

City of West Linn

Public Works Design Standards

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SECTION ONE – GENERAL REQUIREMENTS

1.0000 GENERAL

1.0010 Authority and Purpose

- A. The City of West Linn's Public Works Design Standards will establish and provide specific, technical direction for the design and construction of all streets and associated utility projects. This manual has been developed in response to the City Council's desire to have design and construction standards. The City Council is, through the adoption of these standards, endorsing a comprehensive set of design and construction practices that are designed to deliver high quality improvements to the citizens of West Linn.
- B. Public works improvements are conditioned through the development review process, this Ordinance, other ordinances, and other City policies adopted by the City Council or the Public Works Director. No street, bridge, or utility construction shall commence prior to the City approval of the construction plans. Designs submitted shall be stamped by a Registered Professional Engineer licensed to practice in the state of Oregon.
- C. The purpose of these Design Standards is to provide a consistent policy under which certain physical aspects of public facility design will 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 under private contract designated herein.
- D. 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.
- E. The Design Standards are also not intended to unreasonably limit any innovative or creative effort, which could result in better quality, better cost savings, and/or better life cycles. 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 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

- A. It shall be the policy of the City of West Linn to require compliance with ORS 672 for professional engineers.
- B. 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. This engineer is designated by these Standards to be the Design Engineer. It shall be the Design 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.
- C. 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 Design 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 public and privately financed public facilities in the City of West Linn and applicable work within its service areas.

1.0040 Conflicting Codes

Where these Design Standards conflict with other applicable codes, follow these Design Standards or as directed by City Engineer.

1.0050 Standard Specifications

All construction design detail, workmanship, and materials shall be in accordance with the current edition of the Oregon Department of Transportation (ODOT) Oregon Standard Specifications for Construction and Standard Drawings and Details, except as otherwise provided by these City Design Standards (including the City Standard Drawings and Details).

1.0060 Approval of Alternate Materials or Methods

- A. Any substitution material or alternate method not explicitly approved herein will be considered for approval as set forth in **Subsection 1.0010, Authority and Purpose**. Persons seeking such approvals shall make an application in writing. Approval of any major deviation from these Design Standards will be in written form. Approval of minor matters will be made in writing if requested.
- B. Any alternate must meet or exceed the minimum requirements set in these Design Standards.
- C. The written application shall include, but is not limited to, the manufacturer's specifications and testing results, design drawings, calculations, and other pertinent information.
- D. Any deviations or special problems shall be reviewed on a case-by-case basis and approved by the City Engineer. When requested by the City, full design calculations shall be submitted for review with the request for approval.

1.0070 Special Design Problems

- A. Special applications not covered in these Design Standards require review and approval by the City Engineer. Submittal of full design calculations, supplemental drawings, and information will be required prior to any approval.
- B. Such applications which may require special review and approval are among, but not limited to, the following list.

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	Storm Sewer

1.0080 Revisions to Design Standards

- A. 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.
- B. 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.

1.0090 Definitions

ADA – Americans with Disabilities Act

Alley - A public access easement or right-of-way not more than 20 ft. and not less than 12 ft. in width, which intersects with a public street. A street primarily intended to provide secondary access to another street or side of lots or buildings not intended for normal through vehicular traffic. An alley shall have a minimum 20 ft. turning radius.

Approved Backflow Prevention Device - A backflow prevention device 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.

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

AASHTO - American Association of State Highway and Transportation Officials.

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 device 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 delineated travelway for bicyclists which is established within the roadway directly adjacent to the outside vehicular lane or on the shoulder.

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

Building Service Lateral - A private sanitary sewer beginning at the sewer main and extending to a building.

Building Sewer - A private sanitary sewer from a building to the sewer main.

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

CBE - Crushed based equivalent (CBE) is the number that directly relates the traffic coefficient to the number of inches of rock.

City - The City of West Linn, Oregon.

