

CLACKAMAS COUNTY BOARD OF COUNTY COMMISSIONERS
Sitting/Acting as the governing body of Water Environment Services

Policy Session Worksheet

Presentation Date: 3-15-2023 **Approx. Start Time:** 10:00 AM **Approx. Length:** 1 hour

Presentation Title: WES' Rules & Standards Update (Part 1 of 2)

Department: Water Environment Services (WES)

Presenters: Ron Wierenga, Assistant Director & Greg Geist, Director

Other Invitees: N/A

WHAT ACTION ARE YOU REQUESTING FROM THE BOARD?

The purpose of the policy session is to seek feedback and direction from the Board on draft WES' Rules & Standards. The ultimate goal is that the Rules & Standards will be adopted at a public hearing. Today staff will present background information and key administrative and fiscal policy proposals (Part 1). At a future policy session on March 29, 2023 staff will present key technical policy proposals (Part 2).

EXECUTIVE SUMMARY:

Clackamas Water Environment Services is an intergovernmental partnership formed by Clackamas County Service District No. 1 (CCSD#1), the Surface Water Management Agency of Clackamas County (SWMACC) and Tri-City Service District (TCSD). The formation of WES as an intergovernmental entity offers several benefits that includes the clarification of WES's authority, modernizing standards, creating administrative efficiencies, and the opportunity to consider several key fiscal and technical policy changes.

Currently each service district/rate zone within WES is governed by a separate and distinct section of the WES Rules. The goal of this project is to combine, update and revise the current WES Rules and form one set of rules and standards with overlapping administrative authority, definitions and regulation, therefore unifying a consistent governance throughout WES' service boundary areas.

The initial phase of the rules and standards project included listening sessions with stakeholders, forming task force of practitioners and partner cities, and internal workshops to discuss key technical and financial policies. These sessions identified about a dozen key policies for WES to review and present to the Board for consideration.

WES staff wishes to update the Board on the project status and flag key policy proposals in preparation of future adoption of these administrative documents at a public hearing.

FINANCIAL IMPLICATIONS (current year and ongoing):

There are no financial impacts to WES for adopting the Rules & Standards. The proposed policies in the draft Rules & Standards may have varying impacts to District customers, applicants, and residents. Potential impacts will be discussed with the Board for each key policy proposal during the policy sessions.

Is this item in your current budget? YES NO

What is the cost? N/A

What is the funding source? N/A

STRATEGIC PLAN ALIGNMENT:

This project aligns with several of WES’ Strategic Goals relating to permitting and environmental protection:

- 90% of industrial customers are in compliance with wastewater discharge rules
- 80% of sanitary and storm plan reviews are completed within three weeks of submittal
- 50% of sanitary and storm plan reviews are approved in three or fewer submittals
- 50% of inspected businesses comply with stormwater standards upon initial inspection, as evidenced by adequate pollution controls and storm system maintenance

LEGAL/POLICY REQUIREMENTS:

The Board will be asked to hold a public hearing to consider the adoption of the proposed rules and standards by ordinance in accordance with required administrative processes.

PUBLIC/GOVERNMENTAL PARTICIPATION:

PGA staff were involved in developing and implementing the stakeholder and community engagement plan, community presentations, and the public forums. PGA staff also created a web page for the project. The key policy proposals and Rules & Standards documents were reviewed by the WES Advisory Committee at several meetings, and recommended to the Board for approval. County Counsel has approved the Rules & Standards. Stakeholders have been engaged throughout the process. The Rules & Standards have been thoroughly vetted and ultimately are recommendations based on industry expertise and input.

OPTIONS:

1. Approve key policy proposals as presented in Part 1 for adoption at a future public hearing.
2. Direct staff to revise specific portions of the proposed policies in the final draft Rules & Standards.
3. Continue the project with an emphasis on engagement with the Board and county staff to strive for mutual consensus on the final draft of the WES’ Rules & Standards.

RECOMMENDATION:

Option #1: Approve key policy proposals as presented in Part 1 for adoption at a future public hearing.

ATTACHMENTS:

- 2023 WES Rules and Standards Update Project (Executive Summary)
- WES’ Rules & Standards Update Presentation
- Water Environment Services Rules and Regulations
- Water Environment Services Stormwater Standards
- Water Environment Services Buffer Standards
- Water Environment Services Sanitary Standards

SUBMITTED BY:

Division Director/Head Approval Frank E. Wieringa

Department Director/Head Approval Henry J. Stewart

County Administrator Approval _____

For information on this issue or copies of attachments, please contact <u>_Chris Koontz_</u> @ 503-679-4034



CLACKAMAS

**WATER
ENVIRONMENT
SERVICES**

**2023 WES Rules and Standards
Update Project**

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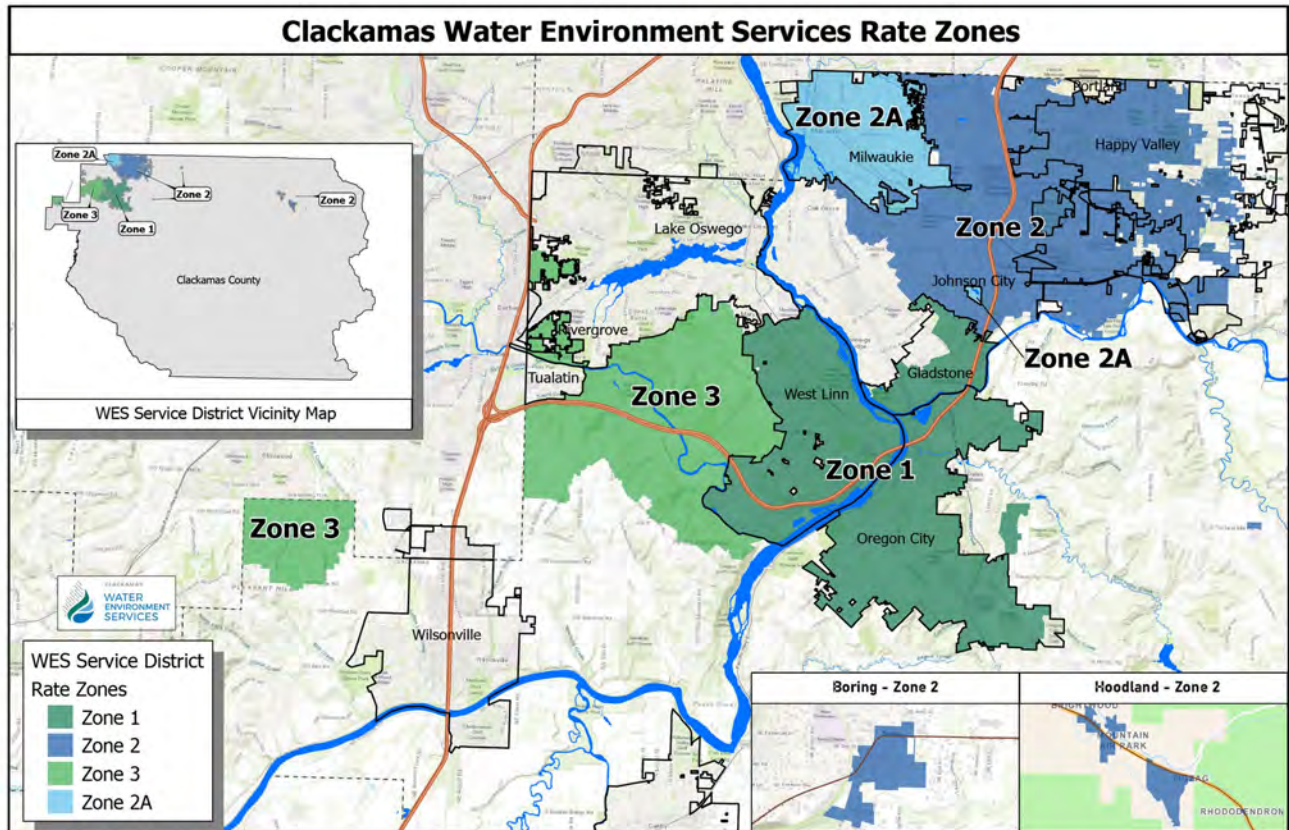
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Clackamas Water Environment Services Rate Zone Map

Rate Zone 1 – Equivalent to the former Tri-City Service District (“TCSD”) boundary

Rate Zone 2 – Equivalent to the former Clackamas County Service District No.1 (“CCSD#1”) boundary

Rate Zone 3 – Equivalent to the former Surface Water Management Agency of Clackamas County (“SWMACC”) boundary



INTRODUCTION

Clackamas Water Environment Services (WES) is in the process of updating its Rules and Regulations (Rules) and the Sanitary and Stormwater Standards (Standards). WES has prepared this packet to support the updated draft Rules and Standards.

This packet includes the following sections:

1. Executive Summary
2. Presentation Overview
3. Summary of Policy Changes
4. Policy Change Worksheets

Why Update the Rules and Standards:

- Develop consistent & comprehensive Rules and Standards for WES (District)
- Consolidate & streamline development review and approval
- Improve regional alignment with county/cities
- Address new regulatory requirements
- Update policies to reflect new technologies

1. EXECUTIVE SUMMARY

Clackamas WES is an intergovernmental partnership formed by the merger of Clackamas County Service District No. 1 (CCSD#1), the Surface Water Management Agency of Clackamas County (SWMACC) and Tri-City Service District (TCSD). The formation of WES as an intergovernmental entity and independent service district offers several benefits that include clarification of WES's authority, modernizing standards, creating administrative efficiencies, and the opportunity to consider several key fiscal and technical policy changes.

Currently each rate zone within WES is governed by a separate and distinct section of the WES Rules. The goal of this project is to combine, update, and revise the WES Rules and to form one set of Rule and Standards with consistent administrative authority, definitions, and regulation, therefore unifying governance throughout WES' service boundary areas.

The initial phase of the Rules and Standards Project included listening sessions with stakeholders, task force of practitioners, and partner cities, followed by internal workshops to discuss key technical and financial policies. These sessions identified about a dozen key policies for WES to review and present to the Board for consideration.

WES staff wishes to update the Board on the project status and flag key policy issues in preparation of future adoption of these administrative documents at a public hearing.

This packet includes a worksheet that summarize each of the policy changes included in the proposed final draft of the WES Rules and Regulations, Sanitary Standards, and Stormwater Standards. The Buffer Standards, which address water quality resource area requirements, have been reformatted to be consistent with the other standards but no policy changes have been proposed. Each policy change worksheet includes the following:

- **Current Policy:** Statement noting the current policy.
- **Issue:** The reason(s) the policy change is recommended.
- **Policy Change:** Proposed language.
- **Significance:** How will the proposed changes make improvements.
- **Alternatives:** Alternatives to consider.

2. PRESENTATION

At a forthcoming Board Policy Session WES will present the proposed Rules and Standards. A presentation will be given with an overview of the project status and will identify key policy issues. The presentation will last approximately 30 minutes followed by time for questions from and discussion with the Board. Sections 3 and 4 of this packet provide a summary and worksheet for each proposed policy change.

Presentation Agenda

- Background
 - Why Update?
 - Approach, Process, and Status
- Key Policy Discussions
 - Administrative
 - Financial
 - Technical Standards for Sanitary/Stormwater Service

3. POLICY SUMMARIES

This section contains a brief summary of each of the proposed policy changes and a reference to relevant language in the Rules or Standards.

Rules and Regulations: The District Rules and Regulations (Rules) are established to serve a public use and promote the health, safety, prosperity, security, orderly and uniform administration of the District affairs, and general welfare of the inhabitants using the District's sanitary and stormwater systems.

Worksheet #1: Annexation (Rules, Section 2.4) - This section establishes procedures relating to the annexation of territory into the District. It is the intent of the District to promote orderly annexation of municipal and unincorporated land where it is determined in best interests of the District and adjoining cities to plan and provide for orderly development. (Policy type: Administrative)

Worksheet #2: Sanitary EDU Assignments (Rules, Section 5.4.1) - Modify the Equivalent Dwelling Unit (EDU) classification assignments methodologies to align with current understanding of sanitary discharge volumes and impacts by category. (Policy type: Financial)

Worksheet #3: System Development Charges Installment Payments (Rules, Section 5.4.10) - Where the District assigns more than two EDUs to a development the District may approve an application to pay the charge in installments and may lien the property for the amount financed. (Policy type: Financial)

Worksheet #4: Reimbursement Districts (Rules, Section 5.6) - A Developer who is not otherwise eligible for SDC credits and who chooses or is required as a condition of development to finance or construct public improvements of the sanitary and/or stormwater system, such that other properties will benefit from those public improvements may request that the District establish a Reimbursement District. (Policy type: Financial)

Worksheet #5: Use of Public Property (Rules, Section 9) - This section establishes Rules to protect the public use of WES owned and managed property and facilities and to establish violations of those rules. (Policy type: Administrative)

Worksheet #6: Enforcement (Rules, Section 10) - This section presents the enforcement policies, methods, and processes used by the District. (Policy type: Administrative)

Worksheet #7: Low Income Monthly User Charges (Rules, Section 5.8.3) - The monthly user charge for service provided to the principal residence of a household having a maximum income under the qualifying limits shall be 50 percent (50%) of the monthly sewer user charge. (Policy type: Financial)

Sanitary Standards: The Sanitary Standards present the technical standards, and specification requirements necessary to meet all policies of the WES Rules related to providing sanitary service. Implementing these standards help protect public health and the environment and meet required Oregon Department of Environmental Quality (DEQ) requirements.

Worksheet #8: Sanitary Sewer Design (Sanitary Standards, Section 5.2.3)- Newly constructed Public Sanitary Sewer Systems shall be designed with sufficient slope to obtain a flow and velocity that will flush the system. (Policy type: Technical)

Worksheet #9: Service Connections Responsibilities (Sanitary Standards, Section 5.4.1) – Owners that benefit from a service connection to the public sanitary sewer are responsible for the operations, maintenance, and repair of the connection from the building sewer to the public sanitary sewer mainline. (Policy type: Technical)

Worksheet #10: Service Provider Letter (Sanitary Standards, Appendix A and Stormwater Standards, Appendix A) - Applicants proposing to develop or redevelop property shall obtain a Service Provider Letter from the District prior to submitting the land-use or design review application to the local planning authority. (Policy Type: Administrative)

Stormwater Standards: The Stormwater Standards present the technical standards and specification requirements necessary to meet all policies of the WES Rules related to providing stormwater and surface water services. Implementing these Standards meets DEQ requirements to minimize the impacts of development to protect water resources which, in turn, will benefit human health, fish and wildlife habitat, recreational resources, and drinking water.

Worksheet #11: Water Quality Performance (Stormwater Standards, Section 6.1.1) – Requires vegetative or filtration treatment of stormwater runoff in accordance with DEQ permit to the “maximum extent practicable”. (Policy type: Technical)

Worksheet #12: Flow Control Performance (Stormwater Standards, Section 6.1.2) – Flow control facilities shall be designed so that the duration of peak flow rates from Post-Development Conditions shall be less than or equal to the duration of peak flow rates from pre-development conditions for all peak flows between 42 percent of the 2-year peak flow rate up to the 10-year peak flow rate. (Policy type: Technical)

Worksheet #13: Onsite Infiltration (Stormwater Standards, Section 6.2.1) – Infiltration is the preferred strategy to achieve stormwater requirements and infiltration testing will be required earlier in the review process to determine technical feasibility. (Policy type: Technical)

Worksheet #14: Fee In Lieu (Stormwater Standards, Section 6.1.4) When a proposed development is unable to meet the flow control or water quality performance standards, the District may allow Applicants to pay a fee in lieu of stormwater management improvements. (Policy type: Fiscal)

4. POLICY CHANGE WORKSHEETS

This section contains a worksheet for each of key policy changes. Each worksheet summarizes the proposed policy changes contained within the following format:

- Current Policy: Statement noting the current policy.
- Issue: The reason(s) the policy change is recommended.
- Policy Change: Proposed language.
- Significance: How will the proposed policy make improvements.
- Alternatives: Alternatives to consider.

List of worksheets:

<i>Worksheet #1:</i>	Annexation
<i>Worksheet #2:</i>	Sanitary EDU Assignments
<i>Worksheet #3:</i>	SDC Financing
<i>Worksheet #4:</i>	Reimbursement Districts
<i>Worksheet #5:</i>	Public Use of WES Property
<i>Worksheet #6:</i>	Enforcement
<i>Worksheet #7:</i>	Low Income Discounts
<i>Worksheet #8:</i>	Sanitary Sewer Design
<i>Worksheet #9:</i>	Service Connection Responsibilities
<i>Worksheet #10:</i>	Service Provider Letter
<i>Worksheet #11:</i>	Water Quality Performance
<i>Worksheet #12:</i>	Flow Control Performance
<i>Worksheet #13:</i>	Onsite Infiltration
<i>Worksheet #14:</i>	Fee In Lieu

Worksheet #1: Annexation

WES Rules, Section 2 Authority, Subsection 2.4 Annexation, page 17

Current Policy:

In accordance with the 2013 Board Policy Session Urban Services Memorandum, properties not within WES's service district must annex into a city and WES prior to obtaining WES services.

Issue:

WES's 2013 Urban Services Policy Memorandum is not codified in the Rules.

Policy Change

Section 2.4 Annexation: The purpose of this section is to establish procedures relating to the annexation of territory into the District. It is the intent of the District to promote orderly annexation of municipal and unincorporated land where it is determined in best interests of the District and adjoining cities to plan and provide for orderly development.

The District will not annex lands outside of the Urban Growth Boundary (UGB), or annex lands within the UGB that are included in an UGMA or a comprehensive land use plan that designates the lands to be incorporated into a City, without a property first annexing into a City or a City consents to District annexation.

In the event a City is not willing to annex properties, and the subject properties are contiguous with the current District boundary, then the District reserves the right at its sole discretion to annex the land and provide services, excluding lands as noted in Section 2.4 of these Rules and Regulations. The District may annex property and/or provide extra-territorial service at its sole discretion to a property in order to abate a health hazard in accordance with Section 6.3.2.

Significance

The policy codifies the established procedures relating to the current annexation practices of annexing territory into the District.

Alternatives

- Revise as directed.
- No change: Do not codify the 2013 Urban Services Policy Memorandum in the Rules, increasing procedural and administrative burdens on property owners to receive WES services.

Worksheet #2: Sanitary EDU Assignments

WES Rules, Section 5 Rates, Charges, and Billings, Subsection 5.4.1 Sanitary Sewer System Development Charge Imposed, Table 2 Assignment of Equivalent Dwelling Units to Classes of Service, page 31.

Current Policy

System Development Charges (SDCs) are imposed on all development within WES's boundaries that increases usage of the sanitary sewer facilities owned, managed, or maintained by WES. SDCs are assigned in accordance with:

- 2018 WES Rules, Rate Zone 1, Table 1 Sewer User Charges and System Development Charge/Equivalent Dwelling Unit (EDU) Assignment for Classes of Service Tri-City Sewer Service Area
- 2018 WES Rules, Rate Zone 2, Table VII Assignment of Equivalent Dwelling Units to Classes of Service North Clackamas Sewer Service Area

Issue

EDU classification assignments were analyzed, and several classifications were not representative of the usage of the sanitary sewer facilities. WES revised the EDU assignments based on the usage.

Policy Change

Rate Zone 1 and 2 EDU assignment classification tables were merged and updated to reflect current knowledge of categorical usage of the sanitary sewer facilities. For a detail list of the assignment classification and changes see the attached Table 2. Non-residential categories were expanded to reflect actual impacts to sanitary sewer. Residential categories were expanded to reflect a wider range of dwelling types and sizes.

Significance

- Proposed EDU assignments are better aligned with their usage of the sanitary sewer facilities.
- Minor impact on SDC revenue and no impact on adopted budgets for Capital Improvement Projects (CIP).
- Aligns with County transportation impact fee methodology.

Alternatives

- Revise EDU assignment as directed.
- No changes. Merge existing Table 1 TCSD and Table VII CCSD1 EDU assignment tables into one table. Applicants may pay an SDC that does not reflect their actual use of the Sanitary System.

Worksheet #2 (cont.): Sanitary Sewer System Development Charge Imposed

Changes to Table 2. Assignment of Equivalent Dwelling Units to Classes of Service			
Class #	Class of Service	Proposed EDU	Current EDU
Residential			
1	Single-family (detached and attached; includes houses, townhomes, row houses)		
1(a)	Total Living Area < 800 square feet (sf)	70% of 1 EDU	1 EDU
1(b)	Total Living Area	90% of 1 EDU	1 EDU
	800 - 1,799 sf		
1(c)	Total Living Area	100% of 1 EDU	1 EDU
	1,800 - 2,999 sf		
1(d)	Total Living Area	110% of 1 EDU	1 EDU
	3,000 - 3,799 sf		
1(e)	Total Living Area ≥ 3,800 sf	120% of 1 EDU	1 EDU
2	Multi-Family	80% of 1 EDU	no change
	(duplex, triplex, condominium, apartment units)		
3	Accessory Dwelling Unit (ADU)	60% of 1 EDU	80% of 1 EDU
Non-Residential			
4	General Commercial (not fitting in a class of service)	1 EDU per 3,800 sf of building floor area	no change
5	Assisted Living / Care Facilities	1 EDU per 2 beds	no change
6	Car Wash - tunnel	16 EDUs per tunnel	no change
7	Car Wash - wand	1.2 EDUs per stall	no change
8	Churches	1 EDU per 7,600 sf of building floor area	180 Seats per EDU
9	Hospitals / Medical Care Units	1 EDU per bed	no change
10	Hotel / Motel	1 EDU per 2 units	no change
11	Laundromats	1 EDU per machine	no change
12	Mini Storage	1 EDU per connection	no change
13	Restrooms - Stand Alone	1 EDU	no change
14	RV Parks	0.8 EDUs per RV space	no change
15	Spas / Health / Athletic Clubs	1 EDU per 1,900 sf of building floor area	1 EDU per 3,800 sf of building floor area
	with showers		
Food			
16	Food Service Establishment	1 EDU per 450 sf	1 EDU per 10 seats
17	Drinking-Only Establishment	1 EDU per 800 sf	1 EDU per 18 seats
18	Food Carts	1 EDU per 2 food carts	no change

Institutions			
19	Preschool and Elementary Schools	1 EDU per 65 students	no change
20	Junior High, High Schools, and Colleges	1 EDU per 29 students	no change
Industrial			
21	Light Industrial/warehouse	1 EDU per 15,000 sf of building floor area	1 EDU per 3,800 sf of building floor area
22	Heavy Industrial >10,000-gals/day of discharge	Minimum 1 EDU per 1,000 cf of sewer discharge, or based on the actual cost to the District, but not less than Light Industrial Class	no change
All Other			
23	Other classifications, not fitting above categories	1 EDU per 3,800 sf, or 1 EDU per connection, whichever is greater	no change

Worksheet #3: SDC Financing

WES Rules, Section 5 Rates, Charges, and Billings, Subsection 5.4.10 System Development Charge Installment Payments, page 37.

Current Policy:

Rules, Section 4.1.8 Installment Payment of District's System Development Charges - Where the District's system development charges and/or collection sewer charge are greater than two times the amount of a system development charge for a single-family residential unit, the applicant may, at the time of application, with the consent of the District, make a one-time election to pay the charge in installments. If approved, payment in 20 semi-annual installments, secured by a lien on the property.

Issue:

The SDC installment payment plan now covers single family residential and multi-family residential developments that have been assigned ten (10) or fewer EDUs.

Policy Change

The District may approve an application to pay the SDC in installments and may lien the property for the amount financed. The District reserves the absolute right to reject any application for installment payments. Installment payments for SDCs shall be limited to single family residential and multi-family residential developments that have been assigned ten (10) or fewer EDUs. The amount financed shall be for that portion of a SDC, and/or a connection charge imposed.

If approved by the District, the applicant shall execute an installment promissory note, payable to the District in the form prescribed by the District for payment in installments not to exceed twenty (20) equal semi-annual installments

Significance

- Aligns with original intent of the financing policy to support small residential sewer connections.
- Aligns interest rate with County policy on SDCs and District policy on Reimbursement Districts
- Reduces financial risk and administrative cost to the District.

Alternatives

- Revise as directed.
- No changes. Large fees are required prior to construction permit issuance.

Worksheet #4: Reimbursement Districts

WES Rules, Section 5 Rates, Charges, and Billings, Subsection 5.6 Reimbursement Districts, page 41

Current Policy:

The current rules do not contain language that would allow a developer to be reimbursed for off-site public improvements

Issue:

Property developers are not reimbursed for the cost of constructing offsite sewers that will provide sewer connections for future users.

Policy Change

A Developing Party who is not otherwise eligible for SDC credits for Qualified Public Improvements and who chooses or is required as a condition of development to finance or cause construction of public sanitary, storm sewer, stormwater or surface water management improvement, or some combination of improvements such that other properties will be Specially Benefited may request that the District establish a Reimbursement District.

A reimbursement district may be formed, so benefiting properties connecting within 10 years pay the assigned Reimbursement Charge and interest as determined by the Board. Installment payments are authorized, consistent with WES's proposed SDC and connection charge financing provisions.

Significance

Add new language to the rules, so developing parties can be reimbursed for properties derive a direct benefit from the public infrastructure they financed and constructed.

Alternatives

- Revise proposed policy as directed.
- No changes. Refer developers to the appropriate city to apply for reimbursement of qualifying public improvements.

Worksheet #5: Public Use of WES Property

WES Rules, Section 9 Use of Public Property, Sections 9.1-9.6, page 92

Current Policy:

WES currently uses County ordinances, parks ordinances and sheriff department to manage allowed uses and enforce unlawful activities conducted on WES property.

Issue:

WES Rules do not currently provide authority to regulate the use of WES owned and managed property, including identifying prohibited uses such as building fires or camping.

Policy Change

The Director or authorized designee would be authorized to close any District owned and/or maintained properties to the public, to restrict the times open to the public, and to limit or prohibit public use whenever necessary to protect the health or safety of the public or maintain proper function of the public facilities.

Additional guidelines address, but are not limited to, the following:

- Fires
- Hunting, Fireworks, and Weapons
- Consumption of Alcoholic Beverages
- Use of District Property
- Concessions
- Animals
- Motor Vehicles
- Waste Disposal
- Camping
- Special Use Permits

Significance

The purpose of this section is to establish Rules and provide for legal remedies for violation of the Rules, in order to protect the District's public property; protect the health, safety, and welfare of the public using such areas; and ensure the best use of and benefits from such areas. The North Clackamas Park and Recreation District is authorized to maintain District natural areas as directed.

Alternatives

- Revise as directed.
- No Change: Do not add Use of Public Property guidance to the Rules and continue to address potential risks in an ad hoc manner.

Worksheet #6: Enforcement

WES Rules, Section 10 Enforcement, Sections 10.1-10.12, page 97

Current Policy:

Rules Section 4.10 - Enforcement of Standards Through Administrative Penalties.

Issue:

Current Rules requires the use of a complicated civil penalty formula that is difficult to implement.

Policy Change

The Director, or their designee, may enforce all of these Rules and Regulations, and any law enforcement officer may enforce the rules of Section 10. Anyone authorized may use the procedures of this section in order to enforce these Rules and Regulations.

Whenever the Director has reason to believe that a use or condition exists in violation of any of the Rules and Regulations adopted thereunder, they are authorized to initiate enforcement action. The violation will be documented by the use of a citation, which form shall vary depending on the violation, further described in Section 10.6.

No civil penalty issued by the Director pursuant to this matrix shall be less than \$100 or more than \$10,000 for each day of each violation.

Civil Penalties Matrix. The amount of any civil penalty shall be determined based on Table 4 as follows, Table 4. Civil Penalties:

Type of Violation	Civil Penalty, Per Day
Industrial Wastewater Discharge Permit Violations	\$1,000
Regulated Activity without a Permit	\$500
Prohibited Discharge	\$500
Erosion Control	\$500
Water Quality Buffers	\$500
Stormwater Control Facilities	\$500
Trespass and other use of property	\$100
All other Violations	\$1,000

Significance

Allows WES to consistently enforce the Rules in alignment with other County Departments.

Alternatives

- Revise as directed.
- No Change: Continue use of complex civil penalty formula.

Worksheet #7: Low Income Discounts

WES Rules, Section 5 Rates, Charges, and Billings, Sections 5.8.3, page 47

Current Policy:

Rules, Section 4.3.2 – Low Income Monthly User Charge - The monthly user charge for sanitary sewer service provided to the principal resident or family having a maximum income under the qualifying income limits shall be fifty percent (50%) of the monthly sewer service charge stated in Table XIII. On July 1st of each year, the qualifying limits shall be set at one hundred eighty-five percent (185%) of the most recently published poverty guidelines in the Federal Register by the U.S. Department of Health and Human Services under authority of 42 U.S.C. 9902(2). The qualifying income limit for a single person household shall be based on the federal poverty guidelines for a one-person household. The qualifying income limit for a family shall be based on the poverty guidelines for a two-person household. In order to be eligible for the reduced user charge, the qualified person must be the person to whom the monthly user charge is billed and must have completed and filed with the District an application for the reduced rate on a form supplied by the District.

Issue:

Eligibility for low-income subsidy is based on outdated federal poverty guidelines rather than the more commonly used Oregon median income level.

Policy Change

The monthly user charge for service provided to the principal residence of a household having a maximum income under the qualifying limits shall be 50 percent (50%) of the monthly sewer user charge. On July 1 of each year, the qualifying limits shall be set at sixty percent (60%) of the most recently published Oregon State Median Income (SMI) estimates developed by the United States Census Bureau or successor statistic and shall remain in effect until the next July. The qualifying income limits shall be incrementally based on household size.

Significance

Qualifying criteria based on Oregon State Median Income not Federal poverty guidelines which streamlines proof of eligibility for customers.

Increasing income limits for larger households.

Alternatives

- Revise as directed.
- No Change: Retain the outdated guidelines and burden of proof for eligibility.

Worksheet #8: Sanitary Sewer Design

WES Sanitary Standards, Section 5 Sanitary Sewer Design, Sections 5.2.3, page 23

Current Policy:

Sanitary Standards, Section 5.2.3.1 Minimum Slope Design - The sanitary sewer mainline shall be designed with a minimum slope of 0.0100 ft/ft unless it can be demonstrated the daily peak flow in a 1/2 full pipe will produce a minimum velocity of 2 fps. Dead end sanitary sewer mainlines that will not be extended shall have the last segment(s) or four hundred feet (400') designed with a minimum slope of 2%, so it will have adequate slope the flow will self-clean the pipe.

Issue:

Sanitary standards only allow for mainline pipes to have a slopes of less than 1% if statewide design criteria is met. Current process requires local technical variances to demonstrate compliance with statewide design guidelines. Engineers would prefer a range of acceptable slopes to allow for site specific challenges to provide public gravity sanitary sewer service. WES has determined the minimum slope for a mainline pipe based on the number of upstream residences connections and can streamline the development approval process while remaining within state guidance.

Policy Change

Table 1 allows for shallower pipe slopes as more homes are connected, starting at 2% for 1-5 homes to 0.50% slope for pipes serving 20-40 homes. Adds flexibility so that projects can meet Oregon Sanitary Design Guidelines (OAR 340-52)

Significance

Sets minimum pipe slope at 0.5%, slightly lower than currently allowed.

Having a range of acceptable pipe slopes clearly noted in the standards allow for engineers to meet the challenging site planning and design of the public sanitary sewer collection system.

Alternatives

- Revise as directed.
- No Change: Retain current standards and require technical variances and administrative approvals for site constrained projects.

Worksheet #9: Service Connection Responsibilities

WES Sanitary Standards, Section 5 Sanitary Sewer Design, Sections 5.4.1, page 30

Current Policy:

Sanitary Standards, Section 5.5 Service Connections - Owners are responsible for sewer line from buildings to the edge of the ROW or easement lines, and WES is responsible for the service connection from ROW or easement lines to public mainline.

Issue:

The current rules do not clearly outline the ownership and maintenance responsibility of WES and the property owner(s). At times this has caused confusion regarding the inspection, maintenance, and repair of service connections.

Policy Change

The Owner(s) that benefits from the Service Connection is solely responsible to own, operate and maintain the Service Connection from the Building Sewer to the Public Sanitary Sewer Mainline, including the connection to the mainline located within a public Right-of-Way or easement.

The District is responsible for maintaining Public Sanitary Sewer Mainlines and shall not be responsible for maintenance or repair of damage resulting from inadequate or improper operation of the Service Connection, Building Sewer, or of attached fixtures or appurtenances, such as cleanouts and traps, between the building and Public Sanitary Sewer Mainline.

Property Owner Responsibilities for Repairs:

Inspections and investigations to determine the condition and functionality of the Service Connection from the building to the Public Sanitary Sewer Mainline.

Repairs of structural and non-structural defects for any portion of the Service Connection that is on private property, including the area within easements granted to the District.

District Responsibilities for Repairs:

Repair of structural defects, as determined by the District, for the portion of the Service Connection that is within the public Right-of-Way.

Significance

Clearly assigns responsibility of maintenance and repair costs of service connection within the public right of way or WES easements.

Alternatives

- Revise as directed.
- No Change: WES will address ownership and maintenance responsibilities on a case-by-case basis.

Worksheet #10: Service Provider Letter

WES Sanitary Standards, Appendix A Permitting and Submittal Requirements, page 54

WES Stormwater Standards, Appendix A Permitting and Submittal Requirements, page 136

Current Policy:

WES supports development under the jurisdiction of several local planning agencies. Prior to land use submittal, Clackamas County Planning Division requires applicants to obtain a signed Preliminary Statement of Feasibility from WES that demonstrates the project can conform to WES sanitary and stormwater standards. The City of Happy Valley does not require any type of preliminary review before land use submittal; applicants frequently request an equivalent level of review from WES.

Issue:

Developers and engineers desire a certain degree of confidence that the proposed development can be achieved in accordance with local ordinances. Currently, WES provides review of preliminary sanitary and storm plans prior to the applicant submitting the land-use application to the local planning agency. This common practice of submitting preliminary plans is not contained in the standards. WES would like to codify this requirement and provide minimum standards for submittals.

Policy Change:

Stormwater Standards Section 3.2 (I) – Applicants must prepare Stormwater Management Plans that confirm feasibility and compliance with WES Stormwater Standards as part of land use review and approval.

Significance

Reviewing and approving preliminary site development plans provides a certain degree of confidence the proposed development is feasible. The preliminary review also streamlines future review/approval for Developers saving time, cost, and the need for variances or multiple approvals. Any significant changes to the plans after land-use approval may cause the development to go through the land-use process again.

Alternatives

- Revise as directed.
- No Change: Follow current practice of reviewing preliminary plans without being codified in the standards.

Worksheet #11: Water Quality Performance

WES Stormwater Standards, Section 6.1.1 Water Quality Performance Standard, page 54

Current Policy:

Stormwater Water Quality Treatment Standards - All new development and redevelopment shall provide on-site water quality facilities, as required by the District. Water quality facilities shall be designed to capture and treat the first 1-inch of stormwater runoff from a 24-hour storm event.

Issue:

Oregon DEQ's stormwater permit requires prioritizing Low Impact Development and Green Infrastructure, and that constructed controls meet a water quality treatment performance standard of 80% solids removal.

Policy Change

Section 6.1.1 Water Quality Performance Standard - Stormwater management facilities (SMFs) shall be designed to capture and treat 80 percent of the average annual runoff volume, to the maximum extent practicable with the goal of 80 percent total suspended solids removal. In this context, "maximum extent practicable" means less-effective treatment may not be substituted when it is practicable to provide more effective treatment. Based on local rainfall frequency and intensity, the required treatment volume equates to a Water Quality Design Storm of 1.0 inch over 24 hours. SMFs for water quality shall be designed in conformance with the design guidelines in the Stormwater Standards.

Significance

The water quality design storms are unchanged and the new language requires meeting the water quality performance standard as consistent with DEQ requirements. Use of some proprietary systems, like hydrodynamic separators, are no longer allowed as a mean to provide basic water quality treatment. The Stormwater Standards provide guidance as to other stormwater design approaches would meet water quality requirements.

Alternatives

- Revise as directed.
- No Change: Potential compliance issues with Oregon DEQ.

Worksheet #12: Flow Control Performance

WES Stormwater Standards, Section 6.1.2 Flow Control Performance Standard, page 54

Current Policy:

Stormwater quantity / Flow Control Standards - Standards Section 5.4.4.1 – Peak-matching standard to reduce the 2-year, 24-hour post-developed runoff rate to a ½ of the 2-year, 24-hour pre-developed rate.

Issue:

WES's peak-matching approach allows for longer durations of stormwater discharges to waterbodies that could erode streambanks. Oregon DEQ's stormwater permit requires a runoff retention standard or an alternate approach that achieves similar results.

Policy Change

Stormwater Standards Section 6.1.2 - Flow Control Performance Standard - Flow control facilities shall be designed so that the duration of peak flow rates from Post-Development Conditions shall be less than or equal to the duration of peak flow rates from pre-development conditions for all peak flows between 42 percent of the 2-year peak flow rate up to the 10-year peak flow rate.

Flow control is not required for projects that discharge directly to the Willamette River, the Tualatin River, or the Clackamas River.

Significance

Performance standard based on control for rate and duration of runoff is more protective of stream stability and water quality, consistent with Oregon DEQ requirements.

Redevelopment projects use "grass" as the pre-developed condition (see Worksheet #8). Potentially larger stormwater facilities on some sites relative to peak-matching standard could be partially mitigated by WES's current infiltration requirement. Potentially increases design and construction costs.

Alternatives

- Revise as directed.
- No Change: Potential compliance issues with Oregon DEQ.

Worksheet #13: Onsite Infiltration

WES Stormwater Standards, Section 6.2.1 Infiltration, page 60

Current Policy:

Infiltration is required for all new development and redevelopment.

Issue:

Soil classification and tested infiltration rates in much of the District is not conducive to the current infiltration requirement, so most development applications request a design variance. The Oregon DEQ stormwater permit requires stormwater approaches that prioritize Low Impact Development (LID) and Green Infrastructure (GI), which has multiple environmental benefits.

Policy Change

When a stormwater management facility is required, GI, such as planters, swales, rain gardens, ponds, and other vegetated facilities are the *preferred* strategy to meet the stormwater management requirements for water quality treatment and flow control. The best way to control the rate and duration of runoff is through the incorporation of infiltration using GI. Infiltration testing will be required earlier in the review process to assess technical feasibility.

Significance

Stormwater feasibility will be introduced earlier in the planning process, so site planning and design can be incorporated into the preliminary plans. Addressing stormwater mitigation in the planning stages will streamline the review/approval process for developers/engineers. The proposed standards align other design standards and requirements for cities in Clackamas County, providing additional consistency.

Alternatives

- Revise as directed.
- No Change: Continued use of design variances to address site limitations and potential compliance issues with Oregon DEQ.

Worksheet #14: Fee In Lieu

WES Stormwater Standards, Section 6.1.4 Fee In Lieu, page 60

Current Policy:

5.4.6 Subregional Detention Policy - In-lieu-of fees for detention and water quality may be requested by the developer for subregional detention and water quality facilities.

Issue:

Regional stormwater management facilities (SMFs) are currently the only fee-in-lieu option for development projects that are unable to meet onsite stormwater management requirements due to site constraints. This approach does not adequately cover the types of development proposals or site conditions that would allow or prevent subregional or regional SMFs.

Policy Change

Stormwater Standards Section 6.1.4 Fee In Lieu - When a proposed development is unable to meet the flow control or water quality performance standards, the District may allow Applicants to pay a fee in lieu of stormwater management improvements. In such a case, the fee shall be based on a proportional cost for the District to construct an equivalent SMF including costs for land acquisition, design, construction, maintenance, and administration.

Significance

Adds stormwater compliance options for projects with significant feasibility constraints to meeting design criteria.

Alternatives

- Revise as directed.
- No Change: Increases technical and administrative burden to projects with challenging site conditions to comply with Stormwater Standards.

WES' Rules & Standards Update

March 15th, 2023

Presented by: Ron Wierenga, Assistant Director & Greg Geist, Director



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Presentation Agenda

Part 1 – March 15, 2023

- Background
 - Why overhaul WES' Rules & Standards?
 - Project approach, process, and goals
- Key Policy Proposals
 - Administrative
 - Financial

Part 2 – March 29, 2023

- Key Policy Proposals
 - Sanitary and Stormwater Standards
- Look ahead
 - Next steps





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Part 1 – March 15, 2023

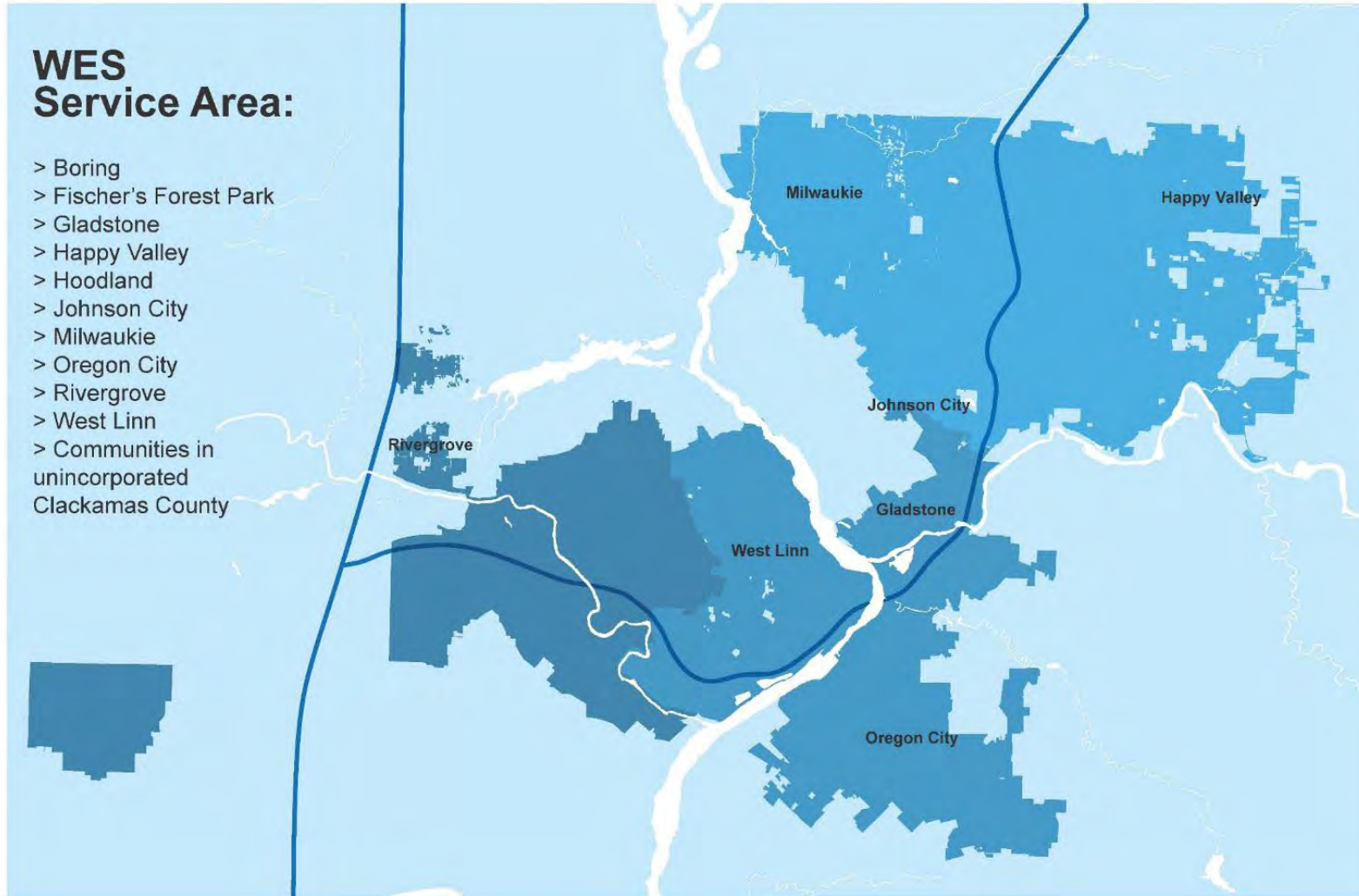
- Background
 - Why overhaul WES Rules & Standards?
 - Project approach, process, and goals
- Key Policy Proposals
 - Administrative
 - Financial

Project Background: Why a Rules Update?

The background of the slide features a series of silhouettes of people climbing a mountain peak. The scene is set against a bright, hazy sky, likely during sunrise or sunset, with the sun low on the horizon. The silhouettes show individuals in various stages of ascent, some reaching the top and celebrating with their arms raised, while others are still climbing. The overall mood is one of achievement and teamwork.

- Develop consistent and comprehensive Rules & Standards for WES
- Consolidate and streamline development review and approval processes
- Improve regional alignment with county/cities
- Address new regulatory requirements
- Update standards to reflect new technologies

Streamlining WES' Rules & Standards



Historic Rules & Standards by Area:

- CCSD#1 Rules and Regulations
- CCSD#1 Sanitary Standards
- CCSD#1 Stormwater Standards
- Tri-City Services District Rules and Regulations
- SWMACC Rules and Regulations
- Administrative Rules for CCSD#1 & SWMACC

Project Outreach and Engagement

Stakeholder Interviews

- Development engineers
- Planners
- Others who use the Rules & Standards

Policy and Technical Issues Workshops

- WES
- DTD
- Happy Valley
- Consulting Engineers

Task Force Meetings

- People who use the rules
 - ✓ Developers
 - ✓ Engineers
 - ✓ Partner Cities

Community Briefings

- Interest Groups & Neighborhood Associations
- Business Community
- Informational forums

Public Review Process

- Public review drafts
- WES Advisory Committee
- County commission hearings

Community Briefings

WES Presentations (2019-2020)

- Oregon City Chamber/Government Affairs Committee
- North Clackamas Chamber
- North Clackamas Watersheds Council
- WES Advisory Task Force
- Clackamas Soil and Water Conservation District
- Clackamas River Basin Council
- Happy Valley Business Alliance
- WES Engineering Advisory Group
- WES Hosted Forums
- Home Builders Association Government Affairs Committee

Direct Communication/Informational Flyer

- Clackamas County Economic Development Commission
- South Clackamas CPO
- Stafford Hamlet CPO
- Sunnyside CPO
- Clackamas County Business Alliance
- Oregon City Business Alliance

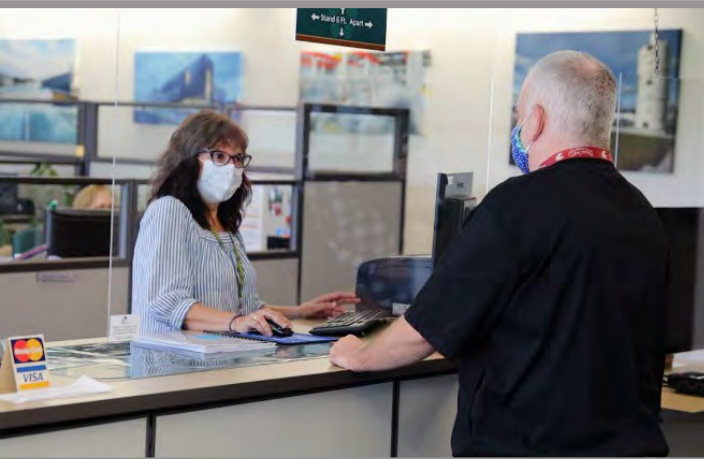
WES Advisory Committee

- 11+ presentations on project and key policies
- Concurred with Policy Proposals and recommended District Board review in March 2022

What we heard from stakeholder input

Collected over 50 recommendations for updates to the Rules & Standards to be included in the review process

- Create more consistency within WES service area and a need for a straight-forward development review process
- Need to update fiscal policies related to development
- Few concerns with sanitary standards
- WES' stormwater technical standards, mainly infiltration, are challenging to implement on some development sites
- Need for stormwater design tools that match typical development and facility types



Key Policy Changes (Policy Summary-Worksheet #)

Administrative Policies

- Annexation (#1)
- Public Use of WES Property (#5)

Fiscal Policies

- Sanitary EDU Assignments (#2)
- SDC Financing (#3)
- Reimbursement Districts (#4)
- Low Income Discounts (#7)
- Fee-In-Lieu (#14)

Technical Standards

- Sanitary
 - Sanitary Sewer Design (#8)
 - Service Connection Responsibilities (#9)
- Stormwater
 - Water Quality Performance (#11)
 - Flow Control Performance (#12)
 - Onsite Infiltration (#13)



Key Policy Changes (Administrative Policies)

Annexation Into the District (#1)

Issue

- WES' 2013 Urban Services Policy Memorandum is not codified in the Rules.

Current Policy

- Properties not with WES' service district must annex into a city and WES prior to obtaining WES services, except in limited circumstances such as where sewer service is readily available, or a public health hazard.

Policy Change

- Rules Section 2.4 - If a property is currently outside of the District boundary and outside of an incorporated City boundary, then the property owner must first seek annexation into the appropriate City. The District will not process a petition for annexation until a City has either approved annexation into the City, or denied annexation into the City and consented to District annexation.
- In the event a City is not willing to annex properties, and the subject properties are contiguous with the current District boundary, then the District reserves the right at its sole discretion to annex the land.

Significance

- Gives WES clearer authority to require annexation prior to providing service.
- District annexation can still occur if a city denies annexation request.



Annexation Example





Public Use of WES Property (#5)

Issue

- Currently no rules regarding activity on WES-owned properties, and difficult to regulate certain activities, like camping or setting fires.

Current Policy

- NA/New Policy. Generally 'No Trespassing' now.

Policy Change

- Rules Section 9 - specifies allowable uses of WES property.

Significance

- Provides clarity on allowed uses of WES owned property, in alignment with other County Departments, such as NCPRD's natural areas.

Key Policy Changes (Financial Policies)

Equivalent Dwelling Unit (Non-Residential) (#2)



Issue

- Non-Residential EDU assignments are not representative of impact to the sewer system, like for warehouses and storage units.

Current Policy

- Table VII - EDUs are assigned to various categories of non-residential uses, or otherwise calculated based on a land/building area formula.

Policy Change

- Updated Rules Table 2 to increase square footage formula for warehouse and storage facilities.

Significance

- EDU assignments and associated SDCs are better aligned with costs/impacts to the sewer system.
- Minor impact on WES' SDC revenue.

Equivalent Dwelling Unit (Residential) (#2)



Issue

- Residential EDU assignments aren't aligned with water usage and impact to the sanitary system, essentially a house-is-a-house except for apartments.

Current Policy

- Table VII - EDUs assigned to detached residential units regardless of dwelling size; attached units and ADUs assigned 80% of single family.

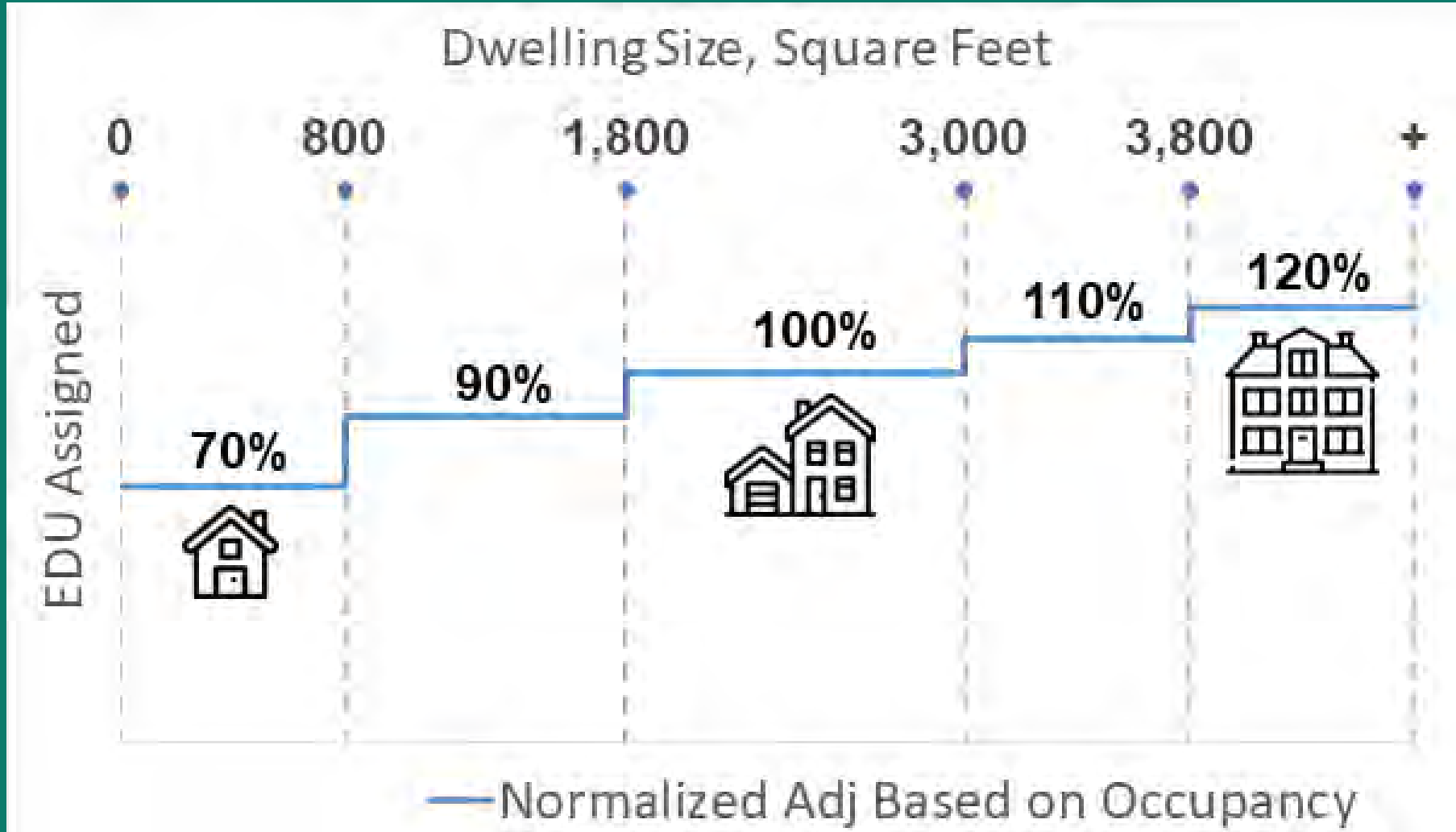
Policy Change

- Updated Rules Table 2 to include 5 categories of EDU assignments for detached residential with EDU assignments ranging from 70% to 120% of a standard residential unit, based on typical occupancy.
- Apartments assigned 80% and ADUs assigned 60% of a standard residential unit.

Significance

- SDCs better aligned with costs/impacts to the sanitary system.
- No impact on SDC revenue or funding for CIP.
- Aligns with Board-adopted transportation impact fee methodology.

Equivalent Dwelling Unit (Residential)



System Development Charge Financing (#3)

Issue

- SDC financing policy has no limits on types or amount of SDCs that can be financed, causing cash flow interruptions and commitment of WES staff resources for financing agreements, due diligence, collecting payments, etc.

Current Policy

- Section 4.1.8 - Allows for installment payments of SDCs over a 10-year period for all projects regardless of type and size.

Policy Change

- Rules Section 5.4.10 - Installment payments for SDCs are limited to residential and multi-family developments that have been assigned ten (10) or fewer EDUs.
- Installments not to exceed 20 equal semi-annual installments. Applicable interest rate shall be the current US Federal prime rate plus 2% as established in an installment agreement.

Significance

- Aligns with original intent of the financing policy to support small residential sewer connections
- Aligns interest rate with County policy on SDCs and District policy on Reimbursement Districts
- Reduces financial risk and administrative cost to the District.



Reimbursement Districts (#4)

Issue

- Property developers are not reimbursed for the cost of offsite sewers to which future users connect.

Current Policy

- NA/New Policy

Policy Change

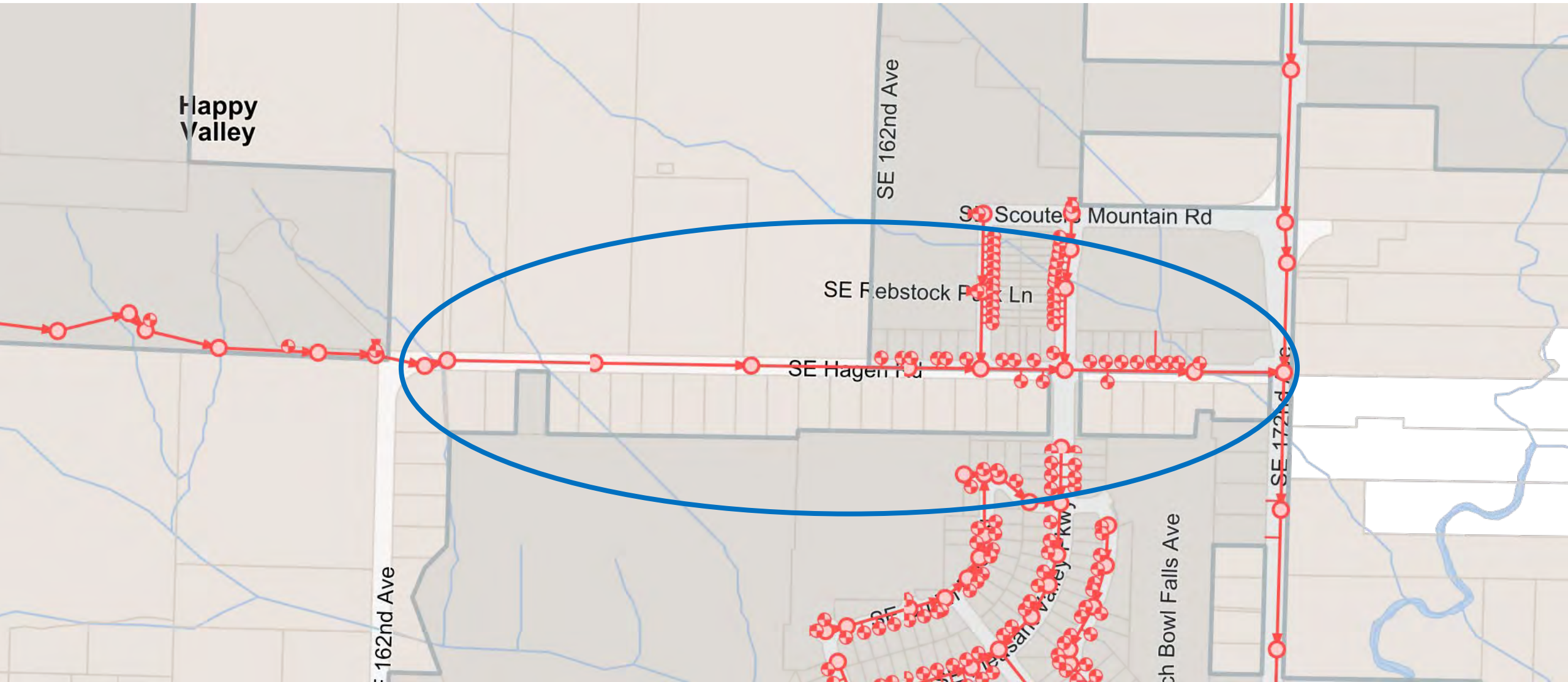
- Rules Section 5.6 Reimbursement District - *A Developing Party who is not otherwise eligible for SDC credits...may request that WES establish a Reimbursement District.*
- Benefiting properties connecting within 10 years pay the assigned Reimbursement Charge and interest as determined by the Board.
- Installment payments are authorized, consistent with WES's proposed SDC and connection charge financing provisions.

Significance

- Developers can get reimbursed for future connections to infrastructure they have built.
- Establishes new fees for significant WES staff time/resources to establish reimbursement districts, collect payments etc.



Reimbursement Districts: Scouters Mountain Example



Low Income Discounts (#7)

Issue

- Qualifying income limit for families is capped at level for two family members.
- Eligibility based on outdated federal poverty guidelines rather than the more commonly used OR State median income level.

Current Policy

- Section 4.3.2 - Allows for a 50% discount of the monthly service charge with qualifying limits set at 185% of the federal poverty guidelines, for families set at limits for a two-person household.

Policy Change

- Rules Section 5.8.3: ...shall be 50 percent (50%) of the monthly sewer user charge.... qualifying limits shall be set at sixty percent (60%) of the most recently published Oregon State Median Income (SMI)...shall be incrementally based on household size.

Significance

- Qualifying criteria based on Oregon State Median Income not Federal Poverty guidelines which streamlines proof of eligibility for customers.
- Increasing income limits for larger households.
- Minor impact on WES' SDC revenue.



Fee-In-Lieu for Stormwater Projects (#14)



Issue

- Limited options for development projects that are unable to feasibly meet onsite stormwater management requirements due to site constraints.

Current Policy

- NA/New Policy

Policy Change

- Stormwater Standards Section 6.1.4: ...the District may allow applicants to pay a fee-in-lieu of stormwater management improvements...based on a proportional cost...for land acquisition, design, construction, maintenance, and administration.

Significance

- Adds compliance options for projects with significant feasibility constraints to meeting stormwater criteria.



End Part 1: Questions?



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Water Environment Services Rules and Regulations

February 2023





Rules and Regulations

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Rules and Regulations

1. Definitions

1.1 Words and Terms

The following words and terms apply to the entirety of these Rules and Regulations and any adopted standards referenced or authorized herein. If the terms are used by a local planning agency, plumbing authority, or building official, then those terms apply in determining authority and permit/code applicability for those agencies. The terms used within WES Rules and Regulations apply when WES has authority and/or manages applicability. Unless the context specifically indicates otherwise, the following words and terms, as used in these Rules and Regulations, shall have the meanings hereinafter designated:

Applicant. The person or entity applying to the District for a permit.

Best Management Practices (BMPs). Schedules of activities, controls, prohibitions of practices, maintenance procedures, and other management practices designed to prevent or reduce pollution in stormwater and sanitary systems. BMPs include facilities, treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw materials storage (40 Code of Federal Regulations (CFR) 122.2). BMPs also include facilities, treatment requirements, operating procedures, and practices to control stormwater runoff.

Biochemical Oxygen Demand (BOD). The quantity of oxygen used in the biochemical oxidation of organic matter under a standard laboratory procedure in five (5) days at a temperature of 20° C, expressed in milligrams per liter or parts per million. Laboratory determinations shall be made in accordance with the applicable techniques prescribed in 40 CFR Part 136.

Biosolids. Domestic wastewater treatment facility solids that have undergone adequate treatment to permit land application, recycling, or other beneficial use.

Board (BCC). The Board of County Commissioners of Clackamas County acting as the governing body of the District.

Bond. As required by the District, a surety bond, cash deposit or escrow account, assignment of savings, irrevocable letter of credit, or other means acceptable to and required by the District to guarantee that work is completed in compliance with all requirements of the District Rules and Regulations and/or for a warranty period specified in the standards.

Buffer/Undisturbed Buffer. The zone contiguous with a sensitive area that is required for the continued maintenance, function, and structural stability of the sensitive area. The critical functions of a riparian buffer (those associated with an aquatic system) include shading, input of organic debris and coarse sediments, uptake of nutrients, stabilization of banks, interception of fine sediments, overflow during high water events, protection from disturbance by humans and domestic animals, maintenance of wildlife habitat, and room for variation of aquatic system boundaries over time due to hydrologic or climatic effects. The critical functions of terrestrial buffers include protection of slope stability, attenuation of surface water and stormwater flows from surface water and stormwater runoff and precipitation, and erosion control.

Building Drain. The pipes that receive discharges from building drainpipes and convey the discharges to the Building Sewer, which starts five (5) feet outside the building wall.

Building Sewer. Private pipe(s) that connect the Building Drain to the Service Connection. The Building Sewer starts five (5) feet outside of the building wall.

Bypass. The intentional diversion of waste streams from any portion of an Industrial User's treatment facility.

Capital Improvement(s). Facilities or assets used for the purpose of providing sanitary sewerage, stormwater, or surface water collection, transmission, treatment, and/or disposal.

Capital Improvement Plan. The Capital Improvement Plan adopted by the District and any updates to the Plan.

Categorical Pretreatment Standards. National Pretreatment Standards specifying quantities or concentrations of pollutants or pollutant properties which may be discharged or introduced into a public sewer system by specific industrial categories. These standards are promulgated pursuant to Section 307(b) and (c) of the Clean Water Act (CWA).

Cesspool. A lined pit which receives domestic sewage, allows separation of solids and liquids, retains the solids, and allows liquids to seep into the surrounding soil through perforations in the lining.

Chemical Toilet. A non-flushing, non-recirculating toilet facility wherein domestic sewage is deposited directly into a chamber containing a solution of water and toilet facility chemical.

Civil Penalty. A monetary sanction for violation of these Rules and Regulations, whereby the District may impose a fine or penalty for violation of these Rules and Regulations, as well as recover all costs incurred, which are attributable to, or associated with the violations, including but not limited to the costs of administration, investigation, sampling and monitoring, legal and enforcement activities, damages to the public storm sewer system, and contracts or health studies necessitated by the violation.

Clean Water Act (CWA). The Federal Water Pollution Control Act, also known as the Clean Water Act, as amended, 33 U.S.C. section 1251 et seq.

Compliance. Meeting the requirements of the District's statutes, rules, permits, or orders.

Composite Sample. A series of samples mixed together to approximate the average strength of discharge to the sewer. A composite sample is collected over a period of time greater than 15 minutes, formed by an appropriate number of discrete samples which are (a) collected at equal intervals and combined in proportion to wastewater flow; (b) equal volumes taken at varying time intervals in proportion to the wastewater flow; or (c) equal volumes taken at equal time intervals.

County. Clackamas County, Oregon.

Cut or Excavation. Any act by which soil or rock is cut into, dug, quarried, uncovered, removed, displaced, or relocated.

Conveyance System. All methods of transporting wastewater, stormwater or surface water from the point of collection to the point of treatment or discharge. Conveyance systems can be publicly or privately owned and operated.

- A **Sanitary Conveyance System** includes gravity mains, force mains, pipes, sewers, pumping or lift facilities, and related access and maintenance facilities and structures.
- A **Stormwater Conveyance System** includes drainageways, culverts, pipes, sewers, and stormwater management facilities that are designed to accept flow and discharge it, such as swales.

Day. A continuous 24-hour period from 12:01 a.m. to 12:00 p.m.

Detention. The release of surface water runoff from a site at a slower rate than it is collected by the drainage system, the difference being held in temporary storage.

Developer. Any individual or organized group of partnerships, corporations, etc., proposing to develop land within the District.

Development. Any anthropogenic change to improved or unimproved real estate, including but not limited to buildings or other structures, utility infrastructure, impervious surfaces, other structures or facilities, mining, dredging, paving, filling, or excavation or any surface type that changes or impedes the natural flow of stormwater runoff. Development also includes partitions, subdivisions and land divisions redevelopment or modifications to the existing impervious surface footprint on a property. Development does not include the following:

- Stream enhancement or restoration projects approved by the District.
- Farm structures and private roads outside of the Urban Growth Boundary.
- Lot Line adjustments.
- Measures to replace within the existing footprint, a structure(s) lost due to a catastrophic event such as fire, provided that such measures are consistent with District/City/County regulations.
- Linear utility projects that replace existing impervious surface with equivalent material.
- Non-pollution generating, linear projects (ex. pathways) that shed runoff onto green space.
- Modular/temporary structures.

Developing Party. The person, private entity or public entity that funds the construction of a project that is eligible to apply for a Reimbursement District.

Director. The Water Environment Services (WES) Director, or designated representative.

Discharge. Any addition of treated or untreated water, stormwater, groundwater, wastewater, process water, or any pollutant or combination of pollutants to waters of the state, directly or indirectly, by actions of dumping, spilling, disposing, or physically connecting to the public system.

Discharger. Any person or entity who causes or allows any discharge to enter directly or indirectly into the public system.

District. Water Environment Services, an Oregon Revised Statutes (ORS) Chapter 190 intergovernmental entity.

District Employee or District Personnel. An individual employed by Water Environment Services.

Domestic Sewage. Sewage derived from the ordinary living processes free from industrial wastes and of such character as to permit satisfactory disposal without special treatment into the Public Sanitary Sewer System.

Drainageway. A natural or manmade channel formed by existing or manmade topography which directs and/or carries surface or stormwater runoff.

Dwelling. A building which is occupied in whole or in part as a home or residence, either permanently or temporarily by one or more families, but excluding hotels, motels, and motor hotels.

Dwelling Unit. A living unit with kitchen with cook stove facilities including, but not limited to, those in multiple dwellings, apartments, hotels, motels, mobile homes, accessory dwelling unit (ADU), and recreational vehicles (RVs) or camper trailers.

Easement. The legal right to use a described piece of land for a particular purpose. It does not include fee ownership but may restrict the owner's use of the land. Easements granted must be legally recorded with the Recording Division of the Clackamas County Clerk.

- A **Public Sanitary Sewer Easement** is any easement in which the District has the right to construct and maintain its public sanitary system.
- A **Public Stormwater Easement** is any easement in which the District has the right to construct and maintain its public stormwater system.

Enforcement. Any documented action taken to address a violation.

Engineer. A registered professional licensed to practice in the State of Oregon by the Oregon Board of Engineering Examiners. This person is also referred to as the project engineer or the engineer of record.

EPSC Manual. Erosion Prevention and Sediment Control Planning and Design Manual.

Equivalent Dwelling Unit (EDU). A unit of measurement of sewer usage that is assumed to be equivalent to the usage of an average dwelling unit. EDU has the following definition for the purposes listed below:

- A. **User Charge.** A unit, based on water consumption and strength of sewage of a single dwelling unit, by which all users of the sanitary sewers may be measured. Where unit equivalency must be computed it shall be equivalent to (a) 1,000 cubic feet of water consumption per month; (b) 0.449 pounds of BOD per day; and (c) 0.449 pounds of suspended solids per day.
- B. **System Development Charge (SDC).** A unit, based upon a single dwelling unit or its equivalent, for connecting to the District public conveyance system.

Equivalent Service Unit (ESU). A configuration of development resulting in impervious surfaces on a parcel, estimated to contribute an amount of runoff to the stormwater system that is approximately equal to that created by the average single-family residential parcel. One ESU is equal to 2,500 square feet of impervious surface area.

Erosion. The visual or measurable movement of soil particles resulting from the flow of, or pressure from, water, wind or earth movement.

Fats, Oils, and Grease (FOG). Any substance such as a vegetable or animal product that is used in, or is a byproduct of, the cooking or food preparation or cleanup process, and that turns or may turn viscous or solidify with a change in temperature or other conditions.

Fill. Placement of any soil, sand, gravel, clay, mud, debris, refuse, or any other material, organic or inorganic which has the effect of raising the level of the ground surface, whether such surface is above, at, or below the water table, or to replace surface waters with dry land.

Food Service Establishment (FSE). Any restaurant, cafeteria, deli, saloon, tavern, bar, lounge, or other similar facility where food is prepared and/or cooked, whether consumption is on or off the premises, but does not include a private home where food is prepared or served for individual family consumption.

Grab Sample. An individual sample collected over a period of time not to exceed 15 minutes. From Environmental Protection Agency (EPA), June 2011, *Introduction to the National Pretreatment Program*, "A sample that is taken from a waste stream on a one-time basis with no regard to the flow of the waste stream. A single grab sample should be taken over a period not to exceed 15 minutes."

Hauled Waste. Any waste hauled or transported by any method which may include, but not be limited to, drop tanks, holding tanks, chemical toilets, campers, trailers, septic tanks, and vacuum pump tank trucks.

Hazardous Materials. Materials described as hazardous under state and federal law, including, but not limited to, any toxic chemicals listed as toxic under Section 307(a) of the CWA or Section 313 of Title III of the Superfund Amendments and Reauthorization Act (SARA).

Hearings Officer. Officer, appointed by the Director, for hearings of appeals of administrative actions.

Holding Tank. A watertight receptacle designed to receive and store domestic sewage generated on-site to facilitate disposal at another location, such as a chemical toilet, camper, trailer, septic tank, and pumping facility used to pump domestic sewage up to an available gravity sewer line.

Illicit Discharge. Any discharge to the public or natural stormwater conveyance system that is not composed entirely of stormwater, except discharges governed by and in compliance with a National Pollutant Discharge Elimination System (NPDES) permit.

Intentional. Consciously and voluntarily acting or omitting an action, when knowing the probable consequences of acting or omitting to act.

Impervious Surface. Any manmade surface that changes, alters, prevents, or retards the existing surface or the natural hydrological cycle and/or prevents the entry of water into the soil and/or causes water to run off the surface in greater rate or quantity than natural conditions. Impervious surfaces may include, but are not limited to, rooftops, concrete or asphalt paving, sidewalk or paved walkways, patios, driveways, parking lots, oiled macadam, gravel, artificial turf, manmade impervious surfaces, or other surfaces which similarly resist infiltration or absorption of moisture or changes, alters, or retards the existing surface or the natural hydrological cycle.

Improvement Fee. A fee for costs associated with capital improvements.

Indirect Discharge. The discharge or introduction of pollutants or industrial waste into the public sanitary sewer system from any non-domestic source regulated under §307(b), (c), or (d) of the CWA.

Industrial User. Any source of indirect discharge to the public sanitary sewer system (40 CFR 403.3(j)).

Industrial Waste. Any liquid, gaseous, radioactive, or solid waste substance, or a combination thereof, resulting from any process of industry, manufacturing, trade, or business, or from the development or recovery of any natural resources, or as defined by the Oregon Department of Environmental Quality (DEQ) or EPA, exclusive of domestic sewage.

Inspector. A person designated by the District to inspect construction sites, construction activities, stormwater systems, activities that affect surface water, building sewers, service connections, and other installations to be connected to the District sewerage, stormwater and/or surface water systems.

Interference. A discharge which, alone or in conjunction with a discharge from other sources, inhibits or disrupts the public sanitary sewer system, treatment processes or operations, or its biosolids processes, biosolids use or disposal, or which contributes to a violation of any requirement of the District's NPDES Permit or other permit issued to the District.

Intermittent Stream. A stream with no visible surface flows for a period of 30 or more continuous days per year.

Local Limit. Specific discharge limits developed and enforced by the District upon industrial or commercial facilities to implement the general and specific discharge prohibitions listed in 40 CFR 403.5(a)(1) and (b).

May. The word “may” is permissive.

Modification. A change or alteration made to the Rules and Regulations to improve something or make it more suitable. A modification shall meet the intent of the standards.

Mulch. Application of plant residue, straw, netting, plastic sheeting, or other suitable materials to the land surface to conserve moisture, hold soil in place, and aid in establishing plant cover.

New Development. Land disturbing activities that are conversions from natural vegetation/landscape to other uses; structural development, including construction or installation of a building or other structure; creation of hard surfaces; and subdivision, partition, and binding site plans. Projects meeting the definition of redevelopment shall not be considered new development. New connections to the public storm system, or public sanitary sewer system, are considered new development.

New Source. Any building, structure, facility, or installation from which there is (or may be) a discharge of wastewater pollutants, the construction of which commenced after the publication of proposed Pretreatment Standards under section 307(c) of the CWA that will be applicable to such source if such Pretreatment Standards are thereafter promulgated in accordance with that section, provided that:

- A. The building, structure, facility, or installation is constructed at a site at which no other wastewater source is located; or
- B. The building, structure, facility, or installation totally replaces the process or production equipment that causes the discharge of wastewater pollutants at an existing source; or
- C. The production or wastewater generating processes of the building, structure, facility, or installation are substantially independent of an existing source at the same site. In determining whether these are substantially independent, factors such as the extent to which the new facility is integrated with the existing plant, and the extent to which the new facility is engaged in the same general type of activity as the existing source, should be considered.

Construction on a site at which an existing source is located results in a modification rather than a New Source if the construction does not create a new building, structure, facility, or installation meeting the criteria of Part B or C above but otherwise alters, replaces, or adds to existing process or production equipment.

Construction of a New Source as defined under this paragraph has commenced if the owner or operator has:

- A. Begun, or caused to begin, as part of a continuous onsite construction program (i) any placement, assembly, or installation of facilities or equipment; or (ii) significant site preparation work including clearing, excavation, or removal of existing buildings, structures, or facilities which is necessary for the placement, assembly, or installation of new wastewater source facilities or equipment; or
- B. Entered into a binding contractual obligation for the purchase of facilities or equipment which are intended to be used in its operation within a reasonable time. Options to purchase or contracts which can be terminated or modified without substantial loss, and contracts for feasibility, engineering, and design studies do not constitute a contractual obligation under this paragraph.

Non-Contact Cooling Water. The water discharged from any use such as air conditioning, cooling, or refrigeration, or to which the only pollutant added is heat.

Non-Significant Categorical Industrial User. An industrial sanitary sewer user that never discharges more than 100 gpd of total categorical wastewater (excluding sanitary, non-contact cooling and boiler blowdown wastewater) and all the following conditions are met:

- A. The Industrial User has consistently complied with all applicable Categorical Pretreatment Standards and all applicable permit requirements.
- B. The Industrial User annually submits the certification statement required in 40 CFR 403.12(q) together with any additional information necessary to support the certification statement.
- C. The Industrial User never discharges any untreated concentrated wastewater.

Non-Stormwater Discharge. Any discharge to the District's MS4 that is not entirely composed of stormwater.

NPDES Permit. A permit issued pursuant to Section 402 of the CWS (40 CFR 122, 123, 124, and 504).

Operator in Charge. The designated personnel on duty at a POTW responsible for supervising and directing any discharge of septic tank wastes hauled to the plant.

Ordinary Mean High-Water Line. The ordinary line on any river or stream established by the annual fluctuations of water generally indicated by physical characteristics such as a line on the bank, changes in soil conditions, or vegetation line.

Owner. The owner(s) of record title or the purchaser(s) under a recorded sale agreement and other persons having an interest of record in the described real property.

Parcel. A lot, parcel, block, or other tract of land that is occupied or may be occupied by a structure or structures or other use and includes yards and other undeveloped areas required under the zoning, subdivision, or other development ordinances.

Pass Through. A discharge that exits the POTW into waters of the state in quantities or concentration, which alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the District's NPDES permit (including an increase in the magnitude or duration of the violation) or any other permit issued to the District.

Perennial Stream. A stream that flows year-round during years of normal precipitation.

Permit. An official document, permit, or certificate issued by the District that authorizes performance of a specified activity

Permittee. The person to whom a building permit, development permit, waste discharge permit or any other permit described in these Rules and Regulations is either applied for or issued.

Person. Any individual, firm, company, or corporation, partnership or association, entity, public corporation, political subdivision, governmental agency, municipality, industry, or any department or agency thereof.

Pollutant. Any of the following, including but not limited to: oil, grease, soil, mining waste, spoil, solid waste, incinerator residue, sewage, garbage, sewage biosolids, munitions, chemical wastes, pesticides, insecticides, fertilizer, biological materials, radioactive materials, heat, heavy metals, asbestos, wrecked or discharged equipment, rock, sand, cellar dirt and untreated industrial, municipal and agricultural waste discharged into water.

Pre-Developed. For new development, pre-developed condition is defined as the condition of land at the time of development. For redevelopment projects, pre-developed condition is defined

as the condition of the land before urban development. For the purpose of hydrological evaluations, the pre-developed conditions will be prescribed in the adopted Stormwater Standards.

Pretreatment Requirement. Any substantive or procedural requirement related to pretreatment imposed on a User, other than a Pretreatment Standard.

Pretreatment Standards. Pretreatment Standards shall mean prohibited wastewater or sanitary discharge standards, standards applied to categories of industrial use (see Categorical Pretreatment Standards), and Local Limits.

Private Stormwater System. A privately-owned and maintained stormwater system.

Process Wastewater. Any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, by-product, or waste product.

Public Mainline. The common sewer that collects and conveys flows from more than one property that is controlled, maintained, repaired, replaced, and operated by the District and located within a public easement or Public Right-of-Way. Public Mainlines do not include the Service Connections that serve a single property, which are the responsibility of the property owner(s).

Publicly Owned Treatment Works (POTW). A treatment works as defined by Section 212 of the CWA (33 United States Code (USC). 1292), which is owned by a governmental entity. This definition includes any public sewers that convey wastewater to the POTW treatment plant but does not include pipes, sewers, or other conveyances not connected to a facility providing treatment. For the purposes of these Rules and Regulations, POTW shall also include any sewers that convey wastewaters to the POTW from persons outside the District who are, by contract or agreement with the District, users of the District's POTW.

Public Right-of-Way. Any public space dedicated to a public transportation agency for ownership and maintenance, such as a county or city owned highway, road, street, avenue, or alleyway. All land or interest therein which by deed, conveyance, agreement, easement, dedication, usage, or process of law is reserved for or dedicated to the use of the general public for roadway purposes, within which the District shall have the right to install and maintain public utilities, including sanitary sewers, stormwater, and surface water systems (ORS 758.010).

Public Sanitary System. All or any part of the facilities for collection, pumping, treating, and disposing of sewage as acquired, constructed, owned, or maintained by the District, excluding Service Connections. See **Conveyance System** definition.

Public Stormwater System. All and any part of the facilities for collecting, treating, and disposing of stormwater as acquired, constructed, owned, or maintained by the District, excluding Service Connections. See **Conveyance System** definition.

Qualified Project. A public improvement or some combination of improvements that is eligible for reimbursement, including the following:

- A. Extension of a sanitary sewer or storm sewer pipeline improvement project, or a portion of a sanitary sewer or storm sewer improvement project, that makes service available to properties, and any subsequent subdivisions thereof, which are off-site and downstream of the Developing Party's own property.
- B. Construction of a storm and surface water treatment project larger or with greater capacity than necessary to meet the stormwater quality and/or quantity management requirements of the property of the Developing Party in order to provide future stormwater quality and/or quantity management to other properties which would otherwise need to construct additional

stormwater quality and/or quantity management facilities to provide service to the same area.

Qualified Public Improvement. A Qualified Public Improvement is: (a) required as a condition of development approval; (b) identified in the District's adopted Capital Improvement Plan pursuant to ORS 223; and (c) either not located on or contiguous to a parcel of land that is the subject of a development approval, or located in whole or in part on, or contiguous to property that is the subject of development approval and required to be built larger or with greater capacity than is necessary for the particular development project to which the improvement fee is related.

Rate Zone. An area served by the District public sanitary sewer system and/or surface water management within the District Service Area boundaries or a defined geographic area that will become part of the District following annexation.

Reasonable Times. During normal operating or business hours.

Receiving Waters. Any body of water into which effluent from a POTW or from a surface water outfall is discharged either directly or indirectly.

Redevelopment. Any proposed Development (see definition of Development above) on a previously developed site, excluding ordinary maintenance activities, remodeling of existing buildings, resurfacing of paved areas, and exterior changes or improvements which do not materially increase or concentrate stormwater runoff, or cause additional nonpoint source pollution. New, existing, and modified connections to the public storm system are considered redevelopment if they increase the discharge of stormwater runoff from new or existing impervious surfaces that were previously not connected.

Reimbursement District. The area that is determined by the Board to derive a benefit from the construction of public improvements, financed in whole or in part by a Developing Party.

Replacement. Any actions that result in expenditures for obtaining and installing equipment, accessories, or appurtenances which are necessary during the design or useful life, whichever is longer, of the treatment works or other facilities to maintain the capacity and performance for which such works were designed and constructed.

Replaced Impervious Surface. The removal of an impervious surface that exposes soil, or native subgrade, followed by the placement of an impervious surface is considered Redevelopment of an impervious surface area. Replacement does not include repair or maintenance activities on structures or facilities taken to prevent decline, lapse or cessation in the use of the existing facility or surface, provided the repair or maintenance activity does not expand the coverage of the existing impervious area. If a proposed development disturbs native subgrade, then Stormwater Standards are triggered.

Representative Sample. A sample from a waste stream that is identical or nearly identical in composition to that in the larger volume of wastewater being discharged.

Respondent. The person to whom an enforcement action is issued.

Sampling Manhole. Specialized manholes designed for measurement of wastewater and pre-treatment flows, water quality sampling, and parameter monitoring. Sampling manholes are most commonly used by industrial dischargers as part of the District's process for the release of permitted discharges to the sanitary sewer system. They are also used by the District to measure in-system flows and where flows are sent to another agency's system for treatment.

Sanitary Sewer. A conduit intended to carry sewage liquid and water-carried wastes from residences, commercial buildings, industrial plants, and institutions, together with minor quantities of ground, storm, and surface waters that are not admitted intentionally.

Sediment. Any material that is in suspension, is being transported, or has been moved from its site of origin by water, wind, or gravity as a product of erosion.

Sensitive Area. An area that contains one or any combination of the following features:

- A. Existing or created wetlands, including all mitigated wetlands. Limits defined by wetlands reports approved by the Oregon Division of State Lands (DSL), the District, the Army Corps of Engineers (USACE), or the local jurisdiction.
- B. Rivers, streams, sloughs, swamps, creeks, drainageways and open conveyances. Limits defined by the top of the bank or first break in slope measured upland from the mean high-water line.
- C. Impoundments (lakes and ponds). Limits defined by the top of the bank or first break in slope measured upland from the mean high-water line.

Sensitive areas shall not include stormwater management facilities including constructed wetlands, rain gardens, detention ponds, vegetative buffers adjacent to sensitive areas, or water features, such as lakes, constructed during an earlier phase of a development for specific purposes such as recreation.

Septic Tank. A watertight receptacle, which receives domestic sewage from an on-site sanitary drainage system, and is designed to separate solids from liquids, digest organic matter during a period of detention, and allows the liquid to discharge to a second treatment unit or to a soil absorption facility.

Septic Tank Wastes. Includes and limited to wastes supplied from the sanitary facilities of residences, hotels, motels, and domestic wastes from the sanitary facilities of commercial and industrial property whether collected from septic tanks, cesspools, holding tanks, drop tanks, or chemical toilets. Process wastes from commercial and industrial property are excluded. Septic tank wastes may also be referred to as “septage” in District documents and regulations.

Service Area. The geographic area where the District provides sanitary and/or surface water services as defined by distinct Rate Zones.

Service Connection. The part of the conveyance or piping system that is located within a Public Right-of-Way or public easement. The Service Connection is a pipe that extends from a property’s Building Sewer and carries discharge from the property to the Public Mainline.

Sewage. The water-carried human, animal, or vegetable wastes from residences, business buildings, institutions, and industrial establishments, together with groundwater infiltration and surface water as may be present. The admixture with sewage of industrial wastes or water shall be considered “sewage” within the meaning of this definition.

Sewer. A closed conduit or pipe that conveys wastewater, stormwater, or surface water.

Sewer User. Any person using any part of the public sewer system. In the case of tenants, the property owner shall also be considered the sewer user for that property.

Shall. The word “shall” means mandatory.

Significant Industrial User. Any and all Industrial Users that:

- A. Are subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter 1, subchapter N.
- B. Discharge an average of 25,000 gallons per day (gpd) or more of Process Wastewater to the public sewerage system (excluding sanitary, non-contact cooling and boiler blowdown wastewater); contributes a process waste stream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the District’s treatment plant; or is designated as such by the District on the basis that the Industrial User has a reasonable

potential for adversely affecting the treatment plant's operation or for violating any Pretreatment Standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

Slug Discharge or Slug Loading. Any discharge of a nonroutine, episodic nature, including an accidental spill or a noncustomary batch discharge that has a reasonable potential to cause interference or pass-through, or in any other way violate the POTW's regulations, local limits, or permit conditions.

Specially Benefitting Properties. For the purpose of establishing a Reimbursement District, all properties or parcels which are either:

- A. Off-site of the Developing Party's own property and capable of receiving gravity sewer service through connection to a Qualified Project. Properties which are adjacent to and upstream of the Developing Party's property and which will be required to further extend sanitary sewer or storm sewer are not Specially Benefitted; or
- B. Off-site of the Developing Party's own property and capable of receiving benefit from a Qualified Project such that the property would not be required to build additional conveyance or stormwater or surface water management improvements to provide service to the same area served by the Qualified Project.

Stop Work Order. An order issued by the District for violation of District Sanitary Standards. All work contributing to the violation must cease when a Stop Work Order is issued, and the Stop Work Order will stay in place until such time as removed by the District in writing.

Storm Drainage. See Storm Sewer.

Storm Sewer. A conduit intended to carry stormwater, surface runoff, or drainage.

Stormwater. Waters on the surface of the ground resulting from precipitation.

Stormwater Management Facility (SMF). Any facility that is designed, constructed, and maintained to collect, treat, filter, retain, or detain surface water runoff during and after a storm event for the purpose of controlling flows and/or reducing pollutants in stormwater runoff. SMFs include, but are not limited to constructed wetlands, rain gardens, water quality swales, stormwater planters, infiltration facilities, and ponds. SMFs can be privately or publicly owned and maintained.

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

Surface Water Management System. All natural and human-made facilities used to regulate the direction, quantity, and quality of surface water, including, but not limited to, drainage easements, culverts, storm drains, catch basins, manholes, stream corridors, ditches, open channels, rivers, ponds, wetlands, and impoundments. Not all surface water management system facilities are owned and operated by the District.

Suspended Solids. The total suspended matter that floats on the surface of, or is suspended in, water, wastewater, or other liquids, and which is removable by laboratory filtering in accordance with the applicable procedures prescribed in 40 CFR Part 136.

