



LYNNWOOD

WASHINGTON

DESIGN MANUAL

Prepared for the City of Lynnwood

April 2023



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DIVISION I – GENERAL – UNDER DEVELOPMENT

GENERAL

Authority Purpose and Applicability

Contact Information

The contact information in Table I is provided for assistance during project planning and development and is not a comprehensive list of contacts.

Table I – Contact Information

Development and Business Services 20816 44 th Avenue W, Suite 230 Lynnwood, WA 98036 https://www.lynnwoodwa.gov/Government/Departments/Development-Business-Services (425) 670-5400	Public Works Department 19100 44 th Avenue W Lynnwood, WA 98036 https://www.lynnwoodwa.gov/Government/Departments/Public-Works (425) 670-5200
South Snohomish County Fire and Rescue 12425 Meridian Avenue S Everett, WA 98208 https://www.southsnofire.org/about-us/divisions/fire-prevention/fire-marshall/lynnwood-fire-marshall (425) 551-1264	Lynnwood Police Department 19321 44 th Avenue W Lynnwood, WA 98036 https://www.lynnwoodwa.gov/Government/Departments/Police-Department (425) 670-5600
Solid Waste Purveyor: Republic Services (West of Hwy 99) https://www.republicservices.com/municipality/lynnwood-wa Residential: (425) 778-0188 Multi-Family/Commercial (425) 778-6508	Solid Waste Purveyor: Waste Management NW (East of Hwy 99) https://www.wmnorthwest.com/ssnohomishcounty/index.html (800) 592-9995
Water and Sewer Purveyor: Public Works 19100 44 th Avenue W Lynnwood, WA 98036 https://www.lynnwoodwa.gov/Government/Departments/Public-Works (425) 670-5200	Water and Sewer Purveyor: Alderwood Water & Wastewater District 3626 156 th Street SW Lynnwood, WA 98087 https://awwd.com/ (425) 787-0220
Natural Gas Purveyor: Puget Sound Energy 10885 NE 4th Street PO Box 97034 Bellevue, WA 98009-9734 http://www.pse.com/Pages/default.aspx (888) 225-5773	Electric Purveyor: Snohomish County PUD No. 1 17425 Meridian Avenue S Everett, WA 98201 https://www.snopud.com/ (425) 783-1000

Standards

Acronyms and Definitions

The following acronyms and definitions are for use with this document. Unless specifically defined below, words or phrases used shall be interpreted to give them the meaning they have in common or trade use and to give this document its most reasonable application.

AASHTO: American Association of State Highway and Transportation Officials

ADA: Americans with Disabilities Act

ADT: Average Daily Traffic

APM: Additional Protective Measure

APWA: American Public Works Association

AWWA: American Water Works Association

ASTM: American Society for Testing and Materials

BMP: Best Management Practice

BOD: Biological Oxygen Demand

BSBL: Building Setback Line

CAO: Critical Areas Ordinance

CBR: California Bearing Ratio

CDF: Controlled Density Fill

CEC: Cation Exchange Capacity

CESCL: Certified Erosion and Sediment Control Lead

CFR: Code of Federal Regulations

CIP: Capital Improvement Project

CMP: Corrugated Metal Pipe

CPEP: Corrugated Polyethylene Pipe

CSWGP: Construction Stormwater General Permit

DNR: Washington State Department of Natural Resources

DOE: Department of Ecology (state, federal, or either?)

EDM: Engineering Design Manual

EIS: Environmental Impact Statement

EOP: Edge of Pavement

FC: Face of Curb

FEMA: Federal Emergency Management Agency

FHWA: Federal Highway Administration

FO: Fiber Optic

HDPE: High-Density Polyethylene

HPA: Hydraulic Project Approval

HRM: Highway Runoff Manual

HSPF: Hydrological Simulation Program-Fortran

ITE: Institute of Traffic Engineers

JARPA: Joint Aquatic Resource Permit Application

JB: Junction Box

KCSWDM: King County Surface Water Design Manual
LED: Light Emitting Diode
LF: linear foot/feet
LID: Low Impact Development
LMC: Lynnwood Municipal Code
LOS: Level of Service
MEF: Maximum Extent Feasible
MH: Manhole
MPH: Miles per Hour
MR: Minimum Requirement
MTCA: Model Toxics Control Act
MUTCD: Manual on Uniform Traffic Control Devices
NACTO: National Association of City Transportation Officials
NAD: North American Datum, Horizontal, of 1983/1991
NAVD: North America Vertical Datum
NEIS: National Electrical Installation Standards
NOAA: National Oceanic and Atmospheric Administration
NOI: Notice of Intent
NPDES: National Pollutant Discharge Elimination System
NTSP: Neighborhood Traffic Safety Projects
NTU: Nephelometric Turbidity Unit
O&M: Operation and Maintenance
O.D.: Outside Diameter
OHWM: Ordinary High-Water Mark
PCC: Portland Concrete Cement
PDF: Portable Document Format
PIT: Pilot Infiltration Test
PROWAG: Public Right-of-Way Accessibility Guidelines
PSE: Puget Sound Energy
PUD: Snohomish County Public Utilities District
PVC: Point of Vertical Curvature or Polyvinyl Chloride
PVI: Point of Vertical Intersection
PVT: Points of Vertical Tangency
RCP: Reinforced Concrete Pipe
RCW: Revised Code of Washington
RTA: Regional Transportation Analysis (Regional Transit Authority)
SCL: Seattle City Light
SDR: Standard Dimension Ratio
SEPA: State Environmental Policy Act
SF: square foot/feet
SPU: Seattle Public Utilities
SS: Sanitary Sewer
SSD: Stopping Sight Distance
SWMP: Surface Water Management Plan
SWPE: Solid Wall Polyethylene

SWPPP: Stormwater Pollution Prevention Plan
TDA: Threshold Discharge Area
TESC: Temporary Erosion and Sediment Control
TIA: Transportation Impact Analysis
TMDL: Total Maximum Daily Load
TMP: Transportation Master Plan
UG: Underground
UIC: Underground Injection Control
USACE: United States Army Corps of Engineers
USPS: United States Postal Service
WDFW: Washington State Department of Fish and Wildlife
WISHA: Washington Industrial Safety and Health Administration
WSDOT: Washington State Department of Transportation
WWHM: Western Washington Hydrology Model

For the purpose of these standards, the terms, phrases, words, and their derivations have the following definitions. When not inconsistent with the context, words used in the present tense include the future tense and words in the plural form include the singular form. The word “must” is mandatory. The word “may” is permissive. The Public Works Director has the authority to interpret definitions. Definitions found in the LMC shall apply to these standards.

Appurtenances

Machinery, appliances, or auxiliary structures attached to the main structure, but not considered integral for the purpose of enabling it to function.

APWA

Professional association of public works agencies, private companies, and individuals dedicated to professional excellence and public awareness through education and advocacy.

AWWA

A professional association that is an international, nonprofit, scientific and educational society dedicated to providing total water solutions assuring the effective management of water.

Arterial

Road or street primarily for through traffic, such as roads or streets that are considered collectors. This does not include local access roads limited to access for neighboring properties.

Auxiliary Supply

Water source or system, other than the City’s water system, that may be available in a building or premises.

Backflow

Flow in a direction other than its intended direction of water, gas, or substances into the distribution system of a public utility system. Back pressure means backflow caused by a pump, elevated tank, boiler, or other means that could create pressure within the system greater than the City's supply system pressure. Back siphonage is a form of backflow due to negative or sub-atmospheric pressure within a utility system.

Backflow Prevention Assembly

Assembly approved by Washington State to protect against cross-connection.

BMP

Schedule of activities, prohibition of practices, procedure, or structural or managerial practice approved by the City, Ecology, or another governing body that prevents or reduces the release of pollutants and other adverse impacts to the environment.

Bioswale

Long, gently sloped, vegetated ditch designed to remove pollutants from stormwater.

Bioretention

Stormwater best management practice consisting of a shallow landscaped depression designed to temporarily store and promote infiltration of stormwater runoff. Standards for bioretention design are specified in

Bollard

Post used to prevent vehicular access. A bollard may or may not be removable.

Lynnwood Surface Water Design Manual

Guiding document to Lynnwood standards containing technical and administrative procedures established by the Public Works Director that describe methods to be used, level of analysis required, and other details for implementation of the provisions of surface water design.

Buffer Zone

Area contiguous to a critical area required for the continued maintenance, functioning, or structural stability of a critical area.

BSBL

Line measured parallel to a property, easement, drainage facility, or buffer boundary that delineates the area (defined by the distance of separation) where buildings or other obstructions are prohibited. Wooden or chain link fences and landscaping are allowable within a building setback line.

CESCL

Individual with erosion and sediment control training that meets minimum standards established by state Ecology with the skills to assess site conditions and construction activities that could impact the quality of stormwater and the effectiveness of erosion and sediment

control measures used to control the quality of stormwater discharges. Certification is obtained through an Ecology approved erosion and sediment control course.

City Engineer

City Engineer or their designee.

Civil engineer

Person licensed by the State of Washington as a professional engineer (PE) in civil engineering. May include specialized areas of Civil Engineering including structural, geotechnical, transportation, sanitary, and hydraulic engineering.

Clearing

Conversion of a native vegetated surface to a non-native surface.

Commercial Project (or land use)

Project or land use requiring a commercial building permit, or a site where a permit would be required for the construction of a building, including industrial projects or land uses and mixed-use, commercial, or multi-family projects or land uses.

Conveyance System

Drainage facilities and features, both natural and constructed, that provide for collection and transport of surface water or stormwater runoff. Natural elements of a conveyance system include swales and small drainage courses, streams, rivers, lakes, and wetlands. Constructed elements of a conveyance system include gutters, ditches, pipes, catch basins, channels, and most flow control and water quality facilities.

Critical Area

Any of the following areas or ecosystems: aquifer recharge areas, fish and wildlife habitat conservation areas, frequently flooded areas, geologically hazardous areas, streams, and wetlands as defined in [LMC 17.10.030](#).

Critical area report

Report evaluating probable impacts of development proposal on critical areas regulated under [LMC 17.10.030](#).

Culvert

Pipe or concrete box structure that drains open channel, swale, or ditch under roadways or embankments, typically with no catch basins or maintenance holes along its length.

Cut Slope

Slope formed by excavating overlying material to connect the original ground surface with a lower ground surface created by the excavation.

Dedication of Land

Assigning ownership for a portion of a property for a specific use or function.

Engineer of Record

Professional engineer who seals project drawings, reports, or documents acknowledging that the professional engineer prepared, coordinated, or had direct supervision of the drawings, reports, or documents for a project's permit or approval submittal.

Detention

Release of surface and stormwater runoff from site at a slower rate than collected by the drainage facility system, with the difference being held in temporary storage.

Detention Facility

Facility that collects water from developed areas and releases it at a slower rate than it enters. Excess of inflow over outflow is temporarily stored in a pond or vault and is typically released over hours or days.

Developer

Property owner, public agency, public or private utility, person, contractor, or entity named in writing by property owner on an application for a development, permit, or approval to act as applicant that owns right-of-way or other easement, or adjudicated rights to such easement under RCW 8.12.090.

Development

Activity upon land consisting of construction or alteration of structures, earth movement, dredging, dumping, grading, filling, mining, removal of sand, gravel, or minerals, driving of piles, drilling operations, bulk heading, clearing of vegetation, activities associated with construction of structures or infrastructure, or other land disturbance or development activities. Includes storage or use of equipment or materials inconsistent with existing use. Also includes approvals issued by City binding land to specific patterns of use including, but not limited to, subdivisions zone changes, conditional use permits, and binding site plans.

Development Review Engineer

Responsible for conditioning, review, inspection, and approval of right-of-way use permits and road and drainage improvements constructed as part of development permits administered by the City.

Development Services

Interdisciplinary project and permit review team consisting of staff from the Community Development, Fire, and Public Works Departments.

Director

Public Works Director.

Ditch

Constructed channel with top width less than 10 feet at design flow.

Drainage Facility

Constructed or engineered feature that collects, conveys, stores, treats, or otherwise manages stormwater runoff or surface water. Includes, but is not limited to, constructed or engineered stream, lake, wetland, or closed depression, or a pipe, channel, ditch, gutter, flow control facility, flow control BMP, water quality facility, erosion and sediment control facility, and any other structure and appurtenance that provides for drainage.

Easement

Legal right to use a parcel of land for a particular purpose. Does not include fee ownership but may restrict the owner's use of the land.

Ecology

Washington State Department of Ecology.

Embankment

Structure of earth, gravel, or other material raised to form pond bank or foundation for road.

Energy Dissipater

Means by which the total energy of flowing water is reduced. Usually, mechanism that reduces velocity prior to or at discharge from an outfall in order to prevent erosion. Includes rock splash pads, drop maintenance holes, concrete stilling basins or baffles, and check dams.

Erosion

Process whereby wind, rain, water, and other natural agents mobilize and transport particles.

Potential Erosion Hazard Area

Areas as defined having the potential to rill and inter-rill erosion hazard or those areas containing soils which, according to the USDA Soil Conservation Service Soil Classification System, may experience erosion hazard as delineated on the City's Geological Hazardous Areas map: <https://www.lynnwoodwa.gov/files/sharedassets/public/public-works/environmental-photos/environmental-docs/geologically-hazardous-areas-map.pdf>.

Existing Conditions

Conditions of access, utilities, development, street or intersection lane geometry and type of control, traffic demand, vegetation, and impervious cover at time of analysis.

Fill Slope

Slope formed by placing and compacting material to create a slope and surface that is higher than the original ground surface.

Fire Marshal

Fire Marshal or their designee.

Franchise Area

Area defined within an individual franchise agreement entered into by the City and another party for a specified purpose, generally including street rights-of-way.

Geotechnical Engineer

Civil engineer, licensed by Washington State, with at least 4 years of professional employment as a geotechnical engineer specializing in the design and construction aspects of earth materials.

Grading

Shaping, excavating, or filling of ground surface.

Groundwater

Water in a saturated zone or stratum beneath the surface of land or a surface water body.

Illicit Discharge

Non-stormwater discharge to a stormwater drainage system causing or contributing to violation of state water quality, sediment quality, or ground water quality standards including, but not limited to, sanitary sewer connections, industrial process water, interior floor drains, car washing, and gray water systems.

Improvement

Permanent, man-made, physical change to land or real property including, but not limited to, buildings, streets, driveways, sidewalks, crosswalks, parking lots, water mains, sanitary and storm sewers, drainage facilities, and landscaping.

Infrastructure

Basic public installations such as roads, transportation systems, parks, and utilities.

Land Disturbing Activity

Activity that results in a change in existing soil cover (vegetative, non-vegetative, or existing soil topography) to include demolition, construction, clearing, grading, filling, excavation, and compaction. Does not include tilling conducted as part of agricultural practices, landscape maintenance, or gardening.

Land surveyor

Person licensed by the State of Washington as a professional land surveyor.

LID

Stormwater and land use management strategies that strive to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation, and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices integrated into the project design.

LID Principles

Land use management strategies that emphasize conservation, use of on-site natural features, and site planning to minimize impervious surfaces, native vegetation loss, and stormwater runoff.

Maintenance

Usual activities taken to prevent decline, lapse, or cessation in use of currently serviceable structures, facilities, BMPs, equipment, or systems if there is no expansion of any of these and there are no significant construction impacts.

Maintenance includes repair or replacement of non-functional facilities and BMPs, and the replacement of existing structures with different types of structures, if the repair or replacement is required to meet current engineering standards or is required by one or more environmental permits and the functioning characteristics of the original facility or structure are not changed.

Multi-family Project or Land Use

Project or land use requiring commercial building permit or commercial site development permit for development of residential dwelling units, not detached single family or duplex dwelling units.

NPDES

Part of the Clean Water Act that requires point source discharges to obtain permits administered by Ecology and referred to as NPDES Phase II Permit.

Outfall

Point where collected and concentrated surface and stormwater runoff is discharged from a pipe system or culvert.

Owner

Each legal owner of a property to which municipal service is provided or will be benefitted by an extension or alteration of municipal utility systems.

Permeable Pavement

Pervious concrete, porous asphalt, permeable pavers, or other forms of pervious or porous paving material intended to allow passage of water through a pavement section. Often includes an aggregate base providing structural support and acting as a stormwater reservoir.

Pervious Surface

Surface material that allows stormwater to infiltrate into ground. Examples include lawn, landscape, pasture, and native vegetation areas. Note, for purposes of threshold determination and runoff volume modeling for detention and treatment, vegetated roofs and permeable pavements are to be considered impervious surfaces, along with lawns, landscaping,

sports fields, golf courses, and other areas that have modified runoff characteristics resulting from the addition of underdrains.

Storm Pipe System

A network of storm drainpipes, catch basins, maintenance holes, inlets, and outfalls designed and constructed to convey surface water.

Plat

Map or representation of subdivision showing division of tract or parcel of land into lots, blocks, streets, or other divisions and dedications as defined in the LMC.

Pre-application

Form and/or meeting used by the Developer for development permit to present initial project intentions to Development Services. Pre-application is not the same as application.

Project

Proposed action to alter, develop, or redevelop a site that also may require permitting and engineering review.

Project Site

Portion of site and off-site areas subject to proposed project activities, alterations, and improvements.

Public Works Director

Public Works Director or their designee.

Receiving Bodies of Water

Creeks, streams, rivers, lakes, and other bodies of water into which surface waters are directed, either naturally or in manmade ditches or piped systems.

Record Drawings

Engineering plans that have been revised to reflect changes to plans that occurred during construction.

Residential Access Street

Neighborhood or local access street.

Riprap

Facing layer or protective mound of stones placed to prevent erosion or sloughing of a structure, construction entrance, or embankment due to the flow of surface and stormwater runoff.

Sediment

Fragmented material that originates from weathering and erosion of rocks or unconsolidated deposits, and which is transported by, suspended in, or deposited by water.

Short Plat

Map or representation of a short subdivision as defined in the LMC.

Short Subdivision

Division of land into four or less lots, tracts, parcels, sites, or subdivisions for the purpose of sale, lease, development, or financing as defined in the LMC.

Sidewalk Section

Portion of driveway approach lying between the back edge of the sidewalk and apron, including end slopes, measured at the front edge of the sidewalk.

Sight Triangle

Unobstructed line of sight along both approaches of both roads at an intersection, and across included corners for distance sufficient to allow the operators of both vehicles, approaching simultaneously, to see each other in time to prevent a collision.

Significant Trees

Trees that are six inches or larger in diameter at breast height (DBH) as defined in [LMC 17.15.080](#)

Slope

Gradient in a ratio of horizontal feet per vertical feet or expressed as a percentage. Side slope ratios of drainage facilities are referred to with the horizontal dimension first.

Start of Construction

The date on which land disturbing activities (not including tree or vegetation removal that does not include soil disturbance or excavation) commence associated with an active construction permit.

Storm Drain

Enclosed conduits that transport surface and stormwater runoff toward points of discharge (sometimes called storm sewers).

Storm Drain System

System of gutters, pipes, streams, or ditches used to carry surface and stormwater from surrounding lands to streams, lakes, or Puget Sound.

Stormwater

Water produced during precipitation or snowmelt that runs off, soaks into ground, or dissipates through evapotranspiration.

Stormwater runoff

Stormwater that flows over or below the surface. Stormwater runoff contributes to and becomes surface water or groundwater.

Surface Water

Water existing on land surfaces before, during, and after stormwater runoff, such as water found on ground surfaces and in drainage facilities, rivers, streams, springs, seeps, ponds, lakes, wetlands, and Puget Sound. It also includes shallow groundwater.

Swale

Shallow drainage conveyance with relatively gentle side slopes, generally with flow depths less than 1 foot.

Temporary Erosion and Sediment Control (TESC) Measures

Erosion and sediment control measures implemented before final stabilization of a site to reduce erosion, control siltation and sedimentation, and prevent discharge of sediment-laden water from the site.

Tract

Legally created parcel of property designated for special non-residential and non-commercial uses.

PERMITS

Permit Types and Standards

PERMIT PROCESS

Permit Process and Fees

PERMIT SUBMITTALS

Design Professionals

PERMIT FEES

Public Works

Transportation Impact

DBS – My Invoices

Revisions to Issued Permit

DIVISION 2 – RIGHT-OF-WAY

STANDARDS

CHAPTER I

Companion Documents

When standards or other design criteria are not specifically addressed in the Engineering Design Manual (EDM), then the most current editions of the following shall govern the design. Transportation design standards:

Design Manual, Washington State Department of Transportation (WSDOT); available online at <https://www.wsdot.wa.gov/Publications/Manuals/M22-01.htm>.

WSDOT Bridge Design Manual LRFD (Load And Resistance Factor Design), available online at <https://www.wsdot.wa.gov/publications/manuals/fulltext/M23-50/BDM.pdf>.

Traffic Engineering Handbook 7th Edition 2016; can be purchased online at <https://www.vitalsource.com/products/traffic-engineering-handbook>.

A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials (AASHTO); available online at <https://www.fhwa.dot.gov/programadmin/standards.cfm>.

AASHTO LRFD Bridge Design Specifications, 9th Edition 2020; available for purchase at <https://aashtojournal.org/2020/05/08/aashto-issues-updated-lrfd-bridge-design-guide/>.

AASHTO Roadside Design Guide 4th Edition, 2011; can be found online at <https://www.scribd.com/document/387124543/AASHTO-Roadside-Design-Guide-4th-ed-2011-pdf>.

2021 International Building Code (IBC); available for purchase online at <https://codes.iccsafe.org/content/IBC2021PI>.

Manual on Uniform Traffic Control Devices (MUTCD); available online at <https://mutcd.fhwa.dot.gov/index.htm>.

Safety Analysis Guide, April 2020, WSDOT; available online at <https://wsdot.wa.gov/publications/fulltext/design/ASDE/Safety-Analysis-Guide.pdf>.

Urban Street Geometric Design Handbook, Institute of Transportation Engineers (ITE); available for purchase online at <https://www.ite.org/technical-resources/topics/geometric-design/>.

Guide for the Development of Bicycle Facilities, AASHTO; available online at <https://nacto.org/references/aashto-guide-for-the-development-of-bicycle-facilities-2012/>

Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way, United States Access Board; available online at <https://www.access-board.gov/prowag/>.

Americans with Disabilities Act (ADA) Standards for Accessible Design; available online at <https://www.ada.gov/regs2010/2010ADAStandards/2010ADAstandards.htm>.

Small Town and Rural Multimodal Networks, Federal Highway Administration (FHWA); available online at https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/fhwahep17024_lg.pdf.

Urban Bikeway Design Guide, National Association of City Transportation Officials (NACTO); available for purchase online at <https://nacto.org/publication/urban-bikeway-design-guide/>.

Urban Street Design Guide, NACTO; available for purchase online at <https://nacto.org/publication/urban-street-design-guide/>.

Surface water design standards:

Stormwater Management Manual for Western Washington (SWMMWW), Washington State Department of Ecology (Ecology), (Current Edition) SWMMWW Modifications; available online at <https://www.lynnwoodwa.gov/Government/Departments/Public-Works/Environmental-and-Surface-Water-Management/National-Pollution-Discharge-Elimination-System-NPDES>

King County Surface Water Design Manual (KCSWDM), Chapter 4 “Conveyance System Analysis and Design,” as amended in Chapter 26 Conveyance System; available online at <https://kingcounty.gov/services/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx>.