City Street - A city street is a street that is maintained by the City. A private street is not maintained by the City, but is designed and constructed to the same standards as a City and temporary street.

City Engineer - The individual designated by the City Manager to have the authority for review and approval of all public works construction or his approved representative.

Collection Systems - Facilities maintained by the City of West Linn 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.

Community Development Code - The official document of West Linn designed to set forth the standards and procedures governing development and use of land in West Linn and to implement the Comprehensive Plan.

Comprehensive Plan - The official document of West Linn that includes goals and policies that direct how West Linn will develop. It may also include action measures or strategies for implementing the goals and policies. The

comprehensive plan is adopted by ordinance, and thus has the force of law and is the basis for the Community Development Code.

Constructed Wetlands - Those wetlands developed as a water quality or quantity facility, subject to change and maintenance as such and which are defined and/or separated from naturally occurring or created wetlands.

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

Created Wetlands - Those wetlands developed in an area previously identified as non-wetland to replace or mitigate wetland destruction or displacement and which are regulated and managed the same as a natural wetland.

Cross Connection - Any actual or potential physical connection between a potable waterline and any pipe or vessel containing a non-potable or potable (e.g., 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.

Culvert - A storm conduit open on both ends.

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

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.

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.

Dedication - The legal conveyance of land, typically from a private property owner to the City.

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 Engineer. Similarly, the words "approved", "acceptable", or "satisfactory", shall mean approved by, acceptable to, or satisfactory to the City Engineer.

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

Detention - The holding of run-off for a designed period of time and then releasing it to the natural water course.

Development - Any man-made change defined as the construction of buildings or other structures, mining, dredging, paving, filling, grading or site clearing, and grubbing in amounts greater than 10 cubic yards on any lot or excavation. Development does not include:

1. Stream enhancement or restoration projects approved by the City
2. Farming practices as defined in ORS 30.930 and farm use as defined in ORS 215.203, except that buildings associated with farm uses are subject to the requirements of Metro's Title 3
3. Construction on lots in subdivisions meeting the criteria of ORS 92.040(2).

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 a 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.

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

Easement (Private) - An area on a parcel that benefits other parcel(s) by granting special uses.

Design 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.

Erosion Prevention and Sediment Control - Measures that are required for construction sites where the ground surface will be disturbed with clearing, grading, fills, excavations, and other construction activities, in order to prevent and/or control eroded material and sediment from leaving the construction site and entering the City storm system and/or a water quality resource area.

Erosion Control, Post Construction - The re-establishment of groundcover or landscaping prior to the removal of temporary erosion control measures.

Erosion, Visible or Measurable - Includes, but is not limited to: deposits of mud, dirt, sediment, or similar material, exceeding 1/2 cu. ft. in volume on public or private streets, adjacent property, or into the storm and surface water system, either by direct deposit, dropping discharge, or as a result of the action of erosion.

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 from a watermain to a hydrant.

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.

Flood or Flooding - A general and temporary condition of partial or complete inundation or normally dry land areas from the overflow of inland or tidal waters, and/or the unusual and rapid accumulation of runoff of surface waters from any source.

French Drain or Leach Line - A covered underground excavated trench filled with washed gravel that surrounds a perforated pipe.

GIS - A geographic information system (GIS) is a framework for gathering, managing, and analyzing spatially reference information. Data in a GIS include layers that can be mapped, that are linked to tables and spreadsheet.

Grade - The degree of inclination of a road or hillside.

Impervious Areas - Those hard surface areas located upon real property which either prevent or retard saturation 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 pre-existent to development.

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

Industrial Street - A street which functions primarily to provide access to local abutting industrial land and is designed to accommodate industrial traffic.

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

Intersection - The area formed by two or more streets intersecting. This area is defined by the intersection of right-of-way lines. For design purposes, an intersection is not formed by naming two approaches of a continuous street on a curve or some other point with different street names.