System Development Charge (SDC). A reimbursement fee, an improvement fee, or a combination thereof assessed or collected as specified in Section 5.4 as a condition of connection to the sanitary sewer system or stormwater system. An SDC does not include the portion of a sanitary sewer connection charge or stormwater mitigation charge that is needed to reimburse the District for its average cost of inspecting or hooking up connections to the sanitary sewer system. An SDC does not include (a) any fees assessed or collected as part of a

local improvement district; (b) a charge in lieu of a local improvement district or assessment; or (c) the cost of complying with requirements or conditions imposed upon a land use decision.

Total Living Area. The gross area (including wall framing) of a dwelling unit conforming to applicable building codes including unfinished areas built for future use. The gross area typically does not include decks, porch covers, garages, attic and basement areas with substandard ceiling height or substandard egress.

Underground Injection Control (UIC). Underground injection controls include facilities such as drywells and perforated pipes that are used to discharge stormwater runoff underground, as authorized by DEQ. UICs do not include facilities such as swales or rain gardens where stormwater runoff is discharged to the surface of the facility for infiltration through the surface into the ground.

Undue Hardship. Special or specified circumstances that partially or fully exempt a person from performance of these Sanitary Standards, so as to avoid an unreasonable or disproportionate burden or obstacle.

Useful Life. The period during which a treatment works, conveyance system, or other specific facility operates.

User. Any person or entity in whose name service is rendered as evidenced by the signature on the application or contract for that service, or, in the absence of a signed instrument, the receipt and payment of utility bills regularly issued in their name. A user, under this system and structure of rates, is either single family or non-single family.

User Charge. The periodic charges levied on all users of the public sewerage system or public stormwater system for the cost of operation, maintenance, and replacement; including but not limited to, expenditures during the useful life of the treatment works or conveyance system for materials, labor, utilities, administrative costs, debt service, debt service coverage, capital improvements, regulatory compliance, and other items which are necessary for managing and maintaining the conveyance system.

Variance. A discretionary decision to permit modification of the terms of any part of these Rules and Regulations based on a demonstration of unusual hardship or exceptional circumstance unique to a specific property.

Violation. An offense of any statute, rule, order, license, permit, or any part thereof and includes both acts and omissions.

Waters of the State. Those waters defined in ORS 468B.005 or as amended which include lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Pacific Ocean within the territorial limits of the State of Oregon, and all other bodies of surface or underground waters, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters which do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction.

Wetland. Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands are those areas identified and delineated by a qualified wetlands specialist as set forth in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands, January 1987, or by a DSL/USACE 404 permit. Wetlands may also consist of:

- A. **Constructed Wetlands.** Wetlands developed as a water quality or quantity facility, subject to maintenance as such. These areas must be clearly defined separated from naturally occurring or created wetlands.

- B. **Created Wetlands.** Created wetlands are wetlands developed in an area previously identified as a non-wetland to replace, or mitigate, wetland destruction or displacement. A created wetland shall be regulated and managed the same as an existing wetland.
- C. **Existing Wetlands.** Existing Wetlands are those identified and delineated as set forth in the Federal Manual for Identifying the Delineating Jurisdictional Wetlands, January 1987, or as amended, by a qualified wetlands specialist.

1.2 Abbreviations

Unless the text specifically indicates otherwise, the following abbreviations are used in these Rules and Regulations to refer to the following:

Abbreviation	Definition
ADU	Accessory Dwelling Unit
BMP	Best Management Practice
BCC	Board of County Commissioners of Clackamas County
BOD	Biochemical Oxygen Demand
C	Celsius
CCSD1	Clackamas County Service District No. 1
cf	cubic feet
CFR	Code of Federal Regulations
CIP	Capital Improvement Plan
CWA	Clean Water Act
DEQ	Oregon Department of Environmental Quality
DSL	Oregon Division of State Lands
EDU	Equivalent Dwelling Unit
EPA	Environmental Protection Agency
EPSC	Erosion Prevention and Sediment Control
ESU	Equivalent Service Unit
F	Fahrenheit
FOG	Fats, Oils, and Grease
FSE	Food Service Establishment
gpd	gallons per day
GRD	Grease Removal Device
mg/L	milligrams per liter
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollution Discharge Elimination System
OAR	Oregon Administrative Rules
ODFW	Oregon Department of Fish and Wildlife
ORS	Oregon Revised Statutes (all statutory references are as amended)
POTW	Publicly Owned Treatment Works
RV	Recreational Vehicle
SARA	Superfund Amendments and Reauthorization Act

Abbreviation	Definition
SDC	System Development Charge
sf	square feet
S.U.	Standard Unit
SMF	Stormwater Management Facility
SMI	State Medium Income
SWMACC	Surface Water Management Agency of Clackamas County
TCSD	Tri-City Service District
TRC	Technical Review Criteria
TSS	Total Suspended Solids
TTOs	Total Toxic Organics
UGB	Urban Growth Boundary
UGMA	Urban Growth Management Area
UIC	Underground Injection Control
U.S.	United States
USC	United States Code
USACE	U.S. Army Corps of Engineers
WES	Water Environment Services
WPCF	Water Pollution Control Facility
WQRA	Water Quality Resource Area
WRRF	Water Resource Recovery Facility



Rules and Regulations

2. Authority

2.1 Purpose and Objectives

Water Environment Services (District) is an intergovernmental entity within Clackamas County, Oregon. The District was organized in accordance with ORS Chapter 190 for the purpose of uniting and simplifying services provided through partner organizations. This management structure provides for a regional, consistent, and efficient way to plan for and provide current and future wastewater and surface water needs in a way that protects public health and the environment while supporting economic development.

It is intended that these Rules and Regulations shall be understood to affect the general purposes described in this document, and that each and every part of the rules is separate, distinct, and severable from all other parts. Omission from, and additional materials set forth in, these Rules and Regulations shall not be interpreted as an alteration, waiver, or deviation from any grant of power, duty, or responsibility or limitation or restriction imposed or conferred upon the Board by virtue of the statutes as now existing or as may hereafter be amended.

Nothing contained in this document shall be so construed as to prejudice, limit, or affect the right of the District to secure the full benefit and protection of any laws which are now or hereafter may be enacted by the Oregon State Legislature. Any reference in these Rules and Regulations to a specific statutory provision shall include that provision and any comparable provision(s) of future legislation amending, modifying, supplementing, or superseding the referenced provision.

These District Rules and Regulations (Rules and Regulations) are established to serve a public use and promote the health, safety, prosperity, security, orderly and uniform administration of the District affairs, and general welfare of the inhabitants using the District's sanitary and stormwater systems.

The objectives of these Rules and Regulations are to:

- Advance public health and welfare.
- Protect watershed health and stream habitats.
- Protect District Employees who may come into contact with sewage, sludge, effluent, spills, or illicit discharges in the course of their employment.
- Comply with state and federal requirements, such as NPDES Permits.
- Support long-term operations and maintenance of public sanitary and storm systems.
- Prevent and minimize the introduction of pollutants to stormwater, the public sanitary and storm system, biosolids, the atmosphere, groundwater, and to surface waters.
- Establish policies and standards that prevent and minimize future pollution through implementation of best management practices (BMPs) and structural controls.
- Ensure that development is planned, designed, constructed, and maintained.
- Provide for fair distribution of costs to current and future users of public sanitary and stormwater systems.

2.2 Adoption of Rules and Regulations

The Board of County Commissioners of Clackamas County (Board) is the governing body of the District. The business and affairs of the District shall be managed by the Board in accordance with ORS Chapter 190. All powers, privileges, and duties of the District by law shall be exercised and performed by and through the Board, whether set forth specifically or implied in these Rules and Regulations, unless otherwise delegated. The Board may delegate to officers and employees of the District any or all executive, administrative, and managerial powers it deems appropriate.

Any existing rules and regulations previously adopted by the District or its predecessor agencies are hereby repealed, and any portion of any previous resolutions or orders are hereby repealed to the extent that such portion is inconsistent with these Rules and Regulations and any subsequent regulation or order.

The provision of these Rules and Regulations and the rules herein adopted shall be in effect thirty (30) days after approval by the Board, unless there is a state of emergency declared.

The Board, acting as the governing body of the District, may amend these Rules and Regulations or put forth new rules in accordance with ORS Chapters 190, 198, and 451, as applicable.

2.3 Applicability

Unless otherwise exempted by the provisions of these Rules and Regulations, the provisions related to sanitary sewers apply to all areas within the District's Service Area where the District provides sanitary sewer service (Rate Zones 1 and 2), and the provisions related to surface water services apply to all areas within the District's Service Area where the District provides surface water services (Rate Zones 2 and 3). These Rules and Regulations do not apply in areas where another municipality's jurisdiction supersedes the District's authority.

The District has several non-contiguous areas that are categorized by Rate Zone (see **Table 1**). These Rate Zones may grow or shrink over time as properties annex themselves into nearby incorporated areas.

Table 1. WES Rate Zones

Rate Zone	Geographic areas	Sanitary Service Provided?	Surface Water Service Provided?
1	West Linn, Oregon City, Gladstone, unincorporated areas	Yes	No
2	Happy Valley, incorporated urban areas and unincorporated areas of Boring, Fischer's Forest Park, and Hoodland	Yes	Yes
3	Rivergrove, unincorporated areas that drain to the Tualatin River.	No	Yes

2.3.1 Rate Zone #1

Rate Zone #1 includes the Service Area formerly served by the Tri-City Service District (TCSD), which includes the Cities of West Linn, Oregon City, Gladstone, and certain unincorporated areas. Rate Zone #1 includes sanitary sewer service.

2.3.2 Rate Zone #2

Rate Zone #2 includes the Service Area formerly served by Clackamas County Service District No. 1 (CCSD1), which includes the City of Happy Valley, certain unincorporated areas within the urbanized portion of the County, and certain unincorporated areas within Boring, Fischer's Forest Park, and Hoodland. Rate Zone #2 includes sanitary sewer and surface water management services.

2.3.3 Rate Zone #3

Rate Zone #3 includes the Service Area formerly served by the Surface Water Agency of Clackamas County (SWMACC), which includes the City of Rivergrove and unincorporated areas of Clackamas County within the Tualatin River Drainage Basin. Rate Zone #3 includes surface water management services.

2.4 Annexation

The purpose of this section is to establish procedures relating to the annexation of territory into the District. It is the intent of the District to promote orderly annexation of municipal and unincorporated land where it is determined in best interests of the District and adjoining cities to plan and provide for orderly development.

- A. Annexation to the District must satisfy the requirements as set forth in Oregon Revised Statutes (ORS) Chapter 198.
- B. Annexation to the District shall be required prior to a building on a property connecting to and/or benefiting from District-owned, operated or maintained sanitary and/or stormwater infrastructure.
- C. Property owners seeking to annex territory into the District must first seek annexation into the applicable City in accordance with local and state ordinances, the Metro Code Chapter 3.07 Urban Growth Management Functional Plan, and/or an Urban Growth Management Area (UGMA) Agreement.
- D. The District will not annex lands outside of the Urban Growth Boundary (UGB), or annex lands within the UGB that are included in an UGMA or a comprehensive land use plan that designates the lands to be incorporated into a City, without a property first annexing into a City or a City consents to District annexation.
- E. In the event a City is not willing to annex properties, and the subject properties are contiguous with the current District boundary, then the District reserves the right at its sole discretion to annex the land and provide services, excluding lands as noted in Section 2.4.D of these Rules and Regulations.
- F. The District may annex property and/or provide extra-territorial service at its sole discretion to a property in order to abate a health hazard in accordance with Section 6.3.2



Rules and Regulations

3. Administration

3.1 Purpose and Objectives

This section describes the administration of the Rules and Regulations including, but not limited to, compliance, authority, enforcement, and appeals.

3.2 Compliance with Laws

Conformance with these Rules and Regulations shall in no way be a substitute for, or eliminate the necessity of, conforming to any and all federal, state, and local laws, ordinances, rules, and regulations which are now, or may in the future, be in effect.

3.2.1 Regulations and Rules as Contract

The terms and conditions contained in these Rules and Regulations; the rules, regulations, and ordinances of the District; and all successive resolutions and orders, shall constitute a contract between the District and all users, contractors, and connectors to the system. The users and connectors will be able to use and connect to the public sewerage system, public stormwater system, and surface water system and their programs.

Nothing contained in these Rules and Regulations shall require the District to provide service or access to the system to any user or connector when any federal, state, or local agency having jurisdiction over the District has imposed limitations upon such service or access, or when the District, in its discretion, has determined that the public interest requires any such limitation.

3.2.2 No Property Interest Acquired

A user or connector to the public sanitary or surface water system does not acquire a vested property interest in continued use or connection to the system. Such use or connection is conditioned always upon the user or connector complying with all applicable terms and conditions contained in these Rules and Regulations, and all successive regulations and orders, and, further, upon compliance with all federal, state, or local requirements which are, or may hereafter, be imposed upon such user or connector.

3.2.3 Conflicts With Existing and Future Regulatory Requirements of Other Agencies

Any provisions or limitations of these Rules and Regulations and any successive regulation or order are suspended and supplemented by any applicable federal, state, or local requirements existing or adopted subsequent to this document that are more stringent than the provisions and limitations contained herein; however, any provision of these Rules and Regulations (and successors) that are more stringent than any applicable federal, state, or local requirement shall prevail and shall be the standard for compliance by the users of any connectors to the District sanitary or surface water

systems. Any specific statutory references within these Rules and Regulations are as amended, intending to capture future changes in substance or reference as applicable.

3.3 Delegation of Authority

The Board delegates to the Director of the District (Director) the authority to implement these rules, including:

3.3.1 Easements

The Director shall have the authority to accept, reject or release easements for the purposes as set forth below; and as the Board may further determine by resolution and order.

- A. The Board grants the Director authority to govern easements for the District in support of:
 - Assessment districts
 - Local improvement districts
 - Capital Improvement Projects
 - Existing easements recorded by instrument or plat
 - Proposed easements to be recorded by instrument or plat
 - Quit claims of existing easements
- B. All documents accepted pursuant to this section and submitted for recording shall show evidence of approval by the District's legal counsel and the signature and title of the person accepting the document on behalf of the District.
- C. The Director, in instances when the Director is not present, shall have the power to delegate the authority under this section by a written statement to his or her designee declaring the delegation, individual designated, and duration of the designation.
- D. The authority granted in this section shall be in addition to other authority that may be provided to District officers and employees to acquire interests in real property on behalf of the District. Nothing in this section shall be deemed to grant any employee or individual the authority to acquire or accept an interest in real property on behalf of the District except as specifically provided herein, or upon the direction or approval by the Board.

3.3.2 Standards

The Director shall have the authority to promulgate such technical standards and requirements necessary to implement the purpose and intent of these Rules and Regulations, including, but not limited to, pipe type, size, connection requirements, elevation, grade, materials, and any other good and necessary item. Such standards shall be contained in one or more documents that are publicly available, and the District shall provide thirty (30) days of public notice on its website of any potential change to such standards or requirements. The Director is authorized to adopt and amend, as needed, the following standards documents as necessary to implement the requirements of these Rules and Regulations:

- A. Erosion Prevention and Sediment Control Planning and Design Manual to establish standards and guidelines for implementing BMPs to provide erosion prevention and sediment control from construction sites.

- B. Stormwater Standards to establish standards and guidelines for implementing Best Management Practices and construction Stormwater Management Facilities to reduce pollutants from new development and redevelopment and for the design, construction, and acceptance of public stormwater systems. All construction and material specifications for any stormwater system construction shall be in conformance with the District's Stormwater Standards.
- C. Buffer Standards to establish standards and guidelines for providing vegetated buffers to protect District Water Quality Resource Areas (WQRA), which include perennial and intermittent streams and wetlands
- D. Sanitary Sewer Standards to establish the standards and guidelines governing the design, construction, and acceptance of public sanitary sewers, including upgrades to public facilities necessary for collecting, pumping, treating, and disposing of sanitary sewage. All construction and material specifications for any public system construction shall be in conformance with the District's Sanitary Sewer Standards. Private sanitary discharge to public systems will be regulated to protect public health and the performance of the public sanitary system.
- E. Exceptions. The Director may approve, in their sole discretion, exceptions to the minimum requirements when the exception, as mitigated, will not increase risks in the vicinity and downstream of the site to public health, safety, and welfare or to water quality, quantity, or public and private property.
- F. Interpretation. The Director shall have broad discretion to interpret these Rules and Regulations.

3.4 Administration in Other Jurisdictions

The District, through its Director or other authorized designee or representative, shall have the authority to do all things necessary to administer the provision of these Rules and Regulations and any subsequent rules as needed in other jurisdictions.

3.5 Enforcement of Rules and Regulations

In the event the District must take an enforcement action to ensure compliance with these Rules and Regulations, any actions taken by the District shall be performed in accordance with the subsequent sections within these Rules and Regulations.

3.6 Severability

If any provision, clause, or paragraph of these Rules and Regulations, or any subsequent rules, shall be found to be unconstitutional, illegal, or unenforceable by any court of competent jurisdiction, the offending provision shall be stricken and such judgment shall not affect the validity of the remaining portions of these Rules and Regulations, or other such rules. The court or other authorized body finding such provision unconstitutional, illegal, or unenforceable shall construe the Rules and Regulations, and any other related rules, without such provision to give effect to the District's intentions to the maximum extent practicable.

3.7 Interpretation

Any person aggrieved by a ruling or interpretation of the provisions of these Rules and Regulations may submit a written appeal to the Director. The appeal must be in writing and submitted within fourteen (14) days after the decision was made. The appeal shall set forth the events and circumstances leading to the appeal, nature of the ruling or interpretation from which relief is sought, and nature of the impact of the ruling on appellant's property or business,

together with any other reasons for the appeal. This section shall not apply to cases arising under Section 10 where a violation of these Rules and Regulations has occurred. Any requests for variances to technical standards will follow the process laid out in the adopted standard.

3.7.1 Decision of District

The Director or authorized designee shall review records of the District and shall make a written decision within thirty (30) days of written notification of appeal.

3.7.2 Appeal of District Decision

If the appellant considers that their grievance has not been handled to their satisfaction, they may send a written request to the District for an independent review by a Hearings Officer of their case within thirty (30) days from the date of the written decision.

Through the adoption of these Rules and Regulations, the Board delegates decision making authority to a Hearings Officer for all matters arising under Section 3.7.3. The Board further delegates to the Director the responsibility for selecting a Hearings Officer from those under contract with the County. If no hearings officer is available under the County contracts, the Director will work with County Counsel to identify a suitable alternative.

3.7.3 Hearings Officer

The Hearings Officer shall set a de novo hearing on the matter at which they will take testimony and hear arguments. The Director or authorized designee shall give notice of the time and place for the hearing to the appellant. For appeals related to development review or land use, notice shall be given to the appellant and all property owners within 250 feet of the subject property. The notice called for in this section shall be given by First Class mail, postage prepaid, at least fourteen (14) days in advance of the time scheduled for the hearing. Only persons who have been aggrieved by the Director's decision shall have standing to participate in the hearing. The Hearings Officer may use the procedures set forth in Section 10.12 of these Rules and Regulations, as applicable. The Hearings Officer shall issue written findings and a decision on the appeal within thirty (30) days after the de novo hearing, with copies to the Board, all persons who participated in the hearing, and those persons who have requested a copy.

3.7.4 Decision of Hearings Officer

The Hearings Officer shall have all the decision-making authority of the Board for all matters brought before them arising under these Rules and Regulations. The decision of the Hearings Officer shall be final when issued. The appellant may file a request for correction of misstated facts, which is to be received by the District or Hearings Officer within ten (10) days after the decision of the Hearings Officer was sent to the appellant. The Hearings Officer shall be limited to review of the accuracy of the facts used in the decision. If the facts are corrected, the Hearings Officer may revise conclusions and findings of the order or decision. The Hearings Officer shall review the request and issue a corrected order or a notice of decision to decline correction within thirty (30) days of receipt of request from the appellant. The correction process shall not change the time to file a writ of review if the order is not corrected. A revised order is final when issued.

3.7.5 Circuit Court Review

Decisions of the Hearings Officer shall be reviewable by the Circuit Court of the State of Oregon for Clackamas County, solely and exclusively under the provisions of

ORS 34.010 to 34.100, or any successor statutes. If a writ of review has not been filed by the time limits described by ORS 34, the decision is enforceable by the District.



Rules and Regulations

4. Connection Rules

4.1 Purpose and Objectives

All connections and specifications shall be in accordance with the requirements of these Rules and Regulations, the District Sanitary Sewer Standards, the District Stormwater Standards, the Plumbing Code of the State of Oregon, and any other federal or state requirement.

4.2 General Requirements

A. Unauthorized Connections

No person shall uncover, make any connection to, make any opening into, use, alter, or disturb any portion of the Districts System without first making an application to and obtaining the authority and/or permit from the District therefor.

B. Permit Applications

The installer of work covered by this section shall make application to the District for connection. The application shall be supplemented by any plans, specifications or other information considered necessary by the District.

C. Payment of Charges

All system development charges (SDCs), and other fees or charges, except user charges, established by the District, shall be paid prior to the issuance of a permit to connect, except charges which have been deferred pursuant to the provisions of Chapter 5.

D. To Whom Permit Issued

The permit shall be issued to the property owner or installer.

E. Indemnification of District

The owner and installer shall indemnify the District, its officers and agents from any loss or damage that may directly or indirectly be occasioned by the installation of the Service Connection, Building Sewer, or Building Drain.

F. Direct Sanitary Connection Required

All building sanitary sewers connected to the District sanitary sewer system shall be directly connected thereto without any intervening private sewage disposal system.

G. Connection Permit Required

A permit is required to connect to the District system, including, but not limited to a Service Connection, pipes, pollution reduction manholes, and detention facilities, whether constructed or natural. Before connecting to the District system, a permit authorizing such connection shall first be secured in writing from the District and all applicable fees paid.

H. Separate Service Connection

No Service Connection shall be used to provide service to more than one property, except as specified below. Each separate Service Connection to the Public Mainline shall pay the

minimum applicable EDU charges, fees and monthly service fees based on the District Rules.

Existing Service Connections that share a party line shall be modified and separated where practicable, in the District's sole discretion, when repairs or replacements of existing sewers are proposed.

A separate and independent Service Connection and Building Sewer shall be provided by the owner at their expense for each tax lot or lot of record, except:

- a. That court apartments, motels, mobile home parks and similar properties held under a single ownership, or condominiums represented by a homeowner association, may be permitted in the sole discretion of the Director to use a single Service Connection as long as such single ownership shall continue. Each single connection shall be of a size and type adequate to service the connecting buildings; or
 - b. In the sole discretion of the Director or their designee, to avoid unnecessary undue hardship, more than one user may share a Service Connection if all of the following criteria are met:
 - i. All parties to the shared Service Connection have entered into a written agreement recorded in the Clackamas County Real Property Records regarding use and maintenance of the Service Connection and reciting it is for the benefit of District;
 - ii. Said agreement shall further provide that it is a covenant running with the land and inures to the benefit of and binds all the parties' heirs, successors, and assigns;
 - iii. Said agreement contains a clause holding the District harmless from any and all liability arising out of the use, damage, or destruction of the private Service Connection, and that the District shall be indemnified for any and all claims or costs, including legal fees, for which the District may be held liable;
 - iv. The District and its employees shall have the right to enter upon the private property, if necessary, to protect, maintain, repair, and replace any portion of the Service Connection at the property owner's expense;
 - v. The District may terminate sewer service to all users of the private Service Connection if one of the users violates these Rules and Regulations and termination of service is a remedy, and may do so without liability to any user of the Service Connection; and
 - vi. The agreement shall be approved by the District prior to recording and no building permit will be issued until the District has so approved.
 - c. Each user shall pay all charges in accord with the District Regulations as if a separate connection to the District's sewerage system had been accomplished. Each single connection under an agreement so approved shall be of a size and type adequate to service the connecting buildings.
- I. Condition of Service Connection, Building Sewer, and Building Drain

The Service Connection, Building Drain, Building Sewer pipe that is located within the right of way, public easement, and on private property, throughout its entire length, must be kept in good repair at the expense of the owner, who shall be responsible for all damages resulting from leaks or breaks in the service pipe. The District may require a property owner to repair a pipe that is discharging any substance prohibited by these Rules.

J. Right of Entry

Agents of the District may have free access at reasonable hours of the day to all parts of the premises from which sewer may be delivered to the District's Public Mainline, for the purpose of inspecting the condition of the pipes and fixtures and the manner in which the sewer is used.

K. Ground Water Infiltration

Service Connections and Building Sewers shall be maintained by the owner of said structure in such a manner as to prevent infiltration of ground water into the sanitary sewer system.

L. Service Connection, Building Drain, and Building Sewer Disrepair

When a Service Connection, Building Drain, Building Sewer pipe falls into disrepair, or contains ground water as determined by the District, the property owner shall have sixty (60) days to repair or replace the pipe upon written notification by the District. After the notification period has ended, if the repairs are not completed, then the District may fine the property owner, or may repair and/or replace the pipe and assess a fee equal to the cost to complete the work to the property owner. The fee for repairing or replacing the Service Connection, Building Drain, or Building Sewer pipe shall be levied and collected in accordance with the District rules.

M. Restricted Connections

No person shall connect any roof, surface, foundation, footing, drainage, or area drain to any sanitary sewer Service Connection, sanitary building sewer, or building drain that is connected to the District sanitary sewer system.

N. Existing Service Connections, Building Drains, and Building Sewers

Whenever a sanitary or storm Building Sewer or Service Connection has been installed that does not conform to District Rules and Standards, then the portions nonconforming shall be replaced in accordance with such regulations.

O. Abandoned Service Connections, Building Sewers, and Building Drains

Any Service Connection that is abandoned shall be capped or plugged by the property owner at their sole cost and expense. All materials to plug or cap the Service Connection shall be approved and inspected by the District and/or city prior to backfilling. When Service Connections, Building Sewers, and Building Drains are temporally abandoned, they shall be properly plugged or capped at the property line by the property owner at the time they are abandoned. If the Service Connection will be permanently abandoned, then the Service connection will be disconnected at the mainline with a watertight fitting and applicable grout to permanently seal the connection. District inspection and approval of the plugged or capped Service Connections, Building Sewers, or Building Drains is required prior to backfilling the exposed sewer to be abandoned. An abandoned Service Connection, Building Sewer, or Building Drain found not properly plugged or capped at the property line shall be properly plugged or capped by the property owner when notified to do so by the District. If the property owner fails to properly abandon the Service Connection, Building Sewer, or Building Drain after twenty (20) days of being notified to do so, the District may have the work done at the property owner's expense.

P. User Requiring Pumping Facilities

The District requires gravity sanitary sewer service, however, if the building is below the available gravity sewer line, and the District, in its sole discretion, allows the property to connect, the owner or user shall install pumping facilities in accordance with the Uniform Plumbing Code.

4.3 Hold Harmless

All users of the system, all contractors who may perform work on the system in any manner, and all other persons or entities whose actions may affect the system shall indemnify and hold harmless the District, the city, their officers, employees, and representatives from and against all suits, actions, or claims of any character or nature brought because of any injuries or damages received or sustained by any person, or property, or alleged to have been so received or sustained on account of the actions, or failure to act, of such users, contractors, or other persons, their subcontractors, employees, or representatives. Such indemnification shall include the cost of defense of such claims, including attorney's fees.

4.4 Public System Construction

All public sanitary sewer or stormwater system construction shall conform to all standards of the District, City in which the construction takes place, and DEQ, including, but not limited to, OAR 340-52, or as may be amended and specifically incorporated by reference in this document.

4.4.1 Sewer Extensions

The extension of the Public Sewer System by a property owner to service adjacent properties will only be allowed in the District's sole discretion. Sewer construction shall be performed by a contractor duly licensed by the State of Oregon and any other licensing entity having jurisdiction over the work. A developing party who chooses, or is required as a condition of development, to finance or cause construction of public sewer such that other properties will be Specially Benefited ay request that the District establish a Reimbursement District in accordance with Section 5.6.

4.4.2 Certification

Prior to the acceptance of a sanitary sewer or stormwater system by the District, the engineer shall certify in writing to the District that all workmanship and materials have been tested by methods approved by the District, that all workmanship and materials conform to the applicable plans and specifications approved by the District, and for the purpose of enabling the District to maintain adequate records relating to the construction costs of the Public Sanitary Sewer or Stormwater System, the engineer shall certify in writing on forms provided by the District the total construction costs of the sewer construction.

4.4.3 Continuous Inspection

Any sewer construction must be constructed under the continuous inspection of the Project Engineer, or designee, in accordance with the approved plans.

4.4.4 Acceptance by District

The acceptance process will be initiated when the project engineer submits the certification of completion. The engineer shall notify the District to perform an inspection of the sewer or system construction. Following completion of the inspection and confirmation in writing that the construction is in conformance with the approved plans and the District's Sanitary or Stormwater Standards, the District shall accept the public sanitary or stormwater system for ownership.

4.5 Maintenance

Sewer and stormwater system maintenance obligations are based on the ownership of the system, unless otherwise specified in a written agreement with the District.

All public and sanitary and stormwater facilities and infrastructure shall be designed and constructed to provide adequate access, area, and surface to conduct operation, maintenance, repair, and replacement of the improvements.

4.5.1 Publicly Maintained

Any sewer, stormwater facility, or District infrastructure that has been constructed by the District or has been accepted by the District will be maintained by the District. District owned and maintained facilities and infrastructure shall have adequate defined area to operate, maintain, repair, and replace the public improvements in accordance with Standards. Privately owned but publicly maintained stormwater facilities and the associated maintenance access area will be encompassed in a tract of land with a public easement dedicated to the District. Access to the infrastructure shall be provided in accordance with the applicable Stormwater Standards, which outline the minimum design criteria that must be provided for maintenance access.

Publicly maintained stormwater facilities shall be located in a location and manner so the facility can be safely and efficiently maintained. Egress and ingress access routes shall be clear of any obstacles and constructed of a sufficient surface to safely convey the size and weight of vehicles and equipment necessary to maintain, repair, and replace the stormwater facility. The access surface shall be maintained to accommodate scheduled maintenance in accordance with the Stormwater Standards.

4.5.2 Privately Maintained

Any sewer or stormwater system that has not been accepted by the District remains the maintenance responsibility of the property owner. Privately maintained facilities and infrastructure shall have adequately defined area to operate, maintain, repair, and replace the privately owned and operated improvements, including Service Connections.

Property owners or users having ownership or control of onsite stormwater management facilities and infrastructure shall maintain such facilities in compliance with these District Rules and Regulations and Stormwater Standards and provide documentation of the annual inspection and any maintenance performed. If a stormwater facility or infrastructure is not maintained in accordance with District Rules and Regulations and Stormwater Standards, then, upon written notification to the property owner or site manager, the owner or manager shall take corrective action. Failure to comply shall result in enforcement action as per Section 10 of these Rules and Regulations.



Rules and Regulations

5. Rates, Charges, and Billings

5.1 Purpose And Objectives

This section includes information related to rates, charges, and billings associated with using and connecting to the Public Sanitary Sewer and Public Stormwater System and includes, but is not limited to, information related to Rate Zones, SDCs, user charges, Reimbursement Districts, and collection policies.

5.2 Rate Zones

The following Rate Zones may be used for the purpose of determining SDCs, user charges, fees, and other charges and billings. As a general principal, it is intended that rates shall be first calculated based on the service received, then adjusted by Rate Zone to implement all operative clauses of the Partnership Agreement.

5.2.1 Rate Zone 1

Rate Zone 1 is coterminous with the former boundaries of Tri-City Service District (TCSD). The boundaries of Rate Zone 1 may be adjusted through annexation.

5.2.2 Rate Zone 2

Rate Zone 2 is coterminous with the former boundaries of Clackamas County Service District No. 1 (CCSD1). The boundaries of Rate Zone 2 may be adjusted through annexation.

The cities of Milwaukie and Johnson City have separate wholesale contractual agreements with the District for the purpose of providing sanitary service, including all facilities necessary for collecting, pumping, treating, and disposing of sanitary sewerage.

Rate Zone 2A is coterminous with the city boundaries of Milwaukie and Johnson City, and for purposes of calculating SDCs, user charges, fees, and other charges and billings shall be considered fully part of Rate Zone 2.

5.2.3 Rate Zone 3

Rate Zone 3 is coterminous with the former boundaries of Surface Water Management Agency of Clackamas County (SWMACC). The boundaries of Rate Zone 3 may be adjusted through annexation.

5.3 Permit and Review Fees

Permit and review fees are set through the annual budget adoption process and authorized by the Board. The District may set fees to recover full costs for reviews and inspections, including all applicable overhead. All fees must be paid prior to receiving a permit and commencing work.

5.4 System Development Charges

This section provides authorization for SDCs for capital improvements pursuant to ORS 223.297 through 223.314, for the purpose of creating a source of funds to pay for existing system

capacity constructed for the benefit of and/or the installation, construction, and extension of capital improvements to accommodate new connections to the system.

As a condition of connection to the sanitary sewer or stormwater system, the applicant shall pay all applicable SDCs to the District and the city, if applicable. Except as allowed in the text below, the SDC is payable at the earliest of either the:

- A. Prior to the issuance of a building permit, or
- B. Increased usage of the system or systems provided by the District.

SDC payments shall apply at the rates in effect on the date when a complete building permit application is submitted to the applicable Building Code Division. The Director, or their designee, shall not issue such permit or allow connection or increased usage of the system(s) until the charge has been paid in full, unless provision for installment payments has been made or unless an exemption is granted per Section 5.4.6 of these Rules and Regulations.

5.4.1 Sanitary Sewer System Development Charge Imposed

Unless otherwise exempted by the provisions of these Rules and Regulations or other local or state law, a SDC is hereby imposed on all development within WES's boundaries that increases usage of the sanitary sewer facilities owned, managed, or maintained by WES.

The sewer SDC shall be calculated based on the equivalent dwelling unit (EDU) ratios defined in **Table 2**. SDCs shall be established and may be revised by resolution or order of the Board.

A consumption-based monthly sewer user charge is based on the equivalent cubic feet of metered water consumption. For terms that are not defined in these Rules and Regulations, the District has discretion in determining how a classification is applied, including referencing definitions from the codes of the County or the city in which the project is taking place.

Table 2. Assignment of Equivalent Dwelling Units to Classes of Service

Class #	Class of Service	EDU	Monthly Sewer User Charge
Residential			
1	Single-family (detached and attached; includes houses, townhomes, row houses)		
1(a)	Total Living Area < 800 square feet (sf)	70% of 1 EDU	1 EDU
1(b)	Total Living Area 800 - 1,799 sf	90% of 1 EDU	1 EDU
1(c)	Total Living Area 1,800 - 2,999 sf	100% of 1 EDU	1 EDU
1(d)	Total Living Area 3,000 - 3,799 sf	110% of 1 EDU	1 EDU
1(e)	Total Living Area ≥ 3,800 sf	120% of 1 EDU	1 EDU
2	Multi-Family (duplex, triplex, condominium, apartment units)	80% of 1 EDU	1 EDU
3	Accessory Dwelling Unit (ADU)	60% of 1 EDU	1 EDU
Non-Residential			
4	General Commercial (not fitting in a class of service)	1 EDU per 3,800 sf of building floor area	Per 1,000 cubic feet (cf) of water consumption per month
5	Assisted Living / Care Facilities	1 EDU per 2 beds	Per 1,000 cf of water consumption per month
6	Car Wash - tunnel	16 EDUs per tunnel	Per 1,000 cf of water consumption per month
7	Car Wash - wand	1.2 EDUs per stall	Per 1,000 cf of water consumption per month
8	Churches	1 EDU per 7,600 sf of building floor area	Per 1,000 cf of water consumption per month
9	Hospitals / Medical Care Units	1 EDU per bed	Per 1,000 cf of water consumption per month
10	Hotel / Motel	1 EDU per 2 units	Per 1,000 cf of water consumption per month
11	Laundromats	1 EDU per machine	Per 1,000 cf of water consumption per month
12	Mini Storage	1 EDU per connection	Per 1,000 cf of water consumption per month
13	Restrooms - Stand Alone	1 EDU	Per 1,000 cf of water consumption per month

Class #	Class of Service	EDU	Monthly Sewer User Charge
14	RV Parks	0.8 EDUs per RV space	Per 1,000 cf of water consumption per month
15	Spas / Health / Athletic Clubs with showers	1 EDU per 1,900 sf of building floor area	Per 1,000 cf of water consumption per month
Food			
16	Food Service Establishment	1 EDU per 450 sf	Per 1,000 cf of water consumption per month
17	Drinking-Only Establishment	1 EDU per 800 sf	Per 1,000 cf of water consumption per month
18	Food Carts	1 EDU per 2 food carts	Per 1,000 cf of water consumption per month
Institutions			
19	Preschool and Elementary Schools	1 EDU per 65 students	Per 1,000 cf of water consumption per month
20	Junior High, High Schools, and Colleges	1 EDU per 29 students	Per 1,000 cf of water consumption per month
Industrial			
21	Light Industrial/warehouse	1 EDU per 15,000 sf of building floor area	Per 1,000 cf of water consumption per month
22	Heavy Industrial >10,000-gals/day of discharge	Minimum 1 EDU per 1,000 cf of sewer discharge, or based on the actual cost to the District, but not less than Light Industrial Class	Per 1,000 cf of water consumption per month
All Other			
23	Other classifications, not fitting above categories	1 EDU per 3,800 sf, or 1 EDU per connection, whichever is greater	Per 1,000 cf of water consumption per month

5.4.2 Surface Water System Development Charge Imposed

Unless otherwise exempted by the provisions of these Rules and Regulations or other local or state law, a SDC is hereby imposed on all development within WES's boundaries that increases usage of the storm system or surface water facilities owned, managed, or maintained by WES.

The surface water SDC shall be calculated based on the equivalent service unit (ESU) ratios defined in **Table 3**.

SDCs shall be established and may be revised by resolution or order of the Board.

Table 3. Assignment of Equivalent Service Units To Classes Of Service

Class #	Class of Service	ESU	Monthly Stormwater User Charge
Residential			
1	Detached single-family (houses) and Accessory Dwelling Unit (ADU)	1 ESU	1 ESU
2	Attached single-family (townhomes and row houses) and multi-family (duplex, triplex, condominium, apartment units)	1 ESU per 2,500 sf of impervious surface area	1 ESU per 2,500 sf of impervious surface area
Non-Residential			
3	Non-residential	1 ESU per 2,500 sf of impervious surface area	1 ESU per 2,500 sf of impervious surface area

5.4.3 Methodology

The methodology used to establish reimbursement fees shall:

- A. Consider the cost of the existing facilities, prior contributions by then-existing system users, the value of unused capacity, rate-making principles employed to finance publicly owned capital improvements, and other relevant factors identified by the Board.
- B. Promote the objective that future system users shall contribute not more than an equitable share of the cost of then-existing facilities.
 - a. The methodology used to establish the improvement fee shall consider the cost of projected capital improvements needed to increase the capacity of the systems to which the fee is related, as identified in the Capital Improvement Plan (CIP) adopted pursuant to Section 5.4.5. The methodology shall be calculated to obtain the cost of capital improvements for the projected need for system capacity for future system users.
 - b. The methodology used to establish the SDC shall be adopted by resolution or order of the Board. The District shall maintain a list of persons who have made a request for notification prior to adoption or amendment of the SDC methodology. These persons shall be so notified of any such proposed changes, as follows:
 - i. The District shall provide written notice to persons who have requested notice of any adoption or modification of SDC methodology at least ninety (90) days before the hearing.
 - ii. The revised methodology shall be available to the public at least thirty (30) days before the first public hearing of the adoption or amendment of the methodology.
 - c. A change in the amount of a reimbursement fee or an improvement fee is not a modification of the SDC methodology if the change is based on a change in project costs, including cost of materials, labor, and real property, or on a

provision for a periodic adjustment included in the methodology or adopted by separate ordinance or resolution, consistent with state law.

- d. A change in the amount of an improvement fee is not a modification of the SDC methodology if the change is the result of a change in the CIP adopted in accordance with Section 5.4.5.

Any challenge to the SDC methodology shall be filed not later than sixty (60) days following final adoption by the Board and only pursuant to the provisions of ORS 34.010 through 34.100.

5.4.4 Authorized Expenditure

All moneys collected through SDCs shall be retained in a separate fund and segregated by type of SDC and by reimbursement versus improvement fees.

Reimbursement fees shall be applied only to capital improvements associated with the systems for which the fees are assessed, including expenditures relating to repayment of indebtedness.

Improvement fees shall be spent only on capacity increasing capital improvements, including expenditures relating to repayment of debt for such improvements. An increase in system capacity occurs if a capital improvement increases the level of performance or service provided by existing facilities or provides new facilities. The portion of the improvements funded by improvement fees must be related to demands created by current or projected development.

A capital improvement being funded wholly or in part from the revenues derived from the improvement fee shall be included in the CIP adopted by the Board.

SDC revenues may be expended on the direct costs of complying with the provisions of these Rules and Regulations, including the costs of developing SDC methodologies and providing an annual accounting of SDC funds.

5.4.5 Capital Improvement Plan

The Board shall adopt by resolution or order a CIP. The CIP shall:

- A. List the planned capital improvements that may be funded with improvement fee or reimbursement fee revenues.
- B. List the estimated cost and time of construction of each improvement.
- C. In adopting a SDC project plan, the Board may incorporate by reference all or a portion of any Public Facilities Plan, Master Plan, CIP, or similar plan that contains the information required by this section. The Board may modify the projects listed in that Plan at any time through the adoption of an appropriate resolution.
- D. The Board may modify such plan and list at any time. If a SDC will be increased by a proposed modification to the list to include a capacity increasing public improvement, the Board will:
- E. At least thirty (30) days prior to the adoption of the proposed modification, provide written notice to persons who have requested notice pursuant to Section 5.4.3 of this ordinance
- F. Hold a public hearing if a written request for a hearing is received within seven (7) days of the date of the proposed modification

5.4.6 Exemptions

SDCs shall not be collected in the following situations:

- A. Sanitary Sewer SDC and Surface Water SDC will not apply for pre-existing structures and uses of the sewer or storm system or stormwater management facility. Additional Sanitary Sewer SDCs and Surface Water SDCs may apply, if there is any alteration, and/or increase of use of the system(s), which would increase the EDU and/or ESU unit assignment in accordance with the Rules above the SDC charges previously collected.
- B. Surface Water SDC for properties within Rate Zone 3, unless a CIP for that area is adopted pursuant to Section 5.4.5 above.
- C. Surface Water SDC for properties within certain unincorporated areas of Hoodland, Boring and Fischer Forest Park portions of Rate Zone 2, unless a CIP for that area is adopted pursuant to Section 5.4.5 above.
- D. Sanitary Sewer SDC within Rate Zone 2–Boring area, no SDC shall be assessed for those properties within the original boundaries of Assessment District 84 unless a CIP for that area is adopted pursuant to Section 5.4.5 above.
- E. Sanitary Sewer SDC within Rate Zone 2–Hoodland area, no SDC shall be assessed for those properties within the original boundaries of Assessment District 1-80 unless a CIP for that area is adopted pursuant to Section 5.4.5 above.

5.4.7 Credits

The District may grant a credit against the SDC otherwise assessed a new development for constructing a Qualified Public Improvement.

For a Qualified Public Improvement located on, or contiguous to, the site of the development, only the over-capacity portion of Qualified Public Improvement is eligible for a SDC credit. There is a rebuttable presumption that the over-capacity portion of such a Qualified Public Improvement is limited to the portion constructed larger, or of greater capacity, than the District's minimum standard facility capacity or size needed to serve the particular development.

Credit shall be only for the improvement fee charged for the type of improvement being constructed. When the construction of a Qualified Public Improvement gives rise to a credit amount greater than the improvement fee that would otherwise be levied against the project receiving development approval, the excess credit may be applied against improvement fees that accrue in subsequent phases of the original development project.

All credit requests must be in writing and filed with the District before the issuance of a building permit. The amount of any credit shall be determined by the District and based upon the subject improvement construction contract documents, or other appropriate information, provided by the applicant for the credit. Upon a finding by the District that the contract amounts exceed the prevailing market rate for a similar project, the credit shall be based upon market rates. The credit shall state the actual dollar amount that may be applied against the improvement fee of the SDC imposed against the subject property. The applicant has the burden of demonstrating qualification for a credit.

Any credits are assignable; however, they shall apply only to that property subject to the original condition for land use approval upon which the credit is based or any partitioned or subdivided parcel or lots of such property to which the credit has been apportioned. Credits are limited to the amount of the fee attributable to the development of the

specific lot or parcel for which the credit is sought. Credits shall not be a basis for any refund.

Credits shall be used by the applicant within ten (10) years of their issuance by the District.

5.4.8 Change in Equivalent Dwelling Unit or Equivalent Service Unit

Whenever a parcel of property annexes to the District, or connects to the city or District's Public Conveyance System shall be subject to an EDU or ESU assignment in accordance with **Table 2** and **Table 3**, and the following shall occur:

- A. If the change results in the assignment of a greater number of EDUs or ESUs, an additional SDC as determined by the District may be levied at the time of such change. The additional charge shall be equal to the net increase of EDUs or ESUs times the current SDC.
- B. If the change results in the assignment of a lesser number of EDUs or ESUs, there shall be no additional unit assignment. However, the full number of EDUs or ESUs originally assigned to the property shall be used as a basis for determining any future SDCs in the event of any further change of use resulting in the assignment of additional EDUs or ESUs.

5.4.9 Annual Accounting

The District shall prepare for public inspection an annual accounting for SDCs showing the total amount of SDCs collected for each Rate Zone.

Any citizen or interested person may challenge expenditure of SDC revenues according to Section 2. Notwithstanding Section 2, the initial appeal of that Section with respect to an expenditure of SDC revenues shall be filed within the applicable time limitations under Oregon law. Thereafter, all time limits of Section 2 shall apply including Circuit Court review pursuant to ORS 34.010 through 34.100.

5.4.10 System Development Charge Installment Payments

The District may approve an application to pay the SDC in installments and may lien the property for the amount financed. The District reserves the absolute right to reject any application for installment payments.

Installment payments for SDCs shall be limited to single family residential and multi-family residential developments that have been assigned ten (10) or fewer EDUs. The amount financed shall be for that portion of a SDC, and/or a connection charge imposed per Section 5.5.

The District shall provide application forms, and prepare an agreement for installment payments, which shall include a waiver of all rights to contest the validity of the lien, except for the correction of computational errors. The application fee for this option shall be set by resolution and included in the District's adopted Fee Table. The applicant shall provide with the application all supporting documentation, as requested.

A person submitting application for installment payments shall have the burden of demonstrating the person's authority to assent to the imposition of a lien on the property and that the interest of the person is adequate to secure payment of the lien.

If approved by the District, the applicant shall execute an installment promissory note, payable to the District in the form prescribed by the District for payment in installments not to exceed twenty (20) equal semi-annual installments due January 1 and July 1 of

each year, to include interest on the unpaid balance in accordance with ORS 223.205 through 223.295. The applicable interest rate shall be the current US Federal prime rate plus 2.0 percentage points.

The promissory note shall be secured by a mortgage or trust deed covering the property to be connected thereto. The cost of recording, preparation of security documents, supporting documentation for the application, and filing fees shall be borne by the applicant in addition to the SDC. The applicant, by electing to pay in installments, agrees that as an additional remedy to recovery upon the promissory note and foreclosure of the mortgage or remedy in lieu thereof, the District may after ten (10) days' notice of delinquent installments cause termination of service to the defaulting property.

The District Director or designee shall cause the lien to be entered in the lien docket kept in the Office of the County Clerk in accordance with ORS 451.520. From that time, the District shall have a lien upon the described parcel for the amount of the reimbursement charge, together with interest on the unpaid balance at the rate in the last published Oregon State Treasurer's bond indices. The lien shall be enforceable in the manner provided in ORS 223.205 through 223.295 and shall be superior to all other liens pursuant to ORS 223.230.

5.5 Connection Charges

Any property that desires to connect to the public sanitary sewer and/or stormwater conveyance systems may be required to pay a connection charge. The connection charge is a one-time charge to recover the District's costs of constructing the Conveyance Systems and Service Connections. Additional District fees and charges may apply, including assignment of SDCs. Property owners seeking to connect to District-financed infrastructure shall pay connection charges for the mainline, and if provided, the service connections as specified in the District Fee Table, prior to the District approving the connection to the infrastructure and prior to the property owner connecting to said infrastructure. Generally, there are two distinct elements to consider when assigning the connection charge:

- A. The cost of constructing the mainline
- B. The cost of constructing the service connection

Because not every situation can be outlined within this section, the District has some discretion in the interpretation and application of assigning a connection charge. Below are the general guidelines in the application of assigning a Connection Charge to a property that is requesting to connect to the public conveyance system.

5.5.1 Public Conveyance Systems Financed by the District

The District shall recuperate a share of the construction cost from the person who is requesting to connect to the public conveyance system that was financed by the District. In this situation a connection charge shall be assigned to the property for the benefit of connecting to the public conveyance system, whether it is for the benefit of connecting drains from a structure or extending the public conveyance system. Below are the three general types of public conveyance system projects that will be assigned a connection charge. The minimum connection charge will be the amount specified in the District Fee Table; however, the charge may be increased as specified in provisions of Section 5.

A. Public Conveyance Systems Financed by Assessment District

Assessment district projects financed the construction of the public conveyance systems, although not all properties that benefit from the construction of the public conveyance system were fully assigned a full proportional share of the cost to

construct the public conveyance system. Also, some properties that benefited from the public conveyance system may have been excluded from participating in the assessment district.

All properties that directly benefit from a public conveyance system that was constructed as part of an assessment district will be assigned a connection charge in accordance with the adopted Final Assessment District Report. Properties that benefited from the public conveyance system financed by an assessment district, and were not included within the assessment district boundary, are generally referred to in the assessment district reports as “district participation.” Most of these properties were assigned a connection charge as specified in the adopted Final Assessment District Report. For properties that were not specified in the adopted Final Assessment District Report, then the connection charge will be assigned based on Section 5.5.1.

B. Public Conveyance Systems Financed by District

A connection charge shall be assigned to any property that benefits from public conveyance systems where the construction was financed by the District. Any property that is requesting to connect to the public conveyance system that was financed by the District, shall pay a connection charge, excluding properties that were previously assigned a connection charge as specified above. These properties will be assigned a connection charge for each connection to the public conveyance system in accordance with the applicable charge(s) as specified in the most recently adopted District Fee Table.

5.5.2 Public Conveyance Systems Financed by a Public Improvement Contract

The District may partner with a developer to construct additional public improvements. In these instances, where the District agrees to make additional improvements to the public conveyance system, the District needs to be able to directly contract with the developer in order to realize the benefits of resources already being available and mobilized on the nearby property. In order to recoup the construction cost financed by the District, a connection charge shall be assigned to each of the properties that benefited from the construction of the public conveyance system. Under this situation the District may partner with a developer to extend the mainline, install service connection, or both. The connection charge will be assigned based on the District’s financial obligation to fund the project.

Connection charges may be assigned separately for each element of the conveyance system, including the mainline and the service connection. In some circumstances, additional charges may apply if the Developer elected to apply for a Reimbursement District.

5.5.3 Public Conveyance Systems Financed by Reimbursement District

Reimbursement Districts are a means for a private developer to get reimbursed for the cost of constructing qualified public conveyance system improvements. Reimbursement Districts are formed in accordance with the District Rules. Reimbursement Districts created for the construction of public conveyance systems are generally financed by private development.

A connection charge shall be assigned and collected in accordance with the Reimbursement District resolution that was adopted by the Board. Additional District fees and charges may apply, including assignment of SDCs.

5.5.4 Connection Charge Exemptions

Properties that are served by public conveyance systems that were solely financed by an assessment district or public conveyance systems that were donated to the District shall be exempt from paying a connection charge for the benefit of connecting to the public conveyance system. Below is a description of the two general types of the public conveyance system that will be exempt from a connection charge.

A. Public Conveyance Systems Donated to the District

The District will not assign a connection charge for any portion of the public conveyance system that is fully donated to the public. These type of public conveyance systems are solely financed by private development, and the District did not finance any portion of the cost to construct the public conveyance system. Since the District did not finance any portion of the public conveyance system, the public can connect to public conveyance systems that were donated to the public without any obligation to pay a connection charge.

Additional District fees and charges may apply, including assignment of SDCs.

B. Assessment Districts Properties

The District will not assign a connection charge to a property that has already been fully assessed through an assessment district project for the full proportionate cost of constructing the public conveyance system. Properties that were included within an adopted assessment district that were fully charged a proportionate share of constructing the public conveyance system, will not be charged for any additional benefits derived from future connections to the public conveyance system, including future land divisions. If the property was not fully charged for the full proportionate cost of constructing the public conveyance system, then it will be assigned a connection charge in accordance with Section 5.5.3, which is intended to represent a full proportional share of the cost to construct the public conveyance system.

5.5.5 Sewer Tap-In Charge

Whenever any property connects to the District sanitary sewer system and there has not been provided a Service Connection to serve such property, the owner shall provide a Service Connection at their own expense and prior to the connection shall pay a tap-in charge and any other applicable fees.

5.5.6 Special Facility Charges

Whenever sanitary sewer service to a property requires special facilities to be provided by the District, the property owner shall be charged the actual cost incurred by the District in providing the special facilities. Special facilities shall include, but are not limited to, manhole connections, public sewer extensions, or public sewer modifications.

5.5.7 Surcharge

If the District or city verifies that any customer has discharged waste on a sustained, periodic, or accidental basis, and those wastewater characteristics result in additional costs above the normal costs associated with treating, operating, maintaining, or complying with regulatory requirements, then that customer may be billed for the additional costs resulting from that discharge, including labor.

5.5.8 Inspection Charge

Each person making an application for connection shall pay the minimum inspection charge as specified in the District Fee Table, or if the District determines the cost of conducting the inspection will exceed the minimum cost, then the applicant shall pay an estimated inspection charge, to be determined by the District based on an estimated cost of the service, which may be adjusted as follows:

- A. If the actual inspection costs exceed the estimated costs, an additional charge equal to the costs in excess of those estimated shall be levied. The charge shall be immediately due and payable.
- B. If the actual inspection costs are less than the estimated inspection costs, the balance of the inspection charges in excess of actual costs shall be refunded.

5.5.9 Timing of Charges and Fees Payment

All charges and fees shall be due and payable prior to the District approving the applicable permit, or prior to providing the service, unless otherwise specifically provided by these Rules and Regulations.

5.6 Reimbursement Districts

A Developing Party who is not otherwise eligible for SDC credits for Qualified Public Improvements and who chooses or is required as a condition of development to finance or cause construction of public sanitary, storm sewer, stormwater or surface water management improvement, or some combination of improvements such that other properties will be Specially Benefited may request that the District establish a Reimbursement District.

5.6.1 Establishing A Reimbursement District

A. Application

A Developing Party who chooses or is required as a condition of development to finance or cause construction of a Qualified Project such that other properties are or will be Specially Benefited may submit an application to the District to establish a Reimbursement District.

The application must be submitted to the District after the Developing Party installs the improvements, but not later than one hundred and twenty (120) days after the Developing Party completes and District accepts the improvements.

A request to establish a Reimbursement District shall be in writing, in a form acceptable to the District, and shall consist of the following:

- a. Detailed or as-built plans or drawings showing the actual location, nature, and extent of all improvements for which reimbursement is sought
- b. A map showing the boundaries of the proposed Reimbursement District and the boundaries with tax lot numbers of the parcels of property Specially Benefited by the improvements and from which a reimbursement is sought
- c. The ownership of Specially Benefited parcels, according to the current County records and the mailing address of such property owners
- d. The actual or estimated detailed direct and indirect costs to construct the Qualified Project, consistent with Section 5.6.

- e. A nonrefundable application fee to cover the District's costs in providing notice of public hearing and the District's examination and report

B. Cost Determination

The applicant shall have the burden of establishing the cost of improvements and shall certify the accuracy of the costs that are submitted to the District.

The applicant shall provide the actual detailed direct and indirect costs to construct the Qualified Project as evidenced by bids, projections, or invoices or other evidence satisfactory to the District. Direct and indirect costs may include, but are not limited to, labor, materials, supplies, equipment, equipment rental, property acquisition, permits, engineering, and financing devoted exclusively to the improvements for which a Reimbursement District is sought to be established. Costs shall not include any amount of profit or overhead of the person making the application. The Director or their designee has the authority to do an independent audit of costs at any time in their sole discretion.

Should the District determine the contract amounts exceed prevailing market rates for a similar project, the District shall readjust the reimbursement charge.

C. Application Processing Fee

A non-refundable application processing fee shall be charged upon submittal of an application to cover the District's costs in forming a Reimbursement District, including providing notice of public hearing and the District's examination and report. The application fee for this option shall be set by resolution and included in the District's Fee Table.

D. District Review

The District shall review each application to establish a Reimbursement District and prepare a report and recommendation to the Board on whether a Reimbursement District should be established.

The recommendation shall address the following factors:

- a. Whether the applicant has paid for some or all the costs of a Qualified Project, which includes improvements for which the applicant desires to be reimbursed.
- b. The properties or parcels that are Specially Benefited by the Qualified Project, and whether such parcels would, as a condition of future Development be required to construct some or a portion of the same improvements for which a Reimbursement District and reimbursement charge is sought to be established.
- c. That portion of the cost of the Qualified Project within the area of the proposed Reimbursement District that is appropriate for reimbursement by the owners of Specially Benefitted properties.
- d. A rational formula for apportioning the cost of the Qualified Project among properties within the proposed Reimbursement District and the proposed reimbursement charge for each property.
- e. The interest rate, if any, to be applied to the proposed reimbursement charge over the following ten (10) years, which represents the estimated annual return on investment of the reimbursable costs.
- f. Whether the applicant has complied with the requirements of this section.

E. Reimbursement District Approval

The Board shall hold a public hearing on the proposed Reimbursement District at which time any person may comment on the proposal. It shall be conducted as set forth below.

After the District's report is complete, the District shall provide notice of the hearing on the application to establish a Reimbursement District by publication, not less than five (5) calendar days nor more than thirty (30) days prior to the hearing, in a newspaper of general circulation within the District and by mailing copies of the notice by regular mail not less than fourteen (14) calendar days prior to the hearing to the owners of any lots or parcels that are proposed to be subject to the reimbursement charge.

- a. The notice shall contain at least the following information:
 - i. That an application for a Reimbursement District has been submitted to the District and the name of the applicant.
 - ii. That the District has prepared a report concerning the application that is available for public inspection by contacting the District.
 - iii. A general description of the Qualified Project and the costs for which a reimbursement charge is sought.
 - iv. A methodology for spreading the cost among Specially Benefitted Properties within the Reimbursement District and, where appropriate, defining a unit for applying the reimbursement charge to Specially Benefitted Properties which may undergo future development.
 - v. The amount to be charged by the District as an administrative fee for processing reimbursements.
 - vi. That the Board will hold a hearing on the proposed Reimbursement District and reimbursement charge on a specified date at which time objections and comments will be heard by the Board.
 - vii. The failure of the owner of the property subject to the proposed reimbursement charge to object before the Board either orally or in writing will be treated and relied upon by the Board as a waiver of objection to the Reimbursement District and reimbursement charge established by the Board.
 - viii. For purposes of mailing notice to parcel owners under this section, any mistake, error, omission, or failure with respect to such mailing shall not be jurisdictional or invalidate the proceedings with respect to the establishment of the Reimbursement District and reimbursement charge.

- b. The Board shall conduct a hearing where it shall consider the application, the District's report, and any testimony or evidence presented concerning the application. The Board has the sole discretion after the public hearing to decide whether to adopt an order approving and forming the Reimbursement District.

After the hearing, in lieu of not approving the formation, the Board may modify the proposed Reimbursement District or reimbursement charge or both by adjusting the area or particular properties from which the reimbursement charges will be collected, adjusting the amount of reimbursable costs, adjusting the formula used in apportioning reimbursable costs, or adjusting the amount of the applicable interest rate by which the reimbursement charge will be increased.

- c. If the Board determines that a Reimbursement District and reimbursement charge should be established, it shall do so by adopting an order that specifies

the properties within the Reimbursement District, method of apportioning improvement costs among properties within the Reimbursement District, reimbursement charge, administration fee, and applicable interest rate.

The District Director, Clerk to the Board, or a designee will ensure a copy of the Reimbursement District order is recorded in the real property records of Clackamas County to provide public notice of the reimbursement charge applicable to Specially Benefited Properties described in the order.

A copy of the order shall be sent by regular mail to the owners of property subject to the reimbursement charge and to any other persons who have requested a copy. Failure of the District to send the order to a person or property owner, or failure of a person or property owner to receive such order, shall not invalidate any proceeding to establish the Reimbursement District and reimbursement charge.

Nothing in this Section 5.6 shall be deemed to create a lien against property, except where such lien arises by operation of law following a court judgment or is granted by a property owner as a condition of making installment payments of the reimbursement charge.

5.6.2 Payments

If within ten (10) years from the date on which a Reimbursement District and reimbursement charge is established by the District, the Specially Benefitted Property owner receives approval from the District and utilizes such approval for connection, direct connection to, or use of a Qualified Project for which a reimbursement charge has been established, then the owner shall pay to the District, in addition to any other applicable fees and charges, the reimbursement charge established by the Board and adjusted to reflect the applicable interest rate.

The reimbursement charge is immediately due and payable by owners of Specially Benefitted Property upon Development or permitted use of a Qualified Project as provided by these Rules and Regulations. If connection is made or construction commenced without required permits, then the reimbursement charge is immediately due and payable upon the earliest date that any such permit was required.

A. Installment Payments

The owner of owner-occupied residential property who is charged a reimbursement charge may apply for payment in a maximum of twenty (20) semi-annual installments over a ten (10) year period, to include interest on the unpaid balance in accordance with ORS 223.205 through 223.295. The applicable interest rate shall be the current United States Federal prime rate plus 2.0 percentage points.

The District shall provide application forms, and prepare an agreement for installment payments, which shall include a waiver of all rights to contest the validity of the lien, except for the correction of computational errors. The application fee for this option shall be set by resolution and included in the District's Fee Table. The applicant shall provide with the application all supporting documentation, as requested.

A person submitting application for installment payments shall have the burden of demonstrating the person's authority to assent to the imposition of a lien on the property and that the interest of the person is adequate to secure payment of the lien.

The District Director or designee shall cause the lien to be entered in the lien docket kept in the Office of the County Clerk in accordance with ORS 451.520. From that time, the District shall have a lien upon the described parcel for the amount of the reimbursement charge, together with interest on the unpaid balance at the rate in the last published Oregon State Treasurer's bond indices. The lien shall be enforceable in the manner provided in ORS 223.205 through 223.295 and shall be superior to all other liens pursuant to ORS 223.230.

B. Exceptions

When the Developing Party is a public entity, the Board has discretion to determine whether the reimbursement charge is subject to the ten-year expiration date or an extended period of time.

No person shall be required to pay the reimbursement charge for Development of property for which the reimbursement charges have been previously paid.

The owner of a Specially Benefited Property may choose to pay the reimbursement charge prior to Development without penalty.

C. District Procedures

Except as otherwise expressly provided, neither the District nor any officer or employee of the District, acting in his or her official capacity, shall be liable for payment of any reimbursement charge, accrued interest, or portion of either. Only those payments that the District has received from or on behalf of Specially Benefited Properties within the particular Reimbursement District shall be payable to the applicant for the Reimbursement District. The District's funds or other revenue sources shall not be liable or subject to payment of outstanding and unpaid reimbursement charges imposed on private property, notwithstanding the District's allowance of installment payments under Section 5.6.

The right to reimbursement is assignable and transferable after written notice is given by the applicant or the applicant's assignee to the District, advising the District to whom future payments are to be made.

Upon receipt of a reimbursement charge or portion thereof, the District will remit such funds to the Developing Party, less an administrative fee, for the cost of administering the program.

The owner of Specially Benefited Property subject to a reimbursement charge may apply for apportionment of the reimbursement charge in accordance with District procedures to apportion special assessments upon payment of a non-refundable fee in an amount established by Board resolution.

The District shall not issue a site development or connection permit or allow sanitary or storm sewer connection until the reimbursement charge has been paid in full, until provision for installment payments has been made and approved, or until the Developing Party provides an unconditional waiver allowing the District to issue such permits without collecting the reimbursement charge.

D. Delinquency, Collection, Interest, and Penalties

It is unlawful and a violation of these Rules and Regulations for any person to use, discharge to, or maintain connection to, the District sanitary or stormwater and surface water management systems without paying the appropriate charges and fees established through a Reimbursement District.

Delinquent charges may be recovered by the District Director or designee, with the assistance of District legal counsel, without further action or authorization by the Board. Recovery of delinquent charges may occur in any manner provided by law, including an action in the small claims or circuit court of Clackamas County. In addition to the remedies provided above to collect a debt, the District may seek a temporary or permanent injunction prohibiting continued occupancy of the premises, requiring disconnection of the premises from the public sanitary or storm and surface water management system, and terminating sanitary sewer service to the user's premises.

The Board may prescribe a schedule of interest and penalty charges to be imposed upon delinquent charges in the District Fee Table, or, if no applicable charges are included in the District Fee Table, through the adoption of a resolution.

In a collection action under this section the prevailing party shall be entitled to its recoverable costs, except for attorney fees, including at trial and on appeal.

E. Judicial Review

Final decision of the Board, District Director, District, or its designated review authority, under this section shall be reviewable solely and exclusively under the provisions of ORS 34.010 through 34.100. Judicial review of a determination by the District Director or designee made according to Section 5.6 may be started only by a property owner who has properly followed the District's administrative appeal process. Failure to do so shall constitute a failure to exhaust administrative remedies.

5.7 Segregation Of Special Assessments

Pursuant to ORS 307, special assessments may be segregated when requested by an owner, mortgagee, or lien holder of property that was partitioned, or divided subsequent to the original assessment.

Whenever an application has been made under the provisions of ORS 223 and the application has been accepted and payment of the assessment has in fact been financed by such procedure, the lien of such assessment may be segregated upon the following terms and conditions:

- A. The property for which the segregation is to be made shall have been assessed as a unit and entered accordingly in the bond lien docket.
- B. There shall be no delinquent installments of principal or interest on the assessment of the entire parcel.
- C. Written application shall be made to the District.
- D. The written application shall be accompanied by any fees established by the Board to defray the costs of investigation, preparing legal documents, calculating an equitable division of the assessment, and making the lien docket entries. Such fees shall not be refundable if the application is disapproved or if the applicant withdraws the application.
- E. If the District determines that the lien may be segregated and divided without prejudice to the overall security of the entire balance owed, then an equitable division of the assessment shall be made based upon the original assessment formula and the preservation of the security interest. Such segregation shall describe the various parcels of the entire tract and the amount of the assessment to be apportioned to each parcel. The District may require that the portion of the assessment segregated and apportioned

to a particular parcel be paid in full or whether the remaining parcel shall be relieved of liability for payment of that portion of the lien.

- F. After the apportionment application, as developed by the District, is received, fees paid, and investigation made, the District shall forward the application to the Board for approval pursuant to ORS 307.
- G. If the application is approved by the Board and the fees provided herein are paid, the District shall certify the fact on the bond lien docket and appropriate entries shall be made therein segregating the total assessment. When such entries are made, the lien shall be only in the amount and as to the parcels approved by the Board.

5.8 User Charges – Sanitary

The following sanitary rates are hereby established for all sanitary customers within the District's Service Areas.

5.8.1 Sanitary Rate Zones

Except as specifically provided below, a monthly sanitary charge shall be paid to the District by users of the District's system in Rate Zones 1, 2, and 2a.

5.8.2 Sanitary Monthly User Charges

Except as specifically provided below, a monthly sewer user charge for each residential dwelling unit is assigned each residential class of service listed in the District Fee Table adopted by the Board and shall be paid by the property owner or user commencing on the third month following the date of connection to the District's sewer system. The charges contained in the District Fee Table will be updated annually as necessary by the Board through adoption of a resolution updating fees and charges.

Except as specifically provided below, the first year of a monthly sewer user charge for non-residential users shall be based on the EDU calculation, as determined by **Table 2**. All non-residential users shall pay from the date of connection to the system. After the first year from the date of connection, monthly charges will be based on EDUs calculated from water usage. EDUs will be rounded to the nearest whole unit with a half value, or more, being rounded up. The resulting figure is multiplied by the monthly base customer charge applied to single-family customers. The Board may set sanitary user charges by order or resolution.

5.8.3 Low Income Monthly User Charges

The monthly user charge for service provided to the principal residence of a household having a maximum income under the qualifying limits shall be 50 percent (50%) of the monthly sewer user charge. On July 1 of each year, the qualifying limits shall be set at sixty percent (60%) of the most recently published Oregon State Median Income (SMI) estimates developed by the United States Census Bureau or successor statistic and shall remain in effect until the next July 1.

The qualifying income limits shall be incrementally based on household size.

In order to be eligible for the reduced user charge, the qualified person must be a residential customer of the District, must be the person to whom the monthly user charge is billed, and must have completed and filed with the District an application for the reduced rate on a form supplied by the District.

5.8.4 Industrial Waste User Charge

An industrial waste user charge will be applied to each class of Industrial User as defined in **Table 2**. The user charge shall be composed of rates for the customer's proportionate contribution of flow, TSS, and BOD that are in excess of domestic sewage contributions.

Rates for industrial flows shall be based on the EDU calculation, as determined by metered water consumption. Rates for TSS and BOD removal shall be based on the actual treatment cost per pound incurred by the District, including administrative overhead, operation, maintenance, and other expenses as established by the District. The user charge shall be based on simultaneous monitoring of flow, TSS, and BOD concentrations measured at the customer's property and the POTW periodically during the preceding 3-month period. Quarterly adjustments may be made to reconcile differences in projected versus actual conditions.

Such user charges shall be payable from the date of connection to the District or city sanitary sewer system or from the date on which the property owner is required to connect to the District or city sanitary sewer system, whichever occurs first.

5.8.5 Deduct Water Meters

Owners of nonresidential properties may install a separate public water meter for water not discharged to the public sanitary sewer system to exclude the water usage from billing for sanitary sewer purposes.

5.8.6 Billing for User Charges

Owners of property may be billed by the District and the jurisdiction that provides collection sewer services according to the schedule set by that entity. No single point of connection to the sewage system shall have a user charge less than the amount specified in **Table 2** as amended periodically.

Users whose charges may be based upon metered water consumption may have temporary charges computed based on the number of dwelling units assigned such use.

In conjunction with a regular bill, the city or District will provide an annual notification to each user of that portion of the monthly user rate that is attributable to wastewater treatment services.

5.9 User Charges – Surface Water

The following surface water rates are hereby established for all surface water customers within the District's Service Area.

5.9.1 Surface Water Rate Zones

Except as specifically provided below, a monthly surface water service fee shall be paid to the District by each applicable property owner within applicable portions of Rate Zones 2 and 3.

5.9.2 Surface Water Monthly User Charges

A monthly customer charge shall be paid by each user within the District's surface water Rate Zones. The Board may set user charges by order or resolution.

The surface water rates shall fund the administration, planning, design, construction, water quality and quantity programming, operation, maintenance, and repair of stormwater facilities and surface water facilities.

All non-single-family customers shall pay for the total number of ESUs attributable to their sites in accordance with **Table 3**. The number of ESUs attributable to a user's area is calculated in whole units, with the minimum user's charge set at 1 ESU. For non-single-family users with more than 1 ESU, the charge will be rounded to the nearest whole unit with a half value, or more, being rounded up. The resulting figure is multiplied by the monthly base customer charge applied to single-family customers.

All rural residential, farm and forested zoned parcels with a residential residence shall be charged as single-family, if the parcels are used primarily for single-family residence purposes, regardless of secondary activities conducted on the parcels.

5.9.3 Mitigation Reduction Factor

The Districts may provide ESU credit(s) against stormwater charges to recognize the benefit of stormwater mitigation facilities that provide on-site retention and/or water quality treatment mitigation in excess of the Districts' minimum Stormwater Standards. It is the customer's responsible for providing all of the necessary information as specified by the District to determine the applicable credit(s), which may include but not limited to a stormwater management plan, documentation, and reports prepared by a licensed professional engineer.

5.10 Collection Policy

The District requires that the property owner is responsible for all fees and charges at the service location.

5.10.1 Account Setup

All applications for service shall be on forms provided by the District. All new accounts shall be set up in the property owner's name as verified in county tax records. The District shall work with existing account holders who are not the property owner to transition the account into the property owner's name. The account holder shall be considered the user of the service.

5.10.2 Notices

In cases where the property owner does not occupy a property, the District will make all reasonable efforts to provide the property owner and tenant with copies of all invoices, notices, and other information relating to fees and charges. This policy is intended to comply with ORS 91.255 and provide notices to enable the property owner and tenant a reasonable opportunity within the time set by the District to avoid delinquent charges and/or discontinuance of service.

5.10.3 Collection of Charges

All fees and charges shall be sent to the user at the address set forth on the District's records. If the District's records reveal that the user is not the owner, then the District may take all reasonable steps to provide the owner with copies of all invoices, bills, and notices pursuant to ORS 91.255.

For accounts set up in the tenant's name prior to the effective date of these Rules and Regulations, if the owner has executed such an agreement to be bound or if the rental

agreement provides, then the property owner and the tenant shall be jointly liable and, following notices to each in accordance with the District's or city's procedures, collection practices may ensue, or service may be terminated. The District may look to either or both parties for payment in addition to the remedies outlined in these Rules and Regulations, ORS 91.255, ORS 454.225, and any other remedy available to the District.

The District may enter a payment plan in its sole discretion to avoid hardship to the user and leave the ultimate resolution between property owner and tenant.

The District may deny or terminate service to the delinquent user at a new service location within the District based upon the outstanding fees and charges at the previous service location.

The Director may enter into such agreements regarding payment of delinquent fees and charges as are reasonable and necessary in the judgment of the Director to obtain payment to the District and avoid hardship and inequities.

5.10.4 Delinquent Charges

All user charges by the District shall be due by the 20th day of the month following the service period covered by the billing within twenty (20) days of billing. Thereafter, a charge shall be considered delinquent.

If the user is different than the owner, the District may take all reasonable efforts to provide notice of delinquent status on billings by First Class mail to the last address of the owner or owner's agent that is on file with the District not later than thirty (30) days from the time payment is due on the account. Thereafter, the District may terminate or deny service to the property regardless of who is occupying the property, including any subsequent tenant, based upon the unpaid fees and charges incurred by the previous tenant following provision of the notices set forth above. In the case of a subsequent tenant, the District will provide not less than ten (10) days' written notice to that subsequent tenant prior to termination of services.

The Board may prescribe a schedule of interest and penalty charges to be imposed upon delinquent charges in the District Fee Table, or, if no applicable charges are included in the District Fee Table, through the adoption of a resolution. Failure to make payment when due shall give the District the right to undertake such collection action as it deems appropriate under the circumstances including, but not limited to, letters, telephone calls (reasonable as to time and place), legal proceedings, or certification to the Clackamas County Assessor (Assessor).

For surface water customers, upon ten (10) days' written notice, if feasible, the District may undertake those steps to construct on-site mitigation facilities or obtain cessation of customer's impact upon the District's or public's stormwater and surface water system, and the charges therefore shall be owed by customer to the District. Any costs incurred by the District to cease or mitigate the customer's impact on the surface water system, shall be charged at the District's usual labor and material rates.

5.10.5 Certification to Tax Assessor

Pursuant to ORS 454.225, the District may certify all delinquent charges to the Assessor for inclusion in the real property tax statement and collected in accordance therewith. In such case, those charges shall become a lien upon the property from the date of the certification to the Assessor and any such collection of the debt and foreclosure of said lien shall be in accordance with Oregon law.

5.10.6 Discontinuance of Service

The District also reserves the right, at any time after any charges or fees hereunder become delinquent, to remove or close connections and enter upon any delinquent owner's property for such purpose. In addition, when any property owner fails to cease discharging into the District sanitary sewer or stormwater system prohibited substances after being notified by the District to do so, service may be similarly discontinued. The expense of such discontinuance as well as the expense of restoring service shall be a debt due to the District and may be recovered in the same manner as other delinquent charges.

5.10.7 Restoration of Service

Service that has been discontinued by the District shall not be restored until all accrued charges, including the expenses of discontinuance and restoration, shall have been paid and the cause for discontinuance corrected.

5.10.8 Fees and Cost

By resolution, the District shall set fees and charges in the District Fee Table for collection efforts, including fees and charges necessary to recover all costs related to insufficient funds check or the cost of processing lien searches and the like based upon labor rates or other items deemed reasonable by the Board or the Director of Water Environment Services as its designee.



Rules and Regulations

6. Sanitary Rules

6.1 Purpose and Objectives

This section presents the rules related to the District's sanitary sewer facilities including, but not limited to, those related to discharges, pretreatment, connections, construction, and septic tank wastes.

The purpose of this rule is to enhance the public use of the District sewer facilities. The rule establishes quantity and/or quality standards for all wastewater and/or waste discharges that may cause or contribute to the occurrence of sanitary sewer overflows, affect water pollution control facility operations, and/or increase POTW costs.

The objectives of this rule are:

- To prevent the introduction of pollutants into the public sewerage system that will interfere with operating the systems or contaminate the resulting biosolids;
- To prevent the introduction of pollutants into the public sewerage system that will pass through the system, inadequately treated, into receiving waters or the atmosphere or otherwise be incompatible with the system;
- To improve the opportunity to recycle or reclaim wastewaters and biosolids from the system;
- And to provide for equitable distribution of the cost of the public sewerage system.

6.2 Applicability

These Rules and Regulations apply to any property that discharges or requests to discharge, via connection request, development permit, or change in use, to the District's public sanitary sewer system. These Sanitary Rules apply in Rate Zones 1 and 2.

6.3 Use of Public Sanitary Sewers Required

The owner of any building situated within the District and proximate to any street or sewer easement in which there is a public sanitary sewer of the District or city may request permission, at owner's expense, to connect said building directly to the public sanitary sewer in accordance with the provisions of these Rules and Regulations. Before connecting to the public sewerage system, a permit authorizing such connection shall first be secured in writing from the District and fees paid.

6.3.1 Disconnection

A property owner may request disconnection from the District's system provided all applicable statutes, rules, and ordinances are complied with. The property owner shall pay a disconnection inspection fee at the time disconnection is requested. The inspection fee is based upon staff time, materials, mileage, other expenses, and a reasonable allocation of general overhead expenses.

6.3.2 Health Hazards

The District can authorize a building(s) to connect to the Public Sanitary Sewer System to abate a health hazard caused by a subsurface disposal system in accordance with the conditions set forth in this section.

A health hazard will be determined pursuant to criteria in OAR 340-71 when a building on a property with a permitted subsurface disposal system exposes the public to suffering or illness due to the presence of inadequately treated sewage, and the subsurface disposal system cannot be adequately abated by the repair or maintenance of existing sewer systems or on-site systems or by the installation of new on-site systems as defined in OAR 340-071-0100.

If the subsurface disposal system cannot be adequately abated as described above, then the property owner may make a request to connect the building(s) to the Public Sanitary Sewer System in accordance with the following conditions:

- A. The property is located adjacent to an existing Public Sanitary Sewer System.
- B. If the property is currently not within the boundaries of the District, then the property owner must first seek annexation in accordance with Section 2.4 of these rules.
- C. If annexation into the District and/or City is not feasible, then the District at their sole discretion may elect to serve the property by providing extraterritorial service in order to abate the health hazard. If the property is served by extraterritorial service, then no future development of the property will be permitted that changes or increases the Equivalent Dwelling Unit assignment to the property at the time the building(s) were connected.
- D. If a connection is authorized, then the property owner shall consent to any conditions the District deems applicable in order to provide service, and pay all applicable fees as determined by the District prior to connecting to the Public Sanitary Sewer System.

6.4 Discharge Regulations

No persons shall discharge or cause to be discharged, directly or indirectly, into the public sewerage system any pollutant, substances, stormwater, groundwater, or wastewater that will interfere with the operation or performance of the public sewerage system; cause a pass through; have an adverse effect on the receiving stream, endanger life, limb, or public property; or constitute a nuisance in the public sewerage systems. Prohibited substances, shall include, but not be restricted to, the following:

- A. Any liquids, solids, or gases which by reason of their nature or quantity are, or may be, sufficient, either alone or by interaction with other substances, to cause fire or explosion or be injurious in any way to persons, property, or the public sewerage system. Pollutants which create a fire or explosion hazard in the POTW, including, but not limited to, waste streams with a closed cup flashpoint of less than 140° Fahrenheit (°F) (60° Celsius [°C]) using the test methods of 40 CFR 261.21. At no time shall two successive readings on an explosion hazard meter, at the point of discharge into the system (or at any point in the system), be more than 5 percent nor any single reading be over 10 percent of the lower explosive limit of the meter. Prohibited materials include, but are not limited to, gasoline, kerosene, naphtha, benzene, fuel oils, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, and sulfides.
- B. Any sewage containing pollutants in sufficient quantity either at a flow rate or pollutant concentration, singularly or by interaction with other pollutants, to injure or interfere with any

sewage treatment process, constitute a hazard to humans or animals, create a toxic effect in the receiving waters, or exceed the limitations set forth in federal Categorical Pretreatment Standards.

- C. Any sewage having a pH lower than 5.5 standard units (S.U.) or higher than 11.5 S.U. or having any corrosive property capable of causing damage or hazard to structures, equipment, or persons. Facilities with continuous monitoring of pH shall not be outside of the pH range of 5.5 S.U. to 11.5 S.U. for more than a total of 15 minutes on any single day (cumulative duration of all excursions) provided that, at no time shall any discharge of a pH be lower than 5.0 S.U. or at/or above 12.5 S.U. pH shall be determined using one of the applicable procedures prescribed in 40 CFR Part 136.
- D. Any solid or viscous substances in quantities or size capable of causing obstruction to the flow of sewers or other interference with the proper operation of the POTW such as, but not limited to, flushable wipes, ashes, cinders, sand, mud, straw, insoluble shavings, metal, glass, rags, feathers, tar, creosote, plastics, wood, animal paunch contents, offal, blood, bones, meat trimmings and wastes, fish or fowl heads, entrails, trimmings and wastes, lard, tallow, baking dough, chemical residues, paint residues, cannery waste, bulk solids, hair and fleshings, or plastic or paper dishes, cups, or food or beverage containers, whether whole or ground.
- E. Any pollutant having a temperature higher than 140°F (60°C) or having temperatures sufficient to cause the influent to the treatment plant to exceed 104°F (40°C). If, in the opinion of the District, lower temperatures of such wastes could harm either the sewers, sewage treatment process, or equipment, or could have an adverse effect on the receiving streams or otherwise endanger life, health or property, or constitute a nuisance, the District may prohibit such discharges.
- F. Any sewage containing food waste garbage that has not been properly shredded to ½-inch or less in any dimension.
- G. Fats, wax, grease, or oils (whether emulsified or not), in excess of 100 milligrams per liter (mg/L) for sources of petroleum origin (“non-polar”), or in excess of 300 mg/L for sources composed of fatty matter from animal and vegetable sources (“polar”) or containing substances that may solidify or become viscous at temperatures between 32°F and 150°F (0°C and 65°C). If a sample is not fractionated to determine non-polar and polar concentrations, then fats, wax, grease, or oils (whether emulsified or not) in excess of 100 mg/L are prohibited as determined by methods in 40 CFR 136.
- H. Strong acid, iron pickling wastes or concentrated plating solutions, whether neutralized or not, unless the Discharger has a valid Industrial Wastewater Discharge Permit that allows otherwise.
- I. Pollutants in excess of the concentrations in Section 6.5.3 of these Rules and Regulations, measured as a total of both soluble and insoluble concentrations for a composite representing the process day or at any time as shown by a grab sample, unless the Discharger has a valid Industrial Wastewater Discharge Permit with a different limitation, defined over a different time period, for the specific pollutant as set forth in Section 6.5.3.
- J. Any sewage containing unusual concentrations of inert suspended solids (such as, but not limited to, Fuller’s earth, lime slurries, and lime residues) or of dissolved solids (such as, but not limited to, sodium chloride and sodium sulfate), which may interfere with the operation of the public sewerage system.
- K. Any sewage with objectionable color not removed in the treatment process (such as, but not limited to, dye and printing wastes and vegetable tanning solutions).

- L. Any slug discharge, which means any pollutant, including biochemical oxygen demanding pollutants, released in a single discharge episode of such volume or strength as to cause interference to the public sewerage system.
- M. Any noxious or malodorous liquids, gases, or solids that either singly or by interaction with other wastes are sufficient to create a public nuisance, hazard to life, or are sufficient to prevent entry into sewers for maintenance and repair.
- N. Any hauled wastes or pollutants, except such wastes received at the District's POTW under a District permit or at a District-approved dump station pursuant to Section 6.6 of these Rules and Regulations.
- O. Any substance which may cause the District's POTW to violate its NPDES Permit or the receiving water quality standards or any other permit issued to the District or city.
- P. Any wastewater which causes or may cause a hazard to human life or creates a public nuisance.
- Q. Any wastewater containing any radioactive wastes or isotopes of such half-life or concentration as to exceed limits established by state or federal regulations.
- R. Any substance that may cause the District's POTW effluent or any other product of the District's sewage treatment process (e.g., residues, biosolids, scums, etc.) to be unsuitable for reclamation and reuse or that may interfere with the reclamation process. In no case, shall a substance discharged to the public sewerage system cause the District to be in noncompliance with biosolids use or disposal criteria, guidelines, or regulations developed under Section 405 of the CWA; any criteria, guidelines, or regulations affecting biosolids use or disposal developed pursuant to the Solid Waste Disposal Act, the Clean Air Act, the Toxic Substances Control Act, or state criteria applicable to the sludge management method being used, or any related amendments.
- S. Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through.
- T. Pollutants that result in the presence of toxic gases, vapors, or fumes in the POTW that may cause acute worker health and safety problems.
- U. Storm water, surface water, groundwater, artesian well water, roof runoff, subsurface drainage, swimming pool drainage, condensate, deionized water, non-contact cooling water, and unpolluted wastewater, unless specifically authorized by the District.
- V. Persistent pesticides and/or pesticides regulated by the Federal Insecticide Fungicide Rodenticide Act.

6.4.1 Tenant Responsibility

Any occupant of the premises as a tenant under any rental or lease agreement shall be jointly and severally responsible for compliance with the provisions of these Rules and Regulations in the same manner as the property owner.

6.4.2 Accidental Discharges

- A. Each Discharger shall provide protection from accidental discharge of prohibited substances or other substances regulated by these Rules and Regulations. Where necessary, facilities to prevent accidental discharge of prohibited substances shall be provided and maintained at the Discharger's own cost and expense.
- B. Detailed plans showing facilities and operating procedures to provide this protection shall be submitted to the District for review and shall be approved by the District

- before construction of the facility. Each existing Discharger shall complete their plan and submit it to the District upon request.
- C. No Discharger shall be permitted to introduce pollutants into the public sewerage system until the accidental discharge protection procedures have been approved by the District. Review and approval of such plans and operating procedures by the District will not relieve the Discharger from the responsibility to modify its facility as necessary to meet the requirements of these Rules and Regulations.
- D. Dischargers shall notify the District immediately upon the occurrence of an accidental discharge of substances, or slug loadings, prohibited by these Rules and Regulations. The notification shall include location of discharge, date, and time thereof, type of waste, concentration and volume, corrective actions taken.
- a. **Written Notice**
- Within five (5) days following an accidental discharge, the Discharger shall submit to the District a detailed written report describing the cause of the discharge and the measures to be taken by the Discharger to prevent similar future occurrences. Such notification shall not relieve the Discharger of any expense, loss, damage, or other liability which may be incurred as a result of damage to the POTW, harm to aquatic life, or any other damage to person or property; nor shall such notification relieve the discharger of any fines, civil penalties, or other liability which may be imposed by this subsection or other applicable law.
- b. **Notice to Employees**
- A notice shall be permanently posted on the Discharger's bulletin board or other prominent place advising employees whom to call in the event of an accidental discharge. Employers shall insure that all employees who may cause or discover such a discharge are advised of the emergency notification procedure.

6.5 Pretreatment Requirements

This section sets forth uniform requirements for discharges related to fats, oils, and grease and discharges of industrial wastes into the public sewerage system and enables the District to comply with all applicable state and federal laws required by the CWA and the General Pretreatment Regulations (40 CFR, Part 403). The District shall be empowered to enforce Section 307(b) and (c) and 402(b)(8) of the CWA and any implementing regulations pursuant to these Rules and Regulations. Enforcement may occur in any form available to the District, which may include injunctive or any other form of relief in federal and state courts or through administrative hearings.

This section provides for the regulation of wastes to the public sewerage system through the issuance of permits for industrial wastes, to certain non-domestic users, and through enforcement of general requirements for the other users, authorizes monitoring and enforcement activities, requires user reporting, assumes that existing customer capacity will not be preempted, and provides for the setting of fees for the equitable distribution of costs resulting from the program established herein.

6.5.1 Grease, Oil, Sand, and Scum Trap BMPs

All restaurants, fast food locations, delicatessens, taverns, and other food preparation facilities that prepare food onsite, service stations, automotive repair facilities, or any other facility as prescribed by uniform plumbing code with the potential to discharge fats, oils, and grease (FOG) to the sanitary sewer system shall install grease, oil, sand, and

scum trap separators (also known as Grease Removal Devices (GRDs)) to remove FOG and scum. All GRDs shall be installed in accordance with the appropriate Oregon Plumbing Specialty Code.

