewalk exists, or 2' back of sidewalk to the face of pole unless otherwise approved by City.

All street light conduits to be 2-1/2" PVC Schedule 40.

Sewer Plan Notes:

The interior of the manhole base shall be formed so the effluent enters the flow smoothly with the shelf slope no more than 1:12. Grouting shall be smooth with no protruding sharp edges. Grouting around pipe intrusions including service laterals to be smooth with flow channels to prevent uncontrolled drops.

Manhole, Base, and Cone or Flat-top lids shall have only mainline tracer wire extended into each manhole and secured under the manhole lid for easy access.

New 4" ASTM D3034 PVC lateral to connection on public mainline with 4" sanitary tee-wye. Connection is to be inspected by Public Works and Building Division.

The sewer laterals shall be installed entering the sewer main line from the upper quadrant of the pipe. Any sewer lateral entering the pipe at the spring line must have a tee-wye sweep fitting installed. All lateral connection(s) are to be inspected by Public Works and Building Departments before backfilling.

Newly constructed curbs or replaced curbs shall be stamped with the capitol letter "S" at the location each sanitary lateral crossing. Letters shall be three (3) inches in height and embossed a minimum of one-quarter (1/4) inch deep.

Construct service saddles at least 24" from manhole wall or adjacent service.

Construct service lateral within 5' of the center of the property served.

Each lateral shall be marked with a green 2"x 4" buried at the end of the pipe with the green tracer wire secured above grade to the 2"x4". The lateral shall be plugged with a water tight plug. When connecting new lines to existing manholes, the manhole wall must be core drilled cleanly, sealed with LINK-SEAL® and grouted or sealed with a Kor-N-Seal® boot to prevent groundwater inflow and infiltration. Use of saw cut and knock out by hammer is prohibited.

Contractor is responsible for vacuum, mandrel and television testing and inspection requirements, see section 4.8 of the City of Warrenton Engineering Design Standards for required testing.

Contractor shall keep downstream sanitary sewer pipes and manholes clean of construction debris. Notification to clean the system may be given by the City at any time. The contractor is responsible for all cleaning which may include manholes downstream of the project scope of work.

All manholes located in unimproved easements and right of ways shall be provided with tamper proof lids, be installed two feet (2') above existing grade and marked with a green Carsonite® marker post, labeled "Sewer".

Contractor shall submit accurate as-built stations for all connections of sewer laterals and note the distance from upstream manholes. This information will be provided on the as-built documents before submittal.

Stormwater Plan Notes:

Installation of curb inlets, field inlets and manholes are to conform to City standards. Connection to existing public systems from private catchments shall be at or have installed curb catch basins or area inlets within the public right-of-way.

Construction of inlet / outlet headwall structures, riprap bank stabilization, bio-filter swale and energy dissipation features.

Installation of storm water detention, flow and pollution control water quality features per approved plans. Below ground culverts, box, MH or wet/dry basin etc.

Construction of drainage ditch to approved slope & grade, vegetation on side slopes for erosion control.

Roof and garage runoff drainage shall drain to approved drainways. Approved drainways include public curb and gutter street systems, pipe systems, or roadside ditches. Drainage grates across a public sidewalk are prohibited.

Each lot may have 2 each 3" schedule 40 PVC weep holes installed on each side of the driveway through the curb or accommodate runoff through easement to collection point with special approval from the Public Works Department.

Contractor is responsible for, mandrel and television testing and inspection requirements - see General Section.

Storm water detention may be required. Engineered Hydrology Studies are required prior to permitting.

Erosion Control Plan Notes:

All sites shall submit an erosion control plan for review, regardless of size. New developments impacting areas of 10,000 square feet or greater must obtain an Erosion Control Permit.

Erosion Control Plan shall include:

- The methods and/or facilities to be used to prevent erosion and pollution created from the development both during and after construction.
- Limits of clearing by flagging boundaries in the field before starting site grading or construction. Staging areas shall be included.
- An analysis of source controls, such as detention and storage during construction as an alternative method to control erosion from storm water runoff.
- A drainage plan during construction.
- Show existing contours as well as all sensitive areas, creeks, streams, wetlands, and open areas.
- A description of historic localized flooding problems resulting from surface water runoff, FEMA or flooding problems known to the community or the City.
- Erosion control plan shall include a schedule for implementation of erosion measures. The schedule shall include:
 - Measures to cover bare soil within 14 days following final grading.