Highway Runoff Manual, Best Management Practices, (HRM) M31-16.05, WSDOT; Only publicly funded linear transportation projects may use the BMPs and minim design requirements, except Low Impact Development (LID) Feasibility (HRM Section 405.2 and within individual BMP design criteria in Section 5-4); available online at <http://www.wsdot.wa.gov/Publications/Manuals/M31-16.htm>.

Traffic control design standards:

- i) *Manual on Uniform Traffic Control Devices*(MUTCD), FHWA; available online at <http://mutcd.fhwa.dot.gov>.

Construction specifications:

- ii) *Standard Specifications for Road, Bridge, and Municipal Construction* M 41- 10, WSDOT; available online at <http://www.wsdot.wa.gov/Publications/Manuals>.

The following shall be applicable when pertinent, when specifically cited in these standards, or when required by a state or federal funding authority:

- iii) Highway Capacity Manual, Transportation Research Board, available for purchase online at <https://www.trb.org/publications/hcm6e.aspx>.
- iv) National Electrical Installation Standards (NEIS); available for purchase online at <http://www.neca-neis.org/>.
- v) American Society for Testing and Materials (ASTM); available for purchase online at <https://www.astm.org/Standard/standards-and-publications.html>.
- vi) Design criteria of federal agencies including the Federal Housing Administration, Department of Housing and Urban Development, and the FHWA Department of Transportation.

GENERAL REQUIREMENTS

CHAPTER 2

Public Rights-of-Way Accessibility Guidelines (PROWAG)

All designs shall meet the current ADA requirements and standards. The City standard for ADA requirements is the Public Right-of-Way Accessibility Guidelines (PROWAG).

In the event field conditions prohibit meeting ADA requirements, the Applicant's/Permittee's engineer shall submit documentation that the designed and constructed improvements meet ADA requirements to the maximum extent feasible (MEF). The Applicant's/Permittee's engineer shall use the City's standard forms for the MEF documentation. After construction, the as-built conditions shall be surveyed by a surveyor licensed in the State of Washington. The Applicant's/Permittee's engineer shall revise the MEF documentation to reflect the as-built conditions.

Low Impact Development

Requirements for LID apply to both on-site improvements and improvements in the right-of-way. Refer to the SWMMWW as adopted.

Permeable sidewalks installed in the right-of-way shall follow BMP T5.15. Bioretention installed in the right-of-way shall follow BMP T9.10.

Proprietary emerging stormwater treatment technologies that have received Ecology General Use Level Designation may be installed in the right-of-way with approval of the Director.

Maintenance

Following the acceptance of donated assets, the City maintains and repairs public streets.

Specific tasks include:

Public roadway maintenance;

Public retaining wall maintenance; and

Street signs inventory and maintenance.

Per LMC 12.12.040, Sidewalks and/or walkways shall be maintained by the abutting property owner, free and clear of ice and snow, all vegetation, and free of all materials which are not a part of surfacing material fixed by the construction design standards of the department of public works. The cost of sidewalk reconstruction shall be consistent with LMC 12.12.06.

Street Tree Removal/Planting Strip Maintenance

Except as otherwise provided in LMC 17.15.150, it shall be unlawful for any person to remove a tree within the City of Lynnwood without having first obtained a valid tree removal permit.

In accordance with LMC 12.12.050 is it the responsibility and duty of the abutting property owner to maintain and reconstruct planting strips. Trees behind the curb and gutter are maintained by the abutting property owner.

During construction, it is the responsibility of the Developer to maintain and protect trees. Tree preservation requirements can be found online at

<https://www.lynnwoodwa.gov/files/sharedassets/public/public-works/environmental-photos/environmental-docs/tree-preservation-guidelines.pdf>.

Pedestrian and Vehicular Connectivity

In order to provide connectivity, street layouts shall continue to streets in adjoining developments(s) or their anticipated locations where adjoining property is not yet developed.

Overhead Utilities

Existing overhead wires including, but not limited to, telephone, cable television, and electrical wires, shall be relocated underground with new development or redevelopment in accordance with the requirements of Chapter 12.20 of the LMC, and all new wires shall be installed underground.

Frontage Improvements

Certain activities require the installation of frontage improvements, refer to LMC 12.12.30. Standard frontage improvements consist of dedication of right-of-way, curb, gutter, sidewalk, amenity zone and landscaping, drainage improvements, and pavement overlay up to one-half (0.5) of each right-of-way abutting a property. Additional improvements may be required to ensure safe movement of traffic, pedestrians, bicycles, transit, and nonmotorized vehicles. The improvements can include transit bus shelters, bus pullouts, utility undergrounding, street lighting, signage, and channelization.

When a development proposal requires frontage improvements, existing frontage improvements shall be upgraded to current standards.

When frontage improvements are required, City staff will review the required improvements for consistency with the City of Lynnwood's Complete Streets as adopted by Ordinance 3424. The Complete Streets policy strives to provide an integrated multimodal transportation system that provides for the safe accommodation of pedestrians, bicyclists, transit users, motorists, and users of all ages and abilities.

Acknowledging that the City is a built environment, design and installation of new or replaced frontage improvements may be adjusted during design or installation, with approval from the Director, to meet the existing conditions. Approval may require a formal Deviation from Engineering Standards as determined by the Director.

Standard Plans [ST-ROA-1](#) and [ST-ROA-2](#) define street widths, curb locations, sidewalk widths, and other right-of-way requirements for all streets.

The frontage improvements run the full length of the property line/right-of-way line.

Transitions to existing conditions occur outside the development frontage.

An amenity zone is required, except where an alternate street design has been approved, or where protection of critical areas requires special consideration. Required frontage

improvements shall be installed, inspected, and approved by the City prior to final approval of the related building/site development permits and before a Certificate of Occupancy is issued or a permit receives final approval.

The installation of required frontage improvements shall not create flooding, ponding, or other drainage issues.

The design of frontage improvements shall address the access needs of the adjacent land use, such as mail collections, solid waste and recycling services, and deliveries.

Dedication of Right-of-Way

- a) Dedication shall occur at the time of recording for subdivisions or prior to permit issuance for construction projects.
- b) The City may require right-of-way dedication to incorporate necessary transportation and frontage improvements.
- c) The Director may grant some reduction in the minimum right-of-way requirement where it can be demonstrated that sufficient area has been provided for all frontage improvements, including utilities, within the right-of-way.
- d) Dedications may be required in the following situations:

Accommodation of motorized, pedestrian, and bicycle transportation, landscaping, utility, street lighting and traffic control devices, and buffer requirements.

The development project abuts an existing substandard public street and the additional right-of-way is necessary to incorporate future frontage improvements for public safety.

Right-of-way is needed for the extension of existing public street improvements necessary for public safety.

Right-of-way is needed to incorporate improvements that are reasonably necessary to mitigate the direct impacts of development.

- e) Trees located on private property that will be dedicated to the City as a right-of-way dedication will not be considered street trees for the purposes of determining required replacement trees. Only trees within the existing right-of-way are considered street trees.

Illumination

- a) City of Lynnwood Public Works – Traffic maintains and establishes service connections for street lighting within the City. When new street lighting is required, the Applicant/Permittee works with the Public Works Department regarding design and installation. The Applicant/Permittee pays the costs associated with the design and installation of the lighting. These costs may include new electrical service and/or a new pole.
- b) Where a half-street improvement is required in conjunction with a development, the roadway width to be used for illumination design purposes shall be the actual width of the roadway at the time of design and not half of the ultimate width. All existing luminaires shall be evaluated for upgrades to present standards. Lighting standards shall be approved by Public Works.
- c) Projects within the City Center shall provide new street lighting consistent with the [City's Streetscape Plan](#). Projects shall provide both vehicular and pedestrian scale lighting as identified in the Streetscape Types.

- d) Street lighting outside the City Center shall be designed to meet the performance standards in Table 7.1, Pedestrian Lighting Requirements and Table 7.2 Pedestrian Facility Light Levels. Luminaire details are found the [City Standards Plans: Traffic](#).

Table 7.1. Pedestrian Lighting Requirements

Parameter	Performance Standard
Calculated "Illumination Path" Width	10'
Maintained Average Horizontal Measured at Pavement	1.0 foot-candle
Average : Minimum Uniformity Ratio	6.0 : 1
Calculation Grid Size	5' on center
Applied Light Loss Factor	0.85
Color Temperature	3,000K

Table 7.2. Pedestrian Facility Light Levels

Pedestrian Facility Type	Minimum Maintained Avg. (foot candles)	Uniformity Ratio (Avg/Min)
Marked Intersection or Mid-Block Crossing	1.0	3:1
Unmarked Crosswalk at Intersection	Same as adjacent intersection	
Sidewalk Adjacent to Residential Use	1.0	4:1
Sidewalk Adjacent to Commercial Use	0.4	4:1

As-constructed street lighting plans for City-owned systems shall be provided to the City. Street lighting systems shall be designed to be accessible by a wheeled vehicle weighing 30,000 pounds.

Contractor cabinets equipped with electrical meters, time clocks, circuit breakers, and other required components are required on arterial installations of five (5) or more streetlights or as required by the Director.

The exact location of the power source shall be indicated, along with the remaining capacity of that circuit. System continuity and extension shall be provided.

Street lighting may be required along private streets. Street lighting systems for private streets shall be designed and constructed on a separate power source from the public street lighting system. All streetlight maintenance, installation, and power costs for private street systems shall be paid by the property owner, homeowner, or homeowners' association.

Curbing

- Curb and gutter shall be Type A per Standard ST-CG-1 on all street classifications;
- however, 24-inch-wide vertical curb may be used for uniformity or replacement;
- Rolled curb Shall be per City of Lynnwood Standard Plan ST-CG-4;
- Extruded curb Shall be per City of Lynnwood Standard Plan ST-CG-3;

- e) Mountable curb shall be per WSDOT Standard Plan F-10.64-03.

Pavement Cut Moratorium (LMC #)

- a) The following applies to a utility doing work, such as system repair or expansion, within the right-of-way. This moratorium does not apply to utility service installation required for new development or redevelopment.

Any street that has been constructed, reconstructed, resurfaced, overlaid or paved within the past five (5) years cannot be cut for five (5) years from the date of project completion unless the moratorium fee is paid and the standard for pavement repair is followed, or A Deviation from Engineering Standards is approved, or it is allowed through a valid franchise agreement.

Emergency situations are exempt from the five (5) year moratorium. A right-of-way permit shall be applied for within 48 hours after beginning emergency work in the right-of-way. This applies to only publicly operated utilities.

TRANSPORTATION IMPACT ANALYSIS

CHAPTER 3

Transportation Impact and Concurrency

The city requires the collection of Transportation Impact Fees for streets and roads, and for certain other matters as provided in LMC 3.105. The Transportation Concurrency shall implement the concurrency provisions as provided in LMC 12.22. of the transportation element of the city's comprehensive plan including but not limited to capacity evaluations, level of service and traffic studies.

STREET CLASSIFICATION

Federal and state guidelines require that streets be classified based on function. The City mainly classifies streets as arterial or non-arterial (local). Other classifications include alley and private streets. The street classification map is available in the [2015 Comprehensive Plan](#) on Figure T-5 – Arterial Roadway System. Street classification is approved through the Transportation Master Plan (TMP) process.

CHAPTER 4

Principal Arterial

Principal arterials connect major regional facilities (such as freeways) to the rest of the street network. The principal arterial system carries most of the trips entering and leaving the City, as well as travel between central business districts and residential communities or between major inner-city destinations.

Minor Arterial

The minor arterial is the next highest arterial category, connecting principal arterials to other minor arterials, collector arterials, and neighborhood streets. Minor arterials provide for vehicular movements among the various areas within the City of Lynnwood. They accommodate trips of moderate length.

Collector Arterial

Collector arterials collect traffic from the neighborhood streets and convey it to the principal and minor arterials. Collectors also serve as connections between the smallest areas within the City, providing safe and reasonable access between neighborhoods.

Neighborhood Streets (Non-Arterial Streets)

Streets that are not designated as arterials are non-arterial streets.

Woonerf

“Woonerf” is a Dutch term that means a circulation area shared by pedestrians, wheeled users and vehicles, and is accessible to surrounding uses. Woonerfs are located in areas where urban space is encouraged to extend into the street.

Alley

Per Revised Code of Washington (RCW) 46.04.020, an alley is a public right-of-way that is used primarily as a means of access to the rear of residences and business establishments and is not designated for general vehicular or pedestrian travel. The City does not maintain alleys.

Private Street

A private street is a privately owned and maintained street providing vehicular access within a property or properties. The City may approve a private street under certain conditions. Refer to EDM Section 12.8 Private Streets for more information.

ACCESS MANAGEMENT

Access Management Ordinance 2968 recognizes the need to balance access to private properties with the maintenance of safety, capacity, and Level of Service (LOS) on the streets that provide access. Property owners abutting City right-of-way generally have a right to access, but the means of access shall be reviewed and approved by the City.

Safety and the function (both current and future) of each street are the foremost factors in determining the number, location, and design of street accesses. Roadway design elements such as auxiliary lanes, medians, channelization, and safe stopping and turning sight distances also are factors in access management, as are the elements of land development, such as internal site circulation and parking layout. Access management is implemented via the Right-of-Way Use Permit, Site Development Permit, and Subdivision review processes.

CHAPTER 5

General

- a) Authority:
 - i) City Rights-of-Way – The Director approves the design, number, and location of access points to City rights-of-way. When changes in land use result in changes to the type and operation of access, the access location and design will be reviewed with the development plans and shall be constructed or modified to meet current standards.
 - ii) State Highways – Access to state highways is regulated by WSDOT pursuant to Chapter 47.50 RCW and Chapters 468-51 and 468-52 Washington Administrative Code (WAC). Two classifications of state highway exist within

City Limited Access and Managed Access. Interstate 5, I-405, and State Route (SR) 525 are Limited Access Highway within or along the City's borders. SR 99, and SR 524 (196th Street SW), and SR 524 Spur (44th Avenue W, south of 196th Street SW) are Managed Access Highways within or adjacent to the City. For information on access permitting, please visit the WSDOT website at <https://wsdot.wa.gov/engineering-standards/design-topics/utilities-railroads-agreements/utility-accommodation-permits-and-franchises>.

- iii) Construction or improvement of an access, approach, or driveway, or construction of any classification of street that will intersect a state highway shall be designed in accordance with this EDM and WSDOT requirements. Where applicable state or federal standards may exceed the requirements of the EDM; state or federal standards shall govern.

b) Consolidation of Access:

In the interest of safety and efficient traffic operations, access to individual and contiguous lots should be consolidated to the extent practicable. Access will be reviewed and approved to minimize conflicts between vehicles, pedestrian and bicycle traffic, and traffic entering and exiting adjacent driveways.

Each lot shall have access to a public right-of-way by:

Direct access to a right-of-way;

A recorded easement providing shared access; or

A recorded tract providing shared access.

No more than one (1) access shall be provided to an individual lot, to contiguous lots under the same ownership, or to lots that are included in the same subdivision or project, unless approved by the Director. Additional access may be granted to contiguous lots if the minimum spacing requirements are met or if a Traffic Engineering Study acceptable to the Director demonstrates that the additional access will not adversely affect safe operation of the street.

- c) Required Access – All new developments shall be served by adequate vehicular access as follows:
 - i) Every lot upon which one (1) or more building(s) is proposed to be erected, or where a traffic generating use is proposed, shall establish direct access from the street right-of-way, access easement, or fire lane, as needed, to provide public services such as fire protection, emergency medical service, mail delivery, or trash collection.
 - ii) The circulation system of the proposed development shall intersect with existing and planned streets abutting the site at approved locations.
 - iii) The circulation system within the proposed development shall provide direct connections to adjacent developments (inter-lot) where appropriate and/or required.
- d) Maintenance – Maintenance of driveway approaches shall be the responsibility of the owner whose property they serve.
- e) Restriction of Turning Movements – Conflict reduction measures may be required to safely manage turning traffic to and from the development site. Median design and driveway channelization are appropriate to reduce conflicts.
- f) Traffic control devices controlling traffic from private property shall be installed by the property owner at no cost to the City.

- g) Abandoned Access – All abandoned accesses on the same frontage shall be removed within thirty (30) days after abandonment, and the curbing, sidewalk, and amenity zone or shoulder and ditch section shall be restored to meet current standards.
- h) Temporary Access – The City Engineer may grant temporary access to accommodate phased development of a site in accordance with an approved phasing plan. Temporary access shall be removed, relocated, redesigned, or reconstructed after permanent, approved access is constructed.

ACCESS DESIGN

All accesses shall be located, designed, and constructed to minimize traffic congestion and maximize public safety on the street system. This chapter provides location and design criteria for access at the right-of-way line, access approach in the right-of-way, and driveways internal to a property.

CHAPTER 6

General

- a) Access to the right-of-way shall be designed as an access approach.
- b) Access design shall comply with required grade transitions while considering building setback, terrain, and existing and designed grades.
- c) Emergency Vehicles – All accesses shall be located and designed to readily accommodate emergency vehicles that would ordinarily respond to the site in question. The International Fire Code also shall apply to driveways designated as fire lanes and/or fire apparatus access roads.
- d) Traffic Control Devices – All on-site traffic control devices, including signs and pavement markings, shall meet MUTCD standards.

Access Width

The access width is measured at the right-of-way/property line. Table 11.1 provides maximum/minimum access widths. The City Engineer may approve a wider access when the traffic study or the turning radius of the appropriate design vehicle turning radius warrants the wider access.

Table 11.1. Access Widths

Access Types	Non-Arterial Streets		Arterial Streets	
	Width (ft)		Width (ft)	
	Min.	Max.	Min.	Max.
Residential	10	20	10	20
Shared	20	30	20	30
Multi-Family	20	30	20	30
Commercial	20	30	20	36
Private Street	20	30	20	30

Access Clearance and Spacing

- a) Minimum Offset Distance from Side Property Lines:
The edge of the driveway shall be offset a minimum of ten (10) feet from side property lines, measured at the prolongation of the driveway's intersection with the right-of-way line.
 - i) The minimum offset distance from side property lines to the edge of the driveway shall be:
 - (a) Zero (0) feet for cul-de-sacs, flag lots, lots with a width of 30 feet or less, shared driveways, and single-family attached developments; or
 - (b) Three (3) feet for lot widths between 30 feet and 50 feet.
- b) Minimum Clearance from Intersections:
 - i) Local Streets – Driveways accessing Local Primary or Local Secondary streets shall be located at least 50 feet from the right-of-way line of the nearest intersection street, or at the minimum offset distance from the lot's side property line that is farthest from the intersection.
 - ii) Minor and Collector Arterial Streets – Driveways accessing Minor Arterial or Collector Arterial streets shall be located at least 75 feet from the right-of-way line of the nearest intersecting street, or at the minimum offset distance from the lot's side property line that is farthest from the intersection, whichever is greater.
 - iii) Principal Arterial Streets - Driveways accessing Principle Arterial streets shall be located at least 150 feet from the right-of-way line of the nearest signalized intersection, 100 feet from the nearest un-signalized intersection, or at the minimum offset distance from the lot's side property line that is farthest from the intersection, whichever is greater. Left-turn restrictions may be imposed at driveways that do not meet the foregoing criteria.
- c) Minimum Access Spacing - The minimum distance between access connections is 40 feet from nearest point to nearest point on the same side of the street.
- d) Multiple Frontages and Corner Parcels:
 - i) Access for projects with multiple frontages shall be off the lower classified road except in transition areas. Additional access may be allowed provided spacing requirements are met.

- ii) Access to corner lots shall be located on the lower classification street at the property line most distant from the right-of-way line.
- e) An access shall not be placed in a curb setback or bulb out.

Access Approach

- a) A paved access approach shall be provided between the property line and the edge of pavement in the right-of-way. Approaches shall conform to Standard Detail ST-DW-1 based on site conditions.
- b) The maximum change in access approach profile grade, within the right-of-way, shall be 6 percent within any 10 feet of distance on a crest vertical curve and 12 percent within any 10 feet of distance in a sag vertical curve.
- c) Driveways, parking, or loading areas that require backing maneuvers in a public street shall be approved only for single-family detached or duplex residential uses abutting a Local Secondary street.
- d) A drainage culvert is required for an access approach that crosses an open ditch section. Minimum culvert internal diameter shall be 12 inches or larger if required to carry anticipated stormwater flows. Refer to EDM Division 3, Surface Water for additional information regarding required culvert size and materials.

Driveway

- a) A driveway, including the landing, extends from the access at the property line/right-of-way line onto the property.
- b) Driveways shall be graded to blend into possible future road sections without encroachment into graded shoulder or sidewalk.
- c) A shared driveway has one (1) access to the right-of-way via a shared tract or easement on the private property. Minimum tract/easement length shall be 20 feet from the right-of-way line.
- d) Driveways shall be paved to the nearest property line of the most distant lot sharing the access or 20 feet, minimum, whichever is farther.
- e) All driveways shall be 90 degrees to the street at the right-of-way access unless a Deviation from Engineering Standards is approved.
- f) A landing on a driveway accessing an arterial shall not exceed a 1V:30H slope for 30 feet. For access to a local street, the landing slope shall not exceed 1V:20H slope for 20 feet.
- g) The maximum driveway profile grade is 15 percent.
- h) The maximum change in driveway grade shall be 8 percent within any 10 feet of distance on a crest and 12 percent within any 10 feet of distance in a sag vertical curve.
- i) Grade breaks, including the tie to the roadway, shall be constructed as smooth vertical curves.
- j) Circular Driveways – New circular driveways are not permitted. Revisions to existing circular driveways may be permitted until the site redevelops. Revisions to existing circular driveways shall meet the following criteria:
 - i) The property frontage must be at least 100 feet.
 - ii) The accesses are onto a Local Primary or Secondary street. Circular driveway access shall not be permitted onto Arterial streets.

- iii) Safe stopping sight distance (SSD) is available for both driveways, as demonstrated by a sight distance analysis prepared by a Professional Engineer licensed in the State of Washington and acceptable to the City Traffic Engineer.
 - iv) Circular driveway approaches shall be separated by a minimum of 40 feet between their closest point.
 - v) Driveways shall be no closer than 10 feet to the side property line, measured from the point at which the prolongation of the driveway edge intersects the right-of-way line.
 - vi) Driveways shall not exceed 20 feet in width for residential lots and shall not exceed 30 feet in width for commercial or multi-family lots.
- k) Fire Access Roads – Driveways which serve as a fire apparatus access shall comply with LMC 9.04.200.

