



General Requirements and Details
for the
**Design and Construction of Water, Sanitary Sewer,
and Surface Water Systems**

Section 1
Planning and Development Review



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SECTION 1 PLANNING AND DEVELOPMENT REVIEW WATER, SANITARY SEWER AND SURFACE WATER

1-1 INTRODUCTION

Proper planning, design and construction of water, sewer and surface water systems are essential for maintaining effective service. To accomplish this, Engineering Services provides guidelines and oversight for the development and installation of these vital systems.

This document provides specific design guidelines and requirements for the construction of water, sanitary sewer and surface water systems. The audience includes City personnel involved in development review and construction, engineers, architects and others working with outside developers in designing and constructing these systems. Design and construction requirements and recommendations are located in each main section. Standard plan drawings follow the main sections. It is the user's responsibility to ensure that the most current standards are obtained from City of Vancouver sources.

Section 1 gives an overview of the *Planning and Development Review* processes performed by Engineering Services to assure consistent and effective utility implementation. Also included here are the legal basis for our requirements, a discussion of considerations in easements, and a section devoted to the definitions of terms used in water, sewer and surface water engineering.

1-2 COMPREHENSIVE PLANNING

Water, sanitary sewer, and surface water development in the City of Vancouver begins with an integrated system plan. The following sections provide a general overview of the planning process in these disciplines.

1-2.01 Water Planning

The City of Vancouver is required by Washington Department of Health to have a Comprehensive Water Plan which must be updated every 6 years. The current plan is the 2007 Comprehensive Water System Plan. This Comprehensive Water System Plan was prepared by HDR, Inc. This document includes the most current 20 year water demand projections. These demands have been evaluated against the existing water production and distribution system in order to spotlight the priorities for improvement.

Included in the plan is a summary of the policies and regulations that govern the operation and construction of new water system improvements.

The City of Vancouver is a participant in the Clark County Coordinated Water System Plan which serves as the primary planning document for water purveyors within Clark County.

In 2003 the City of Vancouver implemented a Wellhead Protection Program designating the entire City as a critical aquifer recharge area restricting or prohibiting activities that could negatively impact the City's ability to use their aquifers as a potable source.

1-2.02 Sanitary Sewer Planning

The City of Vancouver works to optimize construction and management of the sewer system through strong planning. Planning of the City's sanitary sewer service area is a dynamic process. Prior to construction of the first wastewater treatment plant, Stevens and Koon completed a study in 1945 that showed proposed locations for future interceptors and identified a site for a treatment plant.

Service to the eastern portion of the service area was detailed in the 1970 "Clark County Sewerage and Drainage Master Plan" done by Stevens, Thompson & Runyan, Inc. This included planning for Interceptors A and B and recognized the need to transfer the waste flow from the ends of these interceptors to the treatment facilities at Marine Park (formerly the Eastside Treatment Plant). Their concept included a 48 inch tunnel to achieve this. The A, B, and E interceptor systems were all constructed under the guidance of this document.

Three planning documents were completed in the 1980s:

- 1) "Wastewater Facilities Plan, Phase I" was a sewer system planning document prepared in 1981 under an Environmental Protection Agency and Department of Ecology grant. It includes general coverage of the planning area, physical evaluation for selected basins, detailed analysis of the Burnt Bridge Creek sewer basin, and projection of wastewater treatment needs.
- 2) A companion document, "Wastewater Facilities Plan, Sewer Drainage Basin Mapping", is a sewer drainage basin mapping plan for the Burnt Bridge Creek Drainage basin. This includes the majority of the City's service area.
- 3) In 1987 the Industrial Pretreatment Program report was completed. This is the report of the formation of the Industrial Pretreatment Program required by the discharge permit for the City's Westside Wastewater Treatment Plant. It contains a detailed list of all establishments producing industrial wastewater in the City of Vancouver's service area at that time. The Program has maintained and updated this list.

These three 1980s documents were enhanced and updated by the "Sanitary Sewer Master Plan Amendment" in 1990. City staff developed this document. It was required by the City's Wastewater NPDES permit. Detailed basin studies were done for each of the 76 sub-basins in the City's system. These studies were an important tool in setting requirements for sewer extensions during the high growth rate period of the 1990s.

In addition to reproducible drawings, computer files were generated containing all of the topographic data and translated for use with AutoCAD. The topographic flights and the creation of these computer files in 1987, 1988, and 1989 were the initial steps in converting the City's sewer records to digital format. Use of computer technology enabled this planning effort to be truly ongoing.

The latest planning effort is published in the “General Sewer Plan (Volumes 1 and 2) dated April 2011 (with August 2011 revisions). The report was prepared by The City of Vancouver and Kennedy/Jenks Consultants. The report updates the hydraulic computer model of the collection system, analyzes current conditions, estimates buildout flows, makes recommendations for future needs, and captures institutional knowledge about the collection system.