No person shall dispose of waste cooking oil into any drainage pipe. All waste cooking oils shall be collected and stored properly in receptacles such as barrels or drums for recycling or other acceptable methods of disposal. Discharge of waste (including FOG and solid materials removed from a GRD), passively or actively (also known as “jetting”), to the public sewerage system is prohibited.

A. Prohibitions

- a. No Food Service Establishment (FSE) owner/operator shall use any additives (including, but not limited to, enzymes, bacteria, solvents, surfactants, caustics, acids, or emulsifiers) for the purpose of emulsifying FOG or passing FOG through a GRD.
- b. FOG-laden washwater from any cleanup process at an FSE/property is prohibited from being discharged to the storm sewer. The washwater must be discharged to a GRD and then into the public sanitary sewer.
- c. Owner/operators of mobile restaurants, food stands, and coffee kiosks are prohibited from discharging any cooking process or cleanup wastewater to the storm system. This wastewater must be discharged into a GRD at the restaurateur’s commissary.

B. Maintenance

- a. All GRDs shall be maintained in efficient and proper working operation at all times to prevent discharge of FOG by the owner at their expense and shall include removal of floatable solids, oil, and settleable solids collected in the GRD along with cleaning the walls and baffles of the device. The maintenance frequency shall be established such that FOG or food solids do not leave the GRD and enter the sanitary sewer collection system.
- b. Frequency of cleaning shall be determined by property owners on an individual basis and may partially be based on an appropriate accommodation of the volume of material collected to prevent discharge of FOG to the public sewerage system.
- c. No FOG or solids that have accumulated in the GRD shall be allowed to pass into any sewer lateral, sewer system, storm drain, or Public Right-of-Way during maintenance activities. The property owner shall be responsible for the proper removal and disposal, by appropriate and legal means, of the captured material.
- d. It is the property owner’s responsibility for performing routine self-inspection and repair, as needed, of GRDs on their premises.

C. Documentation and Reporting

Establishments with an installed GRD are required to maintain annual maintenance records and records of proper material disposal during maintenance activities. Records shall be retained for the most recent three (3) year period. Records of maintenance and disposal shall be provided to the District upon request.

D. Right of Access for Inspection

The District shall have the authority to enter premises drained by any side sewer, at all Reasonable Times, to ascertain whether this provision of limiting the introduction of FOG and scums to the system has been complied with.

It is the property owner's responsibility to open all GRD access points to allow for District inspection activities. If the District is refused access to the facility, the District may pursue all legally available options to gain access including, but not limited to, obtaining search warrants for inspection and sampling purposes. No person shall interfere with, delay, or refuse entrance to such personnel attempting to inspect or enforce upon any facility involved directly or indirectly with the discharge of wastewater to the District sewer system.

The District is authorized to inspect and collect samples of any waste stream, including the discharge from the facility and any GRD. Failure to grant access shall result in an additional inspection fee and may result in suspension of sewer services provided by the District.

6.5.2 Non-Significant Industrial Users

The District may determine that an Industrial User is a Non-Significant Industrial User. Upon finding that an Industrial User meeting the Significant Industrial User criteria has no reasonable potential for adversely affecting the District's operations or for violating any Pretreatment Standard or requirement, the District may at any time and in its sole discretion, on its own initiative or in response to a petition received from the Industrial User, determine that such Industrial User is a Non-Significant Industrial User.

6.5.3 Discharge Limitations

A. Control of Discharge

It shall be the responsibility of every Industrial User to control the discharge of industrial wastewater into the public sewerage system, or any private or side sewer which drains into the public sewerage system, so as to comply with these Rules and Regulations and the requirements of any applicable wastewater discharge permit issued pursuant to the provisions of these Rules and Regulations.

B. National Categorical Pretreatment Standards

Categorical Pretreatment Standards, as promulgated by the EPA pursuant to the CWA, if more stringent than limitations imposed under these Rules and Regulations, shall be met by all Industrial Users who are subject to such standards.

C. District Requirements (Local Limits)

- a. No Industrial User shall discharge wastewater containing concentrations in excess of the Local Limit concentrations in this section. The following pollutant limits are established in accordance with 40 CFR 403.5(c) to protect against pass through and interference. No person shall discharge wastewater containing pollutant levels in excess of the following daily maximum allowable discharge limits:
 - i. 0.16 mg/L arsenic
 - ii. 0.24 mg/L cadmium
 - iii. 2.77 mg/L chromium
 - iv. 3.38 mg/L copper
 - v. 1.2 mg/L cyanide, total
 - vi. 0.81 mg/L lead
 - vii. 0.0035 mg/L mercury

- viii. 2.45 mg/L nickel
- ix. 0.43 mg/L silver
- x. 2.61 mg/L zinc
- xi. 2.13 mg/L total toxic organics (TTOs)
- xii. 100 mg/L oil and grease (non-polar)
- xiii. 300 mg/L oil and grease (polar)
- xiv. 100 mg/L oil and grease (total)

The above limits apply at the point where the wastewater is discharged to the POTW (end of the pipe). All concentrations for metallic substances are for “total” metal unless indicated otherwise. Total Toxic Organics is defined as the sum of the masses or concentrations of specific toxic organic compounds found in the Industrial User’s discharges at >0.01 mg/l. Specific TTO compounds to report are identified in the applicable Categorical Pretreatment Standard or in the Industrial Wastewater Discharge Permit. Where a user is subject to a Categorical Pretreatment Standard and a local limit for a given pollutant, the more stringent limit or applicable Pretreatment Standard shall apply.

- b. The District may issue mass limitations for dischargers in addition to or in place of concentration-based limits in Section 6.5 above as per 40 CFR 403.6(c)(5), (7), (8) and (9).
 - c. The District may convert the mass-based limits of the Categorical Pretreatment Standards at 40 CFR Part 414, 419, and 455 to concentration limits as per 40 CFR 403.6(c)(6), and (8) and (9).
 - d. The District may require BMPs in individual wastewater discharge permits for Industrial Users to manage the discharge of pollutants. These BMPs will be required in addition to any local limits specified in Section 6.5. Documentation of compliance with BMP requirements shall be recorded in accordance with 40 CFR 403.12(o).
- D. Dilution

No Industrial User shall increase the use of potable or processed water in any way for the purpose of diluting a discharge as a partial or complete substitute for adequate treatment to achieve compliance with the standards set forth in 40 CFR 404.6(d) and these Rules and Regulations.

E. Notification of Hazardous Waste Discharges

All Industrial Users shall notify the District in writing of any discharge into the POTW of a substance, which, if otherwise disposed of, would be a hazardous waste under 40 CFR, Part 261, as set forth in 40 CFR 403.12(p). Any Industrial User who commences discharging shall provide notification in accordance with 40 CFR 403.12(p) no later than thirty (30) days after the discharge of any listed or characteristic hazardous waste(s).

6.5.4 Industrial Wastewater Discharge Permits

All users discharging or proposing to discharge industrial wastes into any sewer outlet within the jurisdiction of the District, or which flow to the public sewerage system, shall obtain an Industrial Wastewater Discharge Permit from the District if it meets one or more of the following conditions:

- A. The discharge is subject to promulgated national Categorical Pretreatment Standards.
- B. The discharge, as determined by the District under 40 CFR Part 403, contains pollutants in concentrations or quantities that interfere or have the potential to interfere with the operation of the public sewerage system; has a significant impact or potential for a significant adverse impact on the public sewerage system, either singly or in combination with other contributing industries; or increases the cost of operation of the public sewerage system.
- C. The discharge requires pretreatment in order to comply with the discharge limitations described in this section.
- D. The discharge contains either suspended solids or biochemical oxygen demanding pollutants in excess of 350 mg/L, or in excess of 30 pounds in any single day.
- E. The discharge contains wastes requiring unusual quantities of chlorine (more than 20 mg/L) for treatment at the treatment plant.
- F. The discharge exceeds an average flow of 10,000 gallons or more in any single day, excluding sanitary, non-contact cooling water and boiler blowdown wastewater, or contributes a maximum instantaneous flow which exceeds 10 percent of the capacity of the available lateral or appropriate trunk sewer.
- G. Contributes a process waste stream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW.
- H. The discharge is a substance, which, if otherwise disposed of, would be a hazardous waste under 40 CFR, Part 261.

The Industrial Wastewater Discharge Permit types are listed below:

- a. Significant Industrial User Permit. All Significant Industrial Users proposing to connect to or discharge wastewater to the public sewerage system shall obtain an industrial waste discharge permit before connecting to or discharging to the public sewerage system.
 - b. Non-Significant Categorical Industrial Permit. The Director may issue a Non-Significant Categorical Industrial Waste Discharge Permit for users meeting the definition of a Non-Significant Categorical User when such level of control is deemed protective of the public sanitary sewer system. A permit may include, but not be limited to, self-monitoring, sampling, reporting, notification, and record-keeping requirements.
 - c. Non-Significant Industrial User Permit. The Director may issue a Non-Significant Industrial Waste Discharge Permit for users that meet the definition of a Non-Significant Industrial User. A permit may include but not be limited to self-monitoring, sampling, reporting, notification, and record-keeping requirements. These requirements may include an identification of pollutants to be monitored, sampling location, sampling frequency, and sample type based on federal, state, and local law.
- I. Permit Applications

Industrial Wastewater Discharge Permits shall specify, where applicable, the following:

- a. Application for an Industrial Wastewater Discharge Permit shall be made to the District on forms provided by the District. The application shall not be considered as complete until all information identified on the form is provided unless specific

exemptions are granted by the District. Completed applications shall be made within thirty (30) days of the date requested by the District or, for New Sources, at least ninety (90) days prior to the date that discharge to the public sewerage system is to begin.

- b. All applications, reports, or information submitted to the District shall be signed and certified in accordance with 40 CFR 403.12(I).
 - c. After full evaluation and acceptance of the data furnished by the applicant, the District may approve the basis for a permit and issue an Industrial Wastewater Discharge Permit subject to the terms and conditions provided herein. No permit shall be issued or effective until payment of the applicable initial or renewal fees as the Board may prescribe by order. All fees charged by the District may be amended at any time.
 - d. The permittee shall reapply with the District for reissuance of its permit at least ninety (90) days prior to the permit expiration date. Reapplication shall be on the form provided by the District.
- J. Change in Permitted Discharge

It shall be the responsibility of every Industrial User to immediately report to the District any changes (permanent or temporary) to the Discharger's premises or operations that change the quality or quantity of the wastewater discharged. Changes in the discharge involving the introduction of new wastestream(s), or hazardous waste as set forth in 40 CFR, Part 261, not included in or covered by the Discharger's Industrial Wastewater Discharge Permit Application itself shall be considered a new discharge, requiring the completion of an application for a permit modification. Any such reporting shall not be deemed to absolve the Discharger from liability for violations of these Rules and Regulations.

Any Industrial User operating under equivalent mass or concentration limits calculated from a production-based standard shall notify the District within two (2) business days after the Industrial User has a reasonable basis to know that the production level will significantly change within the next calendar month. An Industrial User that does not notify the District of such anticipated change will be required to meet the mass or concentration limits that were based on the original estimate of the long-term average production rate.

K. Industrial Waste Inspection

After the submitted discharge permit application has been received and reviewed, the District may schedule with the applicant an industrial waste inspection. The industrial waste inspection may consist of an interview with applicant personnel and a plant tour. At the interview, the applicant's application, waste generating process, water consumption, wastewater composition, and quantities of wastewater flow may be discussed. As part of the plant tour, one or more industrial waste sampling point(s), or Point(s) of Compliance, will be identified. The Points of Compliance, if appropriate and acceptable to the District, will be used for both permittee self-monitoring and monitoring by District personnel for water quality and quantity monitoring and permit enforcement, unless otherwise specified in the permit. The investigator's report of the inspection, together with the completed permit application from the industry, form the basis for establishing the discharge permit conditions and any other relevant documents.

L. Permit Conditions

Industrial Wastewater Discharge Permits shall specify, where applicable, the following:

- a. Fees and charges to be paid upon initial permit issuance.
- b. Effluent limits based on applicable Pretreatment Standards, local limits, and state and local law.
- c. Requirements for installation and maintenance of inspection and sampling facilities compatible with facilities of the District at the permittee's expense.
- d. Special conditions as the District may reasonably require under particular circumstances of a given discharge, including, but not limited to, self-monitoring requirements, access to sampling locations, frequency of sampling, identification of pollutants to be monitored, sample types, standards for testing, and a reporting schedule based on federal, state and local laws. Reporting requirements shall include the provisions in 40 CFR 403.12(g) to demonstrate continued compliance through monitoring and analysis.
- e. Requirements for installation and maintenance of BMPs.
- f. Compliance schedules, as necessary, for installation of additional pretreatment and or operations and maintenance to meet a Pretreatment Standard. The shortest possible schedule for achieving compliance with Standard is required.
- g. Requirements for submission of special technical reports or discharge reports that differ from those prescribed by these Rules and Regulations.
- h. An effective date and expiration date of the permit (in no case more than five (5) years).
- i. Requirements for maintaining and retaining plant records relating to wastewater discharge as specified by the District, DEQ, and EPA, and affording District access for purposes of inspection and copying.
- j. Requirements for inspection and surveillance by District personnel and access to the Industrial User's parcel.
- k. Requirements for immediate notification to the District of any new introduction of wastewater constituents or any substantial change in the volume or character of the wastewater constituents, including listed or characteristic hazardous wastes, being introduced into the public sewerage system or any significant change in the production where the permit incorporates equivalent mass or concentration limits calculated from a production-based standard.
- l. Requirements to develop a written plan for slug control and notification to the District of slug discharges and changes at the Industrial User's facility affecting the potential for a slug discharge.
- m. Other conditions as deemed appropriate by the District to ensure compliance with these Rules and Regulations and federal and state statutes, and Administrative Rules.
- n. Statement of applicable civil and criminal penalties for violation of Pretreatment Standards and requirements, and any applicable compliance schedule. Such schedule may not extend the time for compliance beyond that required by federal, state, or local law.

- o. Duty to reapply and obtain a new permit should the permittee wish to continue the activity regulated by the discharge permit following the expiration date of the discharge permit.
- p. Requirements that samples and measurements taken for purposes of monitoring be representative of the monitored activity, including, but not limited to, the volume and nature of the discharge.
- q. Statement of non-transferability without prior notification to the District in accordance with Section 6.5.4 of these Rules and Regulations and provision of a copy of the existing permit to the new owner or operator.
- r. Requirements that all sampling data reported to the District include complete and accurate chain-of-custody forms.

M. Permit Appeals or Modifications

An Industrial Wastewater Discharge Permit may be appealed or modified for good and valid cause at the written request of the Permittee and/or at the discretion of the District. Any new or increased discharge shall require the Discharger to apply for permit modification. The District at all times has the right to deny or condition new or increased contributions or changes in the nature of pollutants to meet applicable local, state, or federal Pretreatment Standards or requirements or to prevent violation of its NPDES permit or any permit issued to the District. Permittee modification requests shall be submitted to the District and shall contain a detailed description of all proposed changes in the discharge. The District may request any additional information needed to adequately prepare the modification or assess its impact.

The District may deny a request for modification if, as determined by the District in its sole and absolute discretion, the change will result in violations of District, state, or federal laws or regulations; will overload or cause damage to any portion of the public sewerage system; or will create an imminent or potential hazard to personnel.

If a permit modification is made at the discretion of the District, the permittee shall be notified in writing of the proposed modification at least thirty (30) days prior to its effective date and shall be informed of the reasons for the changes. Any request for reconsideration shall be made before the effective date of the changes. If no responses by the permittees are received after the 30-day period, then the modification is effective immediately.

N. Permit Duration/No Property Interest Acquired

All Industrial Wastewater Discharge Permits shall be issued for a specified period, not to exceed five (5) years, as determined by the District and subject to amendment, revocation, suspension, or termination as provided in these Rules and Regulations. No Discharger acquires any property interest by virtue of permit approval, and continued approval is expressly contingent upon compliance with all applicable federal, state, and local requirements, including these Rules and Regulations.

O. Limitations on Permit Transfer

Industrial Wastewater Discharge Permits are issued to a specific Discharger for a specific operation and are not assignable to another Discharger or transferable to any other location without the prior written approval of the District and provision of a copy of the existing permit to the new owner or operator.

P. Permit Revocation

Industrial Wastewater Discharge Permits may be revoked for the following reasons:

- a. Failure to notify the District of significant changes to the wastewater prior to the changed discharge.
- b. Falsifying self-monitoring reports.
- c. Tampering with monitoring equipment.
- d. Refusing to allow the District timely access to the facility premises and records.
- e. Failure to meet effluent limitations.
- f. Failure to pay fines.
- g. Failure to pay user charges.
- h. Failure to meet compliance schedules.
- i. Failure to provide advance notice of the transfer of a permitted facility.
- j. Violation of any applicable Pretreatment Standard or requirement or any terms of the permit or these Rules and Regulations.

Permits shall be voidable upon nonuse, cessation of operations, or transfer of business ownership.

All previous Industrial Wastewater Discharge Permits are void upon the issuance of a new Industrial Wastewater Discharge Permit.

Q. Permit Reissuance

An Industrial User who is required to have a wastewater discharge permit shall apply for wastewater discharge permit reissuance by submitting a complete wastewater discharge permit application, in accordance with Section 6.5.4 of these Rules and Regulations, a minimum of ninety (90) days prior to the expiration of the user's existing wastewater discharge permit. A user whose existing wastewater discharge permit has expired and who has submitted its re-application in the time period specified herein shall be deemed to have an effective wastewater discharge permit until the District issues or denies the new wastewater discharge permit. A user whose existing wastewater discharge permit has expired and who failed to submit its re-application in the period specified herein will be deemed to be discharging without a wastewater discharge permit.

6.5.5 Pretreatment Facilities

If the District determines that treatment facilities, operation changes, or process modifications at an Industrial User's facility are needed to comply with any requirements under these Rules and Regulations or are necessary to meet any applicable local, state, or federal Pretreatment Standards or requirements, the District may require that such facilities be constructed or modifications or changes be made within the shortest reasonable time, taking into consideration construction time, impact of the untreated waste on the public sewerage system, economic impact on the facility, and any other factor deemed appropriate by the District.

Requirements for treatment facilities or other BMPs may be incorporated as part of an Industrial Wastewater Discharge Permit and made a condition of issuance of such permit or made a condition of the acceptance of the waste from such facility.

Existing sources and New Sources shall meet the deadlines for installation and startup of equipment and compliance with Categorical Pretreatment Standards established according to 40 CFR 403.6(b).

A. Plans, Specifications, and Construction

Plans, specifications, and other information relating to the construction or installation of pretreatment facilities required by the District shall be submitted to the District. No construction or installation shall commence until written approval of plans and specifications by the District is obtained. Plans must be reviewed and signed by an authorized representative of the Discharger and certified by a qualified and licensed Professional Engineer. No person, by virtue of such approval, shall be relieved of compliance with other laws of the city, county, or state relating to construction and permits. Every facility for the pretreatment or handling of wastes shall be constructed in accordance with the approved plans and installed and maintained at the expense of the Discharger.

B. Sampling and Monitoring Facility

Any Industrial User constructing a pretreatment facility required by the District shall also install and maintain, at the Industrial User's own expense, a sampling manhole, materials and fittings, or other suitable monitoring access for inspecting, sampling, and investigating the discharge from the pretreatment facility to the public sewerage system. The sampling manhole or monitoring access shall be placed in a location designated by the District and in accordance with specifications approved by the District. A sampling manhole shall be constructed in accordance with a typical Public Sanitary Sewer manhole detail (see the Sanitary Standards). All equipment used for sampling and analysis must be routinely calibrated, inspected, and maintained to ensure its accuracy. Monitoring points shall not be changed without notifying the District and obtaining approval.

C. Operational Upset

Any Industrial User who experiences an upset in operations that places the Industrial User in a temporary state of noncompliance with these Rules and Regulations, and/or any related rule or permit, shall inform the District as soon as practicable, but not later than 24 hours after first awareness of commencement of the upset. Where such information is given orally, a written follow-up report shall be filed by the Industrial User with the District within five (5) days.

An upset shall constitute an affirmative defense to an action brought for noncompliance if the Industrial User demonstrates, through properly signed, contemporaneous operating logs or other relevant evidence (a) a description and cause(s) of the upset and the upset's impact on the Industrial User's compliant status; (b) the duration of noncompliance, including exact dates and times or, if not corrected, the anticipated time that noncompliance is expected to continue; (c) all steps taken, or to be taken, to reduce, eliminate, and prevent recurrence of such upset or other conditions of noncompliance; and, that these steps have been, or will be taken in a workmanlike manner and in compliance with applicable operational maintenance procedures.

A documented, verified, and bona fide operation upset, including good faith and reasonable remedial efforts to rectify the upset, shall be an affirmative defense to any enforcement action brought by the District against an Industrial User for any noncompliance with these Rules and Regulations or any rule adopted, or permit issued in accordance with this document, that arises out of violations alleged to occur during the period of the upset. In an enforcement proceeding, the Industrial User seeking to establish the occurrence of an upset shall have the burden of proof.

The Industrial User shall control all discharge production to the extent necessary to maintain compliance with these Rules and Regulations, or any rule adopted or permit issued in accordance with this document, upon reduction, loss, or failure of its treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in a situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

D. Bypass

Bypass is prohibited, and the District may take enforcement action against an Industrial User for a bypass, unless (a) the bypass was unavoidable to prevent loss of life, personal injury, or severe property damage as defined in 40 CFR 403.17(A)(2), as may be amended from time to time; (b) there were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment downtime (this condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of down time or preventative maintenance); and (c) the Industrial User submitted notices as set forth below.

If an Industrial User knows in advance of the need for a bypass, it shall submit prior notice to the District, if possible, at least ten (10) days before the date of the bypass. The District may approve an anticipated bypass after considering its adverse effects, if the District determines that it will meet the three conditions set forth above.

An Industrial User shall submit oral notice of an unanticipated bypass that exceeds applicable Pretreatment Standards to the District within 24 hours from the time the Industrial User becomes aware of the bypass. A written submission shall also be provided within five (5) days of the time the Industrial User becomes aware of the bypass.

The written submission shall contain (a) a description of the bypass and its cause; (b) the duration of the bypass, including exact dates and times, and, if the bypass has not been corrected, the anticipated time it is expected to continue; and (c) steps taken or planned to reduce, eliminate, and prevent recurrence of the bypass. The District may waive the written report on a case-by-case basis if the oral report has been received.

An Industrial User may allow any bypass to occur that does not cause a violation of Pretreatment Standards or requirements, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provision of the paragraphs of this section.

E. Affirmative Defense

Any Industrial User shall have an affirmative defense in any action brought against it alleging a violation of the general prohibitions covered in 40 CFR 403.5(a)(1) and the specific prohibitions covered in 40 CFR 403.5(b)(3), (b)(4), (b)(5), (b)(6), and (b)(7), in addition to those covered in these Rules and Regulations. The Industrial User in its demonstration shall be limited to provisions of 40 CFR 403.5(a)(2)(i) and (ii).

6.5.6 Reporting Requirements

A. Initial Compliance Report

Within one hundred and eighty days (180) days after the effective date of a Categorical Pretreatment Standard issued by the EPA or within ninety (90) days after

receiving notification from the District that such a standard has been issued, whichever is sooner, existing Industrial Waste Dischargers subject to such standard shall submit to the District a baseline monitoring report, as required by the EPA pretreatment regulations, which includes the following information:

- a. The name and address of the facility and the name of the owner and operator.
- b. A list of any environmental control permits on the facility.
- c. A description of the operation(s).
- d. The measured average and maximum daily flow from regulated process streams and other streams as necessary to allow use of the combined waste stream formula.
- e. Measurement of the particular pollutants that are regulated in the applicable Pretreatment Standard and results of sampling as required in the permit.
- f. A statement reviewed by an authorized representative and certified by a qualified professional as to whether the applicable standards are being consistently met and, if not, what additional measures are necessary to meet them.
- g. If additional pretreatment and/or operation and maintenance will be required to meet the Pretreatment Standards, a report on the shortest schedule by which the needed pretreatment and/or operation and maintenance can be provided. The compliance date for users covered by Categorical Pretreatment Standards should not be later than the compliance date established for the particular standard. The report shall be reviewed and signed by an authorized representative of the Discharger and certified by a qualified and licensed Professional Engineer.

New Sources subject to an effective Categorical Pretreatment Standard issued by the EPA shall submit to the District, ninety (90) days prior to commencement of their discharge into the public sewerage system, a report which contains the information listed in items (1) through (7) above, along with information on the method of pretreatment that will be applied to the New Source to meet applicable Pretreatment Standards.

These reports shall be completed in compliance with the specific requirements of Section 403.12(b) of the General Pretreatment Regulations for Existing and New Sources (40 CFR Part 403) promulgated by the EPA on January 28, 1981, or any subsequent revision, including the signatory requirements 403.12(l) for such reports.

If the information required by these reports has already been provided to the District and that information is still accurate, the Discharger may reference this information instead of submitting it again.

B. Report on Compliance

Within ninety (90) days following the date for final compliance with applicable Categorical Pretreatment Standards or, in the case of a New Source, within sixty (60) days following commencement of the introduction of wastewater into the public sewerage system, any Discharger subject to applicable local, state, or federal Pretreatment Standards and requirements shall submit to the District a report indicating the nature and concentration of all pollutants in the waste stream from the regulated process and the average and maximum daily flow for these process units, and long-term production data, or actual production data, when requested. This

report shall also include an estimation of these factors for the ensuing 12 months. The report shall state whether the applicable Pretreatment Standards or requirements are being met on a consistent basis and, if not, what additional operation and maintenance and/or pretreatment is necessary to bring the Discharger into compliance with the applicable Pretreatment Standards or requirements. This statement shall be signed by an authorized representative of the Discharger and certified by a qualified and licensed Professional Engineer. A New Source is required to achieve compliance within ninety (90) days after commencement of discharge.

If the Industrial User is required to install additional pretreatment or provide additional operation and maintenance, a schedule needs to be submitted. The schedule shall contain increments of progress in the form of dates for commencement and completion of major events leading to the construction and operation of additional pretreatment or operation and maintenance (e.g., hiring an engineer, completing preliminary plans, completing final plans, executing contracts for major components, commencing construction, completing construction, etc.) No increment of progress shall exceed 9 months. The Industrial User shall submit a progress report to the District including, at a minimum, whether it complied with the increment of progress to be met on such a date and, if not, the date on which it expects to comply with this increment of progress, the reason for delay, and the steps being taken by the Industrial User to return the construction to the schedule established. This progress report shall be submitted not later than fourteen (14) days following each date in the schedule and the final date of compliance. In no event shall more than 9 months elapse between such progress reports to the District.

C. Periodic Reports on Compliance

Any Discharger that is required to have an Industrial Wastewater Discharge Permit pursuant to these Rules and Regulations shall submit reports to the District during the months of June and December, unless required on other dates and/or more frequently by the District, a report indicating the nature of its effluent over the previous 6-month period. The report shall include, but is not limited to, a record of the nature and concentrations (and mass if limited in the permit) for all samples of the limited pollutants that were measured, a record of all flow measurements that were taken or estimated average and daily maximum flows, and long-term production data, or actual production data, when requested. Sampling included as part of a periodic compliance report will be conducted in accordance with the requirements outlined in Section 6.5.6. Reports including sampling data are required to include complete and accurate chain-of-custody forms describing the custody of the sample from collection to analysis.

The frequency of the monitoring shall be determined by the District and specified in the Industrial Wastewater Discharge Permit. If there is an applicable effective Categorical Pretreatment Standard, the frequency shall be not less than that prescribed in the standard. If a Discharger monitors any pollutant more frequently than required by the District at its point of compliance, all monitoring results must be included in the periodic compliance reports.

Flows shall be reported on the basis of actual measurement; where cost or feasibility considerations justify, the District may, in its sole discretion, accept reports of average and maximum flows estimated by verifiable techniques.

The District may require reporting by Industrial Users that are not required to have an Industrial Wastewater Discharge Permit if information and/or data is needed to

establish a sewer charge, determine the treatability of the effluent, or determine any other factor which is related to the operation and maintenance of the sewer system.

The District if requested by the Discharger, may agree to perform the periodic compliance monitoring needed to prepare the periodic compliance report required under this subsection of the Rules and Regulations. If the District agrees to perform such periodic compliance monitoring, the District will charge the Discharger for the monitoring based upon the costs incurred by the District for the sampling and analyses.

D. Violations

The Industrial User shall notify the District within 24 hours of first possessing or becoming aware of monitoring data that indicates a violation of the permit. The Industrial User shall repeat the sampling and analysis and submit the results to the District as soon as possible, but in no event later than thirty (30) days after becoming aware of the violation.

E. Total Toxic Organics Reporting

Those industries that are required by the EPA to eliminate and/or reduce the levels of TTOs discharged into the public sewerage system must follow the Categorical Pretreatment Standards for that industry.

F. Signatory Requirements

Industrial Waste Discharge Permit Applications, Baseline Reports, Report on Compliance reports (90-Day Compliance Reports), Periodic Reports on Compliance, and other required reports shall:

a. Contain the following certification statement:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

b. Be signed by a responsible corporate officer, by a general partner or proprietor, or by a duly authorized representative of the Industrial User, as defined under 40 CFR 403.12(l).

c. If an Industrial User plans to submit Periodic Reports on Compliance by a duly authorized representative or designee, a signatory authorization form approved by the District shall be submitted to the District authorizing the representative or designee prior to or together with any reports on behalf of the responsible corporate officer in pursuant to 40 CFR 403.12(l)(1-3).

6.5.7 Inspection and Sampling

A. Inspection

Authorized District representatives may inspect the monitoring facilities of any Industrial User to determine compliance with the requirements of these Rules and Regulations. The Industrial User shall allow the District to enter the premises at all

reasonable hours, for the purpose of inspection (including photographs), sampling, or records examination and copying. The District shall also have the right to set up on the Industrial User's property such devices as are necessary to conduct sampling, inspection, compliance monitoring, and/or metering operations. The right of entry is to the Industrial User's entire premises, and includes, but is not limited to, access to manufacturing, production, and chemical storage areas; those portions of the premises that contain facilities for sampling, measuring, treating, transporting, or otherwise handling wastes; and areas for storing records, reports, or documents relating to the pretreatment, sampling, or discharge of the wastes. The following conditions for entry shall apply:

- a. The authorized District representative shall present appropriate District credentials at the time of entry.
- b. The purpose of the entry shall be for inspection, observation, measurement, sampling, testing, or record examination and copying in accordance with the provisions of these Rules and Regulations.
- c. The entry shall be made at Reasonable Times unless an emergency situation exists as determined by the District.
- d. All regular safety and sanitary requirements of the facility to be inspected shall be complied with by the District representative(s) entering the premises.

B. Sampling

Samples of wastewater being discharged into the public sewage system shall be representative of the discharge and shall be taken after treatment, if any. For Industrial Users subject to Categorical Pretreatment Standards, and for sampling required in support of baseline monitoring and 90-day compliance reports, a minimum of four grab samples must be used for pH, cyanide, total phenols, oil grease, sulfides, and volatile organics for Industrial Users for which historical data does not exist; for Industrial Users for which historical sampling data are available, the District may authorize a lower minimum. For all other pollutants, the sampling method shall be obtaining 24-hour composite samples through flow proportional composite sampling techniques where feasible. The District may waive flow proportional composite sampling for any Industrial User that demonstrates that flow proportional composite sampling is infeasible. In such cases, the samples may be obtained through time proportional composite sampling techniques or through a minimum of four grab samples where the user demonstrates that this will provide a representative sample of the effluent being discharged. Additional grab samples may be required to show compliance with instantaneous limits. Samples for oil and grease, temperature, pH, cyanide, total phenols, sulfides, and volatile organic compounds must be obtained using grab collection techniques.

Samples that are taken by the District for the purposes of determining compliance with the requirements of these Rules and Regulations shall be split with the Industrial User (or a duplicate sample provided in the instance of fats, oils, and grease) if requested before or at the time of sampling.

All sample analyses shall be performed in accordance with techniques prescribed in 40 CFR Part 136 and any subsequent amendments. Where 40 CFR Part 136 does not include a sampling or analytical technique for the pollutant in question, or where the District determines that the 40 CFR Part 136 sampling and analytical techniques are inappropriate for the pollutant in question, sampling and analysis shall be performed using validated analytical methods or any other sampling and analytical

procedures including procedures suggested by the District or other parties, that have been approved by the Administrator of the EPA.

C. Sampling Waiver

Industrial Users subject to a Categorical Pretreatment Standard may apply for and obtain a waiver to forego sampling of a pollutant regulated by a Categorical Pretreatment Standard if the Industrial User has demonstrated through sampling and other technical factors that the pollutant is neither present nor expected to be present in the discharge or is present only at background levels from intake water and without any increase in the pollutant due to activities of the Industrial User. This authorization is subject to the following conditions:

- a. The waiver may be authorized where a pollutant is determined to be present solely due to sanitary wastewater discharged from the facility provided that the sanitary wastewater is not regulated by an applicable Categorical Pretreatment Standard and otherwise includes no Process Wastewater.
- b. The monitoring waiver is valid only for the effective period of the Industrial Waste Discharge Permit, but in no case longer than five (5) years. The Industrial User shall submit a new request for the waiver before the waiver can be granted for each subsequent Industrial Waste Discharge Permit.
- c. In making a demonstration that a pollutant is not present, the Industrial User shall provide data from at least one sampling of the facility's Process Wastewater prior to any treatment present at the facility that is representative of all wastewaters from all processes.
- d. The request for a monitoring waiver shall be signed by a responsible corporate officer, by a general partner or proprietor, or by a duly authorized representative of the Industrial User, as defined under 40 CFR 403. 12(l). The request shall include the following certification statement:

"Based on my inquiry of the person or persons directly responsible for managing compliance with the applicable Categorical Pretreatment Standards, I certify that, to the best of my knowledge and belief, there has been no increase in the level of the pollutant(s) that have been approved for the monitoring waiver in the wastewaters due to the activities at the facility since filing of the last periodic report."
- e. Non-detectable sample results may be used only as a demonstration that a pollutant is not present if the EPA-approved method from 40 CFR Part 136 with the lowest minimum detection level for that pollutant was used in the analysis.
- f. Any grant of the monitoring waiver by the Director shall be included as a condition in the Industrial User's permit. The reasons supporting the waiver and any information submitted by the User in its request for the waiver shall be maintained by the District for three (3) years after expiration of the waiver.
- g. Upon approval of the monitoring waiver and revision of the Industrial User's permit by the Director, the Industrial User shall certify on each report with the statement in Section 6.5.7(C) (d) that there has been no increase in the pollutant in its waste stream due to activities of the Industrial User.
- h. In the event that a waived pollutant is found to be present or is expected to be present because of changes that occur in the Industrial User's operations, the User shall immediately 1) comply with the inspection and sampling requirements

of Section 6.4.2, or other more frequent monitoring requirements imposed by the Director and 2) notify the Director.

- i. This provision does not supersede certification processes and requirements established in Categorical Pretreatment Standards, except as otherwise specified in the Categorical Pretreatment Standard.

D. Monitoring Facilities

- a. Any person discharging industrial waste into the public sewerage system that requires an Industrial Wastewater Discharge Permit shall, at their own expense, construct and maintain an approved control manhole, together with such flow measurement, flow sampling, and sample storage facilities as may be required by the District. The facilities required shall be such as are reasonably necessary to provide adequate information to the District to monitor the discharge and/or to determine the proper Industrial User charge.
- b. Such monitoring facilities shall be located on the Discharger's premises except when, under circumstances approved by the District, it must be located in a public street or Right-of-Way, provided it will not be obstructed by landscaping or parked vehicles.
- c. There shall be ample room in or near such sampling manhole or facility to allow accurate sampling and preparation of samples for analysis. The facility, sampling, and measurement equipment shall be maintained at all times in a safe and proper operating condition at the expense of the Discharger.
- d. Whether constructed on private or public property, the sampling and monitoring facilities shall be provided in accordance with the District's requirements and all applicable local construction standards and specifications. Construction shall be completed within ninety (90) days following written notification by the District.
- e. Dischargers shall allow the District and city and their representatives, access to monitoring facilities on their premises at all Reasonable Times. The District and city shall have the right to set up such supplementary monitoring equipment as it may require.
- f. The District may, in lieu of or in addition to requiring measurement sampling and monitoring facilities, procure and test, at the user's expense, sufficient composite samples on which to base and compute the user charge. In the event that measurement sampling and monitoring facilities are not required, the user charge shall be computed using the metered water flow to the premises as a basis for waste flow and the laboratory analysis of samples procured as the basis for computing BOD and suspended solids content. Metered water flow shall include all water delivered to or used on the premises. In the event that private water supplies are used, they shall be metered at the user's expense. Non-contact cooling waters or other waters not discharged into the public sewerage system may be separately metered at the user's expense in a manner approved by the District, and all or portions of these waters deducted from the total metered water flow to the premises are subject to District approval.

6.5.8 Significant Non-Compliance

At least annually, the District shall publish in a newspaper of general circulation in the District, a list of the Industrial Users who were in significant noncompliance of applicable Pretreatment Standards or requirements for the preceding 12 months, in accordance with and as defined in 40 CFR 403.8(f)(2)(viii). For the purposes of this provision, an

Industrial User is in significant non-compliance if its violation meets one or more of the following criteria:

- A. Chronic violations of wastewater discharge limits, defined as those in which 66 percent or more of all the measurements taken during a 6-month period exceeded (by any magnitude) a numeric Pretreatment Standard or requirement, including instantaneous limits, as defined by 40 CFR 403.3(l), or any successor statutes.
- B. Technical Review Criteria (TRC) violations, defined as those in which 33 percent or more of all of the measurements for each pollutant parameter taken during a 6-month period equal or exceed the numeric Pretreatment Standard or requirement, including instantaneous limits, as defined by 40 CFR 403.3(l), multiplied by the applicable TRC (TRC = 1.4 for BOD, total suspended solids [TSS], fats, oils, and grease [FOG], and 1.2 for all other pollutants except pH).
- C. Any other violation of a pretreatment effluent limit (daily maximum or longer-termed average) that the District determines has caused, alone or in combination with other discharges, interference or pass through (including endangering the health of District or city personnel or the general public).
- D. Any discharge of a pollutant that has caused imminent endangerment to human health or welfare or to the environment or has resulted in the District's exercise of its emergency authority to halt or prevent such a discharge.
- E. Failure to meet, within ninety (90) days after the schedule date, a compliance schedule milestone contained in a permit or order for starting construction, completing construction, or attaining final compliance.
- F. Failure to provide within forty-five (45) days after the due date, required reports, initial compliance reports, periodic compliance reports, and reports on compliance with compliance schedules.
- G. Failure to accurately report noncompliance.
- H. Any other violation or group of violations, including violation of BMPs, which the District determines will adversely affect the operation or implementation of the pretreatment program.

6.5.9 Records

All Dischargers subject to these Rules and Regulations shall retain and preserve for not less than three (3) years all records, books, documents, memoranda, reports, correspondence, and any and all related summaries, relating to monitoring, sampling, and chemical analyses made by or on behalf of a Discharger in connection with its discharge. All such records shall be subject to review by the District. All records that pertain to matters subject to appeals or other proceedings before the Director or the Board, or any other enforcement or litigation activities brought by the District, state, or EPA shall be retained and preserved until such time as all enforcement or other activities have concluded and all periods of limitation with respect to any appeals have expired.

A. Public Records

Information and data furnished to the District regarding frequency and nature of discharges into the public sewerage system or other information submitted in the regular course of reporting and compliance with the requirements of these Rules and Regulations or the Industrial User's Permit, shall be available to the public or other governmental agencies without restriction unless the Industrial User claims, when submitting the data, and satisfies the District as to the validity of the claim, that

release of the information would divulge information, processes, or methods of production entitled to protection as “trade secrets” under federal laws or ORS 192.501(2). Such portions of an Industrial User’s report that qualify as trade secrets shall not be made public, unless the public interest in that case requires disclosure.

The EPA and DEQ shall have access to all records at all times. Effluent data, as defined and set forth in 40 CFR Part 2 and included here by reference, shall be available to the public.

B. Confidential Information Procedure

- a. An Industrial User submitting information to the District may assert a “trade secret” or “business confidentiality” claim covering the information by placing on or attaching to the information a cover sheet, stamped or typed legend, or other suitable form of notice employing language such as “trade secret,” “proprietary,” or “business confidential.” Confidential information needs to be marked with specificity, and the justification for confidentiality needs to be expressly spelled out by the Industrial User in accordance with ORS 192, as amended. This shall be done at the time of submission. Post-submittal claims of confidentiality will not be considered unless good cause is shown by the Industrial User to the satisfaction of the Director. Allegedly confidential portions of otherwise non-confidential documents shall be clearly identified by the Industrial User and may be submitted separately to facilitate identification. If the Industrial User desires confidential treatment only until a certain date or until the occurrence of a certain event, the notice shall so state. If no claim of confidentiality is made at the time of submission, the District may make the information available to the public without further notice. If a claim is asserted, the information will be evaluated pursuant to the criteria of ORS 192.345(2) and 40 CFR Part 2 relating to effluent data.
- b. The Industrial User must show that it has taken reasonable measures to protect the confidentiality of the information, that it intends to continue to take such measures and must show that the information claimed to be confidential (a) is not patented; (b) is known only to a limited number of individuals within the Industrial User who are using it to make or produce an article of trade or a service or to locate a mineral or other substance; (c) has commercial value; (d) gives the Industrial User a chance to obtain a business advantage over competitors not having the information; and (e) is not, and has not been, reasonably obtainable without the Industrial User’s consent by other persons (other than governmental bodies) by use of legitimate means (excluding discovery in litigation or administrative proceedings).
- c. The District shall examine the information meeting the criteria set forth above and to the extent allowed, will determine what information, if any, is confidential, in compliance with applicable laws.
- d. If the District determines that the information is confidential, it shall so notify the Industrial User. If a request for inspection under the public records law has been made, the District shall notify the person requesting the information of its confidentiality and notify the Industrial User of the inquiry and the District’s response.
- e. If the District determines that the information is not entitled to confidential treatment, the District shall notify the Industrial User of its decision, as well as any other person who has requested the information.

- f. Once the final decision is made, the District will wait five (5) business days before releasing the subject information so that the Industrial User may have an adequate time to obtain judicial relief to prevent disclosure.
- g. Information deemed confidential or, while a decision thereon is pending, will be kept in a place inaccessible to the public.
- h. Nothing herein shall prevent a party requesting information to exercise remedies provided by the Oregon Public Records law to obtain such information. Nothing herein shall prevent the Industrial User from undertaking those remedies to prevent disclosure if the District has determined that such disclosure will occur. The District will not oppose any motion to intervene or other action taken by an Industrial User in perfect standing to make any confidentiality claims before a court of competent jurisdiction.

6.6 Septic Tank Waste Requirements

This section sets forth uniform requirements for discharges of septic tank wastes (also known as “septage”) at the Tri-City Water Resource Recovery Facility (WRRF), as required by applicable Oregon laws, the federal CWA, and the EPA General Pretreatment Regulations (40 CFR, Part 403).

This section provides for the regulation of discharges of septic tank wastes at the Tri-City WRRF through the issuance of Septic Tank Waste Discharge Permits to approved septic tank waste haulers, authorizes monitoring and enforcement activities, requires septic tank waste hauler reporting, and establishes fees for the equitable distribution of costs of the public sewerage system.

6.6.1 Septic Tank Waste Prohibited Discharges

No septic tank waste hauler shall discharge or cause to be discharged, directly or indirectly, to the Tri-City WRRF, any waste that is not septic tank waste or any pollutant, substances, or wastewater that will interfere with the operation or performance of the public sewerage system; have an adverse effect on the receiving stream; endanger life, limb, or public property; or constitute a nuisance. Prohibited discharges shall include, but are not limited to, the following:

- A. Discharges prohibited in Section 6.4 of these Rules and Regulations or discharges exhibiting characteristics described in this section, whichever is more stringent.
- B. Any wastes having a pH lower than 6.0 S.U. or higher than 9.0 S.U., or having any corrosive property capable of causing damage or hazard to structures, equipment, or people.
- C. Any process waste from industrial or commercial locations.
- D. Any wastes containing liquids, solids, or gases that will create a fire or explosion hazard.
- E. Any wastes containing solid or viscous substances that may cause obstruction to flow such as, but not limited to, oil, grease, sand, rags, or metals.
- F. Any other type of waste that may be untreatable by the treatment plant or will interfere with the operation of the treatment plant, such as, but not limited to toxic, radioactive, or hazardous wastes.

6.6.2 Septic Waste Discharge Procedures

The District will only accept domestic septic tank wastes originating from within Clackamas, Multnomah, and Washington Counties and hauled to the Tri-City WRRF subject to the following procedures.

- A. Discharge of septic tank wastes at the Tri-City WRRF will only be allowed during plant hours established by the District. The District reserves the right to change the hours and/or days that waste haulers can discharge at the Tri-City WRRF.
- B. Each septic tank waste load hauled to the Tri-City WRRF shall be accompanied by a manifest in a form provided by the District that provides verifiable, complete, and accurate information on the source or sources of the septic tank waste load.
- C. If any septic tank waste exhibits prohibited discharge characteristics, exhibits inconsistencies between certified contents and actual contents, contains materials that are suspected to be harmful to the treatment plant, or if the Tri-City WRRF exhibits capacity or operational problems, the District Operator in Charge shall have full authority to refuse acceptance of waste, limit the volume of the discharge, or establish restriction as deemed necessary for the efficient and safe operation of the treatment plant.

6.6.3 Septic Tank Waste Discharge Permits

Only those persons possessing a valid Septic Tank Waste Discharge Permit from the District and displaying a valid charge card issued by the District will be allowed to discharge septic tank wastes at the Tri-City WRRF. The applicant must obtain a separate charge card for each truck or trailer in order for each truck or trailer to be authorized to discharge septic tank wastes.

Septic Tank Waste Permits for the discharge of septic tank wastes at the Tri-City WRRF will be issued by the District only to those persons possessing a valid Sewage Disposal Service Business License issued by the DEQ and who have submitted a complete application (see Section 6.6.4) to the District with all information required by the District pursuant to the Rules and Regulations. Licenses from the DEQ will not be required of governmental units.

The District may refuse to issue a Septic Tank Waste Discharge Permit to any applicant who has had one or more permits previously revoked or canceled under the provisions of this section of the Rules and Regulations, or to any agent, or associates of such person. The District may also refuse to issue a permit to any applicant who has been or is currently under an enforcement action by the District or another governmental unit and relating to the discharge of pollutants to waters of the state or to POTWs.

6.6.4 Permit Applications

Application for a Septic Tank Waste Discharge Permit to discharge septic tank wastes at the Tri-City WRRF shall be made to the District on forms provided by the District. The application shall not be considered as complete until all information identified on the form is provided unless specific exemptions are granted by the District. The District shall impose appropriate conditions in Septic Tank Waste Discharge Permits to ensure compliance with requirements in these Rules and Regulations.

6.6.5 Surety Bond

Except for governmental agencies, each permit applicant, regardless of the number of trucks for which application is made, shall post a surety bond in a form approved by the

District in the sum of \$10,000, which bond shall be forfeited to the District under any of the following conditions:

- A. The discharge of wastes is toxic or harmful to the treatment plant operation or process.
- B. The septic tank wastes are discharged at any unauthorized location within the boundaries of Clackamas County.
- C. Failure to pay all charges for discharge within thirty (30) days of billing by the District.

6.6.6 Issuance of Permit

After full evaluation and acceptance by the District of the information and data furnished by the applicant, the District shall issue a Septic Tank Waste Discharge Permit to the applicant subject to the terms and conditions required by the District consistent with or pursuant to the Rules and Regulations.

Each permit holder will be issued one Septic Tank Waste Discharge Permit. Each truck or trailer will be issued one charge card, which must be presented to the Operator in Charge before any septic tank wastes may be discharged at the Tri-City WRRF.

In addition to complying with the requirements of the Septic Tank Waste Discharge Permit and these Rules and Regulations, the permittee is required to file annually with the District the permittee's current DEQ Sewage Disposal Service Business License or annual proof of application for renewal of the DEQ License if the DEQ has not issued a renewed License and the permittee is operating under an approved License that administratively continues in effect under Oregon law.

A. Permit Limitations

A Septic Tank Waste Discharge Permit is issued to a specific applicant, and a charge card is issued for a specific truck or trailer. The permit is not assignable or transferable to another waste hauler, and the charge card is not assignable or transferable to another truck or trailer without the prior written approval of the District.

No wastes from septic tanks, holding tanks, or pumping facilities, shall be discharged into any sewer system within the jurisdiction of the District, except as specifically authorized by existing codes, ordinances, and regulations.

All Septic Tank Waste Discharge Permits shall be issued for a term not to exceed three (3) years. Each Septic Tank Waste Discharge Permit shall expire on July 1 of each permit term.

If the permittee wishes to continue an activity regulated by the Septic Tank Waste Discharge Permit, the permittee must file with the District a complete application to renew the permit no later than thirty (30) days prior to the expiration date and obtain a renewed permit by no later than the expiration date.

No permit holder acquires any property interest by virtue of permit approval, and continued approval is expressly contingent upon compliance with this section of the Rules and Regulations and all other applicable federal, state, and local requirements.

B. Enforcement and Revocation of Permit

Any septage hauler that fails to comply with the requirements of these Rules and Regulations or the provisions of its Septic Tank Waste Discharge Permit is subject to enforcement by the District.

All Septic Tank Waste Discharge Permits issued to an applicant by the District shall be revoked or canceled for any of the following reasons:

- a. Failure to accurately certify the source or sources of a waste load prior to discharge and failure to provide verifiable, complete, and accurate information in the manner required by the Operator in Charge at the Tri-City WRRF.
- b. Failure to pay all fees and charges for discharging septic tank wastes within thirty (30) days of billing by the District.
- c. Any act which is named a cause for forfeiture of the surety bond, as outlined in Section 6.6.3.

6.6.7 Protecting the Public Interest

No provision of this section of the Rules and Regulations shall be construed to create any right in any individual to a Septic Tank Waste Discharge Permit or to disposition of septic tank wastes at a District facility, which in the opinion of the District would be inconsistent with the public interest.

Rules and Regulations

7. Surface Water Rules

This section presents the District's surface water rules. The purpose of these rules is to:

- Provide for the effective management of surface water, stormwater, and drainage.
- Maintain and improve water quality in the public surface water system and protect beneficial uses of waters of the state.
- Control hydromodification for the purpose of protecting in-stream physical habitat.
- Establish minimum stormwater management requirements to protect water quality of receiving waters and protect downstream parties from the effect of changes in runoff duration and quality due to development activities.
- Implement the requirements of the CWA, the Oregon DEQ NPDES municipal separate stormwater systems (MS4) permit, and other regulations related to stormwater by regulating the contribution of pollutants to the District's stormwater facilities and waters of the state from stormwater discharges from development and redevelopment sites.

7.1 Purpose and Objectives

The District declares its intention to acquire, own, construct, reconstruct, equip, operate, regulate, and maintain within the District, and outside the District limits when consistent with the Board's adopted policies or intergovernmental agreements, a public stormwater system, and to require persons responsible to construct, reconstruct, maintain, and extend the public stormwater system.

The construction of both the public stormwater system and private stormwater management facilities through or adjacent to a new development shall be provided by the person responsible for the development. Improvements shall comply with all applicable District Rules and Regulations, state and federal standards, and local city ordinances, policies, and standards.

No portion of this section, subsequent interpretations of this section, or policies adopted to implement this section shall relieve any property owner of assessments levied against real property for a local improvement project or for abating conditions on the property that violate any provision of these Rules and Regulations.

Stormwater shall be managed in accordance with the District's Stormwater Standards to avoid a negative impact on adjoining properties, nearby streams, wetlands, groundwater, and other water bodies. All local, state, and federal permit requirements related to implementing stormwater management facilities must be met prior to facility use. Surface water discharge from on-site stormwater management facilities shall be conveyed via a drainage system approved by the District.

7.2 Applicability

These Rules and Regulations apply to any property that discharges or requests to discharge, via connection request, development permit, or change in use, to the District's public stormwater system, to groundwater, or to surface waters within District boundaries. These Surface Water Rules apply in Rate Zones 2 and 3.

Stormwater management requirements apply to all new development and redevelopment activities that result in 5,000 or more square feet of new or replaced impervious area. Stormwater runoff from the new development and redevelopment areas must meet the technical

standards found in the Stormwater Standards. These same standards apply to impervious areas subject to a change in point of discharge.

Source control requirements apply to development proposals with high-risk characteristics. Development proposals include new development, redevelopment, tenant improvements, or to existing sites that propose new offsite discharges. High-risk characteristics and the required source controls are identified in the Stormwater Standards. Source control requirements are applied to areas where the high-risk characteristics occur and any areas that are hydraulically connected to those areas.

Erosion control requirements apply to all development and construction related activity. Sites that disturb 800 square feet or more are required to obtain an Erosion Prevention and Sediment Control Permit from WES.

7.3 Discharge Regulations and Requirements

7.3.1 Compliance with Permits

Any industrial discharger, discharger associated with construction activity, or other discharger subject to any valid NPDES or Water Pollution Control Facility permit issued by the DEQ, from which pollutants may enter the public or private stormwater system, shall obtain and comply with all provisions of such permits, including notifying and cooperating with local entities as required by state and federal regulations. Proof of compliance with said permits may be required in a form acceptable to the District prior to issuance of any grading, building, occupancy permits, or business license. At the District's request, the discharger shall submit a copy of Discharge Monitoring Reports required by NPDES or Water Pollution Control Facility permits to the District.

7.3.2 Compliance with State, Local, and Federal Regulations

All users of the public stormwater system and any person or entity whose actions may affect the system shall comply with all applicable federal, state, and local laws. Compliance with the requirements of this section shall in no way substitute or eliminate the necessity for compliance with applicable federal, state, and local laws.

7.3.3 Accidental Spill Prevention and Control

Dischargers who handle, store, or use hazardous or toxic substances (or discharges prohibited under Section 7.7 shall, upon written request of the District, prepare and submit an Accidental Spill Prevention and Control Plan to the District for submittal. If other laws or regulations require an Accidental Spill Prevention and Control Plan, a plan that meets the requirement of those other laws and regulations will satisfy the requirement of this section.

7.3.4 Notification of Spills

As soon as any person in charge of a facility or responsible for emergency response for a facility becomes aware of any suspected, confirmed, or unconfirmed release of material, pollutants, or waste creating a risk of discharge to the public stormwater system and/or surface waters, such persons shall immediately do the following:

- A. Begin containment procedures.
- B. Notify proper emergency personnel in case of an emergency.
- C. Notify appropriate District and/or state officials regarding the nature of spill.

- D. Dischargers shall immediately take all reasonable steps to minimize the effects of an illicit discharge to the public storm sewer and drainage system or any waters of the state. These actions may include cleaning the impacted public and private system components under public direction or performing additional monitoring to determine the nature and extent of the discharge.
- E. Follow-up with the District regarding compliance and modified practices to minimize future spills, as appropriate. The Director may require dischargers to make structural or operational modifications to their facilities, equipment, or drainage systems or to take other measures to protect the public storm sewer and drainage system. Such structures and site modifications must be reviewed and approved by the Director to determine sufficiency.

The notification requirements of this section are in addition to any other notification requirements set forth in federal, state, or local regulations and laws. The notification requirements do not relieve the person of necessary remediation.

7.3.5 Removal of Illicit Connections

The District may require by written notice that a person responsible for an illicit connection to the public stormwater system comply with the requirements of this section to eliminate the illicit connection or secure approval for the connection by a specified date.

7.3.6 Removal of Illicit Discharges

Whenever the District finds that a discharge of pollutants is taking place or has taken place which will result in, or has resulted in, pollution of stormwater or the public stormwater system, the District may require, by written notice, that the discharge cease, the pollution be remediated, and the affected property restored.

Whenever the District determines that any person engaged in any activity and/or owning or operating any facility which may cause or contribute to stormwater pollution or illicit discharges to the public stormwater system, the District may, by written notice, order that such person undertake such monitoring activities and/or analyses and furnish such reports as the District may deem necessary to demonstrate compliance with the requirements of these Rules and Regulations.

The written notice shall be served either in person or by certified or registered mail, return receipt requested, and shall set forth the basis for such order and shall particularly describe the monitoring activities and/or analyses and reports required.

The burden to be borne by the owner or operator, including costs of these activities, analyses, and reports, shall bear a reasonable relationship to the need for the monitoring, analyses, and reports and the benefits to be obtained.

The recipient of such order shall undertake and provide the monitoring, analyses, and reports within the time frames set forth in the order.

7.4 Stormwater Management Requirements

This section establishes performance standards for stormwater systems and stormwater management facilities.

7.4.1 General Policy

All development shall be planned, designed, constructed, and maintained to:

- A. Protect and preserve existing streams, creeks, natural drainage channels, and wetlands to meet state and federal requirements or to the maximum extent practicable.
- B. Protect property from flood hazards. Provide an overflow route for runoff if the system fails.
- C. Provide a system by which storm/surface water within the development will be controlled without causing damage or harm to in-stream conditions or habitat, or to property or persons.

Development projects shall not be phased or segmented in such a manner to avoid the requirement of these Rules and Regulations.

7.4.2 Stormwater Review

All development and redevelopment activities that result in 5,000 sf or greater of new or replaced impervious surface area, cumulative over the last three years, are subject to stormwater review including, but not limited to, developments that are subject to land use review and building permitting processes. These processes generally include all land use proposals, site development, and permit approvals within, or proposed to be within, District boundaries. The stormwater requirements can be found in the District's Stormwater Standards.

7.4.3 Stormwater Review Exemptions

Projects in the following categories are generally exempt from stormwater review:

- A. Residential structures being re-built following fire damage, flooding, earthquake, or other natural disasters, as long as the structure is re-built at the same scale and discharging to the same disposal point. Expansions to the original footprint, such as adding or altering the original structure, may trigger stormwater management requirements for the expanded impervious area.
- B. Interior remodeling projects and tenant improvements.
- C. Stream enhancement or restoration projects approved by the County.
- D. Development activities that are considered farming and forest practices that are also exempt from local zoning ordinances, land-use approval and building code requirements including roads, structures, and site improvement for properties that are located outside of the UGB where stormwater is managed through dispersion with no direct connection to the public drainage system. Buildings and site development improvements associated with farm and/or forest practices that are required to obtain a building permit or land-use approval including structures, roads and impervious surface areas are subject to the requirements of these standards.
- E. Modular/temporary structures that will be removed at the completion of the project and do not have a direct connection to the public stormwater system.
- F. Actions by a public utility or any other governmental agency to remove or alleviate an emergency condition.
- G. Road and parking area preservation/maintenance projects such as pothole and square cut patching, surface sealing, replacing, or overlaying of existing asphalt or concrete pavement, provided the preservation/maintenance activity does not disturb the native subgrade or expand the existing area of impervious coverage above the thresholds provided in the Stormwater Standards.

- H. Underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics.
- I. Non-pollution generating, linear projects (e.g., pedestrian and bicycle pathways, sidewalks, trails, and ramps) that disperse stormwater runoff into vegetated areas, as long as there is no connection to a storm system as part of the project.

7.4.4 Stormwater Minimum Requirements

The District restricts the uncontrolled and untreated discharge of stormwater runoff into any stormwater system and/or natural drainageway. The District's Stormwater Standards are intended to provide the basic design criteria necessary to mitigate stormwater runoff. The District Stormwater Standards address flow control, water quality, conveyance system design, downstream analysis, safe overflow pathway, erosion prevention and sediment control, source control for high pollutant activities, and operations and maintenance.

7.4.5 Submittals

Development plans subject to the District Rules and Regulations and Standards shall be prepared by a licensed professional engineer registered in the State of Oregon. All plans and reports must be stamped and signed by the project engineer. For additional information on the submittal requirements see the applicable appendices of the Stormwater Standards.

7.4.6 Construction and Certification

All publicly maintained infrastructure such as conveyance systems, vaults, stormwater facilities, or other improvements shall be constructed per the District's standards and specifications.

Following completion of construction, the engineer shall submit applicable as-built drawings and documents, stamped by a professional engineer, indicating all of the infrastructure has been inspected and installed per approved plans and/or approved changes.

7.5 Source Control Requirements

7.5.1 Purpose

The purpose of this section is to minimize the risk of specific site uses and characteristics that have the potential to generate higher levels of pollutants than typical stormwater runoff. The objective is to manage pollutants at the point of generation, reduce their transport into stormwater, and mitigate potential impacts. Source controls may include, but are not limited to, requirements for cover, drainage, containment, discharge to sanitary sewer, hydraulic isolation, shut-off valves, and operational activities such as spill prevention, signage, and storage.

7.5.2 General Policy

Development proposals that include site uses or characteristics that can contribute pollutants to stormwater must manage and mitigate those impacts as a condition of development. Source control requirements are included in the District's Stormwater Standards.

7.5.3 Maintenance of Source Controls

The property owner shall maintain all source controls required by the District as long as the tenant or site occupant continues operation with the same site uses or characteristics.

7.5.4 Inspection

The source control measures shall be installed by the owner or their representative and shall be inspected and approved by a District inspector prior to the start of any site uses that triggered the source controls. The District inspector may inspect the development site to determine compliance with the source control plan and development permit at any time during the construction of the project. If applicable, the development site must satisfactorily pass a final inspection prior to District approval of the Certificate of Occupancy.

7.6 Erosion Control Requirements

7.6.1 Purpose

The purpose of this section is to minimize the amount of sediment, construction waste, and other pollutants reaching the surface water management system as a result of construction, grading, excavating, clearing, and any other activity which causes or accelerates erosion and to minimize the disturbance of existing vegetation. The objective is to control erosion at its source as a means of maintaining and improving water quality and minimizing water pollution, downstream flooding, and wildlife habitat damage.

7.6.2 General Policy

All development, regardless of permit applicability or status, shall keep sediment laden water and any other forms of stormwater pollution from entering the public stormwater system.

The requirements for erosion prevention and sediment control shall be implemented in accordance with the Erosion Prevention and Sediment Control (EPSC) Plan requirements included in the District's Stormwater Design Standards and the District's Erosion Prevention and Sediment Control Planning and Design Manual (EPSC Manual).

7.6.3 Measures During Construction

- A. Temporary and permanent measures for all construction projects shall be required to lessen the adverse effects of erosion and sedimentation. The owner or their agent shall properly install, operate, and maintain both temporary and permanent works to protect the environment, adjacent properties, and the public storm system during the useful life of the project. No visible or measurable erosion shall leave the property during construction or during activity. The owner of the property, together with any person who causes such action from which the visible or measurable erosion occurs, shall be responsible for cleanup, fines, and damages. Cleanup responsibilities include cleaning up the storm system, creeks, drainage ways, wetlands, or rights-of-way impacted by a project. For the purposes of this section "visible and measurable erosion" includes, but is not limited to, the following:
 - a. Deposits of mud, dirt, sediment, construction waste such as concrete washout debris or saw cutting slurry, construction materials such as rocks or asphalt, or similar material on public or private streets, adjacent property, or into the storm

- and surface water system, either by direct deposit, dropping, discharge, or as a result of the action of erosion or construction activity
- b. Evidence of concentrated flows of water over bare soils; turbid or sediment-laden flows; or evidence of on-site erosion such as rivulets or bare soil slopes, where the flow of water is not filtered or captured on the site
 - c. Earth slides, mud flows, earth sloughing, or other earth movement, which results in material leaving the property
- B. Dust and other particulate matters containing pollutants have the potential to settle on property and be carried to waters of the state through rainfall or other means. Dust shall be minimized to the extent practicable, utilizing all measures necessary.
 - C. Maintenance and repair of existing facilities shall be the responsibility of the applicant.
 - D. The applicant is responsible for updating the EPSC Plan with additional controls and resubmitting to the District if the approved EPSC Plan is determined to be ineffective or inadequate for changing site and weather conditions.
 - E. EPSC measures set forth in any approved erosion control plan shall be implemented and maintained on the site until the completion of the project. The District may allow for the removal of selected erosion control measures at an earlier date if erosion control is assured by established landscaping and approved by the District.

7.6.4 Erosion Prevention and Sediment Control Permit

The applicant for a development permit shall submit an EPSC Plan as part of the application specifying appropriate BMPs. An EPSC Permit is required under the following conditions:

- A. Prior to placement of fill, site clearing, or land disturbances, including, but not limited to, grubbing, clearing, or removing ground vegetation, grading, excavating, or other activities, any of which results in the disturbance or exposure of soils covering an area of 800 square feet or greater.
- B. For disturbed areas or exposed soils of areas less than 800 square feet, where the District has determined that site conditions may result in visible and measurable erosion and where the District has provided written notice of the requirement to obtain an EPSC Permit to the property owner. Upon notice by the District, all work shall cease pending receipt of an EPSC Permit and installation of approved erosion control measures.
- C. For any lot that includes natural resources regulated by the District, an EPSC Permit shall be required prior to placing fill, site clearing, or disturbing land, including, but not limited to, grubbing, clearing or removing ground vegetation, grading, excavating, or other activities, any of which has the potential for, or results in, visible and measurable erosion, regardless of the area of disturbance.

Timing

Obtaining the EPSC Permit is required prior to the following, whichever comes first:

- A. Issuance of grading permits, building permits, construction plans and other applicable development permits.

- B. Placement of fill, site clearing, land disturbances, including, but not limited to, grubbing, clearing, or removing ground vegetation, grading, excavating, or other activities, any of which disturbs or exposes soil.

Permit Duration

- A. Development or construction must be initiated as per the approved final development plans within one (1) year of the date of EPSC Permit issuance or the permit will be null and void. If a Hearings Officer or the Board specify a period for commencing development, that period shall supersede.
- B. EPSC Permits (excluding 1200-C and 1200-CN permits) issued by the District shall expire and become null and void 24 months after the date of permit issuance unless extended by the District.
 - a. If the work authorized by such permit has not received final inspection approval prior to the permit expiration date, and the permit has not been extended by the District, all work shall stop until a new permit is obtained that conforms to the erosion control regulations in effect at the time of re-application.
 - b. The District may extend the time for action by the permittee for a period not exceeding 12 months in the District's sole and absolute discretion on written request by the permittee showing that circumstances beyond the control of, and unforeseeable by, the permittee have prevented work from being completed.
- C. All 1200-C and 1200-CN permits shall expire and become null and void if the permit is not renewed annually or as per the general permit schedule set forth by the DEQ.

7.6.5 Erosion Prevention and Sediment Control Plan

Prior to approval of an EPSC Permit, the applicant shall submit an EPSC Plan for review and approval. The EPSC Plan shall be developed in accordance with the Erosion Prevention and Sediment Control Planning and Design Manual. The EPSC Plan shall contain a list of BMPs to be used during construction to control and limit soil erosion in accordance with the District's current EPSC Manual. The EPSC Plan shall include a description of erosion control methods that are adequate to ensure that siltation and pollutants from the grading, site clearing, or construction are contained onsite during the period of activity on the site until the final landscaping is sufficiently established to control erosion.

7.6.6 Approval Process Fees

Fees for EPSC Plan review, site inspections, related activities, and the District's EPSC Manual will be set and adopted by the Board.

7.6.7 Maintenance and Amendment of Inadequate Measures

The permittee shall maintain all facilities required by an approved EPSC Plan to assure their continued effectiveness during construction or other permitted activity. If the facilities and techniques approved in an erosion control plan are not effective or sufficient as determined by the District Site Inspector, the permittee shall submit a revised plan within three (3) working days of written notification by the District. In cases where erosion is occurring, the District may require the permittee to immediately implement interim control measures in accordance with the enforcement procedures in Section 10.

Upon District approval of the revised plan, the permittee shall immediately implement the revised plan. The permittee shall also immediately remove any eroded sediment carried or tracked onto pavement surfaces, off-site areas, or into the surface water management system such as storm drain inlets, pipes, ditches, culverts, stream corridors, wetlands, or other water bodies. Sediments shall be removed from wetlands, vegetated swales, stream corridors, and water bodies in accordance with District Rules and Regulations and federal, state, and local jurisdictions.

7.6.8 Inspection

The erosion control measures shall be installed by the owner or their representative and shall be inspected and approved by a District inspector prior to the start of any excavation work. The permittee or their designated representative shall be responsible for inspecting and monitoring the site erosion controls during the project and keeping records of their inspection. These records shall be made available to District staff upon request. The District inspector may inspect the development site to determine compliance with the erosion and sediment control plan and permit at any time during the construction of the project. If applicable, the development site must satisfactorily pass a final erosion control inspection prior to District approval of the Certificate of Occupancy.

7.7 Stormwater Discharge Prohibitions

7.7.1 Non-Stormwater Discharge Prohibitions

The commencement, conduct, or continuance of any non-stormwater discharge to the public stormwater system or surface waters is prohibited and is a violation of this section, except as outlined below:

- A. The prohibition shall not apply to any non-stormwater discharge permitted or approved under a valid Industrial or Municipal NPDES Permit, waiver, or discharge order issued to the discharger and administered by the DEQ, provided that the discharger is in full compliance with all requirements of the permit, waiver, or discharge order and other applicable laws or regulations and provided that written approval has been granted by the District for any discharge to the Public Stormwater Conveyance System.
- B. The prohibition shall not apply to the following non-stormwater discharges to the public stormwater system: uncontaminated water line flushing, landscape irrigation, diverted stream flows, rising groundwater, uncontaminated groundwater infiltration (as defined in 40 CFR 35.2005(20)) to the District's Public Stormwater System, uncontaminated pumped groundwater, discharges from potable water sources, startup flushing of groundwater wells, foundation drains, air conditioning condensation, irrigation water, dechlorinated swimming pool discharges, springs, water from crawl space pumps, footing drains, lawn watering, individual car washing, charity car washing¹, flows from riparian habitats and wetlands, fire hydrant flushing, street wash water, routine external building wash-down², water associated with dye

¹ Provided that chemicals, soaps, detergents, steam, or heated water are not used. Washing is restricted to the outside of the vehicle, no engines, transmissions, or undercarriages.

² Provided that chemicals, soaps, detergents, steam, or heated water are not used.

testing activity, discharges of treated water from investigation, removal and remedial actions selected or approved by the DEQ, and flows from firefighting. This assumes these discharges are not significant source of pollution.

Discharge of flows to the public or private stormwater system from private washing of sidewalks, streets, and parking lots are discouraged to the maximum extent practicable.

The Director may require BMPs to reduce pollutants or may prohibit a specific discharger from engaging in a specific activity identified in Section 7.7 if at any time the Director determines that the discharge is, was, or will be a significant source of pollution.

7.7.2 Discharge in Violation of Permit

Any discharge that would result in or contribute to a violation of a Municipal NPDES Permit, either separately considered or when combined with other discharges, is a violation of this section and is prohibited. Liability for any such discharge shall be the responsibility of the persons causing, or responsible for, the discharge, and such persons shall defend, indemnify, and hold harmless the District in any administrative or judicial enforcement action against the permit holder relating to such discharge.

7.7.3 Illicit Connections and Illicit Discharges

No person shall establish, use, maintain, or continue illicit connections to the public stormwater system, or begin or continue any illicit discharges to the public stormwater system or surface waters.

7.7.4 Waste Disposal Prohibitions

No person shall throw, deposit, leave, maintain, keep, or permit to be thrown, deposited, left, or maintained, in or upon any public or private property, driveway, parking area, street, alley, sidewalk, catch basin, inlet, or other component of the public stormwater system, materials that may cause or contribute to pollution, including, but not limited to, any refuse, rubbish, garbage, fuels, oils, litter, yard debris, landscape materials, compost, topsoil, bark, gravel, sand, dirt, sod, sediment or sediment-laden runoff from industrial, construction or landscaping activities, hazardous materials, or other discarded or abandoned objects, articles, and accumulations.

Commercial or industrial operations or businesses shall not discharge any process water directly to a private or public stormwater system or surface waters except as permitted or approved under a valid Industrial or Municipal NPDES permit, waiver, or discharge order issued to the discharger and administered by the DEQ. This includes, but is not limited to, outdoor commercial, industrial, or business activities that create airborne particulate matter, process by-products or wastes, hazardous materials, or fluids from stored vehicles, where runoff from these activities discharges directly or indirectly to a private or public stormwater system or surface waters.

7.7.5 General Discharge Prohibitions

No person or person in charge of property shall discharge or cause to be discharged into the public stormwater system any of the following:

- A. Any discharge that may harm human health or aquatic life when discharged to a surface water.

- B. Any discharge in violation of the conditions of the discharger's NPDES or other permit or authorization.
- C. Any unauthorized discharge that is intentionally routed to District Underground Injection Control (UIC) systems.
- D. Any discharge with any of the following characteristics or materials:
 - a. A visible sheen
 - b. A visible discoloration including, but not limited to, those attributable to dyes and inks, except for non-toxic dyes used or approved by the District to investigate the potential source of an illicit connection
 - c. Any discharge having a pH of less than 6.5 or greater than 8.5 or that contains toxic chemicals
 - d. Heat that could damage or interfere with any element of the District's storm sewer and drainage system or that causes or contributes to a violation of the receiving-water temperature standards
 - e. Toxic substances at concentrations that cause or contribute to violations of in-stream water quality standards set by the DEQ or that exceed remedial action goals defined in a DEQ or EPA Record of Decision for the protection of surface water or sediment
 - f. Any discharge containing human sanitary waste or animal feces
 - g. Refuse, rubbish, garbage, discarded or abandoned objects, articles, or accumulations of discharges that contain visible floating solids
 - h. A Process Wastewater, unless authorized to discharge under a DEQ permit
 - i. A volume that causes or contributes to an exceedance of the planned capacity of the storm sewer and drainage system, as established by the Director
 - j. Liquids, solids, or gases which, either alone or by interaction, could cause a fire or an explosion including waste streams with a closed-cup flashpoint of less than 140° F (60° C) (using test methods described by 40 CFR 261.21); or discharges which cause the atmosphere in any portion of the city's storm sewer and drainage system to reach a concentration of 10 percent or more of the lower explosive limit per National Institute for Occupational Safety and Health standards
 - k. A substance that causes or may cause a nuisance, hazard, interference, obstruction or damage to the District's storm sewer and drainage system, District personnel, the general public, receiving waters, or associated sediments
 - l. Any substance that causes or contributes to a violation of the terms of the District's NPDES MS4 Discharge Permit or Water Pollution Control Facility for Class V UIC Permit or in-stream water quality standards set by the State of Oregon



Rules and Regulations

8. Natural Resources and Vegetated Buffers

8.1 Purpose and Objectives

The provisions of this section are intended to prevent and reduce adverse impacts and to enhance drainageways and water resources. These requirements are intended to protect the beneficial uses of drainageways and water resources within the District in combination with other state, federal, county, and local laws, and ordinances.

Water Quality Resource Areas (WQRAs) are protected areas that are located along the edge or perimeter of water resources such as streams, lakes, ponds, reservoirs, and wetlands. WQRAs provide water quality treatment and habitat protection. The District's requires WQRAs for all new developments and redevelopments that are bounded by or contain water resources.

The District requires WQRAs to protect the water quality of water resource areas, which include perennial and intermittent streams and wetlands.

8.2 Applicability within District

The provisions of this section shall apply to all development or redevelopment of property within the District. No person shall undertake development activities on a parcel in the District that contains water resources without first obtaining WQRA approval from the District.

8.3 Applicability with Other Agency Requirements

The applicant shall, at a minimum, meet the District WQRA requirements as provided in the Buffer Standards. However, the local planning authority may have additional requirements, which may be more or less restrictive than the District requirements; local, state, or federal agencies may have similar requirements that may or may not align with the District's requirements and policies for WQRAs.

8.4 General Requirements

All parcels containing a water resource or within 200 feet of a water resource located on an adjacent parcel must submit to the District for a WQRA Boundary Verification prior to any development activity. Any parcel with a WQRA must submit to the District for a WQRA Development Permit prior to any development activities.

Any impacts to the WQRA must be mitigated as calculated by the Buffer Standards.

The preliminary site plan must meet design requirements and submittal requirements laid out in the Buffer Standards, including, but not limited to documentation methodology, vegetated corridors widths, mitigation priorities, and landscaping and planting plans.

A partition or subdivision of property that contains a WQRA shall require that the WQRA shall be platted as a tract rather than as part of any lot. The tract shall be protected from development by restrictive covenant, public dedication, or District approved equivalent. However, the tract may be subject to an easement conveying storm and surface water management rights to the surface water management authority.

8.5 General Prohibitions

The following uses and activities are prohibited within a WQRA:

- A. The planting of invasive non-native or noxious vegetation; and
- B. Uncontained areas of hazardous materials as defined by the Oregon Department of Environmental Quality



Rules and Regulations

9. Use of Public Property

9.1 Purpose and Objectives

The purpose of this section is to protect the District's public property; protect the health, safety, and welfare of the public using such areas; ensure the best use of and benefits from such areas; and provide for legal remedies for violation of these Rules. The North Clackamas Park and Recreation District is authorized to maintain District natural areas as directed.

9.2 Applicability

This section shall apply to all properties that are owned, operated, or managed by the District.

9.3 Entry and Access to Public Property

The District may assess a fee for access to or use of District property, such as a parking fee or an entrance fee. These fees will be approved by the Board.

District properties (excluding buildings) designed for public use are open half an hour before sunrise and close half an hour after sunset unless otherwise established by the District and indicated on signs posted at the property.

9.4 Permits Required

A special use permit shall be obtained prior to pursuing the following activities in any District-owned property:

- A. Movie, commercial or television filming, photography, and production.
- B. Organized events, except those specifically hosted by the District.
- C. Special educational events or festivals, except those specifically hosted by the District when such events are held in District-owned properties.
- D. The District may, from time to time, designate certain District properties where alcohol may be brought for use in meal preparation or consumption by issuing a permit for this purpose. Said permit will be in addition to any permit required by the Oregon Liquor Control Commission.
- E. The District may, by issuance of a permit, allow the sale of alcoholic beverages on the premises of designated facilities when duly licensed by the Oregon Liquor Control Commission. For parks located within the District, such permits shall be administered and issued by the District.

The Director or authorized designee, or any law enforcement officer may revoke any permit when it has been issued erroneously or when a law enforcement officer has probable cause to believe the permit holder or any person in his or her custody, control, or family under that permit, has violated any of the provisions of these Rules and Regulations or any state, county, or federal law.

9.4.1 Production of Permits Required

Any permit issued by the District will be kept at the site of the permitted activity for the duration of the activity. No person shall fail to produce and exhibit, upon the request of any law enforcement officer or District employee, any required permit from the Director the person claims to have.

9.4.2 Impeding Permittee Prohibited

No person shall disturb or interfere unreasonably with any person or party occupying any area of a District property or participating in any activity under the authority of a permit.

9.5 Exclusion from Public Property

- A. The Director or authorized designee is hereby authorized to close to public use any District owned and/or maintained properties, or portion thereof, restrict the times when any District owned or maintained area shall be open to such use, and limit or prohibit public use whenever such action is necessary to protect the health or safety of the public or maintain proper function of the public facilities. Cause for closure or limitation on use may include sanitary conditions; protection of the watershed; construction or repairs; conservation of fish and wildlife; excessive traffic; unsafe or overcrowded shoreline, ramp, parking, or road conditions; prevention of damage to public facilities; or any dangerous, unsafe, or unhealthful conditions.
- B. Authorized District employees, District's agents, and law enforcement officers shall have the authority to cite or eject from a District property any person who violates either any of the rules herein or an exclusion order.
- C. Any person whose permit has been revoked and all other persons in his or her custody, control, and family under that permit shall immediately leave the District's property.
- D. No person who has been ordered to leave a District property by a law enforcement officer, District employee, or District's agents shall remain therein.

9.6 General Prohibitions

Unless specifically allowed through a Special Use Permit or other written agreement with the District, the following prohibitions apply to District owned property.

9.6.1 Entry to Property

Other than law enforcement officers, authorized District employees, or Districts agents, No Person Shall:

- A. Enter any District property, or park a vehicle on District property, without permission of the District, except on District properties designated for public use.
- B. Enter or remain in any District property, or park a vehicle on District property, after the daily closing time and before the daily opening time without permission of the District. Vehicles in violation of this regulation are subject to tow in accordance with Clackamas County Code Chapter 7.01.
- C. Fail to produce, upon request of any law enforcement officer or District employee, while within the boundaries of any District property, any required proof of entrance and/or fee payment if it is required.

9.6.2 Alterations of or to District Property

No person shall:

- A. Mutilate, deface, damage, move, or remove any table, bench, building, sign, marker, monument, fence, barrier, fountain, faucet, traffic recorder, or other structure or facility of any kind.
- B. Dig up, deface, or remove any dirt, stones, rock, or other substance whatever, make any excavation, quarry any stone, lay or set off any blast, or cause or assist in any of the foregoing activities.
- C. Plant any tree or shrub in any District property without written permission of the District.
- D. Except in designated areas, erect temporary signs, markers, or inscriptions of any type without permission from the District.
- E. Pick, cut, mutilate, or remove any flowers, shrubs, foliage, trees, or plant life or products of any type. However, from time to time the District may authorize the removal of non-native species or issue a special use permit for the collection of plant material for the purpose of scientific study.

9.6.3 Fires

No person shall build a fire on any District property.

9.6.4 Hunting, Fireworks and Weapons

No person shall within any District property:

- A. Hunt, pursue, trap, kill, injure, or molest any bird or animal or have in possession any wild animal, bird, fish, or reptile or the eggs or nest of any bird or reptile except for county, state, or federal officers enlisted to remove dangerous or threatening wildlife. However, sport angling is permitted in compliance with rules and regulations promulgated by Oregon Department of Fish and Wildlife (ODFW). From time to time the District may permit the collection of fish or wildlife specimens for the purpose of scientific study when such collection has been authorized by ODFW. Salvage of aquatic species during stream dewatering for a restoration project under the supervision of ODFW or a qualified contractor is allowed.
- B. Discharge, for any reason, any firearm, pellet gun, paint ball gun, bow and arrow, slingshot, or other weapon, except for a law enforcement officer in the discharge of their official duties.
- C. Possess any loaded firearm, except for a law enforcement officer in the discharge of their official duties.
- D. Remove any weapon from the owner's vehicle while in a District property except for a law enforcement officer. All weapons that are stored in a public citizen's vehicle, in a District property, shall be completely unloaded at all times except for those carried by a law enforcement officer.

9.6.5 Consumption of Alcoholic Beverages

Except authorized District employees and agents, no person shall possess or consume alcoholic beverages except as authorized by a Special Use Permit from the District.

9.6.6 Concessions and Solicitations

No person shall:

- A. Operate a concession, either fixed or mobile.
- B. Solicit, sell, or offer for sale, peddle, hawk, or vend any goods, wares, merchandise, food, liquids, or services without having obtained a permit or contract from the District.
- C. Advertise any goods or services, except signs painted or mounted on vehicles in personal use.

9.6.7 Animals

No person shall:

- A. Ride, drive, lead, or keep a horse or other livestock in any District property except when used for official business by a law enforcement office.
- B. Bring any animal, other than service animals, into any District building except as may be permitted by the District for special events.
- C. Allow any animal in his or her custody or control to annoy, molest, bark continuously, attack, or injure any person or animal in the District property.
- D. Tie up any animal in his or her custody or control and leave such animal unattended.
- E. Leave their animal's waste within a District property unless it is placed in a bag or container and left in a designated waste receptacle.

9.6.8 Motor Vehicles

No person shall:

- A. Operate any motor vehicle in violation of the State Motor Vehicle Code and other laws.
- B. Operate any motor vehicle at a speed in excess of 10 miles per hour unless otherwise designated.
- C. Park a motor vehicle any place other than in designated parking areas.
- D. Operate a motor vehicle or bicycle on any area or trail that is not specifically designated for motor vehicle or bicycle use, that is posted as closed to the public, or on which signs have been placed by authority of the District prohibiting the operation of motor vehicles or bicycles.
- E. Leave any vehicle at any District property after hours or overnight without having obtained written permission from the District.

9.6.9 Waste Disposal

No person shall:

- A. Leave any trash, refuse, garbage, litter, waste material, vehicles, bottles, cans, ashes, waste, paper, garbage, sewage, fish entrails, and other rubbish or refuse outside of receptacles designated for that purpose.
- B. Throw, discharge, or otherwise place or cause to be placed in the soils of any District property or the waters of any fountain, pond, lake, stream, or other body of water any matter or thing which will or may result in the pollution of those waters or soils.

9.6.10 Camping

No Person shall camp overnight or longer on any District property.

9.6.11 Noise

No Person shall:

- A. Set up or use a public address system without having secured a special use permit from the District.
- B. Operate or use any noise-producing machine, vehicle, device, or instrument in a manner that is disturbing to other District visitors.

9.6.12 Behavior

No person shall use abusive or threatening language or gestures, create any public disturbance, panhandle, or engage in riotous behavior.



WES Rules and Regulations

10. Enforcement

This section presents an overview of the enforcement policies, methods, and processes used by the District.

10.1 Purpose and Objectives

The Director, or their designee, may enforce all of these Rules and Regulations, and any law enforcement officer may enforce the rules of Section 10. Anyone authorized may use the procedures of this section in order to enforce these Rules and Regulations. No person shall harass, obstruct, interfere with, or disobey the direction of any law enforcement officer or District employee carrying out the enforcement of these Rules and Regulations. The formal enforcement action as described in these sections in no way limits the District from seeking other legal or equitable remedies in the proper court as provided by Oregon law.

10.1.1 Other Laws Applicable

These Rules and Regulations shall in no way be substitute for or eliminate the necessity of conforming with any and all state laws and rules and other ordinances, which are now or may be in the future in effect which relate to the activities regulated in this ordinance.

10.1.2 Severability

If any section, subsection, sentence, clause, phrase, or portion of these Rules and Regulations is for any reason held invalid or unconstitutional by a court of competent jurisdiction, that portion shall be considered a separate, distinct, and independent provision, and the holding shall not affect the validity of the remaining portion.

10.1.3 Fines or Civil Penalties

All monetary fines or civil penalties shall be set by the Board and may be in addition to any fines or fees set by DEQ.

10.1.4 Remedies Nonexclusive

The remedies provided for in this ordinance are not exclusive. The Director may take any, all, or any combination of these actions against a noncompliant Person. Enforcement of violations will generally be in accordance with the WES's enforcement response plan. However, the Director may take other action against any Person when the circumstances warrant. Further, the Director is empowered to take more than one enforcement action against any noncompliant Person.

10.2 Violations

Whenever the Director has reason to believe that a use or condition exists in violation of any of the Rules and Regulations adopted thereunder, they are authorized to initiate enforcement action. The violation will be documented by the use of a citation, which form shall vary depending on the violation, further described in Section 10.6.

The District may impose civil penalties, including, but not limited to, stop work orders, fines, and modification or revocation of permit and/or cessation of services or seek an injunction or other

relief provided by law when any user or person violates any condition or provision of these Rules and Regulations or any final order entered with respect thereto as well as violation of federal or state statutes, regulations, or administrative rules.

The goal of enforcement is to (a) obtain and maintain compliance with applicable federal and state statutes or administrative rules, ordinances, Rules and Regulations, permits and orders; (b) protect the public health and the environment; (c) deter future violators and violations; and (d) ensure appropriate and consistent enforcement. Except as provided in Section 10.7, the District shall endeavor by conference, conciliation, and persuasion to solicit compliance. The District shall address all documented violations in order of seriousness at the most appropriate level of enforcement necessary to achieve the goals set forth herein under the circumstances of each violation. The violators who do not comply with initial enforcement action shall be subject to increasing levels of enforcement until compliance is achieved.

10.3 Declaration of Intent

- A. All violations of the Rules and Regulations are determined to be detrimental to the stormwater system, sanitary sewer system, or the environment and are hereby declared to be a public nuisance. All conditions which are determined by the Director to be in violation of the Rules and Regulations shall be subject to the provisions of this section and shall be corrected by any reasonable and lawful means as provided herein.
- B. The Director shall have the power to render interpretations in order to clarify the application of provisions of the Rules and Regulations. Such interpretations shall be in conformity with the intent and purpose of the Rules and Regulations.

10.4 Inspection, Entry, and Sampling

Authorized District representatives may inspect the property and facilities of any person, property, or facility to determine compliance with the requirements of these Rules and Regulations. The person shall allow the District or its authorized representatives to enter upon the premises at all reasonable hours for the purpose of inspection, sampling, or records examination. The District shall also have the right to set up on the person's property such devices as are necessary to conduct sampling, inspection, compliance, monitoring and/or metering operations. The right of entry includes but is not limited to access to those portions of the premises that contain facilities for sampling, measuring, treating, transporting, or otherwise handling surface water, wastewater, and storing records, reports, or other documents related thereto.

The District is authorized to conduct inspections and take such actions (including photographs) as required to enforce any provisions of these Rules and Regulations or any permit issued pursuant to these Rules and Regulations whenever the Director has reasonable cause to believe there exists any violation of these Rules and Regulations. If the premises are occupied, credentials shall be presented to the occupant and entry requested. If the premises are unoccupied and no permit has been issued, the District shall first make a reasonable effort to locate the owner or other person having charge or control of the premises and request entry. If entry is refused in either case, the District shall have recourse to the remedies provided by law to secure entry, including warrants for entry.