Parking Lot Throat Lengths

- a) Traffic signage in a parking lot shall meet MUTCD requirements.
- b) The required throat length at a parking lot access to public right-of-way is determined during the permit review process.
- c) The throat length vehicle storage in parking lots is based on a typical vehicle spacing of 20 feet but may be increased where larger vehicles can be expected.
- d) The City may adjust the on-site throat lengths for accesses with two (2) approach lanes, subject to the traffic analysis findings, roadway geometry, traffic volumes, and site layout.
- e) On-site storage is measured from the right-of-way line to the first parking stall or drive aisle in a parking lot.
- f) Outbound – The throat shall be of sufficient length to provide adequate storage of outbound vehicles without interference with on-site circulation. Outbound vehicle storage areas shall be provided to eliminate backup and delay of vehicles within the development.
- g) Inbound – The throat shall be of sufficient length to prevent vehicles from spilling onto the street system and from obstructing the adjacent street, sidewalk, or circulation within the facility.
- h) Fire Access – Parking lot driveways which serve as a fire apparatus access shall comply with LMC 9.04.200.

STREET DESIGN

This chapter sets the minimum standards for the geometric street design. The most current WSDOT *Design Manual* and the AASHTO Manual shall be used where additional roadway geometric design guidance is necessary

CHAPTER 7

Reconstruction

Reconstructed roadways shall be brought up to current standards.

Transitions or tapers necessary to connect with an existing roadway of a different width shall meet AASHTO and MUTCD standards.

Widths

- a) Minimum widths for specific streets are provided in Chapter 9 Street Classifications.

Typical lane widths are defined in Table 12.1.

Table 12.1 . Typical Lane Widths

Lane Type	Width (ft)
Parking	8
Bus Only	12
Vehicle Lane	11
Bicycle	5
Bicycle Buffer	3

Vertical Alignment

- a) Curve length and stopping sight distance shall be designed to ensure proper drainage, clear sight distance, and safety for vehicles and pedestrians.
- b) The maximum profile grades in Table 12.2 may be exceeded for 300 feet or less upon showing that no practical alternative exists. Exceptions exceeding 15 percent shall require approval by the South Snohomish County Fire and Rescue's Fire Marshal.
- c) Grade transitions shall be constructed as smooth vertical curves except, upon approval of the Director, in intersections where the difference in grade is 1 percent or less.

Table 12.2 . Maximum Profile Grade

Nonarterial	Collector Arterial	Minor Arterial	Principal Arterial
10%	10%	10%	10%

Vertical Curve Criteria

- a) The minimum vertical curve length for roadways is 75 feet.
- b) The point of vertical curvature (PVC) shall not encroach into a cross street any further than the center of pavement of the cross street.
- c) Cross Slope – The typical cross slope is 2 percent crown to provide for adequate drainage to the pavement edge. The maximum cross slope on the tangent sections shall not exceed 4 percent. The minimum cross slope shall be 1 percent.

Horizontal Curve Criteria

- a) Superelevation is not required in the design of horizontal curves of Local Primary and Local Secondary streets but may be needed to meet terrain and right-of-way conditions.
- b) Calculate superelevation according to AASHTO "Low Speed Urban Streets" design methodology.

Street End

Streets end in a cul-de-sac and hammerheads.

- a) Turnaround facilities shall be provided at street ends where the street length from the nearest intersection is more than 200 feet measured from the face of curb to the end of dead-end street pavement and shall be constructed as follows:
 - i) Streets ending in a cul-de-sac shall be limited in length and provide right-of-way as required by LMC 19-35.020. Cul-de-sacs needed for fire apparatus access shall comply with LMC 9.04.200.
 - ii) Right-of-way may be reduced if utilities and necessary drainage are accommodated on permanent easements within the development.
 - iii) Minimum diameter of surfacing across bulb: 80 feet of paving in curb-type road.
 - iv) Cul-de-sac Island (Optional). If provided, island shall have full-depth vertical curb. Minimum diameter shall be 20 feet and there shall be at least 30 feet of paved traveled way in a curb-type section around the circumference. Island shall be landscaped. The adjoining property owners shall maintain the island through a maintenance agreement.
 - v) Sidewalks shall be constructed on both sides of the stem and on the bulb dead-end. Local Primary and Local Secondary streets shall not be longer than 600 feet, measured from the centerline of the intersecting street to the center of cul-de-sac.

The maximum length may be extended to 1,000 feet if 50 or fewer potential units are to be served and there is a provision for emergency vehicle turnaround near mid-length.

A public pedestrian connection or an emergency vehicle access to connect a street at its terminus with other streets, parks, schools, bus stops, or other pedestrian trip generators shall be required. Off-street sidewalks shall be contained in the right-of-way or a sidewalk easement.

If a street temporarily terminated at a property boundary during development serves more than three (3) lots or is longer than 200 feet, a temporary bulb shall be constructed near the subdivision boundary. The paved bulb shall be 80 feet in diameter, with sidewalks terminated at the point where the bulb radius begins. Removal of the temporary cul-de-sac, restoration, and extension of the sidewalk shall be the responsibility of the Applicant/Permittee who extends the road.

The maximum cross grade of a street at the street end shall be 8 percent.

Partial bulbs or eyebrows shall have a minimum paved radius and an island configuration.

Island shall be offset 2 feet from the edge of the traveled way.

A hammerhead may be used to fulfill the requirement to provide a turnaround facility where the street serves (or will serve) four (4) or fewer single-family residential units.

Pedestrian access shall be required to connect a street end to adjacent streets, parks, schools, or other pedestrian facilities. The pedestrian access shall be in right-of-way or, if approved, may be placed in a sidewalk easement. A turnaround facility shall be provided for a public or private dead-end street where the street length is more than 200 feet, measured from the face of the curb to the end of the dead-end street pavement.

Utility Locations

- a) Horizontal location:

- vi) Generally new or replaced utility manholes, catch basins, valve boxes should not be located in the wheel path of any traveled lane.

Vertical and Horizontal location:

- vii) Refer to Department of Ecology Criteria for Sewage Works Design (Orange Book) for separation requirements of sewer mains and potable water mains. Electric Utilities, Power, Telephone, Fiber-Optic Cable, and Cable TV:
 - viii) Utility poles or other appurtenances shall be located as far from the travel lane or auxiliary lane as conditions allow. No pole or appurtenance shall be located so that it poses a hazard to the general public. Utilities shall place and replace poles with primary consideration given to public safety.
 - ix) Locations of poles shall be compatible with driveways, intersections, and other road features. A pole shall not interfere with sight distances, road signage, traffic signals, culverts, trees, etc.
 - x) Utility poles or other appurtenances shall be located at the back of ditches, unless an alternate location is approved by the Director.
 - xi) Utility poles should not be placed in sidewalks, curb ramps, or landing areas. Utility poles will not impede ADA access in any way.
 - xii) On roadways having vertical curb, poles and obstacles shall be placed clear of sidewalks.
 - xiii) Deviations from the pole and obstacle clearance criteria may be requested by utilities when there are no other viable alternatives and shall identify adequate protection for motorized and nonmotorized users.
 - xiv) Hanging utility wires between poles shall not obstruct traffic signals or signage.

Private Streets

Private street design and installation shall meet all applicable City standards.

A Private Street Covenant shall be executed with the City to ensure maintenance to City standards.

Private streets with a dead-end must meet fire code access requirements. A dead-end street must meet LMC 19.35.010.

The private street shall be paved. Road surfacing shall meet City Standard Plan ST-ROA-1 for private commercial streets and City Standard Plan ST-ROA-2 for private residential street. With approval from the Public Works Director, the width of private residential streets can be reduced to meet fire code access requirements.

xv) Within City Center, private streets shall meet City Center Street Standards. Street lighting systems for private streets shall be designed and constructed on a separate power source from the public street systems and shall be the responsibility of the property owner, homeowner, or homeowners' association.

Private streets shall be designed to provide adequate access for trash collection and merchandise deliveries.

Driveway access to a private street shall meet City Standard Plan ST-DW-1.

INTERSECTION DESIGN

The design criteria in this chapter apply to street intersections. Intersections include driveway access as well as an approach to a street.

To the extent feasible, intersection design shall conform to the guidelines set forth in the most

current versions of the WSDOT *Design Manual*, AASHTO Policy on Geometric Design, the ITE Urban Street Geometric Design Handbook, and the MUTCD, including alignment, sight distance, and geometric elements.

CHAPTER 8

Alignment

The angle of an intersection of two (2) streets shall be 85 degrees to 95 degrees. Approval for modification may require a formal Deviation from Engineering Standards as determined by the Director.

It is desirable that entering through traffic is aligned with the exit lanes at an intersection. However, the entering and exit lanes may be offset up to 6 feet as shown in Figure 13.1, Maximum Intersection Lane Alignment Offset, when the following conditions are met:

- xvi) Illumination is provided.
- xvii) The intersection is not within a horizontal curve and is not within a crest vertical curve.
- xviii) The taper rates provided in Table 13.1 are used.

Dotted extension lines may be required when the travel lanes are offset.

Special consideration shall be made when the exit lanes have been shifted to the right to ensure vehicles can safely traverse the intersection without conflicting with on-coming traffic.

Figure 13.1. Maximum Intersection Lane Alignment Offset

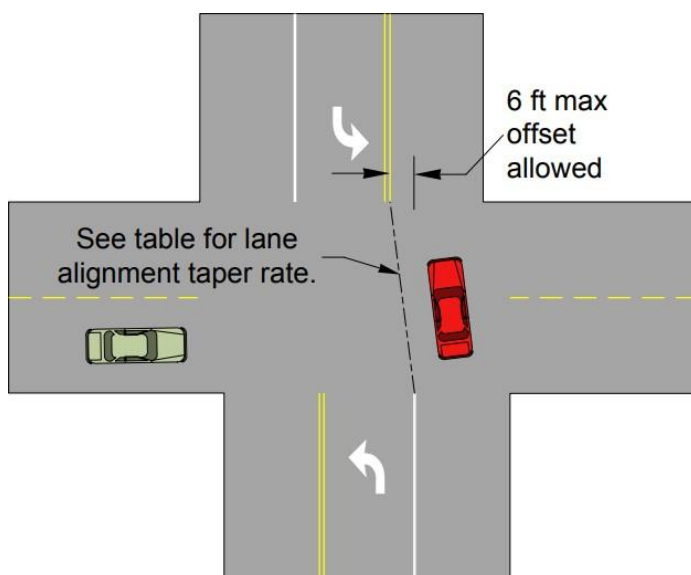


Table 13.1. Intersection Alignment Taper Rates

Posted Speed Limit (mph)	Taper Rate
45	45:1
40	27:1
35	21:1
30	15:1
25	15:1

Spacing

The minimum distance between adjacent parallel streets shall be 200 feet, measured from nearest curb edge to nearest curb edge and be consistent with LMC 19.35.110 Lot and Block Design.

Design Vehicles

Where applicable, the intersection design shall accommodate the use of the roadway as a designated truck route, bus route, or school bus route.

The City's standard design vehicle for Principal Arterials is WB-67 All other arterials WB-50, and for Residential Streets design for fire truck and garbage truck, Larger design vehicles may be required depending on the roadway classification, transit routes, and adjacent land use.

All elements of the intersection shall be designed so the design vehicle will not encroach onto curbs, sidewalks, traffic control devices, medians, or the travel lanes of opposing travel flow, unless otherwise approved by the Public Works Director.

Curb Radii

Curb radii design shall balance vehicle turning movements with pedestrian safety. Typically, it is appropriate to use the smallest turn radii possible that still accommodates the design vehicle.

For design, round curb radii to the nearest 5 foot increment.

Minimum curb radii must meet fire code access.

Drainage

Refer to Division 3 for drainage considerations at intersections.

Intersection Grades

Intersections shall be on grades as flat as practical.

At an unsignalized intersection, the maximum allowable grade in the intersection is 5 percent extending a minimum of 50 feet in each direction, measured from the outside edge of the travel lane of the intersecting street.

At signalized intersections, the maximum grade is 2 percent within the intersection and extends 200 feet in each direction. Grades above 5 percent shall be allowed only in areas with steep topography or other unusual circumstances that prevent a flatter grade.

On sloping approaches at an intersection, landings shall be provided with grade not to exceed 1-foot difference in elevation for a distance of 30 feet approaching an arterial or 20 feet approaching a Local Primary or Local Secondary street, measured from future right-of-way line (extended) of intersecting street.

The point of vertical curvature shall not encroach into a cross street any further than the center of pavement of the cross street.

Pedestrian Accommodations

In order to provide pedestrian safety, accommodations for pedestrians shall be designed into all intersections. Pedestrian accommodations include sidewalks, crosswalks, and pedestrian refuge islands. Pedestrian accommodations shall meet ADA guidelines.

Vaults, covers, castings, or drainage grates shall not be placed within the crosswalk or within crosswalk curb ramps or landing areas.

Two (2) compliant curb ramps with tactile warning strips shall be installed at each corner, where possible, and corresponding companion ramps shall adhere to RCW 35.68.075. This may require construction or retrofit of companion ramps.

When street paving impacts an intersection or modification to a curb ramp occurs, the curb ramps shall be retrofitted to meet the current standard. Impact to an intersection is defined as:

- xix) Nine (9) square feet or more of disturbance to the sidewalk within the area bounded by the curb, the right-of-way or property lines, and the extensions of right-of-way/property lines (across the sidewalk);
- xx) Three (3) linear feet (LF) of disturbance to the curb;
- xxi) Development projects requiring installation of frontage improvements; or
- xxii) Roadway resurfacing defined as an alteration by the 2013 Department of Justice/ Department of Transportation Joint Technical Assistance on Title II of the Americans with Disabilities Act requirements to provide curb ramps when streets, roads, or highways are altered through resurfacing. This includes asphalt overlays or the addition of new asphalt/concrete roadway surface.

In cases where the design of the curb ramp cannot meet the ADA guidelines, the design engineer must obtain prepare and submit and ADA Maximum Extent Feasible justification (MEF) for review and approval by the Public Works Direction.

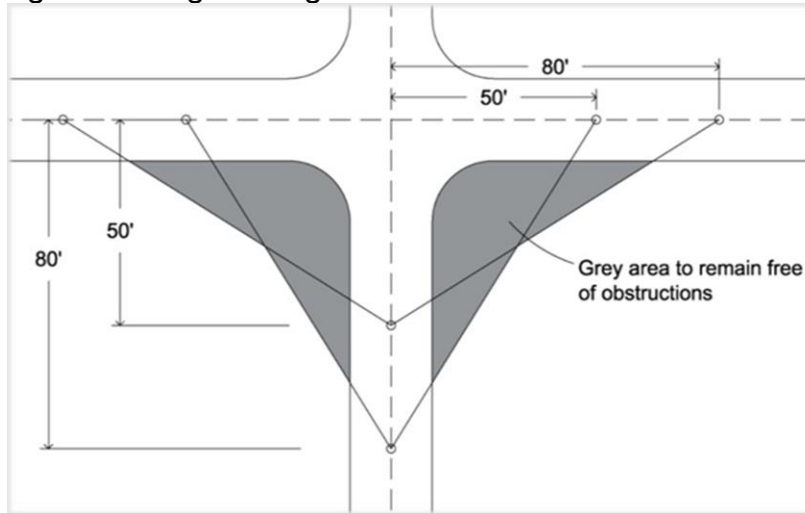
Clear Sight Triangle

General – These guidelines establish clear sight triangles around all intersections and driveways, which shall be kept clear of sight obstructions. The clear sight triangle is determined by the type of intersection control and the speed limit on the major road or street entered upon. In cases involving grades greater than 3 percent, number of lanes greater than two (2), skewed intersections, or for design vehicles other than passenger cars, the following sections shall be adjusted based on the sight distance procedures in the most current edition of A Policy on Geometric Design (AASHTO). For sight triangle requirements as they relate to bicycle facilities, refer to the most current edition of A Guide for the Development of Bicycle Facilities (AASHTO).

- a) Obstructions – Unless specifically approved by the Director, no structure, improvement, vegetation, or other object between 2.5 feet and 8 feet above street grade may be within the clear sight triangle. The driver's eye height position shall be taken from a position 3.5 feet above pavement grade.
- b) Clear Sight Triangle Dimensions for Intersections:

- i) Uncontrolled Intersection – For intersections with no traffic control on any approach, the clear sight triangle for vehicles shall be defined as shown in Figure 13.2, Sight Triangles for Uncontrolled or Yield Controlled Intersections.

Figure 13.2. Sight Triangles for Uncontrolled or Yield Controlled Intersections



- ii) Stop Control on Minor Street – For intersections with stop control on the minor street only, the clear sight triangle for vehicles shall be defined as shown in Figure 13.3 and Table 13.2. For stop control intersections, the decision point shall be 10 feet back from the edge of the traveled way. The minimum required sight distance is the SSD for the major roadway, shown in Table 13.2. The traveled way is the portion of the road intended for the movement of vehicles and bicycles exclusive of shoulders, turn lanes, and on-street parking.

Figure 13.3. Departure Sight Triangles for Stop Control on Minor Street

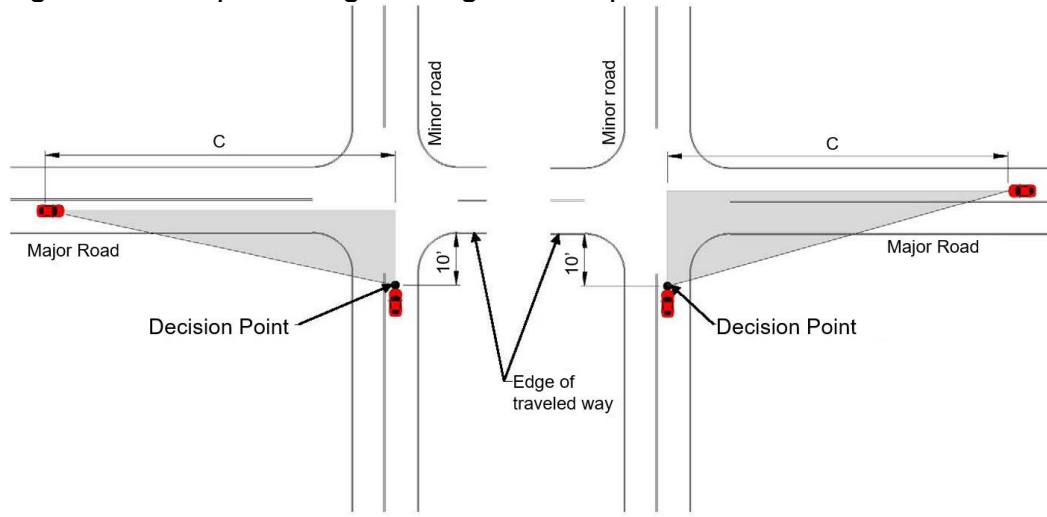


Table 13.2. Sight Distance for Stop Control on Minor Street

Posted Speed Limit (mph) on Major Road	Recommended C (ft) <i>Desirable</i>	Required C (ft) <i>Minimum*</i>
25	280	145
30	335	180
35	390	220
40	445	260

*Minimum shall only be used to evaluate existing conditions or when Desirable cannot be obtained.

- iii) Signalized Intersection – At signalized intersections, the first vehicle stopped on one approach shall be visible to the driver of the first vehicle or bicycle stopped on each of the other approaches. The first stopped vehicle on one approach also shall be able to see pedestrians within the legal crosswalk on all the approaches. Left-turning vehicles shall have sufficient sight distance to select gaps in oncoming traffic and complete left turns. For sight lines to traffic signal displays, refer to the most current WSDOT Design Manual. For right turn on red movements, criteria for stop control on minor streets (Figure 13.3 and Table 13.2 above) shall apply.
- iv) All-Way Stop Intersection – At intersections with all-way stop control, the first stopped vehicle on one approach shall be visible to the drivers of the first stopped vehicles or bicycles on each of the other approaches. The first stopped vehicle on one approach also shall be able to see pedestrians within the legal crosswalk on all approaches.
- c) Clear Sight Triangle Dimensions for Driveways – For driveways not controlled by traffic signals, operate like intersections with stop control on the minor approach. The applicable sight distance triangles for vehicles and pedestrians are shown in Figure 13.4 and Table 13.3.

Figure 13.4. Driveway Sight Triangles

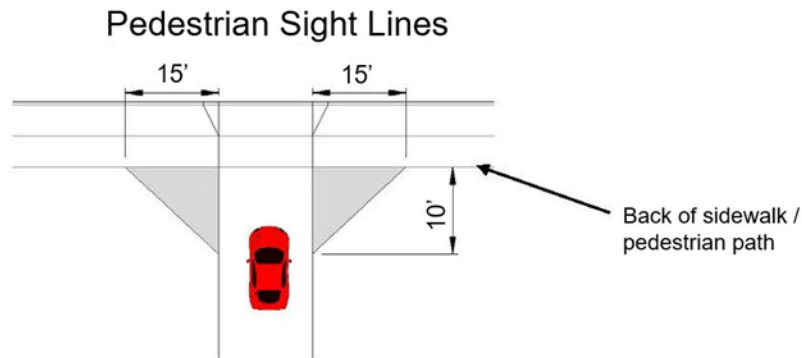
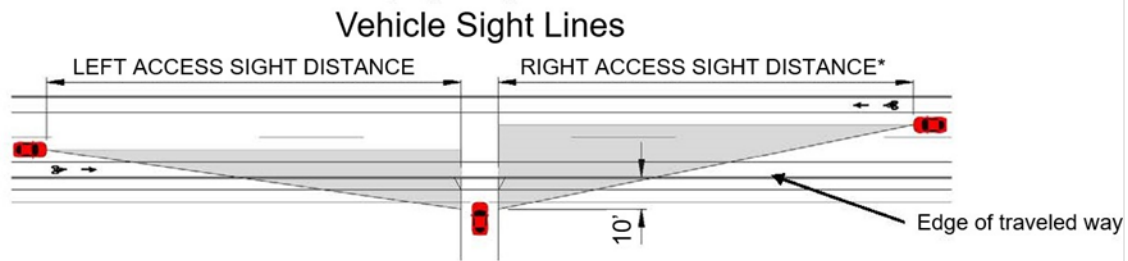


Table 13.3. Clear Sight Distance for Driveways

Major Road Volume (ADT)	Major Road Speed Limit (mph)	Access Sight Distance (ft) Desirable	Access Sight Distance (ft) Minimum*
<6000	25	155	155
	30	200	200
	35	250	250
>6000	25	280	155
	30	335	200
	35	390	250
	40	445	305

*Minimum shall only be used when Desirable cannot be obtained.

Pedestrian Sight Distance

- The minimum sight distance for pedestrian safety shall be determined as follows: the driver of an existing vehicle shall be able to view a 1-foot-high object 15 feet from either edge of the exit lane at the driveway throat when the driver's eye is 10 feet behind the back of the pedestrian walkway.
- The minimum sight distance shall be maintained at all driveways, buildings, and garage entrances where structures, wing walls, etc., are located adjacent to or near a pedestrian walkway.

PEDESTRIAN AND BICYCLE FACILITIES

CHAPTER 9

General

- a) Consideration of pedestrian and bicycle facilities shall be included in any project in accordance with LMC Chapter 12.50 Complete Streets.
- b) Pedestrian and bicycle facilities may be required by the LMC, though Transportation Impact Analysis, by Appendix X – Master Street Plan, or other similar means.
- c) Pedestrian and bicycle facilities may use developed or unopened right-of-way, or in some circumstances, may be located across private property within an easement.

Sidewalks

- a) All designs shall meet the current ADA requirements and standards. Refer to EDM Chapter 13.7, Intersection Design, Pedestrian Accommodations for curb ramp requirements.
- b) Sidewalks are required on all public streets, except alleys. Sidewalks may be required on private streets and street ends. Refer to EDM Chapter 14 Pedestrian and Bicycle Facilities.
- c) Where practical, alternative sidewalk design may be required to protect significant trees.
- d) Sidewalks shall be located between the property/right-of-way line and the amenity zone unless otherwise approved by the Director.
- e) Sidewalks abutting single-family residential uses shall be at least 6 feet wide. Sidewalks abutting uses other than single-family residential shall be at least 8 feet wide, or 12 feet wide by LMC in the “City Center” or along Highway 99.
- f) Sidewalks may be greater than 8 when the City determines that greater widths are warranted due to expected pedestrian traffic volume.
- g) Sidewalks at roundabouts shall be no less than 10 feet when shared with bicycles.
- h) Sidewalks installed immediately adjacent to curb shall have a minimum width of 8 feet to provide adequate space for signs, fire hydrants, utilities, tree grates, and door swing.
- i) Sidewalks shall maintain their full width around obstructions that cannot be relocated.
- j) When a sidewalk must transition to frontage that does not have a sidewalk, the transition shall meet ADA requirements. Unless the City requires a different transition, an asphalt transition is acceptable.
- k) Parking stalls shall be designed and constructed so that no part of any parked vehicle obstructs the Pedestrian Access Route, as defined by ADA, or the sidewalk.
- l) Sidewalks shall be constructed with concrete, unless otherwise approved by the Director.

Shared Use Paths

- a) Paved paths can be designated for pedestrian use, bicycle use, or shared use.
- b) All designs shall meet the current ADA requirements and standards.
- c) Widths for paved paths:

- i) Paths designated for pedestrian use shall be at least 5 feet wide and have 1-foot-wide shoulders on each side.
- ii) Paths designated for two-way bicycle or shared use shall be at least 10 feet; an 8-foot minimum is allowed at pitch points. A minimum 2 foot graded or paved shoulder is required on either side of a bicycle or shared use path. A wider, graded shoulder may be required when heavy pedestrian use is anticipated. If the shoulder is paved and adjacent to a bank slope greater than 6H:1V, a longitudinal pavement marking or surface treatment shall be used to differentiate between the path and the shoulder.
- d) The maximum grade shall not exceed 5 percent. Depending on site conditions, stairs, ramps with landings, and/or switchbacks may be required.
- e) Acceptable surface materials are asphalt concrete (asphalt) and Portland cement concrete (concrete).

Bicycle Facilities

- a) Bicycle facilities shall be provided in accordance with the AASHTO Guide for the Development of New Bicycle Facilities.
- b) The direction of travel for bicycle facilities shall be in the same direction as motor vehicle traffic unless the bicycle facilities are protected from vehicular traffic by a physical barrier.
- c) Off-street bicycle paths shall be constructed in accordance with XX.
- d) Vaned grates or solid lids shall be used on all catch basins located within bicycle facilities.

ROADSIDE FEATURES

CHAPTER 10

Fixed Objects

- a) Locate fixed objects so that vehicle and pedestrian sight distance meets the standards in EDM Chapter 13, Intersection Design.
- b) Standard clearances shall be met in accordance with Table 15.1 and Table 15.2 unless approved otherwise to accommodate existing site conditions.

Table 15.1. Standard Lateral Clearances

From	To	Standard Clearance
Edge of motor vehicle traveled way ¹	Closest part of any fixed object	5 feet
Curb face ²	Closest part of any fixed object	2 feet
Textured surface of wheelchair ramp	Closest part of any fixed object	1 foot
Edge of sidewalk	Stair riser	2 feet
Pole face, fire hydrant	Closest part of any fixed object (excluding traffic control signs and parking meter posts)	5 feet

¹ For lateral clearance measurements, the edge of traveled way is measured from the effective edge of the motor vehicle traveled way and does not include the bike lane, shoulder, or parking area, where present.

² Where a curb is present, fixed objects must be at least 5 feet from the edge of the traveled way, and at least 2 feet from face of curb.

Table 15.2 Standard Vertical Clearances

From	To	Standard Clearance
Roadway surfaces	Any horizontal projection over surface: measured from the crown of the street to the lowest portion of the structure.	16 feet
Sidewalk surfaces	Any horizontal projection over the surface	8 feet
Roadway surfaces	Tree limbs	14 feet
Alley surfaces	Any horizontal projection over paved surface	14 feet
Bicycle path surfaces	Any horizontal projection over surface	10 feet

- c) Electrical Facilities – For projects that require installation of or adjustments to facilities, the Applicant/Permittee shall coordinate this activity with the utility provider. Work with City staff to accomplish appropriate clearances required for design, during construction, and at final buildout. Communication and resolution of required clearances are critical to final design and construction approval of the proposal.
- d) The Contractor shall install the asset tags on all assets as directed by the City.

Landscaping

The following criteria apply to landscaping improvements in the right-of-way. Landscaping is dictated by sub area plans. See <https://www.lynnwoodwa.gov/Services/Apply-for-a-Permit/Planning-Zoning/Comprehensive-Plan-and-Subarea-Plans>. Furthermore, the

landscaping design criteria in this section are based on transportation safety requirements and on minimum requirements for plants to achieve mature growth.

For landscaping requirements on private property, contact Community Development. This chapter applies to trees only where noted.

- a) Any existing right-of-way landscaping disturbed by construction activity shall be replaced or restored to the same or better condition that was existing before construction started.
- b) All landscaping shall meet the sight distance and sight triangle requirements in EDM Section 13.8, Clear Sight Triangle.

Landscaping plans shall meet the following design requirements.

- c) Landscaping Plan:
 - i) The right-of-way landscaping plan shall be drawn to an engineering scale and shall show property lines, plant and tree locations, right-of-way infrastructure, driveways, and intersections, as well as all specifications needed to install and inspect the installation.
 - ii) Coordinate landscaping with transportation and utility plans. Adjust locations of trees to accommodate utilities, pedestrians, and sight distance. Preserve existing trees and landscaping where possible.
- d) Plant Selection:
 - i) All plants shall conform to the standards as published in the most current edition of the American Standard for Nursery Stock manual, provided that existing healthy vegetation used to augment new plantings shall not be required to meet these standards. The American Standard for Nursery Stock manual is available online at: <https://www.americanhort.org/education/american-nursery-stock-standards/>
 - ii) Plant selection shall consider adaptability to climatic, geology, and topographic conditions of the site.
 - iii) Tree and shrub canopies, upon maturity, shall not reach an above-ground utility such as streetlights and power lines.
- e) Soil – The landscaping plan shall provide soil specifications, including soil depths. Improvements that include biofiltration require specific specifications for the soils.
- f) Street Trees:
 - i) New trees shall be at least 2-inch caliper and selected from the City-approved street tree list.
 - ii) Street trees shall be spaced a minimum of 25 feet on center.
 - iii) Provide root barrier along critical root zone of tree at the pavement edge, where critical root zone intersects with pavement edge. Root barriers shall be commercially produced for the purpose of deflecting tree roots downward. Root barriers shall be installed as per the manufacturer's instructions. Root guide ridges shall face towards the tree, with the back flush against the pavement. The top of the root barrier shall be ½-1 inch above the finished soil grade or level with the sidewalk, whichever is lower, when installation is complete.
 - iv) The standard 5-foot clearance from underground utilities often is not enough space to minimize the effects of utility maintenance and repair and ensure

longevity of the tree. When right-of-way width allows, additional clearance distance shall be provided.

- v) When right-of-way width is limited and the 5-foot clearance cannot be met, the City will evaluate site conditions and may permit one (1) or both of the following:
 - (1) Tree installation less than 5 feet from ductile iron or Polyvinyl Chloride (PVC) pipe; or
 - (2) Tree installation less than 5 feet from concrete pipe that has rubber gaskets.
- vi) Adjust placement to avoid conflict with driveways, utilities, and other functional needs. Trees shall be placed:
 - (1) Centered within the amenity zone between the curb and sidewalk;
 - (2) Outside of the sight distance triangles per EDM Sections 13.8, Clear Sight Triangle and 13.9, Pedestrian Sight Distance.
 - (3) 8 feet from underground utility lines or 3 feet with root barriers;
 - (4) 10 feet from power poles (15 feet recommended);
 - (5) 7 ½ feet from driveway edges (10 feet recommended);
 - (6) 25 feet from streetlights or existing trees;
 - (7) 30 feet from curb or travel lane street intersections (when no curb);
 - (8) 10 feet from roadway edge where no curb is present; and
 - (9) 20 feet from marked or unmarked crosswalks.

Mailboxes

- a) United States Postal Service (USPS) shall approve all mailbox locations. Clustered mailboxes are preferred.
- b) The approach to mailboxes shall be clear of obstruction(s).
- c) Mailboxes shall not be installed adjacent to ditches unless approved by the director.

Steps

- a) Steps, stairways, and associated landings from private property shall not extend into the right-of-way.
- b) Stairways in public right-of-way shall be designed and constructed according to XX.
- c) The first riser shall be at least 2 feet clear of a public walk.
- d) A minimum 5-foot by 5-foot landing shall be provided after each 20 risers. Pedestrian lighting may be required for stairways.

Railing

- a) Railings on private property shall be consistent with guard requirements of the construction and building codes. Railings shall have a maximum spacing of 4 inches for vertical elements of the railing. Railings in the right-of-way shall be consistent with Standard Detail ST-SID-3 Pedestrian Railing Barrier and ST-SID-4 Pedestrian Railing Barrier Notes.
- b) Railing in the right-of-way shall be installed along a nonmotorized transportation facility when there is a loss in elevation from the facility of 30 inches or more and:
 - i) The vertical wall face is less than 4 feet in horizontal distance from the facility;
 - ii) The vertical wall face is greater than 4 feet horizontally to the facility and the slope to the wall top is steeper than 1V:3H; and

- iii) The slope(s) adjacent to the facility average greater than 1V:2H.

Cut-and-Fill Slopes

- a) Side slopes shall be 2H:1V or flatter on both fill slopes and cut slopes.
- b) Steeper slopes may be approved by the Director when supported by a geotechnical report and engineering recommendations.
- c) Side slopes shall be stabilized by grass sod or seed, or by other approved plant or surface materials.

Guardrail

Guardrail shall be provided and installed by the Applicant/Permittee as directed by the Director. For purposes of warrants, design, and location, all guardrails along public and private roadways shall conform to the criteria of the most current editions of the WSDOT Standard Plans and Standard Specifications.

SURFACE TREATMENT

CHAPTER II

General

- a) Hard surfacing such as asphalt concrete or Portland concrete cement is required within the right-of-way.
- b) When approved by the City, grades steeper than 20 percent shall be paved with Portland cement concrete.
- c) Use of permeable pavements in the right-of-way may be utilized, subject to approval of the Director. Refer to EDM Section 7.2, Low Impact Development.

Asphalt Pavement Design

- a) Arterial Streets:
 - i) Any pavement for arterial streets shall consider the load bearing capacity of the soils, based on actual field tests, and the traffic-carrying requirements of the roadway.
 - ii) The analysis shall include the traffic volume and axle loading, the type and thickness of roadway materials, and the recommended method of placement. Pavement sections shall not be less than those required for collector arterials.
 - iii) Pavement design shall be prepared by a Professional Engineer licensed in the State of Washington who is proficient in pavement design. Soils tests are required to assess the California Bearing Ratio (CBR) for the subgrade.
 - iv) Design shall comply with the minimum standards identified in Standard [Detail ST-ROA-I Typical Roadway Sections Arterials](#).
- b) Local Primary and Secondary Streets:
 - i) Minimum asphalt pavement sections are identified in Standard Plan 201 Typical Non-Arterial (Local) Street.
 - ii) Unless otherwise approved by the City, in areas of pavement restoration or adjacent to existing pavement, reconstruction shall, at a minimum, match existing roadway sections, provided it exceeds the minimum pavement section.

- iii) Design shall comply with the minimum standards identified in Standard [Detail ST-ROA-2 Typical Roadway Section Neighborhood Streets](#).

Poor Subgrade – The minimum material thicknesses indicated are not acceptable if there is any evidence of instability in the subgrade. This includes, but is not limited to, free water, swamp conditions, fine-grained or organic soil, slides, or uneven settlement. If there are any of these characteristics, the soil shall be sampled and tested sufficiently to establish a pavement design that will support the proposed construction. Any deficiencies, including an R-value of less than 55 or a CBR of less than 20, shall be fully considered and compensated for in the design.

Pavement Widening

- a) Any widening of an existing roadway, either to add traveled way or paved shoulder, shall have the same surfacing material as the existing roadway.

Storm systems shall be modified to provide catch basins consistent with original design concept and in line with the revised curb and gutter alignment. At the discretion of the Public Works Director, existing catch basins may be modified with a solid locking lid and storm system extended to the revised curb and gutter alignment with a new catch basin.

When an existing shoulder is to become part of a proposed traveled way, a pavement evaluation shall be performed. The shoulder area shall comply with the roadway section as provided in City Standards [Detail ST-ROA-1 Typical Roadway Sections Arterials](#) or [Detail ST-ROA-2 Typical Roadway Section Neighborhood Streets](#) to determine if the shoulder is acceptable or if any improvements are necessary. Designs based on these evaluations are subject to review and approval by the Director. The responsibility for any shoulder material thickness improvement shall be considered part of the requirement for roadway widening.

INTERSECTION AND CONTROL DEVICES

CHAPTER 12

Roundabouts

- a) Where traffic studies show that a traffic signal or all way stop is warranted, or to address high collision locations as identified in the Annual Traffic Report, a roundabout will be evaluated as a preferred intersection control method. An engineering study and traffic analysis must be conducted and approved by the City Traffic Engineer prior to installation.

Consistent with the WSDOT Design Manual, Chapter 1300.03(5), no specific warranting conditions stipulate use of roundabouts over other intersection control types; however, if the traffic analysis shows equivalent or better performance over other control types, the cost is equal to or lower than other control types, and other geometric factors do not preclude it, a roundabout should be selected as the intersection control type.

Roundabouts will be designed in accordance with the most current version of the following publications: Roundabouts: An Informational Guide; the MUTCD and Washington State adoptions; and the WSDOT Design Manual.

Video monitoring shall be provided to monitor the complete function and operation of the roundabout, providing communication to the City's Central Transportation System when feasible.

Traffic Signals

The following apply to new or modified traffic signals:

- a) A signal warrant study prepared by a Professional Engineer licensed in the State of Washington shall be required for all new traffic signal installations. The City Traffic Engineer shall review and approve the study.

Signal design shall meet ADA, MUTCD, and WSDOT Design Manual Chapter 13.30 requirements.

Emergency vehicle preemption systems are required for all new signal installations and may be required for signal modifications.

Signal structures consisting of poles and mast arms shall be required for all new installations. Stop bar and advanced loop detection is required for all signalized approach lanes. Camera detection may be installed by request subject to review and approval by the City Traffic Engineer.

Transit signal priority capability may be required at intersections that serve transit routes.

Bicycle loop detection is required for all bike lane approaches to signalized intersections. If a predominant left turning movement for bicyclists is present, bicycle push buttons or channelized bike boxes may be required.

All new signals require backup battery systems. New signals shall provide communication to the City's Central Transportation System when feasible.

Traffic signal equipment, including cabinets, controllers, and other components, shall be reviewed and approved by the City Traffic Engineer.

Intelligent System Coordination???

Rectangular Rapid Flashing Beacons

Rectangular Rapid Flashing Beacons (RRFBs) are to be installed in accordance with WSDOT, FHWA, and MUTCD requirements.

DIVISION 3 – SURFACE WATER

STANDARDS

CHAPTER 13

Surface Water Design

The City has adopted the 2019 Department of Ecology *Stormwater Management Manual for Western Washington* ([2019 ECY SWMMWW](#)); additional standards and policies can be found in LMC [Chapter 13.40 Stormwater Management](#).

The requirements of these standards shall apply to all actions requiring the approval or issuance of a permit by either the Development and Business Services Department or the Public Works Department, or projects involving 2,000 square feet or more of land-disturbing activity, new impervious surface, or replaced impervious surface.

a) General

The following stormwater notes are found in the City's [Standard Plans Index](#). The [Private Development General Notes](#) shall be included in all private development permit applications. [Capital Project General Notes](#) shall be included in all public works project plans. [Storm Drainage Notes](#) shall be included in both public and private improvement plans.

Ownership

Stormwater collection, detention, and treatment facilities located within public right-of-way and easements are owned, operated, and maintained by the City. The Director shall determine which new facilities are to be accepted by the City for ownership, operation, and maintenance. If privately owned, operated, and maintained, a covenant shall be recorded allowing the City to inspect such facilities for proper operation and maintenance.

Western Washington Phase II Municipal Stormwater Permit

All stormwater design and construction must comply with the City's 2019-2024 NPDES Phase II [Permit](#). This permit covers stormwater discharges to certain municipal separate storm sewer systems (MS4s) and stormwater discharges from construction activity, generally disturbing between 1 and 5 acres. As defined in the LMC 13.40.040 Definitions.

“Municipal separate storm sewer system (MS4)” means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

- iv) Owned or operated by the city of Lynnwood;
- v) Designed or used for collecting or conveying stormwater;
- vi) Which is not part of a publicly owned treatment works (POTW); and
- vii) Which is not a combined sewer.

Low Impact Development (LID)

Consistent with the City of Lynnwood *Comprehensive Plan* (Environmental Element and other sections) and *Surface Water Management 2020 Comprehensive Plan*, low impact development techniques shall be employed to the maximum extent feasible.

When low impact development techniques are employed, the design shall be consistent with the [2019 DOE SWMMWW](#), Volume V – Runoff Treatment, Flow Control, and LID BMP Library, along with the most recent version of [Low Impact Development, Technical Guidance for Puget Sound](#) (Puget Sound Partnership [formerly the Puget Sound Action Team] and Washington State University Pierce County Extension).

- (1) All proposed and existing LID BMPs shall be shown on the Applicant/Permittee's erosion control plan. The erosion control plan shall detail the protection and cleaning of all LID BMPs.
- (2) Evaluation of LID feasibility is outlined in Table 18.1, LID/Flow Control BMP Facility Conditions. These facilities also must provide pre-filtering and access, and facilitate maintenance and operations activities. Overflow bypass for pre-filtering systems may not be discharged into the infiltration system and instead must be routed to an approved discharge location. Allowed infiltration systems include ponds and vaults. Infiltration tanks, pipes, and those constructed of modular sections are not allowed unless otherwise allowed in accordance with an approved Deviation.

Performance testing of all LID facilities that include infiltration or limited infiltration, including permeable pavements or other components that include infiltration, must be completed prior to final approval.

Table 18.1. LID/Flow Control BMP Facility Conditions

Type	Conditions
All	<p>BMPs must be shown on building permits and record drawings.</p> <p>Pre-treatment is required prior to all LID/FLOW CONTROL BMPs. At a minimum, a Type I catch basin with a sump.</p> <p>Failure of on-lot LID facilities requires replacement of facility and/or detention; direct connection to the storm system is not an allowed solution. On-lot BMPs not constructed as part of the plat require a separate covenant prior to final building permit approval.</p> <p>Emergency overflow BMPs are required to be located on the same lot or tract as the Flow Control BMP.</p>
Full & Basic Dispersion	Dispersion flow path must be contained in a restricted easement.
Full & Limited Infiltration	Ensure adequate spacing from existing and new trees to allow for tree growth. Infiltration facilities are to remain outside of the dripline of all trees. No BSBL or setback reduction without an approved Deviation.

Type	Conditions
Bioretention	No utility crossings allowed under infiltrative BMPs without approval and use of impermeable utility crossing backfill.
Permeable Pavement (unlined & no underdrain)	Not allowed in public right-of-way.
Grassed Modular Grid Pavement	Plastic gridded style pavers not allowed unless demonstrated to be damage resistant with backfill that will not escape and travel under traffic.
Rainwater Harvesting	Must ensure adequate cross-connection separation and sewer discharge accommodations.
Restricted Footprint	Must be recorded on the face of the plat in addition to the required covenant to receive credit.
Wheel Strip Driveways & Minimum Disturbance Foundation	No additional conditions.
Open Grid Decking Over Pervious Area	Allowed for ground floor decks. Second story applications will be considered impervious.
Native Growth Retention Credit	Must be recorded on the face of the plat in addition to the required covenant to receive credit.
Perforated Pipe Connection	Not allowed in critical drainage areas.

Exemptions, Exceptions, and Adjustments

Exemptions, exceptions, and adjustments to these stormwater standards and provisions are found in [LMC Section 13.40.030](#).

Supplemental Stormwater Guidelines Adoption

The Director may adopt and amend, as deemed prudent and necessary, the City of Lynnwood Supplemental Stormwater Guidelines to further the purposes of these standards. This document shall serve as a guidance manual of technical and administrative procedures to assist the end user in the methods to be used, the level of detail of analysis required, and other technical details for implementation of and compliance with the provisions of these standards.

Drainage design at intersections

- An intersection shall be laid out and graded so that surface water drains and the intersection is safe and accessible for pedestrians and bicyclists.
- Drainage structures shall not be placed in an ADA ramp or landing area.
- Unless otherwise approved by the City, drainage structures shall be located outside the corner radii.
- Drainage structures shall be placed at the upstream side to reduce runoff or ponds in an ADA ramp area.
- When new curb and gutter is installed as part of frontage improvements, drainage shall be addressed to avoid ponding upstream and flooding downstream. This

typically involves the installation of a catch basin at the extents of the frontage improvements.

REQUIREMENTS

CHAPTER 14

Definitions

Definitions related to Stormwater Management may be found in [LMC Section 13.40.40](#).

Stormwater Plan

As specified in the [2019 DOE SWMMWW](#), a Stormwater Site Plan (a.k.a. Technical Information Report) is the comprehensive report containing all of the technical information and analysis necessary for regulatory agencies to evaluate a proposed new development or redevelopment project for compliance with the stormwater requirements. Contents of the Stormwater Site Plan will vary with the type and size of the project and individual site characteristics.

The scope of the Stormwater Site Plan also varies depending on the applicability of Minimum Requirements; refer to I-3.3 Applicability of the Minimum Requirements in the [2019 DOE SWMMWW](#).

Minimum Technical Requirements

These requirements address the following:

General; and

Drainage and Retention/Detention System Design Requirements.

Additional requirements are found in [LMC Section 13.40.60](#).

Clearing and Grading

Because of potential impacts to surface water systems, a permit application for any land clearing in excess of one-eighth of an acre shall be submitted to the Public Works Department for processing as required by LMC 2.44.040 ([LMC 13.40.065](#)).

Stormwater notes are found in the [City's Standard Plans Index](#). [Standard Grading Notes](#) shall be included in both public and private improvement plans.

Submittal Requirements

The requirements for those items not detailed below are found in [LMC Section 13.40.070](#).

b) Stormwater Pollution Prevention Plan (SWPPP)

- 1) Details for a Construction Stormwater General Permit can be found at: <https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Stormwater-general-permits/Construction-stormwater-permit>.
- 2) This [template](#) presents the recommended structure and content for preparation of a Construction Stormwater General Permit (CSWGP) and/or a SWPPP.

c) Spill Prevention Control and Countermeasures (SPCC)

The Contractor shall prepare a project specific SPCC plan that will be used for the duration of the project. The Contractor shall submit a completed and signed SPCC plan to the City for review and obtain approval prior to scheduling a preconstruction meeting. No on-site construction activities may commence until the City of Lynnwood accepts a SPCC plan for the project.

- 1) The threshold requirements for an SPCC are found in LMC [Section 13.45.035 Surface Water Quality](#). Emergency Spill Control Plan.
- 2) Private Development shall prepare the SPCC plan using this [template](#).
- 3) Capital Projects prepared by the City shall prepare the SPCC plan using this [template](#).

d) Temporary Erosion and Sediment Control (TESC) Plan

The TESC plan shall include Monitoring Point(s) to sample stormwater during the entire course of construction. The TESC plan shall show the following:

- 1) Construction sequence.
- 2) Existing and proposed topography and clearing limits. All cut and fill slopes.
- 3) Location and details for construction entrance and on-site tire wash at construction entrance, if required. Construction entrance shall be provided as specified in the [Temporary Construction Entrance Detail](#).
- 4) Provision for perimeter runoff control at property boundaries. Specify areas to receive special treatment such as jute matting, rock lining, sod, mulching, and seeding. Silt fence shall be provided as specified in the [Silt Fence Detail](#).
- 5) Provide interim catch basin sedimentation protection as specified in the [Inlet Protection Detail](#). As allowed by the Director, provide interim catch basin sedimentation protection as specified in the [Catch Basin & Inlet Sediment Trap Detail](#).
- 6) Show all drainage pipes and ditches. Include pipe inverts, minimum slopes and cover, and ditch grades and dimensioning.
- 7) Provide all necessary dimensioning and details for sediment traps, berms, pond storage, pond outlet structure, filtering devices, inlet/outlet stabilization techniques, control/restrictor devices, rock check dams, silt fabric fences, pond inlet baffles, and other design elements. Traps shall be provided as specified in the [Typical Sedimentation Basins Detail](#).
- 8) All notes and details necessary to illustrate the intent of the TESC plan. Standard [TESC Notes](#) found in the [City's Standard Plans Index](#) shall be included in the plan set.

- e) Open Channel Construction submittal requirements shall comply with [LMC 13.40.070.A](#).
- f) Conceptual Drainage Plan

Applicants proposing minor site projects that are not located within an environmentally critical area shall submit a conceptual drainage plan, which shall include the information details found in [LMC 13.40.070.B](#).

g) Detailed Drainage Plan

Applicants proposing small site projects not meeting the Conceptual Drainage Plan criteria or large site projects shall submit a detailed drainage plan, which shall include information with respect to surface and pertinent subsurface water flows entering, flowing within, and leaving the subject property both during and after construction as detailed in [LMC 13.40.070.C](#).

- h) Commencement of construction work meeting any of the thresholds identified in [LMC 13.40.050](#) shall not begin until the provisions in [LMC 13.40.070.D](#) are met.
- i) Administrative Modifications – The requirements of this section may be modified at the discretion of the Director when more information is deemed necessary per [LMC 13.40.070.E](#).

Development in or Adjacent to Critical Areas

Such development shall comply with [LMC Section 13.40.90](#). The following [Native Growth Projection Area \(NGPA\) Notes](#) are found in the [City's Standard Plans Index](#). These notes shall be included in plans for private development adjacent to or impacting Critical Areas where a NGPA is created.

Review and Approval

The review and approval process shall comply with [LMC Section 13.40.080](#).

Establishment of Regional Facilities

In the event that public benefits would accrue due to modification of the drainage plan for the subject property to better implement the recommendations of the comprehensive drainage plan, the Public Works Department may recommend that the City should assume responsibility for the further design, construction, operation, and maintenance of drainage facilities on the subject property. This process shall be consistent with the Establishment of Regional Facilities per [LMC Section 13.40.100](#).

DIVISION 4 – WASTEWATER

WASTEWATER

The design of wastewater facilities and infrastructure shall comply with [Chapter 14.04 LMC](#).

CHAPTER 15

General

Standards

All sanitary sewer mains, side sewers, sanitary sewer manholes, and sanitary sewer facilities must be designed and constructed in accordance with the latest issue or revision of the *Criteria for Sewage Works Design* (Orange Book) published by the Washington State Department of Ecology, the WSDOT/APWA Standard Specifications and WSDOT Standard Plans, and the City of Lynnwood Standards and Details for sanitary sewers.

The [Sewer Standard Notes](#) are found in the City's [Standard Plans Index](#). These notes shall be included in both public and private improvement plans. Sewer design must conform to the City Standard Plans found under Standard Plans Utilities.

Ownership - City

The City owns and is responsible for the sewer main collection system. City owns side sewer lateral within the right-of-way, any repairs to the lateral within the right-of-way is the responsibility of the City. The customer owns the side sewer from the point of connection at the edge of right-of-way to the structure served. Customer is responsible to clean or clear entire line from structure connection to main sewer line and repairs to side sewer outside the right-of-way. In certain cases, sewer collection systems may be privately owned and maintained as determined by the Director. Sewer lift stations are owned and operated by the City.

Ownership – Alderwood Water and Wastewater District (AWWD)

AWWD serves an area within the City easterly of Interstate 5. The AWWD service area can be found on the District website here - [AWWD Service Area Map](#). All AWWD Standards apply to areas located within this service area.

Criteria for Extension

A sanitary sewer main extension must be constructed when the property does not front a sewer main. The extension must be to a point at least 5 feet beyond the farthest edge of the property, or as directed by the Director. Sewer main improvements must be constructed when the existing sewer main is not adequate for the proposed increased use (criteria used to determine adequacy include, but are not limited to, age, pipe diameter, type, and condition of existing sewer mains). The City's most current Wastewater Comprehensive Plan Update must be the primary resource utilized to determine adequacy. The improvements must extend from the project to a point where the system is deemed appropriate. The improvements must be consistent with the City of Lynnwood Standards for new construction and must be approved by the Director.

FOG and Contaminants

All fats, oils, and grease (FOG) and contaminants from facilities must be intercepted in accordance with Lynnwood Municipal Code and the Uniform Plumbing Code. Refer to Section 20.7 Grease Traps and Interceptors. All underground parking facilities must drain into the sanitary sewer systems through an oil/water separator. Refer to Section 20.8 Oil/Water Separators.

Sewer Main

a) Materials

Sanitary sewer pipe must meet the following requirements:

- 1) PVC Sewer Pipe 6-inch Diameter or Less: Polyvinyl Chloride (PVC) sanitary sewer pipe must conform to the requirements of ASTM D3034 SDR-35.
- 2) PVC Sewer Pipe 8-inch Diameter or Greater: PVC sanitary sewer pipe must conform to the requirements of ASTM D3034 SDR-26.

b) General Requirements

No broken or defective sewer pipe or related materials must be used. Sewer main alignments may not include drop structures without Director approval.

Refer to Section 22.7 Sewer Construction regarding trench widths.

There must be a minimum horizontal clearance between sewer and water main pipe of 10 feet unless another design alternative has been specifically approved by the Director. Sanitary sewers must always be installed lower than water mains. Where sanitary sewers and water mains cross, there must be a minimum vertical separation of 18 inches from the crown of the sanitary line to the invert of the water main, unless an alternative design has been specifically approved by the Director.

c) Jacking, Augering, or Tunneling

The Director may order jacking, augering, or tunneling under pavements, buildings, railroad tracks, etc. Prior to these activities, design or shop drawings describing the activities, including dimensioning of pit length, size of underground borings, and complete description of shoring, shall be submitted to the Director for approval.

d) Size

The minimum pipe size for sanitary sewer mains must be 8 inches in diameter. The Director will determine the pipe size required to serve the surrounding area.

e) Slope

All sewers must be designed and constructed to give mean velocities of not less than 2.0 feet per second (fps) when flowing full. The minimum slopes in Table 20.1 must be provided; however, greater slopes are desired.

Table 20.1. Minimum Sewer Pipe Slopes

Sewer Size (inches)	Minimum Slope (feet per 100 feet)
6	1.0
8	0.40
10	0.28
12	0.22
15	0.15
18	0.12
21	0.10
24	0.08

If the current *Criteria for Sewage Works Design* manual requires different slopes, those slopes in the *Criteria for Sewage Works Design* must apply.

Manholes

This work must consist of constructing manholes in accordance with the City of Lynnwood Standards and Section 7-05 of the WSDOT/APWA Standard Specifications. Where conflicts occur, the City Standards have precedence.

a) Materials

- 1) Manholes must be constructed of pre-cast units in accordance with. Any request to deviate from this detail must be reviewed by the Director.
- 2) Manholes must be constructed in accordance with AASHTO M-199 (ASTM C478), unless otherwise shown on the plans or noted in WSDOT/APWA Standard Specifications.
- 3) All reinforced cast-in-place concrete must be Class 4000. Non-reinforced concrete in the channel and shelf must be Class 3000. All pre-cast concrete must be Class 4000. Manhole channels must be Class 3000 concrete. When using adjustment rings on top of the cone or flat top, a minimum of one to a maximum of three 4-inch pre-cast concrete rings may be used for adjustment of the casting to final street grade. Use of brick or wood to raise iron is not allowed.
- 4) Pre-cast bases must be furnished with cutouts or may be core drilled in the field.
- 5) All base reinforcing steel must have a minimum yield strength of 60,000 psi and be placed in the upper half of the base with 1-inch minimum clearance.
- 6) The size of the cutout hole must be equal to the outer diameter of the pipe plus the wall thickness of the manhole. The maximum hole size is 36 inches for a 48-inch manhole, and 42 inches for a 54-inch manhole. The minimum distance between holes is 8 inches measured on the inside of the manhole.
- 7) A 1-foot pre-cast section is required below the cone or flat top.
- 8) Manhole size depends on sizes, location, and numbers of holes for pipes. Manhole design and size must be approved and warranted by the manhole supplier.

- 9) Joints between manhole sections must be rubber gasket and mortared inside and out.
- 10) Standard pre-cast cones must provide reduction from 48 inches to 24 inches with a height not less than 18 inches and from 54 inches to 24 inches with a height not less than 24 inches.
- 11) Standard flat slab covers must be at least 8 inches thick and must conform to the outer dimension of the standard sections upon which they are to be placed.
- 12) For heights over 25 feet, the manhole base slab design must be designed by a structural engineer.

Design Requirements

a) Bedding

Unless otherwise directed by the Director, manholes constructed with pre-cast base sections or cast-in-place sections must be placed to grade upon 6 inches minimum depth of crushed surfacing base course meeting the requirements of Section 9-03.9(3) of the WSDOT/APWA Standard Specifications. The crushed surfacing base course must be compacted to 95-percent maximum density.

b) Joints

Joints between pre-cast manhole elements must be rubber gasketed in a manner similar to pipe joints conforming to ASTM C-443 and they must be grouted inside and out. Shop drawings of the joint design must be submitted to the Director for approval prior to manufacture. Completed joints must show no visible leakage and must conform to the dimensional requirements of ASTM C478.

c) Channels

All manholes must be channeled, unless otherwise approved by the Director. Channels must match existing sewer grades. Channels must converge with smooth transitions rounded into well-finished junctions. Channel sides must be carried up vertically to the crown elevation of the various pipes. Channel width must be wide enough to accept a vacuum tube for maintenance. Concrete shelves between channels must be smoothly finished, warped evenly, and sloped to drain.

All manholes must have a minimum drop of 0.10 feet to a maximum drop of 1.0 foot between the invert in and the invert out.

d) Pipe Connections

All pipes entering or leaving the manhole must be core drilled to the size of the Kor-N-Seal boot (or approved equal) manufacturer's specifications for the pipe size being used. Flexible pipe joint must be placed within 2 feet of the outside face of the manhole in locations with compressible soil such as peat or unconsolidated sediment. The flexible joint must be placed on firmly compacted bedding, particularly within the area of the manhole excavation, which normally is deeper than that of the sewer trench.

Pipe connected to manholes must be provided with a Kor-N-Seal boot (or approved equal) manhole adapter, complete with gasket, and must be approved by the Director.

e) Steps

Manholes 3 feet and deeper must have steps, and must be installed on sides of manholes, opposite of pipe and channels where possible. The first step must be 18 to 24 inches from the top of casting.

f) Connections to Existing Manholes

The Developer must verify invert elevations prior to construction. The crown elevation of laterals must be the same as the crown elevation of the incoming pipe, unless specified. The existing base must be reshaped to provide a channel equivalent to that specified for a new manhole.

g) Spacing

Maximum spacing of manholes must be 300 feet, unless approved by the Director. All manholes are to be accessible to maintenance vehicles.

A manhole is required at any change in pipe slope, alignment, or size. Manholes are not allowed in a fill section unless base is on a cut section. A manhole is required at the ends of all sewer mains unless a cleanout is specifically approved by the Director for camera access.

Manholes not set in the roadway must have paved asphalt access, at least 12 feet wide, to and including the manhole pad.

Sanitary Side Sewer

Side sewers must be connected to the sewer main only, not to the manholes, unless otherwise approved by the Director. Connection to existing side sewers is only allowed if the existing side sewer is in good condition, has no defects allowing inflow or infiltration, and meets current Standards for materials and construction.

Side sewer design must conform to [City Standard Details](#) found under Standard Plans Utilities.

a) Description

The sanitary side sewer is that portion of a sewer line constructed between a public sewer line and the building from which the waste originates.

b) Materials

Materials must meet the requirements of ASTM D3034 SDR-35.

All pipes must be clearly marked with type, class, and thickness, as applicable. Lettering must be legible and permanent under normal conditions of handling and storage. Jointing must be with approved, flexible gasketing. Flexible gasketing must include rubber, synthetic rubber-like, and plastic materials specially manufactured for the joint, pipe size, and use intended, and must be furnished by the manufacturer of the pipe to be used.

c) General

Only one building shall be connected to a side sewer unless approved by the Director.

Side sewers must not cross a public right-of-way or run parallel to the right-of-way centerline.

Side sewers must have a minimum cover of 5 feet in the public right-of-way and 2 feet inside the property line, unless otherwise approved by the Director.

d) Sizing

That portion of a side sewer located within the public right-of-way must have a minimum diameter of 6 inches.

That portion of a side sewer located on private property must have a minimum diameter of 4 inches for single-family residences, and 6 inches for all other uses, except for high-consumption uses, which are determined by the Director on a case-by-case basis.

e) Slope

Side sewers must have a minimum slope of 2 percent, unless otherwise approved by the Director. A [Sewer Backwater Valve](#) device must be installed when, in the opinion of the Director, the rim of the manhole is higher than the bottom of the lowest fixture in the structure or there exists a reasonable possibility of sanitary sewer backup from the sewer main into the residence or business.

f) Fittings and Cleanouts

All fittings must be factory produced and designed for installation on the pipe to be used. Fittings must be of the same quality and material as the pipe used, except when installing a PVC insert on existing pipe.

Side sewers must be connected to the tee, wye, or riser provided in the sewer main, where such is available, utilizing approved fittings or adapters. Where no tee, wye, or riser is provided or available, connection must be made by core drilling and installing an approved tee. Tees must be Romac Industries, Style CG or approved equal. All side sewers must have a 6-inch cleanout at the property line. The riser portion of the cleanout must be PVC, unless otherwise approved by the City construction inspector. Cleanouts must be spaced no more than 100 feet apart.

g) Tracer Tape

All new sewer main and services must include installation of tracer tape to provide a warning if excavation occurs above the mains or services and tracer wire to assist in sewer locating efforts.

- 1) Tape – Must be installed over sewer mains and side sewer pipes and stubs. The tracer tape must be placed approximately three feet above the top of the pipe along its entire length. Tracer tape must be 6 inches wide Carlton Industry Blackburn Manufacturing, or approved equal, and must be marked “Caution Buried Sewer Below.”
- 2) Standard Wire – Must be 10-gauge solid core insulated copper wire. All splices and terminating ends must be fitted with pre-filled gel winged wire connectors designed for direct burial applications. The tracer wire must be installed directly on top of all sewer mains and services. Sewer main tracing wire must terminate at the service connection cleanout.
- 3) High-Density Development – Copperhead tracer wire with grounding rods is required for high-density housing developments, including multi-family, townhome, and condominium developments, along with commercial or industrial developments with complex mains and services within close proximity of each other and adjacent utilities. Copperhead tracer wire must be designed and installed by a qualified contractor and in accordance with manufacturer’s specifications. Performance testing of the installed system, to be completed by a third-party at the Developer’s expense, is required prior to City approval.

Lift Stations

All side sewers must gravity flow into the City’s sanitary sewer system. The City does not promote construction of individual side sewer pumps or public lift stations. The City will only consider these methods if a gravity system cannot be constructed. Private pressure side sewer lines are not permitted within the public right-of-way. If a gravity system cannot reasonably be constructed and a non-gravity system has been approved by the Director, the private pressure lines must enter a manhole on private property and gravity flow into the public system with a standard side sewer connection. The minimum manhole size permitted for this application is 30 inches in diameter. The manhole must be installed with a locking lid frame and cover.

- a) Construction plans for lift stations must be reviewed and approved by the Director. The following items will be considered for each application:
 - i) Lift stations may be duplex submersible pumps or wet well/dry well configuration as determined by the Director.
 - ii) Refer to water standard details specific to pipe, fittings and thrust restraint for any sewer force mains.
 - iii) Lift stations must be equipped with auxiliary power, including an automatic transfer switch.
 - iv) Provisions for telemetry and/or alarms are required. Standards [for Instrumentation and Control – SCADA](#) shall be used to develop and design the necessary telemetry and/or alarm systems.

Grease Traps and Interceptors

Whenever a commercial and/or retail food preparation operation, regardless of size, generates polar or non-polar FOG waste that causes a visible sheen or accumulations in the effluent to be discharged to the sanitary sewer, pre-treatment is required in accordance with LMC and the Uniform Plumbing Code (UPC). Design of FOG pre-treatment devices must comply with City Guidelines and Standards as provided in the [Grease-Interceptor-Sizing-and-Installation-Guidelines](#) and the [Grease Interceptor Single Vault System](#). The devices must include a FOG control program and be provided prior to installation of a new device or when requested for an existing device.

All FOG pre-treatment devices must be inspected by City personnel prior to approval and are subject to inspection and reporting requirements within the LMC. At a minimum, gravity grease interceptors shall be cleaned at least once every 90 days and hydromechanical grease interceptors cleaned at least biweekly. These required frequencies may be extended with the approval of the Director. Grease interceptors must be cleaned whenever the combined thickness of the floating greases and settled solids is equal to, or greater than, 25 percent of the total liquid depth in the interceptor. When cleaned, a gravity grease interceptor must be completely pumped out, all solids removed, solidified grease scraped from the interior and the structure, and all internal plumbing inspected for damage and corrosion. The interceptor shall be refilled with cold water prior to being placed back into operation. If repairs are required, they shall be performed within 30 days.

When cleaned, the hydromechanical grease interceptor must have surface grease and oil removed, settled solids removed, all walls scraped, removable parts removed and cleaned, be inspected for damage and corrosion, and be properly reassembled. If repairs are required, they shall be performed within 30 days.

A grease interception device and/or other biological, chemical, or another pre-treatment approved by the Director, must be installed by the owner. Effluent discharged from any grease interceptor must not contain a visible sheen or accumulations of FOG and must be in compliance with the City regulations for discharge to the sanitary sewer.

- a) Design of the grease interceptor must conform to the [Standard Detail](#) and will be subject to approval by the authority having jurisdiction and utility pre-treatment. Size must be determined by the UPC and manufacturers recommendations. The type and size of the grease removal system shall be based on the drainage fixture unit formula as defined in the currently adopted Uniform Plumbing Code. In no case shall a hydromechanical grease interceptor smaller than 20 gallons per minute or larger than 55 gallons per minute be installed without approval of the director. In no case shall a gravity grease interceptor smaller than 750 gallons be installed without prior approval of the director. The maximum size for a gravity grease interceptor shall be 4,000 gallons. If the calculated minimum size is larger than this, two interceptors of approximately equal size shall be installed in series. If the calculated minimum size is larger than 8,000 gallons, two 4,000-gallon gravity grease interceptors shall be installed in series.
- b) Fixtures in the kitchen area that discharge wastewater containing grease are to be connected to the grease interceptor. Such fixtures as a 3-comp sink, prep sink, mop sink, floor sink and kitchen floor drains. Dishwashers, toilets, urinals, and wash basins must not flow through the interceptor.

- c) The gravity grease interceptor must be located outside the building within 20 feet of drive for access by maintenance vehicles.
- d) The interceptor must be filled with clean water prior to startup of the system.
- e) Access to the interceptor must be maintained free of obstructions for inspection and compliance determination sampling at all times.
- f) When pre-treatment is no longer required, the inlet and outlet pipes must be permanently plugged, the separation chambers pumped out, and the vault removed or filled with compacted crushed rock or controlled density fill.

Oil/Water Separators

Whenever an industrial or commercial business generates mineral/petroleum/non-biodegradable cutting oils exceeding 100 milligrams per liter (mg/L) to be discharged to the sanitary sewer, pre-treatment is required. An oil/water separation device must be installed by the property owner. Selection and sizing of an oil/water separator must be subject to approval of the utility. Water discharged from any oil/water separator to the sanitary sewer system must not contain in excess of 100 mg/L of petroleum oil, non-biodegradable cutting oil, and mineral products, and must be in compliance with the City regulations for discharge to the sanitary sewer.

- a) Sizing of a separator facility must be based upon maximum available flow to the separator and provision of a 45-minute retention time in the separator at that flow, with a minimum capacity of at least 100 gallons.
- b) The oil/water separator must be covered with removable sections. Access and inspection covers, weighing not more than 30 pounds and with suitable hand holds, are to be provided directly above inspection “tee” and oil/grit collection compartments.
- c) Only wastewater from floor drains and covered parking areas must drain to the separator. The location and design must minimize or eliminate the possibility of stormwater reaching the separator – areas over 200 square feet open to rainfall must not drain to the separator. Sewage from restrooms and shower facilities must not drain to the separator.
- d) The separator must be located within 20 feet of drive for access by a maintenance vehicle.
- e) A sampling tee must be located on the outlet as shown on the Standard Details. Access to the separator must be maintained free of obstructions for inspection and compliance determination sampling at all times.
- f) The effluent discharged from any oil/water separator to the sanitary sewer must not exceed 100 parts per million total oils.
- g) When pre-treatment is no longer required, the inlet and outlet pipes must be permanently plugged, the separation chambers pumped out, and the vault removed or filled with compacted crushed rock or controlled density fill.

DIVISION 5 – WATER

WATER

CHAPTER 16

General

All proposed water mains, additions, and improvements to the City's water system must be designed, signed, and stamped by a professional engineer, registered with the State of Washington. The design must be consistent with the City of Lynnwood's current *Water System Plan*, the Lynnwood Standards, applicable American Water Works Association (AWWA) Standards, Section 7-09 of the latest edition of WSDOT/APWA Standard Specifications, and the Washington State Department of Health (DOH) *Water System Design Manual* and must be approved by the Director.

The general requirements of AWWA and the WSDOT/APWA Standard Specifications must apply unless they are inconsistent with any of the provisions of this particular section. If inconsistencies occur, the Lynnwood Standards will have precedence.

The [Water Standard Notes](#) are found in the City's [Standard Plans Index](#). These notes shall be included in both public and private improvement plans. Water design must conform to the City Standard Plans found under Standard Plans Utilities and the [Water Standard Notes](#).

a) City

The City is responsible for the water service from the water main to, and including, the supply meter. The customer is responsible for all connections to and from the backside (or outlet side) of the meter including, but not limited to, vaulted piping systems and connections, meter setter connections, and tailpiece connections (meter couplings). If the meter or piping system to the meter is equipped with an unmetered bypass arrangement, the City is responsible up to, and including, the hot side shut-off valve on the bypass. All connections downstream from the bypass valve are the customer's responsibility.

b) Ownership – Alderwood Water and Wastewater District (AWWD)

AWWD serves and area within the City easterly of Interstate 5. The AWWD service area can be found on the District website here - [AWWD Service Area Map](#). All AWWD Standards apply to areas located within this service area.

c) Lead Free

Any public water system or any plumbing in a residential or nonresidential facility providing water for human consumption that is connected to a public water system, must be lead free. With respect to solders and flux, lead free must meet the standards of DOH.

d) Extensions and Frontage Improvements

Water main extensions will be required when the property does not front a water main. The minimum extension must be to a point at least 5 feet beyond the prolongation of the property line. The standard pipe size approved for water distribution main construction is 8, 12, and 16 inches, with a minimum size of 8 inches in diameter. In certain cases, 4- and 6-inch mains may be used as described in LMC Section 13.04.070.

The standard pipe size approved for water service line construction is $\frac{3}{4}$, 1, 1½, 2, 4, and 6 inches, with a minimum size of $\frac{3}{4}$ -inch diameter.

As specified in the [Water Standard Notes](#), the pipe material required for the construction of water main pipe is CL 52 ductile iron, and the pipe material required for the construction of water service pipe is copper tubing Type K (soft).

Water main improvements are required when the existing water main is not adequate for the increased use proposed (criteria used to determine adequacy include, but are not limited to, age, pipe diameter, type, and condition of existing water main). The City's *Water System Plan*, water main evaluation study, and hydraulic analysis results are used to determine water main adequacy. The improvements must extend from the project to the point the Director deems the system appropriate. The improvements must be consistent with the Lynnwood Standards for new construction and must be approved by the Director.

All water main extensions and new water main construction require the Developer to design and extend the water main to a point at least 5 feet beyond the farthest edge of the property, or as directed by the Director. Where water mains stop, the main must be extended past any asphalt surfaces existing or contemplated, as required by the Director.

e) Cross-Connection Control (CCC)

All connections must be examined and evaluated to determine if they constitute an actual or potential cross connection. Cross connections are not allowed and must be controlled by an approved back flow prevention assembly. All backflow assemblies must be tested by a state certified Backflow Assembly Tester (BAT) upon installation, annually and when moved and/or repaired. Refer to the [Cross-Connection Control Decision Tree](#) to assist in the determination whether CCC is required. The City has established a Policy regarding the minimum standards for the City to protect the public potable water supply from possible contamination or pollution due to backflow or back siphonage from a customer's private internal system into the public potable water system. Refer to the [Cross Connection Control Operating Policy](#). A Double Check Valve Assembly (DCVA) or Reduced Pressure Backflow Assembly (RPBA) shall be designed and constructed as specified in the [2½-inch and Smaller DCVA](#), [2½-inch and Smaller RPBA](#), or [3-inch or Larger Above Ground RPBA or DCVA](#). As determined by the Director and or Fire Marshal, the CCC for fire sprinklers shall be as specified and detailed in the [Riser Detail](#).

f) Fire Hydrant Extensions

Water main extensions and new fire hydrant installations may be required per the Fire Marshal. If a fire hydrant extension exceeds 50 feet, the hydrant run shall be increased from 6 inches to 8 inches. No domestic or irrigation services or taps may be taken from a hydrant run. Fire hydrants shall be as specified in the [Water Standard Notes](#) and [Fire Hydrant Assembly Detail](#), [Fire Hydrant Guard Posts Detail](#), and [Fire Hydrant Valve Marker Post Detail](#).

g) Easement and Alignment

Water main installations not in right-of-way must be located in the center of the easement as much as possible. All water main construction must be staked to ensure placement within designated easements. Any deviation from this requirement must be approved by the Director. In addition to water mains, all hydrants, meters, and other appurtenances must be located within the easements, which must be a minimum of 15 feet wide. Access to easements must remain open for maintenance and repair. Structures and fences may not be located, nor trees and shrubs planted, on easements. Marking posts approved by the City must be noted on plans marking the centerline of easements in unpaved areas.

Easements must be executed at completion of construction.

h) Quality and Consistency

All materials must be new and undamaged. Unless otherwise approved by the Director, the manufacturer of an item used throughout the work must be the same.

i) Water Meters

Residential meters shall be sized per the Uniform Plumbing Code, if the meter supplies a fire sprinkler systems it shall be sized as 1-inch.

Commercial meters shall be per the Uniform Plumbing Code.

j) Irrigation

All irrigation systems, excluding single-family residential, must be served by a dedicated irrigation metered connection, including common landscape areas in single-family residential developments. Deduct meters are not permitted.

Irrigation within the City Center where flower baskets are provided shall provide valve access and connections as specified in the [City Center Flower Basket Valve Access Box Detail](#) and the [City Center Flower Basket Irrigation Connection Detail](#).

All irrigation systems are subject to cross-connection control requirements established by state and local laws and the Lynnwood *Cross-Connection Control Operating Policy* adopted by the City Council. Refer to the [Cross-Connection Control Decision Tree](#) to assist in the determination whether C-CC is required and what type. Refer to the Cross-Connection Control section for links to standards details.

Distribution and Transmission

a) Design Format

Water and sewer plans may be combined. Other utilities must be included in half tone background to show their relative locations. Plans must show existing and proposed easements where mains are on private property. Plans must show elevations of sewer mains, water mains, and storm drains where they cross each other.

b) Utility Separation

A minimum of 10 feet of horizontal clearance must be maintained between water mains and sewer lines. A 5-foot horizontal clearance must be maintained between water mains and all other utilities. If the separation requirements are not possible, the Developer must design the system in accordance with practices in the most recent publication of the AWWA subject to approval by the Director.

There must be a minimum of 18 inches vertical separation wherever a water main crosses a sanitary sewer or storm sewer, or wherever a water service crosses a sanitary side sewer or a storm line. All other utilities (including gas, power, phone, and cable) must be located a minimum of 12 inches below the water utility. Angle crossings between water mains and sanitary sewers or between water mains and storm lines should be at 90 degrees wherever possible; avoid intersection angles of less than 75 degrees.

Any deviation from these separation requirements must be approved by the Director and be consistent with the latest *DOH Water System Design Manual*.

Valves

a) General

At a minimum, valving must be installed at all intersections of water mains, on each end of easements, and in line at a maximum spacing of 500 feet. Valve cans within the road must be located outside of the vehicle wheel path to the maximum extent practicable. In residential applications, valves must be placed such that no more than 20 single-family residences would be out of service in any given shutdown. Additional valves may be required in high-density areas, as directed by either the Fire Marshal or the Director.

Valves must be rated for the in-line pressure.

The valve and valve box must be set plumb, with the valve box centered on the operator nut.

b) Air and Vacuum Release Valves

Air and vacuum release valves must be located at the highest point of the water main, which must be reviewed and approved by the Director. Assemblies shall be designed and constructed as specified in the [2-inch Air Vacuum Valve Assembly Detail](#).

c) Blow-Off Assemblies

Blow-off assemblies shall be at the locations to maintain water quality, where a fire hydrant is not provided, and in accordance with Lynnwood Standards. Assemblies shall be designed and constructed as specified in the [2-inch Blow Off Assembly Detail](#).

d) Check Valves

Check valves for permanent installations, other than cross-connection control, must be rated the source pressure, unless otherwise specified. Check valves must provide non-slamming action under all conditions, unless otherwise specified. Check valves must be reviewed and approved by the Director for the intended application. Check valves are not a substitute for cross-connection control.

e) Gate Valves

Buried gate valves shall be designed and manufactured in accordance with AWWA C515, epoxy coated ductile iron body, bronze mounted, resilient wedge, non-rising stem, suitable for installation with the type and class of pipe being installed. Valves are to be equipped with a standard 2-inch operating nut, and O-ring stem seals. Valves must be of the type to have two O-ring stem seals in the stuffing box of the valve to facilitate seal replacement without valve dismantling.

Allowable resilient wedge gate valves for 2 inches through 12 inches:

- i) U.S. Metroseal 250;
- ii) Waterous American Flow 2500;
- iii) Clow w/Ductile Iron Body;
- iv) M&H w/Ductile Iron Body;
- v) Kennedy w/Ductile Iron Body;
- vi) Mueller A23-62 w/Ductile Iron Body; and
- vii) AVK Series 45 Ductile Iron Body.

Valve boxes shall be as specified in the [Water Standard Notes](#) and the [Water Valve Box and Extension Detail](#). A concrete collar is required around valve boxes located in gravel roadways or in gravel shoulders. The slots and tabs must be set directionally with the main. An operating nut extension, when required, must be furnished and installed by the Developer.

Valves not buried must be specified on the plans and, when required, placed in a vault designed and constructed as specified on the [Large Vault Detail](#).

Two-inch gate valves must be heavy-duty type with a 2-inch drive block.

For every tee installed on a water main, three valves are required, one valve on each pipe leg, except for hydrant connections or as otherwise approved in writing by the Director. For every cross connecting two water mains, four valves are required, one valve on each pipe leg, unless otherwise approved in writing by the Director. The

purpose of installing a valve on each pipe leg is to ensure that each discrete pipeline can be isolated while maintaining adequate flow throughout the adjacent piping network.

Where allowed by the Director, tapping valves and tees shall be design and constructed as specified in the [Tapping Tee Detail](#). Size on size taps are not allowed on existing asbestos cement pipe. Where applicable, tapping valves should be implemented to minimize service disruptions, as well as maintain fire flow and positive pressure.

f) Butterfly Valves

Butterfly valves shall conform to AWWA C-504, Class 150, with ductile iron short body and O-ring stem seal. Butterfly valves shall be used for all lines larger than 12 inches in diameter, except as specifically noted by the Director.

Butterfly valves in chambers shall have a mutual crank operation. Buried butterfly valves will require valve operator extensions.

g) Insertion Valves

When determined by the Director, an insertion valve shall be provided. Valves shall be suitable for frequent operation and for prolonged periods of inactivity. Valves shall operate with flows in either direction and shall provide zero leakage past the seat; minimum working pressure for all sizes shall be 250 psi. Such valves shall not be used on asbestos cement water main.

Insertion valves 4 inches through 12 inches shall be iron body, resilient seated insertion valves with non-rising stems. Design and construction shall comply with AWWA C515 requirements. If the resilient seats are bonded to the gates, the gates shall be completely encapsulated with the material, except for guide tabs or slots. Valve bodies shall be designed to allow for the lifting of the valves by the bonnet flange, gland flange, or other appurtenances. Valves shall be supplied with 2-inch square operating nuts and shall open clockwise.

Valves shall be installed with the stem positioned vertically in buried horizontal water lines without gearing, bypasses, rollers, or tracks.

Mechanical joint components shall be in accordance with AWWA C111 with tee-head bolts and hexagon nuts fabricated from a high strength, low alloy steel. Accessories for the mechanical joint shall consist of the gasket, gland, and fasteners and shall be furnished and packaged separately from valves. Machined flange faces shall be shop-coated with a rust preventative compound; they shall not be painted or coated with the same coating as the body.

Split restraint devices shall consist of multiple gripping wedges incorporated into a follower gland meeting AWWA C110. Mechanical joint restraint shall be in accordance with AWWA C600. Set screw pressure point type restraint hardware is not permitted.

Each valve, after shop assembly, shall be operated and hydrostatic tested in accordance with AWWA C515-11. Valve installation shall result in full host pipe coupon removal by manufacturer-certified installers in accordance with the manufacturers installation manuals.

The manufacturer shall submit a written statement that the inspection and all specified tests have been completed and that results comply with the requirements of these Standards. Components in contact with potable water shall be certified to comply with NSF/ANSI 61, and a copy of the NSF/ANSI 61 certification shall be provided to the City, if requested.

h) Pressure Reducing Valve (PRV)

Size PRV so that the velocity through the valve at maximum demand does not exceed 25 fps. If a wide range of flow rates is anticipated, more than one valve may be required. Ensure an adequate pressure differential across the valve under all ranges of flow to accomplish hydraulic throttling. When pressure differentials greater than 45 psi are expected or when the downstream pressure is low relative to the differential, special valve materials or a special valve design may be required. Properly support PRVs and ensure adequate clearance above and below the valve to facilitate servicing. When required, place in a vault designed and constructed as specified on the [Large Vault Detail](#). Telemetering of data may be required. Install a gate valve on both sides of each PRV for isolation purposes. Standards [for Instrumentation and Control – SCADA](#) shall be used to develop and design the necessary telemetry and/or alarm systems.

i) Storage and Pump Stations

Water reservoirs shall be design in accordance with Washington Administrative Code (WAC) [246-290-235](#), Finished Water Storage Facilities, and the applicable sections of the DOH [Water System Design Manual](#), in particular, Chapter 7: Reservoir Design and Storage Volume. The Director shall determine the type and material used for new reservoirs based on both the construction and the operation and maintenance costs.

A Booster Pump Station (BPS) shall be design in accordance with WAC [246-290-230](#), Distribution Systems, and the applicable sections of the DOH [Water System Design Manual](#), in particular, Chapter 8: Booster Pump Station Design. The Director shall determine the type and material used for new BPSs based on both the construction and the operation and maintenance costs. The design engineer is responsible for the development of the Project Report in accordance with [WAC 246-290-110](#), and shall obtain written approval prior to the construction of any new BPS.

New BPSs must be equipped with auxiliary power, including an automatic transfer switch.

Provisions for telemetry and/or alarms are required for both new reservoirs and BPSs. Standards [for Instrumentation and Control – SCADA](#) shall be used to develop and design the necessary telemetry and/or alarm systems.

The design engineer is responsible for the development of the Project Report in accordance with [WAC 246-290-110](#), and shall obtain written approval prior to the construction of any new reservoir or BPS. The [Construction Completion Report Form](#) (DOH 331-121) must be submitted to DOH within 60 days after the completion of the reservoir or BPS project and before they are placed into service.

DIVISION 6 – CONSTRUCTION AND INSPECTION

CONSTRUCTION

Standards

The Lynnwood Design and Construction Standards and Specifications (Lynnwood Standards) apply whenever public or private work is performed within the City limits, including private work under authority associated with a City Permit or granted by ordinances of the City Council. Capital improvement projects are required to meet all standards outlined in this EDM unless the Director approves an exception from the design standards in effect at the time of construction.

Except where these Lynnwood Standards provide otherwise, design, construction, and materials must conform to the appropriate standards of the most current edition of the following publications produced jointly by the Washington State Department of Transportation (WSDOT) and the Washington State Chapter of the American Public Works Association (APWA):

- i) WSDOT Standard Specifications for Road, Bridge, and Municipal Construction, referred to in this document as the [WSDOT Standard Specifications](#) and [WSDOT Standard Plans](#).
- ii) 2019 Department of Ecology *Stormwater Management Manual for Western Washington* ([2019 ECY SWMMWW](#)).
- iii) City of Lynnwood Supplemental Stormwater Guidelines in LMC [Chapter 13.40 Stormwater Management](#).

Periodically, the City may modify the Lynnwood Standards to make corrections, clarify procedures, or revise the standards or specifications to conform to municipal practice, changes in policy, updates to methods of design and construction, new technology, or corrections to typographical errors.

General

Developers and/or Contractors must be licensed, bonded, and experienced in the field of work being performed.

Before any construction begins, the Developer must provide the City with the name and contact information for the person in charge who can be contacted 24 hours a day regarding construction-related problems.

All work performed in the design, preparation of plans, and construction or improvement of all streets and appurtenances, whether public or private, is the responsibility of the Developer and must be completed to the satisfaction of the Director in accordance with these standards.

It is emphasized that no permits will be issued to start work until plans for the work are approved and the necessary bonds have been provided.

A copy of approved construction plans must be onsite during all phases of construction.

Any revisions to the approved development plans must be submitted to and approved by the Director before being implemented.

Activities such as trench excavation, tunneling or boring, pipe embankment, backfilling, compaction, safety, and pavement patching, whether for public or private utilities, must conform to the requirements set forth in other sections of the Lynnwood Standards.

Jacking, Augering, or Tunneling

- iv) Where required, the Developer shall install the pipe by jacking, augering, or tunneling, or install the pipe in a casing pipe by a combination of these methods. When use of a casing pipe is required, the Developer shall be responsible for selecting the gauge and size required and it shall be set to the line and grade.
- v) During jacking or auguring operations, particular care shall be exercised to prevent caving ahead of the pipe that will cause voids outside the pipe. When the carrier pipe is installed in a casing pipe, the carrier pipe shall be skidded into position in an acceptable manner and to the line and grade as designated. The annular space between the casing and the pipe shall be filled with sand or as otherwise approved.
- vi) The faces of the jacking/bore pit shall be shored, and constructed by driving steel sheets or installing timber lagging as the excavation proceeds. The sheets, or lagging, shall extend a minimum of 5 feet below the bottom of the pit except at the entrance of the utility. Prior to these activities, design or shop drawings describing the activities, including dimensions of pit length, size of underground borings, and a complete description of shoring, shall be submitted to the Director for approval.

Construction Noise

Construction noise shall be limited per [LMC Section 10.12.300](#) from 7:00 AM to 6:00 PM (Monday through Friday). Weekend work is prohibited unless approved per LMC 10.12.300. Refer to Section I-07.5(5), Noise Control and Work Performed at Night, in the WSDOT Standard Specifications.

Preconstruction Meeting

Before issuance of permits, construction, or any development activity, a preconstruction meeting is required between the City's Inspector, the Applicant, and the Applicant's construction representative.

To schedule a preconstruction meeting contact deveng@lynnwoodwa.gov.

Temporary Traffic Control

The Developer shall provide traffic control signs and devices as set forth on the traffic control plans provided with the contract drawings or submit alternate traffic control plans in accordance with Section I-10.2(2) of the WSDOT Standard Specifications.

A temporary traffic control (work zone) plan shall be submitted and approved before beginning any work requiring traffic control.

A traffic control plan shall be prepared to address disruptions to traffic and pedestrians.

The traffic control plan shall allow for continued emergency services. For business disruption, the plan shall contain adequate connections and clear signage.

The Inspector may authorize field adjustments to traffic control to meet actual conditions as directed by a Traffic Control Design Specialist (TCDS).

The traffic control plan shall allow for continued emergency services. For business disruption, the plan shall contain adequate connections and clear signage.

The following basic principles and standards shall be observed by all those who perform work within a street right-of-way:

- vii) Work areas are safe, and congestion is minimized.

- viii) Motorized and nonmotorized traffic is warned, controlled, and protected.
- ix) Emergency access is maintained.
- x) All traffic is expedited through the work zone to the extent possible.

If steel plates are approved for use, the plates shall be pinned, and cold mix asphalt shall be added to provide suitable transition from the roadway to the top of the steel plates. “MOTORCYCLES USE EXTREME CAUTION” signs and appropriate plaques shall be installed for each traffic direction when conditions stated in RCW 47.36.200 require them. Coordination of disruptions to signal loops during construction shall occur at the project preconstruction meeting.

- xi) Temporary video detection signal control shall be provided when traffic loops are impacted by construction.
- xii) The Developer shall pay for all costs to install temporary measures and restore detection signal control, including upgrades to current standards.

For further standards and requirements refer to the [Lynnwood Standard Traffic Control Notes](#).

Pedestrian Accommodation

- xiii) If the contractor’s activity requires closing a pedestrian pathway, another pathway must be made available nearby, off the traveled way. This pathway must replicate, to the maximum extent possible, the characteristics of the existing pathway and comply with the American Disabilities Act (ADA) and the Field Guide for Accessible Public Rights of Way.
- xiv) For long-term pedestrian diversions and or other areas with significant pedestrian activity may require at the discretion the Public Works Director a protected covered pathway and shall comply with ADA accessibility standards, OSHA structural specifications and OSHA standards, 1910-28 “Safety requirements for scaffolding”.
- xv) Advanced signing notification of sidewalk closures must be provided.
- xvi) Pedestrian facilities must be maintained in good condition and kept clear of obstruction.
- xvii) Traffic control devices, equipment, and other construction materials and features must not intrude into the usable width of the sidewalk, temporary pathway, or other pedestrian facility.

Survey Staking

Datum shall be City of Lynnwood NAD 83 Washington North (NAVD88) unless otherwise approved by the Director.

Benchmark(s) shall tie to the City’s Benchmark list.

Sewer

General

- xviii) Sewer construction shall conform with the [Sewer Standard Notes](#).
- xix) Trenching, backfill, and compaction shall conform with the [Standard Grading Notes](#).
- xx) Trench restoration shall conform to the [Temporary Trench Patching Notes](#), [Pavement Repair for Non-Arterial](#), and [Pavement Repair for Arterials](#).

Laying Sewer Pipe

All sewer main installations must have the line and grade set by survey prior to construction. Staking must show each manhole and cuts to all inverts. All mains are to be laid straight between manholes at a minimum depth of 8 feet, measured at the invert, unless the approved plans show otherwise or unless specifically approved otherwise in writing by the Director.

- xxi) The Developer may use any method, such as swede line and batter board or laser beam, etc. to accurately transfer the surveyor-provided control points to the designated alignment and grade.
- xxii) When using the swede line and batter board method, the Developer must transfer line and grade into the trench where they must be carried by means of a taut grade line supported on firmly set batter boards at intervals of not more than 30 feet. Not less than three batter boards must be in use at one time. Grades must be constantly checked and, in the event the batter boards do not line up, the work must be immediately stopped and the cause remedied before proceeding with the work.
- xxiii) When using a laser beam to set pipe alignment and grade, the Developer must constantly check the position of the laser beam from surface hubs provided by the surveyor to ensure the laser beam is still on alignment and grade. In the event the laser beam is found out of position, the Developer must stop work and make the necessary corrections to the laser beam equipment and pipe installed.
- xxiv) Trenching
 - (a) Trenching in general and the maximum trench width shall conform with the [Standard Grading Notes](#) and the [Typical Trench Section in Right-of-Way Standard Detail](#). If the maximum trench width is exceeded without authorization from the City construction inspector, the Developer must provide, at the discretion of the construction inspector, pipe with a higher strength classification or a higher class of bedding.
 - (b) The maximum length of open trench on streets and roadway shoulders must not exceed 300 feet at any time, unless specifically approved by the City construction inspector. The Developer must ensure that the project site is always a safe environment. At the end of each day, all open trenches must either be backfilled or covered with steel plates and barricaded with attached flashing yellow lights to prevent vehicles, people, and animals from falling into the trench.
 - (c) Where trench excavation equals or exceeds a depth of 4 feet, the Developer must provide, construct, maintain, and remove, as required, safety systems that meet the requirements of the Washington Industrial Safety and Health Act, Chapter 49.17 RCW, including Chapter 296-155 WAC. The trench safety systems must be designed by a qualified person and meet accepted engineering requirements (WAC 296-155-650-66411).
 - (d) Trench restoration shall conform to the [Temporary Trench Patching Notes](#), [Pavement Repair for Non-Arterial](#), and [Pavement Repair for Arterials](#).
- xxv) Bedding

Pipe bedding must be placed to provide a uniform and continuous bearing and support for the pipe on solid, undisturbed, or compacted ground in accordance with the [Bedding for Pipe](#) Standard Detail. Bedding must be installed and spread smoothly so that the pipe is uniformly supported. Subsequent lifts are not to exceed 6 inches in thickness and must be installed to the crown of the pipe. An 18-inch lift must be placed and compacted over the crown of the pipe prior to backfilling the trench.

xxvi) Ground and/or Surface Water

- (a) During excavation, installation of pipelines, and placement of trench backfill, excavations must be kept free of water. The Developer must control surface runoff to prevent entry or collection of water in excavations.
- (b) The static water level must be drawn down at least 1 foot below the bottom of the excavation to maintain the undisturbed state of the foundation soils and to maintain the required density of any fill or backfill.
- (c) The dewatering system must be installed and operated so that the groundwater level outside the excavation area is not reduced to an extent that would damage or endanger adjacent structures or property.
- (d) Pumping any water offsite is not allowed without prior approval from the City. Discharges to the public stormwater drainage system must be below 100 NTU and must not be considered a prohibited discharge.

xxvii) Sewer Manholes

- (a) Excavation — The Developer must excavate completely around the manhole to prevent unbalanced loading. The manhole must be kept in operation at all times and the necessary precautions must be taken to prevent debris or other material from entering the sewer, including a tight pipeline bypass through the existing channel, if required.
- (b) Manhole Connections — The Developer must core drill to the size of the Kor-N-Seal boot (or approved equal) according to the manufacturer's specifications for the size of pipe used. Jackhammers shall not be used.

xxviii) Pipe Installation

- (a) Sewer lines must be laid upgrade from the starting point of connection on the existing sewer or from a designated starting point, as approved by the City construction inspector. Sewer pipe must be installed with the bell end forward or upgrade. After placing a length of pipe in the trench, the spigot must be centered in the bell and the pipe forced home and brought to correct line and grade. During joining, the pipe must be partially supported to minimize unequal lateral pressure and to maintain concentricity. Pipe handling after the gasket has been affixed must be carefully controlled to avoid disturbing and dislocating the gasket. Any disturbed or dislocated gaskets must be removed, cleaned, replaced, and lubricated before joining the sections.
- (b) Under no circumstances may pipe materials be dropped or dumped into the trench. Broken or otherwise defective pipe must be removed from the job site and replaced.

- (c) Plugs and Connections — All fittings must be capped or plugged with a plug of an approved material and gasketed with the same gasket material as the pipe unit, the pipe must be fitted with an approved mechanical stopper, or the pipe must have an integrally cast knock-out plug. The plug must be able to withstand all test pressures without leaking.
- (d) Every precaution must be taken to ensure foreign material does not enter the pipe. When pipe laying is not in progress, the open ends of the pipe must be closed by a watertight plug or other means approved by the City construction inspector. If water is in the trench when work resumes, the seal on the pipe must remain in place until the trench is completely pumped dry. No pipe may be laid in water, or when, in the opinion of the City construction inspector, trench conditions are unsuitable.
- (e) Where it is necessary to break out or connect to an existing sewer during construction, only new pipe having the same inside diameter must be used in reconnecting the sewer. Where joints must be made between pipes with a mismatched wall thickness, the Developer must use a flexible gasketed coupling, adapter, or coupling-adapter to make a watertight joint. Couplings must be those manufactured by Romac, Smith Blair, or approved equal for reinforced pipes and Fernco, or approved equal as approved by the City construction inspector for non-reinforced pipes.

xxix) Backfill, Stockpiles, Unsuitable, and Excess

- (a) Backfill and compaction shall conform with the [Standard Grading Notes](#) and the [Typical Trench Section in Right-of-Way](#) Standard Detail. Compaction tests are required for all backfilled trenches in paved public roadways and in roadway shoulders. The City construction inspector has the discretion to require additional tests and to specify test locations.
- (b) No construction materials, soil, debris, etc. may be stockpiled in the public right-of-way unless specific permission is granted in writing by the City construction inspector.
- (c) The Developer must remove from the project site, at its expense, all excess excavated trench material or that deemed by the City construction inspector to be unsuitable for trench backfill.

xxx) Tree and/or Shrub Roots

- (a) No willows, poplars, cottonwoods, birches, soft maple, gum, or any other tree or shrub whose roots are likely to obstruct public sewers are allowed within 30 feet of any public sewer.
- (b) Any of these trees found to be located within 30 feet of a proposed sewer main must be removed at the Developer's expense.
- (c) Any of these trees planted or established within 30 feet of constructed public sewer facilities must be removed by the property owner or owner's association.

xxxi) Side Sewers

(a) General

- (i) Side sewer construction must conform to the [Typical Side Sewer Connection](#) Standard Detail and [Sewer Standard Notes](#).
- (ii) The Developer must obtain a side sewer permit and all other required permits before connection to the sanitary sewer main will be allowed.

(b) Construction

- (i) Side sewers must have a minimum cover of 5 feet in the public right-of-way and 2 feet inside the property line, unless otherwise approved by the Director.
- (ii) Side sewers must not cross a public right-of-way or run parallel to the right-of-way centerline.
- (iii) Trenching, backfill, and compaction shall conform with the [Standard Grading Notes](#) and [Bedding for Pipe](#) Standard Detail.

Water

General

- xxxii) Water construction shall conform to the [Water Standard Notes](#).
- xxxiii) Trenching, backfill, and compaction shall conform with the [Standard Grading Notes](#).
- xxxiv) Trench restoration shall conform to the [Temporary Trench Patching Notes](#), [Pavement Repair for Non-Arterial](#), and [Pavement Repair for Arterials](#).
- xxxv) Underground Fire Systems and Fire Department Connections (FDC's)
 - (a) Installation of private fire service mains and their Appurtenances shall conform to NFPA 24
 - (b) Post indicator valves and FDC's shall comply with roadside clear zone requirements.

Laying Water Pipe

Refer to Laying Sewer Pipe Section XX.XX.

Pipe Installation and Trenching

Refer to Sewer Pipe Installation and Trenching Section XX.XX .

Backfill, Stockpiles, Unsuitable and Excess

Refer to Sewer Backfill, Stockpiles, Unsuitable and Excess Section XX.XX.

Hydrant Permit

The City of Lynnwood Public Works must approve the water usage and type of backflow assembly required. Use of a hydrant for construction shall be in accordance with the [Hydrant Permit Requirements and Fees](#).

Storm

General

- xxxvi) Storm construction shall conform to the [Storm Drainage Notes](#).
- xxxvii) Trenching, backfill, and compaction shall conform with the [Standard Grading Notes](#).
- xxxviii) Trench restoration shall conform to the [Temporary Trench Patching Notes](#), [Pavement Repair for Non-Arterial](#), and [Pavement Repair for Arterials](#).

Laying Storm Drainage Pipe

Refer to Laying Sewer Pipe Section XX.XX.

Sidewalks and Driveways

Concrete sidewalks and driveways shall be constructed in accordance with [Concrete Sidewalk](#) and [Standard Driveway Entrance](#) Standard Details.

When fall protection is required, handrail(s) shall be constructed in accordance with [Pedestrian Railing Barrier](#) Standard Detail and [Notes](#).

Concrete curb and gutters shall be constructed in accordance with the Curb and Gutter Details found in the [Standard Plans](#) for Streets.

Roadways and Pavement Restoration

General

- xxxix) Pavement restoration must be completed according to the [Temporary Trench Patching Notes](#), [Pavement Repair for Non-Arterial](#), and [Pavement Repair for Arterials](#).
- xl) The limits of restoration will be as determined by the Director on a project -specific basis and will require full-lane-width grinding and overlays unless otherwise approved by the Director.

Concrete

- xli) Cement concrete roadway shall be restored to the nearest half panel. Cement concrete shall be replaced or patched with concrete.
- xl ii) Any cement concrete pavement traffic lane affected by the trenching shall have all affected panels replaced.
- xl iii) Cement concrete pavement shall be connected to existing concrete pavement with dowels and epoxy and restored with mix per WSDOT Standard Specification 9-01.2(1).
- xl iv) Concrete pavement shall be restored consistent with WSDOT Standard Plan A-60.10-03.

Asphalt

- xl v) Asphalt concrete pavement removal may be by full depth saw cut or drum grinder.
- xl vi) Asphalt concrete pavement cut widths may be extended by the City construction Inspector to competent roadway pavement.
- xl vii) The City Construction inspector shall approve the restoration limits before restoration begins. Cuts in asphalt shall be wide enough to accommodate compaction equipment.
- xl viii) Cuts shall be expanded to include joints, panel edges, existing patches, or cracks within 4 feet of the opening.

- xlix) Cuts shall be expanded to ensure that new longitudinal joints are not located in a wheel path.

The cut face shall be neat, straight, and vertical. The corners shall be square. When an existing asphalt paved street is to be widened, the edge of pavement shall be sawcut to provide a clean, vertical edge for joining to the new asphalt at the time of the placement of the new asphalt. After placement of the new asphalt section, the joint shall be sealed.

Overlay

- l) A public street shall be overlaid when any one of the following conditions applies:
 - (a) Full street grind and overlay shall be provided for excavation within streets paved within the previous 5 years.
 - (b) Utility installation parallel to the pavement centerline requires a half-street overlay from the centerline to the curb line for the entire length of the utility installation.
 - (c) If the utility trenching encroaches on both sides of the centerline (impacted area), a full-street overlay along the impacted area of the utility installation shall be required.
 - (d) Utility installation consisting of 3 or more perpendicular (transverse) trenches within 150 feet, measured along the pavement centerline, requires overlay from the curb line to the centerline for the full length of the utility installation. If a trench extends beyond the centerline, the Director may require a full-street overlay.
 - (e) Utility installed at an angle to the pavement centerline requires an overlay from the centerline to the curb line for the entire length of the utility installation. If the utility trenching encroaches on both sides of the centerline, the Director may require a full-street overlay.
 - (f) When the permit conditions require street improvements and the existing pavement has alligator cracking, the existing pavement and failed subgrade shall be removed, repaired and paved from the centerline to the new curb line.
 - (g) Additional pavement restoration may be required to include any pavement damaged during construction and/or to include pavement patches per the right-of-way inspectors.
- li) Cold plane both ends of the overlay perpendicular to the roadway for at least 15 feet to provide a flush transition. For half-street or full-street overlays, cold planing (grinding) of the entire paving area is required (centerline to gutter or gutter to gutter). When curb and gutter does not exist, the new overlay surface may, at the Director's discretion, be tapered to meet the elevation of adjacent paved surfaces. All asphalt joints and tapered transitions shall be sealed with AR4000 or equivalent.
- lii) Where curb and gutter does not exist, the shoulder shall be restored with crushed rock.

Monitoring Wells and Potholing

- liii) Monitoring wells or resource protection wells shall be decommissioned adhering to the requirements of WAC 173-160-460. Once the well has been decommissioned, the pavement restoration shall adhere to the appropriate Standard Plan.
- liv) Vertical potholing from vacuum excavations equal or smaller than 12-inch square or diameter shall be backfilled with controlled density fill. Once backfilled, the pavement restoration shall adhere to the appropriate Standard Plan.

Channelization

- lv) All channelization and pavement markings, such as raised pavement markers, paint, thermoplastics, etc., shall be pre-marked by a City-approved striping contractor, and the layout approved by the City Construction inspector, prior to permanent installation by the Contractor. Approval may require a 3 working day notice for layout approval.

Stop Work

Fire Access

The required fire department access must be recognizable day or night and must be free of obstructions including, but not limited to, parked vehicles, construction materials, and equipment. Temporary construction gates may be used as approved by the Fire Department. A “Stop Work” or “Unsafe to Occupy” order will be issued upon failing this section of this standard.

Illicit Discharge

If a permit is issued and the City subsequently issues three (3) stop work orders or if three (3) illicit discharges are reported due to insufficient erosion prevention and sedimentation control, the permit shall be suspended until the dry season, or, if violations occurred in the dry season, until weather conditions are favorable and effective erosion and sedimentation control is in place. The suspension shall be removed at the end of the rainy season or upon the City’s determination that appropriate BMP’s have been installed and are working and that the Permittee has adequate resources and abilities to manage BMPs effectively without further discharges that do not meet requirements.

INSPECTION

General

Work performed on construction or improvements within the City, whether by a private Developer, a City contractor, or City forces, must be completed in accordance with the approved plans and specifications and to the satisfaction of the Director.

Work cannot start until plans are approved. Any revision to the plans must be submitted by the Developer’s engineer to the Director for approval prior to performance of the work. The Director will have the authority to enforce these Standards, as well as other referenced or pertinent specifications, and will appoint project engineers, assistants, and inspectors, as necessary, to inspect the work for compliance.

Testing and Special Inspection

All requests for inspections and for witnessing tests must be scheduled with the City construction inspector by requesting the inspection through the on-line portal at least 24 hours in advance, and no more than 7 days in advance. Failure to give adequate notice may result in delays to the work for required inspections.

Sewer and Storm Drain as noted

lvi) Cleaning and Testing

- (a) All sanitary sewer pipe, including side sewers, must be cleaned and tested after backfilling. Testing must be by either exfiltration or low-pressure air method. The Developer has the option to select the method of testing, unless the groundwater table is such that the City construction inspector may require the infiltration test.
- (b) The Developer must clean and flush all sewer and storm lines with a high pressure hydro-jet or other approved cleaning method prior to testing.
- (c) All testing must be under the direction and in the presence of the City construction inspector. The Developer must contact the City construction inspector at least 3 working days before testing is to occur. Cleaning and testing of sewer lines must be completed within 15 working days of backfilling, unless otherwise approved in writing by the City construction inspector. The Developer must furnish all labor, materials, tools, and equipment necessary to clean and test the sewer lines. Any damage resulting from testing must be repaired by the Developer to the satisfaction of the City construction inspector.
- (d) All wyes, tees, and stubs must be plugged with flexible jointed caps, or an acceptable alternate, securely fastened to withstand the internal test pressure. These plugs or caps must be readily removable, and their removal must provide a socket suitable for making a flexible, jointed, lateral connection or extension.
- (e) If the Developer elects to test large diameter pipe one joint at a time, leakage allowances must be converted from gallons per hour (GPH) per 100 feet to GPH per joint by dividing by the number of joints occurring in 100 feet. If leakage exceeds the allowable amount, corrective measures must be taken, and the line must be re-tested to the satisfaction of the City construction inspector.
- (f) If any sewer installation fails to meet the requirements of the test method used, the Developer must determine the source or sources of leakage and must replace all defective pipe. The complete pipe installation must meet the requirements of the test method used before being considered acceptable. Replacement of defective pipe must not commence until the Developer has received approval of the plan from the City construction inspector.

lvii) Exfiltration Test

- (a) Prior to exfiltration leakage testing, the Developer may fill the pipe with clear water to permit normal absorption into the pipe walls. The Developer must complete the leakage test within 24 hours after filling the pipe. When under

test, the allowable leakage must be limited according to the following provisions. Specified allowances assume pre-wetted pipe.

- (b) Leakage must be no more than 0.28 GPH per inch diameter per 100 feet of sewer, with a hydrostatic head of 6 feet above the crown at the upper end of the test section or above the natural groundwater table at the time of test, whichever is higher. The length of pipe tested must be limited so that the pressure at the lower end of the section tested does not exceed 16 feet of head above the invert, and in no case must the length of pipe being tested be greater than 700 feet or the distance between manholes, whichever is shorter.
- (c) Where the test head is other than 6 feet, the maximum leakage must be 0.28 GPH per inch of diameter per 100 feet of pipe length times the square root of the test head. The leakage can be determined from the equation:

$$\text{Maximum leakage (in gallons per hour)} = 0.28 \times (\sqrt{H/6}) \times D \times (L/100)$$

Where:

D = diameter (inches)

L = length of pipe (feet)

H = test head (feet)

- (d) When the test is to be made one joint at a time, the leakage per joint must not exceed the computed allowable leakage per length of pipe.

lviii) Video Inspection

- (a) Before the City will issue final acceptance of the project, the interior of all 8-inch-diameter and larger mainline sanitary sewer pipes, 8-inch-diameter and larger storm drains, and all manhole/catch basin connections must be inspected by Closed Circuit Television (CCTV) camera and footage provided to the City in DVD format or thumb drive. Personnel performing television inspection must have completed the Pipeline Assessment and Certification Program (PACP) and submit proof of certification to the Engineer at least 3 working days in advance of the first television inspection.
- (b) The CCTV camera must have zoom capability as well as a 360-degree radial view color television camera (also known as a pan and tilt) with a mechanical footage counter calibrated to indicate video footage consistent with the distance traveled in the pipe. Footage must be zeroed at the centerline of the manhole where the video starts, and footage increases as it travels forward and decreases when backward camera movement is required. Display footage must be shown on the video.
- (c) The camera must have a light source providing adequate illumination to clearly identify pipe invert, crown, joints, sides, connections, and infiltration/exfiltration. Provide adequate illumination to record images at least 15 feet in front of the camera.

- (d) Audio commentary must be objective and based on PACP defined assessment conditions. Audio must be intelligible and as free from interference and background noise as can reasonably be done. Do not use subjective comments such as the fault of, caused by, and opinion. Comments must include the footage counter reading, each connection, the starting and ending structure, indicated flaws, areas of infiltration/exfiltration, open joints, outfall, and other features as may be necessary.
- (e) Submit television inspections on DVD format or thumb drive. All inspections must be in a PACP format and able to be uploaded to the City's Asset Management System..
- (f) Each individual sanitary sewer main inspection, from manhole to manhole, must be recorded on one digital file. The City will accept multiple digital files for a single pipe only when the pipe reach cannot be recorded to one digital file due to extreme pipe length or obstructions in the pipe. The City will not accept multiple sewer main inspections recorded on a single digital file.
- (g) The City will not accept dirty, blurry, foggy, submerged, or otherwise non-viewable inspections. Prior to inspection, the Developer must have completed the manhole channeling, grouting, trench backfill, compaction, and final restoration of the street or easement. The City must have accepted the invert elevations and record drawings. All sewer mains and laterals must be cleaned. All lines not clean must be re-flushed, cleaned, and re-inspected.
- (h) At least 2 days prior to the inspection, the Developer must inform the City construction inspector when and which lines will be inspected.
- (i) Immediately preceding the CCTV inspection, water with dye must be poured into the system and must be visible on the DVD recording. At the beginning of each sewer main inspection, the information listed below must be electronically generated and displayed on the CCTV footage. This data must be continuously updated and displayed on the CCTV footage during the inspection.
 - 1. Date of inspection
 - 2. Developer and Developer company name
 - 3. Operator name
 - 4. Upstream manhole number to downstream manhole number
 - 5. Direction of inspection (upstream or downstream)
 - 6. Pipe material and size
- (j) A 1-inch ball must be placed immediately in front of the camera and mounted such that the ball contacts the pipe bottom at all times. CCTV inspection cannot be paused once it begins. Only continuous inspections are acceptable. Pipe joints, manholes, and connections into manholes must be thoroughly inspected by panning the entire connection, including manhole risers. Zooming inspection of all lateral connections is required to verify and document that the lateral connection is seated correctly and is watertight for new, replaced, and repaired service connections. The Developer will bear all costs incurred in correcting any deficiencies found during the CCTV

inspection, including the cost of any additional CCTV inspections that may be required by the City to verify that deficiencies have been corrected.

Side Sewers

- lix) All side sewers must be tested after backfilling. Side sewers that are reconstructed or repaired to a length of 10 feet or more must be tested for watertightness. Testing will not be required for newly reconstructed sections of side sewers consisting of a single length of pipe. Testing must be performed in the presence of the City construction inspector.
- lx) When a new side sewer is installed, the entire length of new pipe must be tested. In cases where a new tap is made on the main, the first joint of pipe off the main must be installed with a test tee so that an inflatable rubber ball can be inserted for sealing off the side sewer installation for testing. In cases where the side sewer stub is existing to the property line, the test ball may be inserted through the cleanout wye to test the new portion of the side sewer installation.

Water

lxi) General

- (a) Sections to be tested must normally be limited to 1,500 feet. The City construction inspector may require that the first section of pipe, not less than 1,000 feet in length, installed by each of the Developer's crews, be tested in order to qualify the crew and the material. Pipe laying may not be continued more than an additional 1,000 feet until the first section has been tested successfully.
- (b) The pipeline must be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks will be in place and time allowed for the concrete to cure before testing. Where permanent blocking is not required, the Developer must furnish and install temporary blocking and remove it after testing. All physical connections to the existing water system must be removed prior to the test.
- (c) The mains must be filled with water and allowed to stand under pressure a sufficient length of time to allow air to escape and the lining of the pipe to absorb water. The City will furnish the water necessary to fill the pipelines for testing purposes at a time of day when sufficient quantities of water are available for normal system operation.
- (d) Prior to requesting the presence of the City construction inspector to witness the pressure test, the Developer must have all equipment set up and completely ready for operation and must have performed the pretest to ensure that the pipe is in a satisfactory condition.
- (e) The Developer must provide all necessary equipment and must perform all work connected with the tests. Prior to requesting the City construction inspector to witness the test, the Developer must perform the test to ensure that the test equipment is adequate, in good operating condition, and that all air has been released. All pressure testing equipment and gauges must be correctly calibrated and include a calibration label or sticker documenting calibration is not less than 12 months old.

- (f) All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test must be furnished, sanitized, and operated by the Developer.

lxii) Water Main Pressure Testing

- (a) All water mains, water services, and appurtenances must be hydrostatically tested in accordance with AWWA Manual 41, AWWA Manual 44, Chapter 3, and as described as follows.
- (b) .
- (c) Testing allowance must be defined as the quantity of makeup water that must be supplied to the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the pipe has been filled with water and the air expelled.
- (d) Any pressure drop during the test period must not be abrupt under any circumstances. The Director must be the sole judge as to whether the pressure drop is acceptable for the existing conditions.
- (e) The test must be accomplished by pumping the main up to the required pressure, stopping the pump for 2 hours, and then pumping the main up to the test pressure again. During the test, exposed sections of pipe being tested must be observed to detect any visible leakage. A clean container must be used for holding water for pumping up pressure on the main being tested. This makeup water must be disinfected by the addition of chlorine to a concentration of 50 mg/L.
- (f) Prior to the acceptance of the work, all new water lines must be subjected to a hydrostatic pressure test of 150 psi over static and no less than 250 psi for 15 minutes with no pressure loss or leakage. The pressure testing pump must be located at the high point of the line unless otherwise approved by the City construction inspector. The mains must be tested between valves. If possible, no hydrostatic pressure must be placed against the opposite side of the valve being tested. Test pressure must be maintained while the entire installation is inspected.
- (g) Any visible leakage detected must be corrected by the Developer, regardless of the testing requirements specified previously. Should the tested section fail to meet the pressure test successfully, as specified, the Developer must, at no expense to the City, locate and repair the defects and re-test the pipeline. If the test does not pass inspection for any reason, additional inspections required to witness the test must be done at the Developer's expense.

lxiii) Valve Testing

- (a) All tests must be made with the hydrant auxiliary gate valves open and pressure against the hydrant valve. After the test has been completed, each gate valve must be tested by closing each in turn and relieving the pressure beyond. This test of the gate valve will be acceptable if there is no immediate loss of pressure on the gauge when the pressure comes against the valve being checked. The Developer must verify that the pressure differential across the valve does not exceed the rated working pressure of the valve.

lxiv) Disinfection of Water Mains

- (a) Before being placed in service, all newly installed pipe must be flushed and chlorinated, and a satisfactory bacteriological report obtained.
- (b) No chlorination treatments must be allowed to remain in the water main over weekends or holidays. Chlorination treatment must be flushed from the water main between 24 and 48 hours of application.
- (c) Disinfection of water mains must be performed in accordance with AWWA Standard C-651-14 and City Standards.
- (d) No connection may be made between the existing distribution system and pipelines that are not disinfected, unless they are connected with a Washington State approved backflow prevention assembly, approved for this type of application.
- (e) The Developer must obtain the approval of the Director or City construction inspector prior to the installation or use of any backflow prevention assembly. To obtain the required flow for flushing on pipe sizes less than 8 inches in diameter, the backflow prevention assembly must be at least 4 inches. For pipe diameters between 8 and 18 inches, the backflow prevention assembly must be at least 6 inches.
- (f) Water mains must be flushed between 24 and 48 hours of chlorination. No flushing will be allowed on weekends or holidays. The Developer must notify the City construction inspector a minimum of 48 hours in advance of flushing or flow testing.
- (g) If no hydrant is installed at the end of the main, then a tap must be provided that is large enough to develop a velocity of at least 2.5 feet per second in the main. Taps required for the temporary or permanent release of air, chlorination, sampling, or flushing purposes must be provided by the Developer. Water services must be flushed with the water main to the angle meter stop and again, immediately prior to connection to the existing or new meter. The water service between the meter and the entrance to the structure must be flushed.
- (h) Samples must be collected, and bacteriological tests obtained by the City construction inspector. The Developer is responsible for payment of all bacteriological testing.
- (i) Before being placed into service, all new mains and repaired portions of, or extensions to, existing mains must be chlorinated so that a chlorine residual of not less than 25 mg/L remains in the water after standing for a minimum of 24 hours in the pipe (maximum standing time is 48 hours). The initial chlorine content of the water must not be less than 50 mg/L.
- (j) Water used to disinfect and flush mains must be dechlorinated and otherwise treated prior to discharge to the stormwater system.

lxv) Methods of Applied Chlorine

- (a) Dry Calcium Hypochlorite — Disinfection by dry calcium hypochlorite in tablet or slug form is not allowed. Powdered calcium hypochlorite will not be

allowed when the ambient water temperature in the water main is less than 41 degrees Fahrenheit.

- (b) Liquid Chlorine — A chlorine gas-water mixture may be applied by means of a solution-fed chlorinating device, or the dry gas may be fed directly through the proper devices for regulating the rate of flow and providing effective diffusion of the gas into the water within the pipe being treated. Chlorinating devices for feeding solutions of chlorine gas must provide a means to prevent backflow of the water into the chlorine.
- (c) Chlorine-Bearing Compounds in Water - A mixture of water and high-test calcium hypochlorite (65 to 70 percent Cl) may be substituted for the chlorine gas-water mixture. The dry powder must first be mixed as a paste, then thinned to a 1-percent chlorine solution by adding water, to give a total quantity of 7.5 gallons of water per pound of dry powder. This solution may be injected in one end of the section of the main to be disinfected while filling the main with water.
- (d) Sodium Hypochlorite — Sodium hypochlorite, commercial grade (12.5 percent Cl), in the form of liquid household bleach (5 to 6 percent Cl), may be substituted for the chlorine gas-water mixture. This liquid chlorine compound may be used full strength or diluted with water and injected into the main in correct proportions to the fill water so that the dosage applied to the water will be at least 50 mg/L.

lxvi) Disinfection Application

- (a) Point of Application — The preferred point of application of the chlorinating agent is at the beginning of the pipeline extension or at any valved section of the pipeline, and through a corporation stop inserted into the horizontal axis of the pipe. The water injector for delivering the chlorine-bearing water into the pipe should be supplied from a tap on the pressure side of the gate valve controlling the flow into the pipeline extension. Alternative points of application may be used when approved by the Director or the City construction inspector.
- (b) Rate of Application — Water from the existing distribution system, or other source of supply, must be controlled to flow very slowly into the newly laid pipeline during application of the chlorine. The rate of chlorine gas-water mixture or dry gas feed must be in such proportion to the rate of water entering the newly laid pipe that the dosage applied will be at least 50 mg/L.
- (c) Valves, Hydrants, and Appurtenances — In the process of chlorinating newly laid pipe, all valves, hydrants, and other appurtenances must be operated while the pipeline is filled with the chlorinating agent and under normal operating pressure.
- (d) Backflow Prevention — No connection may be made between the existing distribution system and any pipelines that have not received purity results from a state-certified laboratory, unless they are connected with a Washington State approved backflow prevention assembly that has been approved for this type of application.

lxvii) Connection to Existing

- (a) All tests must be successfully completed and approved by the City construction inspector before the new system may be connected to the existing system.
- (b) When connecting to existing, all closure fittings must be swabbed with a chlorine solution at least as strong as household bleach (5 to 6 percent chlorine).
- (c) At least 5 days notification shall be provided to the City in advance of connecting to the existing water system. Water main shutdowns may dictate additional advanced notification. Where fire suppression systems are taken out of service, the Developer shall provide a fire watch in coordination with the Fire Marshal's approval. All such notifications to impacted customers shall be provided by the Developer.
- (d) When work has begun on a connection, it must proceed continuously, without interruption, and as rapidly as possible until completed. No main closures will be permitted overnight, over weekends, or on holidays. Typically, no connections will be allowed on Fridays.
- (e) If the connection to the existing system involves turning off the water, the Developer must provide the City with a minimum notice of one week in advance of a 48 hours to the residents and or businesses affected by the shutoff. The City construction inspector will notify property owners (hang shut off notice tags).
- (f) The Developer may be required to perform the connection during times other than normal working hours. The Developer must not operate any valves on the existing system without the direct supervision of the City construction inspector.

lxviii) Testing Short Extension Connections

- (a) When connecting to an existing water main with a new tee and valve(s), new pipe may be extended no more than 20 feet, and the new pipe, fitting, and valve(s) shall be pre-chlorinated pipe and inspected under static line pressure.
- (b) Wet tap sleeves shall be pressure tested at the time of installation.

lxix) Testing Extensions with New Fire Hydrants

- (a) When hydrants are included with the section of main pipe to be tested, the testing must be conducted in two separate tests as follows:
 - (i) Test No. 1 — Water main gate valves and hydrant auxiliary gate valves closed, with the hydrant operating stem valves and hose ports wide open.
 - (ii) Test No. 2 — Water main gate valves and the hydrant operating stem valves tightly closed, with the hydrant auxiliary gate valves and hose ports wide open.

lxx) Testing New Hydrants on Existing Mains

- (a) When hydrants, with a pipe extension of more than 20-feet, are installed and connected to an existing main, the hydrant connection, including the hydrant tee, connection pipe, and auxiliary gate valves, must be installed with pre-chlorinated materials. All fittings shall be pressure tested and inspected by the City construction inspector following a passing purity test.

lxxi) Flushing

- (a) All water mains must be flushed between 24 and 48 hours of chlorination. No flushing will be allowed on weekends or holidays. The Developer must notify the City construction inspector a minimum of 2 working days in advance of any flushing or flow testing.
- (b) Sections of pipe to be disinfected must first be flushed to remove any solids or contaminated material that may have become lodged in the pipe. If no hydrant is installed at the end of the main, then a tap must be provided that is large enough to develop a velocity of at least 2.5 feet per second in the main. Taps required for temporary or permanent release of air, chlorination, or flushing purposes must be provided by the Developer.
- (c) Fire service lines and Fire Department Connections (FDC) shall be flushed per NFPA 24 and per the Construction Guidelines document.
- (d) Following chlorination, all treated water must be flushed from the newly laid pipe until the replacement water throughout its length shows, upon testing, the absence of chlorine. In the event chlorine is normally used in the source of supply, then the tests must show a residual not in excess of that carried by the system.
- (e) The Developer must safely dispose of all treated water flushed from mains in a method approved by the City. Discharging to the storm system requires that the treated hyper-chlorinated wastewater be neutralized prior to entering the storm system or any natural drainage channel. Discharge to the sewer system must receive approval from the Director. An industrial waste discharge permit may be required as determined by the Director. Regardless of discharge, a legal, fixed air gap arrangement, as defined in WAC 246-290-490. The Developer is responsible for disposing of the disinfecting solution to the satisfaction of the City.
- (f) Samples collected from representative points in the new system by the City construction inspector must be tested for bacteria by a state-certified laboratory and satisfactory test results obtained before placing the water main into service. The Developer must pay all testing expenses.
- (g) Following the purity flush, a high velocity flush, more than 7 feet per second, shall be required prior to acceptance. All high velocity flushing activities must be coordinated and conducted by the City Water Department. The Developer must provide all equipment, materials, and staffing necessary to assist in the performance of the flush. This may include traffic control, neutralizing agents, landscape restoration, additional discharge hoses, etc. The high velocity flush must be scheduled through the City construction inspector a minimum of 10 working days prior to the flush. Flushing requests must be approved by the Director. Operational conditions may substantially delay high velocity flushing activities for the project.

lxxii) Repeat Flushing and Disinfection — Should the initial treatment result in an unsatisfactory bacteriological test, chlorination must be repeated until satisfactory results have been obtained. Failure to achieve a satisfactory test must be considered a failure of the Developer to keep the pipe clean during construction or to properly chlorinate the water main.

Authority and Duties of Inspectors

The City's inspectors inspect work performed under an approved permit for permitted development and franchise permits.

The Inspector functions as a resource for the Permittee and Developer. The duties of the Inspector include, but are not limited to:

- lxxiii) Conducts field investigations;
- lxxiv) Interprets and applies standards;
- lxxv) Monitors compliance with permit conditions;
- lxxvi) Monitors utilities protection;
- lxxvii) Monitors traffic control and pedestrian access;
- lxxviii) Monitors excavation, shoring, backfill, restoration, and public safety;
- lxxix) Enforces the Stormwater Pollution Prevention Plan during construction;
and
- lxxx) Reviews as-constructed drawings (record drawings).

The Inspector has the authority to reject defective material and suspend work that is being done improperly. The Inspector may advise the Permittee or Developer of any faulty work or materials; however, failure of the Inspector to advise the Permittee or Developer does not constitute acceptance or approval. The Inspector has the authority to require revisions to approved engineering plans when necessary due to conflicting field conditions. The Permittee/Developer is required to comply with all applicable codes and standards.

The Inspector is not authorized to revise, alter, or relax the provisions of these Standards or the LMC.

Inspection Requirements

General

- lxxxi) Work performed on construction or improvements within the City, whether by a private Developer, a City Developer, or City forces, must be completed in accordance with the approved plans and specifications and to the satisfaction of the Director.
- lxxxii) Work cannot start until plans are approved. Any revision to the plans must be submitted by the Developer's engineer to the Director for approval prior to performance of the work.
- lxxxiii) At all times during construction, the Permittee/Developer shall have the issued permits and approved plans and specifications on the job site.
- lxxxiv) The Director will have the authority to enforce these Standards, as well as other referenced or pertinent specifications, and will appoint project engineers, assistants, and inspectors, as necessary, to inspect the work for compliance.
- lxxxv) It is the responsibility of the Developer to provide test reports, certified by a professional engineer licensed in the State of Washington, to verify compliance of materials used in the project. Sampling and/or testing must be at a frequency and magnitude determined by the Director.
 - (a) Copies of all test reports must be furnished to the Director. All costs incurred for testing or sampling, as required, must be borne by the Developer.

(b) Subgrade compaction shall meet a minimum 95 percent of maximum dry density per ASTM D1557. Compaction shall be tested by an independent testing laboratory.

lxxxvi) All construction or work for which a permit is required shall be subject to inspection by the City. The City may inspect any project at any stage of the work to determine that adequate control is being exercised. See [Construction Inspection Guidelines](#) for further information.

lxxxvii) It shall be the duty of the Permittee to cause the work to remain accessible and exposed for inspection purposes. Failure to notify the City of readiness for inspection in a timely manner may result in the requirement to remove and/or replace buried or hidden elements. The City shall not be liable for the expense entailed in the removal or replacement of any material required to allow for inspection.

lxxxviii) The Developer must notify the City of inspection needs in a timely manner. In general, inspections must be either phoned in to the City Inspection Line or requested through the City's online permitting portal by 4PM for inspection the following business day. Failure to provide adequate advance notification may oblige the City to arrange appropriate sampling and testing after the fact with certification by a qualified private testing laboratory. Costs of such testing and certification is to be borne by the Developer.

lxxxix) The City reserves the right to check survey points and/or the correct locations and elevations of new construction. These spot checks will not change the requirements for normal checking and testing as described elsewhere, and do not relieve the Developer of the responsibility of producing a finished product that is in accordance with the approved plans. If errors are found due to errors or omissions by the Developer's survey activities, the Developer must correct the errors, including removing and replacing improvements, and pay all expenses, including the cost to re-survey.

Clearing and Grading

xc) Tree protection and erosion control measures shall be installed and inspected prior to any clearing or grading activities.

Specific inspections are determined at the preconstruction meeting. Inspection of construction in the right-of-way may include the items that follow:

Survey stakes: Construction staking prior to construction.

Contour lines of boundaries and depth of all existing floodplains, wetlands, channels, swales, streams, storm drainage systems, roads (low spots), bogs, depressions, springs, seeps, swales, ditches, pipes, groundwater, and seasonal standing water; property corners, subgrade elevations, slope (grade) stakes, and right-of-way location; field verification of existing and proposed grading contours; and work limits and clearing limits.

Road and Utilities

xci) Specific inspections are determined at the preconstruction meeting. Inspection of construction in the right-of-way may include the items that follow:

(a) Survey monuments including survey basis of bearing fully defined with distance/bearings fully described and not using parcels, lots/blocks or anything that could be temporary

- (b) Stormwater Pollution Prevention Plan implementation, including installation and maintenance of BMPs.
- (c) Staging and stockpile areas.
- (d) Construction traffic routing; traffic control; signage; and channelization.
- (e) Drainage facilities – materials and installation.

Forms elevations before concrete is poured.

- (f) Retaining walls and rockeries.
- (g) Pavement cuts.
- (h) Trench backfill/compaction; Roadway centerline elevations.
- (i) Utility installation, depth and location.
- (j) Elevations at curb radii PVCs, Points of Vertical Intersection (PVI), and Points of Vertical Tangency (PVT).
- (k) Right-of-way pavement restoration.

xcii) Infiltration Facilities

- (a) The excavation and installation of all infiltration facilities proposed onsite and in the right-of-way shall be observed by a licensed geotechnical engineer.
- (b) The geotechnical engineer shall conduct an additional infiltration test in accordance with the 2019 ECY SWMMWW after the Developer has excavated to the bottom of the proposed infiltration facility (prior to the installation of the infiltration facility).
- (c) The geotechnical engineer shall submit an updated report that verifies that the design infiltration rate is equal to or greater than the infiltration rate in the approved design.
- (d) If the infiltration rate is less than the approved design, a revision to the stormwater design shall be submitted for City review and approval. Alternatively, other measures to improve the infiltration capacity may be taken and re-testing shall be conducted.

xciii) Paving

- (a) Prior to placing any asphalt surface materials on the roadway, the City construction inspector shall review and approve density test reports, certified by a professional engineer, for the crushed surface base course and the crushed surface top course.
- (b) Testing shall be performed by a certified independent testing laboratory. The cost of testing is the responsibility of the Developer. The testing is not intended to relieve the Developer from any liability for the trench restoration.
- (c) Material testing may be required for trench backfill (native or imported), asphalt, and concrete.
- (d) All densities shall be determined by testing specified in the WSDOT Standard Specifications.
- (e) Compaction of all lifts of asphalt shall be at an average of 91 percent of maximum dry density as determined by WSDOT Standard Specifications.
- (f) The compaction tests shall be performed in maximum increments of 2 feet.

xciv) Signals

- (a) In advance of traffic signals being put into service, all signal heads for vehicles and pedestrians shall be approved by the City. Plastic bags or other similar measures will not be accepted.
- (b) Signals or pedestrian crossing controls shall not be put into service until tested by the City and directed to proceed by the City construction inspector.

ACCEPTANCE

Use and Operations

- a) At times during the course of construction, it may be necessary to put all or part of the improvements into public use and operation.
- b) Use and operation will not relieve the Developer from the requirements of acceptance.
- c) The Developer's obligations to maintain and protect such facilities shall continue until such point that this obligation is relieved either through acceptance or release of the maintenance bond.

Project Closeout

The following steps must be completed before the City will accept the improvements and release the performance bond(s).

- a) General
 - i) All easements must be reviewed, approved by the City, and recorded by the Developer.
 - (a) All punch list items must be completed, inspected, and found compliant with City Standards.
 - (b) The City construction inspector must have received, reviewed, and approved the record drawings.
 - ii) The City must receive a satisfactory maintenance bond.
- b) Road
 - i) Review and approval by the City and recording by the Developer of Sight Distance Easements if applicable.
 - ii) All temporary channelization measures shall be removed, unless otherwise directed by the City construction inspector.
- c) Storm
 - i) The City construction inspector must have received, reviewed, and approved the sanitary sewer video inspection.
 - ii) Record drawings shall include a certification of storm facilities to guarantee performance through accurate orifice size, volume, infiltration, etc.
 - iii) Operation and Maintenance Manuals for detention and water quality facilities shall be received and approved.

- iv) Drainage Covenant for Private Facilities shall be approved by the City and recorded by the Developer.
- v) Public water quality facilities utilizing filter systems shall include new filters when accepted by the City, unless otherwise approved by the Director.
- d) Sewer
 - i) The City construction inspector must have received, reviewed, and approved the sanitary sewer video inspection.
 - ii) Operation and Maintenance Manuals for public sewer lift station facilities shall be received and approved by the City.
- e) Water
 - i) The water system must have been tested, inspected, approved, and accepted by the City construction inspector.
 - ii) Operation and Maintenance Manuals for public water pump stations or storage facilities shall be received and approved by the City.

Record Drawings

General

- i) Final acceptance and Developer payment will be withheld until the red-lined drawings have been submitted and approved.
- ii) The Developer shall always keep a plan set onsite for recording "As-Built" information. Refer section I-05.18 of the WSDOT Standard Specifications for record drawings requirements. A survey shall be provided as necessary to confirm elevations, inverts, and grades for the improvements, including utility, road, and pedestrian improvements and Americans with Disabilities Act (ADA) accessible routes.

The Developer must supply the City construction inspector with record drawings/construction plans bearing the stamp and signature of either a registered professional engineer or a registered professional land surveyor. These drawings must show any and all changes in the final locations of all items of work including, but not limited to, curb and gutter, sidewalks, street lighting, fire hydrants, storm drain lines, flow control facilities, water quality facilities, water lines, sewer lines, grease interceptors, hydrodynamic separators, catch basins, maintenance holes, clean outs, underground oil tanks, fire hydrants, valves, back flow preventers, new and existing utilities, abandoned in place utilities, and their appurtenances included in the work. Refer to specific chapters of these Standards for requirements for each type of work. The Developer must make all changes to the record drawings required by the City construction inspector, in strike through design and final (actual) format, before submitting the final record drawings in digital format for City acceptance.

- iii) All final record drawings must be submitted in digital format, on CD-ROM, DVD, or OneDrive in one of the following formats:

AutoCAD (include all reference files, fonts, CTB file, and a layer index describing the data found on each layer. Use version of AutoCAD within the last 5 years of Records Submittal. Include architectural (w/floor plans), civil, and site plan(s)

ArcGIS files including the following file types: .GDB, .MDB or .SHP In addition to one of the above, digital images of all plan sets must be provided as multi-page PDFs and individual TIFF images (each sheet as a separate image) using the state's requirements for producing digital images for archive purposes. Refer to Chapter 434-663 WAC.

- iv) All digital files must be drawn and submitted in the correct spatial registration using NAD 1983/1991 Washington State Plane North coordinates. All elevations and grades on construction plans must be to NAVD88 elevations.
- v) Depending upon drawing complexity, more than one drawing may be submitted. Unless clearly described by the specific layer name, an index indicating what layer data corresponds to each layer name must be provided.
- vi) All projects shall reference a minimum of two horizontal and one vertical benchmarks as found here

Side Sewers

The Developer must submit a side sewer record drawing to the construction inspector at the time of the side sewer inspection. The side sewer record drawing must be on the [Side Sewer As-Built](#) form showing the following:

- (1) Property boundaries, with dimensions, north arrow, and abutting streets.
- (2) Location and size of existing buildings.
- (3) Location of the side sewer, its connection with the building, public main, and the pipe material and diameter.
- (4) The depth and point of connection of the side sewer to the sanitary sewer main.
- (5) Any additional information the City construction inspector deems pertinent.

Operation and Maintenance (O&M) Manuals

For public facilities, including public facilities built by private development:

- vii) A copy of the draft O&M Manual shall be submitted with the permit submittal. The final O&M Manual shall be submitted for review and approval prior to acceptance of the completed construction project. The final approved O&M Manual shall be submitted with one (1) hard copy and one (1) electronic copy; and
- viii) At a minimum, the O&M Manual shall include the following:
 - (a) Party/parties responsible for facility maintenance, including phone numbers and addresses.
 - (b) Maintenance cost distribution for shared stormwater BMPs and drainage facilities.
 - (c) Site map showing BMPs, critical area(s), buildings, affected lots, and dimensions.
 - (d) A list of BMPs and facilities installed onsite and purpose of each.
 - (e) For each BMP or facility, the required maintenance activities and schedule meeting the minimum requirements.
 - (f) List of any proprietary components along with the vendor's contact information and the vendor's maintenance schedule and costs.

- (g) Inspection and maintenance schedules, including recommended maintenance schedules per vendor specifications for proprietary components.
- (h) Care and maintenance of any powered devices (e.g., pumps, aeration).
- (i) Inspection procedures and how the maintenance schedule will be modified if inspections determine the facility is not operating properly.
- (j) The final O&M Manual shall incorporate any comments made during the development review process and shall incorporate any field changes made to the facilities during construction.

Maintenance Bonds

A 2-year maintenance bond, or other surety acceptable to the City, is required at the time of final acceptance of the constructed public works improvements. The maintenance bond amount will be equal to X percent of the documented final cost of the public improvements. The maintenance bond must be in place before the City releases the performance bond.

APPENDIX A

City of Lynnwood Bench Marks