1-2.03 Surface Water Management Watershed Planning

Vancouver is comprised of two major watershed basin areas. These basin areas are Burnt Bridge Creek (BBC) and Columbia Slope (CS). Vancouver Lake, Fisher Creek and Lacamas are smaller watershed basin areas which are partially inside City limits. Due to City annexation history, the master plans for the watershed basins have not occurred within the same time frame. The Columbia Slope plan, completed in 1993, primarily addressed water quantity and drainage but did include some monitoring and water quality evaluation. In 1995, the City partnered with Clark County to develop a Burnt Bridge Creek watershed plan which addressed both water quality and quantity. At that time, the BBC basin was almost evenly split between the two jurisdictions. In 1997, the City annexed the majority of the Burnt Bridge Creek watershed basin area.

The restorative *Burnt Bridge Creek Greenway Improvement Project* was designed to improve water quality, enhance fish and wildlife habitat, control flooding, treat stormwater drainage, increase and diversify the shrub and tree canopy, and enhance educational and recreational opportunities. This project, constructed in the central stream corridor between 2005 and 2006, significantly transformed the degraded natural environment and a long-term maintenance program has been implemented to foster its evolution into a naturally sustainable ecosystem.

During 2007 and 2008, the City completed evaluation of several sub-basin areas. Basin studies were undertaken in the Ellsworth and Lewis & Clark Highlands neighborhoods, the Mill Creek area, and East Evergreen Highway (164th to east City limits). Water quality and system improvements will occur as funding becomes available.

Data collection was initiated in 2008 to begin evaluation of sub-basins in the Sifton, Fruit Valley and Cold Creek areas.

1-3 PROJECT DEVELOPMENT AND REVIEW

The goal in the Development Review process is to review development proposals for compliance with zoning code; land division code; standards related to streets, water, sewer and water quality; State Environmental Policy Act; Shoreline Master program; and other related state and federally mandated programs.

The engineering review process begins with a Preliminary Info Request (PIR) and a Pre-Application conference. Following the initial review, the formal application is submitted. These are reviewed by engineering to determine if the plans are Fully Complete (FC). If the applicant submits full civil plans with the application and requests a full civil review, the City will complete the first review of the civil plans and release them with the completion of the staff report.

Water and sewer utility plans cannot be approved unless the plan contains extension of facilities from an existing public water or sewer line to and through the development site. Utility plans which include or need facilities which run through adjacent private properties cannot be approved unless the City receives permission from those adjacent private property owners. That permission must be expressed in the form of an easement to the City or dedication of right-of-way.

Existing public utilities are defined as public mains that have been accepted by the City of Vancouver. This acceptance consists of successfully passing all required testing, as-built approval and all required paperwork.

1-4 AS-BUILT PREPARATION AND SUBMITTAL REQUIREMENTS

Accurate record drawings are required for all constructed public utilities. As-built submittal, review, and approval are conditions of Final Civil Project Acceptance. General submittal requirements are summarized in the Notification of Civil Plan Approval (plan approval letter) and related permit center correspondence. This section details the submittal requirements.

Applicability: This section applies to approved civil and as-built plan sets submitted together with or separate from land-use applications. Paragraphs below include required submittals, electronic files, content, and quality requirements.

Use and Distribution: Images of approved plans are used primarily for City departments. Approved as-built drawings are the property of the City utilities and the permanent public records.

Review and Approval: Submittals satisfying the drawing, content, and the other requirements listed below are likely to require fewer reviews for approval. Incorrect or incomplete submittals will be returned for revisions, resubmittal, and additional review.

1-4.01 General Drawing Requirements

Survey Requirements: Design and as-built drawings require field surveys. Summarize design (existing conditions) and as-built survey information (firm, date, and applicability) on the plans. Include, show, and note key surrounding permanent topographic features. Clearly indicate if designs were instead prepared without a field survey.

Topographic Features: Electronic files of topographic features within the City's service areas are available for the public to purchase. Visit the Clark County Map Store on the second floor of the Clark County Public Services Building (1400 Franklin Street), call the store at (360) 397-2391, or visit their web site at <http://gis.clark.wa.gov/applications/gishome/index.cfm>.

1-4.02 Vertical and Horizontal Requirements: The City of Vancouver adopts NGVD 29 as its vertical datum (VMC 11.03). The City (and Clark County) horizontal coordinates are projected to NAD 83(91) and Washington State Planes, South Zone, (4501) US foot.

Vertical Datum: The City's vertical datum (NGVD 29) is preferred for design and as-built drawings. Declare and specify the projects vertical datum. Include the declaration on the cover and other sheets showing elevations. Plans using a vertical datum other than NGVD 29 shall indicate the datum and the conversion to City's NGVD 29.

Bench Marks: Show and note project bench marks. Specify horizontal coordinates, elevation, and vertical datum. If elevations are relative to a different vertical datum then note the equivalent NGVD 29 elevations.