Where feasible, inspections shall occur at Reasonable Times. If a permit has been issued and the responsible party or their representative is at the site when the inspection is occurring, the Director or authorized representative shall first present proper credentials to the responsible party. The permittee or person having charge or control of the premises shall allow the Director or the Director's authorized representatives, agents, and contractors to:

- A. Enter upon the property where any regulated facility or activity is located or conducted, or where records must be kept under the conditions of a permit.
- B. Have access to and copy, at reasonable times, any records that must be kept under the conditions of a permit.
- C. Inspect at reasonable times the property, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required by these Rules and Regulations or under a permit.
- D. Sample or monitor at reasonable times, for the purpose of assuring permit compliance with these Rules and Regulations or as otherwise authorized by local or state law, any substances or parameters at any location.

10.4.1 Special Investigations

Whenever any work has been commenced, for which a permit or approval is required by the Rules and Regulations, without first obtaining said permit, a special investigation shall be made before a permit may be issued for such work.

An investigation fee, in addition to the permit or approval fee shall be collected whether or not a permit is then or subsequently issued. The investigation fee shall be equal to the base permit or approval fee required by the applicable requirements of these Rules and Regulations.

10.5 Suspension or Revocation of Permits

10.5.1 Suspension of Permits

The Director may temporarily suspend any permit issued under the authority of these Rules and Regulations for (a) failure of the holder to comply with the requirements of the Rules and Regulations thereunder or (b) failure to comply with any notice, citation, or order issued pursuant to these Rules and Regulations.

Such permit suspension shall be carried out through the citation and order provisions of these Rules and Regulations, and the suspension shall be effective upon service of the citation and order upon the holder or operator. The holder or operator may appeal such suspension as provided by these Rules and Regulations.

Notwithstanding any other provision of these Rules and Regulations, whenever the Director finds that a violation of the Rules and Regulations has created or is creating an unsanitary, dangerous, or other condition which, in their judgment, constitutes an immediate and irreparable hazard, they may, without service of a written citation and order, suspend and terminate operations under the permit immediately.

10.5.2 Revocation of Permits

In addition to the reasons cited in in these Rules, the Director may permanently revoke any stormwater or sanitary sewer related permit issued by the District for any of the following:

- A. Failure of the holder to comply with the requirements of these Rules and Regulations
- B. Failure of the holder to comply with any notice and order issued pursuant to the Rules and Regulations
- C. Interference with the District in the performance of their duties

- D. Discovery of the District that a permit was issued in error or on the basis of incorrect information supplied to the District
- E. Notice of noncompliance

Such permit revocation shall be carried out through the citation and order provisions of these Rules and Regulations, and the revocation shall be effective upon service of the citation and order upon the holder or operator. The holder or operator may appeal such revocation, as provided by these Rules and Regulations.

A permit may first be suspended pending its revocation or a hearing relative thereto the date the Director renders its final decision.

10.6 Citations for Violations

Whenever the Director has reason to believe that a violation of the Rules and Regulations has occurred, a written citation may be issued by the Director. The Director, or those authorized in by this section, may issue a written citation directed either to the owner or operator of the source of the violation, the person in possession of the property where the violation originates, or the person otherwise causing or responsible for the violation. The citation should be issued first against the violator where the violator is not the property owner (e.g., tenant), unless the seriousness of violation demands filing against a property owner.

10.6.1 Requirements of the Citation

The citation must be served in the manner prescribed in Section 10.12.4 and shall contain:

- A. As applicable: the citation number, case file number, and/or permit number.
- B. The street address when available and a legal description of real property and/or description of personal property sufficient for identification of where the violation occurred or is located.
- C. A statement that the Director, or their designee, has found the person or entity to be in violation of the Rules and Regulations on the property, with a brief and concise description of the conditions found to be in violation.
- D. A statement of the corrective action required to be taken. If the Director has determined that corrective action is required, the order shall require that all required permits be secured, and the work physically commence within such time and be completed within such time as the Director shall determine is reasonable under the circumstances.
- E. A statement specifying the amount of any civil penalty assessed according to Section 10.7 on account of the violation and, if applicable, the conditions on which assessment of such civil penalty is contingent. The civil penalty may be contingent on continued violation after an identified time period for corrective action.
- F. Statements advising that (a) if any required work is not commenced or completed within the time specified above, the Director may proceed to abate the violation as authorized by Section 10.9 and cause the work to be done and charge the costs thereof as a lien against the property and as a joint and separate personal obligation of any person in violation; and (b) if any assessed civil penalty is not paid, the Director will charge the amount of the penalty, and any costs of abatement undertaken pursuant to Section 10.9, as a lien against the property and as a joint and separate personal obligation of any person in violation.

- G. A statement advising that the citation shall become final unless, no later than ten (10) days after the citation is served, any person aggrieved by the order requests in writing an appeal before the Director or Hearings Officer.

Prior Notices and Exceptions

Except as otherwise provided, prior to the assessment of any civil penalty the District shall serve a citation upon the respondent. The written citation shall be served in the manner required by Section 10.12.4, specifying the violation, and stating that the District will assess a civil penalty if a violation continues or occurs after the date of corrective action specified in the citation.

The time allowance for corrective action is not required if (a) the act or omission constituting the violation is intentional or (b) the violation has already ceased to exist or is not expected to continue for more than five (5) days.

10.7 Civil and Criminal Penalties

In addition to or as an alternative to any other judicial or administrative remedy provided herein or by law, any person who violates any portion of the Rules and Regulations, or by each act of commission or omission procures, aids or abets such violation, shall be subject to a civil penalty as provided in this section; however, civil infractions shall be subject to civil penalty as provided in ORS 455.895.

In enforcing any of the requirements of the Rules and Regulations or procedures adopted hereunder, WES is authorized to refer violations of these Rules and Regulations to the proper authorities for investigation and enforcement as criminal matters. Pursuant to ORS 198.600, each and any violation of WES Rules is a Class C misdemeanor.

In addition to any liability, duty, or other penalty provided by law, the Director may assess a civil penalty for any violation pertaining to the District's regulations, permits, or orders by service of a written notice of assessment of civil penalty upon the owner or operator of the source of the violation, the person in possession of the property where the violation originates, or the person otherwise causing or responsible for the violation.

Each day that a violation occurs or continues shall be considered a separate violation.

For violations of discharge limits, each parameter that exceeds a discharge limit shall be considered a separate violation. In the case of a monthly or other long-term average discharge limit, penalties shall accrue for each day during the period of the violation.

10.7.1 Civil Penalties Matrix

The amount of any civil penalty shall be determined based on **Table 4** as follows:

Table 4. Civil Penalties

Type of Violation	Civil Penalty, Per Day
Industrial Wastewater Discharge Permit Violations	\$1,000
Regulated Activity without a Permit	\$500
Prohibited Discharge	\$500
Erosion Control	\$500
Water Quality Buffers	\$500
Stormwater Control Facilities	\$500

Trespass and other use of property	\$100
All other Violations	\$1,000

No civil penalty issued by the Director pursuant to this matrix shall be less than \$100 or more than \$10,000 for each day of each violation.

10.7.2 Civil Penalty Assessment

The Civil Penalty assessment shall contain the following information or blanks in which such information is entered:

- A. File number, citation number, or permit number
- B. Name of the person or business entity cited (Respondent)
- C. Name of the property owner
- D. Chapter and section of the rules and regulations violated
- E. A brief description of the violation of which the Respondent is charged in such manner as can be readily understood by a person making a reasonable effort to do so
- F. The date and place at which the violation occurred and the date on which the penalty was issued
- G. The place where the Respondent cited can appeal to the Director and the time within which such appeal must be filed
- H. The penalty assessed for the violation by schedule
- I. Statement to certify that there are reasonable grounds to believe that the Respondent cited committed a violation of the Rules and Regulations

10.8 Stop Work Orders

In addition to civil penalties described in Section 10.7, violations may be enforced by on-site control activities to mitigate existing violations of these rules including failure to follow approved plans and prevent future violations to the greatest extent possible. Initial violations will result in a written description of requirements for compliance and a specified period for compliance as included in the citation. If compliance is not achieved, or violations continue, the Director or designee may issue a stop work order on the project, which will remain in effect until the violation is repaired to the requirements stated in these Rules and Regulations. The District reserves the right to issue an immediate Stop Work Order if a threat is posed to human health or the environment. If the violation is not remedied or the person fails to commence diligently remedying the violation within 24 hours, the District may abate the violation in accordance with Section 10.9.

10.9 Abatement

In addition, or as an alternative to any other judicial or administrative remedy provided herein or by law, the Director may order a Rules and Regulations violation to be abated.

The Director may order any person in violation of the Rules and Regulations to commence corrective work and to complete the work within such time as a Director determines reasonable under the circumstances. The person, subject to the Director's order, shall either complete the corrective work or timely file an appeal. If the required corrective work is not commenced or completed within the time specified, the Director may proceed to abate the violation and cause the work to be done, upon receipt, by a court of competent jurisdiction, of an order authorizing

the same. The Director or District representative is expressly authorized to enter the property of the person committing the violation for the purpose of abatement of said violation. In addition, the District may perform tests on the property to trace sources of water quantity or quality related to the violation.

The actual cost of abatement, including incidental costs such as staff time, legal costs, costs of postage, and any other reasonable costs shall be included as abatement costs of 25 percent of the total fine. The Director will charge the costs thereof as a lien against the property and as both a joint and separate personal obligation of any person who is in violation. All challenges to the reasonableness of the cost charged may be raised at such time as the District undertakes a lien foreclosure.

10.10 Final Order

Any order duly issued by the Director pursuant to the procedures contained in these Rules and Regulations shall become final ten (10) days after service of the citation unless a written request for hearing is received by the Director within the 10-day period.

An order that is subjected to the appeal procedure shall become final twenty-one (21) days after a mailing of the Director's or Hearings Officer's decision.

10.10.1 Supplemental Notice of Violation

The Director may at any time add to, rescind in part, or otherwise modify a notice and order by issuing a supplemental notice and order. The supplemental notice and order shall be governed by the same procedures applicable to all notices and orders and contained in the Rules and Regulations.

10.10.2 Enforcement of Final Order

If, after any order duly issued by the Director has become final, the Respondent to whom such order is directed fails, neglects, or refuses to obey such order, including refusal to pay a civil penalty assessed under such order, the Director may complete any or all of the following actions:

- A. Cause such Respondent to be prosecuted under this title
- B. Institute any appropriate action to collect a civil penalty assessed under this title
- C. Abate the violation using the procedures of this title
- D. File with the County Clerk a certificate describing the property and the violation and stating that the owner has been so notified
- E. Pursue any other appropriate remedy at law or in equity under the Rules and Regulations

10.10.3 Settlement of Civil Penalty Claims

The Director is authorized to settle and compromise claims for civil penalties accruing pursuant to these Rules and Regulations where such settlement is clearly in the interests of the District provided that the Director shall periodically report such settlements and compromises to the Board.

In determining whether a penalty should be compromised or settled, the Director may take into account the following:

- A. New information obtained through further investigation or provided by Respondent, which relates to the penalty determination factors.

- B. The effect of compromise or settlement on deterrence.
- C. Whether Respondent has or is willing to employ adequate means to correct the violation or maintain compliance.
- D. Whether Respondent has had any previous penalties that have been compromised or settled.
- E. Whether the compromise or settlement would be consistent with the District's goal of protecting the public health and environment as described in Section 2.1.
- F. The relative strength or weaknesses of the District's case.

10.11 Recovery of Civil Penalty and Cost of Abatement

10.11.1 Lien Authorized

The District is authorized to have a lien for any civil penalty imposed or for the cost of any work of abatement done pursuant to this title, or both, against the real property on which the civil penalty was imposed or any of the above work was performed.

10.11.2 Personal Obligation Authorized

The civil penalty and the cost of abatement are also joint and separate personal obligations of any Respondent in violation. The prosecuting attorney on behalf of the District may collect the civil penalty and the abatement work costs by use of all appropriate legal remedies.

10.11.3 Priority

The lien shall be subordinate to all existing special assessment liens previously imposed upon the same property and shall be paramount to all other liens except for state and county taxes with which it shall be on a parity.

10.11.4 Claim of Lien

The District may file a claim of lien with the County Clerk within ninety (90) days from the date the civil penalty is due or within ninety (90) days from the date of completion of the work or abatement performed. The claim of lien shall contain the following information:

- A. The authority for imposing a civil penalty or proceeding to abate the violation, or both
- B. A brief description of the civil penalty imposed, or the abatement work done, or both, including the violations charged and the duration thereof, including the time the work is commenced and completed and the name of the persons or organizations performing the work
- C. A description of the property to be charged with the lien
- D. The name of the known owner or reputed owner, and if not known, the fact shall be alleged
- E. The amount, including lawful and reasonable costs, for which the lien is claimed

The Director or their authorized representative shall sign and verify the claim by oath to the effect that the affiant believes the claim is just.

The claim of lien may be amended in case of action brought to foreclose same, by order of the court, insofar as the interests of third parties shall not be detrimentally affected by amendment.

10.11.5 Duration of Lien

No lien created by these Rules and Regulations shall bind the property subject to the lien for a period longer than three (3) years after the claim has been filed unless an action is commenced in the proper court within that time to enforce the lien.

10.11.6 Foreclosure Parties

The lien provided by this title may be foreclosed and enforced by a civil action in a court having jurisdiction.

All persons who have legally filed claims of liens against the same property prior to commencement of the action shall be joined as parties, either plaintiff or defendant.

Dismissal of an action to foreclose a lien at the instance of a plaintiff shall not prejudice another party to the suit who claims a lien.

10.12 Appeals

The decision of the District or the Hearings Officer shall be sent to the user or person by First Class U.S. mail. This decision shall be final unless appealed using the procedures in Section 3.7.2 or ORS 34 relating to writ of review procedures.

10.12.1 Appeals

The citation shall be final unless the respondent files a written Request for Hearing with the District within twenty-one (21) days from the date of the citation. The Request for Hearing shall contain the following information:

- A. The name of the Respondent.
- B. The citation number, the case file number, and/or permit number.
- C. The name and signature of the Respondent and a statement that if acting on behalf of a partnership or corporation, that the person executing the Request for Hearing is duly authorized to file such request and such person is the contact representative.
- D. The date that the citation was received by the Respondent.
- E. A detailed description of the disagreement with the citation. In the Request for Hearing, the party shall admit or deny all factual matters and shall affirmatively allege any affirmative claim and defense and the reasons, therefore.
- F. The request shall be limited to the issues raised in the citation.

10.12.2 Hearing

Through the adoption of these Rules and Regulations, the Board delegates decision making authority to a Hearings Officer for all matters arising under this section. The Board further delegates to the Director the responsibility for selecting a Hearings Officer from those under contract with the County. If no hearings officer is available under the County contracts, the Director will work with County Counsel to identify a suitable alternative.

A Request for Hearing received from a party will initiate a proceeding before the District or Hearings Officer. If a Request for Hearing is filed, the District shall file a complaint with the Hearings Officer. The District may, for any violation, file a complaint with the Hearings Officer before or after a citation is issued. The complaint shall contain the following: name and address of respondent(s); address or location of the alleged

violation; nature of violation, including rule, County Code provisions, statute or administrative rules section violated; and relief sought. Employees of the District are authorized to sign and file complaints on behalf of the District.

10.12.3 Economic or Financial Hardship

In a case in which a citation has been issued and the respondent does not wish to contest the existence of the violation and there is economic or financial hardship, the respondent may appeal only the amount of civil penalties imposed by the citation by initiating a proceeding before the hearings officer. The only issue before the hearings officer in such a proceeding is whether the respondent establishes sufficient economic or financial hardship to justify reduction of the amount of civil penalties.

10.12.4 Notice of Hearing

The District shall provide a Notice of Hearing to the Respondent, which shall contain a statement of the time, date, and place of the hearing. A copy of the Complaint and the Statement of Rights described in Section 10.12.5 shall be attached to the notice. The notice shall be mailed or delivered at least five (5) days prior to the hearing date.

- A. The District shall cause notice of the hearing to be given to the respondent(s) by:
 - a. First Class U.S. Mail; or,
 - b. Personal service; or,
 - c. Attaching the hearing notice in a secure manner to the main entrance to that portion of the premises of which the Respondent has possession or where the violation is present.
- B. Notice may be delivered to the property or to the mailing address of the owner of the property as listed on the County tax roll. Notice is considered complete on the date of personal delivery or upon deposit in the U.S. mail.
- C. The Hearings Officer shall disregard technical deficiencies in the notice, provided the Hearings Officer finds that the respondent received actual notice in advance of the hearing.

10.12.5 Statement of Rights

- A. A Notice of Hearing shall include a statement regarding the following matters:
 - a. A general description of the hearing procedure including the order of presentation of evidence, what kinds of evidence are admissible, whether objections may be made to the introduction of evidence and what kind of objections may be made, and an explanation of the burdens of proof or burdens of production of evidence.
 - b. That a record shall be made of the proceedings and the manner of making the record and its availability to the parties.
 - c. The function of the record-making with respect to the perpetuation of the testimony and evidence and with respect to any appeal from the order of the Hearings Officer.
 - d. Whether an attorney will represent the District in the matters to be heard and the Respondent's right to be represented by an attorney at their expense.
 - e. The title and function of the Hearings Officer, including the effect and authority of the Hearings Officer's determination.

- f. That the decision of the Hearings Officer may be appealed as described in Section 10.11 and that the appellant shall pay all costs of the appeal including costs for preparation of a transcript.
- B. The failure to give notice of any item specified in this section shall not invalidate any order of the Hearings Officer unless on review a court finds that the failure affects the substantive rights of one of the parties. In the event of such a finding, the court shall remand the matter to the Hearings Officer for a reopening of the hearing and shall direct the Hearings Officer as to what steps shall be taken to remedy any prejudice to the rights of any party.

10.12.6 Procedure in Hearings

- A. Hearings to determine whether a violation has occurred shall be held before the Hearings Officer. The District must prove the violation alleged by a preponderance of the admissible evidence.
- B. Unless precluded by law, informal disposition of any proceeding may be made, with or without a hearing, by stipulation, consent order, agreed settlement, or default.
- C. A party may elect to be represented by counsel at his/her own expense and to respond to and present evidence and argument on all issues involved.
- D. A party may request that a hearing be held remotely by telephone or video conference. The Hearings Officer has the discretion to grant or deny a request for a telephonic hearing for any reason.
- E. A party may request that an appeal to the Hearings Officer be conducted solely based on written submissions by the parties, without a hearing. The Hearings Officer may grant a request for appeal based only on written submissions if, and only if, all parties agree in writing to waive a hearing and to proceed through written submission only.
- F. An order adverse to a party may be issued upon default only upon a prima facie case made on the record before the Hearings Officer.
- G. Testimony shall be taken upon oath or affirmation of the witness. The Hearings Officer may administer oaths or affirmations to witnesses.
- H. The Hearings Officer shall issue subpoenas, in accordance with Oregon Rule of Civil Procedure 55, to any party upon showing of general relevance and reasonable scope of the evidence sought. Witnesses appearing pursuant to subpoena, other than the parties or officers or employees of the District, shall receive fees and mileage as prescribed by law for witnesses in civil actions from the party requesting their testimony. Any party requesting the issuance of a subpoena shall pay applicable fees and mileage at the time the issuance of a subpoena is requested.
- I. If any person fails to comply with any subpoena so issued, or any party or witness refuses to testify on any matters on which he/she may be lawfully interrogated, a judge of the Circuit Court for Clackamas County, on the application of the Hearings Officer, or of the party requesting the issuance of the subpoena, may compel obedience by proceedings for Contempt as in the case of disobedience of the requirements of subpoena issued from such court or a refusal to testify therein.
- J. The Hearings Officer shall place on the record a statement of the substance of any written or oral ex parte communications made to the Hearings Officer on a fact in issue during the pendency of the proceedings. The Hearings Officer shall notify the parties of the communication and of their right to rebut such communications.

- K. The record of the case shall include:
 - a. All pleadings, motions, and intermediate rulings
 - b. Evidence received
 - c. Stipulations
 - d. A statement of matters officially noticed
 - e. Questions and offers of proof, objections, and ruling thereon
 - f. A statement of any ex parte communications on a fact in issue made to the Hearings Officer during the pendency of the proceedings
 - g. Proposed findings and exceptions
 - h. The final order prepared by the Hearings Officer
- L. A verbatim, written, or mechanical record shall be made on all motions, rulings, and testimony. The record need not be transcribed unless requested for purposes of court review. The Hearings Officer shall charge the party requesting transcription the cost of transcription in advance. Failure to pay the transcription fees shall constitute a separate ground for denial of review of the decision of the Hearings Officer.
- M. Enforcement proceedings before the Hearings Officer shall be conducted in accordance with the procedure set forth in this section. The Hearings Officer may promulgate reasonable rules and regulations, not inconsistent with this section, concerning procedure and the conduct of hearings.

10.12.7 Presentation of Evidence in Hearing

- A. Irrelevant, immaterial, or unduly repetitious evidence shall be excluded. Erroneous rulings on evidence shall not preclude action by the Hearings Officer unless shown on the record to have substantially prejudiced the rights of a party. All other evidence of a type commonly relied upon by reasonably prudent persons in the conduct of their serious affairs shall be admissible. The Hearings Officer shall give effect to the rules of privilege recognized by law.
- B. All evidence shall be offered and made a part of the record in the case, and except for matters stipulated to and except as provided in item 4) below, no other factual information or evidence shall be considered in the determination of the case. Documentary evidence may be received in the form of copies or excerpts or by incorporation by reference. The burden of presenting evidence to support a fact or position in a contested case rests on the proponent of the fact or position.
- C. Every party shall have the right of cross-examination of witnesses who testify and shall have the right to submit rebuttal evidence.
- D. The Hearings Officer may take notice of judicially recognizable facts, and the Hearings Officer may take official notice of general, technical, or scientific facts within the specialized knowledge of District employees. Parties shall be notified at any time during the proceeding, but in any event prior to the final decision, of material officially noticed, and they shall be afforded an opportunity to contest the facts so noticed.

10.12.8 Powers of the Hearings Officer

The Hearings Officer shall order a party found in violation to comply within such time as the Hearings Officer may by order allow. The order may require such party to do any and all of the following:

- A. Make any and all necessary repairs, modifications, and/or improvements to the structure, real property, or equipment involved.
- B. Obtain any and all necessary permits, inspections, and approvals.
- C. Order compliance as appropriate under applicable state law, codes, permit, or these rules.
- D. Install any equipment necessary to achieve compliance.
- E. Pay to the District a civil penalty, the amount of which shall be determined by the Hearings Officer within the range established pursuant to Section 10.7.
- F. Reimburse the District for actual costs incurred in conjunction with the enforcement action.
- G. Abate or remove any nuisance.
- H. Change the use of the building, structure, or real property involved.
- I. Pay a reduced forfeiture amount.
- J. Undertake any other action reasonably necessary to correct the violation.

10.12.9 Orders of the Hearings Officer

- A. Every order adverse to a party to the proceeding shall be in writing or stated in the record and may be accompanied by an opinion.
- B. Findings of fact and conclusions of law shall accompany a final order. The findings of fact shall consist of a concise statement of the underlying facts supporting the findings as to each contested issue of fact and as to each ultimate fact required to support the Hearings Officer's order.
- C. The Hearings Officer shall notify the respondent of a final order by delivering or mailing a copy of the order and any accompanying findings and conclusions to the respondent or, if applicable, the respondent's attorney of record. The Hearings Officer shall issue a final order within fourteen (14) days from the conclusion of the hearing.
- D. Every final order shall include a citation of the ordinance or title, chapter, and section under which the order may be judicially reviewed.
- E. A final order shall become effective as stated in Section 10.10.

Water Environment Services Stormwater Standards

February 2023





Stormwater Standards

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Stormwater Standards

1. Definitions

Words, terms, and acronyms specific to these Standards are defined below.

1.1 Words and Terms

The Water Environment Services (WES) Rules and Regulations (Rules) contains words and terms that apply to and are consistent across the Rules and all adopted standards. Unless the context specifically indicates otherwise, the following words and terms, as used in these Standards, shall have the meanings hereinafter designated:

Applicant. See the WES Rules.

Approved Point of Discharge. A location down slope from a development that the District has deemed adequate to accept stormwater flows from all or a portion of the Development area.

Best Management Practice (BMP). See the WES Rules.

BMP Sizing Tool. A computer program, approved by the District, for use in calculating the required size of Stormwater Management Facilities (SMFs). This tool is limited to a set list of pre-defined SMFs.

Board. See the WES Rules.

Bond. See the WES Rules.

Building Drain. See the WES Rules.

Building Sewer. See the WES Rules.

Contractor. A person duly licensed or approved by the State of Oregon to perform the type of work to be done under a permit or contract.

Conveyance System. See the WES Rules. As relates to these Standards, conveyance system refers to the stormwater and surface water conveyance system and includes sewers SMFs, drainageways, detention facilities, infiltration facilities, pretreatment facilities.

Debris. Discarded human made objects that would not exist in an undeveloped stream corridor or wetland. Debris includes, but is not limited to, tires, vehicles, litter, scrap metal, construction waste, lumber, plastic, or Styrofoam. Debris does not include objects necessary to a use allowed by Section 709, or ornamental and recreational structures. Debris does not include existing natural plant materials or natural plant materials that are left after flooding, downed, or standing dead trees, or trees that have fallen into protected water resources.

Design Storm. The distribution of rainfall intensity over time, identified to have a probability of recurrence, given in years (i.e., 5-year design storm).

Detention. The release of surface water runoff from a site at a slower rate than it is collected by the drainage system, the difference being held in temporary storage.

Developer. See the WES Rules.

Developer's Engineer. See the WES Rules.

Developer's Engineer's Inspector, or Engineer's Inspector. The Developer's Engineer's Inspector(s) shall be the Developer's Engineer of record, or recognized as representatives of the Developer's Engineer, and their duties shall be to approve materials and workmanship as required by the plans and specifications in accordance with District Stormwater Standards.

Development. See the WES Rules.

Discharge. See the WES Rules.

District. See the WES Rules.

District Employee or District Personnel. See WES Rules.

Disturbed Area or Disturbance. Areas of disturbance for activities defined under “Development”. Work area includes areas used for storage of equipment or materials that are used for these activities.

Drainageway. See the WES Rules.

Drywell. An approved receptacle used to receive storm, surface and other water, the sides and bottom being porous, permitting the contents to seep into the ground. A drywell must conform to local agency standards and Oregon Department of Environmental Quality (DEQ) Underground Injection Control (UIC) standards.

Easement. See the WES Rules.

Ecology. The Washington State Department of Ecology.

Emergency. Any anthropogenic or natural event or circumstance causing or threatening loss of life, injury to person or property, and includes, but is not limited to, fire, explosion, flood, severe weather, drought, earthquake, volcanic activity, spills or releases of oil or hazardous material, contamination, utility or transportation disruptions, and disease.

Engineer. See the WES Rules.

Enhancement. The process of improving upon the natural functions and/or values of an area or resource that has been degraded by human activity. Enhancement activities may or may not return the site to a pre-disturbance condition but create/recreate beneficial processes and resources that occur naturally.

Erosion. See the WES Rules.

Fill. See the WES Rules.

Green Infrastructure. A SMF that mitigates stormwater runoff similar to the natural surface hydrological functions through infiltration and/or evapotranspiration, or that involves stormwater reuse.

Hazardous Materials. See the WES Rules.

Impervious Surface. See the WES Rules. For purposes of these Standards, standing water areas of SMFs and wetlands shall be considered as impervious surfaces. Permeable pavement SMFs, such as permeable pavement designed to mimic the natural hydrology of the site, are considered impervious surfaces for the purpose of determining project impervious surface area thresholds but may be used as a SMF to mitigate the stormwater from the impervious surface area.

Inspector. See the WES Rules.

Installer. Either the Owner of the property being served or a Contractor doing work in connection with the installation of a Building Sewer or conveyance system under a permit from the District, City, or County.

Intermittent Stream. See the WES Rules.

Landscape Architect. A registered professional licensed to practice in the State of Oregon by the Oregon State Board of Landscape Architecture.

Mitigation. The reduction of adverse effects of a proposed project by considering, in the following order:

- A. Avoiding the impact altogether by not taking a certain action or parts of an action.
- B. Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- C. Compensating for the impact by replacing or providing comparable substitute Water Quality Resource Areas.
- D. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

Municipal Separate Storm Sewer System (MS4). A storm drainage system(s) (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains) as defined in 40 Code of Federal Regulations (CFR) 122.26(b)(8).

Native Vegetation. Vegetation native to the Portland metropolitan area provided that it is not invasive non-native or noxious vegetation. See the Portland Plant List maintained by the City of Portland Bureau of Planning and Sustainability.

Owner. See the WES Rules.

Parcel. See the WES Rules.

Permit. See the WES Rules.

Permittee. See the WES Rules.

Person. See the WES Rules.

Pervious Pavement. Surface to walk, drive or park on that may reduce stormwater runoff by allowing water to soak/infiltrate into the ground. Examples are permeable pavers, pervious concrete, and porous asphalt.

Perennial Stream. See the WES Rules.

Plans. Construction plans submitted to the District for review and approval, in accordance with the Stormwater Standards.

Pollutant. See the WES Rules.

Post-Developed Conditions. Refers to the time period, or conditions that may reasonably be expected or anticipated to exist, after completion of the land development activity on a site.

Practicable. Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purpose.

Pre-Developed. See the WES Rules.

Pretreatment Device or Facility. Any structure or drainageway that is designed, constructed, and maintained to collect and filter, retain, or detain surface water runoff during and after a storm event for the purpose of water quality improvement.

Pretreatment or Treatment. A reduction in the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in water to a less harmful state.

Private Stormwater. Flows that include stormwater runoff from private properties (i.e., homes, driveways, roads), that may include pipes and other natural drainageways, creeks, streams.

Private Stormwater System. See the WES Rules.

Professional Engineer (PE). See the WES Rules for the definition of Engineer.

Proprietary Stormwater Treatment Device. A manufactured device, often proprietary, in which stormwater receives treatment before being discharged to the storm drainage system, to a SMF, or to the receiving water. This is a broad category of SMFs with a variety of pollutant removal mechanisms and varying pollutant removal efficiencies.

Public Right-of-Way (ROW). See WES Rules.

Public Stormwater. Public stormwater runoff is defined as flows that include stormwater runoff from public streets that may include pipes, natural drainageways, creeks, streams and rivers.

Public Stormwater Easement. See WES Rules for definition of Easement.

Public Stormwater Mainline. See the WES Rules for Public Mainline. As relates to these Standards, Public Stormwater Mainline refers to the portion of the Public Stormwater System which conveys wastewater through a piping system flowing by gravity.

Public Stormwater System. See the WES Rules.

Redevelopment. See the WES Rules.

Replaced Impervious Surface. The removal of an impervious surface that exposes soil, or native subgrade, followed by the placement of an impervious surface is considered Redevelopment of an impervious surface area. Replacement does not include repair or maintenance activities on structures or facilities taken to prevent decline, lapse or cessation in the use of the existing facility or surface, provided the repair or maintenance activity does not expand the coverage of the existing impervious area. If a proposed Development disturbs native subgrade of an existing impervious surface, then these stormwater standards apply.

Retention. The process of collecting and holding surface water runoff with no surface outflow.

Riparian. Those areas associated with streams, lakes, and wetlands where vegetation communities are predominately influenced by their association with water.

Seasonal High Groundwater. The maximum elevation to which the groundwater can be expected to rise due to a normal wet season.

Sensitive Areas. See the WES Rules.

Service Connection. See the WES Rules.

Sewer. See the WES Rules.

Soil. The upper layer of earth in which plants grow; a black or dark brown material typically consisting of a mixture of organic remains, clay, and rock particles.

Source Control. SMFs and/or specific actions taken that attempt to control high risk pollutant loading from entering the stormwater runoff through site activities and site design.

Storm Drain. See the WES Rules.

Storm Sewer. See the WES Rules.

Stormwater. See the WES Rules.

Stormwater Mainline. See Public Stormwater Mainline.

Stormwater Management. See the WES Rules.

Stormwater Management Facility (SMF). See the WES Rules.

Stormwater Management Plan. A plan that is stamped by a Professional Engineer (PE) and contains specific information regarding plans to locate and construct SMFs and stormwater drainage systems to meet WES performance and design standards.

Stream. See the WES Rules.

Stream, Intermittent. See the WES Rules.

Stream, Perennial. See the WES Rules.

Structure. A building or other major improvement that is built, constructed, or installed, not including minor improvements—such as fences, utility poles, flagpoles, or irrigation system components—that are not customarily regulated through zoning codes.

Utility Facilities. Buildings, structures, or any constructed portion of a system that provides for the production, transmission, conveyance, delivery, or furnishing of services including, but not limited to, heat, light, water, power, natural gas, sanitary sewer, stormwater, telephone, and cable television. Utility facilities do not include stormwater pretreatment facilities.

Vegetated Corridor. See the WES Rules.

Waters of the State. See the WES Rules.

WES Rules. WES Rules and Regulations, as adopted by the Board.

Wet Weather. The portion of the year when rainfall amounts and frequency tend to have the most significant effect on erosion prevention and sediment control (October 1 to May 31).

Wetland. See the WES Rules.

1.2 Abbreviations

Unless the text specifically indicates otherwise, the following abbreviations are used in these standards to refer to the following:

Abbreviation	Definition
AASHTO	American Association of State Hwy and Transportation Officials
BMP	Best Management Practice
CFR	Code of Federal Regulations
cfs	cubic feet per second
CKD	cement kiln dust
CLSM	controlled low strength material
CMP	corrugated metal pipe
CN	curve numbers
CTB	cement treated base
DEQ	Oregon Department of Environmental Quality
DSL	Oregon Department of State Lands
DTD	Clackamas County Department of Transportation and Development
EPA	Environmental Protection Agency
EPSC	Erosion Prevention and Sediment Control
FEMA	Federal Emergency Management Agency

Abbreviation	Definition
ft.	feet
fps	feet per second
GIS	Geographic Information Systems
GULD	General Use Level Designation
h:v	horizontal to vertical
HDPE	high density polyethylene pipe
HEC-RAS	Hydrologic Engineering Centers – River Analysis System
HGL	hydraulic grade line
IE	invert elevation
in.	inches
mm	millimeter
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
OAR	Oregon Administrative Rules
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
O&M	Operations and Maintenance
OPSC	Oregon Plumbing Specialty Code
OR	Oregon
ORS	Oregon Revised Statutes
OSHA	Occupational Safety and Health Authority
PDF	Portable Document Format
PE	Professional Engineer
ppm	parts per million
psi	pounds per square inch
PVC	polyvinyl chloride
ROW	Right-of-Way
SBUH	Santa Barbara Urban Hydrograph
sec.	seconds
sf	square feet
SDR	Standard Dimensional Ratio
SMF	Stormwater Management Facility
SWM	stormwater management
SWMM	Stormwater Management Model
SS	Sanitary Sewer
ST	Storm Sewer
SU	Standard Units
Tc	Time of Concentration

Abbreviation	Definition
UIC	Underground Injection Control
UPC	Uniform plumbing code
U.S.	United States
USACE	United States Army Corps of Engineers
WES	Water Environment Services
WPCF	Water Pollution Control Facility
WQRA	Water Quality Resource Area

Stormwater Standards

2. General Information

The stormwater standards in this document describe requirements and methods for minimizing the hydrologic and water quality impacts of development in areas managed by the District. Implementing these standards will help protect water resources which, in turn, will benefit human health, fish and wildlife habitat, recreational resources, and drinking water.

As land is developed, creation of new impervious surfaces and loss of vegetation increases stormwater runoff during rainfall events, altering the natural hydrologic cycle. Without stormwater management, the changes in runoff and/or discharge patterns lead to reduced groundwater recharge and hydromodification of stream channels. The effects of hydromodification include increased erosion of streambanks, increased incision and/or aggradation of stream channels, reduction of high value riparian habitat, impacts to aquatic organisms, and degradation of water quality.

Runoff flowing from roadways, parking areas, rooftops, and other impervious surfaces also collects pollutants that are transported to streams, rivers, and groundwater. Stormwater pollutants are generally separated into the following categories: suspended solids (sediment), oxygen-demanding pollutants, bacteria, organic carbon, hydrocarbons, metals (cadmium, copper, lead, mercury, and zinc), nutrients (nitrogen and phosphorous), and pesticides/herbicides.

This chapter describes the authority, purpose, applicability, and administrative review requirements of these Standards.

2.1 Authority and Purpose

WES, located in Clackamas County, Oregon, is an intergovernmental entity formed pursuant to Oregon Revised Statutes Chapter 190 for the purpose of providing stormwater and surface water management, including all facilities necessary for collecting, conveying, treating, and disposing of stormwater within its boundaries. It is further declared to be the policy of the District to provide and offer stormwater and surface water management services for such areas adjacent to the District as may, in the judgment of the District, be feasibly served upon such terms, conditions, and rates as the District shall determine, and as provided in other applicable federal and state laws.

The District, through its Director or other authorized designee or representative, shall have the authority to administer all the requirements, regulations, and provisions set forth in these Standards.

The District may promulgate new or amended standards in accordance with the process outlined in the WES Rules.

Conformance with these standards shall not be a substitute for, or eliminate the necessity of, conforming with any and all federal, state, and local laws, ordinances, rules and regulations which are now, or may in the future, be in effect. Other applicable regulations may include the hazardous materials storage requirements of Articles 79 and 80 of the Oregon State Fire Code; the Spill Prevention, Countermeasure, and Containment Regulations of §40.112 of the Code of Federal Regulations (CFR) administered by the Environmental Protection Agency (EPA); the Resource Conservation and Recovery Act; or Willamette Basin Total Maximum Daily Load (TMDL) Programs regulated by the DEQ.

Any provisions or limitations of these standards are suspended and supplemented by any applicable federal, state, or local requirements existing or adopted subsequent hereto which are more stringent than the provisions and limitations contained herein. In the event of a conflict, the most stringent local, state, or federal regulations generally apply.

The purpose of these Standards is to provide a consistent policy under which certain physical aspects of stormwater system design will be implemented. Many of the elements contained in this document are public works oriented and are related to public improvements; however, it is intended these Standards apply to both public and private work designated herein.

2.2 Objectives

The objectives of the Stormwater Standards are as follows:

- Meet federal and state National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permitting requirements.
- Minimize the discharge of pollutants and provide water quality treatment of stormwater runoff to preserve the beneficial uses of drainageways, lakes, ponds, wetlands, and other Sensitive Areas.
- Maintain water quality by protecting Sensitive Areas and the associated vegetative buffers.
- Minimize stormwater runoff volumes and maximize groundwater recharge through the process of infiltration of runoff into vegetated stormwater facilities.
- Maintain the pre-development stormwater runoff characteristics to minimize effects on the drainageways, such as erosion and degradation, generally associated with urbanization.
- Protect the safety of persons and property by safely conveying all stormwater runoff from site development and preventing the uncontrolled or irresponsible discharge of stormwater onto adjoining public or private property.
- Construct SMFs which are safe, effective, and economical to maintain and minimize future replacement costs.
- Provide for orderly development by preserving the drainageways and natural storm drainage systems shaped by the existing topography and creating man-made storm drainage systems with adequate capacity for future development upstream.
- Provide guidance to designers and engineers in meeting the requirements of stormwater regulations when developing land and constructing infrastructure within the District.
- Protect soil, groundwater, and surface water by capturing pollutants and reducing impacts to the environment.
- Redirect flows to the sanitary sewer from areas with the potential for relatively consistent wastewater discharges and manage areas that have potential for pollutant releases or spills with containment or disposal.
- Prioritize structural controls over operational procedures to provide permanent and reliable source control.
- Minimize the movement of soil during construction and the associated impacts to water quality through proper erosion prevention and sediment control practices.

2.3 Applicability

These Stormwater Standards shall govern design, construction, and upgrading of all publicly and privately financed Public Stormwater Systems in the District and applicable work within the District, unless it is shown that the District's authority to impose these standards are superseded by another local jurisdiction.

These Stormwater Standards shall govern design, construction, and maintenance of all privately owned stormwater systems in the District, unless it is shown that the District's authority to impose these standards are superseded by another local jurisdiction.

Some facilities may be required to obtain a NPDES Industrial Stormwater General Permit 1200-Z (1200-Z Permit) issued by DEQ before discharging to the District's Public Stormwater System or to Waters of the State. The 1200-Z Permit includes discharge benchmarks for facilities with industrial activities that are exposed to rainfall and stormwater runoff. The state also has water quality standards listed in Oregon Administrative Rules (OAR) 340 Division 041 for discharges to surface waters.

Applicants may be required to obtain an Industrial Wastewater Discharge Permit from the local wastewater service provider for discharges to the sanitary sewer system. Facilities subject to these requirements are generally commercial or industrial. Typical discharges include process wastewater, cooling water, or other discharges generated by some of the sources that are required that drain to a sanitary sewer system.

The requirements presented in these Standards do not exclude or replace the requirements of other applicable codes or regulations, such as the Willamette or Tualatin River Basin TMDL Programs, the Industrial NPDES Permitting Program, or any other applicable federal or state regulations or permit requirements.

All development within Federal Emergency Management Agency (FEMA) regulated streams and floodplain overlay zones may be required to meet the FEMA floodplain requirements and the requirements of the local planning and building authority.

If it is determined by the District that stormwater management or storm drainage system facilities, in addition to the onsite facilities required by these standards, are necessary to manage and protect natural resources, Public Stormwater Systems, and/or private property effectively, the District may require additional facilities or modifications at the sole discretion of the District.

Table 1 lists the stormwater minimum requirements and the applicable design standards within these Standards.

Table 1. Stormwater Minimum Requirements

Threshold	Minimum Requirements
Development or redevelopment proposing < 5000 square feet (sf) of impervious surface areas, including the cumulative impervious surface area that was developed/redeveloped over the last 3 years.	Verify impervious areas through submission of a site plan that shows the exact square footage (< 5,000 sf) of all new or replaced impervious surfaces.
Development or redevelopment proposing ≥5,000 sf of impervious surface areas, including the cumulative impervious surface area that was developed/ redeveloped over the last 3 years.	Submit a Preliminary Site Plan. Design and construct SMF(s) to meet the flow control, and water quality performance standards.

Threshold	Minimum Requirements
	Execute and record an Operations and Maintenance (O&M) Plan for stormwater facilities on private property to ensure the long-term functionality of the SMF(s).
Development or redevelopment proposing \geq 5,000 sf of impervious surface areas, including the cumulative impervious surface area that was developed/redeveloped over the last 3 years that discharges stormwater runoff to a natural or manmade storm drainage system.	Submit a Downstream Analysis and design Storm Drainage Systems.
Development or redevelopment that is categorized as high risk for increased stormwater pollutant loading	Design and implement applicable source controls.
Development or redevelopment that is proposed to disturb \geq 800 sf of soil.	Develop Erosion Prevention and Sediment Control (EPSC) Plans and obtain EPSC Permit.
Creation of stormwater	

2.3.1 Stormwater Management Requirements

All new Development and Redevelopment activities that result in 5,000-sf or greater of new or replaced impervious surface area, cumulative over the last 3 years, are subject to the requirements of these Standards for all newly proposed and replaced impervious surface areas within the overall project boundary.

Stormwater runoff from all of the Developed and Redeveloped impervious surface areas shall be treated in accordance with these Standards. Water quality facilities shall be designed to capture and treat the first 1 inch of stormwater runoff from a 24-hour storm event. The water quality facility shall use either an approved vegetated SMF or an approved Proprietary Stormwater Treatment Device.

All projects that discharge into an offsite storm drainage system are subject to storm drainage system and downstream analysis requirements.

All existing site development that desires to change the existing point of discharge and the stormwater runoff from impervious areas exceeds the 5,000-sf impervious threshold shall comply with these Standards, and for design criteria purposes the impervious area will be considered as redevelopment.

All Development and Redevelopment activities that result in the creation of private stormwater facilities must execute and record an Operations and Maintenance Plan.

All private storm drains outside the building envelope shall be designed using these standards, along with the Oregon Structural Code, Oregon Plumbing Specialty Code (OPSC), and/or other applicable codes as appropriate.

The stormwater management requirements are in addition to the applicable source control and erosion control requirements.

Exemptions

Projects in the following categories are exempt from the stormwater minimum requirements:

- A. Residential structures being re-built following fire damage, flooding, earthquake, or other natural disasters, as long as the structure is re-built at the same scale and discharging to the same disposal point. Expansions to the original footprint, such as an addition or alteration to the original structure, may trigger stormwater management requirements for the expanded impervious area.
- B. Interior remodeling projects and tenant improvements.
- C. Stream enhancement or restoration projects as approved by the District.
- D. Farming practices as defined by Oregon Revised Statutes (ORS) 30.930 and farm use as defined in ORS 214.200 and including farm roads, including farm structures and farm access roads outside the Urban Growth Boundary where stormwater is managed through dispersion with no direct connection to the public drainage system. Buildings associated with farm practices and farm access roads are subject to the requirements of these standards if there is a direct discharge to a Storm Drainage System. Residential homes proposed to be built on farmland are not exempt from these Standards.
- E. Forest practices as defined by ORS 527.610.
- F. Modular/temporary structures that will be removed at the completion of the project and do not have a direct connection to the Storm Drainage System.
- G. Actions by a public utility or any other government agency to remove or alleviate an emergency condition.
- H. Road and parking area preservation/maintenance projects such as pothole and square cut patching, surface sealing, replacing or overlaying of existing asphalt or concrete pavement, provided the preservation/maintenance activity does not disturb the native subgrade or expand the existing area of impervious coverage above the thresholds listed in this section.
- I. Underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics.
- J. Non-pollution generating, linear projects (e.g., pedestrian and bicycle pathways, sidewalks, trails, and ramps not included in a larger project) that disperse stormwater runoff into vegetated areas, as long as the pathways do not include inlets connected to the Storm Drainage System.
- K. Storm Drainage Systems shall be designed to meet the requirements of Section 5, except when the Development/Redevelopment is not above the impervious thresholds listed in this section, and the storm drainage system is located entirely on a privately-owned parcel, is privately maintained, and receives no stormwater from outside the parcel's property limits. Those systems exempted from the stormwater storm drainage system requirements will remain subject to the requirements of the OPSC and shall be reviewed by the building official.

2.3.2 Source Control Requirements

Source control requirements apply to all developments with high-risk characteristics during new development, redevelopment, tenant improvements, or when existing sites proposing new offsite discharges.

Source controls shall be applied to the areas of the site with high-risk characteristics as well as any areas hydraulically connected to a high-risk area. With redevelopment

projects, only areas that are being disturbed with the redevelopment are required to make structural source control changes.

Projects with the following site uses/characteristics are considered to be high-risk and are subject to source control requirements in Chapter 5. :

- A. Fuel Dispensing Facilities and Surrounding Traffic Areas
- B. Above-Ground Storage of Liquid Materials
- C. Recycling and Solid Waste Storage Areas
- D. Exterior Storage of Bulk Materials
- E. Material Transfer Areas/Loading Docks
- F. Equipment and/or Vehicle Washing Facilities
- G. Equipment and/or Vehicle Repair Facilities
- H. Land with Suspected or Known Contamination
- I. Covered Vehicle Parking Areas for Commercial or Industrial Uses
- J. Industrial and Commercial High Traffic Areas

Applicants are required to address all high-risk site characteristics listed above. For example, if a development includes both a fuel dispensing area and a vehicle washing facility, the source controls in both those sections will apply.

The source control requirements are in addition to the applicable stormwater management and erosion control requirements. Developments that have existing or proposed offsite SMFs are not exempt from the source control requirements.

2.3.3 Erosion Prevention and Sediment Control Requirements

All development that disturbs in excess of 800 sf of soil shall be subject to the Erosion Prevention And Sediment Control (EPSC) requirements of Chapter 8. The Permittee shall be required to obtain an EPSC Permit, unless otherwise excluded by the District.

The erosion control requirements are in addition to the applicable stormwater management and source control requirements.

2.4 Variance

Alternative materials and methods will only be accepted if the Applicant can demonstrate that the existing standards are not appropriate for a given site and the proposed alternative provides the same or greater level of performance as defined in these standards. Alternate materials or methods not explicitly approved herein will be considered for approval through the variance process outlined below.

2.4.1 Variance Request

A variance request to the Standards shall be submitted in writing to the District. The written request for a variance should be submitted to the District prior to land use approval if a land use action is required. Land use conditions of approval are commonly written so there is little, if any, flexibility after land use approval is issued. If land use approval has already been issued or is not required, then the variance request should be submitted in writing along with the first plan review submittal.

Once the District approves the plans, a variance request will only be accepted at the discretion of the District, and if the request is the only feasible solution without regards to delays or cost. Only minor variance requests will be considered during the construction phase of the project to address a specific design or construction problem. It is the responsibility of the Applicant to obtain all approvals from any local, county, state or federal authority having any jurisdiction or permitting of the activities before proceeding with an approved variance.

This written request shall include the following:

- A. The desired variances(s);
- B. The reason(s) for the request(s);
- C. A comparison between the specification(s) and standard(s) and the variance(s) for performance, function, maintainability, safety, etc.;
- D. References to regionally and/or nationally accepted standards, records of successful use by other agencies or other supportive information.

2.4.2 Criteria for Variance

The District may grant a variance when the request does not compromise the following: public safety, environmental protection, maintenance/repair/replacement, and when any one of the following conditions are met:

- A. Topography or other geographic conditions impose an environmental or safety concern and the request is considered an equivalent alternative, which can accomplish the intent and criteria that is provided in these standards.
- B. A minor change to the standard is required to address a specific design or construction problem which, if not enacted, will result in an unreasonable or disproportionate burden or obstacle to development. The financial viability of meeting the requirements of these design standards is not in itself a justification for a design exception.
- C. The variance request is in the public interest and requirements for safety, function, appearance, and maintainability are based upon sound engineering and functionality of the proposed system is a feasible alternative.

All requests will be evaluated on a case-by-case basis, and approval of alternative materials and methods for one development proposal will not imply an approval under similar circumstances in another proposal. Approval of a variance, or denial of a site-specific request shall not constitute a precedent for use at other locations with potentially similar circumstances.

2.4.3 Review Process

The request for variance shall be reviewed by the District. The District shall make one of the following decisions:

- A. Approve as proposed, or
- B. Approve with changes, or
- C. Deny with an explanation.

It is the responsibility of the Applicant to obtain all approvals from any local, county, state or federal authority having any jurisdiction or permitting of the activities before proceeding with an approved variance.

2.4.4 Appealing Variance Request Decision

The Applicant may make a written request to the District to appeal the variance request decision as outlined in the appeals process contained in Section 3.7 of the District Rules and Regulations.

3. General Stormwater Standards

Chapter 3 of the Stormwater Standards presents an overview of the general policies, methods, and processes associated with the Stormwater Standards as a whole.

3.1 General Policy

Public improvements are conditioned through the development review and land use approval process, described, and administered under the local planning department administering the zoning and development ordinance, or by federal, state, or other local government regulation. These Stormwater Standards cannot provide for all situations and are intended to assist, but not to substitute for competent work by design professionals. It is expected that the design professionals will bring to each project the best of skills from their respective disciplines.

These Stormwater Standards are not intended to limit unreasonably any innovative or creative effort that could result in better quality, cost savings, or both.

General stormwater requirements for all projects and developments are as follows:

- A. The District does not allow the diversion of stormwater runoff from one watershed to another watershed.
- B. All public storm drainage systems shall be gravity systems without the use of pumps or other mechanical means to convey or transport stormwater.
- C. The Approved Point of Discharge for all stormwater may be a piped system or open channel as approved by the District. All outfalls to an existing or proposed stormwater facility, stormwater system, drainageway, or surface water system shall be approved by the District.
- D. The Approved Point of Discharge for surface water, stormwater and/or groundwater shall not be a sanitary sewerage system, except as provided in Chapter 5.
- E. No project shall directly or indirectly discharge, to the public storm system, any quantity of stormwater, pollutant, substance, or wash water that will violate the Discharger's permit (if one is issued), the District's NPDES MS4 permit, or other environmental laws or regulations.

3.2 Development Policy

Requirements for development of a property or a tract of land are as follows:

- A. Design of surface water and stormwater systems must include provisions to control runoff from impervious and pervious areas within and upstream of the development without exceeding capacities of available facilities and downstream drainageways.
- B. Development proposals shall maintain the natural drainage pathways for seasonal and intermittent drainages or provide alternate manmade natural drainage pathways.
- C. Pre-existing surface or subsurface drainage, caused or affected by development, shall not flow over adjacent public or private property in a volume, flow rate or location significantly different from that which existed prior to development, but shall be collected and conveyed to an acceptable point of discharge as approved by the District.
- D. Surface drainage entering a development from offsite areas shall be intercepted at the naturally occurring locations. Offsite surface drainage shall be conveyed through the site in a separate stormwater drainage system and will not be mixed with the stormwater collected

and treated within the onsite SMFs unless the onsite SMFs are designed to manage and treat the additional flows from the upstream drainage basin(s) assuming full development potential.

- E. When an Approved Point of Discharge is located and/or conveyed on an adjacent private property, the Applicant shall be responsible to acquire all applicable downstream private and/or Public Stormwater Easements. An easement is not necessary if the point of discharge is considered an intermittent stream, perennial stream, river, wetland, or natural resource.
- F. In compliance with Oregon Drainage Law, development shall not adversely impact downstream properties. Stormwater runoff from a development shall be safely conveyed to prevent the uncontrolled or irresponsible discharge of stormwater onto adjoining public or private property.
- G. Development shall not cause or increase flooding of adjacent or downstream property. An upstream and downstream analysis of the drainage system shall be conducted according to the guidelines in Chapter 7. Open channel and closed conduit systems shall be designed to safely convey the design storms listed in Chapter 7.
- H. All development, regardless of permit status, shall keep sediment laden water and any other forms of stormwater pollution from entering natural drainage systems, wetlands, natural resources, and the Public Stormwater System.
- I. All development must obtain a Service Provider Letter from the District prior to applying for Land Use/Design Review to the local planning authority. To obtain the Service Provider Letter from the District the Applicant must demonstrate that the proposed development is viable in accordance with District Rules and Standards. The Service Provider Letter will only be issued once the Applicant has provided sufficient plans, reports, and studies needed for preliminary review by the District. Based on the preliminary review, the District may request additional information prior to issuance of the letter or as part of the forthcoming land use application. Receipt of the Service Provider Letter does not imply that all District requirements have been met or guarantee that land use approval for the development will be granted. Service Provider Letter submittal requirements are found in Appendix A.
- J. Developments subject to O&M requirements are required to submit an O&M Plan and shall include an agreement that allows District Personnel access to the SMFs for inspections or abatement of a public nuisance or to correct a violation of these Standards.
- K. All publicly maintained SMFs shall be fully located in the Public ROW or within a tract of land that has adequate maintenance access and rights dedicated to the District, and the Storm Drainage System(s) shall be located within an easement or tract of land that has rights dedicated to the District.
- L. District maintained SMFs shall be fully located in the Public ROW or within a tract of land with an easement granted to the District. Both tracts of land and easements with rights granted to the District shall include the minimum access requirements in accordance with Section 6.4.1 to accommodate perpetual maintenance of the infrastructure. The Owner shall provide the District with all necessary documentation granting such easements and dedications. Upon approval of the easement document, the District will either process the easement or require the Applicant, at their own expense to process and record the document as a land record with the Recording Division of Clackamas County. The District will not approve the final construction plans until all public and private easement documents have been completed and recorded to the satisfaction of the District.

- M. A public drainage easement is required on existing open drainages that conveys Public Stormwater.
- N. The District requires vegetated buffers in Water Quality Resource Areas (WQRA) to protect the water quality of water resources, which include perennial and intermittent streams and wetlands as outlined in the WES Rules and the Buffer Standards.

3.3 Engineering Policy

It shall be the policy of the District to require compliance with ORS 672 for Professional Engineers, Surveyors, Photogrammetrists, and Geologists.

All engineering plans, Stormwater Management Plans, stormwater reports, infiltration reports, geotechnical reports, or documents shall be prepared by a registered PE or by a subordinate employee under the Engineer's direction and shall be stamped with the Engineer's seal and signed to indicate the Engineer's responsibility for the design. It shall be the Engineer's responsibility to review any proposed Public Stormwater System, variance, or other change with the District prior to engineering or proposed design work, to determine any special requirements and/or whether the proposal is permissible. A "Plans Approved for Construction" (or equivalent) stamp of the District on the Plans, etc., for any project, does not in any way relieve the Engineer of responsibility to meet all requirements of the District or obligation to provide a Public Stormwater System in accordance with the District Rules and Stormwater Standards, and protect life, health, and property of the public. The District reserves the right to change the Plan for any project prior to final acceptance at any time it is determined that the full requirements of the District Rules have not been met.

All drawings submitted for approval shall be stamped and signed by a registered PE. No plan review or approval shall be made without the Plans being stamped and signed by the PE.

3.4 Stormwater Standard Detail Drawings

The District's Standard Drawings shall be used for public and private development projects and cannot be modified by designers, unless approved by the District on a project-by-project basis. It is the responsibility of the Engineer to incorporate the standard detail drawings as originally intended. See Appendix D for the District's Stormwater Typical Drawings and Standard Details.

3.5 Approval of Alternate Materials and Methods

Any substitution of materials or alternate methods not explicitly approved herein will be considered for approval as set forth in Section 2.4 of these Standards. Persons seeking such approvals shall make application in writing. Approval of any deviation from these Standards shall be provided in writing. Approval of minor matters will be made in writing, if requested.

Any alternative materials and/or methods must meet or exceed the minimum requirements set forth in these Standards.

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

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

3.6 Special Design Applications

Special applications not covered in these Standards require review and approval by the District. Submittal of full design calculations, supplemental drawings, and other information shall be required before any approval is considered.

4. Public Stormwater System Expansion

WES owns and maintains public stormwater and surface water assets in Rate Zones 2 and 3. This chapter only applies to development proposals that require construction of public stormwater assets that are intended to be conveyed to the District. The provisions presented in this section of the Stormwater Standards specify the responsibilities of the parties involved and the process followed by the District prior to acceptance of public stormwater improvements that are not constructed by the District. These requirements are intended to meet the goals and objectives of the District in combination with all other state, federal, county, and local laws and ordinances.

4.1 Public Stormwater System Expansion Approvals

The District must issue approvals for storm system expansion prior to the commencement of construction of any Public Stormwater System. Approvals for storm system expansion shall be issued by the District in accordance with these Standards. Approvals for storm system expansion are required to construct or reconstruct any Public Stormwater System, including inlets, sewers or conveyance system, stormwater facility, or underground injection control (UIC) facility, which are owned by, or intended to be conveyed to, the District. All other stormwater sewer piping not intended to be conveyed to the District shall be permitted by the local plumbing authority.

The Developer and the Developer's Engineer shall submit a signed Stormwater Engineering Agreement on a District-supplied form (form can be found online) which outlines the responsibilities of the Developer and Developer's Engineer, with regard to surveying, costing, design, inspection, testing, certification, and as-built requirements of the District for acceptance of the proposed Public Stormwater System project.

If required, the Developer's Engineer, Contractor, Applicant, District, and/or other related agency representatives will hold a pre-construction meeting to share information and requirements as specified in the stormwater report and/or engineered Stormwater Management Plans. The pre-construction meeting may be arranged by the Developer's Engineer to be held at either the District, County, or City offices prior to any public storm system approvals. Attendees must include the Developer, Developer's Engineer, Contractor, and the District representatives. Other interested parties may also attend the meeting. The purpose of the meeting is to discuss issues surrounding the project including, but not limited to, materials, construction, standard detail drawings, sequencing, testing, and inspection requirements. If requested by the District, the Contractor shall present certification by the State of Oregon and any other licensing body having jurisdiction over the work to demonstrate appropriate construction qualifications.

It is the sole responsibility of the Developer, Developer's Engineer, and Contractor to obtain all other applicable authorization from local agencies, state, and federal approvals prior to proceeding with any construction that is approved by the District.

4.2 Project Construction

The requirements for project construction are defined in the following subsections.

4.2.1 Variance or Deviation from the Approved Plans

No variance, deviation, or minor change from the approved Plans and specifications shall be made without the prior written approval of the District. When any variance or deviation of the approved Plans is requested by the Developer's Engineer, two sets of Plans showing the revisions shall be submitted to the District for approval. No construction of the modified section can commence until these revised Plans are reviewed and approved by the District. Approvals shall be made by the District in writing.

4.2.2 Inspection and Testing

The Developer's Engineer is responsible for all testing and inspection services as required by the District and to certify the material, construction, and testing results to the District. The Developer's Engineer or the Engineer's Inspector shall be allowed full access to all parts of the work; and shall be furnished with every reasonable facility for ascertaining whether or not the work, as performed, is in accordance with the requirements and intent of the approved Plans and specifications.

The Contractor shall furnish, at the Contractor's own expense, such samples as are customarily required for testing purposes. The District does not furnish inspection of storm sewer construction. For this reason, it is imperative that the Developer and/or the Contractor provide prompt and complete notification to the Developer's Engineer and the District as to the progress of the construction of storm sewer improvements.

Notification must be given to the Developer's Engineer when the following work is to be scheduled:

- A. Excavation and installation of the Public Storm Sewer.
- B. Compaction testing/proof roll of trench backfill and fill areas.
- C. Construction of structures (including manholes, service connections, and cleanouts).
- D. All required manhole and storm sewer line testing, including vacuum, air, mandrel, and video testing.

Failure to give the Developer's Engineer proper notification (48 hours) of the Contractors work schedule may invalidate the work performed and make necessary, testing and inspection from an independent testing laboratory for compliance with the District's construction specifications. Such tests shall be furnished, at no expense to the District.

Upon final completion of the construction, the Developer's Engineer will certify that the post construction as-built drawings are complete in all respects and the SMF and Storm Drainage System were built per the approved construction documents.

At a minimum, the following shall be done prior to requesting the final inspection of the stormwater facilities:

- A. Clean all SMFs of sediment and debris.
- B. Submit a Certification of Completion to certify that the project was constructed in accordance with the approved plans and District standards.
- C. Submit as-built drawings according to Section 4.3.4.
- D. Submit storm video testing and reports for all public storm systems that were constructed.
- E. Submit engineer inspection reports.

- F. Submit final construction cost data for the public storm systems that were constructed.

4.3 Acceptance and Warranty

Acceptance of the Public Storm System will be made in writing by the District after all conditions of the public storm system expansion have been met. The following outlines the District's post-construction requirements prior to final acceptance.

4.3.1 Video Inspection of Sewers

If the construction included storm sewers, after the Developer's Engineer certifies the construction is completed, then the entire Public Storm Sewer System shall be video inspected and recorded prior to the District conducting the final construction inspection in preparation of the acceptance of the Public Storm Sewer System. All pipes shall be thoroughly flushed immediately prior to the video inspection.

The video recording shall:

- A. Be in color electronic format acceptable to the Developer's Engineer and be continuous from beginning to end of each pipe run.
- B. Be clear, usable, and free of visual distortions; the image in the video shall appear level.
- C. Include a visual footage meter recording on the tape.
- D. Include a voice recording of suspected deficiencies.
- E. Provide a means of gauging the depth of deflection within the pipe system.
- F. Be performed by experienced personnel trained in locating pipe and grade breaks, obstacles, and service connections by remote video inspection utilizing a 360° pan and tilt camera.
- G. Identify visually, with audio and on the written report, the location of the beginning and end of each pipe run, the lineal feet of pipe, all deficiencies, the name of the company creating the tape recording, name of the operator, and date and time of the recording.
- H. Include a 360-degree inspection of each joint.
- I. Include a clear view up each Service Connection.
- J. Identify groundwater infiltration sources associated with construction or material defects.
- K. Video inspection for District review shall be performed at the end of the project once all construction is complete.

The Developer's Engineer shall review the video recordings and inspection report(s) prior to submitting them to the District.

The video and report shall record all horizontal and vertical deflection in the piping system. Any vertical deflection is unacceptable. Horizontal deflection that creates a half-inch belly in the Public Storm Sewer System is unacceptable. The Developer's Engineer shall be immediately notified, the deficiency corrected, and re-videoed prior to submitting the final video inspection and report to the District.

Once the Developer's Engineer has reviewed and approved the video recording in accordance with the Stormwater Standards, a copy of the video recordings, and written inspection report(s) shall be submitted to the District for review and approval. Illegible, or incomplete video, or inspection report(s) will be returned to the Developer's Engineer.

The District shall approve the video recording prior to scheduling the District inspection of the Public Storm Sewer System.

4.3.2 Test Results

The installation and/or construction of Public Stormwater System in accordance with the District Standards, including infiltration testing, vegetation planting, mainline, manhole, and service connection testing shall be observed by the Developer's Engineer or Engineer's Inspector and the results shall be certified to the District on the approved District forms (form can be found online). All required testing, including but not limited to pervious pavement testing, infiltration testing, or facility testing shall be performed.

4.3.3 Service Connection Drawings

If applicable, provide appropriate information to locate newly installed Storm Sewer Service Connection for each lot or parcel within the project boundaries. Provide stationing, depth, and horizontal dimensions at the end of the pipe to permanent physical objects in the field to assure that the service connection can be located after construction is completed. Service connection drawings shall become the property of the District and are public records. The form can be found online.

4.3.4 As-built Plan Requirements

The Developer's Engineer is responsible for record keeping, inspection, and preparation of the as-built drawings. Final as-builts drawings will be submitted as detailed in Appendix A. For all Public Storm Systems, the Developer's Engineer shall submit certified as-built plan and profile drawings. Record drawings shall be submitted for all other connections to the Public Storm system. As-built drawings shall meet the District's requirements and shall be of archival quality. Each page shall be stamped and signed by the Developer's Engineer and state, in writing, that this is an as-built drawing. As-built drawings shall become the property of the District and are public records.

Drawings shall also be submitted electronically in a release of AutoCAD and Portable Document Feature (PDF) file acceptable to the District. The electronic submittal shall become the property of the District.

4.3.5 Certification of Completion

A stamped and signed Certificate of Completion (form can be found online) shall be provided by the Developer's Engineer. This statement certifies to the District that all construction methods, workmanship, and materials, have been inspected, tested by approved methods, and found to conform to the approved Plans and the specifications of the District.

4.3.6 Final Inspection

A final inspection of the Public Stormwater System by the Developer's Engineer shall be conducted to determine that the construction was completed in conformance with Plans, specifications, and these Standards. The Developer's Engineer shall inspect and verify

that all newly constructed structures meet the District's Stormwater Standards. Once inspected and verified, the Developer's Engineer may notify the District upon completion of construction and request a final inspection conducted by District Personnel. Any deficiencies resulting in non-acceptance of the work shall be identified in writing and presented to the Developer's Engineer for correction. Upon correction of the noted deficiencies the Developer's Engineer shall inspect and verify corrections have been made and then notify the District and request a re-inspection. If the work is accepted, the Developer's Engineer will be notified.

4.3.7 Construction and Engineering Cost

The Developer's Engineer shall calculate and submit on District forms the actual construction and engineering cost of the Public Stormwater System. The Construction and Engineering Cost Data Sheet can be found online. District plan review fees shall be based on the cost to construct the Public Stormwater System.

4.3.8 Letter of Conveyance

The Developer/Owner shall convey (at no cost to the District) all right, title, and interest in the Public Stormwater System to the District. The Certificate of Completion form can be found online.

4.3.9 Warranty Bond

A warranty bond or cash security in an amount equal to 25 percent of the actual construction and engineering cost to complete the Public Stormwater System shall be provided to the District by the Developer/Owner at no cost to the District. This surety bond shall guarantee the workmanship and materials of the Public Stormwater System for a minimum period of 2 years from the date of acceptance by the District unless a longer period is required by the District. A sample Warranty Bond form can be found online. Upon default, the District may draw upon the surety or available funds to remedy violations or required corrections. The different types of acceptable surety are provided in Appendix A.

4.3.10 Letter of Acceptance

Upon completion of all the approval requirements, District Rules, and these Standards, the District shall issue a letter stating the District will accept for ownership and maintenance the public storm system expansion and specify the date the warranty period will begin.

4.3.11 Warranty Period

The Developer/Owner or Contractor's warranty period shall be in effect for a minimum period of 2 years from the date specified in the Letter of Acceptance unless a longer period is required by the District.

Prior to the end of the warranty period, the District will conduct a warranty bond inspection of the public stormwater expansion and notify the Developer/Owner, or the Developer's Engineer of any deficiencies found. The request and scheduling of the warranty bond is the responsibility of the Developer/Owner. Any faulty workmanship and/or defective materials which are discovered within the warranty period shall be corrected and/or replaced by the Developer/Owner at no expense to the District. Such warranty period and warranty bond may be extended upon the disclosure of a defect for

a minimum of 2 years after the correction of the defect is completed at the sole discretion of the District.

All repair work required during the warranty period shall be performed within 30 days of issuance of written notification to the Developer/Owner. Emergency work performed by the District and all work performed by the District due to the nonperformance of the Contractor shall be reimbursed to the District within 30 days of invoice. If the Contractor fails to reimburse the District in 30 days, the District may file a bond claim.

After the warranty inspection and completion of all work required to bring the Public Stormwater System into conformance with these Standards, all sureties shall be released unless the warranty period and warranty bond is extended at the sole discretion of the District.

5. Source Controls

This chapter presents the source control requirements for site uses and characteristics that have the potential to generate higher levels of pollutants than typical stormwater runoff.

The site characteristics/uses in this chapter have been identified as potential sources of chronic loadings or acute releases of pollutants such as oil and grease, toxic hydrocarbons, heavy metals, toxic compounds, solvents, abnormal pH levels, nutrients, organics, bacteria, chemicals, and suspended solids. This chapter presents controls for managing these pollutants at their source.

5.1 General Requirements

The following requirements apply to all sites subject to source control.

5.1.1 Signage Requirements

Informational signage is required for some site uses and activities that have the potential to contaminate stormwater. Proper signage addresses good housekeeping rules and provides emergency response measures in case of an accidental spill.

All signage shall conform to the following requirements:

- A. Signs shall be located and plainly visible from applicable activity areas.
- B. More than one sign may be needed to accommodate larger activity areas.
- C. Signs shall be water and weather resistant.
- D. Signs shall include the following information:
 - a. Safety precautions
 - b. Immediate spill response procedures (for example: “Turn the valve located at...” or “Use absorbent materials”)
 - c. Emergency contact(s) and telephone number(s)
- E. Signs may need to be in more than one language if required to communicate effectively with employees and delivery personnel.
- F. Signs may need to meet retro-reflectivity standards dependent on the use and intent of the sign.

5.1.2 Spill Control

Spill response supplies, such as absorbent material, containment booms, and protective clothing, shall be available at all potential spill areas. Any applicable spill response supplies need to be clearly marked and located where the signage is posted and near the high-risk activity area. The spill response supplies should be appropriate to the nature of the potential risk present at the site. More than one spill response kit may be necessary to accommodate larger activity areas.

Employees should be familiar with the site’s O&M Plan; the site’s Spill Prevention, Countermeasure, and Containment plan; and/or proper spill cleanup procedures.

5.1.3 Public Sanitary Sewer Discharge Permit

Many source control strategies require a connection of private stormwater drains to the public sanitary sewer system. Connection/discharge to the public sanitary sewer system requires prior written approval by the District. A request to discharge to the public sanitary system shall be submitted as part of the permitting process. All impervious surface areas that can drain into the public sanitary sewer shall be designed in a manner to eliminate stormwater runoff from entering the sanitary sewer system. The separation of stormwater into the sanitary sewer system is generally accomplished by covering the impervious area that drains into the sanitary sewer and grading the area in a manner that separated the flows.

5.2 Source Control Requirements

Applicants shall show the locations of proposed structural source controls (including spill control manholes and shutoff valves) and include documentation of high-risk site uses and the applicable source controls as part of the Stormwater Report and Stormwater Plans (see **Appendix A** for submittal requirements).

5.2.1 Fuel Dispensing Facilities and Surrounding Traffic Areas

These requirements apply to all development where vehicles, equipment, or fuel tanks are refueled on the premises, whether it is a gas station, a single-pump maintenance yard, or a small-sized fuel tank. A fuel dispensing facility is defined as the area where fuel is transferred from bulk storage tanks to vehicles, equipment, and/or mobile containers (including fuel islands, above- or below-ground fuel tanks, fuel pumps, and the surrounding pad). Propane tanks are exempt from these requirements.

Any discharge or point of connection to the public or private stormwater system must obtain authorization and permitting by the District. Discharges of hydrocarbons are prohibited to the public sanitary and stormwater sewer systems. When a containment or emergency storage device is used, the Owner or responsible person shall contact the District's Environmental Monitoring Division for authorization to open any valve and discharge any substance to a public sanitary or stormwater sewer system. The District shall determine the conditions to discharge or dispose of the substance to safeguard the environment, public health, and safety.

Underground storage tanks or installations requiring a Water Pollution Control Facility (WPCF) permit are exempt from these requirements but must go through DEQ's WPCF permit process.

Cover

The fuel dispensing area shall be covered with a permanent canopy or roof so precipitation cannot come in contact with the fueling activity area. Rainfall shall be directed from the cover to a stormwater disposal point that meets all applicable code requirements.

Covers 10 feet high or less shall have a minimum overhang of 3 feet on each side. The overhang shall be measured relative to the perimeter of the hydraulically isolated fueling activity area it is to cover.

Covers higher than 10 feet shall have a minimum overhang of 5 feet on each side. The overhang shall be measured relative to the perimeter of the hydraulically isolated fueling activity area it is to cover.

Pavement

A paved fueling pad of concrete shall be placed under and around the fueling activity area and shall meet all applicable building code requirements. Sizing of the paved area shall be adequate to cover the activity area, including placement and number of the vehicles or pieces of equipment to be fueled by each pump. Fuel pumps shall be located a minimum of 10 feet from the edge of the fueling pad.

Drainage

The impervious area beneath the cover shall be hydraulically isolated from the surrounding area through grading, berms, or drains.

Drainage from under the cover that is hydraulically isolated shall be directed to the sanitary sewer system. When connecting to sanitary sewer, an oil/water separator shall be installed to collect and detain the runoff from under the cover of a fuel dispensing area. Unless the District requires a different volume, the minimum storage capacity of the oil/water separator and, if needed, an upstream storage sump/vault shall be 1,000 gallons. A flow-stop or shut-off valve is required downstream of the oil/water separator prior to connection with the public sanitary sewer system.

Surrounding runoff must be directed away from the hydraulically isolated fueling pad to a stormwater discharge point that meets all stormwater management requirements of these standards and other applicable code requirements.

Traffic pathways that surround fueling pads are considered high use/high-risk areas and will require a valve on the storm drainage system. Valves installed on storm drainage systems must be installed downstream of all applicable private SMFs to accommodate spill containment. These valves must be left open to facilitate stormwater flows during normal conditions, and immediately closed in the event of a spill.

Pretreatment: Oil/Water Separator

Runoff from the fuel dispensing area is required to be pretreated in an oil/water separator with coalescing plates prior to being discharged into the spill control manhole. The purpose of the device is to treat runoff from washing down and cleaning of the fueling area and to prevent small spills from entering the spill control manhole.

Coalescing plate separators shall be designed to achieve a 100 parts per million (ppm) non-polar oil and grease limit in the effluent from the peak flow generated by the washing activity. Testing information must be submitted by the manufacturer of the unit that supports the 100 ppm effluent standard at the calculated flow rate.

At a minimum, the device will be sized to treat the standard flow from a 5/8-inch hose which is estimated to be 10 gallons per minute.

Each device shall be verified with the vendor to assure the treatment and flow rate capacity are within the parameters of the device.

Separator details must be shown on the building plans submitted at the time of building permit application and shall match manufacturer specifications and details, including the unit flow rate, effluent water quality, and maximum process flow rate.

All separators shall be maintained per the manufacturer specifications and the private maintenance plan approved by the District.

Spill Control Manholes

A spill control manhole shall be installed as the last device inline to collect and retain the runoff from the fuel dispensing area. The spill control manhole shall have a downstream inline valve prior to point of discharge into an approved storm drainage system. Spills and contaminants are treated and contained within the pretreatment device and spill control manhole until authorization is obtained by the District to release the substance into an Approved Point of Discharge or dispose of it appropriately offsite. In general, with District approval of the acceptable level of contaminants and release method, the contaminants are allowed to be discharged into the public sanitary sewer system. The shut-off valve shall be located below the outlet elevation, and the manhole shall have a minimum dead storage capacity of 60 cubic feet in volume between the invert elevation (IE) of the inflow pipe and the IE of the discharge pipe for storage of oil, grease, and solids. The tee section shall extend 18 inches below the outlet elevation. The manhole shall be located on private property and accessible for operation and maintenance activities.

Shut-Off Valves

Shut off valves are required to protect the public or private sanitary or storm drainage systems from risks that may present a danger or risk to the environment, public health, and safety.

Shut-off valves are required for any of the following situations:

- A. Site or activity areas are exposed to corrosives or oxidizers that can harm storm drainage system components (such as, but not limited to, battery acid).
- B. Substances (such as, but not limited to, oil and grease) that do not settle or remain in one location and are capable of being dissolved in or float on water. These substances can spread rapidly into downstream storm drainage system and disposal systems, causing widespread impacts and difficult cleanup situations.
- C. Substances that are known to infiltrate through soils and contaminate groundwater.
- D. Traffic pathways that surround fueling pads are considered high use/high-risk areas and will require a valve on the storm drainage system. Valves installed on storm drainage systems shall be installed downstream of all applicable private SMFs to accommodate spill containment. These valves shall be left open to facilitate stormwater flows during normal conditions, and immediately closed in the event of a spill.
- E. Fueling pads require a valve downstream of the spill control manhole. Valves installed on sanitary sewer systems shall be installed before the public sanitary sewer system tie-in. These valves shall be kept closed and opened upon approval by the District. The valve shall be closed immediately after the approved discharge activities are completed.
- F. Shut-off valves shall be located on private property and downstream of all SMFs. All valves shall be installed and maintained per the manufacturer's recommendations and the private maintenance plan approved by the District. The Applicant must also obtain a plumbing permit from the local building authority to install plumbing on private property.

Bulk Fuel Terminals

Bulk fuel terminals, also known as tank farms, require the following:

Secondary containment equal to 110 percent of the product's largest container or 10 percent of the total volume of product stored, whichever is larger.

- A. A separate containment area for all valves, pumps, and coupling areas, with sub-bermed areas either in front of or inside the main containment areas. These sub-bermed areas shall have rain shields and be directed to a public sanitary sewer system with a valve maintained in the closed position to control unauthorized discharges. If no public sanitary sewer is available, drainage shall be directed to a temporary holding facility for proper disposal and may require a WPCF permit from the Water Quality Division of DEQ.
- B. An impervious floor within all containment areas is required to prevent spills from contaminating the groundwater.
- C. Truck loading and off-loading areas shall be covered to prevent spills from entering the public sanitary or storm system. To prevent the discharge of spills a shut-off valve is required as identified for fuel dispensing facilities.
- D. Shut-off valves shall be installed for the drainage of the required containment facilities for a tank yard. The valves shall be installed downstream of the primary containment area and kept closed. Valves installed for the drainage of the truck pad and sub-bermed containment areas shall be installed downstream of the SMFs including the spill control manhole.
- E. Approval of a batch discharge from the District is required before discharging a containment area into a public sanitary or stormwater system. This approval will determine appropriate disposal methods, identify pretreatment requirements (if applicable), and approval of the discharge. Pretreatment and testing may be required to establish the specific characteristics of the substance to be discharged. Contact the District's Environmental Monitoring Division to request authorization for batch discharge.
- F. Underground fuel tanks less than 4,000 gallons in size are subject to additional permitting requirements by DEQ, and tanks larger than 4,000 gallons are referred to the EPA. For technical questions and permitting, call DEQ's Northwest Region Portland office and ask for the Underground Storage Tank Permitting Department. The installations of underground storage tanks are subject to all requirements and permits per the local building authority and OPSC.

Additional Requirements

- A. Track spill control manhole and shut-off valve installations.
- B. Installation, alterations, or removal of above-ground fuel tanks larger than 55 gallons, and any related equipment may be subject to additional building permit and fire department requirements. For technical questions and permitting, contact the local building authority and the District's Development Review Division.

5.2.2 Above-Ground Storage of Liquid Materials

These requirements apply to all development where there is any exterior storage of liquid chemicals, food products, waste oils, solvents, process wastewaters, or petroleum products in above-ground containers, in quantities of 50 gallons or more. This includes both permanent storage and temporary storage areas.

Containment

Liquid materials shall be stored and contained in such a manner that if the container(s) is ruptured, the contents will not discharge, flow, or be washed into a drainageway, public storm or sanitary sewer system. A containment device and/or structure for accidental spills shall have capacity to capture a minimum of 110 percent of the product's largest container, or 10 percent of the total volume of product stored, whichever is larger.

Double-walled containers may be exempt from these spill containment requirements.

Quantity thresholds of products that are generally exempt from these spill containment measures include: Janitorial, cleaning, office and stationary supplies packaged for consumer use in containers less than 100 pounds net weight or 15 gallons net volume are exempt from spill containment measures.

Note: This does not include cleaners or solvents used for cleaning machinery or motor vehicle and machine parts.

Cover

Storage containers (other than tanks) shall be completely covered so rainfall and stormwater runoff cannot come in contact with them. Runoff shall be directed from the cover to a SMF that meets all applicable code requirements.

Covers 10 feet high or less shall have a minimum overhang of 3 feet on each side. The overhang shall be measured relative to the perimeter of the hydraulically isolated activity area.

Covers higher than 10 feet shall have a minimum overhang of 5 feet on each side. The overhang shall be measured relative to the perimeter of the hydraulically isolated activity area.

Pavement (Impervious Surface)

An impervious surface storage area is required unless otherwise approved by the District's Development Review Division. The storage area shall be an impervious surface area and shall meet all applicable zoning and building code requirements. Compactors, containers, and drop boxes shall be located on a level Portland Cement concrete pad, a minimum 4 inches thick, at ground level or other location compatible with the local collection service franchisee's equipment at the time of construction. The pad shall be designed to discharge surface water runoff to avoid ponding. Sizing of the impervious areas shall be adequate to cover the area intended for storage.

Drainage

All impervious storage areas shall be hydraulically isolated through grading, berms, or drains, such as:

- A. Covered storage areas. Significant amounts of precipitation are not expected to accumulate in covered storage areas, and drainage facilities are not required for the contained area beneath the cover. If the Applicant elects to install drainage facilities, the drainage from the hydraulically isolated area shall be directed to an approved pretreatment, containment facility and point of discharge.
- B. Uncovered storage areas with containment. Water will accumulate in uncovered storage areas during and after rain. Any contaminated water cannot simply be drained from the area. It must be collected, inspected, and possibly tested at the expense of the Owner before proper disposal can be determined and authorized.

Frequent draining may be required during the wet season, which may prove costly. Some type of monitoring may also be needed to determine the characteristics and level of contamination of the stormwater.

All substances and methods discharged to the sanitary sewer shall be authorized by the District prior to release. The District considers these batch discharges and shall require pretreatment prior to discharge. An industrial discharge permit may be required. Pretreatment requirements shall be set as part of the discharge approval process, based on the types and quantities of material to be discharged. A discharge evaluation shall be performed before connection to a sanitary sewer or storm sewer system. Testing may be required to establish characteristics of the wastewater or contaminated stormwater and to verify that local discharge limits are not exceeded. For batch discharge applications and industrial discharge permit requirements, call the District's Environmental Monitoring Division.

Additional Requirements

- A. Covered storage areas: A shut-off valve may be required for the covered storage area if the Applicant proposes to install drainage facilities to an approved public sanitary sewer connection. The District will make this determination based on the type of material stored and the proposed point of discharge.
- B. Uncovered storage areas: A shut-off valve shall be installed in the storage area so excess stormwater can be drained out of the activity area and directed either to the storm drainage facilities (if clean) or into the public sanitary sewer or authorized pretreatment facility (if contaminated). Except when stormwater is being discharged, the valve shall always be kept closed so any spills within the activity area can be effectively contained.
 - a. Tank farms shall follow the criteria established for bulk fuel terminals in Section 5.2.1. Exceptions may be granted, based on the product being stored. Requests for an exception will require an additional review process and may delay issuance of related building permits.
 - b. Storage of reactive, ignitable, or flammable liquids shall comply with the Uniform Fire Code as adopted by the State of Oregon. These source controls are intended to complement, not conflict with, current fire code requirements. None of these requirements shall exclude or supersede any other requirements in this manual, other District permit requirements, or State and Federal laws pertaining to water quality. Contact the District for further information and requirements.

5.2.3 Recycling and Solid Waste Storage Areas

These requirements apply to all commercial and industrial development with facilities that store recycling materials and/or solid wastes (both food and non-food wastes). A solid waste storage area is a place where solid waste containers are collectively stored. Solid waste receptacles may include, but are not limited to compactors, containers, carts, barrels, dumpsters, and garbage cans. These requirements also apply to areas used to collect and store refuse or recyclable materials. This applies to multi-family residential sites of five or more units if a shared trash collection area is proposed. However, these requirements do not apply to single-family homes or debris collection areas used for temporary storage of wood pallets or cardboard.

The following design requirements apply for approval of solid waste storage and handling activity areas in the District. All receptacles used for storage of solid waste and recyclables (except cardboard) are required to be designed by the manufacturer to fully contain liquid waste if maintained properly and must remain in properly functioning condition throughout their period of use. Per the most current version of the Clackamas County Solid Waste and Recyclable Material collection code, containers used to store cooking oils, grease, or animal renderings for recycling or disposal shall not be located in the principal recyclable materials or solid waste storage areas.

These materials shall be stored in a separate storage area designed for such purpose. Restaurants and other businesses that collect and store oil and grease shall create a separate space under their covered enclosure to store the oil/grease container that does not block access to garbage, food, and recycling containers. Material collection, containers used to store cooking oils, grease, or animal renderings for recycling or disposal shall not be located in the principal recyclable materials or solid waste storage areas. These materials shall be stored in a separate storage area designed for such purpose.

Cover

Restaurants and other businesses that collect and store oil and grease shall create a separate space in accordance with local zoning and building codes. Additional details on these requirements can be found in the local Solid Waste and Recyclable Material collection code.

A permanent canopy, roof, or awning may be required to cover the solid waste storage area and shall be constructed to cover the activity area so rainfall and stormwater runoff cannot come in contact with the waste materials being stored. The cover shall be sized relative to the perimeter of the hydraulically isolated activity area it is to cover. Runoff shall be directed from the cover to a stormwater disposal point that meets all applicable code requirements.

If the structure is covered, then the Building Drain shall be connected to the public sanitary sewer in accordance with local building and plumbing codes. If the structure is not covered, it cannot be drained into the public sanitary sewer system. Uncovered structures shall drain into the storm drainage system with the applicable oil/water separator and cartridge filter water quality treatment.

Pavement

If a paved waste storage area is required. The structure and impervious surface area shall be designed and constructed in accordance with all applicable zoning, building and plumbing codes. The pad shall be designed to discharge surface water runoff to avoid ponding. Sizing of the paved area shall adequately cover the activity area intended for refuse storage, or the trash compactor(s) and associated equipment.

Isolation

Hydraulic isolation shall be provided for the solid waste storage activity area and shall be designed to prevent uncontaminated stormwater runoff from entering the area and carrying pollutants away. Runoff occurring outside the hydraulically isolated area shall be directed to a stormwater disposal point that meets all applicable code requirements. This can be achieved by reverse grading at the perimeter of an activity area, perimeter curbing or berming, or the use of area drains to collect and divert runoff.

Drainage

The paved area under the cover shall be hydraulically isolated, meaning no stormwater draining into or liquids draining out of the covered storage area. Hydraulic isolation may include installation of a berm or grading that prevents uncontaminated stormwater from running into the waste storage area and ensures that any fluid under the enclosure drains to the sanitary system. An oil/water separator may be required as pretreatment before discharging to the sanitary system, per Section **Error! Reference source not found.**

Non-gravity Option

Activity areas that do not have gravity sanitary sewer service may be allowed to install a pressurized system in accordance with local building and plumbing codes. With these types of installations, the following items shall be provided at the time of building permit application:

- A. Verification or evidence that gravity service cannot be obtained.
- B. Details of an electronic sump pump system equipped with a float switch.
- C. District approval.

Pressurized system installations are considered “permanent equipment” and deemed the Owner’s liability in the event of system failure or if the property becomes vacated.

The local building and plumbing codes authorities will review all sump pump or sewage ejector installations for compliance with the UPC and Oregon State Plumbing Specialty Code.

5.2.4 Exterior Storage of Bulk Materials

These requirements apply to developments that stockpile or store materials in outdoor containers that may erode or have negative stormwater impacts. The materials are separated into the following three categories, based on risk assessments for each material stored: high-risk, low-risk, and exempt materials.

These include, but are not limited to, the types found in **Table 2**. Materials with any of the following characteristics are exempt from these requirements:

- A. Have no measurable solubility or mobility in water and no hazardous, toxic, or flammable properties.
- B. Exist in a gaseous form at ambient temperature.
- C. Are contained in a manner that prevents contact with stormwater (excluding pesticides and fertilizers).

Cover

Low-risk materials shall be covered with a temporary plastic film or sheeting at a minimum.

High-risk materials shall be permanently covered with a canopy or roof to prevent stormwater contact and minimize the quantity of rainfall entering the storage area. Runoff shall be directed from the cover to an approved stormwater disposal point that meets all applicable code requirements.