- Implementation of wet weather measures between October 1st and April 30th, unless otherwise approved by the City.
- On sites where vegetation and ground cover have been removed, City approved ground cover shall be re-established by seeding and mulching on or before September 1st with the ground cover established by October 15th. As an alternative to seeding and mulching, or if ground cover is not established by October 15th, the open areas shall be protected through the wet season with straw mulch, erosion blankets, or other approved methods, where appropriate, with long term maintenance plan.

Water containing sediment shall not be discharged into the surface water management system, wetlands or streams without first passing through an approved sediment filtering facility or device. Discharge from temporary sedimentation ponds or detention facilities used for sedimentation during construction shall be constructed to City standards to provide adequate sediment filtration.

A site-specific plan prepared by a registered professional engineer shall be required and additional erosion control measures may be required for sites having one or more of the following characteristics:

- Sites greater than five (5) acres disturbed;
- Sites with slopes greater than 15 percent on any portion of the site;
- Sites with highly erodible soils;
- Sites adjacent to sensitive areas;
- Sites where grading and clearing activities are likely between October 1st and April 30th

Additional erosion control measures may include one or more of the following:

- Limited area cleared at any one time;
- Additional drainage requirements during construction;
- Filtering or treatment of runoff;
- Additional water quality;
- Additional erosion control to cover portions of the site;
- Maintaining a vegetated buffer strip between site and sensitive area;
- Additional facilities to reduce volume and velocity of water runoff;
- If there are no workable alternatives, limit clearing and grading in some areas between October 1st and April 30th.
- All disturbed land areas that shall remain unworked for 14 days or more shall be physically covered in the wet weather season

Site cleanup and debris removal. Contractor to remove excessive soil and debris deposited onto streets or into the City storm drainage system. Street cleanup on streets every day and upon completion of work or as required by the City.

Dust control on streets accessible and used by residents is required.

Minimum Erosion control measures shall include but are not limited to the following. Sediment fences along the downgrade slope of the project perimeter. Filter bags at catch basin inlets. Street cleaning of debris or material dropped in transit. Installation of water quality erosion control BMP's per project plans.

Water Plan Notes:

Only City of Warrenton personnel may operate public water valves on City water mains. Requests shall be made 3 business days in advance to Public Works office: 503 861-0912.

Contractor is responsible to flush, clean, disinfect and pressure test water lines per AWWA standards. Testing is to be performed by the contractor and witnessed by City personnel. Test samples to be transported to a lab approved by the City. City and design engineer shall receive copies of test reports.

Fire hydrants shall be Mueller Super Centurion 250 Model A-423 or an approved equal with a recirculation oil lubrication system. Fire hydrant connections to the mainline shall require a photo of tee and isolation valve prior to backfill, and shall be submitted with final documents.

Hydrants adjacent to paved streets shall be marked using Blue Stimsonite® two sided markers (2-way Blue 88AB) to be attached to the road surface with Thermoset 2 part epoxy (EP-308 hardener Part B+EP-308 Epoxy Resin Part A). Markers shall be placed right of centerline in the lane closest to the hydrant. If the hydrant is located on a corner, markers must be on both streets.

Contractor shall perform a flow test for each hydrant and verify hydrant opening ease and lubricant. Contractor shall paint fire hydrants to City standard.

Air Release and valve assemblies shall be automatic only.

All water valves shall have VC212 valve box self-centering guides or equal.

Valve boxes shall be model 910 Vancouver style w/manufactured cast notches aligned with direction of main and traffic rated lid, labeled "W" or "water" or equal.

All valves shall be operated to verify valve wrench tool clearance prior to final paving.

All valve boxes not set in asphalt shall have a minimum of 18" x 18" x 3" thick concrete pad with valve box centered.

Residential service lines shall have Ford F500-4-NL brass one-inch (1") corporation stop, one-inch (1") MUNICIPEX® water service line with compression fittings, and a 1"x3/4" lockable angle stop using Ford grip ring fittings. All service fittings shall be brass, male x male, iron pipe size, and iron pipe thread. If 1"x1" angle stops are installed, 1"x3/4" adapters shall be included. Meter boxes shall be Armorcast® straight wall polymer concrete RPM A6000485 (12x20x12) with Armorcast® one-piece 20K traffic-rated lid.

Construct service saddles at least 24" from mainline end or an adjacent service.

Commercial properties making connections to the City infrastructure shall provide and install Master Meter Allegro Under-the-Glass (UTG) or Master Meter Octave water meters. The City of Warrenton has a FCC approved radio frequency identification that is programed into these meters, the developer/contractor must contact the City and receive the required frequency for ordering. Meter boxes shall be Armorcast straight wall polymer concrete with one-piece 20k traffic rated lids.