Horizontal Coordinates: Design and as-built drawings shall be relative to NAD 83(91) Washington South. Declare and specify the horizontal coordinate system on the plans. Plans using a different horizontal coordinate system will be accepted on a case-by-case basis.

1-4.03 Required Submittals: This section applies primarily to traditional paper\hard-copy plan sets. (Civil plans reviewed and approved electronically thru ePlans (ProjectDox) do not require electronic submittals of approved plans or original full-size reproducible as-builts. See ePlans handbooks and the plan approval letters for submittal requirements.)

Approved Plans: Submittal of a set of electronic images of the approved plans are required at the time of civil plan approval (and prior to issuance of the plan approval letter). Files are typically scanned tiff images of the approved plan set. Related requirements are included below.

Pre-paving As-builts: Both traditional paper\hard copy plans and ePlans require pre-paving as-builts for sanitary sewer and public storm sewer. Submit to Construction Services and secure approval prior to paving and Construction Acceptance. Details are available at the Construction Services pre-construction meeting.

Full-size Reproducible Originals: Traditional paper\hard-copy applications require submittal of full-size original as-builts. Plot media is at the discretion of the engineer. Mylar is not required provided the drawings are the originals and clearly reproducible.

Electronic File Submittals: Traditional paper\hard-copy applications also require submittal of electronic images (files) of complete civil plan sets. Submittals are required at the time of civil plan and as-built approvals.

Compact Disks: Deliver electronic plan set submittals by compact disks (CD). Include and title separate folders for approved plans and as-built drawings. Group subfolders by file type (format). Tag all files with the read-only (property) attribute. Clearly label the disk. Identify as an electronic approved plans and\or as-built submittals. Include project name and specify project (PRJ) and case (ENG) numbers. Note company name and submittal date. Accompany with a transmittal memo and deliver to the Permits Center. Email or ftp transmittals of electronic drawing files will not be accepted.

1-4.04 Electronic File Formats: Submittal of complete civil plan sets in all three of the following electronic file formats is required. Permits counter correspondence and the plan approval letter will itemize submittal requirements.

- **Tagged Image File Format** (.tiff). Balance resolution with file size.
- **Portable Document Format** (Adobe Acrobat PDF). Optimize for file size.
- **AutoCAD** (AutoDesk dwg). Release 2007 or prior. Other file formats (dxf, shp) may be accepted on a case-by-case basis if required.

1-4.05 Content Requirements: The following paragraphs describe source, markups, identification, and other as-built content requirements.

Source: As-built drawings and electronic files shall be prepared directly from the original approved plans and their CAD source. Apply markups, survey information, identification, and certifications prior to plotting as-built hard copies and electronic files. Hand-drawn changes directly to the approved reproducible originals will be accepted only if original design, notations, changes, markups, and scanned images are all clear, legible, and reproducible.

Changes and Markups: Maintain and clearly show the approved design. Note all approved design changes in the revision blocks. Clearly show all construction changes and include relevant field notes. Identify changes with revision clouds, strikeouts, asterisks, and other legible notes.

Survey Information: Show and note post-construction survey information. Summarize the as-built survey (firm, date, and applicability) on the drawings. Keep and strike design elevations and indicate final survey locations and elevations. If an as-built survey is not warranted then briefly indicate and identify the source of the information shown.

As-built Identification: Clearly identify the cover sheet and each applicable drawing sheet as an as-built and/or record drawing.

Certification: As-builts prepared under the supervision of the stamping engineer is preferred. Responsible designers or other qualified parties may instead prepare as-builts when needed and appropriate. The engineer or other responsible party shall acknowledge the cover and each sheet with a statement and signature. Wording and stipulations are at the engineer's discretion.

Electronic files (tif, pdf, and dwg) shall also include content noted above (or as many as practically possible). Pdf files typically include multiple pages and one page for each plan sheet. Individual pdf sheet files will also be accepted.

AutoCAD dwg files: Linework must reside in model space at full scale (1:1) with no rotation.

Insert all related and required reference drawings. Purge cad files to focus on public improvements and utilities. Delete and purge extraneous linework, layouts, layers, shading blocks, linetypes, and other unneeded elements and features.

Retain and include all public improvements, public and private utilities, as-built changes, and markups. Include key site plan features, roadway centerlines, alignment geometries, and selected permanent surrounding topographic features.

1-4.06 Quality Requirements: Include and clearly identify content as noted above. Electronic files shall be of quality and resolution suitable for clear reproduction. Balance quality and optimize files for reasonable size.

Design drawings and as-builts should (are encouraged to) freeze unneeded shading on the utility plans and to adjust remaining shading and hatching density and transparencies to accommodate plots, scans, exported electronic files, and their reprints.

1-4.07 Hydrology Report Submittal Requirements

Electronic copies of final hydrology reports shall be submitted with the final report drawings. The entire report including all supporting drawings, calculations and appendices shall be included in one electronic document. Electronic hydrology reports shall be submitted in Adobe Acrobat (pdf) format. Hard copies of the report are not required with the as-built submittal.