Table 2. Stormwater Impacts of General Material Types

<p>High Risk Materials</p> <ul style="list-style-type: none"> • Recycling materials with potential effluent (including mercury containing items) • Corrosive materials (e.g., lead-acid batteries) • Storage and processing of food items • Chalk/gypsum products • Feedstock/grain • Material by-products with potential effluent • Fertilizer • Pesticides • Oily or otherwise contaminated vehicle/equipment parts • Lime/lye/soda ash • Animal/human wastes
<p>Low Risk Materials</p> <ul style="list-style-type: none"> • Recycling materials without potential effluent • Used tires • Non-oily scrap or salvage • Treated lumber • Metal • Sawdust/bark chips • Sand/dirt/soil (including contaminated soil piles) • Material by-products without potential effluent • Unwashed gravel/rock • Compost • Asphalt • Non-leaking vehicles in stages of disassembly
<p>Exempt Materials</p> <ul style="list-style-type: none"> • Rock • Finished untreated lumber • Rubber and plastic products (hoses, gaskets, pipe, etc.) • Clean concrete products (blocks, pipe, etc.) • Glass products (new, non-recycled) • Inert products

Covers 10 feet high or less shall have a minimum overhang of 3 feet on each side. The overhang shall be measured relative to the perimeter of the hydraulically isolated activity area.

Covers higher than 10 feet shall have a minimum overhang of 5 feet on each side. The overhang shall be measured relative to the perimeter of the hydraulically isolated activity area.

Pavement

Low-risk material storage areas are not required to have an impermeable surface.

High-risk material storage areas shall be impervious beneath the structural cover. Sizing of the impervious surface area shall adequately cover the activity area intended for storage.

Drainage

Low-risk material storage areas are typically allowed in areas served by standard SMFs. However, all erodible materials being stored must be protected from rainfall and stormwater runoff.

If materials are erodible, a structural containment barrier shall be placed on at least three sides of every stockpile. The barrier shall be tall enough to prevent the contained and uncontaminated area from mixing stormwater runoff into the storage area with the stored materials as a result of being blown or washed away. If the area under the stockpile is paved, the barrier can be constructed of asphalt berms, concrete curbing, or retaining walls. If the area under the stockpile is unpaved, sunken retaining walls or ecology blocks can be used. The Applicant shall clearly identify the method of containment on the building and/or site plans.

For high-risk material storage areas, the paved area beneath the structural cover shall be hydraulically isolated through grading, structural containment berms or walls, or perimeter drains to prevent uncontaminated stormwater from running onto the area and carrying pollutants away. If significant amounts of precipitation are not expected to accumulate in covered storage areas, drainage facilities are not required for the contained area beneath the cover. If the Applicant elects to install drainage facilities, the drainage from the hydraulically isolated area shall be pretreated and connected to a point of discharge approved by the District. In such a case, an evaluation will be done to determine if an NPDES Discharge permit is required.

Additional Requirements

- A. Storage of pesticides and fertilizers may need to comply with specific regulations outlined by DEQ. For answers to technical questions, call DEQ's Northwest Region Portland office.
- B. A sampling manhole or other suitable stormwater monitoring access point may be required to monitor stormwater runoff from the storage area. This may apply to certain types of storage activities and materials if an alternative source control is proposed. The District's Development Review Division will review for applicability of this requirement.
- C. Hazardous materials signage shall be provided at the storage area where hazardous materials or other materials of concern are stored. Signage shall be located so it is

plainly visible from all storage activity areas. More than one sign may be needed to accommodate large storage areas.

- D. A shut-off valve may be required for the structurally covered storage area if the Applicant elects to install drainage facilities and discharge into a sanitary system. The District's Development Review Division will make this determination based on the type of material stored and the proposed system receiving the discharge.

5.2.5 Material Transfer Areas/Loading Docks

These requirements apply to all developments proposing the installation of new material transfer areas, or structural alterations to existing material transfer areas (e.g., access ramp regrading, leveler installations).

The requirements apply to all material transfer areas, including loading/unloading docks, bay doors, and any other building access point(s) with the following characteristics:

- A. The area is designed (size, width, etc.) to accommodate a truck or trailer being backed up to or into it; and,
- B. The area is expected to be used specifically to receive or distribute materials to and from trucks or trailers.

The requirements may not apply to areas that are used only for mid-sized to small-sized passenger vehicles and that are restricted (by lease agreements or other regulatory requirements) to storing, transporting, or using materials that are classified as domestic use: Primary educational facilities (elementary, middle, or high schools), buildings used for temporary storage (a lease agreement will need to be provided), and churches. Contact the District's Development Review Division for help in determining if requirements apply.

Pavement

An impervious surface area such as asphalt or concrete shall be placed underneath and around the loading and unloading activity area and shall meet all applicable building code requirements. This will reduce the potential for soil contamination with potential impacts on groundwater and will help control any acute or chronic release of materials present in these areas.

Isolation

The first 3 feet of the paved/covered area of a loading dock, measured from the building or dock face, shall be hydraulically isolated through grading, berms, or drains to prevent uncontaminated stormwater from running onto the area and carrying pollutants away.

Bay doors and other interior transfer areas shall be designed so that stormwater runoff does not enter the building. This can be accomplished by grading or drains.

Drainage

Drainage from the hydraulically isolated, covered loading dock area shall be directed to a pretreatment facility and then the sanitary sewer. Surrounding runoff and drainage from the access ramp shall be directed away from the hydraulically isolated area to a SMF that meets all applicable requirements of this manual.

Areas which cannot gravity discharge may be allowed to install a pressurized system. With these types of installations, the following items shall be provided at the time of building permit application:

- A. Proof that a gravity system cannot be obtained.
- B. Details of an electronic sump pump system equipped with a float switch.
- C. A point of discharge approved by the District.

Pressurized system installations are considered “permanent equipment” and deemed the Owner’s liability in the event of system failure or if the property becomes vacated.

The local building authority will review all sump pump or sewage ejector installations for compliance with the UPC and OPSC. The District’s Development Review Division will review the pressurized systems for compliance with the Standards.

Bay Doors and Other Interior Transfer Areas. Because interior material transfer areas are not expected to accumulate precipitation, installation of floor drains is not required or recommended. It is preferable to handle these areas with a dry mop or absorbent material. If interior floor drains are installed, they shall be plumbed to an approved pretreatment facility and discharge into the public sanitary sewer.

Shut-off Valves

A shut-off valve downstream of the transfer area may be required to prevent spills and contamination from leaving this area. The District’s Development Review Division will make this determination, based on the type of material being transferred, pretreatment facility and the Approved Point of Discharge.

Shut-off valves are required to protect health, safety and the environment from spills and substances that may provide a risk. Shut-off valves are required for any of the following situations:

- A. Site activity areas that are exposed to corrosives or oxidizers that can harm storm drainage system components (such as battery acid).
- B. Substances (such as oil and grease) that do not settle or remain in one location and are capable of being dissolved in or float on top of water. These substances can spread rapidly into downstream systems, causing widespread impacts and difficult clean-up situations.
- C. Substances that are known to infiltrate through soils and contaminate groundwater.

Valves located in material transfer areas are typically left open to facilitate drainage during normal conditions, and immediately closed in the event of a spill.

Prior to transfer activities of harmful substances, the valves shall be closed and reopened only after the transfer is complete. The shut-off valves must be located on private property and downstream of the exposed area’s collection system.

All valves shall be installed and maintained in accordance with manufacturer specifications. For additional information about installation of shut-off valves contact the local building authority.

Addition Requirements

Bay doors and other interior transfer areas shall provide a 10-foot “no obstruction zone” beyond the entrance within the building. This will allow the transfer of materials to occur with the truck or trailer end placed at least 5 feet inside the building, with an additional staging area of 5 feet beyond that. The “no obstruction” zone shall be clearly identified on the site plan at the time of the building permit application and shall be painted at the facility with bright or fluorescent floor paint.

5.2.6 Equipment and/or Vehicle Washing Facilities

These requirements apply to all development within designated equipment, vehicle washing or cleaning areas. This includes smaller activity areas, such as wheel-washing stations. Residential sites are exempt.

Cover

The washing area shall be covered with a permanent canopy or roof so precipitation cannot come in contact with the washing activity area. Precipitation shall be directed from the cover to a SMF that meets all applicable code requirements.

- A. Covers 10 feet high or less shall have a minimum overhang of 3 feet on each side. The overhang shall be measured relative to the perimeter of the hydraulically isolated washing activity area it is to cover.
- B. Covers higher than 10 feet shall have a minimum overhang of 5 feet on each side. The overhang shall be measured relative to the perimeter of the hydraulically isolated washing activity area it is to cover.

Pavement

The wash pad area shall be impervious surface such as asphalt or concrete placed under and around the washing activity area and shall meet all applicable building code requirements. Sizing of the paved area shall adequately cover the activity area, including the placement of the vehicle or piece of equipment to be cleaned.

Drainage

The paved area beneath the cover shall be hydraulically isolated through grading, berms, or drains to prevent uncontaminated stormwater from running onto the area and carrying pollutants away. Drainage from the hydraulically isolated area shall be directed to a pretreatment facility and then the sanitary sewer. If connected to the public sanitary sewer, and, depending on the washing compounds used (i.e., brighteners), an industrial discharge permit to the public sanitary sewer system may be required. For further questions, contact the Development Review Division. Surrounding runoff shall be directed away from the hydraulically isolated washing pad to a SMF that meets all applicable requirements.

Oil Controls

All vehicle and equipment washing activities shall be equipped with an approved oil/water separator system. The system shall comply with the public sanitary sewer discharge limits. For discharge requirements and limitations to the public sanitary sewer system contact the District's Environmental Monitoring Division.

For washing areas protected with a cover or located inside a structure, the following design criteria apply to oil/water separators discharging a public sanitary sewer system:

- A. Baffled oil/water separators and spill control (SC-type) separators shall not be allowed for use with equipment and/or vehicle washing applications. Note: Activities and processes of a washing facility change over time, and the introduction of heat and surfactants may occur.
- B. Coalescing plate separators shall be designed to achieve a 100-ppm non-polar oil and grease limit in the effluent from the peak flow generated by the washing activity. Testing information must be submitted by the manufacturer of the unit that supports the 100-ppm effluent standard at the calculated flow rate.

- a. The minimum design flow rate shall be 10 gallons per minute which is the estimated flow from a 5/8-inch hose.
 - b. For specially designed washing units, check the vendor specifications for maximum flow rates.
- C. Any pumping devices shall be installed downstream of the separator and pretreatment facility to prevent oil emulsification.
 - D. Separator details must be shown on the building plans submitted at the time of building permit application and shall match manufacturer specifications and details, including the unit flow rate, effluent water quality, and maximum process flow rate.
 - E. All separators shall be maintained per the manufacturer specifications and District approved maintenance plan.

Onsite wash recycling systems may be used for oil control as long as they can meet effluent discharge limits for the public sanitary sewer system. A detail of the wash recycling system and vendor specifications identifying effluent efficiencies shall be submitted as part of the building plans at the time of the building permit application.

5.2.7 Equipment and/or Vehicle Repair Facilities

These requirements apply to all development within designated equipment or vehicle repair including areas conducting body work.

Cover

Repair areas shall be located indoors so precipitation cannot come in contact with the repair area. Precipitation shall be directed from the repair facility roof to a SMF that meets all applicable District requirements.

Floors

The floor shall be impervious material such as concrete.

Drainage

The exterior of the repair area shall be hydraulically isolated through grading, berms, or drains to prevent uncontaminated stormwater from running onto the area and carrying pollutants away. Runoff shall be directed away from the hydraulically isolated repair area to a SMF that meets all applicable requirements.

Storage

Interior: Chemicals used for cleaning machinery or motor vehicle and machine parts (including, but not limited to, lubricants, used fluids, solvents, cleaners, etc.) of any quantity must be stored in or on secondary containment structures.

Exterior: Chemicals and materials must be stored in a manner consistent with the requirements set forth in Section 5.2.2 and Section 5.2.5.

Oil Controls

All vehicle and equipment repair areas with floor drains and/or shop sinks must have an approved oil/water separator system and comply with the District's sanitary sewer discharge standards. Details on oil/water separator design criteria are located in Section 5.2.1.

5.2.8 Land with Suspected or Known Contamination

These requirements apply to all development projects that disturb property at risk, suspected, or known to contain pollutants in the soil or groundwater. This includes development that is surrounded by properties found to have trace pollutants. These requirements will also be applied to any property that is seeking to make a new connection to a public storm system or drainageway from a property that is at risk, suspected, or known to contain pollutants in the soil or groundwater. To avoid confusion with references to water quality pollutants throughout this manual, this section refers to pollutants as contaminants and/or contamination.

Because of local, State, and Federal regulations, special handling and management of soils, groundwater, and surface drainage may be necessary. As a result of these regulations, sites with suspected or known contamination require a more detailed review process that may delay issuance of related site plan and building permit approvals. Applicants are advised to contact the Development Review Division early in the planning process (before plan submittal) if they are aware or suspect the site has contaminants or is adjacent to a contaminated site.

To research contaminant information, refer to DEQ's Environmental Cleanup Site Information database.

- A. If records indicate there is a potential of contamination on the site, the Applicant must contact DEQ prior to pre- and post-construction activities. For technical questions related to site contamination and clean-up, contact the Land Quality Division of DEQ.
- B. All regulatory divisions or departments of DEQ referenced in this section can be reached by calling DEQ's Northwest Region Portland Office.
- C. If a Phase 1 DEQ Site Assessment was required, the report will be submitted to the District for review.
- D. If contamination is discovered subsequent to site plan approval the Owner shall immediately take steps to protect health, safety and the environment and contact the District and DEQ. Plan approval is suspended until the contamination issues are resolved.

Contaminants have the potential to become entrained and transported through exposure to construction activities and post-construction design elements of a development. The requirements in this section apply to:

- A. Excavation and stockpiling of contaminated soils (soil management)
- B. Disposal or re-use facilities related to groundwater, foundation or footing drains, interior floor drains in basements or sub-grade structures, construction dewatering, and surface stormwater treatment and storm drainage systems.

Stormwater discharges from sites suspected of contamination, whether proposed as a temporary construction connection or as permanent connection to any public storm, sanitary sewer system or drainageway, will require a special authorization from the District and Environmental Monitoring Division. After reviewing the proposal and a characterization of the contaminants on the site, the District and/or Environmental Monitoring Division will make one of the following decisions:

- A. Approve discharges to the public storm and/or sanitary sewer system with restrictions such as described in these pages or as is necessary given the nature of the discharge.

- B. Require the Applicant to obtain an NPDES permit from DEQ for the anticipated discharge prior to connection to a public system.
- C. Require the Applicant to obtain a District's Industrial Pretreatment Permit.
- D. Deny the request to discharge to the public storm and/or sanitary sewer system.
- E. Allow unrestricted connection to the public storm and/or sanitary sewer system, with an approved monitoring/testing structure.

Contaminants, media, and site conditions are unique to each parcel of land. Sites at risk for contamination shall therefore be reviewed on a case-by-case basis.

Soil Management

Stockpiles of contaminated soils shall be covered with temporary plastic film or sheeting to prevent stormwater from contacting them.

Stockpile perimeters shall have a containment barrier on all four sides of every stockpile to prevent stormwater run-on and material run-off. Barriers can consist of concrete curbing, silt fencing, or other berm materials, depending on the activity, size, and resources available.

Areas under stockpiles of contaminated soils are not required to be paved. However, an impervious layer shall be placed beneath the stockpile to protect uncontaminated areas from potential leachate.

Construction Dewatering

For technical assistance on obtaining a batch discharge approval for construction dewatering activities, contact the District's Development Review Division. The following requirements apply:

- A. Construction dewatering discharges from contaminated sites to the District's stormwater system are prohibited. Upon approval by the District, these waste streams may be discharged to the sanitary sewer if the discharge meets all standards detailed in Section 5.1.3.
- B. Laboratory analysis reports with data for all pollutants of concern will be required.
- C. Installation of required pretreatment technology, an approved sampling point, and/or a meter may be required by the District prior to any discharge to the sanitary sewer is permitted.
- D. Contact the District for further information on discharging water to the sanitary sewer system.
- E. If onsite infiltration is the proposed method for disposal, authorizations are required from the District and the Land and Water Quality Divisions of DEQ. Private infiltration facilities for construction dewatering shall be located and maintained on private property outside the Public ROW.
- F. If a public sanitary system is the proposed method of disposal, authorizations are required from the District including the Environmental Monitoring Division and will be allowed only if extensive pretreatment is implemented and the discharge is approved by the District. All groundwater and surface water discharges to a sanitary sewer system shall meet local discharge limits and will be subject to all fees and discharge volume charges.

- G. If a Public Stormwater System is the proposed method of disposal, evaluations of discharge to the public storm system will be based on whether discharges meet, or can be pretreated to meet, requirements of the District, NPDES Discharge Permit or other State and Federal regulations for the receiving drainageway.
- H. If a drainageway is the proposed method for disposal, authorizations are required from the District, Land and Water Quality Divisions of DEQ.

Post-Construction Surface Drainage Systems

If onsite infiltration is the proposed method for disposal, authorizations are required from the District, Land Quality, and Water Quality Divisions of DEQ. Private infiltration facilities shall be located and maintained on private property, outside the Public ROW.

If a drainageway is the proposed method for disposal, authorizations are required from the District, the Army Corps of Engineers (USACE), and both the Land Quality and Water Quality Divisions of DEQ.

If an offsite public storm or sanitary sewer system is the proposed method for disposal, authorization is required from the District. Evaluations for discharges from sites with suspected contamination will be based on the following:

- A. Surface drainage systems that are not exposed to industrial activities, contaminated soils, or subsurface discharges are not assumed to contain contaminants and do not pose a threat to public infrastructure. All discharges to a public sanitary sewer system will require an additional review and approval process.
- B. A permanent monitoring and testing point may be required to ensure compliance with discharge regulations. If monitoring is necessary, a permanent structure (such as a sampling manhole or flow-through vault) shall be constructed per District Standards and installed on the discharge line.

Laboratory Analysis Reports

Laboratory analysis reports are required to identify the characteristics and levels of contamination in the soils and groundwater of a site.

The District will determine the applicable process to review the laboratory reports to determine regulatory authority and requirements. Testing and analysis are highly recommended prior to submitting the site plan. DEQ permitting and/or review may be required if contaminants are found and the levels of contamination appear to exceed the District discharge regulations. This may delay issuance of the site plans and related building permits.

Laboratory analysis reports shall include the following information:

- A. Analysis reports shall identify the elevation of the seasonal water table and identify the depth of any perched water aquifers.
- B. Analysis reports shall identify the method of laboratory testing, the detection level and analytical method used for detection, and the depth of any found contaminants in the soils.
- C. Minimum test parameters for baseline contaminants shall include metals (arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, and zinc); total petroleum hydrocarbons; and benzene, toluene, ethyl benzene and xylene.

- D. Test parameters may be required to include other contaminants identified through historical data, research, and environmental assessments.

Additional Requirements

Typical structural controls that would need District approval include containment areas, shut-off valves, oil/water separators and pretreatment facilities. If an Applicant requests an alternative or exception to any of the source controls identified in this section, the Applicant shall engage with District staff. These types of requests require an additional review process and may delay issuance of the site plans and related building or development permits.

5.2.9 Covered Vehicle Parking Areas for Commercial and Industrial Uses

These requirements apply to all development with a covered vehicle parking area, except single-family and duplex residential sites. Projects that add a cover to an existing parking structure are not required to meet these requirements unless the project expands or replaces existing impervious surfaces.

- A. Stormwater runoff from the top floor of a multi-level parking structure shall be directed to a SMF and Approved Point of Discharge that meets all requirements of these Standards.
- B. Significant amounts of precipitation are not expected to accumulate in covered vehicle parking areas, and drainage facilities are not required for the lower floors. If the Applicant elects to install drainage facilities, the drainage from the lower floors of a multi-level parking structure shall be directed to the public sanitary sewer system. Prior to discharge all applicable pretreatment and/or oil water separator requirements shall be met.
- C. The surrounding uncovered portions of the site shall be designed so precipitation and stormwater runoff does not enter the covered parking areas. This can be accomplished through grading and/or drains.
- D. Single-level covers (canopies, overhangs, and carports) are exempt from the requirements of this section.

5.2.10 Industrial and Commercial High Traffic Areas

These requirements apply to all new development with vehicle parking areas for developments zoned industrial or commercial with high-traffic volumes. High-traffic volumes are defined as an average daily traffic of 2,500 vehicles, consistent with DEQ's Industrial Stormwater Best Management Practices Manual (February 2013).

Industrial and commercial high-traffic areas with a drainage area of over 10,000 sf directed to a single shall have an adequate oil control facility located upstream of the SMF. Parking areas of over 10,000 sf that are divided into drainage areas of less than 10,000 sf do not require this pretreatment.

Oil Controls

An oil/water separator with coalescing plates shall be installed between the surface drainage catchment structure and the stormwater management treatment facility. The purpose of the device is to treat and prevent hydrocarbons from entering the SMF. This device shall be maintained per the manufacturer's specifications and the approved operations and maintenance plan.

Coalescing plate separators shall be designed to achieve a 100-ppm non-polar oil and grease limit in the effluent from the peak flow generated by the washing activity. Testing information must be submitted by the manufacturer of the unit that supports the 100-ppm effluent standard at the calculated flow rate.

Flow rates will be determined by the drainage area served by the device. The device will be sized to treat the Water Quality Design Storm as specified in Section 6.1.1.

For Proprietary Stormwater Treatment Devices (see Section 6.5.10), check the vendor specifications for design flow rates.

Oil controls and pretreatment facility details must be shown on the building plans submitted at the time of building permit application and shall match manufacturer specifications and details, including the unit flow rate, effluent water quality, and maximum process flow rate.

All oil controls and pretreatment facilities shall be maintained per the manufacturer specifications and the approved operation and maintenance plan.

6. Stormwater Management Facility Design

SMFs include a variety of methods to mitigate stormwater runoff and remove pollutants from stormwater, including detention, infiltration/retention, sedimentation, filtration, plant uptake, ion exchange, adsorption, and bacterial decomposition. Infiltration is the preferred method to address stormwater runoff for water quality and flow control requirements. In some cases, using a combination of SMFs may be the most effective strategy for removal of specific pollutants of concern in designated high-risk areas.

This chapter describes the methods and criteria for designing SMFs to meet water quality and flow control performance standards. Additional structural source controls may be required for certain types of development categorized as high risk for pollutants as described in Chapter 5.

The District's Stormwater Standards guide the design of Stormwater Management Plans for new development and redevelopment projects. Site-specific Stormwater Management Plans are most effective when developed early in the site planning process. Strategies for meeting the requirements in these standards depend on several site factors, including soil infiltration capacity, available infrastructure, proposed development plans, and downstream conveyance. The plan review and approval requirements are specific to each jurisdiction and may vary from one application, submittal, and building permit to another. To obtain further information on a specific plan review or permit process, contact the District.

6.1 Stormwater Management Performance Standards

Applicants of projects subject to stormwater review must demonstrate that the proposed project will include SMFs that meet water quality and flow control performance standards.

6.1.1 Water Quality Performance Standard

SMFs shall be designed to capture and treat 80 percent of the average annual runoff volume, to the maximum extent practicable with the goal of 80 percent total suspended solids removal. In this context, "maximum extent practicable" means less-effective treatment may not be substituted when it is practicable to provide more effective treatment. Based on local rainfall frequency and intensity, the required treatment volume equates to a Water Quality Design Storm of 1.0 inch over 24 hours. SMFs for water quality shall be designed in conformance with the design guidelines in this section.

Hydrodynamic separators, when used as a sole method of stormwater treatment, do not meet the "maximum extent practicable" requirement for stormwater treatment effectiveness with regard to these Standards.

6.1.2 Flow Control Performance Standard

Flow control facilities shall be designed so that the duration of peak flow rates from Post-Development Conditions shall be less than or equal to the duration of peak flow rates from pre-development conditions for all peak flows between 42 percent of the 2-year peak flow rate up to the 10-year peak flow rate. A hydrologic/hydraulic analytical model capable of performing a continuous simulation of peak flow rates from local long-term rainfall data must be used to determine the peak flow rates, recurrence intervals, and durations. SMFs for flow control shall be designed in conformance with the design guidelines in Section 6.4.

Flow control is not required for projects that discharge directly to the Willamette River, the Tualatin River, or the Clackamas River, provided that all of the following conditions are met:

- A. The project site is drained by a storm drainage system that is composed entirely of man-made conveyance elements (e.g., pipes, culverts, ditches, outfall protection, etc.) and the storm drainage system extends to the ordinary high-water line of the exempt water body.
- B. The entire length of the storm drainage system between the project site and the exempt receiving water shall have sufficient hydraulic capacity to convey discharge from the proposed development of the site and the existing development condition from the remaining drainage area contributing to the storm drainage system for the 25-year storm event, based on the conveyance of the design storm as outlined in Section 7.3.
- C. Any erodible elements of the man-made storm drainage system must be adequately stabilized to prevent erosion under the conditions noted above.
- D. The constructed storm drainage system does not result in an inter-basin transfer of runoff, as determined by the District.

Projects that are exempt from flow control are still subject to the other requirements outlined in these standards, including requirements to provide erosion and sediment control, water quality treatment, storm drainage systems, downstream storm drainage system analysis and applicable source controls.

In designated basins with limited downstream conveyance capacity, flow control shall be designed to reduce the 25-year, 24-hour, post-developed runoff rate to the 2-year, 24-hour pre-developed discharge rate. If there are segments of the downstream Conveyance System that can be upgraded, this additional flow control requirement may still require downstream stormwater conveyance system improvements in order to safely convey all existing and proposed stormwater runoff generated from the upstream and onsite drainage basins.

The District has identified the following drainage basins as having limited downstream capacity within portions of the existing associated stormwater Conveyance System:

- A. Cedar Creek Basin (see **Figure 1**)
- B. Johnson Creek Basin (see **Figure 2**)
- C. Upper Kellogg Creek Basin (see **Figure 3**)
- D. Tributary Basin of Mt. Scott Creek (see **Figure 4**)

Figure 1. Cedar Creek Basin

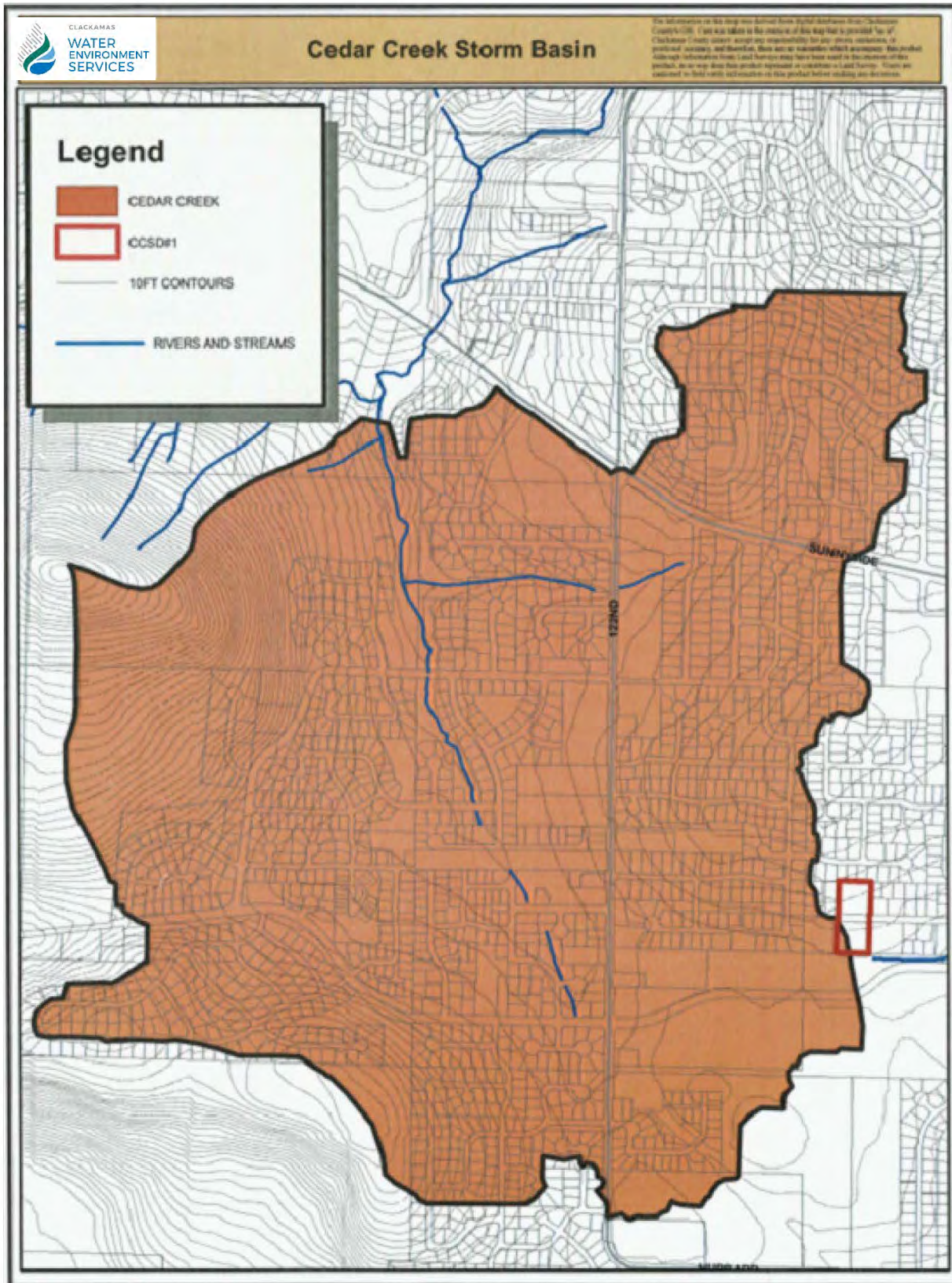


Figure 2. Johnson Creek Basin

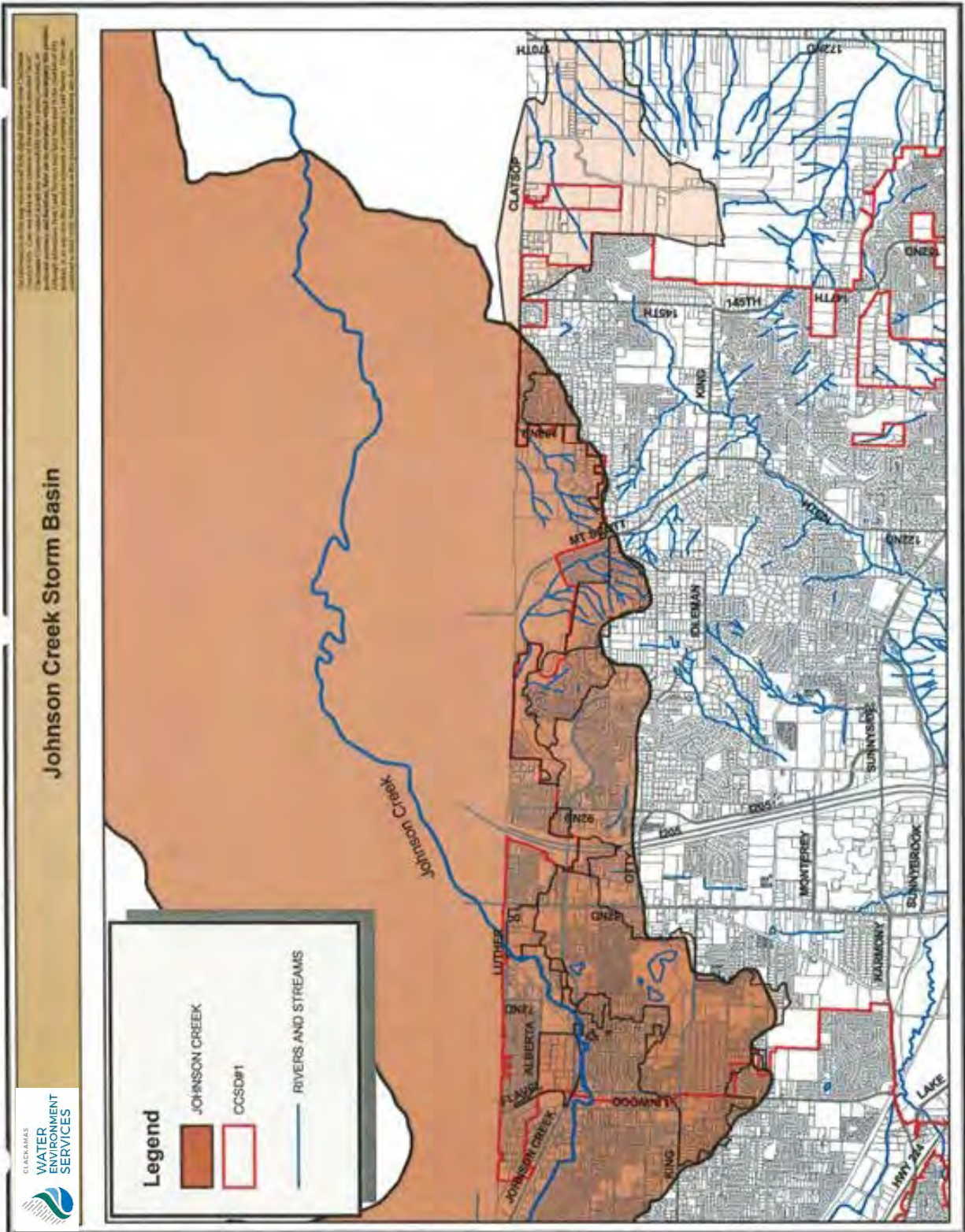


Figure 3. Upper Kellogg Creek Basin

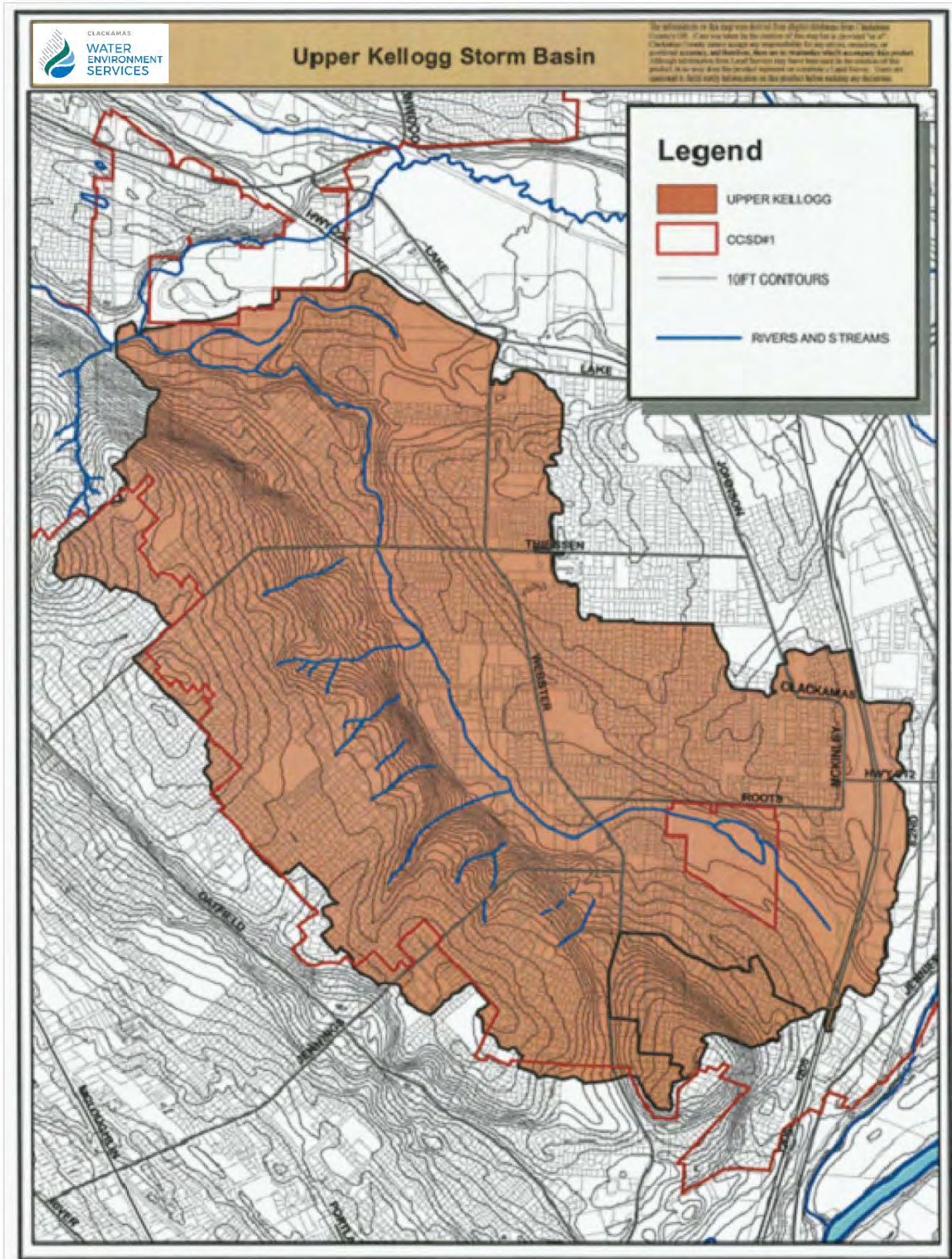
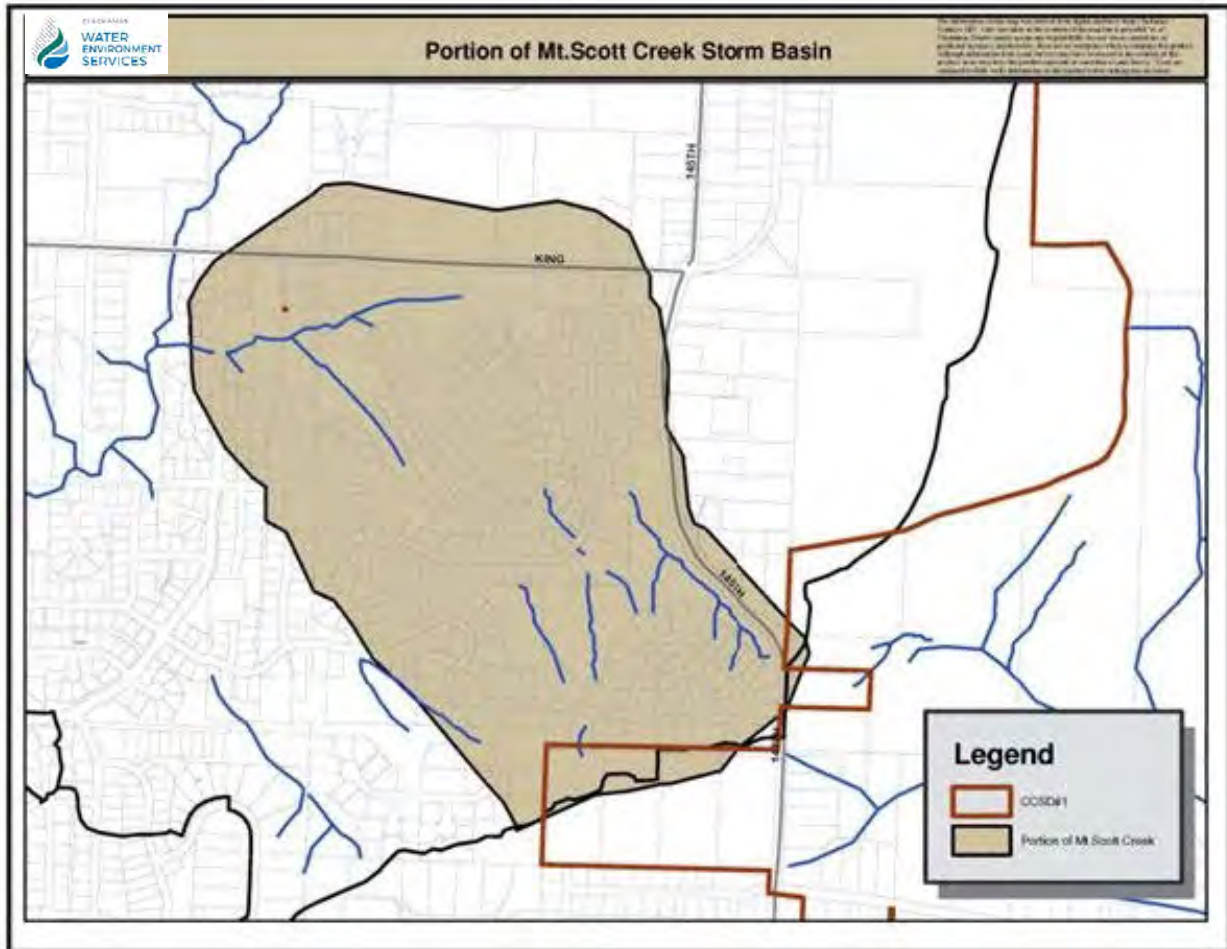


Figure 4. Tributary Basin of Mt. Scott Creek



6.1.3 Emergency Overflow Pathway

For all projects with SMFs, an overland emergency overflow pathway must be identified and/or designed that allows runoff from large storm events to discharge without risk of injury or property damage. The emergency overflow pathway must be incorporated into the design to show how flow will escape from the site during rainfall events larger than the design storm and/or from failure of the primary stormwater storm drainage system. If a Storm Drainage System is used as a component to convey the emergency overflow pathway, then the structure(s) and system shall be designed to convey the 100-year Design Storm.

The Applicant shall identify the proposed 100-year emergency overflow pathway. If downstream properties are impacted by the 100-year storm event, then the Applicant shall provide additional flow control or secondary SMFs to mitigate the potential impact.

6.1.4 Fee In Lieu

When a proposed development is unable to meet the flow control or water quality performance standards, the District may allow Applicants to pay a fee in lieu of stormwater management improvements. In such a case, the fee shall be based on a proportional cost for the District to construct an equivalent SMF including costs for land acquisition, design, construction, maintenance, and administration.

The financial viability of designing and constructing onsite or offsite SMFs is not a justification to use the fee in lieu program. Applicants must demonstrate that the proposed development site has one or more physical limitations that prevent the installation of onsite SMFs, and that offsite or regional facilities are not a feasible alternative. All projects should meet the downstream storm drainage system capacity requirements, and provide an emergency overflow pathway, as needed.

6.2 Stormwater Management Facility Sizing Methods

This section explains the methods accepted by the District for determining the appropriate size and configuration of SMFs to achieve the performance standards.

A Stormwater Report that meets the submittal requirements of **Appendix A** must accompany the engineered stormwater plans to demonstrate and document the design, including sizing methods and calculations.

6.2.1 Infiltration

When site conditions allow, infiltration is the preferred strategy to achieve the stormwater management performance standards. When a SMF is designed to fully infiltrate the 10-year, 24-hour Design Storm, the facility is assumed to meet the flow control performance standard without further analysis. Such facilities provide onsite stormwater retention for most rainfall conditions and should only result in partial downstream discharge during events larger than a 10-year storm. When site conditions do not allow infiltration of the full 10-year, 24-hour Design Storm, infiltration can still be incorporated into the flow control facility design to reduce the volume of discharge released from the site. Flow control facilities designed with partial infiltration should include an underdrain, control structure, and overflow system to manage the release rates from the facility. Whether or not infiltration is incorporated into the design, release rates from the facility must meet the flow control performance standard in Section 6.1.2.

When a rain garden, planter, swale, or pond is designed to fully infiltrate the 10-year, 24-hour Design Storm, the facility is also assumed to meet the water quality performance standard, without further analysis. UIC facilities, such as drywells, infiltration trenches, and infiltration chambers may require upstream water quality treatment to meet the water quality performance standards. Refer to the individual facility design requirements in Section 6.5 to determine which infiltration facilities can be used to provide upstream water quality treatment for UICs. When a UIC facility is designed to infiltrate the 10-year 24-hour Design Storm, the Applicant is responsible for demonstrating the proposed UICs will be rule authorized under Oregon Administrative Rules (OAR) 340-44-008 or will obtain an DEQ-issued UIC Permit.

The Applicant shall conduct infiltration testing and establish a design infiltration rate as described in this section. Infiltration testing is required as part of obtaining the Service Provider Letter.

Infiltration may be limited where any of the following conditions exist:

- A. Infiltration rates of less than ½-inch per hour.
- B. Sites that include steep slopes (>25 percent) and/or geologic hazard zone designation (Subsection 1002.01, Hillsides of the Clackamas County Zoning and Development Ordinance). A geotechnical engineering or geologist report and District approval is required for infiltration facilities located on moderate slopes of 10 to 25 percent.
- C. Sites in areas of seasonal high groundwater table. Sites with jurisdictional wetlands or FEMA floodplains may be required to perform a seasonal high groundwater table assessment to determine that the seasonal groundwater table is at least 12 inches below the bottom of proposed non-infiltrating stormwater facilities.
- D. Sites within the 2-year time of travel to irrigation or drinking water wells or within the 500-foot horizontal setback from irrigation or drinking water wells are not suitable for UICs, such as drywells or infiltration trenches or galleries. However, green infrastructure facilities that provide water quality treatment in conjunction with infiltration, such as rain gardens, planters, and bioinfiltration swales, may still be used within water pollution control facility (WPCF) permit setback distances.
- E. Sites where SMFs would be located on new or existing structural fill material.
- F. Sites that have contaminated soils must be evaluated by the DEQ and/or the EPA to determine if areas on the property are suitable for infiltration without the risk of mobilizing contaminants in the soil or groundwater. Documentation showing contamination assessment and determination must be submitted to the District at the time of application.
- G. There is a conflict with required source controls for high-risk sites (see Chapter 5).

For sites with limiting conditions, Applicants should document the infiltration limitations and design SMFs that do not use infiltration. Infiltration testing may still be required to document select limitations.

Sites without limiting conditions have the potential to use infiltration as part of the stormwater management strategy. Applicants shall conduct infiltration testing and establish a design infiltration rate for potential SMFs. Infiltration, even at slow rates, has the potential to retain stormwater at the source, recharge groundwater, and reduce offsite flows. Incorporating infiltration into SMF design can also reduce the footprint of required SMFs.

Regardless of the tested infiltration rate of the soils on the site, Applicants must demonstrate that SMFs will meet the performance standards for water quality treatment and flow control detailed in Chapter 6.

Infiltration testing is required to determine the suitability to retain the stormwater runoff.

Infiltration Testing to Establish Site Characteristics and to Assess Stormwater Facility Viability

Infiltration testing should be conducted to establish site conditions and soil strata. Infiltration testing can identify ideal locations for SMFs or to identify where site constraints exist.

Required Infiltration Tests

The type and number of required infiltration tests depends on the size and type of proposed development (see **Table 3** and **Table 4**). Infiltration testing shall be conducted according to the specifications in **Appendix A**, or using an equivalent method approved by the District. When a confining layer, or soil with a greater percentage of fines is observed during the subsurface investigation to be within 4 feet of the bottom of the planned SMF, the testing should be conducted within the confining layer

Table 3. Types of Infiltration Tests

Development Size	Test Type	Number of Tests
Development less than 10,000 square feet of impervious area	Basic Method	One test at the location and depth of each proposed SMF
Development equal to or greater than 10,000 square feet of impervious area	Professional Method	See Table 4.

Table 4. Number of Professional Method Infiltration Tests

Type of Development	Location of Infiltration Test	Minimum Number of Infiltration Tests	Maximum Number of Infiltration Tests
Single Family and Partitions	At the location and depth of the proposed SMF(s)	One test per SMF	One test per SMF
Subdivisions	At location and depth of the proposed SMF(s)	One test per SMF	If more than five SMFs are proposed, the District may accept a recommended infiltration rate from a Geotechnical Engineer based on the consistency of the soil classification(s) throughout the site, unless otherwise permitted by the District
Non-single family residential (e.g., multi-family, commercial, industrial, and all other types)	At location and depth of the proposed SMF(s)	One test per SMF	If more than five SMFs are proposed, the District may accept a recommended infiltration rate from a Geotechnical Engineer based on the consistency of the soil classification(s) throughout the site, unless otherwise permitted by the District

Design Infiltration Rate

When feasible, infiltration is the preferred strategy to satisfy the flow control performance standard. The design infiltration rate shall be determined by the Developer's Engineer conducting the infiltration test. A minimum correction factor of 2 shall be applied to the field-tested infiltration rates to determine the design infiltration rate for SMF design.

The design infiltration rate after applying the safety factor shall not exceed 100 in/hr for non-vegetative facilities, such as drywells or infiltration chambers. Vegetated facilities with growing media shall be designed at a maximum infiltration rate of 6.0 in/hr through the growing media.

SMFs shall be designed with an infiltration component, unless otherwise stipulated by the design professional. If the SMF cannot be designed to fully infiltrate the 10-year storm event, then an underdrain and outflow will be required to safely convey the discharge from the SMF to an approved discharge point. If the proposed facility does not have an approved discharge point, then it must be designed to fully infiltrate the 25-year storm event as required by the District.

6.2.2 Water Quality Facility Sizing

Water quality SMFs shall be sized to capture and treat 80 percent of the average annual stormwater runoff with the goal of 80 percent total suspended solids removal. This is equivalent to treating runoff from the first 1.0 inch of an individual 24-hour storm event.

The water quality design volume or flow rate shall be determined through one of the following methods:

- A. The water quality design volume for volume based SMFs (constructed wetlands, ponds, planters, rain gardens, and bioinfiltration swales) shall be calculated as the total runoff volume from a storm with 1.0 inch of precipitation. Volume analysis may be performed using a hydrograph analysis program or spreadsheet tools. (Refer to Chapter 7. and **Appendix D** for design limitations and calculation references when using the Santa Barbara Urban Hydrograph [SBUH], Technical Release 55 (TR-55), or SWMM method for sizing water quality treatment.) The City of Portland's Stormwater Management Manual Presumptive Approach Calculator is not approved for use to meet WES Water Quality Facility Sizing.
- B. The design flow rate for flow based SMFs (filter strips and most manufactured treatment systems) shall be calculated as the peak discharge from design storm with the following peak rainfall intensities:
 - a. Design storm intensity for online facilities of 0.18-inches per hour (in/hr)
 - b. Design storm intensity for offline facilities of 0.10 in/hr
- C. Use a continuous simulation hydrologic/hydraulic model analysis that addresses the design equivalent of capturing and treating 80 percent of the average annual stormwater runoff.
- D. Volume calculations using the 1.0-inch Design Storm and the following equation:

$$V_{\text{imp}} \text{ or } V_{\text{perv}} = 3,630 * A * \frac{(P_{\text{design}} - 0.2 * \left[\frac{1,000}{\text{CN}} - 10 \right])^2}{(P_{\text{design}} + 0.8 * \left[\frac{1,000}{\text{CN}} - 10 \right])}$$

where:

V = runoff volume (impervious or pervious), cubic feet

A = drainage area, acres

P = design precipitation depth, inches (assumed to be 1.0 for water quality sizing)

CN = National Resource Conservation Service (NRCS) curve number, unitless (see **Appendix D**)

6.2.3 Flow Control Facility Sizing

To design for flow duration matching, a hydrologic/hydraulic analytical model capable of performing a continuous simulation of peak flow rates from local long-term rainfall data must be used to determine the peak flow rates, recurrence intervals, and durations.

The Developer's Engineer may use any analytical model capable of performing a continuous simulation of peak flows from long-term local rainfall records. Regardless of how the stormwater calculations are performed, the report submitted to the District must show how the proposed SMFs meet the flow control performance standards. Creation of

a continuous simulation hydrologic model for a specific development site requires specialized expertise and usually takes additional time and expense to develop and review. The Applicant may be required to pay additional fees to the District to review the Stormwater Management Plan developed using other modeling methods. These fees will be used to pay for a third-party peer review of the stormwater report, hydrologic model, and facility design.

6.3 General Design Requirements

When a SMF is required, green infrastructure, such as planters, swales, rain gardens, ponds, and other vegetated facilities are the preferred strategy to meet the stormwater management requirements for water quality treatment and flow control. The best way to control the rate and duration of runoff is through the incorporation of infiltration using green infrastructure.

6.3.1 Allowable Facilities

While the District provides design guidance for numerous public and privately maintained SMF types, not all facilities are acceptable for use in every jurisdictional area. **Table 5** and **Table 6** provide lists of facilities that are approved for use in different parts of the District. The tables cover areas managed by the District, the City of Happy Valley, and the Clackamas County Department of Transportation and Development (DTD).

Applicants should consult with District and local agency staff to understand the types of SMFs that could be approved for use on the project.

If a proposed facility meets the DEQ criteria for a UIC, the Applicant shall comply with UIC requirements and prepare appropriate registration information for DEQ.

Table 5. Facilities Allowed by the District

	Facilities within a Public Street/ROW ^①	Publicly Maintained Facilities ^{①②}	Privately Maintained Facilities ^②
Stormwater Planter	YES	YES	YES
Rain Garden	YES	YES	YES
Vegetated Swale	YES	YES	YES
Filter Strip	YES	YES	YES
Drywell	YES	YES	YES
Infiltration Gallery or Trench	NO	YES	YES
Constructed Wetland	NO	YES	YES
Detention or Infiltration Ponds	NO	YES	YES
Structural Detention	NO	YES	YES
Manufactured Treatment	YES	YES	YES
Sheet Flow Dispersion	YES	YES	YES
Pervious Pavement	NO	YES	YES
Green Roof	NO	NO	YES

Notes:

^① Publicly Maintained Stormwater Facilities - Stormwater Facilities and storm drainage systems that convey stormwater runoff from any Public Rights-of-Way must be maintained by a public agency.

^② Privately Maintained Stormwater Facilities - Stormwater runoff fully contained on private property and mitigated through a privately owned facility must be maintained by the Owner(s). An on-site maintenance agreement must be recorded as a land record specifying the minimum required amount of maintenance in accordance with District Rules and Standards.

^③ Pervious pavement constructed within the Public ROW requires the approval of the local roadway authority.

Table 6. Facilities Allowed by Happy Valley and DTD

	Facilities within a Public Street/ROW ❶	Publicly Maintained Facilities ❶	Privately Maintained Facilities ❷
Stormwater Planter	YES	YES	YES
Rain Garden	YES	YES	YES
Vegetated Swale	YES	YES	YES
Filter Strip	YES	YES	YES
Drywell	YES (with WES maintenance)	YES (with WES maintenance)	YES
Infiltration Gallery or Trench	NO	NO	YES
Constructed Wetland	NO	YES	YES
Detention or Infiltration Ponds	NO	YES	YES
Structural Detention	YES	YES	YES
Manufactured Treatment	YES (WES maintenance for DTD facilities)	YES	YES
Sheet Flow Dispersion	YES (WES maintenance for DTD facilities)	YES (WES maintenance for DTD facilities)	YES
Pervious Pavement	NO	NO	YES
Green Roof	NO	NO	YES

Notes:

❶ Publicly Maintained Stormwater Facilities - Stormwater Facilities and storm drainage systems that convey stormwater runoff from any Public Rights-of-Way must be maintained by the public.

❷ Privately Maintained Stormwater Facilities - Stormwater runoff fully contained on private property and mitigated through a privately owned facility must be maintained by the Owner(s). An on-site maintenance agreement must be recorded as a land record specifying the minimum required amount of maintenance in accordance with District Rules and Standards.

6.3.2 Alternative Facilities

Applicants may propose SMFs that are not allowed as per Section 6.3.1. Such a proposal will require the Applicant to submit a request for a variance per Section 2.4. Alternate facilities must be designed to meet the performance standards outlined in Section 6.1.

6.4 General Facility Design Requirements

The following design requirements apply to all SMFs. Additional facility specific design criteria are included in Section 6.5.

6.4.1 Location and Setbacks

Applicants must review local zoning, building and plumbing code requirements to understand setback requirements for SMFs. The minimum setback for a stormwater facility is 5 feet from a property line, unless more distance is specified by the Developer's Engineer, geotechnical engineer, and/or by local and state minimum setback requirements. See District Buffer Standards for further information on the design requirements for vegetated facilities and buffer areas.

In addition, stormwater facilities that incorporate an infiltration component are subject to all local and state minimum setback requirements. A geotechnical report is required to determine setbacks from slopes for infiltration facilities installed near slopes ≥ 15 percent or within 200 feet of a steep slope hazard area or landslide hazard area.

Easements and Setbacks

Piped storm drainage systems shall generally be located in the Public ROW. Public storm drainage system facilities not located in the Public ROW shall be located within an easement granted to the District.

When design conditions require locating storm drains in easements, the storm drain shall typically be centered in the easement.

An easement shall be centered on the pipe centerline, unless otherwise approved by the District, and easements shall typically be exclusive. Combined easements shall be a minimum of 20 feet wide with a minimum separation of 5 feet between utilities and be approved by the District on a case-by-case basis.

All public manholes, junction or inlet structures in easements shall be accessible to District personnel at all times. A minimum 15-foot-wide access easement is required between the nearest ROW and each structure. Paved or gravel access road maybe be required by the District, if access is deemed necessary, and otherwise unavailable.

Unless shown on a proposed plat of subdivision, all onsite easements shall be furnished to the District for review, approval, and recordation prior to approving the Stormwater Management Plan.

All offsite easements shall be furnished to the District for review, approval, and recordation prior to approving the Stormwater Management Plan.

The District may require that an area of 5 feet in all directions from the edge of a public manhole, catch basin, cleanout, or field inlet be encompassed in a Public ROW or easement granted to the District.

Access easements shall be provided to all stormwater structures such as manholes, catch basins, and other related structures, as required by the District.

When a pipe will be stubbed, the easement shall extend a minimum of 5 feet past the end of the stub.

The center of the storm pipes in an easement shall be located no closer than 5 feet from the easement line.

The following easement requirements are the minimum requirements established to maintain, repair and/or replace the stormwater infrastructure or open storm drainage system.

- A. Easements shall be minimum 15 feet wide for pipes up to 24 inches in diameter.
- B. Easements for pipes over 24 inches in diameter shall be 20 feet wide or greater as determined by the District.
- C. The District may require wider easements for large trunk sewers, sewers greater than 10 feet deep and areas with topographic constraints such as steep slopes or sites where maintenance, repair or replacement would require a wider easement.
- D. A reduced easement width must be approved by the District.
- E. Easement widths shall be increased as required in 5-foot increments as per **Table 7**.

Table 7. Minimum Pipe Size per Minimum Easement Width

Pipe Size (inches)	Minimum Easement Width (feet)
6–12	15
15 < 24	15
24 < 54	20
> 54	30

When a conservation easement is not required, the minimum open storm channel easement width shall extend 5 feet from each side of the top of bank of the open channel.

Structures constructed within easements shall meet the following requirements:

- A. Structures constructed within easements shall require an encroachment agreement with the District. Approval of the encroachment is at the discretion of the District and may involve the imposition of specific conditions in the granting of such. The Applicant will complete an encroachment agreement application and pay all applicable charges and fees.
- B. The encroachment agreement shall allow the District to remove the structure, as needed, to access the storm drainage system. Replacement of the structure shall be at the Owner's expense.
- C. The District may require increased protection for the storm drainage system in the vicinity of an encroachment. All special protection requirements and plans will be reviewed and approved by the District. All review and/or approval costs associated with this provision will be paid by the Applicant.

6.4.2 Outlet Structures

SMFs designed as flow through systems shall have a perforated pipe underdrain system to convey water from the facility to a flow control structure and/or downstream storm drainage system.

Orifice sizes for SMFs will be specified by the BMP Sizing Tool results. Orifices shall be located to prevent clogging and blockages. Outlet structures (orifices, weirs, overflow risers, etc.) shall be configured to operate as passive systems and shall not require adjustments during normal operation.

Flow control structures shall be located in an enclosed structure, outside the open water storage area, in a location that provides sufficient maintenance access for a minimum of 20 feet. Flow control manholes shall have solid locking covers, however open grates may be permitted.

Outlet structures and overflow configurations must address the 100-year overflow pathway requirements in Section 6.1.3.

Additional outlet requirements for specific facility types are addressed in Section 6.5.

6.4.3 Stormwater Facility Signage

All vegetated and porous SMFs, including permeable surfaces such as pervious pavement shall have at least one informational sign that is clearly visible and legible to the public.

The Permittee shall install the applicable sign(s) before the District deems the project is completed, and/or prior to the issuance of the Certificate of Occupancy Permit.

Signs for publicly maintained SMFs require the following:

- A. The Permittee shall be responsible for obtaining and installing the stormwater facility sign at their own expense.
- B. The material shall be aluminum with green reflective sheeting and silk screen lettering or equal as approved by the District.
- C. The minimum sign size shall be 12 by 18 inches. The maximum sign size shall be 24 by 30 inches.
- D. The sign shall be affixed to metal signpost, or facility fencing.
- E. The sign shall be installed near the stormwater facility in a location highly visible to the public.
- F. The sign shall be created and installed in accordance with the Standard Detail Drawing D.26 SWM ST-3.0 Storm – Surface Water Facility Signs.
- G. An electronic file format of the sign is available upon request from the District.
- H. Signs may be available for purchase from the District.

Signs for privately maintained vegetated SMFs shall be provided by the Permittee and will include:

- A. Description of the facility and its purpose
- B. Contact information for maintenance complaints or to report a problem

Signs for privately maintained permeable surfaces, such as pervious pavement, shall be provided by the Permittee and will include at least the following information:

- A. Description of the facility and its purpose
- B. Contact information for maintenance complaints or to report a problem
- C. Operations and maintenance instructions, such as:
 - a. Avoid tracking or piling dirt, mud, or sediment on the driveway.
 - b. If debris is tracked onto the driveway surface, clean by using a vacuum-type street cleaner during dry weather.
 - c. Maintain vegetation along the sides of the driveway to help keep erosion and sediment laden water from clogging the surface.
 - d. Do not place any sealants on the driveway.

6.4.4 Soil Mixes for Stormwater Management Facilities

Vegetated facilities require a soil/landscape system that simultaneously supports plant growth, soil microbes, water infiltration, nutrient and pollutant adsorption, sediment and pollutant filtration, and pollutant decomposition. Therefore, the soil mix selected for a facility is critical to its success.

Facilities that include soil, such as swales, planters, curb extensions, and basins, must use the Blended Soil Specification for Vegetated Stormwater Systems from the most currently adopted City of Portland's Standard Construction Specifications in section 0104.14(d), titled Stormwater Facility Blended Soil. See the City of Portland's Stormwater Management Manual website¹ for information about the most current soil specification information and a list of stormwater facility blended soil vendors and haulers.

6.4.5 Planting and Irrigation

SMF planting guidelines are included in **Appendix B**. Planting plans must meet the following requirements:

- A. Establish and implement procedures such as control of the following: invasive weeds, animal and vandal damage, mulching, re-staking, and watering to the extent needed (as determined by the District) to ensure plant survival. Plastic and mesh tubes are prohibited and shall not be used within a publicly maintained facility.
- B. Stormwater facilities located in the Public ROW are not permitted to include trees.
- C. Selected plant materials should be appropriate for soil, hydrologic, and other facility and site conditions (see **Appendix B**).
- D. For facilities located in riparian corridors, all plants within the facility area shall be appropriate native species from the plant list found in **Appendix B** of the Buffer Standards.
- E. No nuisance, invasive, or prohibited plants shall be used in any stormwater facilities.

¹ See <https://www.portland.gov/bes/stormwater/swmm>.

- F. The design for plantings shall minimize the need for herbicides, fertilizers, pesticides, or soil amendments at any time before, during, and after construction and on a long-term basis.
- G. Plants shall be selected and planted to minimize the need for mowing, pruning, and irrigation once established.
- H. Side slopes of planted areas shall not exceed 3h:1v.

The Developer's Engineer or Landscape Architect shall determine the appropriate irrigation strategy to maintain the plant survivability. Temporary irrigation systems must be fully removed by the Developer before the District releases the storm warranty bond.

6.4.6 Pond Embankment, Retaining Walls, Fencing, Gates and Handrails

Pond embankments and retaining walls are allowed to impound water to enhance the functionality of the SMF.

Pond Embankments

Pond embankments must be constructed with a maximum slope of 3h:1v on the upstream and downstream face. Side slopes within the pond must be sloped no steeper than 3h:1v below the maximum water surface elevation, unless otherwise approved by the District.

Retaining Walls

Retaining walls greater than 4-feet in height shall have a professional structural or geotechnical engineer registered in Oregon provide stamped design calculations and detail drawings required for the retaining wall construction, per local building code requirements. Stormwater ponds that require retaining walls will be limited to the height of 10 feet above the vegetated surface elevation for 50 percent of the circumference of the facility, and 6 feet for the remaining portion of the circumference, unless otherwise approved by the District.

Retaining Wall Ownership

The District shall not have any maintenance or ownership responsibility for retaining walls. The Owner of the property (HOA) shall be responsible for the maintenance, repair and/or replacement of the retaining wall(s) within the public easement(s) or tract(s). The ownership and maintenance responsibility for the retaining wall shall be clearly specified in the CCRs and/or within the stormwater maintenance plan.

Fencing, Gate and Handrails

A minimum 6-foot high fence is required to be constructed around the parameter of all publicly maintained stormwater facilities with a designed water depth greater than 3 feet. Publicly maintained stormwater facility must provide a maintenance access gate with a minimum opening width of 12 feet wide that consists of two 6-foot sections. Fencing or handrails may be required along the top of the retaining wall in accordance with local zoning and building codes.

6.4.7 Public Maintenance Access

Publicly maintained stormwater facilities and structures must provide an access road designed and constructed for the intended use and purpose for accessing and maintaining the proposed SMFs. District maintained facilities should be located adjacent

to the Public ROW. Public maintenance access roads shall be designed and constructed to the minimum standards as specified in Table 8.

- A. Maintenance road access for District-maintained facilities shall be shown on the recorded plat and be situated in a separate tract and identified with the specific and intended use for maintenance access.
- B. The District may require additional protection for access roads, including fencing, signs and/or bollards to restrict public access. Minimum maintenance access of 20 feet to structures is required.
- C. All access roads must be rated for a minimum of 80,000 pounds.

Table 8. Access Road Specifications

SLOPE	DESIGNATION	WIDTH		SURFACE	DESIGN NEEDS	STRUCTURAL SUPPORT
		TOTAL	ROAD			
< 8%	EASEMENT	15-ft	12-ft	GRAVEL	N/A	8-INCH GRAVEL FILTER FABRIC
>8% < 12%	TRACT	15-ft	12-ft	2-INCH A.C.	W/O TURNAROUND	8-INCH GRAVEL FILTER FABRIC
12% - 15%	TRACT	20-ft	15-ft	2-INCH A.C.	W/ TURNAROUND W/ LANDING	8-INCH GRAVEL FILTER FABRIC
>15%	CONTACT DISTRICT					

General Requirements

A Profile of the access road is required.

Maximum grade:

- A. 15 percent with a maximum 3 percent cross-slope.
- B. Special permission is required for grades over 15 percent.

Minimum width of surface:

- A. 12 feet on straight runs and 15 feet on curves.
- B. Curves will be designed with a minimum 40-foot interior radius.
- C. Access will extend to within 10 feet of all pollution control structures unless otherwise approved by the District.
- D. Access roads in excess of 150 feet in length is required to have a turnaround.
- E. Turnaround is required when access is taken from a collector or arterial roadway.

Provide a minimum 12-foot wide double opening gate at the entrance of the stormwater facility maintenance access.

Access Road Contained Within a Tract of Land

All publicly maintained stormwater facilities must provide an access road in accordance with these Standards and must be contained within a Tract of Land that has a WES storm drainage easement.

Design

Access Road:

- A. Horizontal curves
 - a. Minimum Radius for (inside) = 40 feet
- B. Vertical Curves
 - a. Vertical Curves
 - i. Crest maximum $K = 4$
 - ii. Sag maximum $K = 6$

Where $K = L/A$

L= algebraic difference in grades percent

A= length of vertical curve (feet)

Landing:

- A. Maximum slope = 4 percent
- B. Minimum length of 40 feet

Turnaround:

- A. Design per Clackamas County Roadway Standards – Detail C350
- B. Maximum cross slope = 4 percent
- C. Minimum width of the access road 12 feet
- D. Minimum radius for (inside) = 30 feet

Typical Surface:

Three 3-inches of class “B” asphaltic concrete and 2 inches of ¾”-0” compacted crushed rock; over 8 inches of 1½”-0” compacted crushed rock; over subgrade compacted to 95 percent AASHTO T-99.

The Developer’s Engineer may submit a certified road design capable of supporting a 30-ton maintenance vehicle in all weather conditions.

Driveway Access:

All access roads shall have a standard driveway with 6 inches of concrete over 2 inches of gravel. The plan will include design of strengthened sidewalk sections (6 inches of concrete minimum) where maintenance vehicles will cross. (See D600 Clackamas County Department of Transportation).

The final plan will have to show how maintenance equipment will safely access the pond. At least one side of the detention pond is required to have an access suitable for maintenance equipment (backhoe etc.). Direct access to the pond must be 15 feet wide and slopes of 4h:1v or flatter.

6.4.8 Private Maintenance Access

Privately maintained facilities shall be located in a manner so that the facility can be safely and efficiently maintained. Egress and ingress access routes shall be clear of any obstacles and constructed of a sufficient surface to safely convey the size and weight of vehicles, and equipment necessary to maintain, repair and replace the SMF.

6.4.9 Underground Injection Control Registration

Infiltrators and infiltration trenches are generally classified as UICs by DEQ. The District will evaluate each case and may accept ownership and/or maintenance responsibility for UICs. For UICs on private property, with the exception of single-family residential roof and footing drains, there is a requirement to register the UICs and provide site inventory data to DEQ.

Any proposed UIC facility shall be rule authorized pursuant to OAR 340-44-008, have an DEQ-issued UIC permit associated with the facility, or have a notice of intent to issue a UIC permit.

6.5 Stormwater Facility Design Requirements

The following section includes SMF design guidelines for facilities approved for use in the District. Typical facility drawings are included in **Appendix C**.

6.5.1 Stormwater Planter

Stormwater planters are walled basins that capture and treat runoff through a combination of vegetation and an engineered soil mix called biofiltration soil medium. Planters may also be used for flow control when designed with infiltration or with an underdrain with controlled outlet.

Planters treat stormwater through sedimentation of particles in ponded water; filtration and phytoremediation through contact with vegetation; and biodegradation and adsorption of pollutants through contact with soil organisms and chemical soil processes. Planters and rain gardens provide similar treatment and flow control performance, though planters require less space than rain gardens to treat the same contributing area.

General Stormwater Facility Requirements

Water quality pretreatment is generally not required.

Stormwater facilities shall be designed to treat the entire inflow.

An infiltration test shall be conducted at the location and depth of the facility.

SMFs shall have a minimum separation of 3 feet from the bottom of the facility to the seasonal high groundwater elevation or other layer that limits infiltration (e.g., bedrock, clay lens).

If infiltration is used as a design component to determine retention, then the maximum draw down time is 24 hours.

Native soil infiltration rate shall be at least 0.25 in/hr for an infiltration planter. If the infiltration rate is less than 0.25 in/hr, an underdrain is required. For native soil infiltration rates between 0.25 and 2.0 in/hr, the engineer shall determine the need for an underdrain based on design performance calculations.

Water quality planters shall be located prior to the flow control facility, and not be located downstream of detention.

Planters are designed with vertical walls and may require a structural engineer to design (because of their structural walls).

Planters receiving stormwater from downspouts need energy dissipation at the downspout outlet and planters receiving water from the street need a sediment forebay to facilitate maintenance.

Lined flow-through planters may not have setback requirements from building foundations. Check with local building code division to confirm the setback of these facilities from building, structures, and property lines.

Planters shall be designed to consider safety issues (including pedestrian safety). Curbing, fencing, railings, or placing planters above grade may be necessary. Planters located within the ROW shall be approved by the local roadway authority.

Dimensions

Drain rock depth is 18 inches.

Minimum bottom width: 2.0 feet.

Minimum orifice size: filtration facilities 0.5-inches, all other 1.0 inches.

Minimum freeboard: 2.0 inches, if contributing area is less than 5,000 sf; 6.0 inches for larger contributing areas.

Maximum ponding depth: 12.0 inches.

Depth of biofiltration mix: 18 inches minimum.

Materials

When required, waterproof liners shall be 30 mil polyvinyl chloride (PVC) membrane or equivalent.

Planter walls and bottom (when needed) shall be made of concrete. Chemically treated wood that can leach out toxic chemicals and contaminate stormwater shall not be used.

Drain rock is required below the biofiltration soil mix. For infiltration planters, use 0.75 to 1.5 inches of washed drain rock. Drain rock shall conform to Oregon Department of Transportation (ODOT) Standard Specifications 00430.11 or AASHTO No. 4.

When used, underdrains shall be a minimum of 4-inches diameter for private facilities and a minimum of 6 inches for publicly maintained facilities. Underdrains shall be slotted or perforated PVC that conforms to American Society for Testing and Materials (ASTM) D 3034, with a pipe stiffness of 46 pounds per square inch (psi) or a minimum standard dimensional ratio (SDR) of 35 or approved equal. Installation and testing requirements shall conform to the current OPSC and ODOT Standard Specification 02415.50 for PVC pipe. Slotted perforations (0.064-inch-wide x 1.00 inch-long, spaced 0.3-inch on center) are preferred and less susceptible to clogging.

Drain rock and biofiltration soil mix shall be separated by a 2-inch to 3-inch choker course layer. Choker course shall conform to ODOT Standard Specifications 00430.11.

Biofiltration soil mix must support long-term plant and soil health and provide treatment for water as it moves through the soil column. See Section 6.4.4 for soil mix requirements.

Plant selection shall follow the Planting Guide in **Appendix B**. Plant selection shall be based on water level tolerances during the rainy season, as well as the ability of plants to withstand dry summer conditions. Species should be selected that are suitable for the hydrologic, light, and soil conditions in the proposed planter. Planters shall be designed so that they do not require mowing.

6.5.2 Rain Garden

Rain gardens are vegetated depressions that capture and treat runoff with a combination of vegetation and biofiltration soil medium. Rain gardens may also be used for flow control when designed to infiltrate or with an underdrain with controlled outlet.

Rain gardens treat stormwater through sedimentation of particles in ponded water, filtration, and phytoremediation through contact with vegetation, and biodegradation and adsorption of pollutants through contact with soil organisms and chemical soil processes. Rain gardens are ideal for residential and small commercial sites, within parking lots, and along roadways. They can help fulfill landscaping requirements.

Rain gardens may take a variety of shapes to fit the site layout. Rain gardens may be round, linear, or irregular shape and can have multiple distinct depressions, called cells, which can be linked hydraulically via overflow structures or berms.

Site Requirements

Pretreatment is not required.

An infiltration test shall be conducted at the location and depth of the facility.

Rain gardens shall have a minimum separation of 3 feet from the bottom of the facility to the seasonal high groundwater elevation or other layer that limits infiltration (e.g., bedrock, clay lens).

If infiltration is used as a design component to determine retention, then the maximum draw down time is 24 hours.

The native soil infiltration rate shall be at least 0.25 in/hr for an infiltration rain garden. If the infiltration rate is less than 0.25 in/hr, an underdrain is required. For native soil infiltration rates between 0.25 and 2.0 in/hr, the engineer shall determine the need for an underdrain based on design performance calculations.

Water quality raingardens shall not be located downstream of detention.

Dimensions

Minimum drain rock depth is 18 inches.

Minimum bottom width: 2.0 feet

Planted side slopes: no steeper than three horizontal to one vertical (3h:1v). Rock or concrete walls may be used for areas that require steeper side slopes.

Minimum orifice size: filtration facilities 0.5-inches, all other 1.0 inch.

Minimum freeboard: 2.0 inches, if contributing area is less than 5,000 sf; 6.0 inches for larger contributing areas.

Maximum ponding depth: 12.0 inches.

Depth of biofiltration mix: 18 -inches minimum.

Materials

When required, waterproof liners shall be 30 mil PVC membrane or equivalent.

Drain rock is required below the biofiltration soil mix. For infiltration rain gardens, use 0.75 to 1.5 inches of washed drain rock. Drain rock shall conform to ODOT Standard Specifications 00430.11 or AASHTO No. 4.

When used, underdrains shall be a minimum of 4-inches diameter for private facilities and a minimum of 6 inches for public facilities. Underdrains shall be slotted or perforated PVC that conforms to ASTM D 3034, with a pipe stiffness of 46 psi or a minimum SDR of 35 or approved equal. Installation and testing requirements shall conform to the current UPC and ODOT Standard Specification 02415.50 for PVC pipe. Slotted perforations (0.064-inch-wide x 1.00 inch-long, spaced 0.3-inch on center) are preferred and less susceptible to clogging.

Drain rock and biofiltration soil mix shall be separated by a 2- to 3-inch choker course layer. Choker course shall conform to ODOT Standard Specifications 00430.11.

Biofiltration soil mix must support long-term plant and soil health and provide treatment for water as it moves through the soil column. See Section 6.4.4 for soil mix requirements.

Plant selection shall follow the Planting Guide in **Appendix B**. Plant selection shall be based on water level tolerances during the rainy season, as well as ability of plants to withstand dry summer conditions. Species should be selected that are suitable for the hydrologic, light, and soil conditions in the proposed rain garden. Rain gardens shall be designed so that they do not require mowing.

6.5.3 Vegetated Swale

Vegetated swales are gently sloping, landscaped depressions that collect, convey, and treat stormwater runoff with a combination of vegetation and a biofiltration soil medium. Swales may also be used for flow control when designed with infiltration or with an underdrain with controlled outlet. Vegetated swales are designed much like rain gardens, but with a sloping bottom.

Vegetated swales reduce stormwater flow rates, volume, and temperature and improve water quality. Pollutants are removed as runoff passes through the vegetation and soil media and is collected in an underlying layer of gravel or drain rock. Swales are ideal for residential and small commercial sites, within parking lots, and along roadways. They can help fulfill landscaping requirements.

Site Requirements

Pretreatment is not required.

An infiltration test shall be conducted at the location and depth of the facility.

SMFs shall have a minimum separation of 3 feet from the bottom of the facility to the seasonal high groundwater elevation or other layer that limits infiltration (e.g., bedrock, clay lens).

If infiltration is used as a design component to determine retention, then the maximum draw down time is 24 hours.

The native soil infiltration rate shall be at least 0.25 in/hr for an infiltration swale. If the infiltration rate is less than 0.25 in/hr, an underdrain is required. For native soil infiltration

rates between 0.25 and 2.0 in/hr, the Developer's Engineer shall determine the need for an underdrain based on design performance calculations.

Water quality swales shall not be located downstream of detention.

Dimensions

Longitudinal Slope: range is from 0.5 to 6 percent (for steeper sites, use check dams or similar features to slow flow velocity and create step pools to promote infiltration.) See also Section 7.4 and Typical Facility Drawings and associated notes in **Appendix C**.

Minimum drain rock depth is 18 inches.

Minimum bottom width: 2.0 feet.

Planted side slopes: no steeper than three horizontal to one vertical (3h:1v). Rock or concrete walls may be used for areas that require steeper side slopes.

Minimum orifice size: 0.5-inches.

Minimum freeboard: 2.0 inches, if contributing area is less than 3,000 sf; 6.0 inches for larger contributing areas.

Maximum ponding depth: 12.0 inches.

Depth of biofiltration mix: 18 inches minimum.

Materials

When required, waterproof liners shall be 30 mil PVC membrane or equivalent.

Drain rock is required below the biofiltration soil mix. For infiltration swales, use 0.75 to 1.5 inches of washed drain rock. Drain rock shall conform to ODOT Standard Specifications 00430.11 or AASHTO No. 4.

When used, underdrains shall be a minimum of 4-inches diameter for private facilities and a minimum of 6 inches for public facilities. Underdrains shall be slotted or perforated PVC that conforms to ASTM D 3034, with a pipe stiffness of 46 psi or a minimum SDR of 35 or approved equal. Installation and testing requirements shall conform to the current UPC and ODOT Standard Specification 02415.50 for PVC pipe. Slotted perforations (0.064-inch-wide x 1.00 inch-long, spaced 0.3-inch on center) are preferred and less susceptible to clogging.

Drain rock and biofiltration soil mix shall be separated by a 2-inch to 3-inch choker course layer. Choker course shall conform to ODOT Standard Specifications 00430.11.

Biofiltration soil mix must support long-term plant and soil health and provide treatment for water as it moves through the soil column. See Section 6.4.4 for soil mix requirements.

Plant selection shall follow the Planting Guide in **Appendix B**. Plant selection shall be based on water level tolerances during the rainy season, as well as ability of plants to withstand dry summer conditions. Species should be selected that are suitable for the hydrologic, light, and soil conditions in the proposed swale. Swales shall be designed so that they do not require mowing.

6.5.4 Filter Strip

Filter strips are gently sloped areas intended to remove pollutants using sheet flow that runs off adjacent impervious surfaces. Filter strips are vegetated with grasses and densely spaced groundcovers that filter pollutants and reduce the velocity of stormwater.

Filter strips are a good choice for use adjacent to uncurbed roads where a gravel shoulder or shallow gravel strip helps to uniformly distribute flow. They can also be good choices for small projects; for example, to provide water quality treatment for roof or driveway runoff before it is discharged into a drywell, infiltration trench, or other facility.

Site Requirements

Pretreatment not required.

Filter strips are appropriate for all soil types.

Flow shall be distributed evenly along the length of the strip. This may require additional structures or design features to fully spread point discharges along the length of the strip.

Filter strips shall be a minimum of 50 feet from wetlands, rivers, streams, and creeks.

The maximum flow path distance of the contributing impervious surface shall be 100 feet to prevent concentrated flow.

Dimensions

Slope (measured in the direction of flow): 0.5 to 10 percent

Minimum width: 5 feet, measured in the direction of flow

Maximum slope of contributing impervious area (measured in the direction of flow): 6 percent. Steeper slopes may be allowed with an appropriate energy dissipation structure between the impervious area and filter strip.

Maximum design flow depth: 1.0 inch for water quality flow.

Maximum design velocity: 0.5-feet per second for water quality flow.

The filter strip width and slope shall be determined through iterative calculations, using the following two equations:

$$y = \left(\frac{Q_{\text{design}} * n}{1.49 * T * \sqrt{S}} \right)^{0.6} \quad \text{and} \quad V = \frac{Q}{T * y}$$

where:

Q = water quality flow rate, cubic feet per second

T = filter strip width (measured in the direction of flow), feet

S = filter strip slope (measured in the direction of flow), feet per feet

y = flow depth, feet (maximum 0.083)

n = Manning's roughness coefficient, unitless

V = flow velocity, feet per second (maximum 0.5)

Materials

Plant selection shall follow the Planting Guide in **Appendix B**. Establish dense plant growth of groundcovers, herbaceous plants, and shrubs, with a goal of 95 percent coverage. Filter strips often experience moist soil conditions during the wet, rainy season and dry soil conditions during warm summers. Plant selection should respond to specific site conditions for each facility.

6.5.5 Drywell

A drywell is an underground perforated pipe or chamber that collects stormwater runoff and gradually discharges it into underlying soils.

Drywells are “Class V Injection Wells” under the federal Underground Injection Control Program (OAR Division 44). UICs are either classified as exempt (no registration required), authorized by rule, or authorized by permit. Designers are urged to review current regulations and UIC registration materials from DEQ.

Drywells do not provide water quality treatment, so water quality treatment is required before stormwater discharges into drywells. Drywells utilized exclusively to infiltrate the roof runoff from one single-family residential roof are exempt, and a silt trap is the only pretreatment necessary. An approved water quality pretreatment device is required for multiple single-family residential roofs to discharge into a common drywell. Where space is available, rain gardens are preferred to manage residential runoff because they provide both treatment and flow control (and are not regulated UICs). The intent of this section is to support compliance with the water quality treatment requirements as specified by the State of Oregon UIC regulations.

Site Requirements

Native soil design infiltration rate shall be at least 2.0 in/hr. Apply a factor of 2 to the tested infiltration rate to determine the design rate.

Bottom of drywells and other types of stormwater injection devices shall be at least 3 feet above seasonal high groundwater or impermeable layer.

The edge of excavation for the drywell shall be at least 10 feet from building foundations, unless otherwise specified by the local building code division.

Drywells are not allowed on slopes of 15 percent or more.

Drywells are not allowed in areas with existing soil or groundwater contamination

Drywells may be allowed to be located under the travel surface within the Public ROW. The minimum setback from the edge of the travel lane is 5 feet. Check with the local roadway authority,

Soil surrounding the drain rock, surrounding the drywells shall be native, uncompacted soil.

Drywells are not allowed within 500 feet of drinking water or irrigation wells or within the 2-year time of travel setback to drinking water or irrigation wells.

Infiltration rates shall be tested after construction and testing shall be overseen by the Developer’s Engineer to confirm that the dry well provides adequate infiltration capacity for the relevant design storm.

A water quality pretreatment device is required, unless the drywell is receiving runoff from only one single-family residential roof,

The following facilities are approved for pretreatment:

- A. Facilities identified for water quality treatment in Section 6.3.1.
- B. Catch basins with a 36-inch sump and trapped outlet (snout).

If the facility is designed to infiltrate the 100-year storm event, then an emergency overflow pathway is not required.

Dimensions

Private: Diameter: 2-feet minimum

Publicly Maintained: 4-feet minimum

The required storage capacity within the drywell structure and surrounding drain rock is determined by subtracting the volume of water that can infiltrate out of the facility within a 24-hour period from the runoff volume generated by the contributing drainage area during a 25-year, 24-hour storm event.

Materials

Place 12-inch minimum layer of 1.50-inch to 0.75-inch round rock that conforms to ODOT Standard Specifications 00430.11 or AASHTO No. 4 between drywell structure and earth wall. The drain rock should extend from 1 foot below the drywell structure up to the lid.

6.5.6 Infiltration Trench or Gallery

An infiltration trench is a linear, gravel-filled trench that distributes stormwater to underlying soils. An infiltration gallery includes underground chambers to increase subsurface storage.

Infiltration trenches that receive only surface runoff (no underdrains or subsurface pipe) are not classified as UICs. Infiltration trenches with underdrains and infiltration galleries are “Class V Injection Wells” under the federal UIC program (OAR Division 44). UICs are classified either as: exempt (no registration required), authorized by rule, or authorized by permit. Infiltration trenches and galleries do not provide water quality treatment, so water quality treatment is required before stormwater discharges into the facility.

Water quality treatment is required before stormwater discharges into infiltration galleries, though galleries used exclusively for single-family residential roof runoff are exempt and a silt trap is the only pretreatment necessary. Where space is available, rain gardens are preferred to manage residential runoff because they provide both treatment and flow control (and are not considered UICs).

An infiltration test shall be conducted at the location and depth of the facility. Designers are encouraged to review current regulations and UIC registration materials from DEQ.

Site Requirements

Trenches or galleries are not approved for slopes greater than 15 percent, unless approved by a geotechnical engineer.

Trenches or galleries within 200 feet of a steep slope or a mapped landslide hazard area require the review and approval of a geotechnical engineer.

Infiltration trenches or galleries are not allowed in the Public ROW.

Trenches shall not be located where they will be subject to vehicular traffic.

Soil surrounding trenches or galleries shall be native, uncompacted soil.

Bottom of trench or gallery shall be at least 3 feet above seasonal high groundwater elevation.

Native soil design infiltration testing rate shall be at least 1.00 in/hr which includes the applicable safety factor of two, therefore the minimum infiltration design rate is 0.50 in/hr.

Trenches or galleries are not allowed within 500 feet of drinking water or irrigation wells or within the 2-year time of travel setback to drinking water or irrigation wells.

Infiltration trenches or galleries shall be located outside of tree protection zones or at least 10 feet from the base of newly planted trees and large shrubs.

Water quality treatment is required unless the infiltration trench or gallery is receiving only single-family residential roof runoff, then an approved pretreatment device will suffice. The following facilities are approved for pretreatment:

- A. Facilities identified for water quality treatment in Section 6.3.1.
- B. Private catch basins with a 36-inch sump and trapped outlet (snout).

Dimensions

The required storage capacity within the structural chambers and surrounding drain rock is determined by subtracting the volume of water that can infiltrate out of the facility within a 24-hour period from the runoff volume generated by the contributing drainage area during a 25-year, 24-hour storm event.

The maximum draw down time is 24 hours.

Minimum infiltration trench dimensions shall be 12 inches deep and 2 feet wide, filled with drain rock.

An observation well is required for all infiltration galleries and for infiltration trenches that exceed 50 feet in length.

Materials

Drain rock shall be 0.75-inch to 1.50-inch of granular drain backfill material. Drain rock shall conform to ODOT Standard Specifications 00430.11 or AASHTO No. 4.

If applicable, the distribution pipe in an infiltration trench shall be perforated, 6-inch-diameter PVC pipe that conforms to ODOT Standard Specification 02410.70. The IE shall be at least 12 inches below finished grade.

6.5.7 Constructed Wetland

Constructed wetlands are SMFs that are designed to emulate natural wetlands, with shallow water that varies in depth, and varied side slopes. They are saturated or have standing water for part of the year, rather than draining over a short period of time as rain gardens are designed to do. Wetlands are inundated or saturated at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation.

Constructed wetlands present an opportunity to integrate wildlife habitat and a public amenity into the landscape of a large residential, institutional, or commercial development. Constructed wetlands with healthy, thriving plants provide excellent water quality treatment. They require a large surface area and a large contributing area to ensure that wetland conditions are maintained.

Site Requirements

Site shall have adequate space for maintenance access that allows equipment access within 20 feet of the flow control, water quality devices and other structures as specified by the District.

Constructed wetlands are best for Type C and D soils or in areas with a high groundwater table. Soils shall be saturated for a long enough time to maintain wetland vegetation. The soil profile should be investigated to determine whether appropriate site soils exist and if any soil amendments need to be added to assist with initial plant establishment.

Waterproof liners may be used to maintain saturated conditions.

Constructed wetlands may be irregularly shaped, with a sinuous flow path and a variety of side slopes and benches incorporated to maximize plant establishment and diversity.

Vector (mosquito) control is an important design consideration for any facility that has standing water for extended periods of time. Bat boxes, diverse planting, and other design strategies to encourage biological controls can help to keep mosquito populations in balance.

Dimensions

Constructed wetlands can be sized for water quality treatment or a combination of treatment and flow control, similar to ponds. However, constructed wetlands will have a larger surface area, varied side slopes, and shallower ponding areas to maximize water quality treatment.

Two cells are required, with the first cell, the sediment forebay, containing 10 percent of the design volume, unless pretreatment is provided in a different facility. A sediment forebay provides a clear visual indicator of when maintenance is needed.

Water depth in a constructed wetland may vary in the different cells. Determine the average, maximum, and minimum depths for permanent pool in each cell of the wetland.

Design varied side slopes, water depths, and planting zones to provide a variety of habitat and maximize treatment.

Bottom width: minimum 3.0 feet

Maximum ponding depth: 4.0 feet

Average ponding depth: ≤ 2.5 feet

Side slopes: no greater than 5h:1v below maximum ponding depth

Side slopes: no greater than 3h:1v above maximum ponding depth

Materials

When required, waterproof liners shall be 30 mil PVC membrane or equivalent.

Investigate the soil profile and determine whether appropriate site soils exist and if any soil amendments need to be added.

Plant selection shall follow the Planting Guide in **Appendix B**. Plant selection shall be based on water level tolerances during the rainy season, as well as the ability of plants to withstand dry summer conditions. Species should be selected that are suitable for the hydrologic, light, and soil conditions in each of the proposed wetland cells.

Woody vegetation shall be used to provide shade over standing water and to provide structural diversity within the constructed wetland. Shrubs and trees shall be sited to promote long-term health and survival, minimize maintenance, and protect lines of sight. Shrubs and trees shall be located to allow for maintenance access to the treatment area.

Woody vegetation shall not be planted within 20 feet of inlet and outlet structures.

Overflow Spillway

All constructed wetlands shall have an emergency overflow spillway or other overland flow location that will safely pass runoff from the 100-year storm event over the embankment in the event of control structure failure or for storm events that exceed the design of the control structure.

Locate the spillway to direct overflows safely toward the 100-year emergency overflow pathway.

Protect the spillway with riprap or an approved material that extends to and is an appropriate distance beyond the bottom of the berm embankment. Fill the voids of the riprap with soil and vegetate the spillway with grass or ground cover. The selection of the vegetation on the spillway shall consider the required design capacity.

The IE of the spillway shall be a minimum of 6 inches above the 10-year water surface elevation.

Provide a minimum of 12 inches of freeboard through the spillway between the 100-year water surface elevation and the top of the berm.

Alternate methods to accomplish the design intent of the emergency spillway will be acceptable, as long as they accomplish the same level of protection.

6.5.8 Pond

Stormwater ponds can provide water quality treatment, infiltration, and flow control to mitigate post-construction stormwater runoff. Ponds are a good choice where there is a large contributing area draining to a single facility, where there is adequate space to design a pond that can be integrated into the landscaping, and where it is accessible for maintenance. Stormwater ponds can be used to meet both water quality treatment and flow control performance standards. When site conditions allow, ponds should be designed as infiltration facilities or with an infiltration component in addition to a detention component to meet the flow control performance standard. An infiltration test shall be conducted at the location and depth of the facility.

The stormwater report and engineered drainage plans, in addition to documentation of existing and proposed conditions, shall include, at a minimum, the flow control structure rim elevation, the pond grading plan, the outlet pipe IE, the elevation of the top of the berm, the elevation of the top of the overflow structure, all pipe diameters, and any deviation in shear gate/lift assembly from the District's Standard Details.

Site Requirements

Pond type selection shall be appropriate for soil characteristics (e.g., if soils have adequate infiltration capacity, design an infiltration pond rather than a facility with a controlled downstream outlet)

The minimum setback of a pond from the edge of the top of bank, wall, or toe of an embankment to the nearest property line must be horizontal for a minimum of 5 feet, or greater if recommended by a civil or geotechnical engineer.

A geotechnical report is required to determine setbacks of ponds near slopes ≥ 15 percent or within 200 feet of a steep slope hazard area or landslide hazard area.

Vector (mosquito) control is an important design consideration for any facility that has standing water for extended periods of time. Bat boxes, diverse planting, and other design strategies to encourage biological controls can help to keep mosquito populations in balance.

Dimensions

May include two cells, with the first cell (forebay) containing approximately 10 percent of the design surface area. Forebays simplify maintenance and are strongly encouraged. Maintenance access shall be provided to the forebay.

Maximum side slopes: 3h:1v

Length to width ratio: $\geq 3:1$

Materials

When required, waterproof liners shall be 30 mil PVC membrane or equivalent.

Soil amendments shall meet the requirements of Section 6.4.4.

Plant selection shall follow the Planting Guide in **Appendix B**. Plant selection shall be based on water level tolerances during the rainy season, as well as the ability of plants to withstand dry summer conditions. Species should be selected that are suitable for the hydrologic, light, and soil conditions in the pond.

Woody vegetation shall be used to provide shade over standing water and to provide structural diversity within the pond. Shrubs and trees shall be sited to promote long-term health and survival, minimize maintenance, and protect lines of sight. Shrubs and trees shall be located to allow for maintenance access to the treatment area.

Woody vegetation shall not be planted within 20 feet of inlet and outlet structures.

Outlet Structures

Flow Control Structure: Flow control structures for ponds shall be located in an enclosed manhole, outside the open water storage area, in a location that allows equipment maintenance access and access during high flow events. Access to a flow control structure, not located in a public roadway, shall be provided within 12 feet of the edge of a vehicular access, measured from center of flow control structure, when designed to be accessed perpendicularly by the maintenance vehicle and within 6 feet when designed to be accessed from the front of the maintenance vehicle. The flow control structure may be farther from the edge of the roadway if a public access road is provided that allows for maintenance trucks to get within the appropriate distances.

Secondary Outlet. Detention ponds shall have a secondary pond outlet structure, such as a catch basin with grated lid located along an interior side slope. This secondary pond outlet will serve as a backup to convey stormwater to the flow control manhole should the primary pond outlet become clogged. The lip elevation of the secondary pond outlet should be set at approximately the 10-year design water surface. See **Appendix C** for a graphical depiction showing a secondary pond outlet.

Flow control manholes shall comply with District Standard Drawings SWM FC 1.0 through 6.0.

Orifices less than 2.0 inches shall be made of material (e.g., stainless steel, high-density polyethylene pipe [HDPE], or PVC) shall be used to make the orifice plate. The plate shall be attached to the concrete or structure.

Overflow Spillway

In addition to primary and secondary outlets, ponds shall have an emergency overflow spillway that will safely pass runoff from a post-developed 100-year Design Storm to the downstream emergency overflow pathway. The design intent is to protect the integrity of the pond, as well as associated embankments and downstream properties, during large storm events and/or failure of the flow control structure. Secondary spillway shall meet the following criteria:

Locate the spillway to direct overflows safely toward the 100-year overflow pathway.

Locate the spillway in existing soil wherever possible. Protect the spillway with riprap or an approved material that extends to, and is an appropriate distance beyond, the bottom of a berm embankment.

The IE of the spillway shall be a minimum of 6 inches above the 25-year water surface elevation.

Provide a minimum of 12 inches of freeboard through the spillway between the 100-year water surface elevation and the top of the berm.

Alternate methods to accomplish the design intent of the emergency spillway will be acceptable, as long as they accomplish the same level of protection.

Pond Interior Maintenance Access

Design ponds with access suitable for maintenance equipment (backhoe, etc.) to safely access the bottom of the interior of the pond. The purpose of this requirement is to provide an access suitable for sediment removal by District equipment.

The interior pond access will begin at the edge of the required pavement and end at the lowest elevation of the pond. The minimum access requirement is at least 15 feet wide with slopes no steeper than 4:1.

The pond interior access shall be constructed of 8 inches of gravel, pervious pavers, or native vegetation (no trees or shrubs). The access can be constructed of compacted native material suitable for the intended seasonal use. Other materials will be reviewed and approved on a case-by-case basis.

6.5.9 Structural Detention

Structural detention facilities include underground tanks and vaults that temporarily store water must be designed in accordance with the custom pond sizing feature that is part of the BMP Sizing Tool program. Structural detention facilities are appropriate for commercial sites, industrial locations, and multi-family sites. They can be designed to reduce the runoff rate and duration of flow to meet the flow control performance standards. Structural detention facilities alone do not provide water quality treatment, so a separate water quality treatment facility is necessary to meet the water quality performance standards.

Detention pipes and vaults are not allowed for use on developments that convey public waters, such as stormwater runoff from public roadways. Structural detention design shall demonstrate that the facilities have adequate maintenance access of 20 feet to the flow control and water quality structures, can withstand vehicular and other structural

loadings, will be stable, have been designed to counteract buoyancy forces in areas of high groundwater, and that the materials can withstand chemical properties of soils on the site.

The stormwater report and design drawings, in addition to documentation of existing and proposed conditions, shall include, at a minimum, the flow control structure rim elevation, the storage pipe IE, the outlet pipe IE, the elevation of the top of the storage pipe, the elevation of the top of the overflow pipe, all pipe diameters, and any deviation in shear gate/lift assembly from the District's Standard Details.

Site Requirements

Structural detention facilities shall be located to avoid conflicts with other underground utilities.

Regular maintenance is essential to ensure continued function of underground detention facilities. Maintenance access shall be provided to allow sediment removal from the length of the facility and to maintain the outlet control structure. Facility location shall be chosen to maximize access for maintenance and replacement.

Pipes and vaults shall be placed on stable, consolidated native soil with suitable bedding. Pipes and vaults are not allowed in fill slopes unless a geotechnical analysis is performed for stability and construction practices.

Dimensions

Detention Pipe:

- A. Minimum diameter: 36.0 inches
- B. Pipe bottom shall be flat or gently sloped: ≤ 0.5 percent
- C. Maximum distance between pipe bottom and finish grade: 20.0 feet
- D. Sediment storage depth in upstream standard manhole: 6.0 inches minimum
- E. Minimum freeboard: 6.0 inches, measured from the maximum design water surface elevation and the overflow elevation in the control structure.

Detention Vault

- A. Vault bottom shall be flat or gently sloped to the center, forming a "V": ≤ 0.5 percent
- B. Minimum sediment storage depth: 6.0 inches
- C. Minimum freeboard: 6.0 inches, measured from the maximum design water surface elevation and the overflow elevation in the control structure.

Private facilities may use a 1.0-inch-diameter orifice if the structural detention facility is preceded by an approved water quality filtration device.

Materials

Private Maintained Detention Pipe: Stormwater detention/conveyance pipes that are located solely on private property shall be constructed of a material in accordance with OPSC. A plumbing permit to construct the pipe shall be obtained by the local plumbing authority, and the Developer's Engineer shall certify the infrastructure was constructed in accordance with the approved plans. Galvanized metals leach zinc into the environment, especially in standing water situations. This can result in zinc concentrations that can be toxic to aquatic life. Therefore, galvanized materials shall not be used in stormwater facilities and storm drainage systems.

Publicly Maintained Detention Pipe: For publicly maintained facilities, the detention pipe material shall be concrete. The joints shall conform to technical and manufacturer's specifications.

Detention vaults shall be constructed of structural reinforced concrete (3,000 psi, ASTM 405). All construction joints shall be provided with water stops.

A flow control manhole shall be provided to regulate outflow from the structural detention facility. Flow control manholes shall comply with District Standard Drawings SWM FC 1.0 through 6.0.

Orifice structure material shall be HDPE or PVC. A thin material (e.g., stainless steel, HDPE, or PVC) shall be used to make the orifice plate. The plate shall be attached to the structure.

Access

Detention pipes more than 50 feet long shall provide an access riser at each end for maintenance. Detention pipes over 200 feet long shall have an access riser at the upstream end and access risers at least every 100 feet.

Access for detention vaults may be provided by use of removable panels, hatches, or ring and cover.

36-inch minimum diameter corrugated metal riser-type manholes of the same gauge as the detention pipe material may be used for access along the length of the detention pipe and at the upstream terminus of the detention pipe. The top slab is separated (1-inch minimum gap) from the top of the riser to allow for deflections from vehicle loadings without damaging the riser pipe.

All detention pipe, vault access and control structure openings shall be readily accessible by maintenance vehicles.

Detention pipes and vaults shall comply with the OSHA and Oregon OSHA confined space requirements, which include, but are not limited to, the preparation of ventilation plans and clearly marked entrances to confined space areas.

Internal structural walls of large vaults shall be provided with openings sufficient for maintenance access between cells. The openings shall be sized and situated to allow access to the maintenance "V" in the vault floor.

For detention vaults, the recommended minimum internal height is 7 feet from the highest point of the vault floor (not sump), and the recommended minimum width is 4 feet. However, concrete vaults may be a minimum 3 feet in height and width if there are access manholes at each end, and if the width is no greater than the height. Minimum internal height requirements do not apply for any areas covered by removable panels.

6.5.10 Proprietary Stormwater Treatment Devices

Proprietary Stormwater Treatment Devices are manufactured technologies used to address the stormwater quality impacts of land development, including removing pollutants through physical, chemical, or biological treatment processes. These SMFs rely upon a variety of mechanisms to remove pollutants.

Proprietary Stormwater Treatment Devices include hydrodynamic separators, cartridge filters, and other emerging treatment technologies that are designed to remove pollutants from stormwater. Proprietary devices are generally grouped by their use for pretreatment, oil removal, enhanced treatment, basic treatment, phosphorus removal

and construction pollutant management. There are numerous manufacturers that build Proprietary Stormwater Treatment Devices.

Stormwater treatment technologies are reviewed and certified by several agencies. The District follows the Technology Assessment Protocol – Ecology (better known as the TAPE Program), administered by the Washington State Department of Ecology (Ecology). The District allows the use of Proprietary Stormwater Treatment Devices that have a General Use Level Designation (GULD) for basic, dissolved metals, or phosphorus treatment. Devices with Pilot Use Level Designation or Conditional Use Level Designation are not allowed. The District may require pretreatment facilities to improve the performance of Proprietary Stormwater Treatment Devices.

The Proprietary Stormwater Treatment Devices that have been tested and approved under Ecology's TAPE program are regularly updated on the TAPE Program website.

Proprietary Stormwater Treatment Devices approved by Ecology with GULD and classified as Basic Treatment may be utilized to satisfy the stormwater water quality treatment requirements when sized to capture and treat the first 1 inch of stormwater runoff within a 24- hour period; and are sized as specified in the Ecology-approved GULD.

The use of Proprietary Stormwater Treatment Devices approved by Ecology is allowed for use on privately maintained facilities.

The use of Proprietary Stormwater Treatment Devices that will be maintained by a public agency shall be approved by the District. Any device requiring the replacement of specific manufacture filter cartridges and/or media will not be allowed without the specific approval of the District for SMFs which will be publicly maintained and/or accepts stormwater runoff from public improvements.

Site Requirements

Proprietary Stormwater Treatment Devices for water quality treatment shall not be located downstream of flow control facilities.

Proprietary Stormwater Treatment Devices may be located on a range of site conditions. Site requirements vary by type of system. Review the manufacturer's restrictions and recommendations when selecting an appropriate treatment device and configuration for the development and site conditions.

Proprietary Stormwater Treatment Devices shall be a minimum of 5 feet from structures.

Proprietary Stormwater Treatment Devices that are publicly maintained, and require staff to enter, shall provide a minimum of 78 inches of head room.

The device shall be designed to safely convey the storm event as specified in this chapter, and if applicable provide an emergency overflow pathway.

Devices shall be readily accessible by maintenance vehicles at a minimum distance of 20 feet and in accordance with manufacturer recommendations.

Dimensions

Proprietary Stormwater Treatment Devices may be configured as inline systems or offline systems with high flow bypasses, in accordance with manufacturer specifications.

Proprietary stormwater treatment devices shall be designed to treat the peak flow or total volume from the water quality storm event, as defined in Section 6.1.1

Calculations to determine the required size, number, or configuration of the Proprietary Stormwater Treatment Device must be based on the design guidelines specified in the GULD approval documents from Ecology. When sizing Proprietary Stormwater Treatment Devices for water quality treatment, Applicants shall use the treatment flow rates identified in the TAPE approval documents.

6.5.11 Sheet Flow Dispersion

Sheet flow dispersion is one of the simplest methods of stormwater management. Sheet flow dispersion is the dispersion of concentrated flows from driveways, roadways, or other impervious surfaces through a vegetated pervious area. Because flows are already dispersed as they leave the surface (i.e., not concentrated), they need only traverse a narrow band of adjacent vegetation for effective flow attenuation and treatment.

Sheet flow dispersion is applicable for impervious surfaces with slopes less than 15 percent, such as driveways, sport courts, patios, roofs without gutters, recreational vehicle pads, or other situations where concentration of flows can be avoided.

Sheet flow dispersion is a preferred stormwater management strategy for impervious surfaces in rural areas, driveways, and agricultural buildings. The discharge shall not be directly connected to a drainageway, Storm Drainage System, or other Public Storm System.

Site Requirements

Dispersion is not permitted within potential landslide areas. The District may require a geotechnical report to verify the site soils are suitable for sheet flow dispersion.

Dispersion is not permitted within 10 feet of the top of a slope greater than 25 percent.

Dispersion is not permitted over contaminated sites or abandoned landfills.

For sites with septic systems, the discharge point shall be downgradient of the drain field primary and reserve areas. This requirement may be waived if site topography clearly prohibits flows from intersecting the drain field.

Area receiving flow shall be protected from compaction during construction, or substantial soil amendment may be required prior to final site stabilization.

No erosion or flooding of downstream properties may result.

Dimensions

A 2-foot-wide transition zone to discourage channeling shall be provided between the edge of the contributing impervious area and the downslope vegetation. This may be an extension of subgrade material (crushed rock), modular pavement, drain rock, or other material approved by the District. The transition zone may be narrowed for sidewalks and pathways, if approved by the District.

A 10-foot-wide vegetated buffer shall be provided for up to 20 feet of width of contributing impervious surface. An additional 5 feet of buffer width shall be added for each additional 20 feet of width of contributing area or fraction thereof.

The flow path shall be covered with well-established lawn or landscape area (landscaping with well-established groundcover, or native vegetation with natural groundcover). The groundcover shall be dense enough to help disperse and infiltrate flows and to prevent erosion.

6.5.12 Pervious Pavement

Pervious pavement is a walking or driving surface designed to allow rainfall to percolate into the underlying soil or aggregate storage reservoir beneath the pavement. The wearing course (surface layer) of pervious pavement may be any of the following:

Porous asphalt is open-graded asphalt that allows water to percolate or infiltrate into underlying soils.

Pervious concrete omits fines in the aggregate to create stable air pockets that allow water to drain to the base below. There is an inverse relationship between porosity and strength. As porosity is increased, the structural strength is reduced.

Pavers are generally suitable for pedestrian areas and low traffic parking areas. They are available in a variety of configurations such as rigid concrete or durable plastic grid filled with gravel or a mixture of gravel, sand, and topsoil suitable for vegetation.

Pervious pavement shall be designed only as an impervious area reduction technique to manage direct rainfall. It shall not be designed as a SMF that receives runoff from surrounding areas.

Site Requirements

Surface slope no greater than 6 percent.

Site does not receive high sediment loads. Areas with high volumes of leaf litter can cause clogging, so avoid pervious pavement under large trees.

Adequate separation from underlying seasonal high groundwater table; bedrock or other impermeable layer shall be at least 3 feet below the bottom of the pervious pavement facility.

Pervious pavement is not appropriate for areas at elevated risk of hazardous materials spills such as gas stations.

Minimum infiltration rate of 0.25 in/hr.

Not appropriate for construction over fill soils unless evaluated and approved by geotechnical engineer.

No stormwater run-on allowed.

Pavement design shall demonstrate that pavement structure has the structural strength for anticipated vehicle loadings.

Dimensions

Pervious pavements designed with 6 inches of aggregate storage and a minimum design infiltration rate of 0.25 in/hr are assumed to meet the performance standard to fully infiltrate the 10-year, 24-hour Design Storm.

Pervious concrete wearing course: 4-inch thickness for residential driveway, pedestrian only, private street, parking lot or fire lane; 7-inch thickness for public street. Public streets shall be designed in conformance with the local roadway authority.

Porous asphalt wearing course: 2.5-inch thickness for residential driveway or pedestrian paths; 3 inches for private street, parking lot, or fire lane; 6 inches for public street. Public streets shall be designed in conformance with the local roadway authority.

Pavers shall be designed according to manufacturer recommendations. State size of stone to be used between pavers—sand is not allowed if pavers are used for stormwater treatment or flow control.

Where pervious pavement installations are proposed over fine sediments, provide a 1- to 3-inch-thick leveling course if the pervious pavement surface is open-celled paving grids, interlocking concrete pavers, or porous asphalt concrete.

Minimum depth for aggregate storage reservoir shall be 6 inches for vehicular loading. In addition to structural design considerations, design depth is typically determined by storage depth needed to manage design storm.

Pervious pavements designed with 6 inches minimum of $\frac{3}{4}$ -inch to 2-inch crushed/washed open graded base material and a minimum design infiltration rate of 0.25 in/hr are assumed to meet the performance standard to fully infiltrate the 10-year, 24-hour Design Storm.

Materials

Leveling course: The leveling course shall consist of uniformly graded, washed aggregate that conforms to AASHTO No. 8 gradation.

Aggregate storage reservoir: The aggregate storage reservoir shall conform to ODOT Standard Specifications 00430.11 granular drain backfill material, AASHTO No. 57, or approved equal.

Porous asphalt: The surface wearing course for porous asphalt shall conform to open-graded, $\frac{1}{2}$ -inch or $\frac{3}{4}$ -inch asphalt concrete pavement design from ODOT Standard Specification 00745 or approved equal.

Content: 6.0 to 6.5 percent by weight of total (dry aggregate) mix. Performance Grade: 70-22. Do not use an asphalt cement performance grade less than 70-22 for open-graded, porous asphalt mixes.

6.5.13 Green Roofs

A green roof is a building roof that is partially or completely covered with vegetation and growing media, atop a waterproof membrane; a green roof is also called an eco-roof or vegetated roof. Green roofs include the following elements: a thin, layered system of waterproofing, drainage layers, growing media, and planting to cover impervious roof areas and allow water to be absorbed, detained, and evaporated back into the atmosphere. Proprietary systems are also available using various layers or even modular trays that fit easily on an existing roof.

Green roofs are primarily designed for stormwater management, with aesthetics as a secondary goal. Green roofs are not designed for foot traffic or recreation.

Site Requirements

Flat or slightly sloped roofs on large institutional, commercial, or residential projects. Green roofs work on sloped roofs up to a maximum of 4:12 roof pitch without additional engineering—and can be steeper with intermediate structural support of soils.

Structural Considerations

Shall be able to carry additional loads as determined by a structural engineer (15 to 30 pounds per square foot is typical) to support fully saturated conditions.

These load recommendations do not include snow load.

Access to roof via crane, lift or other device is recommended to load heavy, and bulky materials up to rooftop surface.

Safety line tie-off points, hand holds, or walking surfaces may be necessary to facilitate maintenance.

Green roofs shall include outlets to an approved location from roof drains, scuppers, and other drainage devices.

Dimensions

Green roofs may be designed to meet flow control and water quality performance standards.

The Developer's Engineer is required to provide adequate documentation showing how the planned green roof meets District performance standards for flow control and water quality treatment Materials.

Root barrier/protection layer. A synthetic, non-biodegradable layer shall be placed to protect waterproofing layers and to provide additional protection from roots. Do not use copper or copper hydroxide for a root inhibitor.

Drainage layer/filter fabric. A synthetic or mineral layer shall be placed over the protection layer to allow for water movement under the growing media. The drainage layer shall be ½-inch-deep with a void space of at least 50 percent, covered by a non-woven (needle-punched) filter fabric to separate the drainage layer from the growing media.

Growing media. An engineered growing media mix shall be placed over the filter fabric to a depth of at least 4 inches to meet requirements. It shall contain no fines, weed seeds, or other materials. Provide documentation of saturated weight (field moisture capacity) that has been tested and documented by a third party. The media mix shall consist of 80 to 90 percent pumice or lightweight aggregate and 10 to 20 percent composted, plant-based organic matter.

Mineral mulch. A mulch layer of washed gravel or non-decomposable material (no fines) that will not be moved by wind or water movement shall be placed on top of the growing media.

Planting. Establish dense plant growth of low-maintenance, low-water use succulent vegetation supplemented with some hardy perennials, grasses, and other native, non-woody vegetation. A minimum of 10 species shall be included to promote microclimatic diversity and resilience to the roof, allowing for species to fill in if others are slow to perform. Use 10 percent deciduous species distributed throughout the roof to provide organic matter inputs through leaf litter. Plant selection shall follow the Planting Guide in **Appendix B**.

Proprietary systems may not match these dimensions or materials.

7. Storm Drainage System Design

Storm drainage system design is an integral component of site planning. Acceptable storm drainage system design must strive to maintain compatibility and minimize interference with existing drainage patterns; control onsite and downstream flooding of property, structures, and roadways for design flood events; and minimize the potential environmental impacts of stormwater runoff. Three considerations largely shape the design of these systems: public safety, flooding, and water quality. Stormwater collection systems must be designed to provide adequate surface drainage while at the same time meeting other stormwater management goals such as water quality treatment, stream channel protection, wildlife habitat protection, and groundwater recharge.

Some sites may require two separate storm drainage systems: the localized onsite system and the regional bypass system. The onsite system is generally designed to convey stormwater runoff from the developed areas of the site to the SMFs. The SMFs discharge to the bypass system, which conveys upstream stormwater runoff around or through the developed site and conveys the stormwater to the natural point of discharge downstream. This chapter includes requirements for storm drainage system design.

7.1 General Conditions

This section presents design requirements for open channel and closed conduit storm drainage systems. It also describes requirements and methods used to plan, design and size storm drainage systems. Storm drainage systems are generally made up of four components; stormwater runoff entering the site from upstream drainage areas; stormwater runoff conveyed through the site; the acceptable point of discharge from the site; and stormwater runoff discharged downstream from the site.

Storm drainage systems shall be designed to meet the requirements of Chapter 6, except when the drainage system is located entirely on a privately-owned parcel, is privately maintained, and receives no stormwater from outside the parcel's property limits. Those systems exempted from the storm drainage system requirements will remain subject to the requirements of the OPSC and shall be reviewed by the building official.

7.2 Storm Drainage System Requirements

Planning for the storm drainage system is an essential element in preparing a site plan. Several factors must be considered prior to developing the preliminary design and requesting District approval of the Service Provider Letter.

Storm drainage systems are to be designed to intercept and convey stormwater runoff efficiently enough to meet flood protection criteria. The storm drainage system should complement the ability of the site design and structural stormwater controls to mitigate the major impacts of urban development.

7.2.1 Points of Discharge

The Applicant will establish a proposed point of discharge. A point of discharge shall be approved by the District prior to approving the Service Provider Letter.

Runoff from developed portions of the site drainage area should be discharged at the existing natural drainage outlet or outlets.

Runoff must be discharged in a manner that will not increase flooding to downstream properties.

The Applicant will be responsible for acquiring approval from any other agency having jurisdiction or permitting authority related to the activity. The District may require a copy of other jurisdictional approval(s) prior to approving the plan.

If the point of discharge is an open storm drainage system, then adequate velocity dissipation and/or additional channel protection shall be required to prevent erosion and/or alteration to the existing downstream drainageway.

Any connection to a public or private piped downstream storm drainage system shall be approved by the District. The means and methods of connecting or extending a piped storm drainage system will be consistent with District standards and/or other standards required by agencies having the authority to regulate the connection.

7.2.2 Onsite Storm Drainage System

The site shall be planned and designed to generally conform to onsite natural drainage patterns and discharge to natural drainage paths within a drainage area. These natural drainage paths should be modified as necessary to contain and safely convey the peak flows generated by the development.

Open channel storm drainage systems are preferred over closed conduits where feasible, especially where they might provide opportunities for water quality treatment, some infiltration, wildlife habitat improvement, or emergency overland flood relief routes.

It shall be the responsibility of the Owner to provide a storm drainage system for all stormwater runoff and/or surface water entering the property from offsite. Surface water, springs, and groundwater shall be incorporated into the drainage design.

An emergency overflow pathway must be identified and/or designed that allows large flow events to discharge without risk of injury or property damage. The emergency overflow pathway must be incorporated into the design and show how flow will escape from the site during rainfall events larger than the design storm events and/or from failure of the primary storm drainage system. Any emergency overflow pathway structures shall be designed for the 100-year Design Storm.

It is important to ensure that the onsite storm drainage system is designed to reduce blockages and flows in excess of the design storm capacity to minimize the likelihood of nuisance flooding or damage to private properties. If failure of these systems and/or drainage structures occurs during these periods, the risk to life and property could be significantly increased.

7.2.3 Upstream Drainage Areas

Developments are required to convey upstream drainage through or around the development in a system the District refers to as a "Bypass System".

The upstream offsite stormwater or other nuisance surface water runoff will be conveyed through the development in a separate system referred to as the "Bypass System" and will not be mixed with the stormwater collected and treated with onsite SMFs unless the SMFs are designed to include all of the additional flows from the upstream drainage areas(s) assuming full development potential.

Analysis of upstream drainage areas shall assume ultimate build out and/or maximum zoning density in determining the size of the storm drainage system required through the site as specified in this chapter.

Land use zoning adopted by the local planning agency will be used to size the capacity of the bypass system. For areas within the upstream drainage area that currently have a rural zoning designation but have the potential to be incorporated into the Urban Growth Boundary or Reserve, the District will concur with the local planning agency to assign the appropriate zoning designation and/or allowable maximum density to use in the upstream drainage area analysis for ultimate development potential and storm drainage system sizing.

It is important to ensure that the bypass storm drainage system is designed to reduce blockages and flows in excess of the design storm capacity to minimize the likelihood of nuisance flooding or damage to private properties.

If failure of these systems and/or drainage structures occurs during rainfall events in excess of the design storm capacity, the risk to life and property could be significantly increased.

In establishing the layout of stormwater networks, it is essential to ensure that upstream flows will not be redirected onto private property during rainfall events up to the storm drainage system design capacity.

7.2.4 Downstream Analysis

A downstream analysis is required for all projects that exceed the impervious area threshold that requires the Applicant to submit a Stormwater Management Plan designed by a registered PE. A downstream analysis is a field investigation of the existing downstream storm drainage system to determine the capacity of the storm drainage system that will be utilized to safely convey stormwater runoff. Downstream analysis is a mechanism to assure the existing or proposed storm drainage system has adequate capacity to safely convey the stormwater runoff discharged from the development. The analysis will also provide the District with a better understanding of the storm drainage system, so that the District can add problem areas to maintenance work orders or to potential capital project needs.

Any drainage system with a limited or inadequate stormwater conveyance system designated by the District or other governing jurisdictions will be required, if feasible, to improve the downstream Conveyance System capacity. If improving the system is not feasible, the District will determine if additional flow control requirements are an option to develop the property without increasing the potential for downstream flooding during a 25-year storm event. The District or other jurisdiction may designate an area or stormwater Conveyance System as having “limited downstream capacity” based on local knowledge, drainage complaints, engineering study or other information indicating the need for additional flow control requirements for larger storm events. In all cases, an emergency overflow pathway from the developed site to an acceptable point of discharge must be maintained.

The Applicant shall complete the Qualitative Analysis. Depending on the results, the District may require the analysis to extend further downstream, mitigation measures, a Quantitative Analysis, offsite mitigation measures, or additional flow control.

If the proposed stormwater management system for a development or redevelopment project is designed to fully infiltrate the design storm as specified in Chapter 6, then the

Applicant is exempt from the downstream analysis requirements but must still address the 100-year emergency overflow pathway requirement in Section 6.1.3.

When required, the downstream analysis shall evaluate the offsite storm drainage system to the location where the project site contributes less than 15 percent of the upstream drainage area contributing to a public storm drainage system line or drainage channel, or a location 1,500 feet (approximately ¼-mile) downstream of the discharge point from the project site, whichever is greater. The downstream analysis may be stopped shorter than the required distance if the analysis reaches a stream, or river, or a point that is determined at the sole discretion of the District.

Qualitative Analysis

The Qualitative Analysis shall consist of a drainage system map, existing storm drainage systems, drainageways, outfall inspection results, storm drainage system description, and potential problem identification. Depending upon the presence of existing or predicted flooding, erosion or water quality problems, and the proposed design of the onsite drainage facilities, the District may require a Qualitative Analysis further downstream, mitigation measures, or a quantitative analysis.

A drainage area map delineating the onsite and offsite contributing drainage areas upstream and downstream for the site shall be provided. The drainage system map shall be to a defined scale and must show the extent of the drainage system in the downstream analysis area. The drainage system map should also show general land use, topography, and other features impacting the onsite and downstream drainage system. Maps printed from Geographic Information Systems (GIS) or websites may be used as a base for the drainage system map.

The engineer shall physically inspect the existing onsite and offsite storm drainage systems and outfalls in the project area for each discharge location for existing or potential problems and drainage features. An inspection and investigation shall include the following:

- A. Information on pipe sizes and slopes, channel characteristics, and drainage structures.
- B. Date and weather at time of inspection.
- C. Photographs of the existing condition of onsite and downstream drainage features.
- D. Existing and potential problem areas.

For each storm drainage system component (e.g., pipe, culvert, outfall, ditch, open channel, tributary, stream), a written description shall be provided of the location, physical description, size, material, flow direction, and field observations. The description shall document points of inflow from adjacent drainage systems. The description shall also identify and describe points where water enters the downstream storm drainage system and the approximate tributary area at each contributing location. The tributary area shall account for upstream, onsite, and downstream contributions and land use conditions.

All existing or potential problems identified during the storm drainage system and outfall inspection shall be documented and described. Problem areas include constrictions or capacity deficiencies in the drainage system, existing or potential flooding problems, erosion, scouring, or bank sloughing in open channels, and erosion or scouring at outfalls. The following information shall be provided for each existing or potential problem area:

- A. Magnitude of, or damage caused by the problem.
- B. Assumed frequency and duration.
- C. Return frequency of storm or flow when the problem occurs.
- D. The pre- and post-construction water elevation when the problem occurs.
- E. Possible cause of the problem.
- F. Current mitigation of the problem.
- G. Whether the proposed development or redevelopment activity is likely to aggravate or mitigate the problem.

The descriptions shall be used to determine whether adequate mitigation can be identified or whether more detailed quantitative analysis is necessary.

Quantitative Analysis

Upon review of the qualitative analysis, the District may require a quantitative analysis, depending on the presence of existing or predicted flooding, erosion, or water quality problems and on the proposed design of the onsite drainage facilities. The quantitative analysis includes a hydrologic and hydraulic analysis of each component of the downstream storm drainage system. The analysis may be performed through spreadsheet and backwater calculations or by preparing a hydraulic model of the downstream system.

As-built drawings may be used to obtain structure information for the quantitative analysis. If as-built drawings are used, the engineer is responsible for verifying that all elevations are in the same datum. The District may require a field survey of the existing storm drainage system in the downstream analysis area to inform the quantitative analysis.

The quantitative analysis of the downstream storm drainage system shall assume the following:

- A. Project site is developed as proposed with the land use application.
- B. The surrounding drainage area is developed at future build out conditions, using the best zoning information available, or a conservative assumption of future build out conditions.
- C. Full functionality of the proposed onsite SMFs.
- D. The design storm for analysis shall be consistent with the storm drainage system design storms listed in Chapter 6.

The following shall be included as part of the quantitative downstream analysis:

- A. Upstream and downstream drainage area maps showing the flow route for both onsite and offsite stormwater.
- B. Description of hydrologic calculation parameters and design flows used in the analysis.
- C. Capacity and percent full during the design storm in each storm drainage system element.
- D. Velocity in each storm drainage system element during the applicable design storm.
- E. Headwater and tailwater assumptions.

- F. The hydraulic gradeline elevation for the design flow in each storm drainage system component.
- G. All calculation assumptions, equations, and outputs used in the analysis. If calculation assumptions are different than typical standards of practice, justification of the parameters is required. When the downstream system includes older or deteriorated pipes, the Manning's n roughness coefficient should be adjusted to account for increased pipe roughness.

If the Applicant is proposing mitigation measures to change the capacity of the downstream storm drainage system, the quantitative analysis shall include calculations for both the existing and proposed storm drainage system.

Offsite Mitigation Measures

Depending on the results of the offsite analysis, the Applicant may be required to provide offsite mitigation measures. Where required, the mitigation will be of a type to be determined by the District. If the downstream analysis identifies outfall or streambank erosion or scour problems, the Applicant shall correct the identified problem areas as a condition of the development activity.

If the downstream storm drainage system does not have the capacity to convey runoff according to the design standards outlined in Chapter 6, the Applicant shall be required to mitigate for the undersized system. The Applicant may elect to mitigate the storm drainage system problem by either correcting the deficiencies in the downstream storm drainage system (piped and open channel systems) or by providing additional onsite flow control beyond what is required in the performance standards in Chapter 5. The additional flow control may be in the form of additional onsite stormwater infiltration, retention, and/or storage, such that the 100-year, 24-hour post-developed peak discharge rate from the site matches the pre-developed peak discharge rate for the same storm event. The additional flow control requirements will take into account the downstream deficiencies and will be determined at the sole discretion of the District.

7.3 Storm Drainage System Design Methods

The following section describes accepted criteria and methods for analyzing and designing storm drainage systems. It is the responsibility of the engineer to determine the appropriate method of analysis in determining the capacity of the proposed storm drainage system.

7.3.1 Design Methodology

Storm drainage systems shall be designed and constructed to carry the design storm flowing full with no pressure flow. Flow conditions in existing pipe systems will be evaluated on a case-by-case basis for adequacy.

Storm drainage systems in the Public ROW shall be designed as gravity systems, without the use of stormwater pumps. Privately-owned and maintained stormwater pumps will only be allowed if the land cannot be developed without pumping the stormwater because of the topology of the property. It shall be the Developer/Owner responsibility to acquire an easement in order to provide the required gravity system. Failure to obtain an easement to safely discharge the stormwater runoff or provide an emergency overflow pathway is not a reason for the District to approve the pumping of stormwater runoff as described in Section 7.11.

Generally, the SBUH method for computing peak discharge is preferred by the District. Other acceptable methods include TR-55, Stormwater Management Model (SWMM), or other standard methods as approved by the District. For drainage areas 10 acres or less, the Rational Method is acceptable.

Manning's Equation shall generally be acceptable for determining pipe or open channel capacity only within a drainageway with an upstream drainage area of 50 acres or less. For larger drainage areas, backwater effects shall be included in determining capacity for a drainageway, typically using Hydrologic Engineering Centers-River Analysis System (HEC-RAS) or equivalent computer modeling software.

7.3.2 Design Event

The design event for sizing each component of the storm drainage system is determined based on the size of the contributing drainage area and the type of storm drainage system being designed. The design events for storm drainage system sizing are listed in **Table 9** below. Design rainfall intensities and 24-hour storm events are described in **Appendix D**.

Table 9. Storm Drainage System Design Storm

Contributing drainage area	Design storm for storm drainage system sizing		
	Storm sewer, culverts, and outfall pipes ^①	Creek or stream channels	Bridges
Less than 40 acres	10-year, 24-hour storm	10-year, 24-hour storm	100-year, 24-hour storm
40 to 640 acres	25-year, 24-hour storm	25-year, 24-hour storm	
640 acres or greater	50-year, 24-hour storm	50-year, 24-hour storm	

^① When a backwater condition exists, the storm drain system shall be designed in accordance with Section 7.3.5.

7.3.3 Rational Method

The Rational Method is most applicable for runoff estimates from small drainages with large amounts of impervious area. When using the Rational Method, refer to the current version of the ODOT Hydraulics Manual for calculation formulas and tables of coefficients. When using the Rational Method, the following limitations shall apply:

Use the Rational Method only for predicting a conservative peak flow rate to be used in determining the required capacity for storm drainage system elements. The Rational Method shall not be used to size SMFs.

The contributing drainage area cannot exceed 10 acres and the time of concentration shall not exceed 100 minutes for a single calculation.

The rainfall intensity (I) should be based on the rainfall intensity, duration, and recurrence curves shown in **Appendix D**.

In computing the Time of Concentration (T_c), for smaller drainage areas, the largest and most significant component in the total T_c is the portion of the time devoted to sheet flow. For this reason, extreme care should be given to determining the true travel time

for the sheet flow component of the Tc. In calculating the total Tc, the following limitations will apply:

- A. The flow segment used for the sheet flow component shall not extend for more than 300 feet. The use of a distance of less than 200 feet on a pre-developed condition will require supporting documentation, such as photographs that show evidence of shallow concentrated flow at the point of transition.
- B. For segments of the Tc route that flow through closed storm drainage system facilities, such as pipes and culverts, standard hydraulics formulas shall be used for establishing velocity and travel time.
- C. For segments of the Tc route that flow through lakes or submerged wetlands, travel time is normally very short. The travel time can be determined using an appropriate storage routing technique, or it can be assumed to be zero.
- D. The minimum total Tc used in the runoff calculations shall be 5 minutes.

7.3.4 Hydrograph Method

When storm drainage system design calculations are based on SBUH, TR-55 or the SWMM method, the calculations shall have the following limitations:

The rainfall distribution to be used within the District is the Design Storm of 24-hour duration based on the standard NRCS Type 1A rainfall distribution using the 24-hour precipitation isopluvial maps in the National Oceanic and Atmospheric Administration Atlas 2, Volume 10, Precipitation-Frequency Atlas of the Western United States. The depth of rainfall for the 2 through 100-year 24-hour storm events are provided in **Appendix D**.

Curve numbers shall be derived from the NRCS runoff curve numbers contained in TR 55 Urban Hydrology for Small Watersheds (see **Appendix D**).

Soil types shall be derived from the NRCS Soil Survey for Clackamas County.

A maximum overland distance for sheet flow used in calculations shall be 300 feet.

The minimum time of concentration shall be 5 minutes.

See **Appendix D** for additional guidance on performing hydrograph method calculations.

7.3.5 Capacity Analysis: Non-Pressure Flow

Storm drains that are designed to operate at full or partially full conditions during the design storm are called non-pressure flow. The capacity of pipe systems and open channels, for non-pressure flow conditions, can often be estimated using Manning's Equation for steady uniform flow as follows:

Manning's Equation

$$Q = \left(\frac{1.486}{n} \right) A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

or

$$V = \left(\frac{1.486}{n} \right) R^{2/3} S^{1/2}$$

where: Q = flow in cubic feet per second (cfs)

n = coefficient of roughness

A = cross-sectional area of flow in sf

V = Velocity, fps

R = hydraulic radius in feet = A/WP

(WP = wetted perimeter = length, in feet, of the wetted contact between a flow of water and its containing channel, measured at right angles to the direction of flow)

S = hydraulic slope (or hydraulic grade line) in feet per foot

The hydraulic slope or hydraulic grade line (HGL) is defined by the elevations to which water will rise in small vertical pipes, located at various locations along the flow. In a non-pressure flow condition, the hydraulic slope can be assumed to be parallel with the flow line slope. The HGL is separated from the energy line by the velocity head. The energy grade line is the sum of the HGL, the velocity head, friction loss, and the incidental losses. Manning's Equation does not take into account entrance, exit, bend, and junction losses within catch basins or manholes.

Typical values for the hydraulic roughness coefficient (Manning's n) for conduits and channels can be found in **Table 10** and **Table 11** below. Refer to the current version of the ODOT Hydraulics Manual for additional hydraulic roughness values.

This capacity estimate using the Manning's Equation is acceptable for final design purposes if the storm drainage system does not have tailwater influence (such as discharge into a partially full detention basin) or abrupt changes in channel cross-section or slope that might cause non-uniform flow.

Table 10. Normal Range Hydraulic Roughness Coefficient (Manning's *n*) for Conduits

Type of Pipe Material	Manning's <i>n</i> (normal)
Concrete	0.013
Ductile iron	0.012
Corrugated metal (CMP) - annular - 2-2/3" x 1/2"	0.024
CMP - annular – 3" x 1"	0.027
CMP - annular – 6" x 2"	0.032
CMP - helical- 2-2/3" x 1/2"	
12-inch diameter	0.013
18-inch diameter	0.015
24-inch diameter	0.017
36-inch diameter	0.021
48-inch diameter	0.023
60-inch diameter and larger	0.024
Corrugated high-density polyethylene: single wall	0.024
Corrugated high-density polyethylene: smooth wall	0.012
Spiral rib metal	0.011
PVC	0.011
High density polyethylene - butt fused	0.009

Note: These *n* values are the "normal" range hydraulic roughness coefficient values for use in the analysis of conduits. Refer to the most current version of the ODOT Hydraulics Manual for additional reference values.

Table 11. Normal Range Hydraulic Roughness Coefficient (Manning's n) for Channels

Type of Channel	
Constructed	Natural
<p>A. Earth, straight and uniform</p> <p>1. Clean, recently completed.....0.018</p> <p>2. Clean, after weathering0.022</p> <p>3. Gravel, uniform section, clean.....0.025</p> <p>4. With short grass, few weeds0.027</p> <p>B. Earth, winding and sluggish</p> <p>1. No vegetation0.025</p> <p>2. Grass, some weeds.....0.030</p> <p>3. Dense weeds or aquatic plants in deep channels0.035</p> <p>4. Earth bottom and rubble sides0.030</p> <p>5. Stony bottom and weedy banks0.035</p> <p>6. Cobble bottom and clean sides0.040</p> <p>C. Rock cuts</p> <p>1. Smooth and uniform.....0.035</p> <p>2. Jagged and irregular0.040</p> <p>D. Channels not maintained, weeds and brush uncut</p> <p>1. Dense weeds, high as flow depth.....0.080</p> <p>2. Clean bottom, brush on sides.....0.050</p> <p>3. Clean bottom, brush on sides, highest stage of flow.....0.070</p> <p>4. Dense brush, high stage0.100</p>	<p>A. Minor streams (top width at flood stage less than 100 feet)</p> <p>1. Streams on plain</p> <p>a. Clean, straight, full stage, no rifts or deep pools0.030</p> <p>b. Same as above, but more stones and weeds0.035</p> <p>c. Clean, winding, some pools and shoals0.040</p> <p>d. Same as above, but some weeds and stones0.045</p> <p>e. Same as above, lower stages, irregular slopes and sections with more ineffective flow area.....0.048</p> <p>f. Same as d, but more stones0.050</p> <p>g. Sluggish reaches, weedy, deep pools0.070</p> <p>h. Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush.....0.100</p> <p>2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages</p> <p>a. Bottom: gravels, cobbles, and few boulders0.040</p> <p>b. Bottom: cobbles with large boulders0.050</p> <p>B. Floodplains</p> <p>1. Pasture, no brush</p> <p>a. Short grass.....0.030</p> <p>b. High grass.....0.035</p> <p>2. Cultivated areas</p> <p>a. No crop0.030</p> <p>b. Mature row crops0.035</p> <p>3. Brush</p> <p>a. Scattered brush, heavy weeds0.050</p> <p>b. Light brush and trees0.050</p> <p>c. Medium to dense brush.....0.070</p> <p>4. Trees</p> <p>a. Dense willows, straight.....0.150</p> <p>b. Cleared land with tree stumps, no sprouts0.040</p> <p>c. Cleared land with tree stumps, heavy growth of sprouts.....0.060</p> <p>d. Heavy stand of timber, a few down trees, little undergrowth, flood stage below branches0.100</p> <p>e. Same as above, but with flood stage reaching branches.....0.120</p>

Note: The n values listed above are the “normal” range hydraulic coefficient values for use in the analysis of open channels. For conservative design of channel capacity, the “maximum” values listed in the current version of the ODOT Hydraulics Manual should be considered. For channel bank stability calculations, the “minimum” values listed in the current version of the ODOT Hydraulics Manual should be considered.

7.3.6 Capacity Analysis: Pressure Flow

A backwater analysis shall be included in the stormwater report for the following circumstances:

- A. Where uniform flow is not expected or where losses within the system may cause surcharging of water.
- B. A discharge into a tailwater condition, such as a partially full stormwater detention pond or into a partially full channel.
- C. Culvert entrances.
- D. Ditch inlet location where backwater effect could cross a property line.
- E. Other locations as determined by the District.

The backwater analysis shall be to a point where non-pressure flow at the design storm flow rate is re-established.

When a backwater condition exists, the storm drain system shall be designed to convey and contain at least the peak runoff from the 25-year Design Storm or the design storm identified in Section 7.3, whichever is larger.

Structures for proposed pipe systems must be designed to provide a minimum of 1 foot of freeboard between the HGL and the top of the stormwater structure and appurtenances or finish grade above the pipe during the design flow. Surge in pipe systems shall not be allowed if it will cause flooding in portions of a structure, including below-floor crawl spaces and basements.

7.3.7 Hydrologic and Hydraulic Calculation Reporting

Design hydrologic and hydraulic data for each reach of a proposed storm drain system shall be included in the stormwater report submittal. It is the responsibility of the Developer's Engineer to determine the best way to document the design analysis for presentation in the Stormwater Report.

Storm Drainage System calculations shall include the following items:

- A. Description and sketch of the storm drainage system, including pipe size, slope, and material for each segment of the system.
- B. Description and sketch of the contributing area (curve number value or equivalent, as well as the size).
- C. Time of concentration calculations, including assumed coefficients, flow path lengths, and slope.
- D. Capacity analysis calculations as outlined in Sections 7.3.5 and 7.3.6.
- E. Design flow calculations, including assumed coefficients and design storm.
- F. Design flow rate for each pipe and open channel segment of the onsite storm drainage system.
- G. HGL and ground surface elevation at each structure and outlet location. It is preferable to show this information on a profile plot on an engineering scale, though spreadsheet tables are acceptable. When spreadsheet tables are used in place of a profile plot, include the distance between the ground surface and the HGL at each structure and outlet location.

H. Flow velocity at outlet structures and in open channels.

7.4 Open Channels

The following section describes accepted criteria and methods for designing open channel storm drainage systems, such as swales and ditches.

7.4.1 Geometry

Constructed open channels shall be sized to pass the design flows listed in **Table 9** without causing erosion.

Channel side slopes shall be no steeper than two-horizontal to one-vertical (2h:1v) for undisturbed ground (cuts), as well as for disturbed ground (embankments).

A low-flow channel, within the main channel, designed to carry 10 percent of the design storm, will be required for channels with a design flow of greater than 20 cubic feet per second (cfs). Side slopes for the low-flow channel shall not exceed 2h:1v and shall be stabilized to the satisfaction of the District. The minimum stabilization material shall be seeded matting or approved equivalent.

Channel design along curves shall be curvilinear with a 100-foot minimum radius. Tighter curves may be used if the District determines that sufficient erosion control has been incorporated into the design to maintain stable bank conditions following development.

Channels shall be designed to provide sufficient freeboard so as not to saturate any adjacent public road base with design storm peak flows. Channels shall have a minimum freeboard of 6 inches when the design discharge is 10 cfs or less and 1 foot when the design discharge is greater than 10 cfs. Extra freeboard may be required for curved segments of an open channel.

7.4.2 Channel Lining and Infiltration

Every opportunity should be taken to design open channels to provide infiltration throughout an entire storm drainage system. Engineers are also encouraged to consider innovative means of collecting and conveying runoff to incorporate infiltration into the storm drainage system design.

Vegetation-lined channels shall be used whenever practicable. Rock-lined channels shall be used only where a vegetative lining will not provide adequate protection from erosion.

If the channel has a flow line slope of 6 percent or greater or a peak design velocity that exceeds 4.0 feet per second (fps), the channel shall incorporate rock lining or riprap energy dissipation devices designed by a qualified PE. Channel protection shall be based on the minimum level of protection listed in **Table 12**.

Where riprap protection is specified, riprap shall be placed over a woven geo-textile fabric.

No protruding pipes, culverts, or other structures, which reduce or hinder the flow characteristics of the channel, will be allowed. Channel connections shall be designed to prevent scouring. All pipe connections shall match side slopes and incorporate a headwall.

All channel sides and bottoms shall be seeded, sodded, or rock-lined immediately following excavation, regardless of mean flow velocity.

Table 12. Protection for New Channel Construction

Velocity at design flow, fps		Required protection	Thickness, feet	Minimum height above design water surface, feet
Greater than	Less than or equal to			
0	5	Vegetation lining	Not applicable	0.5
5	8	Bioengineered lining	Not applicable	1
		ODOT Class 50 riprap ¹	1.5	
8	12	ODOT Class 200 riprap	2.5	2
12	20	Slope mattress, etc.	Varies	2
20		Engineer-designed		

¹ The District may require ODOT Class 100 Riprap on an as needed basis.

7.4.3 Open Channel Location

New open channels in residential areas shall be in easements and recorded on plat maps with the following restrictions:

- A. Owner shall not alter the drainageway without approval of the District.
- B. Owner shall not place any structure or fence within the normal high-water area of the open channel.
- C. Owner shall not introduce foreign material such as grass clippings within the high-water area of the open channel.

7.4.4 Check Dams

Check dams are not recommended for use in storm drainage system channels due to the problems they pose for routine maintenance operations. However, check dams are recommended for use in temporary channels as an EPSC device (see Chapter 8) and for stepping down swales being used for infiltration. Where check dams are proposed, they shall be spaced at maximum 2-foot elevation intervals.

7.5 Culverts

Culverts, for the purposes of this manual, are single runs of pipe that are open at each end and do not have structures such as catch basins or manholes. Culverts designed for fish passage are governed by the Oregon Department of Fish and Wildlife (ODFW) and often require additional design considerations such as depth of flow and velocity that may differ considerably from the design requirements included herein. When conflicts exist, the Applicant shall work with the District and the regulating agency to establish the appropriate design criteria.

Criteria for culverts designed for open channel flow in this section shall apply to culverts placed in drainageways and roadside ditches. Culverts which are part of a roadside ditch system or within the ROW shall be permitted by the local road authority.

Culverts within FEMA floodplains shall be reviewed and approved by the local FEMA-designated floodplain permitting authority.

Culverts placed in streams or drainageways determined to be Waters of the State require approval from the Oregon Division of State Lands (DSL) and the USACE.

For culverts which convey flows from or through water quality sensitive areas; a local representative of the ODFW or other applicable state or federal agency shall be contacted to determine if fish passage is required and to identify site specific design criteria.

7.5.1 Culvert Design Criteria

Culverts located within the structural street section shall be placed in accordance with local agency standard details for utility placement location.

For new culverts 18 inches in diameter or less, the maximum allowable design storm event headwater elevation (measured from the inlet invert) shall not exceed two times the pipe diameter or three times the pipe diameter with a seepage collar unless an exception is approved by the District.

For new culverts larger than 18 inches in diameter the maximum allowable design storm event headwater elevation (measured from the inlet invert) shall not exceed 1.5 times the pipe diameter unless an exception is approved by the District.

The maximum headwater elevation of a design storm event for new culverts shall be at least 1 foot lower than the road or parking lot sub-grade.

Minimum diameters for cross culverts under public and private roadways are 18 inches. All other roadway culverts, including driveway culverts, are a minimum of 12 inches.

No bends shall be permitted in culvert pipes.

Minimum cover, as measured from the top of pipe to finished grade:

- Under roads classified as collectors or higher: 2 feet.
- If Class 52 Ductile Iron Pipe is used, the cover may be reduced to 1 foot.
- PVC and HDPE shall require a 2-foot minimum cover in any public roadway area.
- Pipe covers of less than the above stated minimums may be permitted on a case-by-case basis. These may require a designed reinforced concrete cover that will distribute roadway use (traffic) forces to a foundation area to the sides of the pipe.
- Reinforced concrete box culverts with no cover requirement may be permitted on a case-by-case basis. Signed and sealed structural design calculations shall be submitted for review (this requirement may be waived for pre-cast reinforced concrete box culverts with covers greater than 2 feet). In culverts with no cover, the clearance from the roadway surface to the reinforcing steel shall be no less than 3 inches and the 30-day concrete strength shall be no less than 4,500 pounds per square inch.

Maximum culvert length without access structures is 300 feet.

Minimum separation from other utility pipes and conduits (as measured from the outside edge of pipe) is 6 inches vertical, 3 feet horizontal, unless otherwise specified by the purveyor of the utility in question.

Controlled Density Fill or Controlled Low Strength Material (CLSM) shall be used for any pipes with less than 12 inch separation.

Pipe bedding and backfill shall conform to applicable roadway standards or the District's Standard Details.

The entrances and outlets to all culverts shall be stabilized with quarry rock or other energy dissipation methods to minimize scouring of the channel bottom and sides. These shall be designed by a PE using published references such as the current version of the Hydraulic Design of Energy Dissipaters for Culverts and Channels (U.S. Department of Transportation, Federal Highway Administration) and other references.

Rock protection at culvert entrances should extend upstream a minimum of 5 feet and shall have a minimum height of 1 foot above the design headwater elevation. Rock protection at the culvert outlet shall have the greater of:

- A minimum height of 1 foot above the design tailwater elevation
- 1 foot above the crown of the pipe

When two parallel pipes are installed, the minimum separation between the exterior pipe walls shall be 3 feet or half the diameter of the larger pipe, whichever is greater. Pipe separations less than the stated minimum may be permitted on a case-by-case basis.

7.5.2 Culvert Materials

The pipe materials listed in Section 7.6.2 are approved for use for culverts, subject to the limitations listed in Section 7.5.1.

7.5.3 Headwalls/Endwalls

Pipe headwalls, endwalls, or other approved end protection shall be required where pipe material other than concrete or ductile iron is exposed in the design of an outlet or inlet pipe or where required to provide slope stability. Headwalls and endwalls should be built high enough to support the full depth of pipe cover recommended by pipe manufacture. Headwalls and endwalls built to the proper height improve pipe capacity during extremely high flows and help prevent pipe blockage, road washouts, and compounding damage caused by pipe failure.

No plastic pipes shall be exposed, which may require pipe transitions from underground plastic to exposed ductile iron pipe or mitered pipe end matching the slope with a paved concrete endwall. Concrete endwalls shall extend a minimum of 18 inches out from the end of pipe.

For culverts 18 inches in diameter and larger, the embankment around the culvert inlet shall be protected from erosion by armoring around the inlet with rock or other protection. The armoring shall extend downstream from the culvert a minimum of 5 feet and shall be as high as the designed headwater elevation.

7.6 Pipe Systems

Pipe systems are comprised of more than one run of pipe and include at least one junction-type of structure such as a catch basin or manhole. The following section describes accepted criteria and methods for designing pipe systems.

7.6.1 General Pipe Design Criteria

Storm drainage pipe systems, sometimes referred to as storm sewers or lateral closed systems, are piped storm drainage systems used for transporting runoff from the roadway and other inlets to outfalls at structural SMFs and receiving waters. Pipe drain

systems are suitable mainly for medium to high-density residential and commercial/industrial development where the use of natural drainageways and/or vegetated open channels is not feasible.

Storm Drainage Systems shall be designed to accommodate flows identified under Chapter 7 and include the design considerations of this section.

Manning's Equation shall be used to calculate pipe capacity. Open channel (gravity) flow is required.

Storm management facilities shall be designed and constructed to accommodate all assumed future full build-out flows generated from upstream property within the basin.

Storm Drainage Systems within the ROW shall be not less than 12 inches in diameter.

Service Connections within the ROW shall not exceed half the diameter of the mainline and cannot exceed 8 inches in diameter. For larger Service Connections, a structure for maintenance access is required.

Mainlines to be publicly maintained shall be not less than 12 inches in diameter.

Private storm drains outside the Public ROW or public easement shall not be less than 6 inches in diameter and permitted and inspected in accordance with the OPSC.

Pipes from catch basins to the main line in the Public ROW shall be not less than 12 inches in diameter.

Storm pipes serving roof drain with no requirement to be extended shall be a minimum of 8 inches in diameter. Storm Sewer Service Connections serving a house or commercial property shall generally be 6 inches in diameter or as approved by the District.

The maximum pipe slope is 20 percent except as approved by the District. Pipes on slopes in excess of 20 percent shall be constructed with anchor walls per the standard details. Storm lines shall not decrease in size as they move downstream regardless of the slope provided on the pipe.

Storm sewers shall be designed with a minimum slope of 0.5 percent. Exceptions will be made for topographic constraints, but the minimum acceptable pipe design must have sufficient slope to maintain a minimum flow velocity of 3.0 fps for a pipe flowing half-full.

Any change in pipe size, alignment, grade, or material shall require a structure per the Standard Details.

IE in and IE out crown elevations shall be matched for any changes in pipe size diameter from upstream to downstream the pipe.

If trash racks or debris barriers are required by the District for pipe or culvert systems, the Developer's Engineer shall submit the trash-rack-debris barrier system design to the District for approval.

7.6.2 Pipe Material

Pipe materials shall conform to the District rules, regulations, and standards. Pipe material must also comply with the local road authority. Acceptable pipe materials and abbreviations are as follows:

- Concrete sewer pipe or reinforced concrete pipe
- Concrete lined ductile iron

- PVC
 - ASTM D3034 SDR 35, 4 to 24 inches
 - ASTM C-900 D-1784 DR, 4 to 24 inches (preferred by District)
 - ASTM C-905 D-1784 DR, 4 to 24 inches (preferred by District)
- HDPE, ASTM D-3035
- Polyethylene – Smoothed Wall

Where required for added strength, C905 or C900 PVC shall be used. Pipe with less than 3 feet of cover requires submittal of the manufacturer's specifications. The District may require pipe load analysis calculations in unusual situations, typically in areas where the depth of ground cover over the pipe is not within the limits specified by the District or the pipe manufacturer.

A minimum 75-year lifespan is required.

Alternate materials will be approved on a case-by-case basis. The Developer's Engineer shall provide manufacturer's specifications, design calculations, or other information as required by the District for review.

Trench backfill, compaction, and testing shall conform to the District's Sanitary Standards Chapter 6 and Standard Detail Drawings.

7.6.3 Alignment and Location

The following bullets provide the criteria for the alignment and location of the storm drainage system

Storm drainage systems within a Public ROW shall be located in the center of the street and a minimum of 5 feet from the curb, unless otherwise approved by the District and the local road authority.

Storm drainage systems shall be laid on a straight alignment and uniform grade between structures.

Utility crossings shall be constructed as near 90 degrees as practicable. Utility crossings have the minimum separation of 12 inches of vertical separation measured from the edge of each pipe. Any separation of less than 12 inches will be reviewed and approved on a case-by-case basis by the District.

Unless approved by the District, the minimum separation distance between parallel sanitary and storm sewers and utilities shall be 5 feet measured from the edge of each pipe, and vertical separation between utilities is a minimum of 3 feet. Additional horizontal spacing may be required to allow for maintenance and repair access.

If streets have curved alignments, whenever possible, the storm drain alignment shall be parallel with water and sanitary lines with a minimum separation of 10 feet with sanitary and 6 feet with water. The intent is to prevent conflict with sanitary and water lines while providing the fewest manholes required to traverse on curve and prevent a conflict with survey monuments.

Where storm drains are located parallel with other utility pipe or conduit lines, the vertical and horizontal alignment shall permit future side connections of main or lateral storm drains and avoid conflicts with the parallel utility without abrupt changes in vertical grade of main or lateral storm drains.

Storm drain alignments shall accommodate future planned projects such as street widening, changes in horizontal or vertical street alignment, and master plan water or sewer facilities.

Storm drain lines shall enter a creek or drainage channel at 90 degrees or less to the direction of the flow. The outlet shall have a headwall and scour pad or riprap to prevent erosion of the existing bank or channel bottom. The size of the pipe and channel being entered will govern which protective measures are required.

7.6.4 Junctions

Connections to the existing public storm systems that are 8 inches diameter and greater.

Manholes shall be provided at least every 500 feet, at every grade change, and at every change in alignment.

Manhole lids shall not be located in a wheel path of the motor vehicle travel way.

Manhole lids shall have a minimum of 12 inches clearance from the edge of a curb and gutter.

All manholes shall be a minimum of 48 inches in diameter and have a minimum 12-inch ledge in the base.

A detail shall be submitted with the plans where pipes into or out of a manhole are larger than 24 inches or where more than four mainline connections are made.

A minimum of 8 inches of un-perforated wall separating the cut-outs or breakouts for the individual pipe connections shall be provided in manholes.

Where a connection is proposed to an existing manhole, elevation of the existing ledge, location of steps, and elevations of existing inlets and outlets shall be submitted as a detail on the plans.

Manholes constructed on lines with 12-inch or smaller pipes shall have a minimum 0.2-foot fall through the manhole, unless otherwise approved by the District.

Where different size public storm drainage pipes enter a manhole, the crowns of the upstream pipes shall be no lower than the crown on the downstream pipe without District approval.

A lateral entering a manhole within a public storm drainage system shall be designed so that the invert of the lateral is 6 inches above the invert of the outlet pipe.

All manhole bases shall be properly channelized.

No more than three side laterals or side sewers are allowed to be connected to a manhole unless an exception is approved by the District.

Manhole lids shall be in conformance with the Standard Details.

A Curb Inlet Manhole or Modified Curb Inlet Manhole per Standard Details may be used in lieu of a manhole, when approved as part of a flow-through system.

Storm drainpipe junctions shall be manholes, or other approved junctions, which conform to Oregon UPC and District requirements. Oversized manholes and other specialized junctions shall be approved on a case-by-case basis by the District.

Public piped storm drain systems shall have junctions at not more than 500-foot intervals.

Junctions located outside the Public ROW shall generally be minimum 48-inch-diameter manhole structures except as approved by the District.

Catch basins may be used as junctions only with pipes not greater than 12 inches in diameter for depths up to 5 feet from rim to invert with prior approval of the District.

Cleanouts may only be used as junctions only with private pipes not greater than 6 inches in diameter for depths up to 5 feet from rim to invert with prior approval of the District.

Catch basin laterals must be connected to the mainline at a manhole.

Roof drain laterals may be tee connected into the mainline, manhole, or catch basin.

Pipes entering manholes may have a maximum free fall of 4 feet as measured to the invert of the manhole base. A sump may be required for energy dissipation at the discretion of the District.

7.6.5 Inlets and catch basins

Curb and gutter requirements will be regulated by the local road authority.

All inlets and catch basins shall be designed to accept a 25-year storm event. Grates shall, as far as practical, be designed to avoid failure due to accumulation of debris.

Inlets shall be designed to completely intercept the design storm gutter flow with no greater than 250 feet between inlets. Flow paths shall not cross intersections, so inlets shall be installed at intersections as needed. In addition, catch basins shall be provided just prior to curb returns.

Flow through catch basins are generally not allowed. The main storm line shall not pass through any catch basins.

Type GB-2 catch basins, or equal are required for all curbed street inlets and shall be generally located within the Public ROW, or an easement granted to the District.

All catch basins shall be constructed with an 18-inch minimum sump.

No more than three catch basins, with the maximum distance of 50 feet apart, may be connected in series before connecting to a main storm line.

A ditch inlet or field inlet may be connected to the end of the main storm line through a structure.

Inlets shall be located along the gutter line or open channel flowline. When streets are widened or otherwise modified, causing an inlet to be located outside a flowline, the inlet shall be removed entirely and reconstructed with a junction box, manhole, or other acceptable connection as specified by the District.

Dual GB-2 catch basins are required at all roadway sags and cul-de-sac low points. An emergency overflow pathway for the 100-year storm event shall be provided within the boundary of the plat as a tract of land, or onsite as a recorded easement.

Catch basins, except for CG-48 manholes shall be a maximum depth of 6½-feet from the top of grate to the lowest pipe IE, unless approved by the District.

Where design criteria and methodology are not specified in this section, design shall follow the current versions of the ODOT Hydraulics Manual or the Hydraulic Engineering Circular No. 12 (FHWA-TS-84-202) Drainage of Highway Pavements.

Ditch inlets and area drains in rear or side yards shall be equipped with an 18-inch sump.

A main storm line shall not pass through an area drain or ditch inlet.

Area drains or ditch inlets located at the upper terminus of a main storm line shall connect to the main storm line at a manhole.

The maximum acceptable intake flow rates for area drains and ditch inlets with a grate angle of 30 degrees are shown in **Table 13** where H is the hydraulic head measured in feet from the bottom of the grate to headwater and Q is the flow rate in cubic fps.

Table 13. Maximum Intake Flow Rates for Area Drains and Ditch Inlets with Grate Angle of 30 Degrees

H	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0	7.0	10.0
Q	2.0	5.6	10.3	11.9	13.3	14.6	16.8	18.8	22.3	26.6

7.6.6 Pipe Cover Requirements

In paved areas or areas anticipated to receive vehicular traffic, pipe cover shall be measured from the top of the paved surface (finish grade) to the upper exterior surface of the pipe barrel. The pipe bell shall not intrude into the subbase. In areas without pavement or vehicular traffic, pipe cover shall be measured from finish grade to the upper exterior surface of the pipe barrel.

The minimum cover requirement for the mainline storm sewer shall be 36 inches unless an exception is approved by the District and roadway authority.

7.6.7 Storm Drainage Systems in Right-of-Way, Private Streets or Easements

All publicly maintained storm drainage systems shall be located within the ROW, or private street with public easements that provide access to all structures. If the storm drainage system cannot be located in a ROW or private street, then an easement granted to the District will be provided.

Public storm drainage systems in easements will be allowed only after all reasonable attempts to place the drains in the ROW have been exhausted. Provisions shall be made for vehicular access to manholes for preventive maintenance and emergency service.

See Section 6.4.1 for more discussion on easements.

7.7 Service Connections

The following subsections provide the requirements and responsibilities for Service Connections.

7.7.1 Responsibilities

A property shall be served by a single Service Connection designed, constructed, maintained, repaired and/or replaced in the following manner:

- A. Operation and Maintenance of the Service Connection:
 - a. The Owner(s) that benefits from the Service Connection is solely responsible to own, operate and maintain the Service Connection from the Building Sewer to the public mainline, including the connection to the mainline located within a Public ROW or easement.

- b. The District is responsible for maintaining Public Stormwater Mainlines, and shall not be responsible for maintenance or repair of damage resulting from inadequate or improper operation of the Service Connection or of attached fixtures or appurtenances, such as cleanouts and traps, between the building and public mainline.
- B. Property Owner Responsibilities for Repairs:
- a. Inspections and investigations to determine the condition and functionality of the Service Connection from the building to the public mainline.
 - b. Repairs of structural and non-structural defects for any portion of the Service Connection that is on private property, including the area within easements granted to the District.
- C. District Responsibilities for Repairs:
- a. Repair of structural defects, as determined by the District, for the portion of the Service Connection that is within the Public ROW.

7.7.2 Diameter

Each residential single-family lot shall be served by a single 6-inch diameter Service Connection.

The diameter of the Service Connection for lots other than residential single family shall be served by a minimum 6-inch diameter pipe, or larger if deemed necessary by OPSC or permitted at the sole discretion of the District.

7.7.3 Materials

The Service Connection pipe, tee, cleanout, and joint materials shall be designed and constructed of the same material as the Public Stormwater Mainline.

All couplings, adapters, etc., used to connect dissimilar pipe materials together shall be approved by the District.

7.7.4 Installation

Service Connections shall be made by means of a manufactured tee. No Inserta Tees, wyes or grouted connections will be allowed in the extension of Public Stormwater Mainlines, unless otherwise approved by the District.

Service Connections may be installed into an existing Public Stormwater Mainline with an installation of an Inserta Tee at the sole discretion of the District. For further details see Section 7.7.9.

Manholes are required for Service Connections 8 inches or larger in diameter, and Service Connections shall be a minimum of one-half the diameter of the mainline. No Service Connection shall be larger in diameter than the mainline.

For additional information regarding Service Connection specifications see the Standard Detail drawings.

7.7.5 Location

Generally, the Service Connection shall be located within a Public ROW, or public easement as shown in Standard Detail drawings. Any other proposed location shall be at the sole discretion of the District on a case-by-case basis.

7.7.6 Direct Connection

All drain lines and/or stormwater facilities connected to the Public Storm System shall be connected in accordance with OPSC.

7.7.7 Separate Connection

A separate and independent Service Connection shall be provided for each tax lot, parcel of property, or lot of record. The District does not allow shared Service Connections.

A reduced number of connection points or a single point of connection may be utilized to serve parcels of properties for projects such as condominiums, multi-family, commercial, and industrial projects, whereas the parcels cannot be further divided. The Owner shall be responsible for the customer account and monthly service charges for all of the properties. The Owner shall not further divide the property, or sell a portion of the development, thus creating a shared Service Connection. If a portion of the property is either sold to another person, or divided to create a separate property, then the Owner shall provide a separate Service Connection connected to the Public Storm System to serve the property.

Any partition of land division that is required to install a Service Connection to serve the additional lot(s), shall construct said service connection prior to the recording of the plat, if the Service Connection traverses any part of an adjoining property, common area, private easement, or shared land. The Service Connection will not be required to be constructed to serve the additional lot(s), if the property has direct access to the Public Storm System, and no other jurisdiction is requiring any improvement to be constructed prior to the recording of the plat. Any existing building/residence not currently connected to the Public Storm System shall be required to construct the residence rain drains to the Public Storm System prior to the recording of the plat. Any existing Service Connections shall be used where feasible, as determined by WES.

Where a parcel requiring connection to a public storm drainage system cannot connect through a Service Connection meeting the requirements of this section, then extension of the public storm drainage system shall be required.

7.7.8 Restricted Connections

No person shall connect any Building Sewer or Building Drain that conveys domestic waste or a prohibited substance into the Public Storm System.

7.7.9 Tap-In Connections

For tap-in connections, the storm mainline must be at least a minimum of two (2) times the diameter of the Service Connection. Prior to starting any work the Contractor shall obtain approval by the District, and applicable local authorities. In order for the District to inspect the installation the Installer shall give the District 72 hours advance notice prior to starting the work. The Contractor will conduct the work during the District's regularly

scheduled business hours. If the Installer fails to comply with all local, state and federal safety codes applicable to the work, then District will not perform the inspection.

7.7.10 Slope and Alignment

The minimum slope for Service Connections shall be 2 percent (¼-inch per foot). In unusual conditions a slope of 1 percent (1/8-inch per foot) may be proposed by the Developer's Engineer and approved by the District. Maximum slope for Service Connections shall not be greater than 100 percent slope (45 degrees). All changes in alignment or slope of the pipe shall be made with manufactured fittings. No bends greater than 22.5 degrees, and a totaling 45 degrees shall be allowed. Any piping system constructed on private property shall be required to obtain a plumbing permit issued by the applicable jurisdictional plumbing authority, such as the City or County.

7.7.11 Minimum Depth

The minimum depth of the service connection shall be 3 feet deep at the edge of the ROW or Public Stormwater Easement. Service connections which cannot be laid at the required minimum depth shall be reviewed and approved by the District on case-by-case basis.

7.7.12 Buried Detectable Tape

White detectable metallic tape labeled "CAUTION BURIED STORM LINE BELOW" shall be installed 6 inches above the service connection pipe along its entire length from the tee connection at the mainline to the top of the white 2x4 stake.

Curbs shall be stamped with "ST" in a location of buried sanitary sewers and Service Connections.

7.7.13 Markings

Each Service Connection shall be marked with a white 2x4 stake extended from the end of the pipe to at least 1 foot above the ground.

The location of the Service Connections shall be indicated by a permanent marker, in one of the following manners:

- A. Where the service connection is located in a street with curbs, the connection marker shall be a permanent stamp on the top of the curb: ST – Storm Sewer; SS – Sanitary Sewer.
- B. Where the Service Connection is in a street without curbs, the marker shall be on the sidewalk.
- C. Where the Service Connection is in a street without curbs or sidewalks, the Developer's Engineer shall present to the District for approval an alternative permanent marking method.

7.8 Structures

The following section provides design criteria for storm drainage system structures.

7.8.1 Manholes

Manholes or curb inlets with manhole-type access shall be installed at all pipe junctions where the depth from rim to invert exceeds 4 feet or where the pipe is 18 inches in diameter or greater.

Manholes shall conform to the District's applicable Standard Drawings.

Where minimum vertical distance is proposed between inlet and outlet pipes in a manhole (or inlet structure serving as a junction structure), pipes must be aligned vertically by one of the following criteria, in order of preference:

- Standard manhole channel shall have a minimum channel drop across the manhole of 0.20 foot with a maximum drop of 1 foot.
- Drops between the IE in and out exceeding 1 foot across the manhole will not be channeled.
- Drops exceeding 3 feet between the IE in and out will require an 18-inch sump to dissipate the energy.
- Drops exceeding 6 feet between the IE in and out will not be prohibited.
- Manholes shall be required at, but not limited to, the following locations:
 - Changes in vertical grade or horizontal alignment of storm drainpipes
 - Change in size of storm drainpipes
 - Uppermost extent of storm pipe not opened (daylighted) to receive ditch or other open storm drainage system flows. Cleanouts are not allowed in this situation.

Manholes with pipe horizontal alignment changes of more than 30 degrees in angle shall have the outlet pipe invert at least 0.2 foot in elevation lower than all inflow pipe inverts. This is in addition to the normal grade crossing the manhole.

In addition, a minimum 3-foot elevation difference between the rim and the top of pipe at all manholes with more than 30 degrees of alignment change is required. This is to allow for containment of turbulence generated during high flows by such abrupt changes of alignment.

Standard depth manhole rim frames shall be installed in all paved street locations.

Manhole rims not in pavement areas, and not in the pavement section of a paved road, shall be set 6 inches above finished grade with a bolt down tamperproof lid.

7.8.2 Inlet Structures

Inlet structures are required at the ends of all dead-end streets with a descending grade and at all impervious surface sags and low points, but in no case shall they be spaced farther apart than 250 feet.

Inlet structures located in street sections where there is curb and gutter shall be a curb inlet catch basin per District standards, unless otherwise approved by the District.

Catch basins with connector storm drains shall connect to a receiving storm drainage system pipe into a manhole, unless otherwise approved by the District.

Ditch and/or area inlets shall be required to intercept existing flows and convey to the appropriate outlet.

Any low point structure shall provide an emergency overflow pathway.

7.9 Outfalls

Outfalls from drainage facilities shall be designed with adequate energy dissipaters to minimize downstream damage and erosion. All outfalls with exit velocities of more than 4 fps shall be examined with respect to soil type to ensure adequate erosion control. Unless otherwise approved, an outfall elevation shall be submerged by the receiving creek or channel during the peak storm event as specified in this chapter.

Storm drain lines shall enter a creek or drainage channel at 90 degrees or less to the direction of the flow. The outlet shall have a headwall and scour pad or riprap to prevent erosion of the existing bank or channel bottom. The size of the pipe and channel being entered will govern which protective measures are required.

Engineered energy dissipaters, including but not limited to, stilling basins, drop pools, hydraulic jump basins, baffled aprons, and bucket aprons, shall be designed using published references such as the current version of the Hydraulic Design of Energy Dissipaters for Culverts and Channels published by the Federal Highway Administration of the U.S. Department of Transportation, the current version of the ODOT Hydraulics Manual and others. The design reference shall be cited in the stormwater report.

Rock protection at outfalls shall be designed in accordance with information listed in **Table 14**.

Table 14. Rock Protection at Outfalls

Discharge velocity at design flow, fps		Minimum required protection dimensions				
Greater than	Less than or equal to	Type	Thickness, feet	Width	Length (use greater of)	Height over crown, feet
0	5	ODOT Class 50 Riprap ¹	1.5	Diameter + 6 feet	8 feet –OR– 4 x diameter	1
5	10	ODOT Class 200 Riprap	2.5	Diameter + 6 feet	12 feet –OR– 4 x diameter	1
10		Engineered energy dissipater required				

¹The District may require ODOT Class 100 Riprap in areas with likelihood of vandalism.

If the outfall is located in an environmental overlay zone, additional requirements may apply. A permit from the USACE and/or the DSL may be required. The Applicant is responsible for obtaining the proper permits from the regulating agencies.

7.10 Drains

The following requirements apply to drains installed with development activities.

7.10.1 Slope Intercept Drains

Slope intercept drains are allowed at the following locations:

Along the upper and lower boundaries of a development where surface and/or ground water can be expected to migrate and cause adverse impacts to the future, or adjacent Owners.

Along the upper and lower boundaries of a development where slope exceeds 10 percent to prevent drainage from the tributary area above the site.

Along the top of all cut slopes which exceed two-horizontal to one-vertical (2h:1v) where the tributary drainage area above the cut slope has a drainage path greater than 40 feet as measured horizontally from the hinge point of the cut.

7.10.2 Subsurface Drains/Cutoff Trenches

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

- Along the upper and lower boundaries of a development where surface and/or ground water can be expected to migrate and cause adverse impacts to the future, or adjacent Owners.
- For stability on cut and fill slopes, when required by the District.
- For all existing springs or springs intercepted during construction activity for other facilities.
- Where high groundwater exists or when it is necessary to reduce the piezometric surface to an acceptable level to prevent land slippage or under floor flooding of buildings.
- Where recommended by a geotechnical engineer.
- Where possible, a minimum slope of 0.15 foot per 100 feet should be used. The subsurface drain must be installed below the water flow to function properly. The use of a geotextile fabric to line the trench is recommended.

7.10.3 Foundation Drains

The following drainage provisions shall be made for foundation drains in a development:

Foundation drains shall be piped directly to a storm drain system other than a street gutter. Provisions must be taken so that the design HGL of the receiving storm drainage system does not back up into the foundation drain.

Foundation drains are prohibited to be piped directly onto the street. If directing drain onto the street is the only possible solution, then the District and local road authority shall consider the circumstances to determine the acceptable solution on a case-by-case basis. Otherwise, foundation drains shall be piped directly to a storm drain system other than a street gutter.

Should site topography prevent connecting foundation drains directly to a public storm drain system, the drains for one or more lots shall be piped through a private system to the public storm drainage system. This private storm drainage system shall be located in a dedicated easement and the Owner shall be responsible for the private system maintenance. Any private storm drain piping shall be permitted and constructed in accordance with OPSC.

7.11 Private Pumping Systems

Private stormwater pumping systems are only allowed for private commercial/industrial development. These private stormwater pumps will be permitted only after approval by the District. It is the District experience that pumping systems are not reliable in order to prevent flooding or property damage without the Owner assuming significant liability and risk to itself,

and the surrounding properties. Therefore, it is the District policy not to allow the pumping of stormwater runoff, unless the Developer can meet all of the conditions listed below:

- The proposed pump system is not intended to circumvent any development that can provide a gravity storm drainage system, by means of obtaining an easement to provide the required gravity storm drainage system, and emergency overflow pathway. Not being able to acquire the necessary easement does not authorize the pumping of stormwater runoff.
- Due to topology a pumping system may be considered, if there is no other possible engineered solution to providing a gravity system, and pumping is the only possible solution to alleviate flooding. Without pumping the property would have no means to develop.
- Pumping stormwater will not be allowed for facilities that are publicly maintained or have multi-property Owners sharing the use of the pumping system, such as a partition, subdivision, or other similar development.
- Pumping will only be allowed if the use benefits a single property Owner who is the sole responsible person for the liability, risk, ownership, operation, maintenance, replacement, and repair of the private pumping system.
- The pump system must provide storage for a minimum of 25 percent of the runoff volume from a 2-year, 24-hour storm event. An emergency backup power source may be required, at the discretion of the District.
- The pump system must include dual pumps with an external audible and visual alarm system.
- The pump system must be capable of discharging a 100-year storm event.
- The topology of the property must provide an off-site emergency overflow pathway, to convey the stormwater runoff from 100-year storm event during a complete failure to an acceptable storm drainage system.
- Applicants will be required to provide assurance that no downstream impacts from the implementation of a stormwater pump system.
- Private storm drainage system for the pump system must transition to gravity and will only be allowed to discharge into an open storm drainage system.
- All pump systems must be privately operated and maintained by a single Owner. Prior to final approval of the project served by such a pump system, an agreement establishing responsibility for payment of costs resulting from the operation and maintenance of the pump system must be approved by the District and must be legally recorded.
- An O&M Plan and maintenance covenant, consistent with Chapter 9 shall be developed for all private stormwater pumps.

8. Construction Requirements

All development, regardless of permit status, shall keep sediment laden water and any other forms of stormwater pollution from entering natural drainage systems or the storm drainage system. The requirements for erosion prevention and sediment control shall be implemented in accordance the District's Rules, these Standards, and the most current version of the Erosion Prevention and Sediment Control Planning and Design Manual adopted by the District. The Applicant for a development permit shall submit an EPSC Plan as part of their application specifying appropriate BMPs. For site disturbances of 5 acres or larger, the Applicant must demonstrate that they also have an DEQ-approved 1200-C permit.

The Applicant for a development permit is ultimately responsible for retaining all soil on the project site and must recognize the potential for changing, or unexpected site and weather conditions. If at any time the District approved EPSC Plan is determined to be ineffective, District will require additional controls to be implemented until a site is stabilized. The Applicant is responsible for updating the EPSC Plan and resubmitting it to the District.

8.1 General Provisions

The following general erosion prevention and sediment control provisions apply to all properties within the District boundary, regardless of whether that property is involved in a construction or development activity.

- A. The use of erosion prevention techniques, including proper site planning and construction phasing, shall be emphasized, rather than sediment control measures. Erosion and sediment control practices shall be designed and implemented to maintain water quality; protect fish and wildlife habitat; maintain natural vegetation; reduce the use of pesticides, fertilizers, chemicals; and manage dust.
- B. Construction within waterways shall be pursuant to permits issued by State and Federal agencies having jurisdiction and shall apply their regulations. Pollutants such as, but not limited to, fuels, lubricants, asphalt, concrete, bitumens, raw sewage, and other harmful materials shall not be discharged into rivers, wetlands, streams, impoundments, undisturbed buffers, or any storm drainage system, or at such proximity that the pollutants flow to these watercourses.
- C. The use of water from a stream or impoundment, wetland, or sensitive area, shall not result in altering the temperature or water quality of the water body in violation of OARs, and shall be subject to water rights laws. All sediment-laden water from construction operations shall be routed through sedimentation basins, filtered, or otherwise treated to remove the sediment load before release into the surface water system.
- D. Construction shall be done in a manner to minimize adverse effects on wildlife and fishery resources pursuant to the requirements of local, state, and federal agencies charged with wildlife and fish protection.
- E. Natural Vegetation
 - a. As far as is practicable, natural native vegetation shall be protected and left in place. Disturbed Areas shall be carefully located and marked to reduce potential damage.
 - b. Trees shall not be used as anchors for stabilizing working equipment.

- c. During clearing operations, trees shall not be permitted to fall outside the Disturbed Area. In areas designated for selective cutting or clearing, care in falling and removing trees and brush shall be taken to avoid injuring trees and shrubs to be left in place.
 - d. Where natural vegetation has been removed, or the original land contours disturbed, vegetative ground cover shall be planted and established in accordance with the Wet Weather standards in Section 8.2.6.
- F. The use of hazardous chemicals, including pesticides, insecticides, herbicides, defoliants, soil sterilant, and fertilizers, must strictly adhere to Federal, State, County, and local restrictions.
- G. All pesticides, fertilizers, and chemicals delivered to the job site shall be covered and protected from the weather. None of the materials shall be exposed during storage. Waste materials, rinsing fluids, and other such material shall be disposed of in such a manner that pollution of groundwater, surface water, or the air does not occur. In no case shall toxic materials be dumped into drainageways.
- H. Dust and other particulate matters caused by development activity containing pollutants may not settle on property and/or be carried to Waters of the State through rainfall or other means. Dust shall be minimized to the extent practicable as per Section 8.6.5.

8.2 Erosion Prevention and Source Control Required

This section provides criteria regarding erosion prevention and sediment control standards. The requirements of this section shall apply to all activities requiring an EPSC Permit. The Applicant for the EPSC Permit shall be responsible for meeting these requirements.

8.2.1 Erosion Prohibited

Visible or measurable erosion as defined in Section 7.6 of the District's Rules, which enters, or is likely to enter, the public or private storm and surface water system or other properties, is hereby prohibited, and is a violation of these standards, unless authorized by a state or federal permit or certification.

Unless authorized by a State or Federal permit or certification, no person shall create physical erosion by dragging, dropping, tracking, or otherwise placing or depositing, or permitting to be deposited, mud, dirt, rock, or other such debris upon a public street or into any part of the public storm and surface water system, or any part of a private storm and surface water system which drains or connects to the public storm and surface water system. Any such deposit of material shall be immediately removed using hand labor or mechanical means. No material shall be washed or flushed into any part of the storm and surface water system until all mechanical means to remove the debris have been exhausted and preventative sediment filtration is in place. The Applicant of the property, Permittee, under a site development permit, together with any person or persons, including but not limited to the Contractor or the Developer's Engineer who causes such erosion, shall be held responsible for violation of these standards.

8.2.2 Erosion Prevention and Sediment Control Plan

An EPSC Plan shall be prepared in accordance with the requirements of Section 8.4 of these standards for all sites where an EPSC Permit is required.

8.2.3 Erosion Prevention and Sediment Control Permits

The Applicant for a development permit shall submit an EPSC Plan as part of their application specifying appropriate BMPs.

An EPSC Permit is required under the following conditions:

- A. Prior to placement of fill, site clearing, or land disturbances, including but not limited to grubbing, clearing or removal of ground vegetation, grading, excavation, or other activities, any of which results in the disturbance or exposure of soils covering an area of 800 sf or greater.
- B. For Disturbed Areas or exposed soils of areas less than 800 sf, where the District has determined that site conditions may result in visible and measurable erosion and where the District has provided written notice of the requirement to obtain an erosion prevention and sediment control permit to the Owner. Upon notice by the District, all work shall cease pending receipt of an EPSC Permit and installation of approved EPSC measures.
- C. For any lot that includes natural resources regulated by the District, an EPSC Permit may be required prior to placement of fill, site clearing, or land disturbances, including but not limited to grubbing, clearing or removal of ground vegetation, grading, excavation, or other activities, any of which has the potential for, or results in visible and measurable erosion, regardless of the area of disturbance.

An EPSC Permit shall not be issued for activities on lots that include natural resources, where the site activity has not been authorized, or is not exempt under the provisions of Natural Resources as determined by the District. This provision does not apply where the EPSC Permit is associated with correction of a violation of the District Rules or Standards or as necessary for public safety, or the protection of property or water quality.

8.2.4 NPDES 1200-CN and 1200-C Permit

In addition to the District EPSC Permit, a NPDES 1200-CN permit is required for projects disturbing one acre up to less than 5 acres of disturbance. The 1200-CN shall be issued by the District along with the local permit.

For disturbances of 5 acres or greater, a District EPSC Permit and an DEQ 1200-C permit is required. The local permit shall be issued by the District. The 1200-C permit shall be obtained directly from DEQ.

8.2.5 Maintenance and Removal of Stormwater Best Management Practices

The Permittee shall maintain the BMPs contained in the approved EPSC Plan to continue to be effective during the construction phase, post construction phase, establishment of permanent vegetation, or any other permitted activity. If the BMPs approved in an EPSC Plan are not effective or sufficient as determined by District site inspection, the Permittee shall submit a revised plan within three (3) working days of written notification by District. Upon approval of the revised plan by the District, the Permittee shall immediately implement the additional BMPs included in the revised plan. In cases where erosion is likely to occur, the District may require the Applicant to install interim control measures prior to submittal and/or approval of the revised EPSC Plan.

Temporary BMPs, such as sediment fences, shall be removed after permanent vegetation is established.

8.2.6 Wet Weather Stabilization

Where natural vegetation has been removed, or the original land contours disturbed, vegetative ground cover shall be planted and established by October 1 and continue to function through May 31 of the following year, or as approved by the District. If ground cover is not established by October 1, the open areas shall be protected through May 31 of the following year with straw mulch, erosion blankets, or other methods approved by the District. The site shall be revegetated per a submitted and approved seeding and maintenance plan as soon as practicable after construction has commenced, but not later than September 1. After that date, a stabilization plan approved by the District must be used.

8.2.7 Contaminated Soils

In the event the construction process reveals soils contaminated with hazardous materials or chemicals, all parties shall stop work immediately, ensure no contaminated material is hauled from the site, remove work forces from the immediate area of the contamination, leaving all machinery and equipment, and secure the area from access by the public until such time as a response team has evaluated the situation and identified an appropriate course of action. The Applicant and the Contractor shall notify OSHA and DEQ of the situation upon discovery. The Applicant and the Contractor must comply with OSHA and DEQ statutes and rules.

8.3 Establishing Protective Vegetative Cover Upon Completion of Final Grading

To prevent and minimize erosion, all development shall implement BMPs as required by the EPSC requirements in these Standards including, but not limited to, the following stages of a project:

- A. Vegetation is to be established as soon as practicable after completion of final grading to minimize erosion.
- B. Prior to final project acceptance, the site shall be permanently stabilized with approved cover or permanent landscaping.
- C. In cases of a land division, temporary groundcover will be accepted on each lot where home construction will begin within 30 days of project completion.
- D. To the extent practicable, all stormwater facilities and open channel storm drainage system shall be permanently stabilized prior to use.
- E. Erosion control measures shall be continued after construction has been completed until the permanent stabilization measures and vegetative ground cover for the site is established and functioning such that erosion has ceased.
- F. The Developer will be responsible for all erosion prevention and sediment control for individual lots until ownership has changed.
- G. In cases with developments with 1200-C permits, the Permittee is responsible for erosion prevention and sediment control until the 1200-C permit is terminated by the state.
- H. Temporary EPSC measures shall be removed by the Developer when permanent stabilization or landscaping has been installed and is functioning.

8.4 Plans Required

An EPSC Plan shall be prepared in accordance with the requirements of the most current version of the Erosion Prevention and Sediment Control Planning and Design Manual adopted by the District and these Standards for all sites where an EPSC Permit is required. See **Appendix A** for submittal requirements.

8.5 Supplemental Plans

This section provides criteria for supplemental plan submittals.

8.5.1 Mass Grading and Runoff Control

A phased mass grading and runoff control plan is required for projects where clearing and mass grading activities are proposed during Wet Weather. The runoff control plan shall identify BMPs from Section 8.6.3, **Table 15**, or approved alternatives, and be submitted with, or as a revision to, the EPSC Plan. All stormwater BMPs specified on the runoff control plan shall be in place and functional prior to commencement of mass grading.

8.5.2 Dewatering

A dewatering plan is required for projects with anticipated excavation activities at or below the ground water table, or if ground water is encountered during construction. The supplemental plan shall be submitted with, or as a revision to, the EPSC Plan and shall identify how dewatering discharges will be managed.

8.5.3 Cement Treatment

A cement treatment plan is required for projects where cement treatment is proposed as a soil amendment (including, but not limited to Portland cement-treated base [CTB], cement kiln dust [CKD], or fly ash). The supplemental plan shall indicate an application rate, work schedule, and limits of work areas proposed for cement treatment. If cement treatment will occur during Wet Weather, the following conditions will also apply:

- A. The project shall be phased in small manageable areas to minimize the risk for erosion.
- B. Contractor shall have sufficient erosion prevention stormwater BMPs on site to cover all exposed soil.
- C. Each phase must be stabilized with temporary or permanent erosion prevention stormwater BMPs before disturbing additional phases.
- D. The plan shall indicate how runoff from areas treated with cement will not cause or accelerate erosion of soils not treated with cement.
- E. If the runoff has a high pH (8.5 standard units or higher) then the plan must include an engineered sediment basin or similar impoundment must be used for treatment before discharge. The operator is required to determine the acceptable pH water quality criteria range of site discharge based on criteria of the receiving waterbody according to OAR 340-041-0021. If necessary, the operator must adjust or neutralize the high pH water until it is in the range of pH Standard Units (SU) using an appropriate treatment BMP such as carbon dioxide (CO²) sparging or dry ice. The operator must conduct and document pH monitoring of stormwater captured in the sediment impoundment as described below:

- a. The operator must begin the pH monitoring period when the engineered soils are first exposed to precipitation and must continue every 7 calendar days and within 24 hours of the occurrence of discharge from the site, or the occurrence of a storm event of 0.10-inches or greater until final stabilization of the area of engineered soils is established.
 - b. Document date soil amendments were added and final stabilization achieved in the Inspection Reports.
 - c. The operator must monitor the pH of stormwater in the sediment basins/impoundments and at discharge point locations that receive stormwater runoff from the area of engineered soils before the stormwater discharges to surface waters. Testing shall be done by an approved method and protocol and be performed by an operator knowledgeable in the testing method.
 - d. The benchmark value for pH is defined in SU and determined by the river basin containing the receiving waterbody according to OAR 340-041-0021. Anytime monitoring indicates that the pH is the maximum allowed SU or greater, the operator must either:
 - i. Prevent the high pH water from entering storm sewer systems or surface waters; or
 - ii. If necessary, adjust or neutralize the high pH water until it is in the range of pH SU acceptable for discharge to the river basin containing the receiving waterbody by using an appropriate treatment BMP such as carbon dioxide (CO²) sparging or dry ice. The operator must obtain written permission from District (and/or other authorities as applicable) before using any form of chemical treatment other than CO² sparging or dry ice.
- F. If visible or measurable erosion is occurring, all cement treatment activities shall be suspended, and approved erosion prevention facilities shall be applied to all exposed soil.

8.5.4 Chitosan Treatment Systems

Chitosan treatment plan is required where chitosan is proposed as a BMP. The supplemental plan must include a statement of the intent to use chitosan, the reason for its use and the name, experience and training of the qualified operator who will be monitoring the use of chitosan. Additional requirements are dependent on the form of chitosan proposed, as detailed below:

- A. If chitosan acetate is proposed, the system must be a chitosan enhanced sand filtration system. The supplemental plan must demonstrate that the system is consistent with the protocol outlined in Ecology's GULD for chitosan enhanced sand filtration.
- B. If chitosan lactate (cartridge) is proposed, the system shall be designed by a registered PE to meet site specific conditions and comply with the manufacturer's recommendations. A supplemental plan must include the following:
 - a. Location and design schematic of treatment system, location of inlet and location of discharge and dispersion device design.

- b. Method for ensuring filtration or settlement of treated stormwater to comply with the following discharge standards:
 - i. Residual chitosan must not exceed 1 mg/L,
 - ii. Turbidity must not exceed DEQ's Water Quality Standards, and
 - iii. pH must remain within a range of 6.5-8.5
- C. Qualified operator inspection and certification of consistency with the design, prior to system operation and use.
- D. Testing and monitoring protocol, including at minimum:
 - a. Qualified operator must field test discharge using a Residual Chitosan Lactate Field Screening Test Kit, or District approved equal.
 - b. Field tests shall be performed during the first discharge of treated water and weekly thereafter for as long as chitosan is being used.
- E. Response protocol, if field testing demonstrates exceedance of discharge standards, including immediate notification to the District, modification to the treatment system, and implementation of additional erosion control facilities.
- F. Notification protocol to the District if any modifications to the treatment system are made.
- G. Maintenance protocol of treatment system

8.6 Best Management Practices

This section provides a list of approved stormwater BMPs. Each BMP shall be implemented consistent with additional information in the Standard Details and the most current Erosion Prevention and Sediment Control Planning and Design Manual adopted by the District.

Depending on site-specific conditions, the required base measures may be inadequate to prevent erosion and control sediment discharges. In these cases, additional stormwater BMPs shall be applied to the site to meet the EPSC standards.

8.6.1 Base Measures

The following stormwater BMPs, as described in **Table 15**, shall be implemented on all sites requiring an EPSC Permit:

- A. Gravel construction entrance/exit.
- B. Linear barrier or downslope perimeter control (e.g., sediment fence, straw wattles, or similar measure).
- C. Storm drain inlet protection.

8.6.2 Erosion Prevention Stormwater BMPs

Erosion prevention is the highest priority in the overall EPSC Plan and shall be integrated into a project throughout the planning, design, scheduling, and construction phases. Erosion prevention stormwater BMPs shall be included in the approved EPSC Plan. **Table 15** lists approved erosion prevention facilities.

Table 15. Erosion Prevention Stormwater BMPs

Name	EPSC Manual Standard Detail	Description
Preserve Natural Vegetation	NA	Maintain existing vegetation or place vegetative buffer strips. This SMF is especially effective for sites with sensitive resources like wetlands, stream corridors, lakes, and steep slopes.
Buffer Zone	NA	An undisturbed area or strip of natural vegetation or an established suitable planting adjacent to a Disturbed Area that reduces erosion and runoff. A Vegetated Corridor shall not be used or considered a buffer zone under this section.
Temporary and Permanent Seeding	NA	Vegetative cover established on Disturbed Areas to reduce erosion by seeding (applied by hand or hydroseeding) with appropriate and rapidly growing grasses. Permanent seeding can be used in conjunction with erosion control blankets and mats to provide both temporary and permanent erosion prevention control.
Ground Cover	NA	A protective layer of straw or other suitable material applied to the soil surface. Various ground cover methods include straw mulch and compost blankets.
Hydraulic Application	NA	A mechanical method of applying erosion control materials, other than simply hydroseeding, to bare soil. This BMP is often called Bonded Fiber Matrix. Bonded Fiber Matrix can be used without seed in upland areas to stabilize and prevent erosion. This BMP cannot be used in areas of concentrated flow or water quality facilities. This BMP may be used in place of straw, mulch, compost, or matting depending on site and weather conditions.
Sod	NA	Permanent or temporary turf for immediate erosion protection and stabilization.
Matting	4-1 and 4-2	A class of products that includes manufactured mulch materials that are produced in a roll configuration that is placed on the ground and held in place by stakes, metal staples, geotextile pins, or other fastening system. Matting shall be 100% biodegradable fibers or approved equal. Refer to the Floodplain, Wetland and Stream Construction Strategies Handbook for a comparison of matting types for work in sensitive areas.
Soil Binders	NA	Materials that are applied to the soil surface for dust control and temporary erosion control. These are also known as hydraulic soil stabilizers.
Stockpile Management	4-3	Methods to reduce or eliminate loss of sediment from temporary stockpiles of soil.
Dust Control	NA	Water applied over susceptible areas, typically due to dry soil conditions, during high wind periods. (Also see Section 8.6.5).

8.6.3 Runoff Control Stormwater BMPs

The purpose of runoff control BMPs is to control stormwater runoff and drainage patterns at construction sites. Runoff control BMPs shall be included in the EPSC Plan. **Table 16** provides a list of approved runoff control BMPs.

Table 16. Runoff Control Stormwater BMPs for All Sites

Name	EPSC Manual Standard Detail	Description
Pipe Slope Drain	4-9	The pipe slope drain carries concentrated runoff down steep slopes without causing gullies, erosion, or saturation of slide-prone soils. It should be designed to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device, or stabilized area.
Outlet Protection	4-7 and 4-8	Outlet protections are physical structures that reduce the velocity and energy of concentrated flow to prevent scour at storm drainage system outlets. Outlet protection includes riprap-lined basins, concrete aprons, and stilling basins.
Surface Roughening	4-10 and 4-11	Soil surface is roughened by mechanical methods. All slopes prepared by surface roughening shall meet engineering compaction requirements. This BMP is intended to only affect the surface of soils and is not intended to compromise slope stability or overall compaction.
Check Dams	4-4 and 4-5	Small, temporary dams placed across a natural or man-made channel or drainage ditch and designed to reduce drainage ditch erosion caused by stormwater runoff by reducing the velocity of flow in the ditch. Check dams are often used as a temporary measure while a channel is being permanently lined with vegetation or other materials to prevent erosion.
Diversion Swale or Dike	4-6	A ridge of compacted soil or a vegetated lined swale located at the top, base or somewhere along a sloping Disturbed Area.

8.6.4 Sediment Control Stormwater BMPs

Sediment control BMPs include any practice that traps soil particles after they are dislodged and moved by wind, water, or mechanical means. These BMPs are usually passive systems that rely on filtering or settling particles out of the water or wind once they have become suspended. Soil that accumulates in or near sediment control BMPs is a waste product that must be removed and disposed of at an approved location. Uncontaminated sediment/soil can be placed back on site and protected with appropriate erosion control BMPs.

Sediment control BMPs are considered the last line of defense before stormwater runoff leaves a site and are not to be used as the primary methods for EPSC.

Table 17 lists approved sediment control BMPs. These BMPs are to be applied prior to and during earthwork. Sediment control BMPs shall be included in the approved EPSC Plan.

The perimeter sediment barrier identified in **Table 17** is not required where:

- A. Flows are collected through the use of temporary or permanent grading or other means such that the flows are routed to an approved settling pond, filtering system, or sediment control BMP.
- B. There are no concentrated flows, slopes are less than 10 percent, and runoff passes through a grass area which is either owned by the Applicant or such use is allowed, through written agreement, by the Applicant of the grass area. The grass area shall be at least equal in dimensions to the project area. The grass area shall not be located in a Vegetated Corridor or Sensitive Area.
- C. The surface is protected by re-established permanent vegetation.

Table 17. Sediment Control Stormwater BMPs

Name	EPSC Manual Standard Detail	Description
Gravel Construction Entrance/Exit ¹	4-13	Gravel construction entrances/exits shall be required at each entrance/exit to and from the site. If a property contains or is adjacent to a stream, watercourse, stormwater facility, wetlands, or other water quality sensitive area, BMPs in addition to a gravel construction entrance/exit shall be required to prevent physical erosion into the water quality sensitive area.
Tire Wash Facility	4-26	The wheel wash, which shall be incorporated with a stabilized construction entrance, shall be designed and constructed for anticipated traffic loads.
Linear Barrier or Perimeter Control ¹	4-23	Linear barrier (sediment fence) shall be installed around the down-gradient perimeter of the site to control sheet flow from the site. Sediment fence shall not be placed in areas of concentrated flow or across stream channels.
Wattles	4-27	Wattles are small, cylindrical barriers composed of biodegradable fibers encased in photodegradable open-weave netting. Wattles are placed in shallow trenches and staked along the contour of newly constructed or disturbed slopes.
Storm Drain Inlet Protection ¹	4-15 through 4-20	Temporary inlet protection shall be provided for all active inlets for the duration of construction to keep sediment, trash, and other construction-related pollutants out of the storm drain system.
Rock or Brush Filter Berm	4-14	Rock or brush filter berms are temporary barriers composed of brush, wrapped in filter cloth, and secured or rock anchored in place. These are designed for sheet flow, not concentrated flow, and shall not be placed across a stream or channel.
Sidewalk Subgrade Gravel Barrier	4-25	Undercut lots or sidewalk subgrades with rock base are linear drainage barriers that provide an effective sediment filtration and retention area behind the curb. If weep holes exist, they must be plugged when using this BMP.
Dewatering		Separation of sediment and water achieved through filtration, either by gravity or with pressure.
Sediment Trap	4-24	A sediment trap consists of a small, temporary ponding area with a rock weir or perforated riser pipe at the outlet. This BMP is not to be used for drainage areas greater than 5 acres.
Sediment Basin	4-22	A temporary sediment basin has one or more inflow points and baffles to spread the flow for wet and dry storage. The sediment basin is effective for about one year with a drainage area less than 10 acres.
Turbidity Curtains	NA	A turbidity curtain is a pre-manufactured floating geotextile structure which minimizes turbidity transport from a Disturbed Area adjacent to or within a body of water. This BMP can be used to minimize the mixing of turbid water with adjacent clean water and/or contain soil particles during construction and/or repair activities.
Sediment Entrapment Mats	4-21	This is a flat layered pad that provides filtration and settling of sediment. BMP may be incorporated into the permanent stabilization/revegetation process if used in conjunction with mulch and/or seed.

¹These measures are minimum requirements for all projects per Section Base Measures 8.6.1.

8.6.5 Dust Control Stormwater BMPs

Dust shall be minimized to the extent practicable, using all measures necessary, including, but not limited to the following BMPs.

- A. Sprinkling the haul and access roads and other exposed dust producing areas with water.
- B. Application of dust palliatives on access and haul roads as approved by the District.
- C. Establishing temporary vegetative cover.
- D. Placing wood chips or other effective mulches on vehicle and pedestrian use areas.
- E. Maintaining the proper moisture condition on all fill surfaces.
- F. Pre-wetting cut and borrow area surfaces.
- G. Use of covered haul equipment.

8.6.6 Non-Stormwater Pollution Control Stormwater BMPs

For the purposes of this section, non-stormwater pollution includes, but is not limited to, concrete truck wastewater, paint, fuel, hydraulic fluid, solvents, glues, and other waste materials characteristic of construction sites. Non-stormwater pollutants are prohibited from entering a public or private street or storm system or surface waters.

Non-stormwater pollution controls consist of general site and materials management measures that directly or indirectly aid in minimizing the discharge of sediment and other construction related pollutants from the construction site.

Approved non-stormwater pollution control BMPs include:

- A. Concrete truck washout areas.
- B. Written spill prevention and response procedures.
- C. Employee training on spill prevention and proper disposal procedures.
- D. Protected areas for equipment storage and maintenance where the risk of pollution is minimal.
- E. Debris boxes to contain construction wastes.

8.7 Inspection Requirements

This section provides criteria for EPSC inspections during a project's construction.

8.7.1 Pre-Construction Conference

Prior to the initial EPSC inspection, the District may require, or the Permittee, Applicant, or Contractor may request, a pre-construction conference to review and discuss the EPSC Plan for the site.

A pre-construction conference shall be required when the risk of erosion is high due to one or more of the following factors:

- A. Construction during Wet Weather.
- B. Steep slopes with severe erosion potential.
- C. Construction adjacent to a sensitive area or vegetated corridor.

D. Mass grading on a large site.

8.7.2 District's Initial EPSC Inspection

On all projects, except single family home construction sites, EPSC base measures shall be installed by the Permittee and then inspected and approved by the District's Inspector prior to the start of any permitted activity.

For single-family home construction sites, EPSC measures for each property shall be installed by the Permittee and then inspected and approved by the District's Inspector prior to the building foundation installation. Foundation approvals shall not be given until EPSC measures are approved.

8.7.3 Permittee Inspections

The Permittee or Applicant's authorized agent shall provide ongoing inspection of the site in accordance with approved plans to ensure compliance with the standards specified in this chapter. The Permittee or Applicant's authorized agent for inspections shall be knowledgeable in EPSC BMP selection, installation, and maintenance. They shall also possess the technical skills to assess conditions at the construction site that could impact stormwater quality, and to assess the effectiveness of EPSC BMPs selected. If the Permittee or representative determines the stormwater BMPs approved in the EPSC Plan are not effective or sufficient to ensure compliance, additional stormwater BMPs must be implemented and identified in a revised plan.

For single family developments that disturb 1 acre or greater and all non-single-family developments the Engineer's Inspector shall:

- A. Meet the applicable DEQ qualifying inspection certifications.
- B. Inspect the site once every 14 calendar days and within 24 hours of any storm event, including snowmelt, that results in discharge from the site.
- C. Maintain records of their EPSC inspection and maintenance activities. Records shall be made no later than 48 hours after inspection by the Permittee or their authorized agent. Records shall be made available to the District Inspector upon request.

For single family developments that disturb less than 1 acre, the Permittee's or representative shall:

- A. Inspect the EPSC measures and provide maintenance as required to maintain the functionality of the BMP measures.
- B. Inspect site daily when stormwater runoff, including runoff from snow melt, is occurring, once per week on active sites when runoff not occurring or once every two weeks on inactive sites
- C. Keep onsite documentation of their EPSC activities for reference during operations, maintenance activities, and inspections.

8.7.4 Final Inspection

A final erosion control inspection shall be required on all sites after they have been stabilized and prior to approval of the Certificate of Occupancy. All temporary BMPs shall be removed prior to final inspection.

For single family sites seeking final erosion control inspection between September 1 and May 31, groundcover, using approved techniques, shall be completed before the single-family site can be deemed complete.

9. Operations and Maintenance

The purpose of the District's O&M requirements is to assure long-term operations and maintenance of public and private SMFs.

The O&M requirements in this chapter apply to all SMFs constructed as a requirement of the District's Rules. Maintenance activities, such as routine maintenance, restorative maintenance, and rehabilitation are required to ensure the long-term function and effectiveness of SMFs and infrastructure. Initial site planning must incorporate provisions for adequate access and space to perform maintenance activities for all SMFs.

9.1 General Requirements

All SMF designs will be held to the same maintenance standards regardless of the organization or entity that has accepted responsibility for the maintenance. There are two categories of maintenance for SMFs, described below.

Privately maintained SMFs only convey Private Stormwater that generally benefit one owner or entity. They include residential, multi-family, commercial, and industrial types of developments. These SMFs require a maintenance covenant recorded with the title that describes the types of facilities and necessary maintenance.

Publicly maintained SMFs are regional and sub-regional SMFs which convey Public Stormwater, that benefit the public in general, and any facility located within the Public ROW. SMFs that serve multiple properties (e.g., facilities for residential subdivisions) shall be transferred to WES following the 2-year warranty period and formal acceptance.

9.2 Operations and Maintenance Plans Required

All SMF that are intended to be privately maintained require the Developer, Applicant, or Owner to execute and record an O&M Plan prior to final inspection approvals of the related development permits. The O&M Plan shall ensure that Owner maintains and operates the SMF to preserve and continue its function. O&M Plans require Owners of property with SMFs to properly maintain, repair, modify or reconstruct (if necessary) the facility, and provide a schedule for the maintenance frequency for the facility.

9.2.1 Operations and Maintenance Plan Development

O&M Plans shall be required for all permanent SMFs to ensure that they function as designed. The purpose of an O&M Plan is to provide guidance to those who are responsible for the long-term inspection and maintenance of the facility.

To ensure functionality of the SMFs, Owners are required to inspect facilities regularly per the approved O&M Plan to determine maintenance needs. Routine inspection and maintenance can help to keep overall maintenance costs low by detecting problems early and avoiding large repair or replacement costs.

The facility design and maintenance specifications in **Appendix B** can be used to create the O&M Plan. If the proposed facility types do not match the SMFs in **Appendix B**, the Applicant and Developer's Engineer will be responsible for creating any drawings, maintenance specifications, and an inspection checklist to be incorporated into the O&M Plan.

O&M Plans for privately owned/maintained facilities shall be recorded with the Recording Office of Clackamas County as an exhibit to the maintenance covenant referenced in Section 9.3 before issuance of a building permit or final plat approval.

9.2.2 Operations and Maintenance Plan Elements

The following outline can be used to prepare an O&M Plan.

Introduction and general information

Facility information, including type and identifying name or number, as applicable. Include the number of each type of structure including the manufacturer's model number where applicable.

Name and contact information for the organization or individual responsible for conducting maintenance and/or ensuring maintenance is conducted.

Written narrative overview describing the site, drainage areas, and intended function of the facility.

Operations and Maintenance

Normal operating procedures for facility function, including any seasonal modifications, adjustments, and manufacturer's recommendations.

Required regular maintenance activities and schedule (e.g., landscape maintenance, sediment removal, pipe cleaning).

Required inspection frequency to verify facilities are being maintained and functioning as designed.

Minimum maintenance standards that are required for the SMF to produce desired results and maintenance actions when the minimum standards are not met (See **Appendix B**). Where applicable, the minimum maintenance standards should include manufacturer's recommendations.

Expected lifespan of the facility components (i.e., the time when Owners should expect to replace growing media, plantings, cartridges, and control structure elements). Proprietary facility lifespan information, if known.

List of interrelated or connected SMFs and description of how each facility works with the next one.

O&M Plan Responsibility

Identify the person(s) or organization(s) responsible for inspections of SMFs.

Identify the funding source for maintenance.

Attachments

Include a site plan to identify the location of the facility/facilities, sources of runoff entering each facility, and ultimate stormwater disposal point.

Include the SMF detail sheet(s) and O&M Plan and checklist(s) (when applicable, use details in **Appendix C** for reference).

Include a copy of the public maintenance agreement and/or private maintenance covenant that will be used to assign maintenance responsibility and/or to allow access for maintenance or inspection of the SMFs.

9.2.3 Operations and Maintenance Plan Review and Approval Process

The O&M Plan and associated agreements, covenants, and easements will be reviewed as part of the District's overall plan review and approval process.

9.3 Privately Owned and Maintained Facilities

Generally, SMFs that convey Private Stormwater that benefit a single Owner or entity shall be privately-owned and maintained. All privately owned and maintained SMFs require an O&M Plan that is reviewed and approved as part of the overall plan review process.

9.3.1 Maintenance Covenant for Private Stormwater Facilities

Maintenance of all privately-owned SMFs shall be ensured through the creation of a formal maintenance covenant that must be approved by the District and recorded into the land record prior to final plan and/or plat approval. The O&M Plan, including scheduled inspections and regular maintenance activities, shall be referenced in the maintenance covenant.

9.3.2 Access Easement

Prior to the issuance of any permit that includes a SMF, the Applicant or Owner of the site must execute a maintenance covenant that includes public access rights, to inspect the facility and ensure that it is maintained in proper working condition. This includes the right to enter a property when the District has a reasonable basis to believe that a violation of District standards and/or rules and regulations is occurring or has occurred, and to enter when necessary for abatement of a public nuisance or correction of a District violation. The access easement shall be included in the maintenance covenant, as approved by the District and recorded at the Recording Office of Clackamas County.

9.3.3 Annual SMF Inspection and Maintenance

The Responsible Party identified within the O&M Plan shall complete and keep records of annual inspections of their SMF. The annual inspection records may be reviewed by the District upon request. All SMFs must undergo an annual inspection to document maintenance and repair needs and ensure compliance with the requirements of these standards. Maintenance needs may include, but not limited to the following: removal of silt, litter and other debris from all stormwater structures and facilities; grass cutting and invasive vegetation removal; and necessary replacement of water quality vegetation. Any maintenance needs identified must be addressed by the Responsible Party in a timely manner. The inspection and maintenance frequency may be increased as deemed necessary to ensure proper functioning of the SMF.

9.3.4 Records of Maintenance Activity

Owners shall keep records of all SMF maintenance and repairs and shall retain the records for at least three (3) years. These records shall be made available to the District staff during inspection of the facility and at other reasonable times upon request. The Owner shall submit a copy of the SMF maintenance and inspection records to the District annually.

9.3.5 District Inspection of Stormwater Management Facilities

Inspections may be conducted by the District at any time, including but not limited to, routine inspections, random inspections, inspections based on complaints or other notice of possible violations, inspections related to the District's NPDES MS4 Permit, and joint inspections with other agencies done under environmental or safety laws. Inspections may include, but are not limited to, review of maintenance and repair records; sampling discharges, surface water, groundwater, or material/water in SMFs; and facility condition evaluations.

9.3.6 Failure to Comply with the O&M Plan

If a SMF becomes a danger to public safety or public health, the District shall notify in writing the party responsible for maintenance of the SMF. Upon receipt of the written notice, the responsible person shall have 30 days, unless otherwise specified by the District, to complete the necessary maintenance and repair of the facility in an approved manner. If a responsible party fails or refuses to meet the requirements of the maintenance covenant, the District, after reasonable notice, may correct a violation of the design standards or maintenance needs by performing all necessary work to return the facility to proper working condition. If the Owner does not comply with their O&M Plan, after proper notice, the District shall assess the Owner of the facility for the cost of repair work and any penalties.

9.3.7 Modifications to the Operations and Maintenance Plan

If it is determined that the O&M Plan requires modification to maintain the functionality of the facility, then modifications to the O&M Plan shall be submitted to the District for review and approval. Written approval from the District is required prior to modifying the O&M Plan. The approved modified plan shall be recorded at the Recording Office of Clackamas County.

9.4 Publicly Owned and Maintained Facilities

Generally, publicly owned and maintained SMFs convey Public Stormwater, serve multiple properties, or provide drainage for the general public. Publicly owned SMFs can serve any type of development (residential, multi-family, commercial, industrial). Publicly owned facilities may be constructed by the District, or they may be constructed by private parties, with maintenance responsibilities transferred to the District following acceptance after completion of the 2-year warranty period.

9.4.1 Location

All publicly owned SMFs shall be located in the Public ROW or separate tract with adequate maintenance access with an easement granting rights to the District.

9.4.2 Operations and Maintenance Plan

All SMFs to be maintained by the District require an O&M Plan that is reviewed and approved as part of the overall plan review process. The O&M Plan is prepared by the Applicant, identifying the District as the responsible party for inspection and maintenance following acceptance after completion of a successful 2-year warranty period.

During the 2-year warranty period, the Applicant is responsible for all maintenance and documentation requirements outlined within the O&M Plan. Prior to the completion of the

warranty period, the District will require all maintenance records and documents be reviewed and deficiencies addressed prior to the transfer of maintenance responsibilities.

The Applicant shall enter into a maintenance agreement with the District establishing bonding, surety, or payment for maintenance of the facility during the 2-year warranty period.

9.4.3 Maintenance Fees

The District may establish maintenance fees for publicly maintained SMFs that serve multiple privately owned properties. When separate maintenance fees are established, they will be distributed proportionally among the Owners that use the facility for stormwater management.

APPENDIX A. Permitting And Submittal Requirements

Appendix A outlines the planning, plan review, and project completion requirements for both sanitary and storm sewer projects and is included in both the Sanitary Standards and the Stormwater Standards. This section is intended to standardize the submittals and clearly outline the minimum requirements. The requirement for a complete submittal package is intended to reduce the overall plan approval processing time.

1. Review and Permitting Requirements

The following is a generalized overview of the District development review and permitting processes. This process may vary from one application, submittal and/or building permit to another and is only shown as a general outline of procedures and processes involved in the review and approval of projects located within the District. To obtain further information on a specific plan review or permit process contact a Development Review staff member. The Developer shall have ultimate responsibility for compliance with all requirements specified in these Sanitary Standards and the District's Regulations. The Developer shall be directly responsible for all administrative requirements including application for service, submittal of all required Plans, bonds and insurance, and payment of fees.

General Plan Review and Approval Process

This subsection describes the most common elements of the general development review process for a typical partition, subdivision, multi-family, commercial or industrial project. Applicants should discuss their project with the District and local planning authority early to understand the review and approval process required for a specific project.

- 1. Pre-Application Conference** – The Applicant may elect to meet with the local planning authority, District, and other related departments to discuss the proposed project to better understand the potential requirements. It is best if the Applicant submits a preliminary concept or plan, so the District is better prepared to discuss the proposed development. Contact the local planning authority to schedule the pre-application meeting. The planning authority will invite the District to the meeting.
- 2. Service Provider Letter** – Applicants proposing to develop or redevelop property shall obtain a Service Provider Letter from the District prior to submitting the land-use or design review application to the local planning authority.
- 3. Water Quality Resource Area Boundary Verification** – If applicable, prior to the District issuing a Service Provider Letter, the local planning authority must approve a WQRA Boundary Verification for vegetated buffer requirements (see the Buffer Standards).
- 4. Conditions of Approval** – The local planning authority will process the land use/design review application and route a copy of the application for District review. The District will review the application and submit comments to the local planning authority to be included as conditions.
- 5. Jurisdictional Authority**– If the proposed project is outside the service area boundaries of the District, the Developer must petition for annexation to the District. The annexation must be approved by the Board before final occupancy or plat approval. The Applicant shall submit a complete annexation packet to WES prior to any plan approvals by WES.

6. **Pre-Design Meeting** – The Applicant may elect to coordinate a meeting with the local planning authority and/or the District to discuss the project and requirements outlined in the conditions.
7. **Plan Submittal** – Upon land use approval, the Applicant must submit required fees, civil plans and supporting documentation as specified in these standards for plan review and approval.
8. **Other approvals** – Other permits and approvals may be required prior to the District approving the plans (i.e., County, City, State or Federal).
9. **Approved Plan(s)** – Plans and applicable building permit applications will be reviewed, approved, and then signed by an authorized representative of the District. If applicable, it may be necessary to hold a Pre-Construction Meeting with the Developer’s Engineer, Contractor, Applicant, District, and other related agency representatives to discuss project requirements, including processes to complete the project as specified in the Sanitary and Stormwater Engineering Agreements.
10. **Construction** – The public sanitary and stormwater management infrastructure shall be constructed under the supervision of the Developer’s Engineer as specified in the Sanitary and Stormwater Engineering Agreements.
11. **Construction Completed** – Upon final completion of the construction, the Developer’s Engineer will certify the project was constructed in accordance with the approved plans, and the as-built plans are an actual record of what was constructed.

The following items will be completed and submitted prior to requesting the final inspection of the public sanitary and/or stormwater infrastructure:

- i. All sanitary and/or stormwater infrastructure shall be cleaned of sediment and debris.
 - ii. A *Certification of Completion* shall be submitted – Certifies the project was constructed in accordance with the approved plans and District Standards.
 - iii. Two paper copies of the as-built drawings shall be submitted.
 - iv. If applicable, submit the video testing of the public sanitary and stormwater conveyance piping systems, along with the Contractor’s reports for review and approval. The Developer’s Engineer shall review the video and reports, and note any deficiencies discovered in the system(s) prior to submitting the items to the District.
 - v. Submit a copy of the Developer’s Engineer inspection reports.
 - vi. Submit Service Connection drawings prepared by the Developer’s Engineer (if required).
12. **Final Inspection** – The District will review the required as-built submittals and, if acceptable, will schedule the final field inspection. All repairs and corrections shall be made prior to the District deeming the project complete.
 13. **Final As-built Drawings** – When requested by the District, the Developer’s Engineer shall submit the corrected final as-built drawings on paper, electronic CAD, and PDF files of the as-built civil construction plan set.
 14. **Warranty Surety** – Upon completion of the public sanitary and stormwater final inspection, the Applicant will submit a sanitary and/or stormwater warranty surety in the amount of 25 percent of the actual cost to construct the public infrastructure. The warranty surety will be held for a minimum period of 2 years from the date of completion, or until all the requested system repairs are completed.

15. **Letter of Completion and Acceptance** – Upon final approval of the construction of the public sanitary and stormwater infrastructure, and all of the above noted items have been reviewed and approved by the District, then the District will issue a letter of completion of the stormwater infrastructure, and letter of acceptance of the public sanitary sewer system and/or Public Stormwater System.
16. **Warranty Surety Inspection** – Between 20 and 24 months after issuance of the letter of completion and acceptance, the District will inspect the public facilities at the request of the Owner. The inspection will include all public sanitary and stormwater infrastructure, included the plantings and other related improvements. Once all deficiencies are corrected, the District will issue a warranty surety release letter.

Service Provider Letter Submittal Requirements

The intent of the Service Provider Letter is that, prior to applying for Land Use/Design Review, the Applicant must demonstrate the proposed development is viable in accordance with District Rules and applicable Standards. The Service Provider Letter will only be issued once the Applicant has provided sufficient plans, reports, studies, and agency approvals needed for preliminary review by the District. Based on the preliminary review, the District may require additional information prior to issuance of the letter or as part of the forthcoming land use application. Receipt of the Service Provider Letter does not imply that all District requirements have been met or guarantee that land use approval for the development will be granted.

Applicants must submit the following to the District for review:

- Preliminary plat (if applicable)
- Preliminary proposal for public and private sanitary infrastructure
- Proposed sanitary system layout, including compliance with minimum design standards
- Points of connection to public sanitary sewer system
- Service proposal for upstream properties
- Preliminary Stormwater Management Plan and Drainage Report
- Site assessment and maps
- Proposed storm drainage system and stormwater facilities:
 - Infiltration, detention, and water quality facilities
 - Conveyance System design
 - Point of discharge
 - Emergency overflow pathway
 - Service proposal for upstream properties
- Soils report and analysis
- Drainage area maps
- Infiltration testing results
- Drainage system analysis (upstream and downstream)
- Sizing and conveyance calculations
- Other supporting reports and information (as deemed necessary by the District)

- BMP Sizing Tool calculations
- WQRA Boundary Verification or Natural Resource Assessment
- Preliminary approval for off-site easements
- Offsite mitigation measures for downstream conveyance

Land Use Submittal Requirements

As part of the land use/design review application process, the local planning agency will route applicable sanitary and stormwater plans and reports to District for comment. The Applicant must provide sufficient plans, reports, studies, and agency approvals needed for preliminary review by the District, as including, but not limited to the Service Plan Submittal Requirements, above. The Applicant's materials shall include any additional information or revisions requested by the District with issuance of the Service Provider Letter.

The land use review stage includes WES issuance of 1) a Service Provider Letter, prior to land use application submittal, and 2) land use conditions of approval, following receipt of a complete land use application from the local planning agency.

Plan Review Submittal Requirements

The Developer's Engineer shall submit sufficient supporting information to indicate that the proposed plan design meets all the provisions within these Standards, including the land-use conditions. The submittal information shall include, but not be limited to, the items listed within this section.

Initial/First submittal requirements:

The following is a list of application submittals required by the District for a typical development:

- Water Quality Resource Area (WQRA) Boundary Verification and WQRA Development Permit, submit to the local planning authority as required (see Buffer Standards)
- Complete set of drawings for the Stormwater Management Plan
- Existing conditions
- Infiltration testing
- Proposed on-site storm drainage system and stormwater facilities
- Proposed grading plan
- Existing and proposed off-site improvements
- EPSC Plan
- Details and notes
- Stormwater Management Report that includes:
 - The engineered or BMP Sizing Tool method used to size the stormwater facilities.
 - A Storm Drainage System/Hydrologic and Hydraulic Calculations Report
 - Hydrology and hydraulic calculations with drainage area maps
 - Tributary drainage areas shall be calculated in table form and identified on maps submitted with the report

- Geotechnical/Geologist Report
 - Infiltration Testing
 - Soils Report
 - Geology Report

Other submittal requirements required by the District as applicable prior to final plan approval.

- Standard Forms
 - Storm System Engineering Agreement
 - Storm System Construction and Engineering Costs Data Sheet
 - Sanitary Sewer Engineering Agreement
 - Sanitary Sewer Construction and Engineering Costs Data Sheet
- Non-Residential Questionnaire Easements/Agreements as applicable
 - Public/Private Sanitary and Stormwater Easements
 - Public/Private Storm Facility Operation and Maintenance Plan/Agreements

Periodically, the District may require additional information to support design assumptions used for sanitary sewer design. When required, the information shall be included on the Plans or submitted in memorandum form to the District. The following may be required:

- Potential size of drainage basin
- Number of potential EDUs

Sanitary Sewer Extension Submittal

The Public Sanitary Sewer Extension submittal shall include all required information along with any other information requested by the District. The required information includes, but is not limited to the following:

- Two sets of complete civil construction Plans.
- Sanitary Sewer Engineering Agreement (form can be found online).
- Construction and Engineering Cost Estimate (form can be found online).
- Sanitary Plan review fees.

All submittals will be reviewed for completeness and the Developer's Engineer will be notified if required information is missing. Upon acceptance of a complete submittal, subsequent project review and approval steps shall be undertaken.

Partition/Subdivision Plat Review and Approval

The Applicant shall submit a preliminary plat to the local planning authority, who will coordinate plat review with the District. The District will only perform an official review of plats received from the local planning authority. The District will review the plat in accordance with the approved Sanitary Plans and Stormwater Management Plans and return comments to the local planning authority. Prior to final plat approval by the District, the Developer shall address the following:

- All associated agreements and easements shall be reviewed and approved by the District. The District will deliver the signed documents to the County Surveyor's Office at the time of plat approval.

- Sanitary and Stormwater Improvements shall be:
 - Fully constructed in accordance with the approved plans, or
 - The Applicant shall obtain a performance surety for all proposed sanitary and stormwater improvements on the approved plan. If the construction work is partially completed, the surety will be based on a status report submitted by the Developer's Engineer.
- Public easement documents shall include a site plan and specify the entitlements within the boundary of the easement.
- Deferred Improvements – In some situations, the responsibility to construct improvements may be deferred to the future Owner of a specific lot. Deferrals are at the discretion of the District and will be reviewed on a case-by-case basis. All deferred improvement(s) shall be fully constructed and completed in accordance with the Rules and applicable Standards, prior to any future occupancy permit approvals by the District. All responsibilities of the future Owner to construct the deferred improvements shall be stipulated in a separate document recorded as a covenant with the plat.
 - Subdivision Plats – Any deferred improvements must be part of a District-approved subdivision improvement plan.
 - Partition Plats – Eligible improvements are limited to Service Connections, Conveyance System, pervious surfaces, and stormwater facilities that either benefit one lot, or are shared facilities. In the case of shared facilities, the deferred improvements will be the responsibility of the first future lot Owner to submit a building permit application.
 - Other related agreements and documents (i.e., Homeowner's Association covenants, conditions and restrictions; maintenance agreements, etc.)

Plan Submittals

This section contains specific information and drawing specifications for submittals made to the District. This section is intended to standardize the submittals and clearly outline the minimum requirements. The requirement for a complete submittal package is intended to reduce the overall plan approval processing time. Plans will not be reviewed until a complete plan has been submitted. A complete plan shall include at a minimum all requirements listed in this section.

a. Specific Sheet Submittal Requirements and Specifications

The following sheets are required as part of a complete plan submittal:

- Title Sheet
- Composite Utility Plan
- Composite Stormwater Management Plan Cover Sheet
- Stormwater and Sanitary Sewer Plans and Profiles
- Grading Plan
- EPSC Plan
- Vegetated Buffer Planting Plan
- Stormwater Management Facility Planting Plan
- Standard and Non-Standard Drawings/Detail Sheets

- Standard and Non-Standard Construction Notes
- All applicable Standard Drawings shall be included on a separate sheet in a clear and legible size.

b. Title Sheet

As a minimum the following information shall be found on the title sheet:

- Index of Sheets.
- Complete legend of symbols used.
- Vicinity Map to a scale of not less than 1 inch = 800 feet showing the project location.
- Site Plan of the entire project showing street ROW and/or subdivision layout.
- Temporary and permanent benchmarks including their descriptions. Total acreage including streets directly served.

c. Composite Utility Plan

The Composite Utility plan shall be scaled to show the entire site on one sheet unless otherwise approved by the District and shall show:

- All proposed sanitary and storm improvements
- All other proposed improvements
- All existing utilities and utilities adjacent to and within 100 feet of the project
- Existing natural or artificial drainage features
- Tract names and numbers
- Property lines with tax lot numbers and addresses
- Street names at a minimum shall be shown

d. Composite Plan Cover Sheet (separate sanitary and storm)

The following information shall be included on the Composite Plan cover sheet:

- The scale shall be scale-appropriate to fit the entire site on one sheet, unless otherwise approved by the District
- Show the appropriate contour lines to demonstrate the overall site topography. Generally, these are 1-, 2-, 5-, or 10-foot contour lines. The topography must extend a minimum of 50 to 100 feet beyond the proposed limits of development
- Show the entire system
- Show the SMFs
- Shade all other utilities not related to sanitary sewer or stormwater drainage systems.
- Show drainageway(s) as existing and/or proposed.
- Show emergency overflow pathway(s) to an acceptable point of discharge.
- Show existing and/or proposed storm drainage and conservation easements.
- Show vegetated buffers and associated sensitive areas.
- Show all site and roadway improvements.

- Show the subdivision, phase lines or plat boundaries.

e. Plan and Profile Views

Plan and profile views shall include the following information:

Plan View

Plan views shall contain as a minimum the following information:

- The scale shall be 1 inch = 50 feet horizontal. Alternative scales may be approved by the District on a case-by-case basis. The scale shall be shown for each plan and profile view.
- Entire sanitary and storm sewers clearly shown and labeled.
- Plan views showing north predominantly to the top or left of each sheet.
- Plan views showing accurate 1- or 2-foot contour lines and extending a minimum of 50 feet to 100 feet beyond the limits of the development. Alternative contour spacing may be approved by the District on a case-by-case basis.
- All proposed extensions of the Conveyance Systems showing mainlines, manholes and Service Connections.
- Manholes identified and stationed to facilitate comparison of the plan view and the profile view.
- Manhole callouts in District format.
- District stationing formats for new lines and manholes.
- Size and type of pipe, backfill material, and location.
- Sanitary/Storm Service Connection tees off the mainline. For each lot being served, show the mainline stationing, pipe size, length, and depth of lateral at end of pipe.
- Public ROW, property, and easement lines.
- Location of water courses, stream and railroad crossings, culverts and storm drains that cross the alignment.
- Subdivision names, roadway names and lot/parcel numbers or tax lot numbers.
- Existing and proposed Sensitive Areas and the required Vegetated Buffer.
- Existing utilities, all manholes, water mains, services, gas mains, underground power, and other utilities and structures, including hydrants, pedestals, signs, mailboxes, light poles, wells, water mains, valves, pumps stations, and blowoff structures, manholes, valves, meter boxes, power poles, handicap ramps, striping, and trees.
- Existing and proposed edge of pavement on both sides of the street, including shoulders, curb, sidewalk, ditch line, culverts, and driveways.
- Plan view including the above items for a minimum distance of 50 feet to a maximum of 500 feet may be required beyond the proposed improvement in order to prevent future improvement conflicts.
- Location and dimensions of all SMFs, including the following:
 - Setbacks from property lines and structures,
 - Facility wall material, if required, and geotextile/waterproofing membrane specifications,

- Growing medium specifications,
 - Drain rock and filter fabric specifications,
 - All stormwater piping associated with each facility including pipe materials, sizes, slopes, IEs at bends and connections,
 - Ground elevations at catchment locations, channel inverts, top and toe of slope surrounding detention/retention areas,
 - Ground slopes of channel inverts and sides, parking lots, bottoms and sides of facilities and adjacent surroundings,
 - Invert and top or bottom elevations (if applicable) of pipes, catch basins, overflows, manholes or other similar structures.
 - Location of construction fencing used to protect proposed SMFs from compaction and other construction disturbance.
- Location of all drainageways and the 100-year flood plain.
 - Show the location and direction of any surface stormwater conveyance path(s).
 - Location and detail of all existing facilities on which work is to be performed, i.e., installation, repair, or removal.
 - Location and description of all known existing property monuments, including, but not limited to, section corners, quarter corners, donation land claim corners and any other county control monuments.
 - Street stationing may be shown on the construction plans, but later removed on the final as-built plans.
 - Roof drain connection points shall be shown using the ® symbol.
 - Sanitary and storm structures should be easily visible and shown drawn at least 2x the size of the line width and in proportion to the line weight.

Profile View

Profile views shall contain as a minimum the following information:

- Plan and profiles on each sheet shall match and line up on at least one edge of the drawing (i.e., profile to show pipe in same direction as the plan view and lined up plan view over profile).
- The scale shall be 1 inch = 50 feet horizontal and 1 inch = 10 feet vertical. Alternative scales may be approved by the District on a case-by-case basis. The scale shall be shown for each plan and profile view.
- Location of existing and proposed manholes and other appurtenances with each manhole numbered and stationed. Manhole numbers to be provided by District, if applicable. Manhole callouts shall be in the District format. The benchmark used as a basis for vertical control in the design shall be referenced on the plans.
- The location and elevation of an approved benchmark shall be shown on the plans or, if not within the proposed area of work, shall be referenced by number and location. Elevations shall be based on the NGVD88 datum if the project is within ½-mile of a County benchmark. A conversion factor to relate the existing connection point elevations to the plan elevations and benchmark.

- Grid lines using the horizontal and vertical scale.
- Existing and proposed ground and/or pavement surface with elevations noted at critical points.
- Sanitary/Storm lines shall be labeled with the name of the mainline centered under the profile view in large bold letters.
- Sanitary/Storm lines shall be labeled with the pipe size, material, slope (as a %), length and type of backfill between manholes.
- Nonstandard manholes must be labeled with the type (i.e., tamperproof, drop, flat top, etc.).
- Railroad, culvert, ditch, or stream crossings with elevations of the ditch or streambed and casing details.
- All existing and proposed storm, water, and any other crossing utility lines greater than 6 inches in diameter.
- Non-standard SMFs and appurtenances shall show a typical cross-section with dimensions.

f. Grading Plan

Projects requiring grading and/or fill activities will require the submittal and approval of grading plans prior to the beginning of such operations. The District will review the grading plan in the context of the overall Stormwater Management Plan. Generally, an additional grading permit and/or approval are required by the local authority or State agency governing such activities. It is the responsibility of the Applicant to obtain all necessary permits and approvals prior to beginning any grading activity.

Grading plan views shall contain as a minimum the following information:

- Total land area and proposed Disturbed Area,
- Existing topography and impervious area,
- Proposed topography and impervious area,
- 1-, 2-, or 10-foot contour intervals (as applicable),
- Elevations of all existing and proposed streets, alleys, utilities, sanitary and stormwater sewers, and existing buildings and structures,
- Natural or artificial drainageways,
- Limits of flood plains (as applicable),
- Existing and proposed slopes, terraces, or retaining walls,
- All existing and proposed SMFs, drainage structures and/or features, and devices used to protect these areas during construction,
- All stormwater structures/features on-site, upstream, and downstream of the site,
- EPSC Plan (as applicable),
- Drainage calculations when required,
- Drainage easements when required,
- Geotechnical report (if applicable),

- Any other supporting documentation necessary to evaluate the existing and/or proposed site conditions for stormwater management.

g. Erosion Prevention and Sedimentation Control Plan

The general process and requirements for EPSC Plans is outlined in the Stormwater Standards. For specific details on erosion control BMP measures and applications see the **Erosion Prevention and Sediment Control Planning and Design Manual** adopted by the District. A link to this manual can be found on the District website.

If a 1200-C or 1200-CN Permit is required, the EPSC Plan shall meet the requirements of the 1200-C Program, in addition to the following list:

- The total acreage of the site and the total acreage of the proposed Disturbed Area.
- Adjacent offsite drainage patterns indicated by arrows.
- Contours at 2-foot intervals. Where slopes exceed 15 percent, contours may be shown at 5-foot intervals.
- North arrow.
- Existing and proposed structures for the project site.
- Existing and proposed access location for the project site.
- Existing project boundaries, rights-of-way, easements, and jurisdictional boundaries clearly identified by note, symbol, or key.
- Adjacent streets with street names and ROW boundaries.
- Capacity and condition of existing drainage facilities, including roadside or other drainage ditches, that transport surface water onto, across, or from the project site.
- Existing Sensitive Areas, vegetated corridors, and water quality and quantity facilities. For natural drainage features, show direction of flow, drainage hazard areas, and the 100-year floodplain.
- Clearing and grubbing limits.
- Proposed ground contours.
- For multi-phase projects, phasing of any EPSC work clearly indicated on the plan.
- Details of proposed EPSC BMPs.
- EPSC Plan to include a key signifying BMP measure used and placement on EPSC Plan.
- When sedimentation ponds are proposed, at least one cross section detail shall be shown.
- Vegetation/permanent site stabilization measures.
- If submitted independently of the full project plans, a cover sheet with the proposed name of the development, the name and address of the Applicant and Developer, the name and address of the Developer's Engineer, and the land use case file number from the local planning authority.

h. Vegetated Buffer Planting Plan

If restoration of a Water Quality Resource Area or vegetated buffer is required in the **Stormwater Standards**, a plan addressing the requirements shall be submitted.

The construction plans and specifications shall include:

- Water Quality Resource Area and required vegetated buffer boundaries.
- The limits of any approved, temporary construction encroachment.
- Orange construction fencing noted at vegetated buffers as well as at encroachment limits during construction.
- Permanent type fencing and signage at the development and the vegetated buffer boundary noted and details shown.
- Conservation easement documents prepared and easement area shown on the plan.
- Site preparation plan and specifications, including limits of clearing, existing plants, and trees to be preserved, and methods for removal and control of invasive, non-native species, and location and depth of topsoil and or compost to be added to re-vegetation area.

Planting plans and specifications shall include the following information:

- Planting table that documents the common name, scientific name, distribution (planting zone, spacing, and quantity), condition and size of plantings, and installation methods for plant materials listed.
- Mulching rates.
- Plant tagging for identification noted.
- Plant protection methods.
- Seeding mix, methods, rates, and areas delineated.
- Irrigation plan and specifications, including identification of water source, watering timing and frequency, and maintenance of the system.
- Maintenance schedule, including responsible party and contact information; dates of inspection (minimum three per growing season and one prior to onset of growing season); and estimated maintenance schedule (as necessary) over the two-year monitoring period.
- “Good” rated corridor notes (i.e., invasive species removal shall be replanted with native vegetation).
- Access points for installation and maintenance, including vehicle access if available.
- Standard drawing details (north arrow, scale bar, property boundaries, project name, drawing date, Developer’s Engineer and Owner).

i. Stormwater Management Facility Planting Plan

The Stormwater Management Facility Planting Plan shall include planting information for each SMF based on requirements of the **Stormwater Standards**.

Planting plan specifications and plans must address all elements that ensure plant survival and overall SMF functional success. At a minimum, landscape specifications and plans must include:

- A planting plan that indicates existing vegetation to be preserved; protective construction fencing; the location of all landscape elements; and the size, species, and location of all proposed plantings. The plant species should be selected and placed in accordance with proper delineation and location of moisture zones where appropriate.

- A plant list or table that includes botanic and common names; size at time of planting; quantity; spacing; type of container; evergreen or deciduous; and other information related to the facility-specific planting in accordance with landscape industry standards. Also include the square footage of each plant zone and the numbers and types of each plant required and provided in each zone.
- A soil analysis for the SMF growing medium (required for all public facilities and may be required for private facilities. A soil analysis is not required for single-family residential sites). The source of the growing medium must be provided. The location of all stockpiles must be indicated on plans, and erosion protection measures included on the EPSC Plan.
- The method of temporary irrigation to be used for the plant establishment period.
- Stormwater Management Facility Planting Plan shall also include all areas requiring protective construction fencing to shield the area from construction traffic and compaction.

j. Landscape Plan

Landscape plans for publicly maintained SMFs shall be prepared, stamped with the seal of, and signed by, a Landscape Architect, registered in the State of Oregon. Plans for privately maintained SMFs do not require the involvement of a Landscape Architect. Landscape Plans shall include the following a detailed landscape plan, at a scale of 1 inch equals 20 feet shall be provided for each landscaped SMF. This plan may be combined with the grading plan. The landscape plan shall include the following:

- Existing vegetation to be preserved and protective construction fencing.
- Areas of SMFs to be designated with construction fencing to protect from construction traffic and compaction.
- Final ground contours at a minimum of a 2-foot contour interval.
- Location of top and toe of slope.
- Limits of embankment designed to impound water.
- Location of all drainage structures as well as any other piped utilities in the vicinity.
- Limits of areas to receive amended topsoil and growing medium.
- A plant list or table, including botanic and common names, size at time of planting, quantity, spacing, type of container, evergreen or deciduous, and other information related to the facility-specific planting, in accordance with landscape industry standards.
- Location of stockpiles (erosion protection measures must be shown on the EPSC Plan).
- Method of temporary irrigation to be used for the establishment period.
- Location of maintenance access, as applicable.

k. Standard Drawings/Detail Sheets

The construction plans shall include a sheet containing all the standard details applicable to a specific project.

The purpose of the District Standard Drawings and Details is to provide basic information as a convenience to those who use them in their designs. These drawings and details are also intended to communicate design standards and practices to the Developer's Engineer.

Detailed drawings shall be included with all construction plans where Standard Drawings do not apply. If a standard drawing, such as a manhole, must be modified to fit existing, or unique conditions, the modified detailed drawing shall be shown on the plan and profile sheet. When appropriate, due to required detail complexity, a separate detail sheet shall be used.

Standard Drawings are available for use on development projects and cannot be modified by designers on a project-by-project basis. It is the responsibility of the Developer's Engineer to incorporate these drawings as originally intended.

Non-standard detail drawings shall be the responsibility of the Developer's Engineer to demonstrate that site conditions require a non-typical device or structure and submit the specifications and supporting documentation to the District for approval. All non-standard details shall be shown on the Stormwater Management Plan.

Stormwater Management Facility Detail sheets are included in the **Stormwater Standards**. A link to additional Standard Details can be found on the District website.

I. General Sanitary/Stormwater Construction Notes

General construction notes required on the plans can be found on the District website or provided upon request. These general construction notes shall be included on the sanitary and Stormwater Management Plans. These notes are required, and the design professional may include other applicable notes they deem necessary.

m. General Sheet Submittal Specifications and As-built Requirements

The following subsections outline general submittal specifications for sheet size, scales, north arrow, text, labeling callout, and title block specification requirements.

Sheet Dimension Requirements

Construction plans shall be clear and legible and submitted on blue-line paper 22 by 34 inches or 24 by 36 inches in size with a 1½-inch clear margin on the left edge and ½-inch margins on all other edges.

Title Block

Located on the bottom edge or at the right side of the drawing, showing the project name, drawing name/type, completed modification date table, the submittal date, drawing number, Developer's Engineer's name, address and official stamp, the Developer/Owner's name and address and where applicable, the name of the plat of subdivision and/or name of development.

Drawing Scale Requirements

The following general layout guideline shall be used:

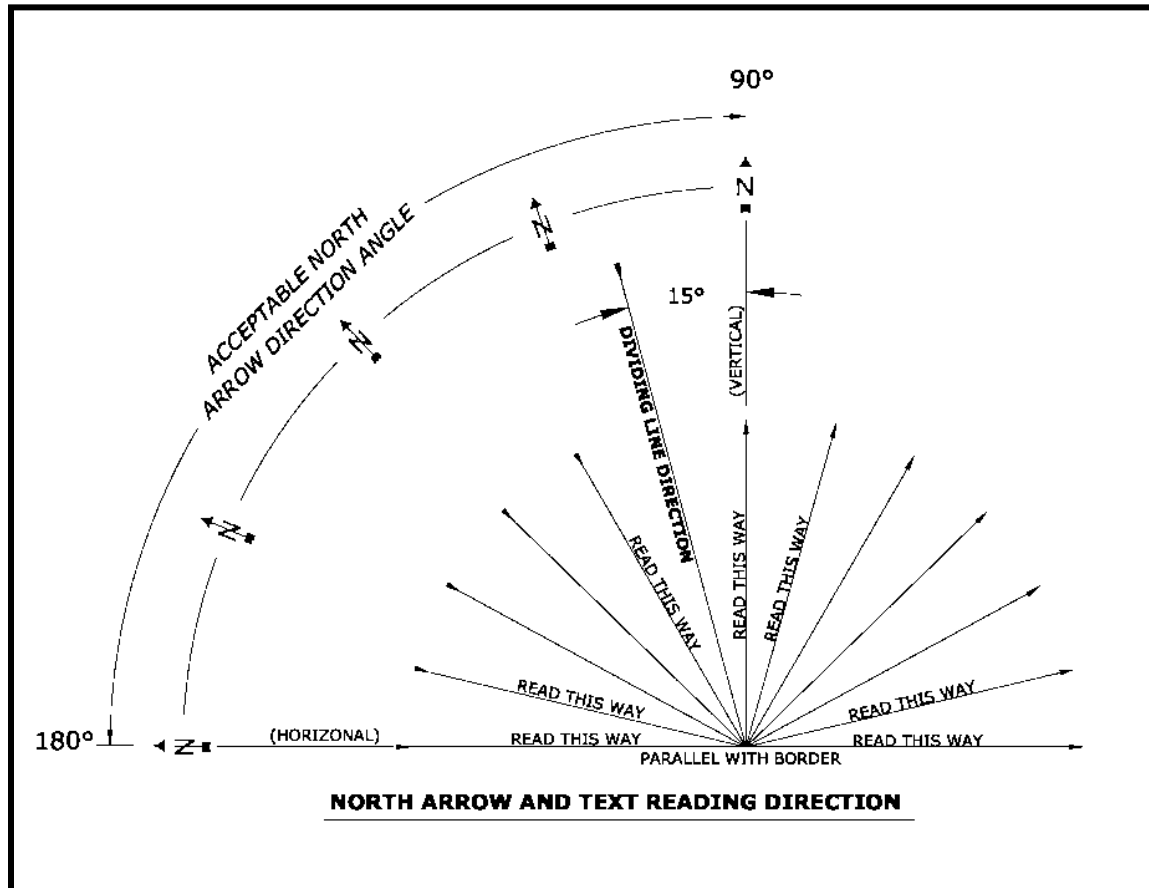
- Plan and Profile sheets shall be 1 inch = 50 feet horizontal and 1 inch = 10 feet vertical. The District may approve alternative scales on a case-by-case basis.
- Each sheet shall include a bar scale with text.

North Arrow Requirements

Each sheet shall include a north arrow. Each separate view on each sheet shall have its own north arrow. The north arrow in each view should face the top (VERTICAL) on the sheet if possible. It is acceptable to align the north arrow off vertical if the project does not fit vertically facing north; it can be rotated counterclockwise as much as 90 degrees.

For acceptable north arrow angle directions see **Figure 5**.

Figure 5. North Arrow and Text Reading



Lettering/Text Requirements

- Text Rotation
 - Text should be readable from either the bottom or right edge of the sheet. For acceptable text reading direction, see **Figure 5**.
- Lettering Size and Style
 - Lettering Size
 - The minimum lettering size shall be eight-hundredths (0.08) of an inch high for existing items and a minimum lettering size shall be ten-hundredths (0.10) of an inch high for new items. Items shall be legible and reproducible.
 - Lettering Style

- Standard text styles should be used. All lettering should be upper case.

Labeling Requirements

- Sanitary and storm structures, proposed and existing, shall be labeled on each sheet.
- All street names are to be labeled in each model space window.
- All tax lots and easements within the development and surrounding area pertaining to the project shall be clearly labeled.
- Non-standard storm structures (e.g., Flat Top Manhole) shall be labeled with the unique structure type after the structure name.

Plan and Profile Views-Structure and Pipe Callouts

Plan View Leader Line Requirements (see **Figure 6** and **Figure 7**)

- Leader lines must angle off horizontal and vertical planes from the center point of the structure in plan view. Horizontal and vertical leader lines are acceptable in profile view.
- Leader lines should have an arrow.
- The leader line arrow should touch the edge of the symbol and point to the center of the structure.

Figure 6. Accepted Leader Practice

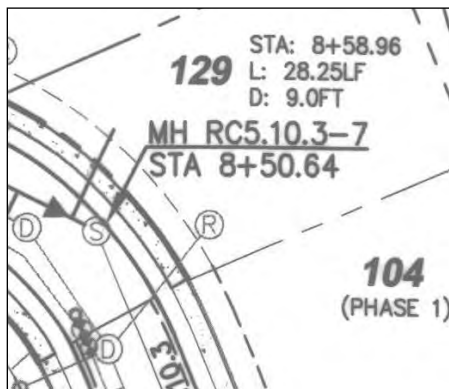
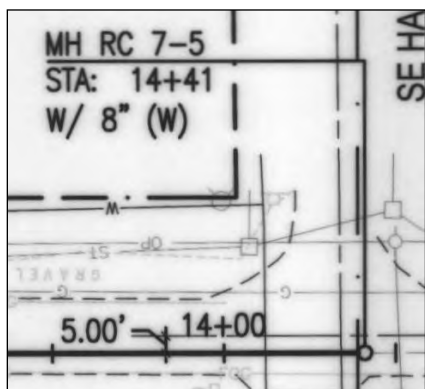


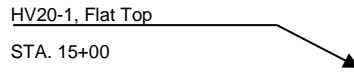
Figure 7. Not Accepted Leader Practice



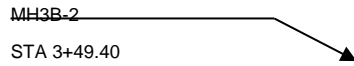
General Sanitary/Storm Structure Callouts in Plan and Profile Views

Street stationing and other related information is allowed on the construction plans; however, this must be removed on the accepted as-built plans.

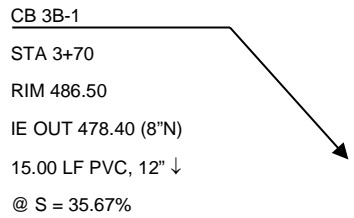
Plan View–Non-Typical Manhole Callout:



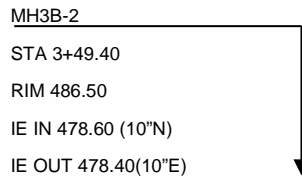
Plan View–Manhole Callout:



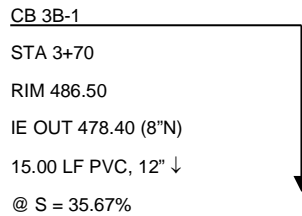
Plan View–Catch Basin and Other Structures:



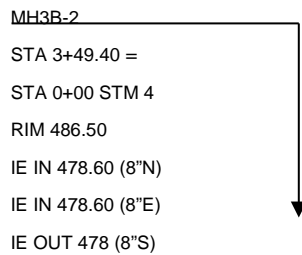
Profile View–Manhole Callout:



Profile View–Catch Basin and Other Structures:



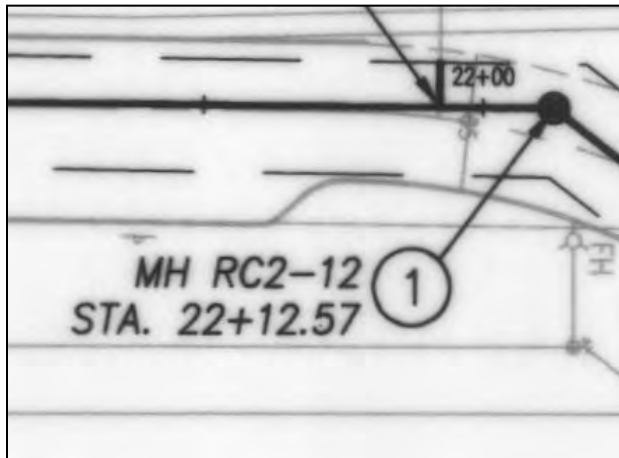
Profile View–Manhole Callout with Multi IE IN:



Reference Balloons

In general, note reference balloons are not allowed. The District will determine the type and format of all callouts on the final as-built drawings if notes are included. If reference balloons are used on construction drawings then the structure name callout must precede the number as shown below in **Figure 8**.

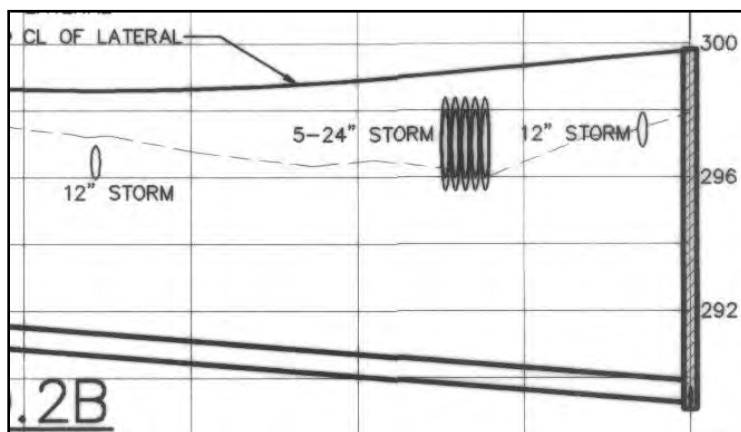
Figure 8. Reference Balloon



Utility Crossings

Show and label all storm, sanitary, waterline, gas and all other utilities that are 6 inches or larger that cross the pipeline alignment in the profile view. Utility invert and crown elevations may be required if they are in close proximity to a proposed storm line. See **Figure 9**.

Figure 9. Utility Profile



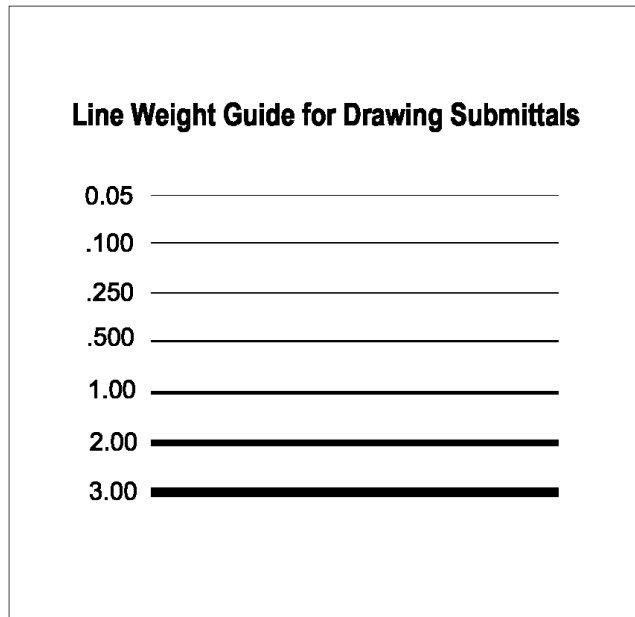
n. Plan and Profile View Sheet Specifications

Plan and Profile Views shall contain the following information:

- Follow the Line Weight Guide for Drawing Submittals, **Figure 10**
- Screening layers during plotting will not be permitted for any line types on plots except for widely spaced hatching. Screening lines are not allowed on as-built record drawings.

- The primary structures and pipes (storm) shall appear **BOLD** and stand out against all other background features in both the plan and profile views, i.e., only the applicable conveyance lines and appurtenances should appear bold on submittals.

Figure 10. Line Weight Guide



Plotted Line Widths:

Lines shall be plotted in millimeters and widths and plotted at 1 inch = 50 feet in model space and 1:1 in paper space. The line widths should be plotted the thickness of the lines as illustrated in Figure 10.

Screening of line weights is prohibited for illustration of line weights. Solid gray lines may be used in place of screening lines.

Plan View:

The plan and profile showing the proposed mainline extensions and Service Connections shall have a line weight of 3.00 millimeter (mm) (black). The sanitary or storm in the background shall have a width of 1.00 mm.

Existing contour lines in the plan view may be drawn as a dashed or solid line type; black or gray; between 0.250-0.500 mm in weight.

Profile View:

Profile view of the proposed system mainline shall be drawn at a line weight of 2.00 mm. Other utilities shown in the background shall be drawn at a line weight of 0.500 mm in either black or gray.

Existing sanitary/storm lines shall be shown in the profile view as a dashed black or a gray line in a line weight of 1.00 mm.

Other associated line specifications for plan and profile views:

Profile view gridlines:

- Primary – 0.250 mm/black
- Secondary – 0.050 mm/black
- Tax lots, parcels, property, and easement lines – 1.00 mm/black
- Roadway improvements – 0.500 mm/black
- All other utilities – 0.250 mm/black or gray
- Subdivision or plat boundary – 2.00 mm/black or gray

As-Built Submittal Requirements

The District requires the sanitary and storm plans shall be as-built prior to the acceptance of the project. As-built drawings are necessary to assure the project was constructed per the approved plans and/or meet the requirements of these Standards. The Developer's Engineer of record is responsible for record keeping, inspection, and preparation of the as-built drawings. Final as-built drawings will be submitted in the following manner, paper(s), CAD files and PDF files.

a) Survey requirements

The following Public Sanitary System structures shall be surveyed, and the as-built elevation and location shall be noted on the final as-built drawings:

- i. I.E. ins, outs and rim elevations of the:
 - Point of connection, existing downstream manholes, and structures,
 - Dead end manholes, cleanouts, and structures,
 - Any manhole or structure that may be extended in the future,
 - Any substantial change in the approved plans that deviate more than 0.250-feet in elevation or alignment.
 - A table listing the Service Connections for each building lot noting the mainline stationing, the measurement in linear feet of the location of the Service Connection from the center of the upstream and downstream manholes, pipe size, pipe length, and pipe depth at the property line crossing.
 - Show alignment changes, slope changes, IE changes, pipe size changes and changes in construction materials.
 - Measured depth from existing ground surface of all storm, sanitary, waterline and utilities that cross the pipeline alignment in profile.
 - Type of pipe, backfill material and location.

b) Paper As-built Drawing Requirements

As-built drawings shall contain, at a minimum, the following information:

- For all publicly maintained systems and all public and private detention and SMFs, the Developer's Engineer shall submit certified as-built plans and profile drawings.
- Each page shall be stamped by the Developer's Engineer and stated in writing that it is an as-built drawing.

- Show final pipe alignment, slope, pipe size, and pipe material type in the appropriate view.
- Indicate areas of rock removal not completed by standard backhoe, i.e., splitter or blasting.
- As-built drawings and electronic drawings shall become the unencumbered property of the District and are public records that may be distributed as the District deems necessary.
- Two (2) sets of full sized “Draft” as-built drawings on blue-line shall be submitted to the District for review and redline mark-up prior to final paper, electronic file format submittal, and PDF files.
- The final as-built drawings shall be black-line drawings on paper. High quality plotting preferences must be used so the paper, when photocopied and/or scanned, is capable of being reproduced with all details legible at an archival quality.
- On the applicable Plan View sheet show a table listing the following information for each sanitary and/or storm Service Connection; mainline stationing, measurement in linear feet of the location of the Service Connection from the center of the upstream and downstream manholes, pipe size, pipe length, and pipe depth of the service lateral at the property line.
- Street stationing and information not related to the storm system construction is not allowed on the as-built plans; however, this information is acceptable on the construction plans.
- Remove all hatching associated with material type.
- The subdivision name shown in the title block shall match the name shown on the plat.

c) CAD Requirements for As-Built Drawings

General Requirements:

- AutoCAD electronic files must be compatible with the AutoCAD version the District is currently running.
- Standard fonts, shapes and line types are required.
- All drawings are to be plotted in paper space at a scale of 1:1.
- For specific line weight requirements see **Figure 10**.
- Show the project boundary in **BOLD** type.
- All manholes, catch basins, fire hydrants, valves, meters, etc. are to be inserted as blocks. All blocks are to be created on layer 0.
- Not allowed are blocked x-refs and preferences or permissions set, so that the District cannot access each layer individually.
- All drawings are to be seamless and drawn in model space.
- Drawings are NOT to be rotated off of world coordinate bases.
- Drawings are to be delivered purged of all unused layers, blocks, line types, and styles.
- The drawing files saved to disk shall be ready to plot when opened and be the same dated file used to plot the paper as-built.
- SoftDesk point files are not requested and should not be transmitted. Combination files are acceptable.
- The final as-built drawing files are to be saved under one file folder. All drawings, x-refs, plot files, images, text, and shape files are to be in this one file folder.

- Only pertinent files are to be submitted in this project folder. NO revisions, SoftDesk files, log times, or miscellaneous DWGs are to be submitted.
- Before approval will be given, the digital file and hard copy will be evaluated to verify that they are the identical drawings and to make sure all required and only necessary files are included.
- The electronic as-built drawings shall be submitted along with a completed “As-built Release of Liability Form” and all contents shall become the property of the District.
- Provide the CAD as-built project drawings in digital data and saved to compact disk or flash drive for transmittal to the District.
- Use of a self-extracting PKZIP file format is acceptable. Use of compressed file(s) is allowed only if the decompression program is included.

Disks Labeling Requirements:

- Title of project
- The District (WES Log#) project file number
- Specify contents of the disk (DWGs)
- Name of the Developer’s engineering firm submitting the files
- The project completion date.

d) PDF File Requirements for As-Built Drawings

AutoCAD electronic files must be compatible with AutoCAD version the District is currently running.

As-built drawings and electronic drawings shall become the unencumbered property of the District and are public records that may be distributed as the District deems necessary.

The PDF files shall represent an exact copy of the paper as-built drawings.

General Conditions for Performance And Warranty Surety

The District may require the Applicant to submit a surety, cashier’s check, or irrevocable letter of credit from an acceptable financial institution to guarantee performance or warranty in completion of the improvements required by these standards. Upon default, the District may draw upon the surety or available funds to complete the remaining work or remedy violations. The different types of acceptable surety are listed below.

a) Surety – Types of Acceptable Guarantees

Surety shall be provided only through State regulated surety companies while assignment or commitment of savings or loan proceeds shall be through State regulated financial institutions. Cash Acknowledgment is a cash surety held directly by the District.

b) Surety Forms

All sureties shall be submitted with forms provided by the District or other authority having jurisdiction to permit or regulate the activity. All sureties are subject to review and approval by the District’s legal department.

c) Performance Surety

The Applicant shall provide a Performance Surety acceptable to the District prior to recording of the plat for residential developments or the issuance of building permits for commercial or industrial developments, if the required public improvements are not completed and/or accepted by the District.

The following conditions shall be met prior to acceptance of the Performance Surety:

- The Performance Surety shall be in the amount of 125 percent of the Developer's Engineer's cost estimate for all approved but uncompleted sanitary and stormwater improvements, including landscaping requirements. The Developer's Engineer's cost estimate for the required improvements will be approved by the District.
- Nothing herein shall limit the Owner's responsibility for repair and maintenance to the amount of the surety.

The following conditions shall be met prior to release of the Performance Surety:

- All improvements must be completed as shown on the approved plans and accepted by the District in accordance with the Rules, Regulations, and Standards.
- A warranty surety shall be provided to the District prior to release of the Performance Surety.

If the Applicant fails to comply with the conditions of approval and the approved plans, the District may call upon the Performance Surety to complete the improvements according to the approved plans.

At the end of the surety period when all conditions are satisfied, the residual surety amount shall be released.

d) Warranty Surety

In general, the Warranty Surety is posted by the surety principal to the District to ensure the principal will maintain, repair, replace and be responsible for damage to the improvements for a period of 2 years following the date the District deems the improvements complete and a letter of completion and/or acceptance is issued.

The following conditions shall be met prior to acceptance of the Warranty Surety:

- The Warranty Surety shall be in the amount of 25 percent of the actual constructed cost for all constructed sanitary, stormwater, and vegetated buffer vegetated buffers are covered in the warranty bond improvements. The Developer's Engineer's cost data sheet will be approved by the District.
- The Warranty Surety shall be in favor of the District and be issued for a minimum two-year period from the date of completion of the sanitary or storm system.
- Nothing herein shall limit the Owner's responsibility for repair and maintenance to the amount of the surety.
- Upon notification from the District, the principal shall, within 30 days complete corrective measures to the satisfaction of the District.
- The District may perform emergency work without notice to the principal or surety.
- All work performed by the District due to the nonperformance of the principal or in response to an emergency shall be reimbursed to the District within 30 days of invoice.

- If the principal fails to reimburse the District in 30 days, the District may demand payment from the Surety.
- The warranty period may be extended, if the required improvements show any signs of failure during a final warranty release inspection.

The following conditions shall be met prior to release of the Warranty Surety:

- The Owner or Developer shall perform a thorough cleaning of all sanitary and stormwater improvements.
- The District shall make a determination of final completion in conformance with the approved plans, specifications, and District standards as well as conduct a final warranty surety inspection of all sanitary and stormwater improvements, including landscaping in any SMF and vegetated buffer. If more than 20 percent of the total area within a SMF or Vegetated Buffer is not in compliance with the approved plans, then the vegetated plantings will be replanted and/or repaired to meet the requirements of the approved plans. If replanting of the SMF or Vegetated Buffer is required, then an additional 1-year warranty surety in the amount of 25% of the cost of replanting all of the effected vegetated planting areas shall be required. The additional 1-year warranty surety will be renewed annually until the vegetated plantings are acceptable to the District.
- Any deficiencies resulting in non-acceptance of the work permitted shall be identified in writing on a final punch list and presented to the Developer's Engineer and/or Permittee with a date named for correction and completion. Upon correction of the noted deficiencies and the determination that all work is in conformance with District Standards, the work will be deemed complete and all sureties shall be released.

2. Infiltration Testing Requirements

To properly size and locate SMFs, it is necessary to characterize the soil infiltration conditions at the location of the proposed facility. All projects that require a SMF shall evaluate existing site conditions and determine if the site's infiltration rate is adequate to support the proposed SMF. The following sections provide the approved methods for testing infiltration and setting the design infiltration rate. District staff may require additional testing on a case-by-case basis.

Basic Method – Open Pit Test

The Basic Method – Open Pit Test (Basic Method) is applicable only to projects on private property with less than 10,000 sf of new or redeveloped impervious area. The results of infiltration testing shall be documented on the Basic Method Form. The Basic Method cannot be used for projects that have known downstream conveyance problems.

The intent of the Basic Method is to determine whether or not the local infiltration rate is adequate (0.5-inches/hour) to support a SMF that infiltrates. It is recommended but not required that the Basic Method infiltration test is conducted by a licensed professional.

1. Conduct one test for each proposed SMF. The test should be where the facility is proposed or within the direct vicinity.
2. Excavate a test hole to the depth of the bottom of the infiltration system, or otherwise to 4 feet. The test hole can be excavated with small excavation equipment or by hand using a shovel, auger, or posthole digger.

3. If a layer hard enough to prevent further excavation is encountered, or if noticeable moisture/water is encountered in the soil, stop, measure, and record this depth from the surface. Proceed with the test at this depth.
4. Fill the hole with water to a height of about 6 inches from the bottom of the hole (or to one-half the maximum depth of the proposed facility) and record the exact time. Check the water level at regular intervals (every 1 minute for fast-draining soils to every 10 minutes for slower-draining soils) for a minimum of 1 hour or until all of the water has infiltrated. Record the distance the water has dropped from the top edge of the hole.
5. Repeat this process two more times, for a total of three rounds of testing. These tests should be performed as close together as possible to portray the soil's ability to infiltrate at different levels of saturation accurately. The third test provides the best measure of the saturated infiltration rate.
6. For each test pit required, submit all three testing results with the date, duration, drop in water height, and conversion into inches per hour.

If the results of the Basic Method show an infiltration rate greater than 0.5-inches per hour, the Applicant can proceed with SMF design that uses infiltration. If the Applicant would like to use an infiltration rate for design purposes, a Professional Method Infiltration Test shall be conducted.

Professional Method

The Professional Method shall be used for all public and private developments with more than 10,000 sf of new or redeveloped impervious area. The Professional Method may be required by the District a public and private development of any size with known downstream conveyance problems. The qualified professional shall exercise judgment in the selection of the infiltration test method.

Testing Criteria

Testing shall be conducted or observed by a qualified professional. This professional shall be a PE, Registered Geologist, or Certified Engineering Geologist licensed in the State of Oregon.

The location and depth of the test shall correspond to the facility location and depth.

Infiltration testing should not be conducted in engineered or undocumented fill.

Boring logs shall be provided as supporting information with infiltration and depth to groundwater tests.

All testing data shall be documented in the project submittals. The submittals shall demonstrate that the proposed facilities are sized appropriately for the tested infiltration rates.

Depth and Location of Required Tests

Infiltration tests shall be performed at the base of the proposed facility.

If a confining layer, or soil with a greater percentage of fines, is observed during the subsurface investigation to be within 4 feet of the bottom of the planned infiltration system, the testing shall be conducted within that confining layer.

Tests shall be performed in the immediate vicinity of the proposed facility. Exceptions can be made to the test location provided the qualified professional can support that the strata are consistent from the proposed facility to the test location.

For relatively deep stormwater facilities, a hollow stem auger with an electronic measuring tape can be used, provided there is an adequate seal between the auger and the native soil.

Factors of Safety

Table 18 lists the recommended factors of safety to be applied to field-obtained infiltration rates for use in stormwater system design. To obtain the infiltration rate used in design, divide the infiltration rate measured in the field by the factor of safety. The factor of safety used in design should be chosen by collaboration between the geotechnical engineer or geologist overseeing the infiltration testing and the civil engineer designing the stormwater management system.

Determination of the factor of safety shall include consideration of project specific conditions such as soil variability, testing methods, consequences of system failure, complexity of proposed construction, and other pertinent conditions. The design infiltration rate after applying the safety factor shall not exceed 100 in/hr for non-vegetative facilities, such as drywells or infiltration chambers. Vegetated facilities with growing media shall be designed at a maximum infiltration rate of 6.0 in/hr through the growing media.

Table 18. Infiltration Rate Safety Factors

Test Method	Recommended Correction Factors
Encased Falling head	3
Open Pit Falling Head	2
Double-Ring Infiltrometer	Public Facilities: 1 Private Facilities: 2

Open Pit Falling Head Procedure

The open pit falling head procedure is based on the EPA Falling Head Percolation Test Procedure (Onsite Wastewater Treatment and Disposal Systems Design Manual, EPA/625/1-80-012, 1980). The test is performed in an open excavation and therefore is a test of the combination of vertical and lateral infiltration.

1. Excavate an approximately 2-foot by 2-foot-wide hole into the native soil to the elevation of the proposed facility bottom. The test can be conducted in a machine-excavated pit or a hand-dug pit using a shovel, posthole digger, or hand auger. If smooth auguring tools or a smooth excavation bucket is used, scratch the sides and bottom of the hole with a sharp-pointed instrument, and remove the loose material from the bottom of the test hole.
2. A 2-inch layer of coarse sand or fine gravel may be placed to protect the bottom from scour and sloughing.
3. Fill the hole with clean water a minimum of 1 foot above the soil to be tested and maintain this depth of water for at least 4 hours (or overnight if clay soils are present) to presoak the native material.
4. Percolation rate measurements shall be made after 15 hours and no more than 30 hours after the soaking period begins. It is important that the soil be allowed to soak for a sufficiently long period of time to allow the soil to swell if accurate results are to be obtained. Any soil that sloughed into the hole during the soaking period shall be

- removed and the water level shall be adjusted to 6 inches above the added gravel (or 8 inches above the bottom of the hole).
5. In sandy soils with little or no clay, soaking is not necessary. If after filling the hole twice with 12 inches of water, the water seeps completely away in less than 10 minutes, the test can proceed immediately.
 6. The measurements should be made with reference to a fixed point. A lath placed in the test pit prior to filling or a sturdy beam across the top of the pit are convenient reference points. The tester and excavator should conduct all testing in accordance with OSHA regulations.
 7. Measure the water level to the nearest 0.01-foot (1/8-inch) at 10-minute intervals for a total period of 1 hour (or 20-minute intervals for 2 hours in slower soils) or until all of the water has drained. At no time during the test is the water level allowed to rise more than 6 inches above the gravel.
 8. Successive trials shall be run until the measured infiltration rate between two successive trials does not vary by more than 5 percent. At least three trials shall be conducted. After each trial, the water level is readjusted to the 12-inch level. Enter results into the **Infiltration Test Data Table** provided at the end of this section as **Table 19**.
 9. The results of the last water level drop are used to calculate the tested infiltration rate. The final rate shall be reported in inches per hour. See the calculation following the **Infiltration Test Data Table** provided at the end of this section.
 10. For very rapidly draining soils, it may not be possible to maintain a water head above the bottom of the test pit. If the infiltration rate meets or exceeds the flow of water into the test pit, conduct the test in the following manner:
 - a. Approximate the area over which the water is infiltrating.
 - b. Using a water meter, bucket, or other device, measure the rate of water discharging into the test pit.
 - c. Calculate the infiltration rate by dividing the rate of discharge (cubic inches per hour) by the area over which it is infiltrating (square inches).
 11. Upon completion of the testing, the excavation shall be backfilled

Encased Falling Head Test Procedure

The encased falling head procedure is based on a modification of the EPA Falling Head Percolation Test Procedure (Onsite Wastewater Treatment and Disposal Systems Design Manual, EPA/625/1-80-012, 1980). The most significant modification is that this test is performed with a 6-inch casing that is embedded approximately 6 inches into the native soil. The goal of this field test is to evaluate the vertical infiltration rate through a 6-inch plug of soil, without allowing any lateral infiltration. The test is not appropriate in gravelly soils or in other soils where a good seal with the casing cannot be established.