Irrigation Service - A metered connection intended for seasonal use and delivering water, 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. Through-traffic movement is deliberately discouraged on local residential streets.

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

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

MUTCD - Manual on Uniform Traffic Control Devices, current edition.

Natural Drainageway - A natural depression which collects drainage of surface water. It may be permanently or temporarily inundated.

Natural Grade - The grade of the land in an undisturbed state.

Natural Resource - A functioning natural system such as a wetland or stream.

Natural Resource Area - The land containing the natural resources to be protected.

On-Site Detention - The storage of excess run-off on a development site prior to its entry into a public storm drain system. Stored run-off is gradually released after the peak of the run-off has passed.

Owner - The owner of record of real property as shown on the latest tax rolls or deed records of the county or 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.

Person - Individual firm, corporation, association, agency, or other entity.

Peak Run-off - The maximum water run-off rate (cfs) determined for the design storm.

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 Engineer, which show the location, character, dimensions, and details for the work to be done, and which 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 which cannot legally be further divided.

Private Storm Drain - A storm drain located on private property serving one or more structures or inlets and is not owned or maintained by the City.

PROWAG - Public Right-of-Way Accessibility Guidelines. More information here: <https://www.access-board.gov/prowag/>

Public Sanitary Sewer - Sanitary main 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.

Redevelopment - Any development outside of the public right-of-way that requires demolition or complete removal of existing structures or impervious surfaces at a site and replacement with new impervious surfaces. Maintenance activities such as top-layer grinding, repaving (where all pavement is not removed), and reroofing are not considered to be redevelopment. Interior remodeling projects and tenant improvements are also not considered to be redevelopment. Utility trenches in streets are not considered to be redevelopment unless more than 50% of the street width is removed and repaved.

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.

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.

Riparian Areas - Lands which are adjacent to rivers, streams, lakes, ponds, and other water bodies. They are transitional between aquatic and upland zones, and may contain elements of both ecosystems. They may have high water tables because of their close proximity to aquatic systems, soils which are usually largely of water-carried sediments, and some vegetation that requires free (unbound) water or conditions that are more moist than normal.

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

Sedimentation - Deposition of debris and soil.

Sewage - Water-carried wastes from residences, business buildings, institutions, and industrial establishments, except industrial wastes.

Shared Roadway - A roadway where bicyclists and motorists share the same travel lanes. These are provided where bike lanes may be warranted, but there is inadequate width to provide them.

Sidewalk - A walkway 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.

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

Siltation - Deposition of (silt) fine textured waterborne sedimentation.

Standard Drawings - The drawings of structures or devices commonly used on public improvements and referred to on construction plans contained in the **West Linn Public Works Standard Construction Specifications**.

Stream - A body of running water moving over the earth's surface in a channel or bed, such as a creek, rivulet, or river. It flows at least part of the year, including perennial and intermittent streams. It is dynamic in nature and its structure is maintained through a build-up and loss of sediment.

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

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 - Sloping of a road cross-section to improve drivability around a curve or spiral.

Transition Area - The land adjacent to a natural resource area that constitutes a buffer to protect the resource from conflicting development and activities.

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

Traffic Coefficient - A number used in determining the structural section of a street.

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

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 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 pipelines, pumping stations, reservoirs, valves, and ancillary equipment used to transmit water from a supply source through a service meter.

Water Main - A water supply pipe for public use.

Water Service Line - The pipe connection from the City water main to the users' water meter, hydrant, backflow prevention device, or fire sprinkler double check valve.

Wetlands - Those lands adjacent to watercourses or isolated therefrom which may normally or periodically be inundated or saturated 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 and under normal circumstances support a prevalence of vegetation typically adapted for a life in saturated soil conditions.

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 Engineer for review. Submittal requirements consist of design plans (where required), drainage calculations and other information as necessary. Conditions of approval from the Development Plan Review process, or as specified by the City Council, the Planning Commission, Hearings Officer or the Planning Director shall be shown on the design plans.

1.2020 Plan Preparation

Construction plans and specifications shall be prepared as specified in **Subsection 1.2021, Sheet Size** through **Subsection 1.2034, Detail Sheets**, 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 22 in. x 34 in. or 24 in. x 36 in. size sheets. Sheets shall have a 1-1/2 in. clear margin on the left edge and a 1/2 in. margin on all other edges.

1.2022 Scale of Plans

When plans are prepared for developer financed projects, the scale of drawings shall be as follows.

1. Horizontal scales shall be 1 in. = 10 ft., 20 ft., 30 ft., 40 ft., or 50 ft., vertical scales shall be 1 in. = 2 ft., 4 ft., 5 ft., or 10 ft. For subdivision plans it is preferred that all plan views and profile views of the plan set are drawn at a common scale, if more than one scale is necessary, the difference should be large enough to be noticeable (e.g. 1 in. = 20 ft. & 1 in. = 50 ft.). When a scale is used which is smaller than 1 in. = 20 ft. (e.g. 1 in. = 40 ft.) intersection details showing fittings and valves shall be provided at a larger scale.
2. Architectural scales (e.g., 1/4 in. = 1 ft. 0 in.) are not permitted unless approved.
3. Letter size shall not be smaller than 0.10 in.

1.2030 Required Sheets

- A. Construction plan submittals shall contain the following minimum sheets: title sheet (unless not required by the City Engineer) plan and profile sheet(s), and detail sheet(s). A title block shall appear on each sheet of the plan set and shall be placed on the lower right-hand corner of the sheet, across the bottom edge of the sheet or across the right-hand edge of the sheet. The title block shall include the names of the project, the engineering firm, the owner, the sheet title, and page number.
- B. The seal and signature of the Design Engineer responsible for preparation of the plans shall appear on each sheet as well as the Design Engineer's phone number.
- C. The description and date of all revisions to the plans shall be shown on each sheet affected, and shall be approved and dated by the Design Engineer as evidenced by signature or initial.

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:

- 1. Site plan of entire project with street right-of-way and/or subdivision layout at a 1 in. = 100 ft. scale. A 1 in. = 200 ft. 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.
- 2. Vicinity map at a 1 in. = 1000 ft. scale or greater. Map shall show the location of the project in respect to the nearest major street intersection.
- 3. Index of sheets.
- 4. Complete legend of symbols used.
- 5. General and construction notes pertinent to project, space permitting. If space does not permit a separate note page shall be used.
- 6. Temporary and/or permanent benchmarks used along with their descriptions, elevations of benchmark, and datum.
- 7. Design Engineer's name, address, phone number, and seal.
- 8. Developer's/owner's name, address, and phone number for public improvements with private financing.
- 9. Statement referencing City of West Linn Public Works Standard Construction Specifications.
- 10. Provide contact phone number for all affected utility companies.
- 11. Show tax lot numbers or lot and block designations.
- 12. Conditions of approval.

1.2032 Plan Sheet

The plan view of each sheet shall be drawn at the appropriate scale showing the following minimum information:

- 1. 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.

2. Location of all underground utilities within 100 ft. 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.
3. Location of all water courses, railroad crossings, culverts, bridges, large water transmission pipes and gravity sewers, and/or storm drains within 200 ft. of proposed gravity sewer and storm drain extensions if they affect the design of the project. All water courses shall show the 100-year flood plain as indicated on the U.S. Army Corps of Engineers and Federal Emergency Management Agency (FEMA) maps.
4. 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 separate line shall be separately designated (e.g., sewer line 'A', storm line 'A', etc.).
5. 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.
6. Where streets are being widened, edge of pavement elevations shall be shown to determine pavement cross-slope to new curb or pavement edge.
7. On water plans, show all fittings and valves and identify by type (e.g., MJ x MJ, FLG x MJ, etc.); fire hydrants; intersection details for valves and fittings (required when scale of plans is smaller than 1 in. = 20 ft., e.g., 1 in. = 40 ft.). Design Engineer shall submit table on the plans stating the required restraint distance out from each side of a bend in the waterline. The calculation for required restrained pipeline length necessary for the thrust force to be fully dissipated to the soil shall use pipe diameter, bend angle, bend orientation (vertical or horizontal), maximum anticipated internal pressure (200psi typical), depth of cover (3 ft. typical), safety factor of 3:1, soil type, whether polyethylene encasement is required, trench construction type and manufacturer of restrain (e.g. EBAA Iron Field Lok®). The parameters used in the calculation shall be called out on the plans and shall provide a small detail showing how restraint length is measured.
8. On all plans, show stubouts and blockouts for future developments.
9. On grading plans, show all existing and future contours within 50 feet of the project, including those on adjacent properties. Show buildable lot area and future finished floor and finished garage elevations.

1.2033 Profile Sheet

- A. 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. The following minimum information shall be shown:
 1. For sewers and storm drains, show locations of manholes, catch basins, and cleanouts, with each numbered and stationed as indicated in **Subsection 1.2032.4, Plan Sheet**.
 2. Existing profile at centerline of proposed utility or street. Profiles at the right-of-way lines will be required if grade differences are significant.
 3. 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.. Extension of the profile of streets for future extensions (stub streets), will be extended at least 200 ft. for local streets or as required by the City Engineer.
 4. Existing underground utilities that cross the alignment of the proposed facility.

5. 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 250 ft. beyond the end of the improvement.
 6. Clearly show all potential conflicts with existing public and private utilities (i.e., pipes, conduits, vaults, cathodic protection systems, etc.) that impact proposed design.
 7. Profiles for ditch and creek flowlines shall extend a minimum of 200 ft. beyond the project, both upstream and downstream. Typical cross-sections at 50 ft. intervals shall also be submitted.
- B. City of West Linn as-builts are only to be used as an aid to the engineer. When a potential conflict may occur, the Design 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

Detail drawings shall be included with all construction plans, including applicable City of West Linn Standard Drawings and/or ODOT Standard Drawings and Details. If a Standard Drawing 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. When Standard Drawings are used, a reference to the specific Standard Drawing number shall be made on the title sheet.

1.2040 Supporting Information

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

1. Design calculations.
2. Hydrology and hydraulic calculations with basin maps.
3. Alternate materials specifications including manufacturer's design application recommendation.
4. Grading plan support information to include as appropriate:
5. Soils classification report
6. Hydrology Report
7. Geotechnical Engineer's report

1.2041 Facility Plan

- A. When designing sanitary or storm sewer facilities, a facility plan shall be submitted with the construction plans when required by the City Engineer. This plan shall be used to identify and analyze the proposed extension of facilities. The topographic plan shall show all upstream and tributary areas within no less than 200 ft. of the proposed development.
- B. The plan shall include existing contours at 2 ft. intervals, or as approved by the City, including location of existing structures and public and private utilities.

1.2042 Erosion Control Plan

- A. The erosion control plan shall address the measures as required by Chapter 31 of the Community Development Code and the Erosion Prevention and Sediment Control Plans, Technical Guidance Handbook (ECTGH) (Clackamas County Department of Utilities, 1994). Construction projects beginning prior to May 1 or those projects anticipating construction activity between November 1 and April 30 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.

- B. The plan shall include existing contours at 2 ft. intervals, 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 Franchise Utility Plans

- A. Franchise utility company plans, including, but not limited to: telephone, natural gas, power and cable television shall be submitted to and approved by the City Engineer prior to any construction of these utilities.
- B. Franchised utilities shall be located outside of the paved roadway to avoid future street cuts. Underground utilities that must cross an existing paved street shall not be installed by any method that cuts the pavement, unless approved by the City Engineer.
- C. Underground utilities shall be buried to a minimum depth of 36 in. as measured from finish grade to top of utility.

1.2050 Plan Submittal and Review Procedures

- A. Construction plans for all privately financed public works facility improvements shall be submitted to the City Engineer. The City Engineer will coordinate the plan review and approval of all construction plans which will include review for compliance with all West Linn Public Works Standard Construction Specifications, the West Linn Community Development Code, Municipal Code, Ordinances, and the project Conditions of Approval.
- B. All plan submittals shall include information required in **Subsection 1.2040, Supporting Information** and **1.2041, Facility Plan**, of these Design Standards along with all other information requested by the City Engineer. This information is to include, but not be limited to, construction cost estimates, easement documents, right-of-way dedications, executed agreements, and a plan check and inspection fee. All submittals will be reviewed for completeness and the Design 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.
- C. Three paper sets and one electronic copy of complete construction plans and required reports shall be submitted for the review. A complete construction cost estimate will be submitted for review and determining review fees. Once the plans are deemed complete, a detailed review will begin on a “first-in, first-out” basis. If the submittal is not complete, notification will be given by the City to the Design Engineer specifying information needed.
- D. Upon completion of the detailed review, the City will notify the Design Engineer, by way of letter, any revisions or “Red-line comments” the City may have. The Design Engineer will revise the plans, addressing all items in the City’s letter, and return 6 sets of revised plans to the City for approval.

1.2060 As-Built Plan Requirements

- A. For all public works facility improvements the Design Engineer shall submit certified As-built drawings for all plans which were approved for construction and a copy of the recorded plat. One set of As-built drawings shall be submitted for preliminary review. If the first submittal is not acceptable, the City Engineer will notify the Design Engineer of information needed for resubmittal.
- B. As-built drawings shall meet the requirements of **Subsections 1.2020, Plan Preparation; 1.2030, Required Sheets; and 1.2060, As-Built Plan Requirements** through **1.2064, Water Main** of these Design Standards and shall be of archival quality. .
- C. As-built drawings, including all field changes, shall be submitted in the following electronic formats as acceptable to the City Engineer:
 - 1. AutoCAD
 - 2. PDF

3. GIS data as either geodatabase feature classes or shapefiles. GIS data must conform to the City's utility data schema including field naming, data types, and domain-restricted values. Data must also be spatially referenced using the City's preferred coordinate system.
- D. The Design 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 West Linn Public Works Standard Construction Specifications.
- E. The words "As-Built Drawing" shall appear as the last entry in the revision block along with the month, day, and year the as-built drawing was prepared.
- F. 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:

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

1.2062 Storm Drains

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

1. Station of wye or tee into main line. Tie end of branch line to nearest property corner at right-of-way line and distance back from the face of curb.
2. 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.
3. Other change altering the approved plans.

1.2063 Sanitary Sewer

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

1. Station of wye or tee into main line. Tie end of service lateral to nearest property corner at right-of-way line and distance back from the face of curb.
2. Depth at the end of service lateral measured from existing ground to invert of pipe. When required by the City Engineer, invert elevations shall be noted.
3. Length of service lateral measured from centerline of sewer main to end of pipe.
4. 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.
5. Other changes altering the approved plans.
6. Provide complete test results to the City Engineer.
7. Type of pipe, backfill material and location.
8. All rim and invert elevations on manholes, catch basins, and clean outs.

1.2064 Water Main

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

1. Station and/or property line/corner to valves (not at standard location), all fittings, blow-offs, and dead-ended lines.
2. All changes from standard 36 in. 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.
3. 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 valve.
4. Identify types of fittings (i.e., MJ x MJ, FLG x MJ, etc.); provide information in the form of an inventory list on construction drawings.
5. Other change altering the approved plans.
6. Provide design calculations and complete test results to the City Engineer.
7. Actual location and depth, from finish grade of street, of any other utilities encountered during construction.