1-5 LEGAL AUTHORITY

Utilities are regulated by local, state and federal laws. Vancouver's Municipal Code (VMC) Title 14 provides the City's regulations for water, sewer and surface water. These ordinances can be found under the "City Government" tab on the City of Vancouver's website: <http://www.cityofvancouver.us>

1-5.01 Water

The City of Vancouver's water utility owns and maintains all public water mains within the City's Water Service Area Boundary, with certain exceptions. The City of Vancouver Water Service Area Boundary includes nearly all the area within Vancouver City Limits and some areas beyond. Public mains are required by state law. All public water mains should be located in the right-of-way or a dedicated easement. On-site plumbing is governed by the local plumbing code. Any pipes downstream of either the water meter or first gate valve on Fire Protection Sprinkler piping, are private.

1-5.02 Sanitary Sewer

The City of Vancouver's sanitary sewer utility owns and maintains all public sewer mains. Public mains are required by state law. Only the pipes in the right-of-way or an easement are public. Service laterals branching from the public mains are typically private. On-site plumbing is governed by the local plumbing code.

VMC 14.08 regulates connections to public sewers, and VMC 14.10 provides pretreatment regulations for sewer discharges from businesses and industries within the sewer district. The Code of Federal Regulation CFR 40 regulates discharges to sewer systems from categorical industries. The state agencies of the Washington Dept. of Health and the Washington Dept. of Ecology regulate various aspects of sewer design. Septic system design and approval is administered by the Clark County Health Dept.

The City adopts the most current Edition of the *Standard Specifications* for Road, Bridge and Municipal Construction. Amendments to the *Standard Specifications* for sanitary sewer construction are shown in Standard Plan detail sheet Division 7.

1-5.03 Surface Water Management

These general notes and requirements for surface water design are based on the City of Vancouver's Municipal Code for Erosion Prevention and Sediment Control, VMC 14.24, Storm Water Control, VMC 14.25 and Water Resources Protection, VMC 14.26, Washington State Department of Ecology's 2005 Stormwater Management Manual for Western Washington and Washington Administrative Code (WAC173-218) Underground Injection Control Program.

The City of Vancouver is required to meet federal Clean Water Act regulations which include those implemented through National Pollutant Discharge Elimination System (NPDES) permits for stormwater and wastewater. Although it is a federal permit, the Department of Ecology is the regulatory authority in Washington State. On January 17, 2007 the City of Vancouver was issued an NPDES Western Washington Phase II Municipal Stormwater Permit (Phase II Permit) for discharges of stormwater to surface waters through its municipal separate storm system.

The NPDES Phase II Permit requires specific actions to reduce the discharge of pollutants to the maximum extent practicable and to protect water quality. Five mandatory components are to be developed and implemented through a Stormwater Management Program (SWMP) established by each permittee:

- Public Education and Outreach
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Controlling Runoff from New Development, Redevelopment and Construction Sites
- Pollution Prevention and Operation Maintenance for Municipal Operations

Additional regulatory requirements are defined in Washington State Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Quality Standards (Chapter 173-200 WAC), Sediment Management Standards (Chapter 173-204 WAC) and human health based criteria in the national Toxics Rule (Federal Register, Vol. 57, NO. 246, Dec. 22, 1992). The City is directed to use all known, available, and reasonable methods of prevention, control and treatment to prevent and control pollution of waters of the state.

To ensure compliance with these regulations, the City requires the use of Best Management Practices (BMPs). As defined by Ecology, best management practices

include schedules of activities, prohibitions of practices, maintenance procedures, and structural and/or managerial practices that, when used singly or in combination, prevent or reduce the release of pollutants and other adverse impacts to the waters of Washington State.

1-6 DEFINITIONS OF TERMS

Anchor: A wall tied to a sewer main to secure it on a steep slope.

Area Drain/Field Inlet: A structure used to collect storm water in ditches, swales or lawns often with an angled grate to prevent clogging with debris.

Asbestos Cement (AC) Pipe: Concrete pipe reinforced with asbestos fiber. Not in current City of Vancouver standards.

AWWA: American Water Works Association, a non-governmental group which writes voluntary standards for potable water production, treatment, and distribution.

Backflow: The flow of water, other liquids, gases or solids from any source back into the customer's plumbing system or purveyor's water distribution system.

Backflow Assembly or Backflow Prevention Assembly: A device used to prevent backflow into a public water main, or to prevent a cross connection of pipes carrying fluids used for different purposes.

Backpressure: Water pressure which exceeds the operating pressure of the purveyor's potable water supply.

Backsiphonage: Backflow due to a negative or reduced pressure within the purveyor's potable water supply.

Best Management Practices (BMP): Physical, structural and managerial practices, and prohibitions of practices, that, when used singly or in combination, control stormwater runoff peak flow rates and volumes and prevent or reduce pollution of surface water or groundwater. An experimental or alternate BMP is one that has not been tested and evaluated by the Department of Ecology in collaboration with local governments and technical experts. (See Emerging Technologies)

Blow-off: A small pipe with an isolation valve, connected to a water main, designed to flush water, air, or particulate matter out of the main, or to relieve pressure in a water main prior to connection. Normally installed at the end of dead-end water mains, and at low points in large mains.

Butterfly Valve: A device to shut off or control the flow of water that includes a circular disk that is rotated around a shaft that is perpendicular to the pipe axis.

Cast Iron (CI) Pipe: Pipe made by casting iron with about 3.5% carbon, by weight. In Vancouver, "cast iron" is used to refer to the type of cast iron that contains carbon in a flake form. This type, also called "gray iron," is not often used, because of the availability of the superior ductile iron. Cast iron (carbon in flake form) pipe is thick-walled, corrosion-resistant, but brittle, and is not included in current Vancouver standards.

Catch Basin/Curb Inlet/Combination Curb Inlet: A structure used to collect surface water runoff from streets and paved areas, having a sump base designed to retain grit, sediment and debris, before flowing into the storm sewer. A catch basin has a grate level with the pavement, a curb inlet has an opening in the curb and gutter and a combination curb inlet incorporates the features of both.

Categorical Industry: An industry which has been defined as categorical by the definitions provided in the Clean Water Act's Code of Federal Regulations (40 CFR). These are typically required to sample for pollutants specific to the nature of the industry and to maintain compliance with the categorical guidelines.

CCF or ccf: One hundred cubic feet. A unit of water volume used to measure water use. 1 ccf is equivalent to 748 gallons.

CF: One cubic foot A unit of water used to measure water use. 1 cf is equivalent to 7.48 gallons

Categorical Industry: An industry which has been defined categorical by the definitions provided in the Clean Water Act's Code of Federal Regulations (40 CFR). These are typically required to sample for pollutants specific to the nature of the industry and to maintain compliance with the categorical guidelines.

Cleanout: A vertical pipe connected to a sewer to allow for inspection and maintenance. These are typically installed at a 'wye' or elbow, at the end of a main or at the change in direction of a service lateral.

Corporation Stop or Corp Stop: A quarter-turn ball valve, generally used to isolate water service pipes, and usually installed without a valve box for access. Corporation stops are a necessary part of water service taps.

Culvert: A pipe or concrete box which permits the natural flow of water from creeks, open channels or ditches under a roadway or embankment.

Datum: The elevation standard used for a survey reference.

Deduct Meter: A water meter approved, purchased from, supplied and installed by the City of Vancouver. The deduct meter shall be maintained by the user under authorization of the City for a commercial or industrial use to be credited on a sewer bill for water used and not discharged to the sewer.

Design Storm: A prescribed hyetograph and total precipitation amount (for a specific duration recurrence frequency) used to estimate runoff for a hypothetical storm of interest or concern for the purposes of analyzing existing drainage, designing new drainage facilities or assessing other impacts of a proposed project on the flow of surface water. (A hyetograph is a graph of percentages of total precipitation for a series of time steps representing the total time during which the precipitation occurs.)

Detention Facility: A facility (e.g. pond, vault, pipe) in which surface and stormwater is temporarily stored and released at a controlled rate.

Development: Any land disturbing activity or change to improved or un-improved property, including but not limited to construction, installation, or expansion of a building or other structure, land division, street construction, drilling and site alteration such as, dredging, grading, paving, parking or storage facilities, excavation, filling, or clearing.

Double Check Detector Assembly (DCDA): An approved assembly consisting of two approved double check valve assemblies, set in parallel, equipped with a meter on the bypass line to detect small amounts of water leakage or use.

Double Check Valve Assembly (DCVA): An approved assembly consisting of two independently operating check valves, loaded to the closed position by springs or weights, and installed as a unit with, and between, two resilient seated shutoff valves and having suitable connections for testing.

Drywell: Precast concrete manhole with perforations and installed with drain rock for exfiltration of surface water runoff or other drainage to the subsurface.

Ductile Iron (DI) Pipe: Pipe made by centrifugally casting iron with about 3.5% carbon content, with carbon in a nodular form (due to an additive such as magnesium). It is much less brittle than an older form of cast iron called gray iron (or just “cast iron”). The City of Vancouver Standard for water mains is ductile iron pipe with an asphaltic outer coating, and a cement inner liner.

Effective Impervious Surface: Those impervious surfaces that are connected via sheet flow or discrete conveyance to a drainage system. Impervious surfaces on residential development sites are considered ineffective if the runoff is dispersed through at least one hundred feet of native vegetation.

Emerging Technologies: New technologies or BMP’s that have not been evaluated using approved protocols, but for which preliminary data indicate that they may provide a necessary function in a stormwater treatment system.

Erosion/Sediment Control: Any temporary or permanent measures taken to reduce erosion, control siltation and sedimentation, and ensure that sediment- laden water does not leave the site or enter the stormwater system.

Fire Hydrant: A water distribution facility designed for fire suppression use, located in the public right-of-way or easement, and connected to a water main by a 6 inch diameter or larger pipe.

Force Main: A pressurized sewer main which is the outlet of a sewage pump.

Galvanized Iron Pipe (aka G.I. pipe): pipe made of iron coated with zinc. Used only for small mains and services, and is not allowed under current City of Vancouver standards.

Gate Valve: A device to shut off or control the flow of water, which includes a threaded stem to drive a gate vertically into a seat.

GPM or gpm: gallons per minute, a measurement of flow rate.

Grade: 1) The slope of a surface expressed as the difference in elevation of two points divided by the horizontal distance between the two points. It is usually measured in percent (ft/100 ft). (ex: 1 unit vertical distance and 100 feet horizontal difference separate two points. The grade or slope between the points = (1 unit /100 units) = 0.01 or 1 percent). 2) The elevation at a specific point (ex: finished grade = 123.12 ft.).

Grading: Excavating, filling or embanking of earth materials.

Grinder Pump: A small pump, usually used to macerate and pump sewage from a single family residence or business to the main line when gravity service is not available.

Hot Tap: See **Water Tap**

Hydraulic Grade Line: The sum of the elevation in feet above mean sea level of a water pipe or water facility, and the pressure head in feet (relative to atmospheric pressure) of the water in that pipe or facility. During static conditions, all the water in the pipes of a given pressure zone will be at the same hydraulic grade line.

I&I (Infiltration and Inflow): Rain or groundwater entering a sewer through defective pipes or leaks in joints, connection or manhole walls in the sewer lines.

Impervious Surface: A hard surface area which either prevents or retards the entry of water into the soil mantle as under natural conditions prior to development, and/or a hard surface area which causes water to run off the surface in greater quantities or at an increased rate of flow than the flow present under natural conditions prior to development. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, gravel parking lots, packed earthen materials, and oiled, macadam or other surfaces which similarly impede the natural infiltration or stormwater.

Ingress/Egress: The right to go either in (ingress) or out (egress).

Interceptor: A main sanitary sewer line that receives flow from a number of other lines and conveys the flow to a treatment plant.

Irrigation water meter: A water meter to measure water used strictly for irrigation on commercial or industrial properties, and is not discharged to the sewer. This meter connects directly to a public water main, it is supplied, owned and maintained by the City of Vancouver.

Live Tap: See Water Tap

Low Impact Development (LID): A stormwater management and land development strategy applied at the parcel and subdivision scale that emphasizes conservation and use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely mimic predevelopment hydrologic functions.

Manhole: A large covered cylindrical vault built over a sanitary or storm sewer main to allow inspection and maintenance.

Math. or Matheson pipe: a type of steel water pipe, presumably made at the Matheson Steel Mill, used in Vancouver until the 1930's. The pipe is thin-walled, unlined, and uncoated.

National Pollutant Discharge Elimination System (NPDES): A federal permit program, administered in the State of Washington by the Washington State Department of Ecology, that regulates wastewater and stormwater sources of discharge to surface water. Municipal and industrial wastewater and municipal, industrial and construction stormwater discharges require separate NPDES permits.

New Development: Land disturbing activities, including Class IV-general forest practices that are conversions from timber land to other uses; structural development, including construction or installation of a building or other structure; creation of impervious surfaces; and subdivision, short subdivision and binding site plans, as defined and applied in Chapter 58.17 RCW. Projects meeting the definition of redevelopment shall not be considered new development.

New Impervious Surface: Impervious surface created on or added to a site or structural development including construction, installation, or expansion of a building or other structure. New impervious surfaces may also include existing impervious surface that is removed and replaced. To be considered new, the removal and replacement activity must result in significant changes in impervious surface locations, grade, and/or drainage system features, and/or must involve construction, installation, or expansion of a building or structure after complete or substantial intentional demolition.

OD Steel Pipe: OD refers to the outer diameter: the pipe's outer diameter is equal to the nominal diameter (for example, 6", 8", 10"). OD steel is thin walled, with a cement lining and bituminous paper coating on the outside. Not in current Vancouver standards.

Outfall: The point where water flows from a manmade conduit, channel, or drain into a water body or other natural drainage feature.

Predevelopment Condition: The native vegetation and soils that existed at a site prior to the influence of Euro-American settlement. The pre-developed condition shall be assumed to be forested land cover unless reasonable, historic information is provided that indicates the site was prairie prior to settlement.

Pressure Zone: A portion of the water distribution system separated from other pressure zones that is served by one or more water sources or reservoirs, all of which are at the same hydraulic grade line. Dead-end mains, permanently closed valves, booster pumps, or pressure reduction valves form the boundaries between pressure zones. Different pressure zones must not be connected by private development.

PSI or psi: Pounds force per square inch, a measurement of pressure, generally understood to mean pressure relative to atmospheric pressure (open air has a pressure of 0 psi).

Puget Sound Manual: The State of Washington Department of Ecology's Stormwater Management Manual for the Puget Sound Basin, 1992 Edition.

Redevelopment: On a site that is already substantially developed (i.e., has 35% or more of existing impervious surface coverage), the creation or addition of impervious surfaces; the expansion of a building footprint or addition or replacement of a structure; structural development including construction, installation or expansion of a building or other structure; replacement of impervious surface that is not part of routine maintenance activity; and land disturbing activities.

Reduced Pressure Backflow Assembly (RPBA): An approved assembly consisting of two independently operating check valves, spring loaded to the closed position, separated by a spring loaded differential pressure relief valve loaded to the open position, and installed as a unit with and between two resilient seated shutoff valves and having four suitable test cocks for checking the water tightness of the check valves and the operation of the relief valve.

Reduced Pressure Detector Assembly (RPDA): An approved assembly consisting of two approved reduced pressure backflow assemblies, set in parallel, equipped with a meter on the bypass line to detect small amounts of water leakage or use. This unit must be purchased as a complete assembly. The assembly may be allowed on fire line water services in place of an approved reduced pressure backflow assembly upon approval by the local water purveyor.

Regional Facility: A city owned, designed, and constructed facility used for detention, retention and/or water quality of stormwater runoff from large areas of land or basins.

Replaced Impervious Surface: For structures, the removal and replacement of any exterior impervious surfaces or foundation. For other impervious surfaces, the removal down to bare soil or base course and replacement.

Residual Pressure: The pressure in a distribution system when a large amount of water is flowing out of the system (during a fire hydrant flow test, for example).

Sanitary Main: A sewer pipe typically owned by the city (a public line) which conveys wastewater to trunk lines and interceptors which then transports the wastewater to the treatment facility.

Sanitary Pump Station: A facility used to pump sewage to a higher elevation.

Service Lateral: A privately owned sewer line which typically serves one building and has only a branch to the sewer main.

Sanitary Sewer: A pipe or conduit that carries domestic or industrial wastewater.

Slope: See **Grade** definition 1

Static Head: Pressure, measured in height of water, in a pipe or facility when there is no water flowing, or when the effect of flowing water is negligible.

Static Pressure: Pressure, measured in pounds per square inch or other pressure units, in a pipe or facility when there is no water flowing, or when the effect of flowing water is negligible.

Storm Sewer: A sewer that is designed to carry stormwater and surface water runoff or drainage, but typically excludes domestic wastewater and industrial wastes. Storm drains are enclosed conduits that transport surface and stormwater runoff toward points of discharge.

Stormwater Facility: The natural or constructed components of a stormwater drainage system designed and constructed to perform a particular function, or multiple functions. Stormwater facilities include, but are not limited to: pipes, swales, ditches, open channels, culverts, storage basins, infiltration devices, catch basins, manholes, drywells, oil/water separators, sediment basins, rain gardens and permeable pavements.

Stormwater Manual: The 2005 Stormwater Management Manual for Western Washington, which is the 5-volume technical manual (Publication Nos. 05-10-29 through 05-10-33) prepared by the Washington State Department of Ecology for use by local governments that contains BMPs to prevent, control, or treat pollution in stormwater.

Stormwater Pollution Prevention Plan (SWPPP): A plan that identifies best management practices to identify, reduce, eliminate and/or prevent stormwater contamination and water pollution.

Stormwater Site Plan: A comprehensive report containing all of the technical information and analyses necessary for regulatory agencies to evaluate a proposed new development or redevelopment project for compliance with stormwater requirements. Contents of the Stormwater Site Plan will vary with the type and size of the project, and individual site characteristics. Guidance on preparing a Stormwater Site Plan is contained in Section 4-2.

Stub (Stub-out): A length of pipe with a plugged end, for connecting future extensions.

Tapping Sleeve: A device attached around an existing water main to support a gate (tapping) valve. A tapping machine is used with the tapping sleeve and valve to cut an opening in the main. Allows a connection to a main while the main is under pressure.

Threshold Discharge Area (TDA): An on-site area draining to a single natural discharge location or multiple natural discharge locations that combine within one-quarter mile downstream (as determined by the shortest flowpath).

Thrust Block: Support, generally made of poured concrete, for a pipe fitting to resist the pressure or reactive forces due to the fluid carried by the pipe. Thrust blocks are typically used with water mains, or sometimes sewer force mains.

Transite Pipe: A type of asbestos cement pipe.

Trunk: A major sanitary sewer pipe which collects flow from smaller mains.

Underground Injection Control: “Underground Injection Control” or “UIC” is a manmade subsurface fluid distribution system designed to discharge fluids into the ground; consisting of an assemblage of perforated pipes, drain tiles, or other similar mechanisms, or a dug hole that is deeper than the largest surface dimension. Subsurface infiltration systems include drywells, pipe or french drains, drain fields, and other similar devices.

Utility Easement: A legal agreement with the owner of a parcel of land and the City which allows access to a utility line or facility for monitoring, repair, meter reading and maintenance. One utility requires a minimum 15 foot easement.

Wastewater, Sanitary or Domestic: The spent domestic water of the community, primarily from residential sources but also from the sanitary facilities in commercial and industrial facilities. This is a combination of liquid and water-carried wastes which should not contain excessive chemicals or toxic substances.

Wastewater, Industrial: The wastewater discharged to sanitary sewer from industrial sources. Categorical industries and large volume dischargers need a permit to discharge and may be required to pretreat wastewater prior to discharge.

Water Main: A pipe to convey potable water from water sources to water services, located in the public right-of-way or easement, to serve more than one property, and at least 4 inches in diameter by current standards.

Water Meter (public): A device to measure water used. Water meters are installed, read, and maintained by City of Vancouver staff or their appointed representatives. They are to be located in the right-of-way or a water easement. Single family water meters shall be centered along the property frontage.

Water Meter Box (public): A concrete or synthetic box with cover to house and protect a water meter, generally installed by a private developer, but maintained by City staff.

Water Service: A pipe to convey potable water from water mains to customer’s water meters, located in the public right-of-way or easement, to serve one building or property, ranging in diameter from the current minimum of 1 inch, to 6 inches or larger. Single family water services shall be centered along the property frontage. Water fire service pipes extend from water mains to backflow prevention devices, are located in the public right-of-way or easement, and are generally 4 inches or larger in diameter.

Water Service Tap: A connection to a water main made by drilling through an open corporation stop, while the water main is pressurized. A water service pipe can then be connected to the closed corporation stop.

Water Source: A natural system containing water and the facilities to convey water to a distribution system. For the City of Vancouver water system, all the water sources are wells that tap ground water.

Water Tap: A connection to a water main made by attaching a tapping sleeve to the main, and cutting an opening in the main through an open gate (tapping) valve, while the water main is pressurized. A new water main can then be connected to the closed gate valve. Also called a “Hot Tap” or “Live Tap”

Water Transmission Main: A large diameter water pipe used to convey potable water from a water source to a reservoir or to a specific part of the water distribution system. Due to pressure problems, potential changes in use, or other considerations, new connections to a water transmission main may be restricted.

Wet Tap: See **Water Tap**

Wet Well: A container or vault used to hold water or wastewater for pumping to a higher-pressure system.

1-7 NOTIFICATION PHONE NUMBERS

The following is a list of organizations and agencies which may need to be contacted or notified when working on development projects in the City of Vancouver.

City of Vancouver

Construction Services	
City capital projects	(360) 487-7750
Development-related projects	(360) 487-7780
Development Review Services	
Building Permits	(360) 487-7800
Inspection Hotline	(360) 619-1200
Right-of-way Permits	(360) 487-7802
Water, Sewer, Street Permits	(360) 487-7802
Engineering Services	
Sanitary System Planning and Design	(360) 487-7130
Surface Water Management	(360) 487-7130
Wastewater/Pretreatment	(360) 487-7130
Water Protection	(360) 487-7130
Water System Planning and Design	(360) 487-7130
Operations Center	
Stormwater/Drainage Maintenance	(360) 696-8177
Street and Traffic Maintenance	(360) 696-8177
Utility Billing (water/sewer/stormwater)	(360) 487-7999
Wastewater/Sewer Maintenance	(360) 696-8177
Grease Trap Program	(360) 696-8177
Water Production and Distribution	(360) 696-8177
Cross-connection and Backflow	(360) 696-8177
After Hours Emergencies	(360) 693-9302
Procurement Services	(360) 619-1030
Risk Management	(360) 619-1094
Transportation Services	(360) 487-7700
<i>Call before you Dig(Utility Notification Center)</i>	1-800-424-5555
<i>Clark County</i>	
Construction	(360) 397-6118
Traffic	(360) 397-6118
<i>Clark Public Utilities</i>	(360) 992-3000
<i>C-Tran</i>	(360) 695-0123
<i>Fire Departments</i>	
Clark County District 5	(360) 397-2100
Clark County District 6	(360) 576-1195
Vancouver Fire Department	(360) 696-8166
<i>Police Departments</i>	
Clark County Sheriff	(360) 397-2211
Vancouver Police Business/Information	(360) 487-7400
Vancouver Traffic Hotline (non-emergency)	(360) 487-7402
Washington State Patrol	(360) 260-6333

School Districts

Camas Public Schools	(360) 833-5400
Evergreen Public Schools	(360) 604-4000
Vancouver Public Schools	(360) 313-1000

Washington State Department of Ecology

Spill Line	(360) 407-6300
Oil Spills	1-800-OILS-911

Washington State Department of Transportation

	(360) 905-2000
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