Customer Yard Valves (shut-offs) behind the meter shall be installed by the developer on the proposed water service and are required to be in place prior to the activation of the Water Meter.

Appendix B – General Conditions and Special Provisions

The City of Warrenton General Conditions and Special Provisions to the Oregon Standard Specifications for Construction are in the process of being written.

Appendix C – Construction Permit – Plan Review Form

The Construction Permit (2 pages below) is required as part of [Section 2.9 Construction Submittal](#) of these Design Standards. This form is also used for design exception submittal per [Section 2.6 Design Exceptions](#) of these Design Standards. This form can also be found on the City of Warrenton website www.ci.warrenton.or.us



Public Works Construction Permit

City of Warrenton – Public Works

45 SW 2nd Street, Warrenton, OR 97146

Phone: (503) 861-0912 Fax: (503) 861-9661

Web: www.ci.warrenton.or.us

Permit Number: _____

Date Submitted: _____

Date Approved: _____

Plan Review Fee: _____

Const. Review Fee: _____

PROJECT INFORMATION

Project Name:

Street Name(s)/Location:

Description of Work:

APPLICANT Send Correspondence to this Contact

Contact Name:

Business Name:

Address:

City/State/ZIP:

Phone:

Email:

ENGINEER Send Correspondence to this Contact

Name:

Phone:

Business Name:

Address:

City/State/ZIP:

Email:

OR PE #:

Warrenton Bus. License #:

DESIGN EXCEPTION(S)

Does this plan submittal include a design exception(s) request? Yes No

Summary of design exception request(s):

Design exception(s) request must address the requirements in the Design Standards Section 2.6.1 and be included with this form.

INFRASTRUCTURE CONSTRUCTION COST

Preliminary Construction Cost (Prepared by ENGINEER & attached):

Note: The preliminary construction cost estimate must be prepared by the ENGINEER and attached to this permit. Development review is done through a third-party consultant firm, those fees will be pass through and paid through building permitting. A construction permit fee of 2% of the final construction cost estimate (\$500 minimum) will be required prior to issuance of the construction permit. The construction cost used to calculate the required fee is associated with all improvements made in the public right-of-way or public improvements constructed in easements. This includes but is not limited to, road, curb, sidewalk, driveway, ADA ramps, grading, erosion control, storm drainage, sanitary sewer, water, street light, retaining structures, signage, and striping. The estimated construction cost associated with the construction permit needs to include any scope changes associated with the plan review process.

Applicant's Signature:

Date:

STAFF USE ONLY	
Completeness Review	<input type="checkbox"/> 3 Full Size Plan Sets <input type="checkbox"/> Completed and Signed by PE <input type="checkbox"/> Current Design Standards Used <input type="checkbox"/> Preliminary Cost Estimate Provided <input type="checkbox"/> Design Exception(s) (if applicable) Provided
Plan Review Routing	<input type="checkbox"/> PW Operations <input type="checkbox"/> PW Engineering <input type="checkbox"/> WFD <input type="checkbox"/> Building/Planning
Plan Review Submittal Log	
1.	Date:
2.	Date:
3.	Date:
4.	Date:
5.	Date:
Plan Review Response(s) Log	
1.	Date:
2.	Date:
3.	Date:
4.	Date:
5.	Date:
Design Exception(s) Review Log	
1.	Date:
2.	Date:
3.	Date:
4.	Date:
5.	Date:
Construction Cost Estimates and Fees	
Preliminary Construction Cost Estimate:	Plan Review Fee:
Final Construction Cost Estimate:	Construction Review Fee (2%):
<p><i>The preliminary construction cost estimate must be prepared by the ENGINEER and attached to this permit. A construction permit fee of 2% of the final construction cost estimate (\$500 minimum) will be required prior to issuance of the construction permit. The construction cost used to calculate the required fee is associated with all improvements made in the public right-of-way or public improvements constructed in easements. This includes but is not limited to road, curb, sidewalk, driveway, ADA ramps, grading, erosion control, storm drainage, sanitary sewer, water, street light, retaining structures, signage, and striping. A construction permit fee of 2% of the estimated construction cost will be required prior to commencing construction activity. The fee will be collected in lieu of the Right-of-Way Permit Fee (Street-cut fees still apply). The final construction cost estimate associated with the construction permit must include any scope changes associated with the plan review process.</i></p>	
Approvals and Performance Bond	
Performance Bond Amount:	Date Submitted:
<p><i>The performance bond must be issued in the amount of the final construction cost estimate and be filed with this form.</i></p>	
Public Works Operations Approval:	Date:
Public Works Engineering Approval:	Date:

