

**CITY OF SCAPPOOSE
PUBLIC WORKS
DESIGN
STANDARDS**

7/01/02
(with resolution 14-28, Ch 1 & 5 amendments)

**CITY OF SCAPPOOSE
STANDARD
DETAIL
DRAWINGS**

7/01/02

**CITY OF SCAPPOOSE
PUBLIC WORKS DESIGN STANDARDS**

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CITY OF SCAPPOOSE

PUBLIC WORKS DESIGN STANDARDS

SECTION: 1.0000 — GENERAL

1.0010 — Authority and Purpose

In 1994 the City of Scappoose adopted the Scappoose, Oregon Public Works Design Standards and Standard Specifications. The passage of time and changes in community size and in the standard practices of the engineering community has necessitated the revision of these standards and specifications. The information contained in this document shall be known as the Scappoose Public Works Design Standards or, in the shortened version, as the Design Standards.

The purpose of these Design Standards is to provide a consistent policy under which certain physical aspects of public facility design shall be implemented. Most of the elements contained in this document are Public Works oriented and it is intended that they apply to both public improvements under City contract and public improvements made under private contract.

These Design Standards cannot provide for all situations. They are intended to assist but not to substitute for competent work by design professionals. It is expected that engineers will bring to each project the best of skills from their respective disciplines.

The Design Standards are also not intended to unreasonably limit any innovative or creative effort, which could result in better quality, better cost savings, or both. Any proposed departure from the Design Standards will be judged, however, on the likelihood that such variance will produce a compensating or comparable result in every way adequate for the user and City resident.

Alternate materials and methods will be considered for approval by the City's Engineer as the need arises and conditions warrant modification. This consideration will be on a case-by-case basis and require sufficient justification prior to approval.

1.0020 — Engineering Policy

It shall be the policy of the City of Scappoose to require compliance with Oregon Revised Statute 672 for professional engineers.

All engineering plans, reports, or documents shall be prepared by a registered professional engineer, or by a subordinate employee under the engineer's direction, and shall be signed by the engineer and stamped with the engineer's seal to indicate the engineer's responsibility for them. It shall be the engineer's responsibility to review any proposed public facility extension, modification, or other change with the City prior to engineering or proposed design work to determine any special requirements or whether the proposal is permissible. It is highly recommended that the design engineer and developer schedule a meeting with City Staff to review the proposed design before significant work is invested in the design. A "Preliminary Review" and/or a "Plans Approved for Construction" stamp of the City on the plans, etc., for any job, does not in any way relieve the engineer of responsibility to meet all requirements of the City or obligation to protect life, health, and property of the public. The plan for any project shall be revised or supplemented at any time it is determined that the full requirements of the City have not been met.

1.0030 — Applicability

These Design Standards shall govern all construction and upgrading of all publicly and privately financed public facilities in the City of Scappoose and applicable work within its service areas.

1.0040 — Standard Specifications

Except as otherwise provided by these Design Standards, all construction design detail, workmanship, and materials shall be in accordance with the current edition of the City of Scappoose Standard Specifications and drawings.

1.0050 — Approval of Alternate Materials or Methods

Any substitution material or alternate method not explicitly approved herein will be considered for approval as set forth in Section 1.0010. Persons seeking such approvals shall make application in writing. Approval of any major deviation from these Design Standards shall be in written form. Approval of minor matters shall be made in writing if requested.

Any alternate must meet or exceed the minimum requirements set in these Design Standards.

The written application is to include, but is not limited to, the manufacturer's specifications and testing results, design drawings, calculations, and other pertinent information.

Any deviations or special problems shall be reviewed on a case-by-case basis and approved by the City's Engineer. When requested by the City, full design calculations shall be submitted for review with the request for approval.

1.0060 — Special Design Problems

Special applications not covered in these Design Standards require review and approval by the City's Engineer. Submittal of full design calculations, supplemental drawings, and information will be required prior to any approval.

Such applications, which may occur requiring special review and approval, are among, but not limited to, the following:

- | | |
|---|---|
| Sewer Force Mains | Water Distribution Pump Stations |
| Relining of Existing Sewers | Relining of Existing Water Mains |
| Internal Sealing of Existing Sewers | Water Pressure Regulating Devices |
| Sewer Regulatory Devices | Energy Dissipaters |
| Sewage Pump Stations | Water Reservoirs |
| Sewer Siphons | Water Treatment Plants |
| Sewage Treatment Plants | Water Flow Measurement/Monitoring/Telemetry Devices |
| Sewer Flow Measurement/Monitoring Devices | |

1.0070 — Revisions to Design Standards

It is anticipated that revisions to these Design Standards will be made from time to time. The date appearing on the title page is the date of the latest revision. Users should apply the latest published issue to the work contemplated.

Parenthetical notations at the end of sections indicate the most recent change to those sections. All sections without notations are from the original Design Standards as adopted. Some sections may be changed more than once and it shall be the user's responsibility to maintain his/her copy of these Design Standards with the latest changes.

1.0080 — Definitions

Alley - A public access easement or right-of-way not more than 20 feet and not less than 12 feet in width, which intersects with a public street.

Approved Backflow Prevention Assembly - A testable assembly that has been investigated and approved by the Oregon State Health Division.

Arterial Street - A major facility for moving intra-area traffic and for moving traffic to and from the freeway/expressway system. Highway 30 is Scappoose's only arterial street.

As-Built Plans - Plans signed and dated by the project engineer indicating that the plans have been reviewed and revised, if necessary, to accurately show all as-built construction details.

Average Day Demand - The total volume of water delivered to the system in one year, divided by 365 days.

Backflow - The reverse of flow from its normal or intended direction of flow. Backflow can be caused by back-pressure or back-siphonage.

Backflow Preventer - An approved testable assembly or means to prevent backflow into the potable water system.

Back-siphonage - Backflow that results from negative pressure (partial vacuum) in the supply piping system.

Bike Lanes - A designated travel-way for bicyclists, which is established within the roadway directly adjacent to the outside vehicular lane or on the shoulder.

Bike Path - A designated travel-way for bicyclists, which is completely separated from the vehicular travel lanes and is within independent rights-of-way.

Bike Route - A designated travel-way for bicyclists which is shared with vehicular traffic. The roadway is designated with signs for bicycling (no pavement markings for the bike route or delineation of parking spaces is used).

Building Fire Flow Requirements - Fire flow requirements based on type of occupancy and building material construction.

Building Service Lateral - A private sanitary sewer beginning five (5) feet outside the building and extending to the sanitary sewer main.

Building Supply - The pipe carrying potable water from the water meter or other source of water supply to a building or other point of use or distribution on the lot. Building supply shall also mean customer line.

City - The City of Scappoose, Oregon.

City's Engineer - The individual designated by the City Manager to have the authority for review and approval on all public works construction.

Collection Systems - Facilities maintained by the City of Scappoose connected thereto for the collecting, pumping, conveying, and controlling of wastewater.

Collector Sewer - The portion of the public sewerage system which is primarily installed to receive wastewater directly from individual residences and other individual public or private structures.

Collector Street - A facility that allows traffic within an area or neighborhood to connect to the arterial system.

Core - To cut and remove a portion of pipe or other structure with a circular hollow drill.

Cross Connection - Any actual or potential physical connection between a potable waterline and any pipe or vessel containing a non-potable or potable (i.e., well) fluid (suspended solid or gas) so that it is possible to introduce the non-potable fluid into the potable fluid by backflow.

Cul-de-sac - A dead-end street having a turnaround area at the end.

Curb - The line indicating the edge of the vehicular roadway within the overall right-of-way.

Curb cut - The at-grade curb, not including the wings, delineated by a concrete apron along a street.

Cut Sheets - Sheets of tabulated data, indicating stationings, structures, fittings, angle points, beginning of curve, points on curve, end of curves, storm drain slope, staking offset, various elevations, offset cuts, and storm drain depths for streets, waterlines, sanitary sewers, and storm drains.

Datum - The vertical elevation control for the City of Scappoose is "The National Geodetic Vertical Datum of 1929" which corresponds to the USC&GS 1947 Datum.

Dead-end Street - A street or series of streets, which can be accessed from only one point. Dead-end streets can be either temporary (intended for future extension as part of a future street plan) or permanent. Dead-end streets must provide adequate turn-around capability.

Definition of Words - That, whenever, in these Standards, the words "directed", "required", "permitted", "ordered", "designated", or words of like importance are used, they shall be understood to mean the direction, requirement, permission, or order of designation of the City's Engineer. Similarly, the words "approved", "acceptable", or "satisfactory", shall mean approved by, acceptable to, or satisfactory to the City's Engineer.

Demand - The total quantity of water supplied for a given period of time to meet the various required uses. The various uses include residential, irrigation, commercial, and industrial uses as well as fire fighting, system losses, other unaccounted-for, and miscellaneous uses.

Design Intensity - The uniform rainfall intensity, inches per hour, associated with a duration equal to the time of concentration of the basin and a specified return frequency (e.g., 2 yr., 10 yr., etc.), that is used to calculate the peak discharge rate to be used for conveyance system design.

Design Storm - A rainfall event of a specified duration (e.g., 6-, 12-, 24 hr.) and return frequency (e.g., 2yr., 10 yr., etc.) that is used to calculate the runoff volume and/or discharge rate to be used for system design.

Designated Arterial or Collector Street - A street designated as an arterial or collector in the Comprehensive Plan.

Detention - The storage and subsequent release of excess stormwater runoff to control peak discharge rates prior to discharge to the storm sewer or natural drainageway.

Detention Volume - The storage volume required to control the peak discharge rates at the point of discharge from a development.

Development – Any activity that makes a material change in the use or appearance of a structure or land, including partitions and subdivisions as provided in Oregon Revised Statutes 92 and 227.215.

Direct Discharge – Any stormwater discharge from a developed site, which has not passed through approved water quality treatment prior to its ultimate outfall to a natural drainageway, wetland or other natural resource area.

Domestic Sewage - The liquid and water borne waste derived from the ordinary living processes, free from industrial wastes, and of such character to permit satisfactory disposal, without special treatment, into the public sewer or by means of private sewage disposal system.

Double Check Valve Assembly - An assembly composed of two single, independently acting, approved check valves, including tightly closing shut-off valves located at each end of the assembly and fitted with properly located test cocks.

Double Check - Detector Check Valve Assembly - A line-sized, approved, double check valve assembly with a parallel meter and meter-sized, approved, double check valve assembly. The purpose of this assembly is to provide backflow protection for the distribution system and, at the same time, provide a metering of the fire system showing any system leakage or unauthorized use of water.

Drainage Facilities - Pipes, ditches, detention basins, creeks, culvert bridges, etc., used singularly or in combination with each other for the purpose of conveying or storing storm water run-off.

Drywell – See Stormwater sump.

Easement - Areas located outside of dedicated rights-of-way, which are granted to the City for special uses and public facilities.

Engineer - The engineer, licensed by the State of Oregon as a Professional Engineer, under whose direction plans, profiles, and details for the work are prepared and submitted to the City for review and approval, or who is in charge of and responsible for construction of the improvement.

Expansion Joint - A joint to control cracking in the concrete surface structure and filled with preformed expansion joint filler.

Fire Hydrant Assembly - The fire hydrant and attached auxiliary valve.

Fire Protection Service - A metered connection to the public water main intended only for the extinguishment of fires and the flushing necessary for its proper maintenance.

French Drain or Leach Line - A covered underground excavated trench filled with washed gravel that surrounds a perforated delivery pipe used to receive storm water, wherein the sides and bottom of the trench are porous, permitting the storm water to seep into the ground.

Grade - The degree of inclination of a road or slope expressed in percent, that is, rise over run times 100.

Hydrant Lead - The waterline connecting the fire hydrant to the auxiliary valve on the City distribution main.

Impervious Areas - Those hard surface areas located upon real property which either prevent or retard soaking of water into the land surface and cause water to run off the land surface in greater quantities or at an increased rate of flow from that present under natural conditions before any development.

Industrial Waste – Solid, liquid, or gaseous waste resulting from any industrial, manufacturing, trade, or business process or from development, recovery, or processing of natural resources.

Interceptor Sewer - The primary public sanitary sewer which conveys wastewater directly into the Wastewater Treatment Plant or into a larger interceptor sewer.

Irrigation Service - A metered connection intended for seasonal use and for delivering water for irrigation purposes, which is not discharged to the sanitary sewer.

Lateral Sewer - A building service lateral.

Local or Residential Street - A facility designated to serve primarily direct access to abutting land and offers the lowest level of traffic mobility. Through-traffic movement is deliberately discouraged.

Longitudinal Joint - A joint, which follows a course approximately parallel to the centerline of the roadway.

Major Partitioning - A partition which includes the creation of a road or street.

Major Trees - "Major trees" within the right-of-way are those which have a 12" caliper or larger. Street improvement plans will identify major trees by location, caliper, and species.

Major tree species are those which contribute to the landscape character of the area to include; e.g., Douglas fir, cedar, redwood, sequoia, oak, ash, birch, walnut, maple. The identification of major trees should distinguish species generally suitable for retention adjacent to streets and those species with growth habits that create nuisances, unusual maintenance problems, or hazards to the public.

Major trees exist in clusters, groves, or rows within the right-of-way.

Manager - The City Manager of the City of Scappoose acting either directly or through authorized representatives.

Manufacturer's Name - Any manufacturer's name, specification, catalog, number or type used herein is specified by make and order to establish the standard requirements of the City. It is understood that other equivalent makes will be considered for approval, providing they are comparable with this established standard.

Maximum Day Demand - The maximum volume of water delivered to the system in any single day of the year, divided by one day.

Minor Partition - A partition, which does not include the creation of a road or a street.

Natural Grade - The grade of the land in an undisturbed state prior to any development activities.

On-Site Detention - The detention of stormwater from a private storm drain in a privately owned and maintained storm system to provide a controlled release, at or below a maximum allowable rate, to the public storm drain system.

Outfall – The point at which collected concentrated stormwater is discharged, generally from a pipe(s), from a project site to an open drainage element such as a ditch, channel, swale, stream, river, pond, lake or wetland.

Owner - The owner of record of real property as shown on the latest tax rolls or deed records of the county, and includes a person who furnishes evidence that he is purchasing a parcel of property under a written recorded land sale contract.

Partition - To divide an area or tract of land into two or three parcels within a calendar year when such area or tract of land exists as a unit or contiguous units of land under single ownership at the beginning of such year.

Peak Hour Demand - The maximum volume of water delivered to the system in any single hour of the year, multiplied by one hour.

Person – Individual, firm, corporation, association, agency, or other legal entity.

Peak Run-off - The maximum stormwater run-off rate(cfs) determined for the design storm, or design rainfall intensity.

Plans - Construction plans, including system plans, sewer plans, and profiles, cross sections, detailed drawings, etc., or reproductions thereof, approved or to be approved by the City's Engineer, which show the location, character, dimensions, and details for the work to be done, and which, when approved, constitute a supplement to these standards.

Potable Water - Water, which is satisfactory for drinking, culinary, and domestic, purposes and meets the requirements of the health authority having jurisdiction.

Private Collection System - A privately owned and maintained lateral sewer system installed to serve multi-unit structures on single ownership properties that cannot legally be further divided.

Private Storm Drain - A storm drain, located on private property, serving more than one structure or parking lot on the same premises.

Projected Maximum Day Demand - The maximum volume of water anticipated to be delivered to the system in a future single day of a year, divided by one day.

Public Sanitary Sewer - Any sewer, in public right-of-way or easement, operated and maintained by the City for carrying sewage and industrial wastes.

Public Storm Drain - Any storm sewer, in public right-of-way or easement, operated and maintained by the City.

Release Rate - The controlled rate of release of drainage, storm, and run-off water from property, storage pond, run-off detention pond, or other facility during and following a storm event.

Retention – The process of collecting, holding, and infiltrating surface and stormwater runoff, with no outflow, from a developed property.

Right-of-Way - All land or interest therein which (by deed, conveyance, agreement, easement, dedication, usage, or process of law) is reserved for or dedicated to the use of the public for sidewalk, utility, and/or roadway purposes which the City has sole responsibility to maintain.

Roadway - All of that portion of the right-of-way used or to be used for vehicle movement that exists between the curbs, proposed curb lines, or edges of pavement.

Sedimentation - Deposition of erosion debris or soil transported by water from a higher elevation to an area of lower gradient.

Sewage - A combination of the water-carried wastes from residences, business buildings, institutions, and industrial establishments, except industrial wastes.

Sidewalk - A walk or raised path along the side of a road for pedestrians. A right-of-way deeded, dedicated, and designated for the use of non-motorized vehicles and pedestrians. In almost all cases, a sidewalk will be hard surfaced portland cement concrete or asphaltic concrete.

Silt - Fine textured soil particles, including clay and sand, as differentiated from coarse particles of sand and gravel.

Siltation - Deposition of (silt) waterborne sediments - fine textured sedimentation - terms used to describe the smoothing or cementing effect of a blanket of silt deposited over sand and gravel areas used by migratory fish for spawning (includes colloidal material when the transporting water evaporates).

Soakage Trench – A linear trench, usually filled with clean drain rock, designed to infiltrate stormwater. Soakage Trenches may be either an injection system with a perforated pipe carrying stormwater into the trench below grade or a surface infiltration system.

Standard Drawings - The drawings of structures or devices commonly used on public improvements and referred to on construction plans.

Stormwater Sump – A drainage facility (or system) designed to utilize the infiltration capability of the ground, commonly referred to as percolation, to dispose of surface and stormwater runoff. A drywell.

Streets or Roads - Any public highway, road, street, avenue, alley, way, easement, or right-of-way used or to be used for vehicle movement.

Structures - Those structures designated on the standard plans such as catch basins, manholes, etc.

Subdivision - To divide an area or tract of land into four or more lots within a calendar year when such area or tract of land existed as a unit or contiguous units of land under a single ownership at the beginning of such year.

Superelevation - The vertical distance between the heights of the inner and outer edges of highway pavement.

Swale – A broad bottomed, shallow, vegetation lined channel, which allows for reduced flow velocity and filtration of stormwater, generally with flow depths less than one foot.

Total Fire Flow - A combination of building fire flow requirements, any internal system fire flow requirements (e.g., sprinklers), and domestic maximum day demand (highest 24-hour consumption within the last three years).

Transverse Joint - A joint which follows a course approximately perpendicular to the centerline of the roadway.

Traveled Way - That portion of the roadway for the movement of vehicles, exclusive of shoulder and auxiliary lanes.

Treatment Volume – The storage volume necessary to provide the required level of water quality treatment of stormwater prior to discharge to a storm sewer element, facility or natural drainage element.

Turnaround Area - A paved area of sufficient size and configuration that a motor vehicle may maneuver so as to travel in the opposite direction.

Trunk Sewer - (Interceptor) A sanitary sewer which is primarily intended to receive wastewater from a collector sewer, another trunk sewer, an existing major discharge of raw or inadequately treated wastewater, or water pollution control facility.

Uniform Building Code – The Uniform Building Code adopted by the International Conference of Building Officials (current edition), as revised by the State of Oregon, called the “Structural Specialty Code.”

Uniform Plumbing Code - The Uniform Plumbing Code adopted by the International Association of Plumbing and Mechanical Officials (current edition), as revised by the State of Oregon, called the "Oregon State Plumbing Specialty Code".

Wastewater - The total fluid flow in the sanitary sewerage system, which includes industrial waste, sewage, or any other waste (including that which may be combined with any ground water, surface water, or storm water) that may be discharged into the sanitary sewerage system.

Water Distribution System - Water distribution pipelines, pumping stations, reservoirs, valves, and ancillary equipment used to transmit water from the supply source to the service line.

Water Main - The water-supply pipe for public or community use.

Water Service Line - The pipe connection from the City water main to the metering device, hydrant, or fireline backflow prevention assembly.

Wet Weather Season – Defined for the purposes of construction and development in the City of Scappoose as the period between October 1st and the following June 1st.

Wetlands - Those lands adjacent to watercourses or isolated therefrom which may normally or periodically be inundated by the waters from the watercourse or the drainage waters from the drainage basin in which it is located. These include swamps, bogs, sinks, marshes, and lakes, all of which are considered to be part of the watercourse and drainage system of the City and shall include the headwater areas where the watercourse first surfaces. They may be, but are not necessarily, characterized by special soils such as peat, muck, and mud.

1.2000 — Construction Plans

1.2010 — General Information

Prior to any construction work and plan approval, complete construction plans, specifications and all other necessary submittals shall be submitted to the City’s Engineer for review and approval.

1.2020 — Plan Preparation

Construction plans and specifications shall be prepared as specified in Sections 1.2021 - 1.2034 by a professional engineer licensed in the State of Oregon.

1.2021 — Sheet Size

All construction plans shall be clearly and legibly drawn in ink on reproducible medium measuring 22 x 34 inches. Sheets shall have a 1-1/2 inch clear margin on the left edge and a 1/2-inch margin on all other edges.

Half scale plans, on 11 X 17 inch sheets, may be used only with permission of the City's Engineer.

1.2022 — Scale of Plans

When plans are prepared for developer-financed projects, the following scale of drawings is required.

<u>Plan/Scale</u>	<u>Horizontal</u>	<u>Vertical</u>
Street	1" = 20'*	1" = 2'
Sewer	1" = 40'	1" = 4'
	1" = 50'	1" = 5'
Storm	1" = 40'	1" = 4'
Water	1" = 20' or 40'**	1" = 4'

*Subdivision street plans, when combined with other proposed facilities listed above, may be drawn at 1" = 40' scale.

**When a scale is used which is smaller than 1" = 20' (i.e., 1" = 40') intersection details showing fittings and valving shall be provided at a larger scale.

Architectural scales (e.g., 1/4" = 1'0") are not permitted.

Subdivision public facility plans for single-family attached units shall be drawn at 1"=20' scale.

1.2030 — Required Sheets

Construction plan submittals shall contain the following minimum sheets: title sheet (unless not required by the City's Engineer) plan and profile sheet(s), and detail sheet(s). All sheets shall contain an approval block as shown below:

Approved By:	
_____	Date _____
Planning Services Manager	
Approved By:	
_____	Date _____
City Engineer or Delegate	
<p>These plans are approved for construction subject to the revisions as noted. All work must be in conformance with the City of Scappoose Public Works Design Standards and Standard Specifications and with the City of Scappoose Municipal Code and does not relieve the Engineer of Record of responsibility for the design.</p>	

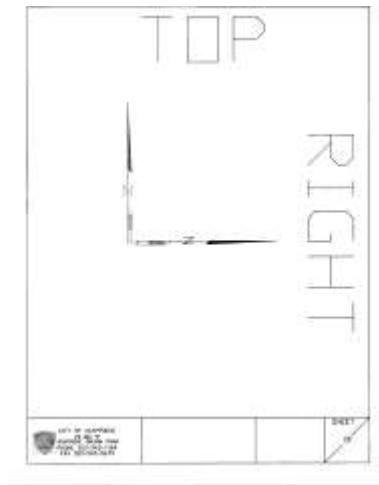
1.2031 — Title Sheet

All subdivision projects and multiple sheet improvement projects shall have a title sheet as the first page of the construction plans. This sheet shall contain the following minimum information:

- a. Site plan of entire project with street right-of-way and/or subdivision layout at a 1" = 100' scale. A 1" = 200' scale may be used if project size is too large. The site plan shall also be a composite utility plan showing all properties served by proposed sewer, water, and storm facilities, in addition to the proposed facility.
- b. Vicinity map at a 1" = 1000' scale or greater.
- c. Index of sheets.
- d. Complete legend of symbols used.
- e. General and construction notes pertinent to project.
- f. Temporary and/or permanent benchmarks used along with their descriptions, elevations of benchmark, and datum.
- g. Engineer's name, address, phone number, and seal.
- h. Developer's/owner's name, address, and phone number for public improvements with private financing.
- i. Statement referencing City of Scappoose Standard Specifications.
- j. Provide contact phone number for all affected utility companies and pertinent City personnel.
- k. Show tax lot numbers or lot and block designations.

1.2032 — Plan Sheet

The plan view of each sheet shall be drawn at the appropriate scale with the north oriented to the top or right edge of the drawing and showing the following minimum information:



a. Adjacent street curbs, property lines, right-of-way lines, utility easements referenced to property lines, street centerlines, and intersections. Show property corner and curb elevations to determine water service level, serviceability of lot/property for sanitary sewer, points of disposal for building storm drains, and how new curbs will join to existing curbs.

b. Location of all underground utilities within 100 feet of project (if they are affected by the project), existing power/telephone poles and guy anchors, valves, manholes, catch basins, fire hydrants, meter boxes and vaults, signs, etc.

c. Location of all water courses, railroad crossings, culverts, bridges, large water transmission pipes and gravity sewers, and/or storm drains within 200 feet of proposed gravity sewer and storm drain extensions if they affect the design of the project. All watercourses shall show the 100-year flood plain as indicated on the U.S. Army Corps of Engineers and Federal Emergency Management Agency (FEMA) maps.

d. On sewer and storm drain plans, each manhole, catch basin, and cleanout shall be numbered and stationed. Stationing shall tie to existing street monuments, property corners, or manholes. Each line shall be stationed continuously upgrade on the plan sheet. Each separate line shall be separately designated (e.g., sewer line 'A', storm line 'A', etc.).

e. On street plans, horizontal stationing shall show points of tangency and curvature for centerline; curve data shall show tangent length, radius distance, centerline curve length, and delta angle. Centerline intersection stationing, in both directions, shall be shown.

f. Where streets are being widened, edge of pavement elevations shall be shown to determine pavement cross-slope to new curb or pavement edge.

g. Elevations and contours shall be based on City of Scappoose datum only.

1.2033 — Profile Sheet

Profiles for construction plans shall be the same horizontal scale as the plan sheet. Where profiles are drawn on the same sheet as the plan view, the profile shall be immediately below the plan

view. Stationing shall be continuously upgrade from left to right with lower stations to the left (except where stationing on the plan view is from right to left in which case the stationing in the profile shall align with the plan view). The following minimum information shall be shown:

a. For sewers and storm drains, show locations of manholes, catch basins, and cleanouts, with each numbered and stationed as indicated in Section 1.2032(d).

b. Existing profile at centerline of proposed utility or street, plus 100 feet each direction from end of proposed street.

c. Proposed profile grade, as appropriate, for all sewers, storm drains, and waterlines, giving pipe size, length between structures or fittings, slope, backfill and pipe material, sewer inverts, rim elevations, etc.

d. Existing underground utility that crosses the alignment of the proposed facility.

e. Beginning of all vertical curves, points of vertical intersection, end of vertical curve, low point of sag curve, and length of vertical curve. Profiles of existing centerline grade shall extend a minimum of 100 feet beyond the end of the improvement.

f. Clearly show all potential conflicts with existing public and private utilities (i.e., pipes, conduits, vaults, cathodic protection systems, etc.) that impact proposed design.

SPECIAL NOTE: City of Scappoose as-builts are only to be used as an aid to the engineer. When a potential conflict may occur, the engineer shall field locate, or cause to be located, and verify the alignment, depth, and inverts of all existing facilities shown on the plans that will be crossed by the proposed facility.

1.2034 — Detail Sheets

Standard detailed drawings shall be included on a separate sheet(s) with all construction plans. If a standard drawing does not exist, or if a Standard Drawing, such as sewer manholes, must be modified to fit existing or unique conditions, the modified drawing shall be shown on the plans. When appropriate, due to required detail complexity, a separate detail sheet shall be drawn. It is the intent of the City of Scappoose that all appropriate details be included on the plans not simply referenced on the plans.

1.2040 — Supporting Information

The engineer shall submit sufficient supporting information to justify the proposed design. Such information shall include, but not be limited to, the following:

- a. Design calculations.
- b. For storm drains, hydrology and hydraulic calculations with basin maps.
- c. Alternate materials specifications including manufacturer's design application recommendation.
- d. Grading plan support information to include as appropriate:

- (1) Soils engineering report
- (2) Hydrology report
- (3) Engineering geology report
- (4) Geotechnical Report

- e. A description of the stormwater facility, including its intended functionality, and an explanation of how the outlet(s) function to meet peak discharge control and water quality treatment control requirements.
- f. Downstream Analysis

- (1) An analysis shall be performed to determine the potential impacts from the project on the downstream system. At a minimum, the downstream analysis will include the area from the project site to a point, to be determined by the city, downstream of the project site. The analysis must proceed far enough along the drainage course to determine that nothing downstream of the end point will be adversely affected by the project's runoff. Refer to section 2.0027, Downstream Analysis Report, for a detailed description of how to perform a downstream analysis.
 - (2) For waterline systems, water model calculations.
- g. All calculations and design data shall be submitted in a sealed engineering report, not as loose calculations and drawings.

1.2041 — Facility Plan

When designing sanitary or storm sewer facilities, a facility plan shall be submitted with the construction plans when required by the City's Engineer. This plan shall be used to identify, analyze, and facilitate the logical extension of proposed facilities. The topographic plan shall show all upstream and tributary areas within no less than 200 feet of the proposed development.

The plan shall include existing contours at two (2) foot intervals (1 foot or even .5 foot contour intervals may be appropriate for very flat sites), or as approved by the City, including location of existing structures and public and private utilities.

1.2042 — Erosion Control Plan

The erosion control plan shall address the measures as required by the Erosion Prevention and Sediment Control Planning and Design Manual¹. Construction projects beginning prior to June 1st or those projects anticipating construction activity between October 1st and June 1st will be required to submit a plan addressing "wet weather" measures as outlined in the ECTGH. Construction activity is assumed as "active" until all permanent vegetation and/or erosion protection is established.

The plan shall include existing contours at two (2) foot intervals (1 foot or even .5 foot contour intervals may be appropriate for very flat sites), or as approved by the City, including location of erosion control facilities (i.e., silt fence, straw mulch, sediment ponds, etc.); outlet structures (i.e., catch basins, culverts, creeks, etc.); and existing public and private utilities.

1.2043 — Maintenance Plan

A maintenance plan shall be submitted for City review and approval for all privately financed private or public detention, retention and water quality facilities. The plan shall include both type(s) and frequency of maintenance activity required.

1.2050 — Plan Submittal

Construction plans for all privately financed public works facility improvements shall be submitted to the City's Engineer. The City's Engineer will coordinate the plan review and approval of all construction plans which will include review for compliance with all Scappoose Public Works Standard Specifications, the Scappoose Community Development Plan, City Code, Ordinances, and any relative Master Plan.

All plan submittals shall include information required in Section: 1.2040 and 1.2041 of these Design Standards along with all other information requested by the City's Engineer. This information is to include, but not be limited to, construction cost estimates, easement documents, right-of-way dedications,

¹ Developed by Unified Sewerage Agency of Washington County, Water Environment Services of Clackamas County, and City of West Linn, as updated.

executed agreements, and processing and review fees. All submittals will be reviewed for completeness and the engineer notified if required information is missing. Submittals should be made in a timely manner as lack of information to the City may impede the review process.

1.2060 — As-Built Plan Requirements

For all public works facility improvements the engineer shall submit certified as-built drawings for all plans which were approved for construction, within 3 months of project completion. As-built drawings shall meet the requirements of Sections 1.2020, 1.2030 and 1.2060 - 1.2064 of these Design Standards and shall be of archival quality. At a minimum, the drawings shall be 4 mil Mylar with silver halide emulsion. Original inked mylars may also be submitted in lieu of photographic mylars. An electronic copy of all drawings shall also be submitted in Auto CAD format.

The engineer shall submit, along with the As-built drawings, a statement certifying that all work for which plans were approved has been completed in accordance with the Scappoose Public Works Design Standards and Specifications.

The words "As-Built Drawing" shall appear both as the last entry in the revision block along with the month, day, and year the as-built drawing was prepared as well as in large letters on the face of each sheet.

All sheets that were part of the original approved design plan set shall be submitted as part of the as-built drawings, including title and detail sheets.

NOTE: Actual location and depth from finish grade of any other utilities encountered during construction shall be shown and noted on both plan and profile of the as-built plans.

1.2061 — Street

The following minimum information shall be noted on street as-built drawings:

- a. Change in horizontal alignment, curve data, and stationing of primary control points (e.g., PC, PI, PT, PRC).
- b. Vertical curve or grade changes; change in location of low point in sag vertical curve.
- c. Change to approved thickness for street structural section components. Show station limits where changes in structural section have occurred.
- d. Change to driveway locations or widths.
- e. Other change altering the approved plans.

1.2062 — Storm Drains

The following minimum information shall be noted on storm drain as-built drawings:

- a. Station of connection into main line if not in a manhole. Tie end of branch line to nearest property corner at right-of-way line and distance back from the face of curb.
- b. Show alignment changes, grade changes, and changes in construction materials. If changed alignment results in station changes, a station equation shall be shown as appropriate at a manhole.
- c. Other change altering the approved plans.

d. Show the design and tested flow for all drywell installations in a table on the storm plan sheet indicating the drywell number, size, and depth.

1.2063 — Sanitary Sewer

The following minimum information shall be noted on sanitary sewer as-built drawings:

- a. Station of wye or tee into main line. Tie end of service lateral to both adjacent property corners at right-of-way line.
- b. Depth at the end of service lateral measured from existing ground to invert of pipe and invert elevations shall be noted (to the nearest 0.1 foot).
- c. Length of service lateral measured from centerline of sewer main to end of pipe.
- d. Show alignment changes, grade changes, and changes in construction materials. If changed alignment results in station changes, a station equation shall be shown as appropriate at a manhole.
- e. Other change altering the approved plans.
- f. Provide complete test results to the City's Engineer.
- g. Type of pipe, backfill material and location.
- h. Inverts of all pipes and the rims of all manholes shall be determined by survey and certified by the engineer.

1.2064 — Water Main

The following minimum information shall be noted on water main as-built drawings:

- a. Station and/or property line/corner to valves (not at standard location), all fittings, blow-offs, and dead-ended lines.
- b. All changes from standard 36-inch depth cover. Limits shall be shown on plan with annotated reason for change. Actual pipe elevation (top of pipe) will be taken at every fitting.
- c. Show alignment changes, grade changes, and changes in construction materials. If changed alignment results in station changes, a station equation shall be shown as appropriate at a fitting.
- d. Other change altering the approved plans.
- e. Provide design calculations and complete test results to the City's Engineer.
- f. Actual location and depth, from finish grade of street, of any other utilities encountered during construction.

1.2070 — Easements

When topography or other conditions make impractical the location of drainage facilities, sanitary sewers or water lines within the street right-of-way, an unobstructed easement shall be provided across the property with satisfactory access to the street. These easements shall be a minimum of 15 feet for lines 12 inches or smaller and shall be 20 feet for lines over 12 inches. Larger easement widths may be required for special circumstances, such as excessively deep pipe or location of building to the

easement. All easements must be furnished to the City's Engineer for review and approval prior to recording. See also Scappoose Municipal Code, Section 17.154.050.

SECTION: 2.0000 — STORM DRAINAGE

2.0010 — General Design Requirements

Performance Standards - Storm drainage design within a development area must include provisions to adequately control run-off from all public and private streets and the roof, footing, and area drains of residential, multi-family, commercial, or industrial buildings. The design must ensure future extension of the drainage system to the entire drainage basin in conformance with any adopted Storm Drainage Master Plans and these Design Standards. These provisions include:

a. Surface or subsurface drainage, caused or affected by changing the natural grade of the existing ground or removal of natural ground cover or placement of impervious surfaces, shall not be allowed to flow over adjacent public or private property in a volume or location materially different from that which existed before development occurred, but shall be collected and conveyed, in an approved manner, to an approved point of disposal.

b. Surface water entering the subject property shall be received at the naturally occurring locations and surface water exiting the subject property shall be discharged at the natural locations with adequate energy dissipaters within the subject property to minimize downstream damage and with no diversion at any of these points.

c. The approved point of disposal for all storm water may be a storm drain, existing open channel, creek, detention or retention pond or facility approved by the City's Engineer. Acceptance of suggested systems will depend upon the prevailing site conditions, capacity of existing downstream facilities, and feasibility of the alternate design.

d. When private property must be crossed in order to reach an approved point of disposal, it shall be the developer's responsibility to acquire a recorded drainage easement (of dimensions in accordance with those included in Section 2.0024). The drainage facility installed must be a closed conduit system. Temporary drainage ditch facilities, when approved, must be engineered to contain the storm water without causing erosion or other adverse effects to the private property.

e. The peak discharge from the subject property, for all applicable design storms, may not be increased from conditions existing prior to the proposed development, except where it can be satisfactorily demonstrated by the applicant that there is no adverse impact to the down stream system.

f. Retention and/or detention facilities will be required, where necessary, to maintain surface runoff rates from the subject property at or below, the existing runoff rates for all applicable design storms except where it can be demonstrated by the applicant, and to the satisfaction of the City's Engineer, that no adverse impact to the down stream system will result from not providing said facilities.

g. Minimum width of an access easement from an existing public road to a drainage facility shall be fifteen (15) feet.

h. Drainage from roofs, footings, and downspouts may drain directly to a street through the curb under the following circumstances:

- (1) On-site disposal is not practical, and
- (2) The building pad ground elevation is at least two (2) feet above the existing street curb, and
- (3) The existing street is adequately crowned to avoid sheet flow across the

street. This requirement may be waived if on narrow streets and on a case-by-case basis.

i. Vegetation shall be established on areas disturbed by/or on areas of construction, as necessary, to minimize erosion in accordance with Section 2.0050 of these standards, and as set forth in the City of Gresham Erosion Control Plans and Technical Guidance Handbook.

j. Stormwater quality facilities will be required to control the discharge of pollutants, from development and significant redevelopment, to the municipal storm drainage system or natural watercourse.

All storm drain system designs shall make adequate provisions for collecting all storm water run-off. The system shall accommodate all run-off from upstream tributary areas whether or not such areas are within the proposed development. The amount of run-off to be accommodated shall be based upon ultimate development of all upstream tributary areas.

Proposed storm drain systems shall not discharge flows into inadequate downstream systems unless approved by the City's Engineer.

Public storm lines shall be located within the public right-of-way as directed by the City's Engineer, per Section 2.0021. These lines are placed in the public right-of-way for ease of maintenance and access, control of the facility, operation of the facility, and to provide required replacement and/or repair. Any storm lines not placed in the public right-of-way shall be located in a public utility easement as described in Section 1.2070 and Section 1.0024 with the approval of the City's Engineer.

2.0011 — Site Drainage Plans

Existing Drainage Plan - Provide a topographical contour map defining existing conditions to include the following minimum information:

a. Two-foot (2') contour intervals; slopes over 10% may use 5-foot (5') intervals; very flat sites may need contour interval of one-foot (1') or even one-half foot(1/2'); extend contours a minimum of 100 feet beyond property.

b. All structures, buildings, parking lots, and utilities on the property.

c. Location of all existing drainage facilities and water courses, including wetlands and floodplain areas.

d. Locations of all subsurface water outlets (e.g., springs).

e. Show arrows to indicate direction of flow for all drainage information.

Proposed Drainage Plan - Show proposed site grading and drainage facilities on a topographical contour map. Unless the detail for proposed improvements will obscure the conditions shown on the existing drainage plan, proposed site grading and drainage may be shown on the existing drainage plan. The following minimum information shall also be shown:

a. Finished contours of the property, after development, at two-foot (2') or five-foot (5') intervals as required.

b. Percent grade for graded slopes; elevations, dimensions and locations for all graded slopes.

c. Cut/fill areas; structural fill placement areas; erosion/sedimentation control methods;

reseeding areas.

d. All proposed drainage facilities - public and private systems; paved areas, curbs, sidewalks; drainage ditches, culverts.

Drainage Calculations - Furnish such supporting information as required per Section: 1.2040 of these Design Standards. This information shall include basin (sub-catchment) boundary maps, a site Drainage Submittal Summary sheet, discharge rates, velocities at the system outfall and hydraulic grade line calculations where required by the City's Engineer.

Detention/Retention Requirements - All proposed development will be required to use adequate drainage management practices. Developments located within a master planned drainage basin will follow the recommendations adopted in that plan. Developments not located within master planned drainage basins will minimize the rate and amount of run-off to receiving systems and streams. On-site storm detention may be required, as necessary, to ensure that new development does not increase flooding or erosion downstream. Where appropriate, retention may be required to prevent on site or downstream flooding or erosion.

2.0012 — Pipe Materials and Size

All public storm drains shall be constructed with either concrete or HDPE smooth interior, corrugated exterior pipe as specified in the appropriate section of the Scappoose Public Works Standards. Where required, for added strength, Class 50 Ductile Iron pipe will be used. Concrete pipe strength shall meet the applicable sections of ASTM C-14 and ASTM C-76. PVC pipe shall not be used except with the written approval of the City's Engineer.

Corrugated metal pipe (CMP) may be used for culvert applications only, if the material is specified as having a 75-year design life. Submittal of the manufacturer's specifications, testing results and warranty will be required for City review prior to approval.

Aluminized steel type II spiral rib pipe may be used for detention pipe applications only. Structural end cap bracing specifications from the manufacturer is required. Refer to: Standard detail drawing number 608, and Division Six for Technical Requirements. All risers within the right of way shall be per standard detail drawing number 608.

Private storm-drain pipe shall meet the appropriate sections of the Uniform Plumbing Code.

All public storm-drain main lines and lateral lines to catch basins and other inlet structures shall be a minimum of twelve inches (12") in diameter. Private storm drain lines, which convey water from building rain drains and/or footing drains, only may be a minimum of six inches (4") in diameter. Such lines, however, must discharge into a drainage structure of the public system and at a location and elevation approved by the City. Where such lines connect to the public system beyond the curb, such as at manholes, an exposed two-way clean-out shall be provided at the edge of the right-of-way to facilitate maintenance.

2.0013 — Minimum Design Criteria

Storm Frequency - All public storm drain systems shall be designed for the design storm recurrence interval in the following table:

DRAINAGE SYSTEM DESIGN CAPACITY

Drainage System Element	Description	Design Storm Recurrence Interval, Years
Minor:	Streets, curbs, gutters, inlets, catch basin and connector drains	25
Major:	Laterals (collectors) <250 tributary acres	25
	Trunk >250 tributary acres	50*
	Arterial Streets and the Drainage System in or under Arterial Streets	50*
Watercourses:	Without designated floodplain	50
	Within designated floodplain	100
Bridges:		100
Detention Facilities:	Storage volume (on site)	25
	Storage volume	100
	Discharge rate	Function of down-stream capacity ¹
Retention Facilities:	Drywell infiltration capacity	25**
	Detention capacity	50

**Maximum allowable design capacity = 1200 GPM = 2.67 CFS per drywell

*Surcharged conditions for pipe systems and culverts and bank full conditions for open ditches and channels are acceptable only for demonstrating the adequacy of the conveyance system to convey the peak run-off for the 25- or 50-year design storms (as required), provided that:

- a. run-off is contained within defined conveyance system elements; AND
- b. the hydraulic grade line does not exceed the elevation of the roadway subgrade; AND
- c. no portions of a building will be flooded.

Conveyance system adequacy shall be demonstrated by performing a backwater analysis.

Time of Concentration – shall be calculated using the SCS Small Watersheds, Technical Release 55, Worksheet 3: Time of concentration (T_c) or travel time (T_t).

Velocity and Slope - All storm drains shall be on a grade which produces a mean velocity, when flowing full, of at least three feet (3') per second.

Velocity in Natural Channels - Control of discharge from developed areas to natural channels shall be such that the average velocity resulting from all design storms less than or equal to the 25-year event remains below the erosive velocity of the channel.

Manning Equations - When calculating minimum pipe slopes and velocities, the design engineer shall use the Manning pipe friction formula.

¹ Typically this will mean designing for the 2,5,10, and 25-year storm events.

Pipe Coefficient - The storm-drain pipe roughness coefficient to be used in the Manning formula shall be not less than 0.013.

Stormwater Flows - Several methods are available to design engineers for estimating peak runoff rates. Three of these are the "Rational Method", the SCS "Curve Number" method, and the Santa Barbara Urban Hydrograph (SBUH) method. These methods will be acceptable for estimating the peak runoff rates to be used in sizing storm drainage conveyance improvements in those areas for which there are no specific Master Plan recommendations.

Detention Volumes - Several methods are available for the calculation of run-off rate volumes for the purpose of calculating detention/retention storage volume requirements. Detention volume estimates shall be based on hydrographs developed for the storm duration specified by the City for the applicable return frequencies. A method shall be used which routes the design hydrograph through the proposed detention system. Unless specified otherwise, the standard design storm duration shall be 24 hours. For development of the appropriate hyetograph(s) the SCS Type 1A 24-hour rainfall distribution is, currently, being accepted for all development submittals. If necessary, that distribution may be obtained from the City. A table of 24-hour rainfall depths for storms with 2-, 5-, 25-, 100-yr recurrence intervals is also available from the City. For methods based on the SCS "curve number" approach, the City provides a table of the SCS soil types found within the City of Scappoose along with their respective hydrologic soil groups. A second table is available which associates runoff curve numbers (CN) with the hydrologic soil groups and a variety of land uses. This table is intended as guidance only. The Rational Method, or other "intensity based" methods shall not be used to establish storage volume calculations or allowable release rates for detention facilities.

The design engineer should expect flow (and detention or retention) calculations to be checked with the software commonly known as the "King County" model.

2.0014 — Culverts

Culverts at road crossings in natural, perennial channels shall be designed to pass the peak discharge for the 25 year design storm such that the headwater water surface elevation:

- a. does not exceed 1.5 times the culvert diameter; OR
- b. remains at least 1 foot below the roadway subgrade, whichever is less.

In waters federally designated as critical habitat, tribute to, or have endangered or threatened listed fish species, water-crossing structures shall be constructed and maintained so as to not impede or eliminate a listed species' access to habitat or ability to migrate. Proposed culvert crossings, regardless of Tributary size, intermittent or perennial, shall address Oregon Department of Fish & Wildlife and National Marine Fisheries Service's regulations and stream crossing guidelines.

2.0015 — Bridges

New and replacement bridges over natural, perennial channels shall be designed to pass the 100 year peak discharge from the tributary area assuming full development. Vertical clearance between the design water surface and the bottom of any part of the bridge shall be a minimum of two feet, or 25% of the mean channel width between ordinary high water marks at the crossing, whichever is greater.

20020 — Alignment and Cover

2.0021 — Right-of-Way Location

Storm drain lines shall generally be located five (5) feet (south and east) from right-of-way

centerline. All changes in direction of pipe shall be made at an approved structure, except as provided in Section 2.0022.

2.0022 — Curvature

Storm drain lines shall not be curved between structures.

2.0023 — Minimum Cover

All storm drains shall be laid at a depth sufficient to protect against damage by traffic and to drain building footings where practical. Sufficient depth shall mean the minimum cover from the top of the pipe to finish grade at the storm drain alignment.

Minimum cover shall be thirty inches (30") above the top of the pipe in paved areas and thirty-six inches (36") at all other locations.

In areas of relatively flat terrain, the design engineer must show that sufficient depth is provided at the boundary of the development to properly drain the remainder of the upstream basin area tributary to the site.

2.0024 — Easements

a. When it is necessary to locate storm drains in easements, the storm drain shall be centered in the easement. All storm drain easements shall be exclusive and shall not be used for any purpose which would interfere with the unrestricted use of the storm drain line. Exceptions to this requirement will be reviewed on a case-by-case basis (e.g., a utility corridor in a new subdivision).

b. Easements for storm drain lines fifteen inches (15") or less in diameter shall have a minimum width of ten feet (10'). Pipelines eighteen inches (18") to thirty-six inches (36") in diameter shall have a minimum width of fifteen feet (15'). All pipelines greater than thirty-six inches (36") in diameter shall have a minimum width of twenty feet (20'). Larger widths may be required for special circumstances, such as excessively deep pipe or location of building to the easement.

c. Open channels shall have easements sufficient in width to cover the 100-year Floodplain Line when a 100-year design storm is required, or fifteen feet (15') from the waterway centerline, or ten feet (10') from the top of the recognized bank, whichever is greater. A fifteen-foot (15') wide access easement shall be provided on both sides of the channel for channel widths greater than fourteen feet (14') at the top of the recognized bank.

d. Easement locations for public storm drains serving a PUD, apartment complex, or commercial/industrial development shall be in parking lots, private drives, or similar open areas which will permit unobstructed vehicle access for maintenance.

e. All easements must be furnished to the City's Engineer for review and approval prior to recording.

2.0025 — Relation to Watercourses

Storm drain lines shall enter a creek or drainage channel at 60° or less to the direction of flow. The outlet shall have a head wall and scour pad or riprap to prevent erosion of the existing bank or channel bottom. The size of pipe or channel being entered will govern which protective measures are required. All protective measures must conform to the requirements of Section 2.0034 of these Design Standards.

2.0026 — Outfalls on Slopes

Outfalls proposed on slopes greater than 15% or greater than 20 feet in height must meet

one of the following criteria:

1. The discharge must be less than 0.5 cfs; or
2. A tight-line conveyance system must be constructed to convey the runoff to the bottom of the slope with adequate energy dissipation at the bottom to protect the toe of the slope, and/or the receiving water-course, from erosion.

2.0027 — Downstream Analysis Report

The downstream analysis will show what impacts, if any, a project will have on the hydraulic conveyance system(s) downstream of the project site. The analysis is to be divided into three parts that are followed sequentially. The three parts include: review of resources, inspection of the affected area, and analysis of downstream effects.

(1) During the review of resources, the designer will review any existing data concerning drainage of the project area. This data will commonly include area maps, floodplain maps, wetland inventories, stream surveys, habitat surveys, engineering reports concerning the entire drainage basin, inventories of known drainage problems, and previously completed downstream analyses. The City may be able to provide some of this information. Other sources of information include, Oregon Department of Environmental Quality, Oregon Division of State Lands, Department of Fish and Wildlife, and other local agencies.

(2) The Designer will physically inspect the drainage system at the project site and downstream of the site. During the inspection, the designer should investigate any problems or areas of concern that were noted during the review of resources. The designer should also identify any existing or potential capacity problems in the drainage system, any existing or potential areas where flooding may occur, any existing or potential areas of channel destruction (including erosion and sedimentation), and existing or potential areas of significant destruction of aquatic habitat.

(3) The information that has been gathered is analyzed to determine if construction of the project will create any drainage problems downstream or will make any existing problems worse. Often, if the other minimum requirements are met, the project will not negatively impact the downstream drainage system. There are however some situations that, although minimum requirements have been met, will still have negative impacts. Whenever a situation is encountered where it has been determined that there will be negative impacts resulting from the project, mitigation measures must be included in the project to correct for the impacts.

2.0030 — Structure Location

2.0031 — Manholes

Manholes shall be located at all changes in slope, alignment, pipe size, and at all pipe junctions with present or future storm drains.

Manhole spacing shall not be greater than 500 feet.

Manholes are required pipe junctions, except where laterals are “t’ed” in to a main storm line. Flat-top manholes shall be used when rim to crown of pipe elevations are less than four feet (4’).

When the downstream pipe size increases, the crown of all upstream pipes shall not be lower than the crown of the larger downstream pipe.

2.0032 — Catch Basins

Catch basins shall be located in streets at the curblin to receive storm water run off and convey it to the main storm drain.

Catch basins shall be located at the following locations, but in no case be spaced further than 400 feet:

- a. At curb returns on the upstream side of an intersection.
- b. At the ends of all dead-end streets with a descending grade.
- c. At intermediate locations so that storm flows at the curblin do not exceed three feet (3') in width (measured from the curb face) or three inches (3") in depth (measured at the curb face), whichever is less.
- d. At the downstream end of the street improvements which abut unimproved roads or undeveloped property.
- e. At the upstream end of the street improvements which abut unimproved roads or undeveloped property.
- f. Where a pipe larger than 8 inches in diameter, or more than two pipes of any size, or a combined, non-gutter flow greater than .5 cfs, discharges to a proposed catch basin, the catch basin shall be replaced by an inlet manhole.
- g. A single unit double catch basin at low point (sag) of all vertical curves. Refer to standard detail drawing number 610.

Catch basins shall be capable of intercepting completely the design storm flow at the curb.

2.0033 — Inlet Manholes

Where private, on-site stormwater systems connect to the existing, or proposed, public stormwater system at a catch basin location, inlet manholes shall be required where either, a) the pipe connection is larger than 6" in diameter or, b) two or more pipes discharge to the location or, c) the design peak flow from the on-site system exceeds 0.5 cfs. Refer to standard detail drawing 606-A, 606-B, or 606-C.

2.0034 — Outfall Protection

The outfalls of all stormwater systems shall be adequately protected to prevent erosion of slopes and channels. All outfalls shall include, at a minimum, the erosion protection as shown in the table below. Alternative approaches to protection may be accepted, at the discretion of the City's Engineer, following review of the submittal.

ROCK PROTECTION AT OUTFALLS						
DISCHARGE VELOCITY AT DESIGN FLOW (fps)		REQUIRED PROTECTION				
Greater than	Less than or equal to	Minimum Dimensions				
		Type	Thickness	Width	Length	Height
0	5	Riprap*	1 ft.	Diameter + 6'		Crown + 1'
5	10	Riprap**	1 ft.	Diameter + 6' or 3X dia., whichever is greater		Crown + 1'
10	20	Gabion Outfall	1 ft.	(As required)	(As required)	Crown + 1'
20	----	Engineered	Energy	Dissipater	Required	
<p>* Riprap to be reasonably well graded with the following gradation:</p> <p>Maximum stone size = 8" Median stone size = 6" Minimum stone size = 2"</p> <p>** Maximum stone size = 24" Median stone size = 16" Minimum stone size = 4"</p>						

2.0040 — Stormwater Detention/Retention

There are two (2) drainage basins within the City, each with unique flood control problems. These are the Scappoose Creek, and Jackson Creek; Detention/retention requirements and methods are evaluated on a case-by-case basis and may vary between, and within, basins.

2.0041 — Development Not Requiring Detention

In general, developments meeting the following criteria will not be required to provide detention:

- a. Land divisions of less than four lots.
- b. Multi-family developments of less than four units.
- c. Commercial and industrial development where the construction of a new facility or expansion of an existing facility will not increase the impervious area by 5,000 square feet or more.

2.0042 — Floodplain Information

Floodplain information, delineating the floodway and 100 year floodplain limits, shall be shown where it occurs within or adjacent to any development. Floodplain limits shall be based on maps prepared by the U.S. Army Corps of Engineers and the Federal Emergency Management Agency (FEMA). Where better information is available, it shall be used by the Design Engineer.

2.0043 — Detention Volume

When detention is required or downstream facilities are inadequate, the volume to be detained may be up to the volume necessary to limit the developed site peak discharge to pre-developed rates for all storm events with a recurrence interval less than or equal to 25 years².

2.0044 — Emergency Overflow

The Design Engineer shall assess the impacts of system failure for on-site detention. Overflow may occur due to rainfall intensity which exceeds the design storm, debris blockage of storm drain system, or some other reason.

If a system overflows, due to blockage or a higher intensity storm event, it shall not cause inundation of neighboring or down stream properties. Potential overflow routes shall be protected from erosion by adequate means.

If surface detention (e.g., detention/retention pond) is used, an overflow system shall be included to provide controlled discharge of the 100-year, 24-hour design storm event for developed conditions, without overtopping any part of the pond embankment or exceeding the capacity of the emergency spillway. The overflow design shall assume failure of the normal outlet control structure. An emergency spillway shall be able to safely pass all flows over the pond embankment without overtopping the embankment. Sufficient armoring will be required to the toe on each face of the embankment to prevent failure of the embankment from erosion.

2.0045 — Detention Facilities

Detention volume storage methods, in order of preference, are the following:

Surface storage - off channel

Surface storage – on channel

Subsurface storage – off channel

Subsurface storage – on channel

Detention facilities shall not be considered sedimentation facilities unless the following requirements, at a minimum, are met:

- a. The sediment control portion of the facility must be either a separate pond or structure, or a separate “cell” or element which is isolated from the high flows generated by larger storms which could flush accumulated material back into the stormwater system or channel.
- b. Separate calculations shall be submitted demonstrating the designed performance of the sedimentation element. Information must include an explanation of the function of the facility, the required live and dead storage volumes, detention time, and projected frequency of maintenance.

2.0046 — Infiltration (Retention) Facilities

When infiltration-groundwater recharge disposal of stormwater is proposed, the following shall be submitted for review:

- a. Soil Logs – A minimum of one soil log per acre. Each soil log shall extend to a depth at least 5 feet below the bottom elevation of the proposed infiltration facility or to the seasonal

² Generally this means designing for the 2,5,10, and 25-year storm events. However, the release rate for the 2-year storm event will be ½ the undeveloped rate for the project area.

water table elevation.

b. Infiltration Tests – The results of infiltration tests which have been performed in accordance with City requirements and procedures as shown below.

c. Engineer’s Opinion – The written opinion of a qualified soils Engineer that the site is capable of supporting a functional infiltration system which will meet the design requirements for the development being proposed. Any requirements related to steep slope, landslide hazard, or other sensitive area impacts shall also be addressed in the report.

In addition to all other applicable requirements, the approval of infiltration-groundwater recharge stormwater disposal systems requires the performance of one or more percolation tests. The number and location of these tests will be dependent upon the size and location of the subject property, and shall be submitted to the City for review prior to the tests. All test measurements shall be made during the period when groundwater level is expected to be at its maximum. All tests made for the purpose of approval of infiltration systems shall be performed under conditions in which the surrounding soil is saturated, or nearly so. The infiltration rate test procedure shown below simulates this condition. All tests shall be conducted in accordance with this procedure.

Maximum Infiltration Rate Test

This test is used to determine the maximum sub-surface infiltration rate for the purpose of designing infiltration systems such as drywells and infiltration trenches or vaults. The purpose of the procedure is to ensure the simulation of actual conditions, which occur during storms, including the saturation of the surrounding soil.

1. An excavation shall be made to the bottom elevation of the proposed infiltration system. The maximum infiltration rate shall be determined using either the EPA falling head percolation test procedure (Design Manual – Onsite Wastewater Treatment and Disposal Systems, EPA, 1980) or the double ring infiltrometer test (ASTM D3385).

2. The test hole or apparatus is filled with water and maintained at depths above the test elevation for a period of not less than 4 hours. This represents the saturation period.

3. Following the saturation period, the infiltration rate shall be determined in accordance with one of the test procedures specified above, with a head of 6 inches of water.

4. The Engineer shall perform at least 1 test per acre to determine a representative infiltration rate for the site. The measured rate shall have the following factors of safety applied:

E.P.A. Method	Factor of Safety = 2.0
ASTM D-3385	Factor of Safety = 1.75

All newly constructed stormwater drywells (sumps) shall be tested prior to paving in order to determine their in-place capacity. Testing of both new and existing drywells shall follow the procedure outlined below:

a. Fill sump with water at an initial rate equivalent to the minimum required flow rate for the sump, or 300 GPM, whichever is less, and record the water surface elevation below the sump rim after 5 minutes. Maintain the initial flow rate, recording the water surface elevation every five minutes until it stabilizes.

b. After the water surface elevation stabilizes, increase the flow rate by 300 GPM and record the water elevation as in step 1.

c. Repeat step 2 until:

- (1) the sump has reached the design capacity; or
- (2) the sump has reached the maximum allowable capacity for a single drywell; or
- (3) the sump has reached its actual in-place capacity; or
- (4) the maximum flow rate from the water source has been reached.

(Note: The minimum peak inflow for a test to be considered valid shall be 600 GPM unless this exceeds the design capacity of the sump.)

d. Cease discharge of water to the sump and record the water surface elevation every minute until the sump is empty or the water surface has remained constant for a period of 5 minutes.

e. Provide the City with all recorded test data within 24 hours following the test.

f. If, following analysis of the test data, the tested capacity of the drywell is less than the design capacity, contact the City immediately.

The City must be notified at least 24 hours prior to conducting the test. Only clean water shall be delivered to the sump or sedimentation manhole for testing. The introduction of silts, sediments, gravels, or any other foreign material shall not be permitted.

The test shall be witnessed and certified by the design engineer.

All facilities shall, at a minimum, meet current Oregon Department of Environmental Quality (DEQ) requirements and shall present a currently issued DEQ authorization for the project or design.

2.0050 — Erosion Control

Developments shall provide erosion control methods in accordance with the Erosion Prevention and Sediment Control Planning and Design Manual³, as updated to limit the transportation of soil materials by storm run-off during the construction phases of a project.

2.0051 — Erosion Control - Application

1. For subdivision plats, temporary erosion control measures also shall be utilized by the applicant during installation of plat improvements and by subsequent builders during construction of dwellings and other lot improvements.

2. Prior to the initial clearing and grading of any land development, provisions shall be made for the interception of all potential silt-laden run-off that could result from said clearing and grading. Said interception shall preclude any silt-laden run-off from discharging from the proposed land development to downstream properties or waterways unless previously approved by the City's Engineer. Said interception shall cause all silt-laden run-off to be conveyed by open ditch, or other means, to whatever temporary facility is necessary to remove silt prior to discharge to downstream properties or water ways.

3. Prior to initial clearing and grading of construction site, an evaluation of the following factors must be carried out:

(a) **Soil Erodibility** - Soil erodibility should be identified using Soil Conservation Service erodibility ratings. Erosion control techniques shall be designed accordingly.

³ Developed by Unified Sewerage Agency of Washington County, Water Environment Services of Clackamas County, City of West Linn, Oregon

(b) **Slope and Run-off** - Cleared areas will require protection from erosion.

(c) **Cover** - Erosion protection will be required for all disturbed areas.

4. Temporary/permanent hydroseeding or acceptable seeding and mulching, consistent with the Erosion Prevention and Sediment Control Planning and Design Manual, must be provided whenever perennial cover cannot be established on sites which will be exposed between October 1 and June 1.

2.0060 — Private Drainage Systems

2.0061 — Subdivisions

When subdivision lots drain to the rear it may be necessary to provide a private drainage system in private easements. This system shall be for collection of roof drains, footing drains, and surface run-off. This shall be a closed conveyance system designed to meet Uniform Plumbing Code requirements.

2.0062 — Subsurface Drainage

Subsurface drains (underdrains) shall be provided at the following locations:

a. For all existing springs and field tile intercepted during construction activity for other facilities; i.e., sewer, water, mains, street excavations, foundations, etc. Subsurface drains are not needed if the tile is removed.

b. Where high ground water exists or when it is necessary to reduce the piezometric surface to an acceptable level to prevent land slippage or underfloor flooding of buildings.

c. The drainage line installed shall begin at a cleanout and terminate at an approved point of disposal. Open jointed storm drain lines will not be considered as an acceptable solution.

2.0070 — Stormwater Quality Treatment

a. General Requirements and Applicability

The purpose of the water quality treatment facilities are to reduce the pollutants associated with stormwater runoff from new development and redevelopment. By establishing these criteria, the City of Scappoose is satisfying federal regulatory requirements to control the discharge of pollutants in stormwater as specified in the Clean Water Act Amendments of 1987.

The requirements are minimum requirements Citywide. If the City determines that additional controls are necessary in basins that drain to sensitive receiving waters or groundwater sources (such as defined by the DEQ's 303d, and proposed Total Maximum Daily Load (TMDL) requirements for water-quality limited streams, the DEQ's Underground Injection Control Regulations, or Federally designated threatened and endangered fish listings), additional facilities, treatments, or other best management practices (BMPs) may be required. These requirements could include larger facility designs, as well as, additional types of water quality controls.

It is the responsibility of the City and property owners to meet stormwater treatment requirements. While there have been significant advances in the field of stormwater treatment technologies, the water quality program still requires a best effort attempt at installing facilities that will address the commonly predictable stormwater problems of a development. Therefore, it is essential

that the site planner and the design engineer consider the future use of a site and provide solutions for any predictable water quality problems.

SECTION: 3.0000 — SANITARY SEWERS

3.0010 — General Design Requirements

Performance Standards - Sanitary sewer system design shall meet the policies and guidelines of the latest Sewerage System Master Plan and its updates.

Sanitary sewer systems shall, in general, be designed to provide gravity service to all areas of development. Approval of the City's Engineer shall be obtained prior to design of any sewer which cannot provide gravity service.

Sanitary sewer system capacity shall be designed for ultimate development density of the tributary area. The system shall allow for future system extension and for future development based on current or proposed land use designations.

Sanitary sewers shall be designed to remove the domestic sewage and industrial wastes from basements of houses, where practical, commercial or industrial buildings, and all public and private establishments where possible.

Storm water, including street, roof, or footing drainage, shall not be discharged into the sanitary sewer system but shall be removed by a system of storm drains or by some other method separate from the sanitary sewer system.

Unpolluted or non-contact cooling waters shall not be discharged into sanitary sewers. The overflow drains and filter backwash lines of swimming pools and "hot tubs" shall drain into a sanitary sewer.

In general, sewer systems shall be designed to allow for future loads and for ultimate development of the specific drainage area or basin concerned based on current or proposed land use designations.

As a condition of sewer service, all developments will be required to provide public sewers to adjacent upstream parcels in order to provide for an orderly development of the drainage area. This shall include the extension of sewer mains in easements across the property to adjoining properties, and across and along the street frontage of the property to adjoining properties when the main is located in the street right-of-way. This shall include trunk sewers that are sized to provide capacity for upstream development.

All public sewer pipelines shall be located within the public right-of-way whenever possible. These lines are placed in the public streets and right-of-way for ease of maintenance and access, control of the facility, operation of the facility, and to provide required replacement and/or repair. Under special topographical conditions the placing of public sewers outside of public right of way may be approved by the City's Engineer.

Design shall comply with Oregon Department of Environmental Quality sewer design guidelines, **OAR 340, Division 52**.

For any project requiring construction within or adjacent to watercourses and/or wetlands, in addition to approval by the City, permits from the appropriate responsible agencies (Oregon Department of Fish and Wildlife, Oregon Division of State Lands, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, U.S. National Marine Fisheries Service, etc.) shall be obtained. Copies thereof, or written evidence that no permit is required, shall be given to the City prior to any clearing or construction.

3.0011 - Sanitary Sewer Plans

In addition to the requirements of the previous **Sections 1.2000 thru 1.2064** the following requirements shall apply to plans for public sanitary sewer improvements:

The plan and profile sheets shall show the topographic information required by **Section 1.2041 - Facility Plan**, for a minimum of 200 feet upstream of the proposed end of any extendable mainline sewer.

3.0012 — Pipe Materials and Size

All public sanitary sewers shall be constructed with concrete pipe or PVC pipe as specified in the appropriate section of the Scappoose Standard Specifications. Where required for added strength, Class 50 Ductile Iron pipe will be used. Concrete pipe strength shall meet the applicable sections of ASTM C-14 and ASTM C-76 and Standard Drawing No. 301. PVC pipe and fittings shall conform to ASTM D-3034, SDR 35.

Private sanitary sewers shall meet the appropriate sections of the Uniform Plumbing Code.

All public sanitary sewer main lines shall be a minimum diameter of eight inches (8"). A six-inch (6") diameter sewer for non-extendable sewers up to 250 feet in length serving eight (8) dwelling units or less may be permitted with approval by the City's Engineer.

3.0013 — Minimum Design Criteria

Design Values – If there are no specific project values for the amount of sewage to be generated (Uniform Plumbing Code flows), the following design values shall be used:

Land Use Designation	Net Density Equivalent Dwelling Units/Acre	Net Population per Acre	Daily Sanitary Flow gpd/Acre
R-1	5.8	15.1	1208
E-4	14.5	31.9	2552
MH	13.9	30.6	2448
A-1	21.8	48.0	2840
C	9.09	20.0	1600
EC	13.64	30.0	2400
LI	4.55	10.0	800
HI	4.55	10.0	800

In addition to the sanitary sewerage flows, an allowance of 1,000 gallons/acre/day shall be added for all the land area in the basin being served.

Using the appropriate sanitary sewerage flows, a peaking factor shall be applied to the sanitary flow only. The peaking factor shall be calculated as:

$$\text{Peaking Factor} = 5.756 - 0.232 * \text{LN} (\text{Flow in gpd}) \text{ with a maximum of } 3.30.$$

The sewer design flow in gpd is then calculated as:

$$\text{Acres} * (1,000 + \text{DSF} * (5.756 - 0.232 * \text{LN} (\text{DSF}))) \text{ where:}$$

DSF = Daily Sanitary Flow in gpd from table above
LN = Natural Logarithm of Daily Sanitary Flow

Velocity – All sanitary sewers shall be designed at a grade that produces a mean velocity of the sanitary sewer design flow of no less than two feet (2') per second and not more than fifteen feet (15') per second. If topography requires a grade which would result in a velocity greater than fifteen (15') per second in one pipe section, additional drop manholes shall be installed as required.

The velocity shall be calculated using the sewer design flow for the basin to be served now and in the future at ultimate design flow.

Size - The sewer size shall be based on the minimum size needed for the design flow and not the size needed to result in a desired slope. The sewer size shall be determined using 2/3rd of the maximum gravity flow capacity of the pipe.

The engineer shall, as required in section 1, sub-section 1.2040 –Supporting Information, submit his calculations for each sewer line to be installed, exclusive of service laterals, Such calculations shall include the requirements of the Performance Standards as required in sub-section 3.0010 above.

Manning Equation – When calculating volumes, slopes, and velocities, the engineer shall use the Manning pipe friction formula.

Pipe Friction Coefficient – The pipe friction coefficient for use in the Manning formula shall be 0.013 minimum.

Minimum Slope – For verification purposes the following table of minimum pipe slopes shall be used. The slopes shown are for informational purposes only. The actual slopes shall be determined by the actual sewer design flow.

Pipe Size	Slope	Pipe Size	Slope
In.	ft./ft.	In.	ft./ft.
6	0.006	30	0.00058
8	0.004	36	0.00046
10	0.0026	42	0.00040
12	0.0020	48	0.00032
15	0.00144	54	0.00028
18	0.00114	60	0.00024
21	0.00092	66	0.00020
24	0.00078	72	0.00018
27	0.00066		

Pipes with slopes of 20% or more, while having to conform to the maximum velocity requirements specified above, are required to have anchor walls as detailed in the Standard Drawing No. 316, “Sewer Pipe Anchor Walls.”

3.0020 — Alignment and Cover

3.0021 — Right of Way Location

Sanitary sewer lines shall be located five feet (5') north and west from the right-of-way centerline. All changes in direction of pipe shall be made at a manhole.

Sewers shall be located in the street right-of-way. If streets have curved alignments, the center of the manhole shall not be less than six feet (6') from the curb face on the outside of the curve, nor the sewer centerline less than six feet (6') from the curb face on the inside of the curve.

Curved alignments in sanitary sewers, vertically or horizontally, are not permitted.

3.0022 — Minimum Cover

All sanitary sewers shall be laid at a depth sufficient to drain building sewers, to protect against damage by frost or traffic, and to drain basement sewers, where practical. Sufficient depth shall mean the minimum cover from the top of the pipe to finish grade at the sewer alignment. In new residential hillside subdivisions, mainline and lateral sewers shall be placed in the street at a depth sufficient to drain building sewers on the low side of the street.

Sanitary sewers in residential areas shall be placed with the following minimum cover:

- Sewer Mainline - Six feet (6') at Right-of Way for level or upward sloping lots
- Trunk and Collector Sewer – Eight feet (8') in roadways and easements

Ductile iron pipe shall be used when cover is less than three feet from subgrade and approved by the City's Engineer.

Where the topography is relatively flat and existing sewers are shallow (five feet (5') or less), the minimum cover shall be three feet (3').

Deviation from the above standards will be considered on a case-by-case basis when one of the following circumstances exist:

a. Underlying rock strata - required: A request in writing to the City's Engineer, together with submittal of a soils report, with a plan and profile certifying that bed rock exists three feet (3') or less below the undisturbed ground surface at all investigated alignments.

b. A ditch or stream must be crossed - required: A plan and profile; horizontal scale 1" = 20', vertical scale 1" = 2'.

3.0023 — Separation with Waterlines

Water mains shall be installed a minimum clear distance of ten feet (10') horizontally from sanitary sewers and shall be installed to go over the top of such sewers with a minimum of 18 inches of vertical clearance at the intersections of these pipes (in accordance with the requirements of OAR Chapter 333, Public Water Systems). Exceptions shall first be approved by the City's Engineer. In all instances the distances shall be measured surface to surface. The minimum spacing between water mains and storm drains, gas lines, and other underground utilities, excepting sanitary sewers, shall be three feet (3') horizontally when the standard utility location cannot be maintained.

Where water mains are being designed for installation parallel with other water mains, utility pipe, or conduit lines, the vertical location shall be twelve inches (12") below (or in such a manner which will permit future side connections of mains, hydrants, or services) and avoid conflicts with parallel utilities without abrupt changes in vertical grade of the above mentioned main, hydrant, or service. Where crossings of utilities are required, the minimum vertical clearance shall be six inches (6").

Where individual properties are served by private pumps and force mains discharging to a public sanitary sewer at the property line, and a domestic water well is also on that same property, either Uniform Plumbing Code (for water systems servicing 3 or less dwelling units) or State Health Department (for community water systems servicing 4 or more dwelling units) specified separation of sewer and waterlines shall apply.

3.0024 — Easements

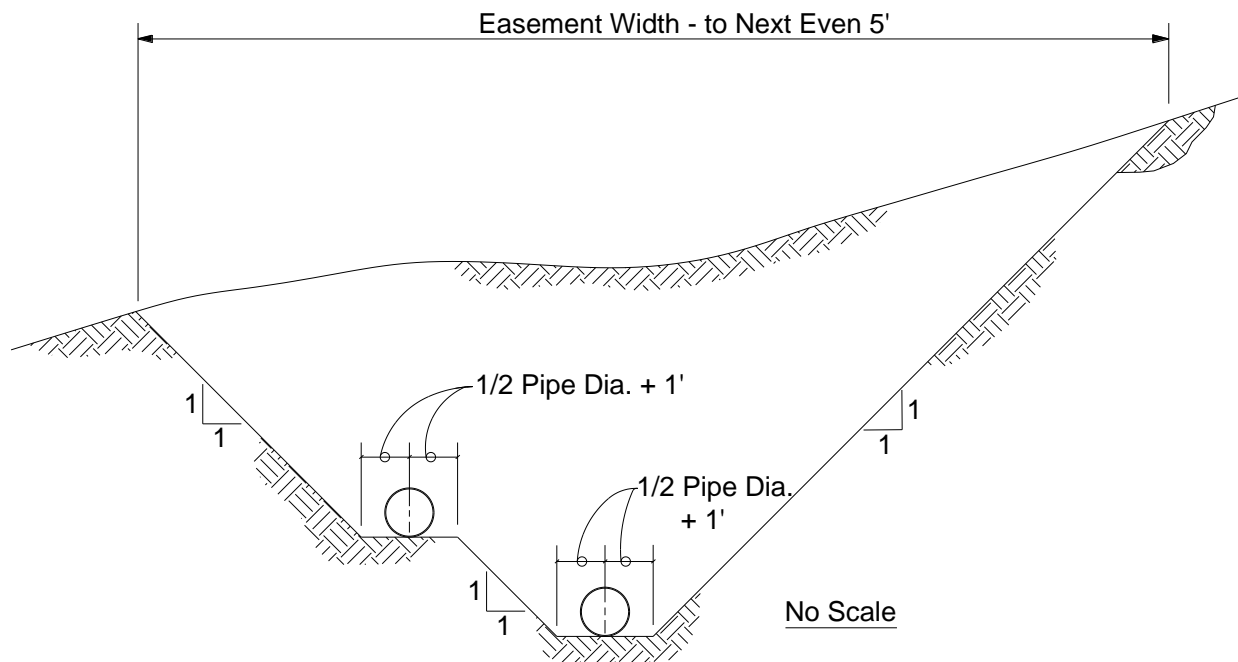
Sewers placed in easements along a property line shall have the equal width easements centered about the property line and the sewer shall be offset 18 inches from the property lines. For sewers placed in easements located other than along a property line, the sewer shall be placed in the center of the easement. The conditions of the easement shall be such that the easement shall not be used for any purpose that would interfere with the unrestricted use for sewer-main purposes. Under no circumstances shall a building or structure be placed over a sanitary sewer main or sewer easement. This shall include overhanging structures with footings located outside the easement.

Sanitary sewer easements as prepared and recorded, shall expressly preclude permanent structures over the easement excluding curbs and pavement. Sidewalks crossing the easement at approximately 90° shall be permitted, as are fences allowable by the land use designation. Landscaping within the easement shall exclude the planting of all trees and also shrubs normally expected to exceed 4 feet in height. The easement shall clearly state that all improvements (including landscaping) within the easement are the sole responsibility of the property owner and that if, for maintenance purposes, it is necessary for the City to remove the improvements, it will be the responsibility of the property owner to reinstall them.

Easements for sewers less than 12 inches in diameter shall have a minimum width of fifteen feet (15'). Sewers greater than 12 inches in diameter shall have a minimum easement width of 20 feet.

Sewers with more than six feet (6') of cover and/or inside diameters 24 inches or greater will require wider easements. A slope of one horizontal to one vertical from the sewer invert to ground surface will be used in determining easement width. Easement widths shall vary from the fifteen foot (15') minimum by five foot (5') increments; i.e., 15, 20, 25 feet, etc.

For sanitary sewers and storm sewer to be located within the same easement the above rules apply except that the separation of the sewers, both horizontally and vertically must be considered. If the sanitary and storm sewers were to be at the same elevation, a one-foot (1') horizontal separation of the outside surfaces, including bells, is required. If the sewers are at differing elevations then the horizontal separation and easement width is determined as shown below:



Easement locations for public sewer mains serving a PUD, apartment complex, or commercial/industrial development shall be in parking lots, private drives, or similar open areas which will permit an unobstructed vehicle access for maintenance by City personnel.

All easements must be furnished to the City's Engineer for review and approval prior to recording or the start of construction.

3.0025 — Relation to Watercourses

Generally, the top of all sanitary sewers entering, crossing or adjacent to streams shall be at a sufficient depth below the natural bottom of the streambed to protect the sewer line. One foot (1') of cover is required where the sewer is in rock; three feet (3') of cover is required in other materials. In paved channels, the top of the sewer line shall be placed at least six inches (6") below finish grade of the bottom of the channel, except as provided above.

Sewers located along or parallel to streams shall be located outside of the streambed and sufficiently removed therefrom to provide for future, possible stream channel widening. All manhole covers shall be watertight at or below the 100-year flood elevation.

Sewers crossing streams or drainage channels shall be designed to cross the stream as nearly perpendicular to the stream channel as possible, and shall be free from change of grade. The minimum cover shall be 36 inches from the bottom of the streambed or drainage channel.

The pipe material shall be ductile iron with an 18-foot length of pipe centered on the stream or drainage channel centerline or continuous High Density Polyethylene. The ductile iron or High Density Polyethylene pipe shall extend to a point where a one-to-one slope begins at the top of the bank and slopes down from the bank away from the channel centerline and intersects the top of the pipe.

Concrete encasement per Standard Drawing No. 317 will be required when the above cover requirements cannot be met. Each deviation from the above requirements will be reviewed and approved by the City's Engineer on a case-by-case basis.

3.0030 — Structures

3.0031 — Manholes

Manholes shall conform to ASTM C-478.

Manholes shall be located at all changes in slope, alignment, pipe size, and at all pipe junctions with present or future sanitary sewers excluding four-inch (4") or six-inch (6") service branches serving 4 or fewer living units.

Manhole spacing shall not be greater than 500 feet.

3.0032 — Cleanouts

Cleanouts will not be approved as substitutes for manholes on public sewer lines. Cleanouts are permitted at the upper end of a sewer that will be extended during a future construction phase. If future extension requires a change in sewer alignment or grade, a manhole will be required at the cleanout location.

Cleanouts are permitted at the end of a non-extendable sewer line that does not exceed 250 feet in length nor serve more than eight lots (8).

3.0040 — Structure Design

3.0041 — Manholes

Designs for manholes are shown in the Public Works Standards of the City of Scappoose. They are suitable for most conditions. New designs or revisions should not be shown on the construction drawings unless the standard designs are not suitable. New or revised designs may be necessary if:

- a. One or more of the sewers to be connected to the manhole is over 27 inches in diameter (smaller diameters may require a special design if the manhole is at an alignment change.)
- b. Several sewers will be connected to the manhole.
- c. There is less than 90 degrees between the incoming and outgoing sewer.
- d. The manhole will be subject to unusual structural loads.
- e. Diversion or other flow control measures are required.

Where one or more of conditions a), b), or c) are encountered, a drawing of the manhole base should be made to determine if it is feasible to use designs shown in the Standard Drawings. It may be necessary to restrict the options to a specific Standard Drawing specified by a note on the construction

drawings. If a special design is required for any reason, it will be necessary to show the details on the construction drawings and to provide structural calculations as needed.

Some alternate manhole features are shown in the Standard Drawings. Where these features are required, they must be specified by a note on the construction drawings. Some examples are;

a. Slab tops must be used in lieu of cones where there will be less than 4 feet between the manhole shelf and the top of the manhole lid.

b. Watertight manhole frames and covers are to be used if floodwaters are expected to cover the manhole top or if the manhole must be located in the street gutter. Such conditions should be avoided wherever feasible.

c. Tamperproof manhole frames (7" depth) and covers are required in all areas outside the paved public right-of-way.

Standards for elevation differences at manholes have been established to compensate for normal energy losses and to prevent surcharging of a sewer by a larger sewer. For purposes of slope calculation and for establishing elevation differences, the elevations are given at the intersection of the sewer centerlines (usually the center of the manhole). The rules for elevation differences at manholes are:

a. The crowns of incoming sewers shall be at least as high as the crown of the outgoing sewer.

b. If the incoming and outgoing sewers are of equal size and are passing straight through the manhole, no added elevation change is required.

c. If sewers intersect or the alignment changes at the manhole, the invert elevation difference shall be at least 0.10 feet for 0°-45° of horizontal deflection angle, and 0.20 feet for over 45° of horizontal deflection angle.

d. The slope of a sewer within a manhole shall be no less than the slope of the same sewer outside of the manhole.

e. Drop connections are required when the vertical distance between flow-lines exceeds two (2) feet. The drop connection shall be an inside baffled drop and a detail shall be shown on the drawings. Smooth flow-lines with vertical distances of less than one-foot must be provided wherever feasible.

f. All connections must enter the manhole through a channel in the base. This includes drop connections and connections to existing manholes.

Where conditions make compliance with these rules impractical, exceptions will be permitted. It will be necessary, however, for the designer to provide a complete analysis of the need for such designs.

3.0050 — Service Branches

Service branches are those private sewer lines by which a private building sewer connects to the public sewer main.

Each individual building lot shall be connected by a single, separate, private, building-sewer/service branch line connected to the public sewer main. Combined (Siamese) sewer service branches for two (2) lots may be permitted only for single family attached when each property cannot legally be further divided. See Standard Drawing No. 312 for an example.

The minimum inside diameter of a sewer service branch for a single-family residence shall be four inches (4"). The minimum inside diameter for all other service branches shall be six-inches (6"). In all cases the service branch shall be equal to or greater than the building sewer diameter. Service branches shall be built to the same construction standards and of the same materials as the sewer mainline. Service branches in general shall be placed at 90 degrees to the main sewer line to avoid excessive exposure to other utilities during excavation for construction or maintenance of the service branches. Angles other than 90 degrees (45 degrees minimum) may be approved for special conditions such as cul-de-sac lots. Service branch connections may be made at manholes (not less than 90 degrees, in the direction flow direction, to sewer mainline) if such placement would not interfere with other present or future connections to the manhole.

The minimum slope of sewer service branches shall be 2.00 percent (1/4 inch per foot). Except that for unusual conditions, a slope of 1.00 percent (1/8 inch per foot) may be approved. It will be necessary, however, for the design engineer to provide a complete analysis of the need for any sewer service branch slope less than 2.00 percent. The maximum slope shall be 100.00 percent (45 degrees or one foot per foot). Connections to deep sewer mainlines shall be made with risers (see the Standard Drawing No. 314). Alternatively, drop connections into manholes must be used where service branch slopes would exceed 100 percent.

Tees for service branches shall be installed at 100% slope (45 degrees or one foot per foot), and 1/16 or 1/8 bends installed to provide proper grade for the service branch. Service branches shall be installed to end six feet (6') beyond the street right-of-way line or at the easement line where sewer is installed in an easement. A watertight plug shall be installed in end of branch and a 2" x 4" wood marker shall be placed at branch end from pipe invert to at least 12 inches above existing grade. The top of the 2" x 4" shall be painted white and marked with the depth of the branch measured from the existing ground to the invert of the pipe. The curb shall have an "S" stamped in the face or top of the curb at the center of the branch crossing.

3.0060 — Connection to Existing Sewers

Connections to, and extensions of, existing sewers will occur to facilitate new development. Certain requirements will be placed on the design engineer as to permitted methods and/or locations.

Connections to existing manholes shall be made with the following guidelines:

a. Where the invert of the connecting pipe is two feet or less above the manhole shelf, an inside drop will be constructed utilizing Portland cement concrete as shown on Standard Drawing No. 318. The sewage entering the manhole will follow a smooth concrete channel transitioning evenly from the invert of the inlet pipe into main channel. Sewage will not be allowed to fall freely to the manhole base.

b. Where the invert of the connecting pipe is more than two feet above the manhole shelf, the contractor will be required to construct a baffled inside drop. The sewage entering the manhole will follow a smooth concrete channel transition from the bottom of the drop into the main channel.

c. Where the invert is required to enter below the shelf of the manhole, the inlet pipe will not enter below a point where the crown of the new inlet pipe is below the crown of the outlet pipe. The base of the manhole will be rebuilt if damaged in this process. The sewage will enter the main flow in a smooth channel transitioning from the inlet pipe to the main channel.

d. No pipe will enter an existing manhole where the angle between the incoming flow and the outgoing flow is less than 90°.

When sewers are extended from cleanouts, the entire cleanout assembly, including the wye, shall be removed. New building service laterals will be made at existing tees where possible.

When tees do not exist on the Public Sanitary Sewer System, the new lateral sewer will enter the collection system through a "cored" opening with an approved connector. This connection shall be done in conformance with Standard Drawing No. 327.

3.0070 — Private Sewer Lines

Private sewer lines shall be installed on private property in accordance with the requirements of the Uniform Plumbing Code.

Easements for private sewer lines are the responsibility of the property owners, but copies of the recorded easements must be given to the City prior to any service branch construction.

Private sewer lines (except service branches) shall not be permitted within the public right-of-way.

3.0080 — Subsurface Disposal

Subsurface sanitary sewage disposal is permitted only when connection to a public sanitary sewer is not practical. Contact the Columbia County Sanitarian for questions and permits for subsurface disposal within the Columbia County area.

3.0090 — System Testing

All sanitary sewer systems shall successfully pass the testing requirements of the City. See the City of Scappoose Standard Construction Specifications for details.

3.0100 — Sewage Pump Station Design Standards

3.0101 — General

The pump station design shall be approved by the City's Engineer.

3.01011 - Facility

Station shall include: Submersible pumps, wet well, valve vault, associated piping and valves, electrical controls, instrumentation, telemetry, access road, fencing, landscaping, potable water supply, and shall be reviewed and approved in concept by the City's Engineer before design is begun.

3.01012 - Capacity

Pump station shall be designed to pump the peak wastewater flow from the service area. When the service area is not built out, staging of pump station capacity will be allowed.

3.01013 - Standby Power

The City's Engineer shall require permanent standby power, with automatic transfer capability, for all public pump stations.

3.01014 - Type

The pump station design shall be approved by the City's Engineer.

3.0102 — Design

3.01021 - DEQ Requirements

Pump station shall be designed to meet the minimum requirements and guidelines of the Department of Environmental Quality (DEQ), Oregon Administrative Rules, Chapter 340, Division 52 and shall meet the rules posed at <http://www.deq.state.or.us/wq/wgrules/guidance.htm>.

3.01202 - Responsible Design Engineer

The design shall be made by a registered professional engineer experienced in the design of such facilities.

3.01023 - Calculations Required

Service area, peak flow, pump station calculations shall be submitted to the City.

3.01024 - Storage Volume

Wet well shall be designed to provide four (4) hours of sanitary sewage inflow storage above high water alarm elevation unless otherwise approved by the City Engineer.

3.01030 — Materials

3.01031 — Pumps

A minimum of two pumps shall be supplied. Each pump shall be capable of pumping the peak wastewater flow. Where more than two pumps are used, the station shall be able to pump peak wastewater flow when the largest pump is out of service.

Pumps shall be explosion-proof, suitable for hazardous location, capable of passing solids and shall be UL or FM listed and shall be approved by the City's Engineer.

3.01032 — Piping and Valves

Piping and fittings shall be ductile iron.

Valves shall be metal, suitable for wastewater use. Valves shall be plug valves designed for wastewater service.

Provide pressure gages on pump discharge piping.

3.01033 — Electrical

Electrical controls shall be located above ground mounted in a waterproof enclosure. Electrical panels shall be UL listed. The pump station wet well shall be considered a hazardous location.

3.01034 — Controls

Controls may be mechanical relays or programmable logic controllers.

Pumps shall alternate lead-lag position with each pumping cycle.

Pump controls shall be approved by the City's Engineer.

Float activated alarm shall indicate emergency high water level.

3.01035 — Alarms and Telemetry

Alarms shall be telemetered to the City of Scappoose Wastewater Treatment Plant by dedicated telephone lines with a KAYE Dialog Ultra auto dialer and shall have a visual alarm light.

Alarms include at a minimum:

Pump failure

Power failure
Telemetry failure
High water level
Sump Pump alarm

3.01036 — Landscaping and Fencing

A 6-foot chain link fence with three strands of barbed wire and redwood slats shall surround the pump station. Access for easy maintenance shall be incorporated in the design.

3.01037 — Additional Features

Provide 1-inch hose bib at valve vault. Potable water shall be provided by reduced pressure backflow preventer.

Provide positive ventilation in valve vault.

Provide odor control systems as required.

3.01038 — Force Main

Force main shall be designed for a nominal flow velocity in the range of 3 to 5 feet per second.

3.01040 — Construction

3.01041 - Code Authority

Pump station and related facilities will be constructed in conformance with the current edition of the National Electric Code, the Uniform Building Code and the Uniform Plumbing Code as adopted by the state of Oregon and the City of Scappoose, and the National Fire Protection Association Division 820 (NFPA 820) Standards.

3.01042 - Fabricated Steel Surface Finish

Steel fabrications shall be hot dipped galvanized. Corrosion resistant painting shall be required on valves, piping, and pipe fittings or other items not galvanizable.

3.01043 — Operating and Maintenance Data

Compile product data and related information appropriate for City's maintenance and operation of products furnished under the contract.

Provide an operating and maintenance (O & M) manual as well as As-Built drawings.

Instruct City's personnel in the maintenance of products and in the operation of equipment and systems.

3.01044 — Spare Parts

Supply two sets each of all gaskets, bearings, and mechanical seals for rotating equipment.

SECTION: 4.0000 — WATER MAINS

4.0010 — GENERAL DESIGN REQUIREMENTS

Performance Standards - Water distribution systems shall be designed to meet Oregon Administrative Rules Chapter 333 (including ORS448), AWWA Standards, and guidelines of the Water System Master Plan, April 1997, and its updates.

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 required by the State (20psi). For single family residential areas the minimum static pressure shall be 35 PSI, and the minimum fire flow shall be 1,000 GPM. For all other developments, including areas with single family homes larger than 3,600 s.f. or mixed-use areas, the required fire flow shall be as determined by the Fire Department up to a maximum of 3,500 gpm. For requirements above 3,500 gpm, the development shall provide supplemental fire flow as approved by the Fire Department.

Water system design shall meet distribution needs for projected maximum daily demand within a given service area. New water systems shall allow for future extensions, beyond present development, that are consistent with the Master Plan. New water systems shall be sized according to the current zoning area fire flow needs, velocity standards and water modeling determinations.

All waterlines shall be located within the public right-of-way or as directed and approved by the City's Engineer. These lines are placed in the public right-of-way for ease of maintenance and access, control of the facility, operation of the facility, and to permit required replacement and/or repair. The City's Engineer, under special conditions, may allow a public waterline to be located within a public water easement as referenced in Section 4.0024.

4.0011 — Pipe, Valves and Fittings Materials and Size

All public water distribution systems shall be constructed with ductile iron pipe, minimum thickness Class 52 or with Polyvinyl Chloride (PVC) pipe which conforms to AWWA C 900 or C 905 and UNI-B-11 standards.

Ductile Iron Pipe - All Ductile iron pipe shall be cement mortar-lined pipe with push-on or mechanical type joints. When a corrosive potential condition is encountered, all ductile iron pipe and fittings will be polyethylene encased with an 8 mil tubing meeting manufacturer and AWWA standards. Where an active cathodic protection system is encountered as a result of other utilities, a deviation from the normal pipe design/material/installation practice may be required by the City's Engineer. Polyvinyl chloride (PVC) pipe may be considered as an alternate to ductile iron pipe where an active cathodic protection system is encountered.

Polyvinyl Chloride (PVC) Pipe and Tracer Wire Installation - All PVC pipe 4"-12" shall conform to AWWA C905 and UNI-B-11 standards. All PVC pipe shall have a dimension ratio no greater than 18, with an outside diameter identical to cast iron. Tracer wire shall be a minimum 12 gauge coated copper wire and installed with all PVC water pipe.

All gate valves shall be pressure rated for 200 psi and all butterfly valves shall be pressure rated for 150 psi. All ductile iron mechanical joint fittings shall be pressure rated at 350 psi. All flanged fittings and cast iron mechanical joint fittings shall be pressure rated at 250 psi. All fittings shall be factory cement mortar lined and coated.

Water distribution main sizes shall generally conform to the following:

4-inch - May only be used with approval of the City's Engineer in residential zones on dead-end streets less than a center line distance of 250 feet measured from the center of the intersecting

street to the radius point of the cul-de-sac of a dead-end street with service to not more than 12 single family residences; and shall be connected to a looped minimum six-inch main. Fire hydrants shall not be permitted on four-inch lines. All four-inch lines shall terminate with a standard blow-off (Standard Detail Drawing No. 407A).

6-inch - Minimum size residential subdivision distribution water main for the grid (looped) system, not to exceed an unsupported length of 600 feet and shall not be permanently dead-ended. Looping of the distribution grid shall be at least every 600 feet.

8-inch - Minimum size for permanently dead-ended mains supplying fire hydrants with a fire flow of 1,000 GPM and for primary feeder mains in residential subdivisions, not to exceed an unsupported length of 600' unless otherwise approved by City's Engineer.

10-inch and larger – As required for primary transmission lines in subdivisions, industrial and commercial areas.

Where system static pressures allow, and field flow measurement or system modeling shows adequacy, velocities in distribution mains may be designed, but not exceed eight feet (8') per second for combined fire, domestic and irrigation flows. Velocity in service lines (as defined in Section: 4.0050) shall be designed not to exceed ten feet (10') per second.

For portions of the water system with mid-range to low static pressures, required flows may be difficult to achieve while still maintaining a minimum system residual of 20 psi. A water modeling report shall be submitted to verify the adequacy of the design in these areas.

4.0012 — Grid System

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 by the City. 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.

4.0013 — Dead-End Mains

Dead-end mains which will be extended in the future shall be provided with a properly sized blow-off (see Standard Detail Drawing Nos. 407A and 407B).

Permanent dead-end mains shall terminate with a Standard Blow-Off Assembly (see Standard Detail Drawings Nos. 407A and 407B).

The installation of permanent or long term dead-end mains greater than 250 feet, upon which fire protection depends and the dependence of relatively large areas on single mains, will not be permitted unless otherwise approved by City's Engineer.

No more than 20 single family residences should be temporarily served from an un-looped waterline during a phased construction.

4.0020 — ALIGNMENT AND COVER

4.0021 — Right-of-Way Location

Where waterlines are located within narrow right-of-ways (less than 50'), location of waterline shall be reviewed and approved by City's Engineer on a case-by-case basis.

In general, water systems shall be located twelve feet (12') south and east from the right-of-way centerline or as approved by the City's Engineer. Except as provided in Section 4.0024, all waterlines shall be in the public right-of-way. All abrupt changes in vertical or horizontal alignment shall be

made with a fitting and adequate thrust restraint. (Refer to Standard Detail Drawing Nos. 408, 409, and 410.)

Curved alignment for waterlines or mains is permitted and shall follow the street centerline when practical. The minimum allowed radius shall be based on allowable pipe deflection for the pipe diameter and the pipe laying length, but not to exceed 3° joint deflection.

4.0022 — Minimum Cover

The standard minimum cover over buried water mains within the street right-of-way shall be thirty-six inches (36") from finish grade. Standard trench section (Standard Detail Drawing No. 402) will be utilized for all water pipe installed.

The minimum cover for mains in easements across private property shall be forty-eight inches (48") from finish grade.

Finish grade shall normally mean the existing or proposed pavement elevation. Where the main is located in the cut or fill side slope or where mains are located in easements, finish grade shall mean final ground elevation at the water main alignment.

Deviation from the above standards will be considered on a case-by-case basis when the following exists:

- a. When there is underlying rock strata that prohibits placement of the water main thirty-six inches (36") below finish grade, a written request must be submitted to the City's Engineer, together with submission of a soils report, with a plan and profile certifying that bed rock exists less than three feet (3') below the undisturbed ground surface.
- b. Substantial utilities exist at an elevation conflicting with the waterline at 36" below finished grade; and installation of the waterline below such utility would cause the new waterline to be at an unreasonably deep elevation below finished grade.
- c. Where the water main or service is installed at a depth of 24" or less below finished grade, control density backfill (C.D.F.) shall be used in place of standard backfill material.

4.0023 — Separation with Sewer Lines

Water mains and services shall be installed a minimum clear distance of five feet (5') (refer to Standard Detail Drawing No. 411) horizontally from gravity sanitary sewer mains and laterals, and shall be installed to go over the top of such sewers with a minimum of 18 inches of clearance at intersections of these pipes. Separation from sanitary sewer force mains shall be reviewed on a case-by-case basis. Exceptions shall first be approved by the City's Engineer. In all instances, the distances shall be measured edge to edge.

4.0024 – Separation with Utilities

The minimum spacing between water mains and storm drains, gas lines, and other underground utilities, excepting sanitary sewers, shall be three feet (3') horizontally when the standard utility location cannot be maintained. This separation also applies to water service and utility service lines.

Where water mains are being designed for installation parallel with other water mains, utility pipe, or conduit lines, the vertical separation shall be twelve inches (12") below or in such a manner which will permit future side connections of mains, hydrants, or services, and avoid conflicts with parallel utilities without abrupt changes in vertical grade of the above mentioned main, hydrant, or service. Where crossing of utilities are required, the minimum vertical clearance shall be six inches (6").

4.0025 — Easements

Mains placed in easements along a property line shall be offset 18 inches from the property line, and shall have easements centered on the property line. Mains placed in easements along a right-of-way line shall be offset a minimum **3** feet from the right-of-way line and within a minimum 10 foot wide easement where building set-back is 20 feet or more. Where building set-back is less than 20 feet, easement shall be 15 feet wide. For mains placed in easements located other than along a property or right-of-way line, the main shall be placed in the center of the easement. Easements, when required, shall be exclusive and a minimum of fifteen feet (15') in width. In areas of steep (15% slope or greater) or unusual topography, wider easement will be required. Easements next to buildings more than two stories high shall be designed by the City's Engineer on a case by case basis. The conditions of the easement shall be such that the easement shall not be used for any purpose which would interfere with the unrestricted use for water main purposes. Under no circumstances shall a building or structure be placed over a water main or water main easement. This includes overhanging structures with footings located outside the easement. No trees or large shrubs (capable of reaching 15 feet in height in 20 years) shall be planted in the easement. No parking of vehicles shall be allowed within water main easement unless otherwise approved by the City's Engineer. Any fencing installed shall meet all requirements of the land use designation, and shall be approved by the City's Engineer. In no case shall the fencing restrict access to the easement. Any fencing removed from the easement for operation and maintenance of the water facilities shall be reinstalled by the property owner.

Easement locations for public mains serving a Planned Unit Development, apartment complex, or commercial/industrial development shall be in private drives or similar open areas which will permit unobstructed vehicle access and operation of facilities for maintenance by City personnel.

Any water main placed within a water main easement will be permanently marked with blue plastic markers at all angle points, and no less than every 200 feet, or at a change in direction. In addition, markers shall be placed where the waterline intersects the public right-of-way at the easement location. A monument cap set in the pavement of parking lots, driveways, etc. shall be an acceptable alternative to the sign.

All easements shall be furnished to the City for review and approval prior to recording.

4.0026 — Relation to Watercourses

New water mains may cross over or under existing streams, ponds, rivers, or other bodies of water.

a. **Above Water Crossings** - The pipe shall be engineered to provide support, anchorage, and protection from freezing and damage, yet shall remain accessible for repair and maintenance. All above water crossings will require review and approval by the City's Engineer.

b. **Underwater Crossings**

- (1) Mains crossing stream or drainage channels shall be designed to cross as nearly perpendicular to the channel as possible.
- (2) Valves shall be provided at both ends of the water crossing so that the section can be isolated for testing or repair. The valves shall be easily accessible and not subject to flooding.
- (3) The following surface water crossings will be treated on a case-by-case basis:
 - (a) Stream or drainage channel crossing for pipes twelve inches (12") inside diameter and greater.

- (b) River or creek crossings requiring special approval from the Division of State Lands.
- (4) The minimum cover from the bottom of the stream bed or drainage channel to the top of pipe shall be thirty-six inches (36").
- (5) A scour pad centered on the waterline will be required for mains less than twelve inches (12") inside diameter when the cover from the top of the pipe to the bottom of the stream bed or drainage channel is thirty inches (30") or less. The scour pad shall be concrete, six inches (6") thick and six feet (6') wide; reinforced with number four bars twelve inches (12") on center both ways; and shall extend to a point where a one-to-one slope begins at the top of the bank and slopes down from the bank away from channel centerline and intersects the top of the pipe. There shall be a minimum 6" clearance between bottom of pad and top of waterline.

4.0030 — APPURTENANCES

4.0031 — Valves

In general, valves shall be the same size as the mains in which they are installed. Valve types and materials shall conform to the City of Scappoose Standard Specifications.

Distribution system valves shall be located at and flanged to the tee or cross fitting. There shall be a sufficient number of valves so located that not more than four (4), and preferably three (3) valves, must be operated to effect any one particular shutdown. The spacing of valves shall be such that the length of any one shutdown in commercial or industrial areas shall not exceed 500 feet nor 800 feet in other areas.

In general, a tee-intersection shall be valved in two branches and a cross-intersection shall be valved in three branches. Transmission water mains shall have valves at not more than 1,000 foot spacings. Hazardous crossings such as creeks, railroad and freeway crossings, shall be valved on each side. Valves shall be accessible at all times.

When a hydrant tee or a tee branching to a cul-de-sac blow-off is installed in a sloped waterline, install a main line valve on the up hill run of the tee, to allow for release of air from hydrant or blow-off. An additional main line valve may be needed on the down hill run of the tee for other operational purposes.

Distribution tees and crosses with valves for future branch lines on transmission mains may be required at the direction of the City's Engineer.

4.0032 — Fire Hydrants

The public water system supplying public fire hydrants shall be designed to provide up to a maximum of 3,500 GPM. Minimum fire flow in single family residential areas shall be 1,000 GPM, except in areas where homes exceed 3,600 s.f. or areas of mixed use, in which case fire flows will be as determined by the fire department.

The distribution of hydrants shall be based upon the required average fire flow for the area served. Design coverage shall result in hydrant spacing of approximately 500 feet in residential areas, approximately 300 feet in commercial or industrial subdivisions, or as approved by the Fire Department and City's Engineer. In addition, sufficient hydrants shall be available within 1,000 feet of a building in commercial/industrial areas to provide its required fire flow.

Residential hydrants shall be located as nearly as possible to the corner of street intersections and not more than 600 feet from any cul-de-sac radius point.

No fire hydrant shall be installed on a main of less than eight inches (8") inside diameter unless it is in a looped system of six-inch (6") mains. The hydrant lead shall be a minimum six-inch (6") inside diameter.

All fire hydrants will be located at the back of the existing or proposed sidewalk, in the planter strip or behind the sidewalk if adequate right-of-way exists. If any public hydrant encroaches on private property, an easement will be provided as directed by the City's Engineer. In general, fire hydrants will be located at or near the P.C. of the curb return or at a common property line. Pumper port of fire hydrant shall be perpendicular to the curb line.

No hydrant shall be installed within five feet (5') of any existing above-ground utility nor shall any utility install facilities closer than five feet (5') from an existing hydrant.

Hydrant installation shall conform to Standard Detail Drawing No. 401. Maximum 6' bury hydrants will be required in all installations. Installation of hydrant extensions will not be allowed, unless approved by the City's Engineer.

Unless off of a fireline/fire sprinkler service, fire hydrants shall be placed on the same side of the right-of-way/street as the waterline serving the fire hydrant, unless otherwise approved by the City's Engineer.

Each fire hydrant shall have an auxiliary valve and valve box which will permit repair of the hydrant without shutting down the main supplying the hydrant. Such auxiliary valves shall be resilient wedge gate valves. The auxiliary valve shall have mechanical joint-by-flange joint ends as referenced in the Standard Drawing No. 401. The valve shall be connected directly to the water main using a flange joint tee and "Megalug" retainer glands.

Hydrants shall not be located within twenty feet (20') of any building, nor will they be blocked by parking. The large hydrant port shall face the road or travelway.

Guard posts (bollards), a minimum of three feet (3') high, shall be required for protection from vehicles when necessary. Such protection shall consist of four-inch (4") diameter steel pipes, six feet (6') long, filled with concrete, and buried a minimum of three (3) feet deep in concrete, and located at the corners of a six (6) foot square with the hydrant located in the center. Use of posts other than at the four corners may be approved by the City's Engineer.

4.0033 — Pressure-Reducing and Combination Air Valve Units

The City's water distribution system is divided into several pressure zones. Where water systems cross these zone lines, a pressure-reducing valve station may be required. The specific design and location for such valves will be reviewed and approved by the City's Engineer.

When shown on the plans or designated by the City's Engineer, combination air valve units, per Standard Detail Drawing No. 406, shall be installed. Such valves will be required on large diameter transmission lines at all high points in grade, and at other points as determined by City's Engineer.

4.0034 — Railroad or Highway Crossings

All such crossings defined above, or as determined by the City to be of a hazardous nature, shall be valved on both sides of the crossing. Casing of railroad or freeway crossings, if required, shall be as noted in the permit from the respective agency.

4.0040 — BACKFLOW PREVENTION

Backflow prevention assemblies shall be required on all 1-1/2" and larger water services, irrigation services and fire sprinkler system services, and as provided for in the City of Scappoose

Municipal Code. Backflow assemblies shall be located at the right-of-way and on the lot which it serves. For installation requirements on assemblies 3" through 10", see Standard Detail Drawing 416A-D. All assemblies shall be state-approved and testable. Maintenance and testing of backflow prevention assemblies shall be the responsibility of the property owner.

4.0050 — WATER SERVICE LINES

The sizes of water service lines, which may be used, are 1", 2", 4", 6", 8", 10", and 12". Water service lines will be reviewed for impacts on the distribution system and shall not be greater in size than the distribution main. In no case shall a new service be provided off of an existing galvanized waterline.

For four-inch (4") and greater services (3" and larger meters), a design drawing must be submitted to the City showing the vault and fitting requirements with the expected flow (normal and maximum day flow) requirements and proposed usage.

Domestic service lines 1" and 2" shall normally extend from the main to behind the curb, with a meter curb stop and meter box located at the termination of the service connection (Standard Drawing Nos. 403 and 404). Meter shall be provided and installed by City. Meter boxes are to be provided by the developer. Whenever possible, individual service connections shall terminate in front of the property to be served along the street frontage where property is addressed, and shall be located 18-inches each side of a common side property line. 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 City's Engineer.

For services 4" and larger (3" and larger meters), meter vaults shall be placed at the entrance to the property being served, unless otherwise approved by the City's Engineer. See Standard Detail Drawings 415A-D.

Multiple service connections to a premises shall be laid out to follow a logical sequence of addresses, to facilitate matching of service connection to building(s). On-site waterlines shall be laid out to facilitate a logical matching of service connection to building and address.

When a corrosive potential condition is encountered and the copper service passes over or under an active cathodic protection system, the service will be installed in a Schedule 40 PVC conduit for a distance of 10 feet on each side of the active system. All conduit placements shall be included in the as-built drawings.

GENERAL DESIGN CRITERIA

WATER SERVICE AND METER SIZING

SERVICE SIZE	METER SIZE	MAX. DESIGN FLOW (GPM)
1"	3/4"	24
1"	1"	40
2"	1 1/2"	80
2"	2"	128
4"	3"	256
4"	4"	400
6"	6"	800
8"	8"	1280
10"	10"	2000
12"	12"	2640

Notes

1. Continuous flow not to exceed 30% of maximum design flow for 3/4" – 2" disk meters.

2. Continuous flow not to exceed 50% of maximum design flow for all compound meters.

Fire Service - There are three categories of private fire services: 1) hydrants, 2) fire sprinkler lines, and 3) combination hydrant and fire sprinkler lines.

The water fire service line shall normally extend from the main to the property line and end with a vault, metering device and valves. An approved backflow prevention assembly will be required of the property being served.

The City shall install a flow meter and sensor (Data Industrial Series 1400 w/ 220 MB sensor or equal) on all fire lines with on-site fire hydrants. All costs for the installation shall be the responsibility of the property owner being served.

Firelines serving only fire sprinkler systems shall be metered by a detector meter on the approved backflow assembly.

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

Fire sprinkler systems for single family residences or rowhouse-type residences 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 Scappoose allowable flow for that particular size of service and meter.

Fire Vaults - A vault for a 3" and larger double check detector assembly will be required when a development provides fire sprinklers. The vault drawing will be included on construction drawings submitted to the City.

GENERAL DESIGN CRITERIA

FIRELINE/FIRE SPRINKLER SYSTEM SERVICES

SERVICE SIZE	METER SIZE	MAX. DESIGN FLOW (GPM)
1"	3/4"	24
1"	1"	40
2"	1 1/2"	80
2"	2"	128
4"	City Installed Flow Meter	400
6"	City Installed Flow Meter	900
8"	City Installed Flow Meter	1600
10"	City Installed Flow Meter	2500

Notes

1. Continuous flow not to exceed 30% of maximum design flow for 3/4" – 2" disk meters.
2. Continuous flow not to exceed 50% of maximum design flow for all compound meters.

4.0060 — SYSTEM TESTING

All new water systems (lines, valves, hydrants, and services) shall be individually pressure tested, chlorinated, and tested for bacteria. All testing shall be performed in accordance with the APWA and AWWA Specifications and in the presence of the Design Engineer or of a City inspector as determined by the City's Engineer.

No connection to the existing system shall be made until the new system has been tested and accepted.

4.0070 — WATER QUALITY SAMPLING STATIONS

Water sampling stations will be required and installed in all new subdivisions, or as directed by the City's Engineer. In general, install one station for every 20 lots (see Standard Detail Drawing No. 405).

SECTION: 5.0000 — STREETS

5.0010 — General Design Requirements

Performance Standards - All street designs shall provide for the safe and efficient travel to the motoring public. Streets shall be designed to carry the recommended traffic volumes identified for each street classification. Street classifications are set forth in the Scappoose Transportation System Plan, December 1997, as updated.

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

All vertical and horizontal curves shall meet the guidelines of the AASHTO Policy and the design speed for each street classification. Where practical, the Design Engineer shall provide the decision sight distance for the design speed based on the methodology in AASHTO Chapter IX, or the stopping sight distance based on the 85% speed as set forth in the AASHTO policy, whichever is greater. Only with the approval of the City Engineer shall a lesser sight distance be permitted.

5.0011 — Right-of-Way and Pavement Width

Right-of-way and pavement widths for each street classification shall be as follows:

	<u>Right-of-Way</u>	<u>Pavement Width</u>
Principal/Major Arterial	100'	74'
Minor Arterial	72'	44'
Major Collector	66'	44'
Minor Collector	60'	36'
Local: Residential	54'	32'
Local: Commercial & Industrial	54'	40'
Cul-de-sac	50'	32'a
Cul-de-sac Turnaround	55' radius	45' radius
Alley	20'	20'

- Notes: a. In the Sensitive Lands -- Slope Hazard Areas, right-of-way width may be 40' and pavement width may be 28' with approval of the City's Engineer
b. Right-of-way dedication at intersections shall be along the "long cord"

On streets with raised island medians, the minimum curb-to-curb pavement width shall be twenty feet (20') per travel direction.

For streets designated collector and below, the Planning Services Manager together with the City's Engineer may consider design modifications to conserve major trees in the public right-of-way. Pavement width on a collector street may be reduced to no less than thirty-two feet (32').

5.0012 — Access

All development shall be provided public street access. Access roads (public and/or private), driveways, and easements shall be as set forth in other sections of these Design Standards.

5.0013 — Traffic Analysis

The City's Engineer will require a traffic analysis report as determined by the type of development and its potential impact to existing street systems. A traffic analysis will generally be

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

The report will be prepared by a traffic engineer licensed in the State of Oregon. At a minimum, the report shall contain the following:

1. Purpose of Report and Study Objectives

A discussion of key traffic issues to be addressed and the transportation system and development objectives related to a specific development.

General transportation system objectives are:

- to maintain easy and safe traffic flow on surrounding street system;
- to provide effective and safe transfer of vehicle traffic between the site and the street system;
- to provide convenient, safe and efficient on-site and off-site movement of vehicles, pedestrians, transit, service and delivery vehicles, and bicycles;
- to effectively mitigate adverse site-generated traffic impacts on affected streets and intersections. Site-specific objectives may be established by the City for each study;
- to analyze accident history in study area and evaluate impacts of site-generated traffic.

2. Executive Summary

A concise summary of the study purpose/objectives, site location and study area, development description, key assumptions, findings, conclusions and recommendations.

3. Description of Site and Study Area Roadways

A description of the site and study area, existing traffic conditions and accident history in the study area, and anticipated nearby development and committed roadway improvements which would affect future traffic in the study area.

The study area will be defined by:

All roads, ramps, and intersections through which peak hour site traffic composes at least 5% of the existing capacity of an intersection approach, or roadway sections on which accident character or residential traffic character is expected to be significantly impacted.

4. On-site Traffic Evaluation

An evaluation of the proposed (and alternative) site access locations, the adequacy of access drive depth, driveway lanes, and queuing storage, the safety and efficiency of proposed vehicular circulation, parking layout, pedestrian and service vehicle routes/facilities, together with recommendations for on-site traffic markings and controls.

5. Offsite Traffic Analysis

The analysis shall include:

a. Existing daily and P.M. peak hour counts by traffic movements at intersections effected by generated traffic from the development (use traffic flow diagrams).

b. Projected daily and P.M. peak hour volumes for these same intersections and proposed access points when the development is in full service. (Use traffic flow diagrams)

c. A determination of the existing levels of service and projected levels of service at each intersection and access points studied.

d. A discussion of the need for traffic signals. This should include a traffic warrant computation based on the National Manual on Uniform Traffic Control Devices.

e. The recommendations made in the report should be specific, and should be based on a minimum level of service "D" with maximum volume to capacity (v/c) ratio of 0.90 when the development is in full service. As an example, if a traffic signal is recommended, the recommendation should include the type of traffic signal control and what movements should be signalized. If a storage lane for right turns or left turns is needed, the recommendation should include the amount of storage needed. If several intersections are involved for signalization and an interconnect system is considered, specific analysis should be made concerning progression of traffic between intersections. For stop-controlled intersections, a minimum level of service "E" shall be required on the minor approach. Level of service shall be based on the current edition of the TRB Highway Capacity Manual and the associated Highway Capacity Software. The manager may approve other methods.

f. The report should include a discussion of bike and pedestrian usage and the availability of mass transit to serve the development.

6. Recommendations for Public Improvements

Recommendations should be made for external roadway improvements, such as additional through lanes and turn lanes, and traffic control devices necessitated as a result of the development. Recommended improvements to transit facilities, and pedestrian and bike circulation should also be reported.

The recommendations should specify the time period within which improvements should be made, particularly if improvements are associated with a phased development, the estimated cost of improvements, and any monitoring of operating conditions and improvements that may be needed. If needed street improvements unrelated to the development are identified during the analysis, such improvements should be reported.

7. Access Management

On sites with arterial and collector street frontages, the report shall evaluate and recommend the use of access management plans or techniques:

to separate basic conflict areas (reduce number of driveways or increase spacing between driveways and intersections);

to remove turning vehicles or queues from the through lanes (reduce both the frequency and severity of conflicts by providing separate paths and storage area for turning vehicles and queues).

These techniques may include turn restrictions, striping, medians, frontage roads, channelization of lanes or driveways, shared driveways and access between similar uses, access consolidation, lanes for left or right turns, and other transportation system management (TSM) actions.

8. Technical Appendix

A technical appendix including worksheets, charts, and drawings to support findings described in the body of the report. Include computer diskette with all HCS input and output files matching that provided in the traffic analysis report. The files shall be clearly identified on the disc and cross-referenced in the appendix for easy reference.

5.0014 — Intersections

Connecting street intersections shall be located to provide for traffic flow, safety, and turning movements, as conditions warrant. Where signalized, design shall provide for optimal signal phasing. Consideration for arterial street progression, protected/permitted and permitted left turn phasing shall occur. New signal proposals in remote locations shall first include an evaluation of alternate applications such as Roundabouts.

Arterial Intersections: Exclusive left turn lanes will be provided; bus turnouts will be provided where appropriate; crosswalks will be provided at all approaches; street alignments across intersections shall be continuous.

Neighborhood Collector and Local Street Intersections: Street and intersection alignments should facilitate local circulation but avoid alignments that encourage non-local, through traffic.

Streets shall be aligned so as to intersect at right angles (90°). Angles of less than 70° will not be permitted. Intersection of more than two streets at one point will not be permitted.

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

For intersections, which are not directly aligned with street centerlines, the centerline spacing must meet the following minimum separation distance:

<u>Street Class</u>	<u>Intersection Spacing (Ft.)</u>
Principal/Major Arterial	500*
Minor Arterial	400*
Major Collector	300*
Minor Collector	150
Local/Cul-de-sac	100

*The City's Engineer may permit a minimum spacing of not less than 300 feet (Principal/Major Arterial), 200 feet (Minor Arterial), 200 feet (Collector), when findings are made to establish that:

1. Without the change, there could be no public street access from the parcel(s) to the existing street, or
2. The change is necessary to support local pedestrian, bicycle circulation and access, and
3. The change is necessary due to topographic constraints, and
4. All other provisions of the street design requirements can be met.

5.0015 — Substandard Street Construction

A. **Half-Street Construction** Half-street construction is generally not acceptable. Where such a street is justified, the right-of-way and pavement width will be approved by the City Engineer. In no case shall the pavement width required be less than that required to provide two lanes of traffic to pass at a safe distance. For a 32-foot local street, the half-street pavement width will be 20-feet. Half-streets will only be approved when the abutting or opposite frontage property is undeveloped and the full improvement will be provided with development of the abutting or opposite (upon right-of-way dedication) frontage property.

A development on an unimproved substandard street shall be responsible for constructing a continuous, 20' wide half street to a connection with the nearest publicly owned right-of-way.

In cases where an existing street is to be improved, the improvement shall be to at least the centerline of the street or 20' wide which ever is more.

B. **Private Access Way Construction** Development on an unimproved access way shall be responsible for constructing a continuous 12' wide pavement to the nearest publicly owned right-of-way. On a case-by-case basis, the City Engineer may approve the construction of 24" wide paved treads in-lieu of a 12' wide pavement.

5.0016 — Street Classification

All streets within the City shall be classified as listed in the Scappoose Transportation System Plan, December 1997, as updated. The classification for any street not listed shall be that determined by the Manager.

5.0017 — Design Speed

Design speeds for classified streets shall be as follows:

Principal/Major Arterial	35 - 45 mph
Minor Arterial	35 - 40 mph
Major Collector	25 - 30 mph
Minor Collector	25 mph
Local	25 mph
Cul-de-sac	25 mph
Public Alley	10 mph

* Where existing traffic conditions identify 85% speeds in excess of design speeds listed, then the 85% speed will be used for design purposes.

5.0020 — Horizontal/Vertical Curves, and Grades

5.0021 — Horizontal Curves

Horizontal curve radius (on centerline) for each street classification shall be designed according to the roadway design speed. The radius shall not be less than the following:

Principal/Major Arterial	600 - 750'
Minor Arterial	415 - 600'
Collector	165 - 275'
Neighborhood Collector	165'
Local: Queuing Street	165'
Local	100'
Cul-de-sac	100'
Public Alley	55'

In no case shall a horizontal radius of less than 55 feet be permitted on any public or private road or access way.

5.0022 — Vertical Curves

Vertical curve length shall be based on the design criteria which include: (1) design speed, (2) crest vertical curve, and (3) sag vertical curve. Stopping sight distance for crest and sag vertical curves shall be based on sight distance and headlight sight distance, respectively.

All vertical curves shall be parabolic and the length shall be computed for each location.

5.0023 — Grades

Maximum grades for each street classification shall be as follows:

Arterial	0.060 ft./ft.	(06%)
Major Collector	0.080 ft./ft.	(08%)
Minor Collector	0.100 ft./ft.	(10%)
Local/Cul-de-sac	0.120 ft./ft.	(12%)
Local Residential	0.120 ft./ft.	(12%)
Local Commercial & Industrial	0.120 ft./ft.	(12%) (no exceptions)
Public Alley	0.120 ft./ft.	(12%) (no exceptions)

Local and cul-de-sac streets may exceed 12%, but in no case shall they exceed 15%. The City's Engineer may approve a grade greater than 12% when all of the following conditions exist:

1. Topographic constraints do not allow the development to be served by a street with a maximum grade of 12% without causing destabilization of soils by excessive cuts and fills.
2. There is no practical access to the property being developed through adjacent properties at a maximum 12% grade.
3. The section of Local Street will not exceed a combination of length, horizontal alignment, and/or grades exceeding 12% which will create hazardous traffic conditions.
4. In no case shall the maximum street grade exceed 15%.

Minimum grade for all streets shall be 0.0050 feet per foot (0.50%) however, in all cases street grades shall allow for proper and adequate drainage. Cul-de-sac "bulbs" shall have a minimum slope of 0.0060 feet per foot (0.60%).

5.0030 — Pavement Design

In general, all streets shall be constructed with asphaltic concrete (AC) or Portland Cement Concrete (PCC).

The Engineer will provide a street structural design section for all streets.

DESIGN CRITERIA

- **Street Pavements** -- The street pavement sections shown in the Standard Detail Drawings are typical: full-depth asphalt concrete, asphalt concrete with crushed rock base, Asphalt Concrete with treated base, and Portland Cement Concrete. Treated sub grades in the pavement section are also acceptable.
- **Soil Tests** -- Conduct two soil tests for projects that have 500 feet or less of new street. An

additional soil test is required for each additional 500-foot section. For all pavements, determine the California Bearing Ratio (CBR) within the top 2 feet of the proposed subgrade elevation.

- **Design Life** -- 50 years.
- **Design Procedure - Asphalt Pavements** -- The design procedures contained in the following references are preferred. (See the **References** section for full citations.)

AASHTO Guide for Design of Pavement Structures, 1986. American Association of State Highway and Transportation Officials (as updated).

Thickness Design - Asphalt Pavements for Highways and Streets. The Asphalt Institute, September 1991 (MS-1) (as updated).

- **Design Procedure – Portland Cement Concrete Pavements** -- The design procedures contained in the following references are preferred. (See the **References** section for full citations.)

AASHTO Guide for Design of Pavement Structures, 1986 (as updated).

Thickness Design for Concrete Highway and Street Pavements. Portland Cement Association, 1984 (as updated).

- **Minimum Thickness** -- The minimum thickness designs specified in the standard details are only a point of reference. All projects are subject to a specific thickness design based upon existing soil conditions, the projected 20-year traffic volume, and an expected 50-year life.
- **Local Streets, Asphalt Pavement** -- Specify Type "C" surface course with a minimum thickness of 1.5 inches. Specify the base course of asphalt concrete as Type "B" with a minimum thickness of 1.5 inches.
- **Arterials and Collectors, Asphalt Pavement** -- Specify Type "B" wearing surface with a minimum thickness of 1.5 inches. Specify the base course of asphalt concrete as Type "B" with the appropriate calculated design thickness.
- **Treated Base Materials** -- For asphalt pavement sections that include either a cement treated base (CTB) or an asphalt treated base (ATB), specify a finish surface pavement of not less than 3 inches of asphalt concrete.

5.0040 — Concrete Curb

All street improvements will be constructed with Monolithic Curb and Gutter. Standard Curb, as shown in the Standard Drawings, may only be used when the cross slope of roadway drains away from curb such as with raised median construction. Curb exposure for Standard Curb is seven (7) inches and nine (9) inches at catch inlets. Curb exposure for monolithic curb and gutter shall be six (6) inches and eight (8) inches at catch inlets. Joint spacing in curbs shall be 15-foot maximum for contraction joints. In addition, expansion joints shall be located at all curb return points and at driveway curb-drop transition points.

A minimum of two drainage block-outs to accommodate 3" drain pipe shall be provided for each lot. These block-outs shall be located five feet (5') from each side of property line.

Section 5.0041 — Curb Return Radius

Curb return radius at street intersections shall be designed to accommodate all expected traffic. Curb extensions and/or special crosswalk/sidewalk features designed to enhance pedestrian safety may be required to encourage pedestrian usage. Minimum curb radius required shall be as follows:

<u>Intersection</u>	<u>Radius</u>
Local/ with Minor Collector or Local	20'
Local/ with Major Collector or Arterial	30'
Minor Collector with Collector or Arterial	30'
Collector/Arterial with Collector/Arterial	30'

Streets serving commercial/industrial properties may be required to install larger curb radius as required for vehicle movements.

5.0042 — Parking

<u>Street Class</u>	<u>Parking Lanes</u>	<u>Parking Required</u>
Principal/Major Arterial	None	May be allowed in some areas
Minor Arterial	None	May be allowed in some areas
Major Collector	2	Variable (1) (2)
Minor Collector	2	Yes
Local: Residential	2	Yes (3) (4)
Local: Commercial & Industrial	2	Yes (3)
Cul-de-sac	2	Yes (5)
Public Alley	None	Not Allowed (6)

1. Where bike lanes exist on collectors, parking may be prohibited.
2. Collector - No parking within 45' of curb return.
3. Local - No parking within 30' of curb return.

4. Local Streets in the Sensitive Lands -- Slope Hazard Areas, which are approved for reduced 40 feet right-of-way and 28 feet pavement, will be required to have one parking lane; to assure that on-street parking is adequate for adjacent uses, a reduced street design will consider clustered parking bays adjacent to the street, if needed.

5. Cul-de-sac - No parking allowed within the 35' radius cul-de-sac turnaround.

For streets designated collector and below, the City's Engineer may consider design modifications to conserve major trees in the public right-of-way. Subject to approval by the Community Development Director, parking lanes may be removed on one or on both sides of a street.

5.0050 — Sidewalks

In general, new sidewalks with curbs are required for all development requiring a development permit. Sidewalks on Arterial Streets shall be buffered from the roadway to provide for the safety and comfort of pedestrians. Where planter strips are required, sidewalks shall be six (6) inches off the right-of-way line (except cul-de-sacs). Where no planter strips are required, sidewalks shall abut curbs.

MINIMUM SIDEWALK WIDTH:

<u>Street Class/Location</u>	<u>Curb Tite</u>	<u>6" Off R/W</u>	[Notes]
Arterial:		6'	All uses
Collector: Major	6'		
Minor	6'		
Local: Residential	5'		40' R/W - Residential Hillside
Commercial & Industrial	6'		
Public Alley			No sidewalk required
Cul-de-sac:	5'		Residential
	5'		40' R/W - Residential Hillside
	6'		Constraint
			Commercial/Industrial
Bus Stop	8'		

Sidewalks may meander within the dedicated right-of-way or outside of the right-of-way within an easement with the approval of the City's Engineer.

Sidewalks shall have a maximum slope 1:12 and a cross slope no greater than 1:50. Where steeply sloped roadways and constrained right-of-way precludes a running slope of 1:12, the least possible running slope shall be provided. Sidewalks shall be constructed with a continuous passage of 5' clear of all obstructions, including poles, mailboxes, sign-posts, etc. With City Engineer's approval, utilities with facilities in the sidewalk may locate their facilities to be in conformance with a 36" minimum horizontal clearance. A 7' vertical clearance above the sidewalk shall be maintained.

Include handrails or fences to protect pedestrians when there is a vertical drop of 6" or greater at back of sidewalk.

5.0051 — Sidewalk Ramps

All intersections shall contain 2 sidewalk ramps per corner. In retrofit areas, one ramp may be located at the midpoint of the curb return with approval by the City's Engineer. Sidewalk ramps shall meet all applicable guidelines of the Americans with Disabilities Act (ADA).

Locations of sidewalk ramps shall be designed with regard to storm water flows, street grades, and pole locations. Other factors may also dictate sidewalk ramp location.

See Standard Detail Drawing No. **514** for additional details.

5.0060 — Bikeways

The City has adopted the Scappoose Transportation System Plan, December 1997, which includes a Bicycle/Pedestrian Plan. This plan summarizes the City's policy and implementation strategies for bikeways within the City. The City will use both AASHTO and ODOT standards and criteria as the minimum guidelines for bikeway design, construction, and control.

The guidelines for bikeways consist of the following:

1. AASHTO, "Guide to Development of Bicycle Facilities," latest edition.
2. ODOT, "Oregon Bicycle & Pedestrian Plan", latest edition.

3. Manual on Uniform Traffic Control Devices with Oregon supplements by Oregon Transportation Commission, latest edition.

Section 5.0061 — Bikeway Location, Width

<u>Bikeway Location</u>	<u>Width</u>	<u>Comments</u>
Public Street (designated bike lane)	6 ^{1**}	Each direction of travel at shoulder/curb
Public Street (non-designated bike lane)	13' 14'	One way pavement width – minimum One way pavement desirable
Off-street Bicycle Path	5 [*]	One-way travel
Off-street Bicycle Path	8' - 10 ^{1*}	Two-way travel
Off-street Bicycle Path (shared with pedestrians)	12 ^{1*}	Two-way travel
Off-street Bicycle Path (shared with pedestrians)	7 [*]	One-way travel

* Paths are constructed with 2' gravel shoulders on both sides.

** A six-foot section is required unless this width is not practical because of physical or economic constraints. A minimum width of four feet may be designated as a bicycle lane.

5.0062 — Design Criteria

In general, bikeway design shall meet the adopted standards referred to in Section 5.0060.

All bikeways shall have a minimum cross-slope of two percent (2%) and a maximum cross-slope of five percent (5%).

Bikeway curvature will be based on a minimum design speed of 20 MPH.

Bikeway grades shall be limited to a maximum of five percent (5%). Where topography dictates, grades over five percent (5%) are acceptable when a higher design speed is used and additional width is provided.

5.0063 — Construction

Off-street bikeways shall be constructed for two different situations where limited maintenance vehicle (City-owned) use will occur, and where heavy maintenance vehicle use will occur. In both cases, subgrade preparation will require removal of existing organic material and compaction.

<u>Bikeway Thickness</u>		
<u>Use</u>	<u>Asphalt</u>	<u>Aggregate</u>
Limited	4"	6"
Heavy	6"	8"

Bikeway Thickness		
Use	Portland Cement Concrete	Aggregate
Limited	4"	6
Heavy	6"	8

When drainage such as side ditches is required parallel with the bikeway, the ditch centerline shall be at least five feet (5') from the edge of the pavement. Ditch side slope adjacent to the bikeway shall be no steeper than 2:1 when measuring the horizontal distance to the vertical distance.

When culverts cross bikeways, the ends of the pipe shall be no closer than five feet (5') from the edge of the bikeway.

5.0070 — Driveways

Access to private property shall be permitted with the use of driveway curb cuts. The access points with the street shall be the minimum necessary to provide access while not inhibiting the safe circulation and carrying capacity of the street. Driveways shall meet all applicable guidelines of the Americans With Disabilities Act (ADA).

Access to and from off-street parking areas shall not permit backing onto a public street, except for single-family dwellings.

Curb cuts, including wings, cannot encroach on the clearance of a utility pole or fire hydrant. There must be sufficient clearance on each side of a pole or hydrant, as determined by the City Engineer.

No driveway shall traverse a slope greater than (14) percent, at any point along the driveway length.

On arterial and collector streets and above, one driveway per site frontage will be the normal maximum number. Double frontage lots and corner lots on these streets may be limited to access from a single street, usually the lower classification street. If additional driveways are approved by the City's Engineer, a finding shall be made that no eminent traffic hazard would result and impacts on through traffic would be minimal. 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. Commercial developments with frontage greater than 250 feet may request an additional driveway if needed.

TABLE 5-1

Driveway Widths (Minimum/Maximum, Ft.)

Street Classification	Res.	Comm.	Ind.
Principal/Major Arterial:	NA (1)	12/36	12/36
Minor Arterial:	12/24 (2)	12/36	12/36
Major Collector:	12/24 (2)	12/36	12/36
Minor Collector:	12/24 (2)	12/36	12/36
Local:	12/24 (2)	12/36	12/36

Cul-de-sac:	12/24 (2)	12/36	12/36
Public Alley	12/24 (2)	NA	NA

Res. = Residential Zone
Comm. = Commercial Zone
Ind. = Industrial Zone

Notes: (1) Special conditions may warrant access.
(2) 28' maximum with 3-car garage.

TABLE 5-2

Minimum Driveway Spacing to intersecting R-O-W*

Street Classification	Residential	Commercial	Industrial
Principal/Major Arterial (2)	100' (1)	100' (1)	100' (1)
Minor Arterial (2)	100' (1)	100' (1)	100' (1)
Major Collector (2)	45' (1)	100' (1)	100' (1)
Minor Collector (2)	45' (1)	100' (1)	100' (1)
Local (all)	45' (1)	45'	45'
Cul-de-sac	45' (1)	45'	45'
Public Alley	45' (1)		

Notes: (1) Minimum distance or no closer than 60% of parcel frontage unless this prohibits access to the site, in which case City Engineer may approve a deviation.

(2) Direct access to this street will not be allowed if an alternative exists or is planned.

* Driveways shall not be constructed within the curb return of a street intersection.

Curb cuts shall be a minimum of five feet from the property line, unless a shared driveway is installed. Deviation may be approved by the City Engineer.

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

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

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

5.0080 — Street Lighting, Trees, Names and Signage

5.0081 — Street Lighting

A complete street lighting system shall be the responsibility of new development. All streets fronting the property shall be provided adequate lighting as determined by the City. For lighting

requirements, all developments will be required to submit a lighting plan to the City's Engineer. The lighting plan shall conform to IES (Illuminating Engineering Society) standards.

Street lights shall conform to Standard Drawings # 527, 528, 529, 530, and 532. Infill development utilizing existing utility poles will use Standard Drawing # 529.

5.0082 — Street Trees See Scappoose Development Code, Chapter 17.104.

5.0083 — Street Names and Traffic Control Signage and Striping

Street names for all new development will be approved by the City and Fire Chief prior to recording of any maps or plats. The development shall install or pay for all street name and traffic control signage prior to the signing of the final plat or map by the City. A “signage and striping plan” shall be included with plan submittals for new street construction.

Street names and building numbers shall conform with the established grid system(s) in the City and metropolitan area. No new street name shall be used which will duplicate or be confused with the name of existing streets in the metropolitan area.

5.0090 — Permanent Dead-end Streets

A standard cul-de-sac turnaround shall be provided at the end of a permanent dead-end street that does not provide looped circulation. Permanent dead-end streets shall be limited to serving no more than twenty-five dwellings and shall not exceed six hundred feet in length from the point of the nearest centerline/centerline intersection.

A permanent dead-end street is measured from the right-of-way line at the nearest intersecting street which has at least two points of access, to the right-of way line at the furthest end of the dead-end street.

5.0100 — Alleyways and Private Residential Streets/Accessways

5.0101 — Alleyways

Alleyways - Commercial and Industrial:

Alleyways may be provided in commercial and industrial developments with approval by the City’s Engineer and Planning Services Manager. When approved, alleyways shall be dedicated to the City. The right-of-way width shall be 20 feet with a 20-foot pavement width.

Design for alleyways shall meet the same criteria as other public streets. The exception to those criteria may be centerline radius and design speed. Generally, alleyways shall be designed for one-way operation.

Alleys - Residential Districts:

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

1. **Limits:** Alleys must be constructed continuously from one street to a parallel or intersecting street. All lots must have frontage to a public street. If there are parking restrictions on the public street, additional parking spaces must be provided off of the alley.

2. **Pavements:** The standard design for residential district alleys shall consist of 20’ of pavement within a 20’ right-of-way. Pavement shall drain to the center with an inverted crown.

5.0102 — Private Residential Accessways

In general, private residential streets and accessways shall be provided for multi-family developments such as condominiums and apartments. The standards for private residential accessways include:

1. Dead-end accessways shall not exceed 600 feet in length nor serve more than 25 dwelling units. Dead-end access ways, which exceed 150 feet in length, shall be provided with an approved fire turnaround.

2. "PRIVATE STREET" signage and driveway approach shall be placed at the intersection with the public street to clearly identify the private accessway.

3. Private maintenance of the private streets/access ways shall be provided by a Homeowner's Association or other appropriate entity. Maintenance shall insure continual emergency access at all times.

4. Location of private accessways shall meet the Uniform Fire Code and meet the minimum depth pavement section of local residential streets except they may use an inverted crown.

5. Private residential accessways shall not be allowed in Manufactured Home Subdivisions.

5.0110 — Local Street Design for Adverse Topography

Local streets shall have a cross-section slope of 2.5% ("crown") in accordance with Standard Drawing No. 500, except in situations of adverse topography. The Design Engineer may utilize an "offset" or unequal crown section when the existing ground slope exceeds 8.00% across the roadway section.

The offset crown design shall meet the following conditions:

1. Minimum distance from "crown" to (one) face of curb is 10.00 feet.
2. Maximum cross-slope of pavement is 5.00%.
3. Maximum differential in top of curb elevation from one side to the other is 1.00 foot.

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