1. Embed a solid 6-inch-diameter casing into the native soil at the elevation of the proposed facility bottom (see **Figure 11**). Ensure that the embedment provides a good seal around the pipe casing so that percolation will be limited to the 6-inch plug of the material within the casing. This method can also be applied to testing within hollow stem augers, provided the driller and tester are reasonably certain that a good seal has been achieved between the soil and auger.

2. A 2-inch layer of coarse sand or fine gravel may be placed to protect the bottom from scour and sloughing.

3. Fill the pipe with clean water a minimum of 1 foot above the soil to be tested and maintain this depth for at least 4 hours (or overnight if clay soils are present) to presoak the native material.

Percolation rate measurements shall be made after 15 hours and no more than 30 hours after the soaking period begins. It is important that the soil be allowed to soak for a sufficiently long period of time to allow the soil to swell if accurate results are to be obtained. Any soil that sloughed into the hole during the soaking period shall be removed and the water level shall be adjusted to 6 inches above the added gravel (or 8 inches above the bottom of the hole).

In sandy soils with little or no clay, soaking is not necessary. If after filling the hole twice with 12 inches of water, the water seeps completely away in less than 10 minutes, the test can proceed immediately.

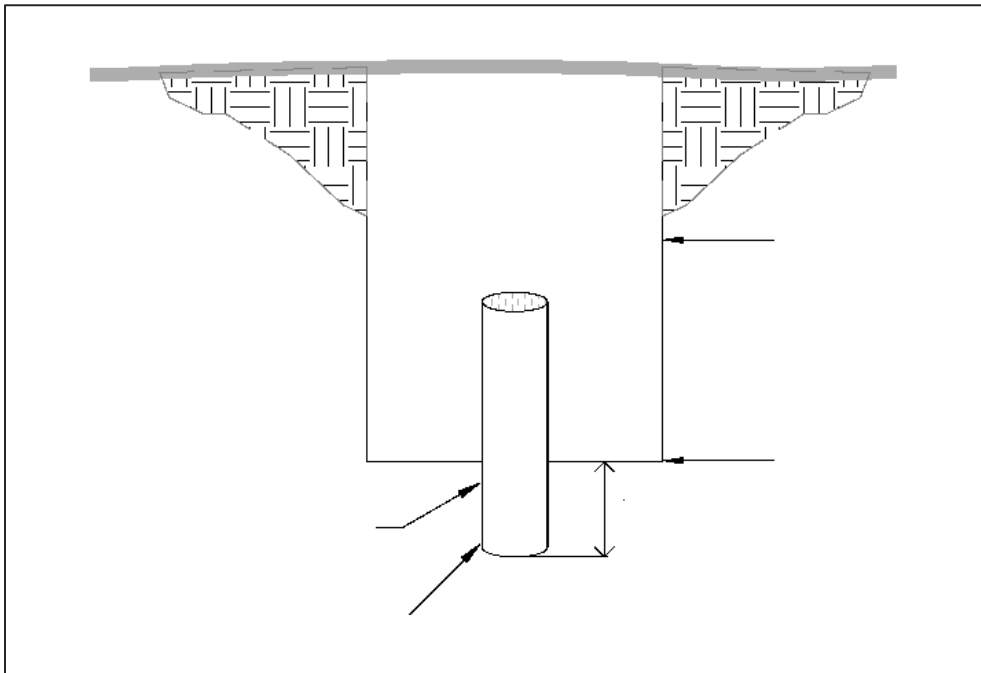
4. To conduct the first trial of the test, fill the pipe to approximately 6 inches above the soil and measure the water level to the nearest 0.01-foot (1/8-inch). The level should be measured with a tape or other device with reference to a fixed point. The top of the pipe is often a convenient reference point. Record the exact time.

5. Measure the water level to the nearest 0.01-foot (1/8-inch) at 10-minute intervals for a total period of 1 hour (or 20-minute intervals for 2 hours in slower soils) or until all of the water has drained. The infiltration test is continued until the measured infiltration rate between two successive trials does not vary by more than 5 percent. At least three trials shall be conducted. After each trial, the water level is readjusted to the 6-inch level. Enter results into the **Infiltration Test Data Table** provided at the end of this section. At no time during the test is the water level allowed to rise more than 6 inches above the gravel.

6. The result of the last water level drop is used to calculate the tested infiltration rate. The final rate shall be reported in inches per hour.

7. Upon completion of the testing, the casings shall be immediately pulled, and the test pit shall be backfilled.

Figure 11. Encased Falling Head



Double Ring Infiltrometer Test

The double-ring infiltrometer test procedure shall conform with ASTM 3385-94. The test is performed within two concentric casings embedded and sealed to the native soils. The outer ring maintains a volume of water to diminish the potential of lateral infiltration through the center casing. The volume of water added to the center ring to maintain a static water level is used to calculate the infiltration rate. The double-ring infiltrometer is appropriate only in soils where an adequate seal can be established.

This test may be difficult to perform where the tested soil strata are in a pit since careful regulation of the static volumes is necessary.

Reporting Requirements

In addition to the information required by the state for a signed and stamped Geotechnical Engineering Report, the following information shall be included in the project's submittals.

1. Infiltration results in inches per hour.
2. Location and depth of excavation. The excavation should be deep enough to verify that there is a 5-foot separation between the final depth of the facility (rock gallery) and the seasonal high groundwater or soil layer that could reduce the infiltration rate.
3. Summary and discussion of infiltration testing, including number of tests, amounts of water used in each test (inches, gallons, etc.), and time of each test. Testing is required to show that an accurate rate was achieved.
4. Discussion of how the test was performed:
 - Open pit (size of area)
 - Encased falling head

- Pipe type and size
 - Embedment depth
 - Double-ring infiltrometer
 - Pipe type and size
 - Embedment depth
5. **Table 19.** Infiltration Test Data Table provided at the end of this appendix.
 6. Soil types with depth.
 7. Groundwater observations: seasonal high groundwater level estimation.

Table 19. Infiltration Test Data Table

Location:		Date:		Test Hole Number:	
Depth to bottom of hole:		Diameter of hole:		Test Method:	
Tester's Name:					
Tester's Company:			Tester's Contact Number:		
Depth, feet			Soil Texture		
Time	Time interval, minutes	Measurement, feet	Drop in water level, feet	Percolation rate, inches per hour	Remarks

Figure 12. Infiltration Test Data Table Example

Infiltration Test Data Table Example					
Location: Lot 105, Low Point Heights Subdivision		Date: 6/28/2010		Test Hole Number: 3	
Depth to bottom of hole: 57 inches		Diameter of hole: 0.5 feet		Test Method: Encased falling head	
Tester's Name: C.J. Tester			Tester's Contact Number: 555-1212		
Tester's Company: Tester Company					
Depth, feet			Soil Texture		
0-0.5			Black Topsoil		
0.5-1.0			Brown SM		
1.0-2.2			Brown ML		
2.2-5.1			Brown CL		
Time	Time interval, minutes	Measurement, feet	Drop in water level, feet	Percolation rate, inches per hour	Remarks
9:00	0	3.75	-		Filled with 6"
9:20	20	3.83	0.08		
9:40	20	3.91	0.08	2.88	
10:00	20	3.98	0.07	2.52	
10:20	20	4.04	0.06	2.16	
10:40	20	4.11	0.07	2.52	
11:00	20	4.17	0.06	2.16	
11:20	20	4.225	0.055	1.98	
					Adjusted to 6" level for Trial #2

Appendix B: Stormwater Facility Guidance

1. Planting Guide for Vegetated Stormwater Facilities

This appendix provides planting matrices categorized by SMF type. The matrices provide important information on plants approved for installation in each facility type and are intended to guide plant selection for planting plans.

All plants included in these matrices are intended to be drought tolerant but require irrigation temporarily during their establishment period. Even after the establishment period, native plants may require supplemental irrigation during periods of high heat or extended drought. The species listed are representative examples and are not to be considered exclusive or exhaustive for these facility types.

The City of Portland maintains a comprehensive Native Plant List for planting within the Portland metropolitan region that can be found on the City's website.

When a conflict exists between the representative species outlined within this publication and the Native Plant List, the Native Plant List will prevail.

An alternate plant selection may be proposed for review and approval by the District. No species adopted within the Portland Nuisance Plants List will be permitted.

Plant Type Information

A description of the type of information provided for each plant table is provided below.

Plant Name: Plants are listed by their botanical name first, in italics, followed by a generally accepted common name. Note that common names vary, so use of the botanical name is recommended to ensure proper plant selection

Zone: As noted in the zone section of the compiled plant lists, zone denotes the planting moisture zone in which it is appropriate to locate each respective plant. Zone A refers to the highest point on the slope (dry/upland), Zone B refers to the mid-section of the slope (moist/dry) and Zone S refers to the lowest part of the slope (saturated/wet). Refer to the Standard Detail Drawings for zones by facility type. Some plants work in multiple moisture zones, and others only in a particular dry, moist, or wet condition.

Origin: Plants approved for stormwater facilities can be grouped into three categories: NW Natives, NW Native Cultivars, and Non-Native Adaptive plants.

NW Native: These are plants that are indigenous to the Willamette Valley. They typically require minimal care once they are planted because they have evolved and adapted to the growing conditions and climate of the region. Because of their place in the local ecology, native plants also provide habitat value for birds and other local species. For these reasons, native plants are strongly recommended for stormwater facilities and should be used to the maximum extent practical. In designated vegetated buffers and sensitive areas only native plants are allowed in SMFs.

NW Native Cultivar: These species are cultivated varieties of native plants produced by horticultural techniques and are not normally found in wild populations. Cultivars are bred for certain desired characteristics that make them different from their native counterparts. Native cultivars may be selected over a native plant if it is more suitable for certain conditions, such as densely urbanized applications. For example, Kelsey

dogwood (*Cornus sericea* 'Kelsey') is a cultivar of the native red twig dogwood (*Cornus sericea*). Kelsey dogwood has been selectively bred to be much smaller at maturity than red twig dogwood, which can be advantageous in small scaled urban stormwater planters. In such instances, the native cultivar is preferred because it will not outgrow the facility or require frequent pruning maintenance, while still offering the same vegetative advantages as its native counterpart.

Non-Native Adaptive: These plants are not native to the Willamette Valley but have certain characteristics that make them very useful and well adapted to stormwater facilities. The non-native adapted plants included on the stormwater facility plant lists are considered non-invasive. The District prefers that native and native cultivars be used whenever practical but will allow non-native adapted plants where appropriate

Type/Size: The following factors provide guidance on individual plant characteristics:

(E)vergreen/(D)eciduous: Identifies the characteristic of a plant to keep or lose foliage during winter months. Evergreen plant materials are often preferred at the understory level for stormwater treatment through winter.

Potential Height: Identifies maximum size at maturity to use as a design guideline.

Typical On-Center Spacing: Identifies the optimum spacing for new plantings. This is to be used as a guideline and may vary slightly depending on site conditions.

Context Factors

The following factors should be considered when selecting vegetation. Consult the appropriate Plant List for guidance.

Sun/Shade: When developing planting plans, solar orientation is important to consider. This column identifies which plants are appropriate for full to part sun or shade.

Facility with underdrain: In facilities with underdrains, it is important to select plants appropriate for faster draining soils.

Facility less than 3 feet wide: Narrow conditions require plants that are not too large and will outgrow or have the potential for roots to be damaged in narrow planters. This column identifies which plants are appropriate for narrow planter widths.

Lined facility/on top of utilities: In lined facilities it is important to limit larger material or plants with aggressive and deep roots. This column identifies which plants are appropriate for this application.

Parking areas: This column identifies plants that are appropriate for facilities in most parking areas. Large shrubs selected for parking areas should have form and habit that are open and transparent. For portions of parking areas that have line of sight requirements, plants should be selected from the "Streets/Line of Sight" column.

Streets/line of sight: For street-side facilities and in parking areas where line of sight visibility is required, use plant materials that do not limit necessary lines of sight visibility. This column identifies which plants are appropriate for this application.

Adjacent to buildings: When planting adjacent to buildings, limit plant sizes for compatibility with building footings, windows, or other systems. This column identifies which plants are appropriate to use adjacent to buildings.

In Natural Resource Overlay District: If the stormwater facility is within the Natural Resource Overlay District, all plants shall be indigenous to the Willamette Valley.

Public Maintenance: For facilities that will be publicly maintained, plant palette shall be more limited and focused on lower maintenance plants. These facilities should also emphasize more hardy plants that can adapt to higher summer temperatures and extended drought.

Maintenance Legacy: The designer should carefully consider the long-term vegetation management strategy for the stormwater facility, with an emphasis on the anticipated maintenance requirements for the future Owners.

Native vs Blended Soils: Designers should select plants after a careful analysis of the facility's growing medium matrix. Plant material selection should take into account the site-specific characteristics of both blended and underlying native soils, including infiltration rates.

Planting Requirements

While planting sizes, densities, and irrigation requirements are not specified here, vegetation must be installed such that 100 percent vegetative cover is achieved through a mix of herbaceous, groundcover, and shrubs at the end of the warranty period, prior to acceptance. A dense vegetative cover at the ground level must be achieved for maximum water quality treatment.

Planter plant matrices and facility layout figures are provided in the following tables:

- Table 20. Stormwater Planter Plant List
- Table 22. Swale Plant List
- Table 23. Wetland Plant List
- Table 24. Pond Plant List
- Table 25. Green Roof Plant List

Table 20. Stormwater Planter Plant List

Plant Name Botanical Name Common Name	Zone	Origin			Type/Size			Context Factors						
		NW native	NW native cultivar	non-native adapted	(E)vergreen/(D)eciduous	Potential Height	Typical On Center Spacing	Sun/Shade	Narrow facility	Fully-lined facility	Parking areas	Streets	Adjacent to buildings	In buffer area
Herbaceous Plants														
<i>Carex densa</i> Dense sedge	x	x			E	24"	12"	Sun to Part Shade	x	x	x	x	x	x
<i>Eleocharis ovata</i> Ovate spike rush	x	x			E	30"	12"	Sun to Part Shade	x	x	x	x	x	x
<i>Juncus ensifolius</i> Dagger-leaf rush	x			x	D	10"	12"	Sun to Part Shade	x	x	x	x	x	
<i>Juncus patens</i> Spreading rush	x	x			E	36"	12"	Sun, Part Shade, Shade	x	x	x	x	x	x
Small Shrubs/Groundcover														
<i>Cornus sericea</i> 'Kelsey' Kelsey dogwood	x		x		D	24"	24"	Sun to Part Shade	x	x	x	x	x	
<i>Mahonia repens</i> Creeping Oregon Grape	x	x			E	2'	3'	Sun, Part Shade, Shade		x	x	x	x	x
<i>Fragaria chiloensis</i> Coastal strawberry	x	x			E	6"	12"	Sun to Part Shade	x	x	x	x	x	x
<i>Polystichum munitum</i> Sword fern	x	x			E	2'	2'	Sun, Part Shade, Shade	x	x	x	x	x	x

Table 21. Rain Garden Plant List

Plant Name Botanical Name Common Name	Zone			Origin			Type/Size			Context Factors						
	A	B	S	NW native	NW native cultivar	non-native adapted	(E)vergreen/(D)eciduous	Potential Height	Typical On Center Spacing	Sun/Shade	Narrow facility	Publicly maintained	Fully-lined facility	Parking areas	Streets	Adjacent to buildings
Herbaceous Plants																
<i>Carex obnupta</i> Slough sedge	x		x	x			E	48"	12"	Part to Full Shade		x	x	x	x	x
<i>Carex stipata</i> Sawbeak sedge	x	x	x	x			D	36"	12"	Sun to Part Shade	x	x	x	x	x	x
<i>Deschampsia cespitosa</i> Tufted hair grass	x			x			D	36"	12"	Part Shade	x		x	x	x	x
<i>Elymus glaucus</i> Blue wild rye	x	x		x			E	24"	12"	Part Shade	x		x	x	x	x
<i>Juncus balticus</i> Baltic rush		x	x	x			E	24"	12"	Sun	x	x	x	x	x	x
<i>Juncus patens</i> Spreading rush	x	x	x			x	E	36"	12"	Sun to Part Shade	x	x	x	x	x	x
<i>Scirpus microcarpus</i> Small Fruited Bulrush	x		x	x			E	24"	12"	Sun	x		x	x	x	x
Small Shrubs/Groundcover																
<i>Athyrium filix-femina</i> Lady fern	x	x		x			E	3'	2'	Part Shade to Shade	x		x	x	x	x
<i>Arctostaphylos uva-ursi</i> Kinnickinnick	x	x		x			E	5"	3'	Sun to Part Shade	x	x	x	x	x	x
<i>Mahonia repens</i> Creeping Oregon Grape	x	x		x			E	2'	3'	Part Shade to Shade	x	x	x	x	x	x
<i>Philadelphus lewisii</i> Mock orange	x		x	x			D	6'	4'	Sun to Part Shade			x	x	x	x
<i>Polystichum munitum</i> Sword fern	x	x		x			E	2'	2'	Part Shade to Shade	x		x	x	x	x
<i>Symphoricarpos albus</i> Snowberry	x	x		x			D	3'	3'	Sun, Part Shade, Shade	x	x	x	x	x	x

Plant Name Botanical Name Common Name	Zone			Origin			Type/Size			Context Factors						
	A	B	S	NW native	NW native cultivar	non-native adapted	(E)vergreen/(D)eciduous	Potential Height	Typical On Center Spacing	Sun/Shade	Narrow facility	Publicly maintained	Fully-lined facility	Parking areas	Streets	Adjacent to buildings
Large Shrubs/Small Trees																
<i>Cornus sericea</i> Red twig dogwood	x	x	x	x			D	6'	4'	Part Shade						
<i>Physocarpus capitatus</i> Pacific ninebark	x		x	x			D	9'	3'	Sun to Part Shade			x	x	x	x
<i>Rosa nutkana</i> Nootka rose	x	x		x			D	8'	4'	Sun, Part Shade, Shade			x		x	
<i>Ribes sanguineum</i> Red flowering currant	x	x		x			D	8'	4'	Sun, Part Shade, Shade		x	x	x	x	x
<i>Salix sitchensis</i> Sitka willow	x		x	x			D	15'	5'	Sun, Part Shade, Shade						
Trees*																
<i>Cornus nuttallii</i> Pacific dogwood	x	x		x			D	20'	10'	Sun, Part Shade, Shade	x		x	x	x	x
<i>Rhanmus purshiana</i> Cascara	x	x		x			D	30'	20'	Part Sun to Shade						
<i>Calocedrus decurrens</i> Incense cedar	x	x	x	x			E	90'	15'	Part Shade to Shade				x		

* Trees are not required but are allowed with adequate soil volume and root space for healthy growth and maturity. Provide minimum 2 cubic feet of soil volume per square foot of mature canopy size.

Table 22. Swale Plant List

Plant Name <i>Botanical Name</i> <i>Common Name</i>	Zone			Origin			Type/Size			Context Factors						
	A	B	S	NW native	NW native cultivar	non-native adapted	(E)vergreen/(D)eciduous	Potential Height	Typical On Center Spacing	Sun/Shade	Narrow facility	Publicly maintained	Fully-lined facility	Parking areas	Streets	Adjacent to buildings
Herbaceous Plants																
<i>Carex obnupta</i> Slough sedge	x		x	x			E	48"	12"	Part Shade		x	x	x	x	x
<i>Carex stipata</i> Sawbeak sedge	x		x	x			D	36"	12"	Sun to Part Shade	x	x	x	x	x	x
<i>Deschampsia cespitosa</i> Tufted hair grass	x			x			D	36"	12"	Part Shade	x		x	x	x	x
<i>Elymus glaucus</i> Blue wild rye	x	x		x			E	24"	12"	Part Shade	x		x	x	x	x
<i>Juncus balticus</i> Baltic rush		x	x	x			E	24"	12"	Sun	x		x	x	x	x
<i>Juncus patens</i> Spreading rush	x	x	x			x	E	36"	12"	Sun to Part Shade	x	x	x	x	x	x
<i>Scirpus microcarpus</i> Small fruited bulrush	x		x	x			E	24"	12"	Sun	x	x	x	x	x	x
Small Shrubs/Groundcover																
<i>Athyrium filix-femina</i> Lady fern	x	x		x			E	3'	2'	Sun to Part Shade	x		x	x	x	x
<i>Arctostaphylos uva-ursi</i> Kinnickinnick	x	x		x			E	5"	3'	Sun to Part Shade	x		x	x	x	x
<i>Fragaria chiloensis</i> Coastal strawberry	x	x		x			E	6"	12"	Sun to Part Shade	x	x	x	x	x	x
<i>Mahonia repens</i> Creeping Oregon grape	x	x		x			E	2'	3'	Part Shade to Shade	x	x	x	x	x	x
<i>Philadelphus lewisii</i> Mock orange	x	x		x			D	6'	4'	Sun to Part Shade			x	x	x	x
<i>Polystichum munitum</i> Sword fern	x	x		x			E	2'	2'	Part Shade to Shade	x		x	x	x	x
<i>Symphoricarpos alba</i> Snowberry	x	x		x			D	3'	3'	Sun, Part Shade, Shade	x	x	x	x	x	x
Large Shrubs/Small Trees																
<i>Cornus sericea</i> Red twig dogwood	x	x	x	x			D	8'	4'	Part Shade						
<i>Physocarpus capitatus</i> Pacific ninebark	x		x	x			D	6'	3'	Sun to Part Shade			x	x	x	x
<i>Rosa nutkana</i> Nootka rose	x	x		x			D	8'	4'	Sun, Part Shade, Shade			x		x	

Plant Name Botanical Name Common Name	Zone			Origin			Type/Size			Context Factors						
	A	B	S	NW native	NW native cultivar	non-native adapted	(E)vergreen/(D)eciduous	Potential Height	Typical On Center Spacing	Sun/Shade	Narrow facility	Publicly maintained	Fully-lined facility	Parking areas	Streets	Adjacent to buildings
<i>Ribes sanguineum</i> Red flowering currant	x	x		x			D	8'	4'	Sun, Part Shade, Shade			x	x	x	x
<i>Salix sitchensis</i> Sitka willow	x		x	x			D	15'	5'	Sun, Part Shade, Shade						
Trees*																
<i>Cornus nuttallii</i> Pacific dogwood	x	x		x			D	20'	10'	Sun, Part Shade, Shade	x		x	x	x	x
<i>Rhamnus purshiana</i> Cascara	x	x		x			D	30'	20'	Part Shade to Shade				x		
<i>Calocedrus decurrens</i> Incense cedar	x	x	x	x			E	90'	15'	Part Shade to Shade				x		

*Trees are not required but are allowed with adequate soil volume and root space for healthy growth and maturity. Provide minimum 2 cubic feet of soil volume per square foot of mature canopy size.

Table 23. Wetland Plant List

Plant Name Botanical Name Common Name	Zone			Origin			Type/Size			Context Factors					
	A	B	S	NW native	NW native cultivar	non-native adapted	(E)vergreen/(D)eciduous	Potential Height	Typical On Center Spacing	Sun/Shade	Narrow facility	Fully-lined facility	Parking areas	Streets	Adjacent to buildings
Herbaceous Plants															
<i>Alisma plantago-aquatica</i> Water plantain			x	x			D	24"	12"	Sun	x	x			
<i>Carex obnupta</i> Slough sedge	x		x	x			E	48"	12"	Part Shade		x	x	x	x
<i>Deschampsia cespitosa</i> Tufted hair grass	x			x			D	36"	12"	Part Shade	x	x	x	x	x
<i>Elymus glaucus</i> Blue wild rye	x	x		x			E	24"	12"	Part Shade	x	x	x	x	x
<i>Juncus ensifolius</i> Dagger-leaf rush	x		x			X	D	10"	12"	Sun to Part Shade	x	x	x	x	x
<i>Juncus patens</i> Spreading rush	x	x	x			X	E	36"	12"	Sun to Part Shade	x	x	x	x	x
<i>Scirpus microcarpus</i> Small fruited bulrush	x		x	x			E	24"	12"	Sun	x	x	x	x	x
Small Shrubs/Groundcover															
<i>Mahonia repens</i> Creeping Oregon grape	x	x		x			E	2'	3'	Part Shade to Shade	x	x	x	x	x
<i>Rosa pisocarpa</i> Swamp rose		x	x	x			D	6'	3'	Sun to Part Shade		x	x	x	x
<i>Polystichum munitum</i> Sword fern	x	x		x			E	2'	2'	Part Shade to Shade	x	x	x	x	x
<i>Symphoricarpos albus</i> Snowberry	x	x		x			D	3'	3'	Sun, Part Shade, Shade	x	x	x	x	x
Large Shrubs/Small Trees															
<i>Cornus sericea</i> Red twig dogwood	x	x	x	x			D	8'	4'	Part Shade					
<i>Physocarpus capitatus</i> Pacific ninebark	x		x	x			D	6'	3'	Sun to Part Shade		x	x	x	x
<i>Rosa nutkana</i> Nootka rose	x	x		x			D	8'	4'	Sun, Part Shade, Shade		x		x	
<i>Ribes sanguineum</i> Red flowering currant	x	x		x			D	8'	4'	Sun, Part Shade, Shade		x	x	x	x
<i>Salix sitchensis</i> Sitka willow	x		x	x			D	15'	5'	Sun, Part Shade, Shade					
<i>Ceanothus velutinus</i> Snowbrush	x	x		x			E	6'	3'	Sun, Part Shade, Shade		x	x	x	x

Plant Name <i>Botanical Name</i> Common Name	Zone			Origin			Type/Size			Context Factors					
	A	B	S	NW native	NW native cultivar	non-native adapted	(E)vergreen/(D)eciduous	Potential Height	Typical On Center Spacing	Sun/Shade	Narrow facility	Fully-lined facility	Parking areas	Streets	Adjacent to buildings
Trees															
<i>Acer circinatum</i> Vine maple	x	x		x			D	15'	8'	Part Shade to Shade	x	x	x	x	x
<i>Cornus nuttallii</i> Pacific dogwood	x	x		x			D	20'	10'	Sun, Part Shade, Shade	x	x	x	x	x
<i>Fraxinus latifolia</i> Oregon ash	x		x	x			D	30'	25'	Sun					
<i>Calocedrus decurrens</i> Incense cedar	x	x	x	x			E	90'	16'	Part Shade to Shade			x		

Table 24. Pond Plant List

Plant Name <i>Botanical Name</i> <i>Common Name</i>	Zone			Origin			Type/Size			Context Factors						
	A	B	S	NW native	NW native cultivar	non-native adapted	(E)vergreen/(D)eciduous	Potential Height	Typical On Center Spacing	Sun/Shade	Facility width	Publicly maintained	Fully-lined facility	Parking areas	Streets	Adjacent to buildings
Herbaceous Plants																
<i>Alisma plantago-aquatica</i> Water plantain	S		x	x			D	24"	12"	Sun	x		x			
<i>Carex obnupta</i> Slough sedge	x		x	x			E	48"	12"	Part Shade		x	x	x	x	x
<i>Deschampsia cespitosa</i> Tufted hair grass	x			x			D	36"	12"	Part Shade	x	x	x	x	x	x
<i>Elymus glaucus</i> Blue wild rye	x	x		x			E	24"	12"	Part Shade	x		x	x	x	x
<i>Juncus ensifolius</i> Dagger-leaf rush	x		x			x	D	10"	12"	Sun to Part Shade	x	x	x	x	x	x
<i>Juncus patens</i> Spreading rush	x	x	x			x	E	36"	12"	Sun to Part Shade	x	x	x	x	x	x
<i>Scirpus microcarpus</i> Small fruited bulrush	x		x	x			E	24"	12"	Sun	x	x	x	x	x	x
Small Shrubs/Groundcover																
<i>Athyrium filix-femina</i> Lady fern	x	x		x			E	3'	2'	Part Shade to Shade	x		x	x	x	x
<i>Mahonia repens</i> Creeping Oregon grape	x	x		x			E	2'	3'	Part Shade to Shade	x		x	x	x	x
<i>Polystichum munitum</i> Sword fern	x	x		x			E	2'	2'	Part Shade to Shade	x		x	x	x	x
<i>Symphoricarpos albus</i> Snowberry	x	x		x			D	3'	3'	Sun, Part Shade, Shade	x	x	x	x	x	x
Large Shrubs/Small Trees																
<i>Cornus sericea</i> Red twig dogwood	x	x	x	x			D	8'	4'	Part Shade		x				
<i>Physocarpus capitatus</i> Pacific ninebark	x		x	x			D	6'	3'	Sun to Part Shade		x	x	x	x	x
<i>Philadelphus lewisii</i> Mock Orange	x	x		x			D	6'	4'	Sun to Part Shade		x	x	x	x	x

Plant Name Botanical Name Common Name	Zone			Origin			Type/Size			Context Factors						
	A	B	S	NW native	NW native cultivar	non-native adapted	(E)vergreen/(D)eciduous	Potential Height	Typical On Center Spacing	Sun/Shade	Facility width	Publicly maintained	Fully-lined facility	Parking areas	Streets	Adjacent to buildings
<i>Rosa Nutkana</i> Nootka rose	x	x		x			D	8'	4'	Sun, Part Shade, Shade			x		x	
<i>Ribes sanguineum</i> Red flowering currant	x	x		x			D	8'	4'	Sun, Part Shade, Shade		x	x	x	x	x
<i>Salix sitchensis</i> Sitka willow	x		x	x			D	15'	5'	Sun, Part Shade, Shade						
<i>Ceanothus velutinus</i> Snowbrush	x	x		x			E	6'	3'	Sun, Part Shade, Shade		x	x	x	x	x
Trees																
<i>Acer circinatum</i> Vine maple	x	x		x			D	15'	8'	Part Shade to Shade	x		x	x	x	x
<i>Cornus nuttallii</i> Pacific dogwood	x	x		x			D	20'	10'	Sun, Part Shade, Shade	x		x	x	x	x
<i>Rhamnus purshiana</i> Cascara	x	x		x			D	30'	20'	Part Sun to Shade						
<i>Calocedrus</i> Incense cedar	x	x	x	x			E	90'	15'	Part Shade to Shade				x		

Table 25. Green Roof Plant List

Plant Name Botanical Name Common Name	Zone		Origin			Type/Size			Context
	C	D	NW native	NW native cultivar	non-native adapted	(E)vergreen/(D)eciduous	Potential Height	Typical On Center Spacing	Sun/Shade
Sedums and Succulents									
<i>Delosperma</i> ssp. Ice plant	x	x			x	E	4"	6"-12"	Sun
<i>Malephora crocea</i> v. <i>purpurea</i> Coppery mesemb	x	x			x	E	10"	6"-12"	Sun to Part Shade
<i>Sedum album</i> White stonecrop	x				x	E	3"	6"-12"	Sun
<i>Sedum oreganum</i> Oregon stonecrop	x	x	x			E	4"	6"-12"	Sun to Part Shade
<i>Sedum spathulifolium</i> Stonecrop	x	x			x	E	4"	6"-12"	Sun to Part Shade
<i>Sedum spurium</i> Two-row stonecrop	x	x			x	E	6"	6"-12"	Sun
<i>Sempervivum tectorum</i> Hens and chicks	x				x	E	3"	6"-12"	Sun to Part Shade
Herbaceous Plants									
<i>Achillea millefolium</i> Common yarrow	x	x			x	D	24"	24"	Sun to Part Shade
<i>Artemesia 'Silver Mound'</i> <i>Silver mound artemesia</i>	x	x			x	D	12"	12"	Sun to Part Shade
<i>Castilleja foliosa</i> Indian paintbrush	x	x	x			D	10"	12"	Sun
<i>Festuca glauca 'Elijah's Blue'</i> Elijah's blue fescue	x	x			x	E	12"	12"	Sun
<i>Fragaria chiloensis</i> Coastal strawberry	x	x	x			E	6"	12"	Sun to Part Shade
<i>Polystichum munitum</i> Sword fern	x	x	x			E	24"	24"	Sun, Part Shade, Shade
<i>Thymus serpyllum</i> Creeping thyme	x				x	D	3"	6"	Sun, Part Shade, Shade

2. Stormwater Facility Operations and Maintenance Guidance

Stormwater Planter

Rain Garden

Vegetated Swale

Filter Strip

Drywell

Infiltration Trench

Detention Pond

Constructed Wetlands

Structural Detention

Pervious Pavement

Green Roof

Stormwater Facility inspection and Maintenance Log

Stormwater Planters

NO pesticide, herbicide, or fungicide use is allowed.

Clean up spills immediately. Remove and replace contaminated soil. Call Metro to determine proper disposal requirements of spill response materials and contaminated soil. Record the date and spill response measures in the inspection log.

Structural Component	Spring	Summer	Fall	Winter	24-hr Precip > 1"
Replace or repair inlets if they are cracked or broken. Reseal inlet pipes if they are not watertight.	X		X		
Check overflow caps and replace if cracked or missing.	X		X		X
Check flow spreader, if present, and repair as necessary. Check inlet protection and replace or replenish rock, as necessary.	X		X		
Check liner, if present, and repair tears or holes, as necessary. Replace liner, as necessary.	X		X		
Patch concrete.		X	X		

Ponding Area	Spring	Summer	Fall	Winter	24-hr Precip > 1"
Remove trash.	X	X	X	X	X
Remove sediment from ponding area, forebays, and inlets.	X		X		X
Repair any erosion around edges of concrete forebay if erosion is occurring.		X	X		X
Check trench drains discharging to the facility and remove any soil or debris.	X	X	X	X	X
Check for channeled flow in facility; fill in channels with soil and add plants to disperse flow.		X	X		X
Add 3 inches of mulch or topsoil to bare areas and reseed or replant to achieve 100% coverage at maturity. Do not add bark dust or bark chips; they will float and then clog the outlet or create bare spots.	X				
Remove weeds, invasive plants, and dead plants. Replant or reseed to achieve 100% coverage at maturity	X	X	X		
Thin grasses (remove dead blades) or remove top third of previous year's growth.	X				
Prune shrubs.	X			X	
If facility drains slowly, rake soil to stop crusting. Replace or amend soil if ponding occurs more than 24 hours	X		X	X	X
Ponding should not occur for more than 48 hours.	X		X	X	X

Rain Gardens

***NO** pesticide, herbicide, or fungicide use is allowed.*

Clean up spills immediately. Remove and replace contaminated soil. Call Metro to determine proper disposal requirements of spill response materials and contaminated soil. Record the date and spill response measures in the inspection log.

Structural Repairs	Spring	Summer	Fall	Winter	24-hr Precip > 1"
Replace or repair inlets if they are cracked or broken. Reseal inlet pipes if they are not watertight.	X		X		
Check overflow caps and replace if cracked or missing.	X		X		X
Check flow spreader, if present, and repair, as necessary. Check inlet protection and replace or replenish rock, as necessary.	X		X		

Ponding Area	Spring	Summer	Fall	Winter	24-hr Precip > 1"
Remove trash.	X	X	X	X	X
Remove sediment from ponding area, forebays, and inlets.	X		X		X
Repair any erosion around edges of concrete forebay if erosion is occurring.		X	X		X
Check trench drains discharging to the facility and remove any soil or debris.	X	X	X	X	X
Check for channeled flow in facility; fill in channels with soil and add plants to disperse flow.		X	X		X
Add 3 inches of mulch or topsoil to bare areas and reseed or replant to achieve 100% coverage at maturity. Do not add bark dust or bark chips; they will float and then clog the outlet or create bare spots.	X				
Remove weeds, invasive plants, and dead plants. Replant or reseed to achieve 100% coverage at maturity	X	X	X		
Thin grasses (remove dead blades) or remove top third of previous year's growth.	X				
Prune shrubs and trees.	X			X	
If facility drains slowly, rake soil to stop crusting. Replace or amend soil if ponding occurs more than 24 hours.	X		X	X	X
Ponding should not occur for more than 48 hours.	X		X	X	X

Vegetated Swales

NO pesticide, herbicide, or fungicide use is allowed.

Clean up spills immediately. Remove and replace contaminated soil. Call Metro to determine proper disposal requirements of spill response materials and contaminated soil. Record the date and spill response measures in the inspection log.

Structural Repairs	Spring	Summer	Fall	Winter	24-hr Precip > 1"
Replace or repair inlets if they are cracked or broken. Reseal inlet pipes if they are not watertight.	X		X		
Check overflow caps or grates and repair, as necessary. Replace if they are missing.	X		X		X
Check flow spreader, if present, and repair, as necessary. Check inlet protection and replace or replenish rock, as necessary.	X		X		

Ponding Area	Spring	Summer	Fall	Winter	24-hr Precip > 1"
Remove trash.	X	X	X	X	X
Remove sediment from ponding area, forebays, and inlets.	X		X		X
Repair any erosion around edges of concrete forebay if erosion is occurring.		X	X		X
Check trench drains discharging to the facility and remove any soil or debris.	X	X	X	X	X
Check for channeled flow in facility; fill in channels with soil and add plants to disperse flow.		X	X		X
Add 3 inches of mulch or topsoil to bare areas and reseed or replant to achieve 100% coverage at maturity. Do not add bark dust or bark chips; they will float and then clog the outlet or create bare spots.	X				
Remove weeds, invasive plants, and dead plants. Replant or reseed to achieve 100% coverage at maturity	X	X	X		
Thin grasses (remove dead blades) or remove top third of previous year's growth.	X				
Prune shrubs and trees.	X			X	
If facility drains slowly, rake soil to stop crusting. Replace or amend soil if ponding occurs more than 24 hours.	X		X	X	X
Ponding should not occur for more than 48 hours.	X		X	X	X

Filter Strips or Landscaped Areas Receiving Sheetflow from Impervious Areas

NO pesticide, herbicide, or fungicide use is allowed.

Clean up spills immediately. Remove and replace contaminated soil. Call Metro to determine proper disposal requirements of spill response materials and contaminated soil. Record the date and spill response measures in the inspection log.

Maintenance Component	Spring	Summer	Fall	Winter	24-hr Precip > 1"
Remove trash.	X	X	X	X	X
Remove accumulated sediment.	X		X		X
Replace or replenish rock bordering filter strip or sheet flow area, as necessary.		X	X		X
Check flow spreader, if present, and repair, as necessary. Check inlet protection and replace or replenish rock, as necessary.	X			X	X
Check trench drains leading to the facility and remove any soil or debris.	X	X	X	X	X
Check for channeled flow; fill in channels with soil and add plants to disperse flow.	X		X		X
Remove weeds, invasive plants, and dead plants. Replant or reseed to achieve 100% coverage at maturity	X	X	X		
Thin grasses (remove dead blades) or remove top third of previous year's growth.	X				
Prune shrubs and trees.	X			X	
If moss is present, aerate the area or add 1/2-inch of 3/4-inch clean (no fines) rock.	X		X		
If facility drains slowly, aerate grasses or rake soil to stop crusting. Replace or amend soil if ponding occurs more than 24 hours.	X		X	X	X
Ponding should not occur for more than 48 hours.	X		X	X	X

Dry Wells

NO pesticide, herbicide, or fungicide use is allowed.

Clean up spills immediately. Have drywell professionally cleaned and notify DEQ. Record the date and spill response measures in the inspection log.

Maintenance Component	Spring	Summer	Fall	Winter	24-hr Precip > 1"
Replace or repair inlets if they are cracked or broken. Reseal inlet pipes if they are not watertight.		X	X		
Remove sediment from catch basin.	X		X		X
Remove leaf litter/debris from gutters.	X		X		
Check trench drains leading to the facility and remove any soil or debris.	X	X	X	X	X
Remove inspection portal lid and check for spalling or cracking of walls and for root intrusions. Repair, as necessary.		X	X		
Remove inspection portal lid and check sediment depth. Have professionally cleaned when depth of sediment or debris is 6 inches or greater.		X	X		
Ponding should not occur for more than 48 hours.	X		X	X	X

Infiltration Trenches

***NO** pesticide, herbicide, or fungicide use is allowed.*

Clean up spills immediately. Have drywell professionally cleaned and notify DEQ. Record the date and spill response measures in the inspection log.

Maintenance Component	Spring	Summer	Fall	Winter	24-hr Precip > 1"
Replace or repair inlets if they are cracked or broken. Reseal inlet pipes if they are not watertight.		X	X		
Remove sediment from catch basin.	X		X		X
Remove leaf litter/debris from gutters.	X		X		
Check trench drains leading to the facility and remove any soil or debris.	X	X	X	X	X
Remove inspection portal lid. Check for cracking of walls and root intrusion. Remove roots and repair walls, as necessary. Have professionally cleaned when depth of sediment or debris is 3 inches or greater.		X	X		X
Ponding should not occur for more than 48 hours.	X		X	X	X

Detention Pond

NO pesticide, herbicide, or fungicide use is allowed.

Clean up spills immediately. Remove and replace contaminated soil. Call Metro to determine proper disposal requirements of spill response materials and contaminated soil. Record the date and spill response measures in the inspection log.

Structural Repairs	Spring	Summer	Fall	Winter	24-hr Precip > 1"
Replace or repair inlets if they are cracked or broken. Reseal inlet pipes if they are not watertight.	X		X		
Remove sediment in catch basins discharging to pond.	X		X		
Inspect outlet structure. Clean clogged orifices. Repair cracked or broken shear gate and handles.		X	X		
Check spillway and berms. Add erosion control matting to areas of slight or moderate erosion.		X	X		X
Check spillway and berms. Contact WES at 503.742.4567 if the erosion is severe or there is evidence of concrete cracking or spalling.		X	X		X

Ponding Area	Spring	Summer	Fall	Winter	24-hr Precip > 1"
Remove trash.	X	X	X	X	X
Remove sediment from ponding area and inlets.		X	X		X
Replace or replenish rock at inlets if erosion is occurring.		X	X		X
Check flow dissipaters. Repair or replace diffuser, as necessary. Replace or replenish rock, as necessary.		X	X		
Add 3 inches of mulch or topsoil to bare areas and reseed or replant to achieve 100% coverage. Do not add bark dust or bark chips; they will float as the wetland refills and either clog the outlet or create bare spots in the ponding area.	X	X	X		
Remove weeds, invasive plants, and dead plants. Replant or reseed to achieve 100% coverage at maturity	X	X	X		
Thin grasses (remove dead blades) or remove top third of previous year's growth if desired.	X				
Prune shrubs and trees.	X			X	
Check depth or high-water mark in several areas. If depth is less than 50% of design depth, dredge area and replant. If depth is more than 150% of the design depth, add soil and replant in channeled area.	X		X		

Constructed Wetlands

NO pesticide, herbicide, or fungicide use is allowed.

Clean up spills immediately. Remove and replace contaminated soil. Call Metro to determine proper disposal requirements of spill response materials and contaminated soil. Record the date and spill response measures in the inspection log.

Structural Repairs	Spring	Summer	Fall	Winter	24-hr Precip > 1"
Replace or repair inlets if they are cracked or broken. Reseal inlet pipes if they are not watertight.	X		X		
Remove sediment in catch basins discharging to wetlands.	X		X		
Inspect outlet structure. Clean clogged orifices. Repair cracked or broken shear gate and handles.		X	X		
Check spillway and berms. Add erosion control matting to areas of slight or moderate erosion.		X	X		X
Check spillway and berms. Contact WES at 503.742.4567 if the erosion is severe or there is evidence of concrete cracking or spalling.		X	X		X

Ponding Area	Spring	Summer	Fall	Winter	24-hr Precip > 1"
Remove trash.	X	X	X	X	X
Remove sediment from ponding area and inlets.		X	X		X
Replace or replenish rock at inlets if erosion is occurring.		X	X		X
Check flow dissipaters. Repair or replace diffuser, as necessary. Replace or replenish rock, as necessary.		X	X		
Add 3 inches of mulch or topsoil to bare areas and reseed or replant to achieve 100% coverage. Do not add bark dust or bark chips; they will float as the wetland refills and either clog the outlet or create bare spots in the ponding area.	X	X	X		
Remove weeds, invasive plants, and dead plants. Replant or reseed to achieve 100% coverage at maturity	X	X	X		
Thin grasses (remove dead blades) or remove top third of previous year's growth if desired.	X				
Prune shrubs and trees.	X			X	
Check depth or high-water mark in several areas. If depth is less than 50% of design depth, dredge area and replant. If depth is more than 150% of the design depth, add soil and replant in channeled area.	X		X		

Structural Detention

NO pesticide, herbicide, or fungicide use is allowed.

Clean up spills immediately. Call Metro to determine proper disposal requirements of spill response materials. Record the date and spill response measures in the inspection log.

Structural Component	Spring	Summer	Fall	Winter	24-hr Precip > 1"
Replace or repair inlets if they are cracked or broken. Reseal inlet pipes if they are not watertight.	X		X		
Remove sediment in catch basins discharging to tank or vault.	X		X		X
Remove inspection portal lid, check for root intrusion, and remove roots and repair facility, as necessary. Check sediment depth and have professionally cleaned when depth of sediment and debris is > 15 percent of diameter at any point or > 6 inches below pipe invert.		X	X		X

Pavers and Pervious Pavement

NO pesticide, herbicide, fungicide, or moss inhibitor use is allowed.

NO sand or deicer should be used on paver area.

Clean up spills immediately. Call Metro to determine proper disposal requirements of spill response materials. Record the date and spill response measures in the inspection log.

Maintenance Component	Spring	Summer	Fall	Winter	24-hr Precip > 1"
Check for moss growth. Use baking soda to kill moss and then scrape dead moss off and throw in yard waste bin.	X			X	
Sweep leaf litter and debris off pavement. Use a professional pavement sweeper or wet/dry vacuum, as necessary. NO pressure washing; it clogs the pavement.	X		X		X
Remove overhanging plants or grass near pavers.		X	X		
During rainstorms, check for water running onto surface and divert water away from pavement.			X	X	X
Repair cracks and settling, as necessary.	X	X			
No ponding or runoff should occur on the pavement.	X		X	X	X

Green Roofs

NO pesticide, herbicide, or fungicide use is allowed.

Clean up spills immediately. Call Metro to determine proper disposal requirements of spill response materials. Record the date and spill response measures in the inspection log.

Maintain system per manufacturer's requirements

Stormwater Facilities Inspection and Maintenance Log



OWNER:

CONTACT INFO:

FACILITY LOCATION/ADDRESS:

FACILITY TYPE:

ACCESS NOTES:

Refer to the facility's quarterly inspection requirements in the O&M Plan before conducting inspections and maintenance actions.

INSPECTION YEAR:

WINTER INSPECTION LOG	SPRING INSPECTION LOG	SUMMER INSPECTION LOG	FALL INSPECTION LOG
DATE:	DATE:	DATE:	DATE:
INSPECTOR NAME:	INSPECTOR NAME:	INSPECTOR NAME:	INSPECTOR NAME:
COMPONENTS INSPECTED*:	COMPONENTS INSPECTED*:	COMPONENTS INSPECTED*:	COMPONENTS INSPECTED*:
STRUCTURAL: <input type="checkbox"/>	STRUCTURAL: <input type="checkbox"/>	STRUCTURAL: <input type="checkbox"/>	STRUCTURAL: <input type="checkbox"/>
PONDING AREA: <input type="checkbox"/>	PONDING AREA: <input type="checkbox"/>	PONDING AREA: <input type="checkbox"/>	PONDING AREA: <input type="checkbox"/>
VEGETATION: <input type="checkbox"/>	VEGETATION: <input type="checkbox"/>	VEGETATION: <input type="checkbox"/>	VEGETATION: <input type="checkbox"/>
MAINTENANCE ACTIONS PERFORMED:	MAINTENANCE ACTIONS PERFORMED:	MAINTENANCE ACTIONS PERFORMED:	MAINTENANCE ACTIONS PERFORMED:

* **Structural Components** include all 'hard' elements of the facility (inlets, flow spreaders, liners, overflow caps, etc.).

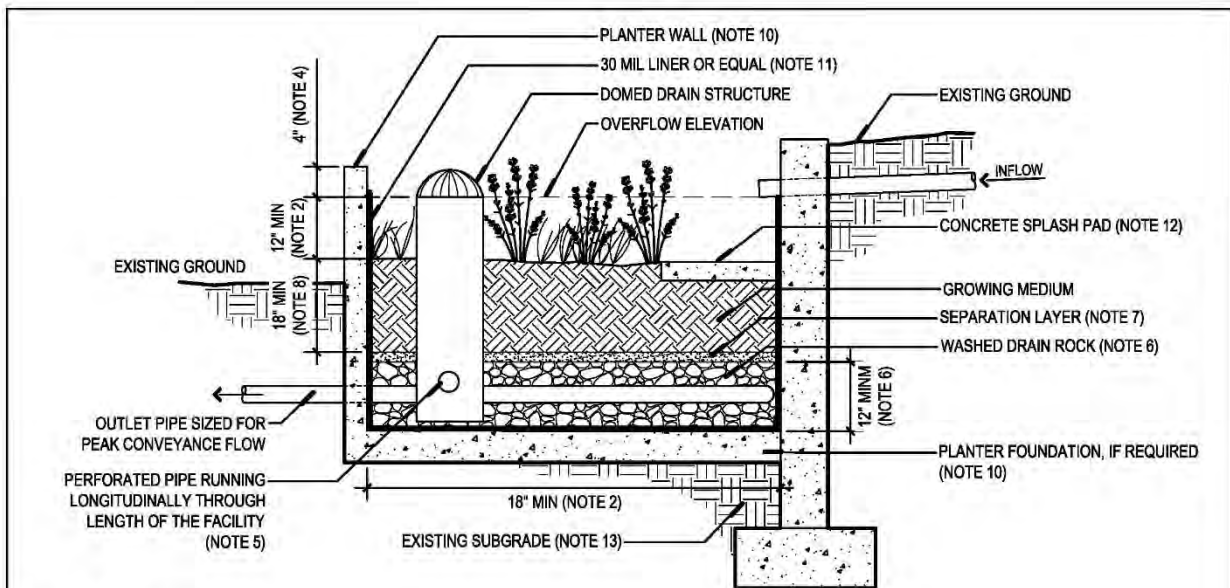
Ponding Area includes areas on the surface or underground where stormwater accumulates. Inspect for blockages, sediment, and trash.

Vegetation includes maintaining vegetation, so the facility can function as designed (i.e., tree pruning, weed removal, mowing, grass management).

Stormwater Standards


Appendix C: Stormwater Typical Drawings and Standard Details

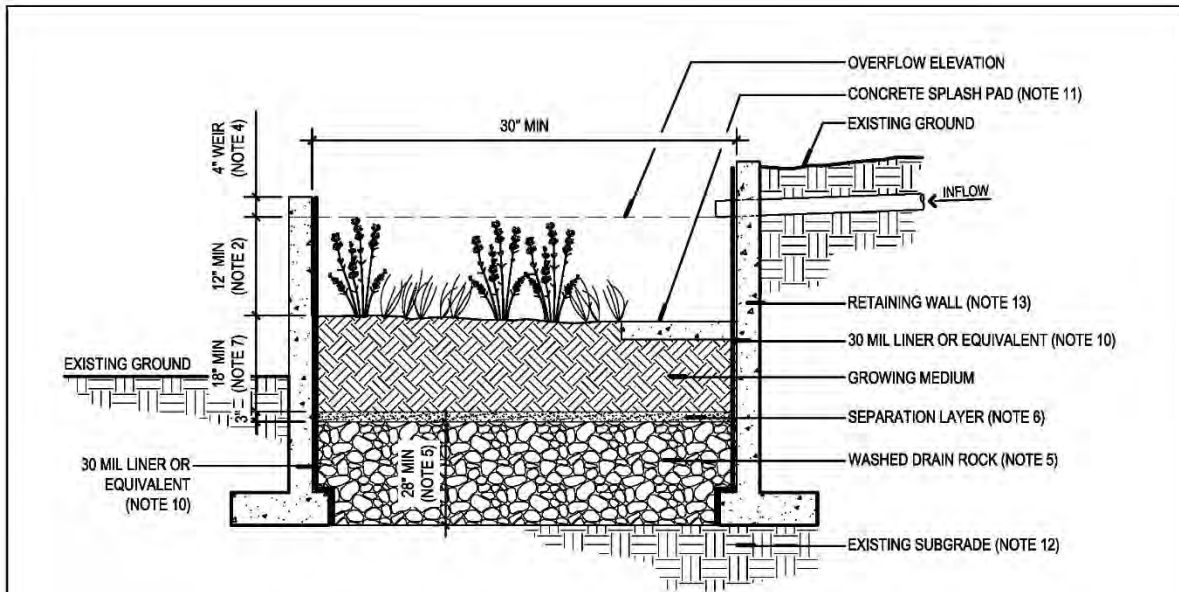
<u>Dwg #</u>	<u>Drawing Description</u>	<u>Dwg #</u>	<u>Drawing Description</u>
<u>BMP SIZING TOOL FACILITY DRAWINGS</u>		<u>STANDARD DETAILS (cont.)</u>	
SWM-01	PLANTER FILTRATION	SWM-24	FLOW STRUCTURE TYPE 3
SWM-02	PLANTER INFILTRATION	SWM-25	MANHOLE BASE
SWM-03	RAIN GARDEN FILTRATION	SWM-26	MH CHANNEL AND RING EXTENSION
SWM-04	RAIN GARDEN INFILTRATION	SWM-27	MH DRYWELL
SWM-05	VEGETATED SWALE FILTRATION	SWM-28	MH ENERGY DISSIPATOR
SWM-06	VEGETATED SWALE INFILTRATION	SWM-29	MH FLEXIBLE CONNECTION
SWM-07	FILTER STRIP	SWM-30	MH FLOW CONTROL
SWM-08	SIMPLIFIED DESIGN APPROACH DRYWELL	SWM-31	MH OVAL GRATE DETAIL
SWM-09	SIMPLIFIED DESIGN APPROACH INFILTRATION TRENCH	SWM-32	MH SHALLOW PRECAST
SWM-10	DETENTION POND	SWM-33	MH STANDARD
SWM-11	DETENTION POND FLOW CONTROL STRUCTURE	SWM-34	MH STEP
SWM-12	PERVIOUS PAVEMENT	SWM-35	MH STANDARD FRAME & COVER
SWM-13	GREEN ROOF	SWM-36	MH SUBURBAN FRAME & COVER
<u>STANDARD DETAILS</u>		SWM-37	ANCHOR WALL
SWM-14	CB CURB AND GUTTER DETAIL	SWM-38	TRENCH RESTORATION
SWM-15	CB CURB INLET	SWM-39	TRENCH RESTORATION WITH CDF
SWM-16	CB DITCH INLET	SWM-40	COLLECTION SYSTEM DIAGRAM
SWM-17	CB FRAME AND GRATE	SWM-41	MH LOCATION DIAGRAM
SWM-18	CB STANDARD GB2	SWM-42	CURB CUT OPENING
SWM-19	DETENTION TANK DIAGRAM	SWM-43	CURB STAMP DETAIL
SWM-20	POND DIAGRAM	SWM-44	INSERTA TEE
SWM-21	SHEAR GATE AND ORIFICE	SWM-45	OUTFALL RIP RAP
SWM-22	FLOW STRUCTURE TYPE 1	SWM-46	OUTFALL RIP RAP SIZING
SWM-23	FLOW STRUCTURE TYPE 2	SWM-47	REMOVABLE BOLLARD
		SWM-48	ROOF DOWNSPOUT SYSTEM
		SWM-49	SERVICE CONNECTION



GENERAL NOTES:


1. **PROVIDE PROTECTION** FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION.
2. **DIMENSIONS:**
 - WIDTH: 18" MINIMUM
 - DEPTH OF PLANTER (FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION): 12"
 - SLOPE OF PLANTER: 0.5% OR LESS
3. **SETBACKS:**
 - PLANTERS MUST BE MINIMUM OF 5 FEET FROM PROPERTY LINE.
4. **OVERFLOW:**
 - INLET ELEVATION MUST ALLOW FOR 4" OF FREEBOARD, MINIMUM.
 - PROTECT FROM DEBRIS AND SEDIMENT WITH STRAINER OR GRATE.
5. **PIPING:**
 - PERFORATED UNDERDRAIN PIPING: SHALL BE ABS SCH. 40, DUCTILE IRON, OR PVC SCH.40, 6" MINIMUM DIAMETER. PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
 - OVERFLOW PIPING: SHALL BE ABS SCH.40, DUCTILE IRON, OR PVC SCH.40 AND SHALL NOT BE PERFORATED. MINIMUM DIAMETER IS 6". PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
6. **DRAIN ROCK:**
 - SIZE FOR FLOW-THROUGH PLANTER: 1 1/2" - 3/4" WASHED
 - DEPTH: 12" MINIMUM
7. **SEPARATION BETWEEN DRAIN ROCK AND GROWING MEDIUM:** SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
8. **GROWING MEDIUM:**
 - DEPTH: 18" MINIMUM
 - FACILITY SURFACE AREA MAY BE REDUCED BY 20% WHEN GROWING MEDIA DEPTH IS INCREASED TO 30" OR MORE.
9. **VEGETATION:** FOLLOW LANDSCAPE PLANS OR REFER TO PLANTING REQUIREMENTS IN APPENDIX F.
10. **PLANTER FOUNDATION AND WALLS:**
 - MATERIALS SHALL BE 4" REINFORCED CONCRETE, STONE, BRICK, OR OTHER DURABLE MATERIAL.
 - CONCRETE, BRICK, OR STONE WALLS SHALL BE INCLUDED ON FOUNDATION PLANS.
 - INSTALL INVERTED CURB AS NEEDED BETWEEN PLANTER AND ROAD SUBGRADE.
 - WALL HEIGHTS GREATER THAN 24" ABOVE GRADE REQUIRE HANDRAIL.
11. **WATERPROOF LINER (IF REQUIRED):**
 - LINER SHALL BE 30 MIL PVC OR EQUIVALENT, FOR FLOW THROUGH FACILITIES.
 - A WATERPROOF LINER IS NOT REQUIRED IF THE FOUNDATION OR WALL MATERIAL IS WATERPROOF REINFORCED CONCRETE OR APPROVED EQUAL.
12. **INSTALL CONCRETE SPLASH PAD** TO TRANSITION FROM INLET TO GROWING MEDIUM. SIZE OF PAD SHALL BE 1 FT. x 1 FT.
13. **SEASONAL HIGH GROUNDWATER SEPARATION:**
 - SEPARATION DISTANCE AS REQUIRED BY THE WES.
14. **SUBMIT RETAINING WALL DESIGN** IN ACCORDANCE WITH APPLICABLE STRUCTURAL CODES FOR REVIEW AND APPROVAL.
15. **SEE WES STANDARD DRAWINGS** FOR LOCATING PLANTERS IN THE PUBLIC RIGHT-OF-WAY.

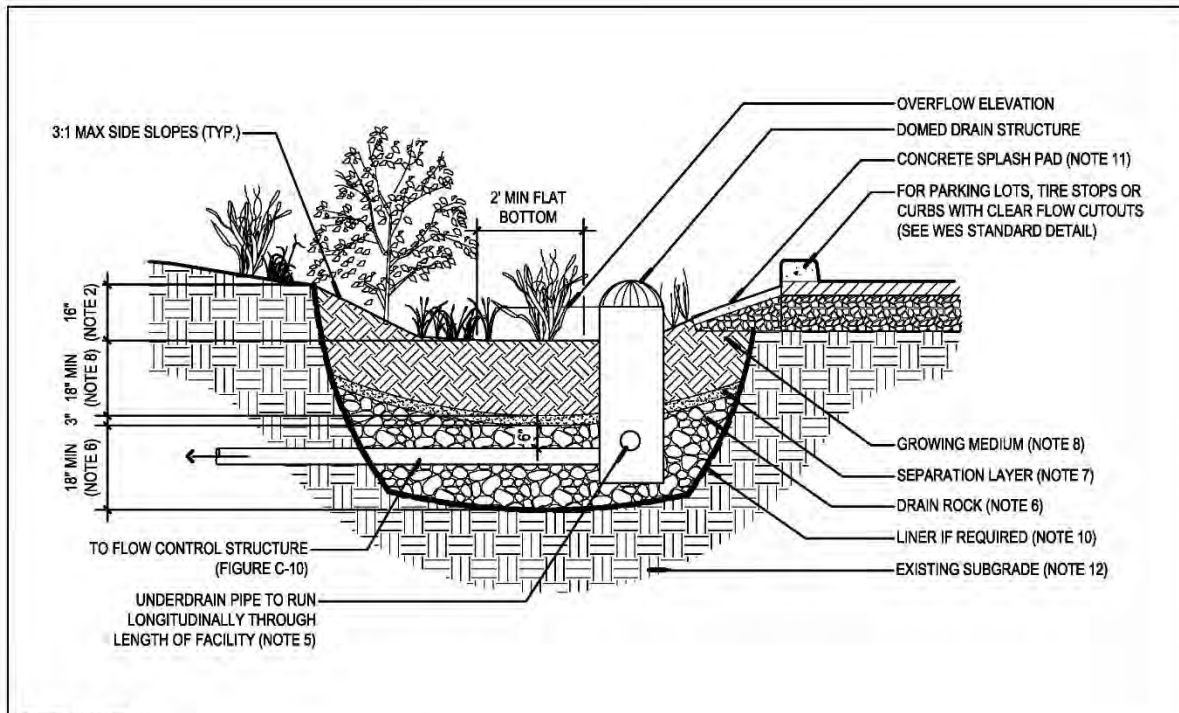
	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING SWM -01
		PLANTER FILTRATION	



GENERAL NOTES:


1. **PROVIDE PROTECTION** FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION.
2. **DIMENSIONS:**
 - WIDTH: 30" MINIMUM
 - DEPTH OF PLANTER (FROM TOP OF GROWING MEDIUM TO OVERFLOW WEIR ELEVATION): 12"
 - SLOPE OF PLANTER: 0.5% OR LESS
3. **SETBACKS:**
 - PLANTERS MUST BE MINIMUM OF 5 FEET FROM PROPERTY LINE.
4. **OVERFLOW:**
 - WEIR ELEVATION MUST ALLOW FOR 4" OF FREEBOARD, MINIMUM.
 - SIZE OVERFLOW WEIR FOR THE 100 YEAR DESIGN STORM. IDENTIFY EMERGENCY OVERFLOW ROUTE ON THE STORMWATER MANAGEMENT PLAN.
5. **DRAIN ROCK:**
 - SIZE: 1 1/2" - 3/4" WASHED
 - DEPTH: 28" MINIMUM
6. **SEPARATION BETWEEN DRAIN ROCK AND GROWING MEDIUM:** SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
7. **GROWING MEDIUM:**
 - DEPTH: 18" MINIMUM
 - FACILITY SURFACE AREA MAY BE REDUCED BY 20% WHEN GROWING MEDIA DEPTH IS INCREASED TO 30" OR MORE.
8. **VEGETATION:** FOLLOW LANDSCAPE PLANS OR REFER TO PLANTING REQUIREMENTS IN APPENDIX F.
9. **PLANTER WALLS:**
 - MATERIALS SHALL BE STONE, BRICK, CONCRETE OR OTHER DURABLE MATERIAL.
 - CONCRETE, BRICK, OR STONE WALLS SHALL BE INCLUDED ON FOUNDATION PLANS.
 - INSTALL INVERTED CURB AS NEEDED BETWEEN PLANTERS AND ROAD SUBGRADE.
 - WALL HEIGHTS GREATER THAN 24" ABOVE GRADE REQUIRE HANDRAIL.
10. **WATERPROOF LINER:**
 - LINER SHALL BE 30 MIL PVC OR EQUIVALENT.
 - A WATERPROOF LINER IS NOT REQUIRED IF THE WALL MATERIAL IS WATERPROOF REINFORCED CONCRETE OR APPROVED EQUAL.
11. **INSTALL CONCRETE SPLASH PAD** TO TRANSITION FROM INLET TO GROWING MEDIUM. SIZE OF PAD SHALL BE 1 FT. x 1 FT.
12. **SEASONAL HIGH GROUNDWATER SEPARATION:**
 - SEPARATION DISTANCE AS REQUIRED BY WES.
13. **SUBMIT RETAINING WALL DESIGN** IN ACCORDANCE WITH APPLICABLE STRUCTURAL CODES FOR REVIEW AND APPROVAL.
14. **SEE WES STANDARD DRAWINGS** FOR LOCATING PLANTERS IN THE PUBLIC RIGHT-OF-WAY.

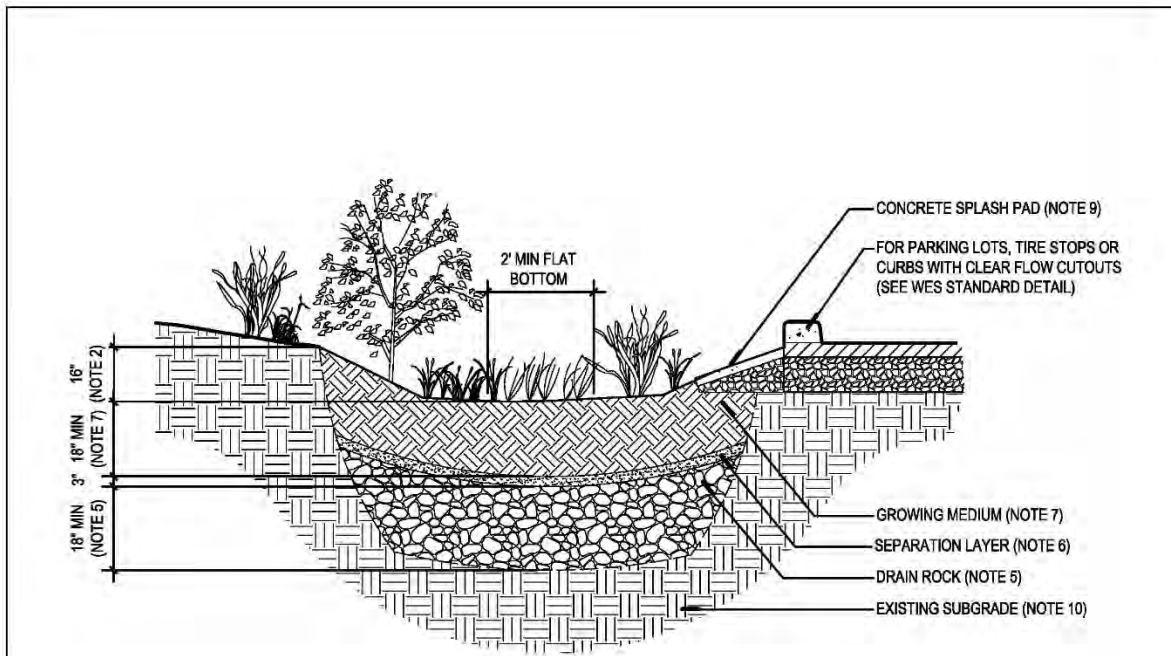
	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING SWM -02
		PLANTER INFILTRATION	



GENERAL NOTES:


1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION. UNLESS REQUIRED BY SITE CONDITIONS, UNLINED RAIN GARDENS ARE PREFERRED TO MAXIMIZE ONSITE INFILTRATION.
2. DIMENSIONS:
 - DEPTH OF BASIN (FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION): 12"
 - FLAT BOTTOM WIDTH: 2' MINIMUM
 - SIDE SLOPES OF BASIN: 3:1 MAXIMUM
 - SLOPE OF RAIN GARDEN: 0.5% OR LESS
3. SETBACKS:
 - FILTRATION RAIN GARDEN MUST BE 10' FROM FOUNDATIONS AND 5' FROM PROPERTY LINES UNLESS APPROVED BY BUILDING OFFICIAL.
4. OVERFLOW:
 - OVERFLOW REQUIRED. INLET ELEVATION MUST ALLOW FOR 4" OF FREEBOARD, MINIMUM.
 - PROTECT FROM DEBRIS AND SEDIMENT WITH STRAINER OR GRATE.
5. PIPING:
 - PERFORATED UNDERDRAIN PIPING: SHALL BE ABS SCH. 40, DUCTILE IRON, OR PVC SCH.40. MINIMUM DIAMETER IS 6". PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
 - OVERFLOW PIPING: SHALL BE ABS SCH. 40, DUCTILE IRON, OR PVC SCH. 40 AND SHALL NOT BE PERFORATED. MINIMUM DIAMETER IS 6". PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
6. DRAIN ROCK:
 - SIZE: 1 1/2" to 3/4"-0 WASHED
 - DEPTH: 18" MINIMUM
7. SEPARATION BETWEEN DRAIN ROCK AND GROWING MEDIUM: SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
8. GROWING MEDIUM:
 - DEPTH: 18" MINIMUM
 - FACILITY SURFACE AREA MAY BE REDUCED BY 20% WHEN GROWING MEDIA DEPTH IS INCREASED TO 30" OR MORE.
9. VEGETATION: FOLLOW LANDSCAPE PLANS OR REFER TO PLANTING REQUIREMENTS IN APPENDIX A.
10. WATERPROOF LINER (IF REQUIRED): SHALL BE 30 MIL PVC OR EQUIVALENT.
11. SPLASH PAD TO TRANSITION FROM INLETS TO GROWING MEDIUM.
12. SEASONAL HIGH GROUNDWATER SEPARATION:
 - SEPARATION DISTANCE AS REQUIRED BY WES.
13. SEE WES STANDARD DRAWINGS FOR LOCATING PLANTERS IN THE PUBLIC RIGHT-OF-WAY.

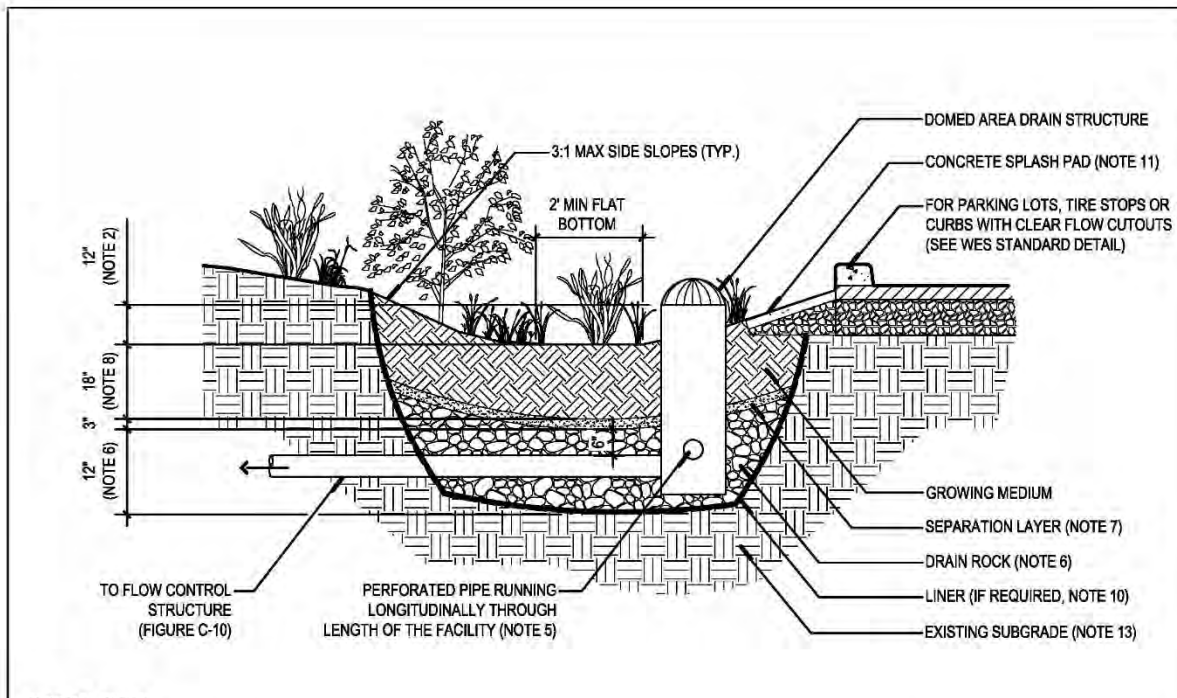
	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING SWM -03
		RAIN GARDEN FILTRATION	



GENERAL NOTES:


1. **PROVIDE PROTECTION** FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION.
2. **DIMENSIONS:**
 - DEPTH OF BASIN (FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION): 16"
 - FLAT BOTTOM WIDTH: 2' MINIMUM
 - SIDE SLOPES OF BASIN: 3:1 MAXIMUM
 - SLOPE OF RAIN GARDEN: 0.5% OR LESS
3. **SETBACKS:**
 - INFILTRATION RAIN GARDEN MUST BE 10' FROM FOUNDATIONS AND 5' FROM PROPERTY LINES.
4. **OVERFLOW:**
 - EMERGENCY OVERFLOW PATH FOR THE 100 YEAR DESIGN STORM SHALL BE IDENTIFIED IN THE STORMWATER MANAGEMENT PLAN.
5. **DRAIN ROCK:**
 - SIZE: 1 1/2" TO 3/4" - WASHED
 - DEPTH: 18"
6. **SEPARATION** BETWEEN DRAIN ROCK AND GROWING MEDIUM: SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
7. **GROWING MEDIUM:**
 - DEPTH: 18" MINIMUM
 - FACILITY SURFACE AREA MAY BE REDUCED BY 20% WHEN GROWING MEDIA DEPTH IS INCREASED TO 30" OR MORE.
8. **VEGETATION:** FOLLOW LANDSCAPE PLANS OR REFER TO PLANTING REQUIREMENTS IN APPENDIX A.
9. **SPLASH PAD** TO TRANSITION FROM INLETS TO GROWING MEDIUM.
10. **SEASONAL HIGH GROUNDWATER SEPARATION:**
 - SEPARATION DISTANCE AS REQUIRED BY WES.
11. **SEE WES STANDARD DRAWINGS** FOR LOCATING RAIN GARDENS IN THE PUBLIC RIGHT-OF-WAY.

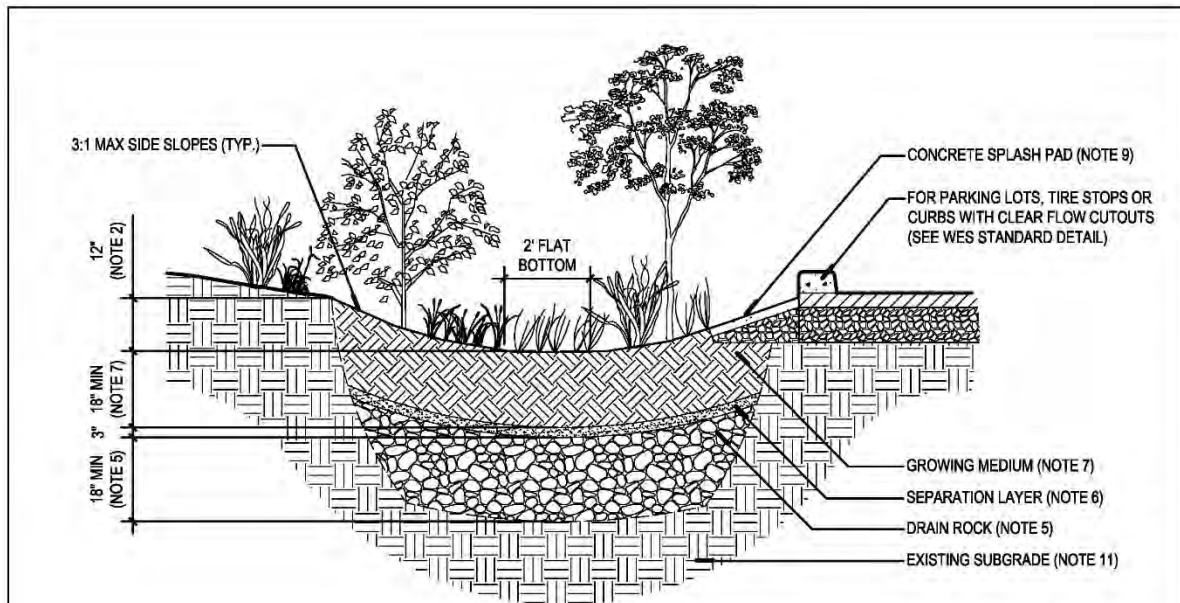
	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING SWM -04
		RAIN GARDEN INFILTRATION	



GENERAL NOTES:


1. **PROVIDE PROTECTION** FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION. UNLESS REQUIRED BY SITE CONDITIONS, UNLINED SWALES ARE PREFERRED TO ALLOW MAXIMUM INFILTRATION.
2. **DIMENSIONS:**
 - DEPTH OF SWALE (FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION): 12"
 - LONGITUDINAL SLOPE OF SWALE: 6.0% OR LESS. INSTALL CHECK DAM IF OVER 4.0%. SEE NOTE 12.
 - FLAT BOTTOM WIDTH: 2' MINIMUM
 - SIDE SLOPES OF SWALE: 3:1 MAXIMUM
3. **SETBACKS:**
 - FILTRATION SWALES MUST BE 10' FROM FOUNDATIONS AND 5' FROM PROPERTY LINES UNLESS APPROVED BY BUILDING OFFICIAL.
4. **OVERFLOW:**
 - INLET ELEVATION MUST ALLOW FOR 4" OF FREEBOARD, MINIMUM.
 - PROTECT FROM DEBRIS AND SEDIMENT WITH STRAINER OR GRATE.
5. **PIPING:**
 - PERFORATED UNDERDRAIN PIPING: SHALL BE ABS SCH. 40, DUCTILE IRON, OR PVC SCH.40. MINIMUM DIAMETER IS 6". PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
 - OVERFLOW PIPING: SHALL BE ABS SCH. 40, DUCTILE IRON, OR PVC SCH. 40 AND SHALL NOT BE PERFORATED. MINIMUM DIAMETER IS 6". PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
6. **DRAIN ROCK:**
 - SIZE: 1 1/2" - 3/4" WASHED
 - DEPTH: 12"
7. **SEPARATION** BETWEEN DRAIN ROCK AND GROWING MEDIUM: SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
8. **GROWING MEDIUM:**
 - 18" MINIMUM
 - FACILITY SURFACE AREA MAY BE REDUCED BY 20% WHEN GROWING MEDIA DEPTH IS INCREASED TO 30" OR MORE.
9. **VEGETATION:** FOLLOW LANDSCAPE PLANS OR REFER TO PLANTING REQUIREMENTS IN APPENDIX F.
10. **WATERPROOF LINER (IF REQUIRED):** SHALL BE 30 MIL PVC OR EQUIVALENT.
11. **SPLASH PAD** TO TRANSITION FROM INLETS TO GROWING MEDIUM.
12. **CHECK DAMS:** SHALL BE REQUIRED FOR OVER 4% SLOPE, SHALL BE SPACED AT A MAXIMUM 2-FOOT ELEVATION INTERVALS. MAINTAIN 4 - 10 INCH DEEP ROCK CHECK DAMS AT DESIGN INTERVALS.
13. **SEASONAL HIGH GROUNDWATER SEPARATION:**
 - SEPARATION DISTANCE AS REQUIRED BY WES.
14. **SEE WES STANDARD DRAWINGS** FOR LOCATING SWALES IN THE PUBLIC RIGHT-OF-WAY

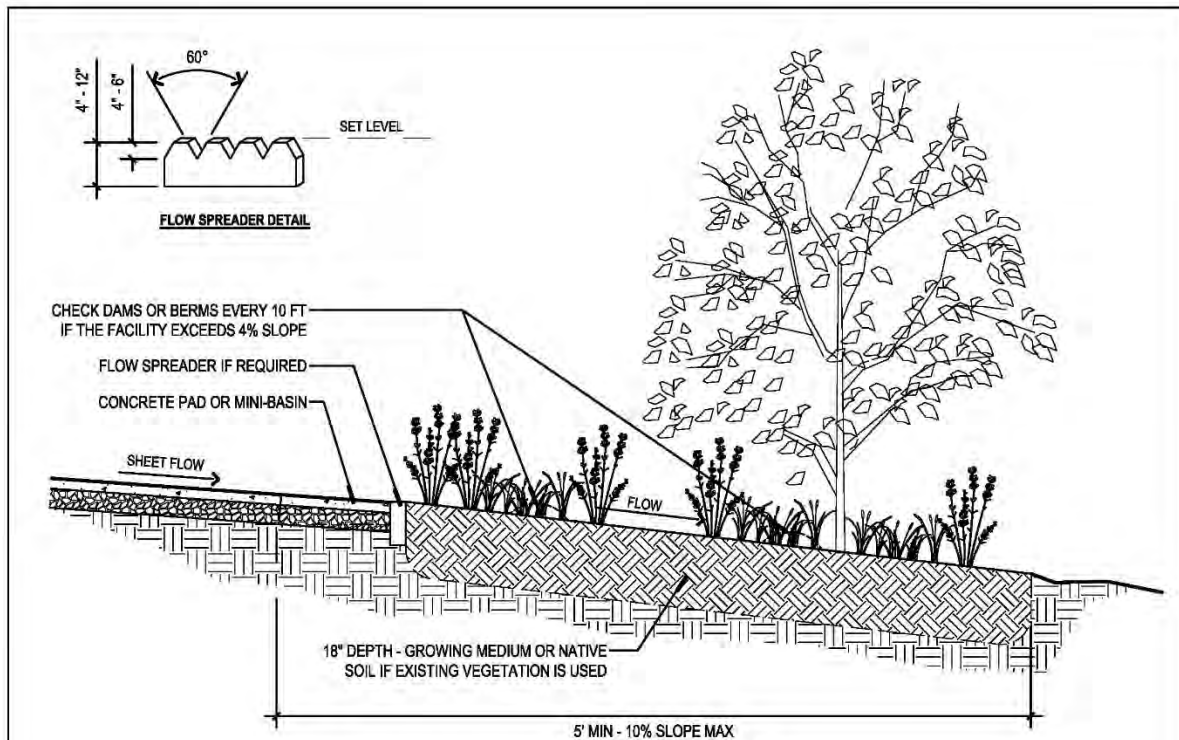
	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING SWM -05
		VEGETATED SWALE FILTRATION	



GENERAL NOTES:


1. **PROVIDE PROTECTION** FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION.
2. **DIMENSIONS:**
 - DEPTH OF SWALE (FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION): 12"
 - LONGITUDINAL SLOPE OF SWALE: 6.0% OR LESS
 - FLAT BOTTOM WIDTH: 2'
 - SIDE SLOPES OF SWALE: 3:1 MAXIMUM
3. **SETBACKS:**
 - INFILTRATION VEGETATED SWALES MUST BE 10' FROM FOUNDATIONS AND 5' FROM PROPERTY LINES.
4. **OVERFLOW:**
 - EMERGENCY OVERFLOW PATH FOR THE 100 YEAR DESIGN STORM SHALL BE IDENTIFIED ON THE STORMWATER MANAGEMENT PLAN.
5. **DRAIN ROCK:**
 - SIZE: 1 1/2" - 3/4" - WASHED
 - DEPTH: 18"
6. **SEPARATION BETWEEN DRAIN ROCK AND GROWING MEDIUM:** SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
7. **GROWING MEDIUM:**
 - 18" MINIMUM
 - FACILITY SURFACE AREA MAY BE REDUCED BY 20% WHEN GROWING MEDIA DEPTH IS INCREASED TO 30" OR MORE.
8. **VEGETATION:** FOLLOW LANDSCAPE PLANS OR REFER TO PLANTING REQUIREMENTS IN APPENDIX F.
9. **SPLASH PAD** TO TRANSITION FROM INLETS TO GROWING MEDIUM.
10. **CHECK DAMS:** REQUIRED FOR OVER 4% SLOPE, SHALL BE SPACED AT A MAXIMUM 2-FOOT ELEVATION INTERVALS. MAINTAIN 4 - 10 INCH DEEP ROCK CHECK DAMS AT DESIGN INTERVALS.
11. **SEASONAL HIGH GROUNDWATER SEPARATION:**
 - SEPARATION DISTANCE AS REQUIRED BY WES.
12. **SEE WES STANDARD DRAWINGS** FOR LOCATING PLANTERS IN THE PUBLIC RIGHT-OF-WAY.

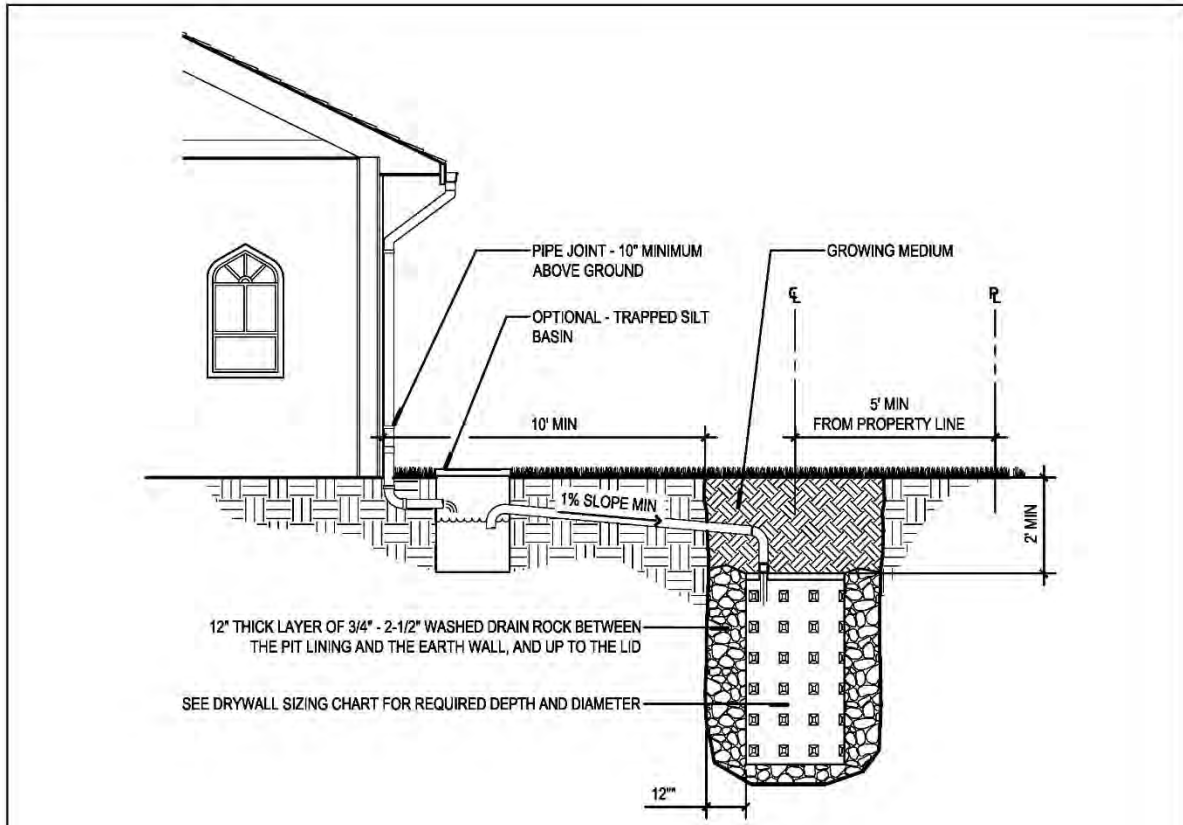
	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING SWM -06
		VEGETATED SWALE INFILTRATION	



GENERAL NOTES:

1. **PROVIDE PROTECTION** FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION.
2. **DIMENSIONS:**
 - LENGTH: 5' MINIMUM
 - SLOPE OF PLANTER: 0.5% -10%
3. **SETBACKS:**
 - FILTER STRIP MUST BE MINIMUM OF 5 FEET FROM PROPERTY LINE, 10 FT FROM BUILDINGS, 50 FT FROM WETLANDS, RIVERS, STREAMS, AND CREEKS.
4. **OVERFLOW:**
 - COLLECTION AND CONVEYANCE TO APPROVED DISCHARGE POINT MAY BE REQUIRED DEPENDING ON DESIGN.
 - WHERE REQUIRED, COLLECTION FROM FILTER STRIP SHALL BE SPECIFIED ON PLANS TO APPROVED DISCHARGE POINT ACCORDING TO WES STANDARDS.
5. **GROWING MEDIUM:**
 - UNLESS EXISTING VEGETATED AREAS ARE USED FOR THE FILTER STRIP, GROWING MEDIUM SHALL BE USED WITHIN THE TOP 18".
 - USE SAND/LOAM/COMPOST 3-WAY MIX OR APPROVED MIX THAT WILL SUPPORT HEALTHY PLANTS.
6. **VEGETATION:**
 - THE ENTIRE FILTER STRIP MUST HAVE 100% COVERAGE BY NATIVE GRASSES, NATIVE WILDFLOWER BLENDS, NATIVE GROUND COVERS, OR ANY COMBINATION THEREOF.
12. **FLOW SPREADERS:** A GRADE BOARD OR SAND/GRAVEL TRENCH MAY BE REQUIRED TO DISPERSE THE RUNOFF EVENLY ACROSS THE FILTER STRIP TO PREVENT A POINT OF DISCHARGE. THE TOP OF THE LEVEL SPREADER MUST BE HORIZONTAL AND AT AN APPROPRIATE HEIGHT TO PROVIDE SHEETFLOW DIRECTLY TO THE SOIL WITHOUT SCOUR. LEVEL SPREADERS SHALL NOT HOLD A PERMANENT VOLUME OF RUNOFF. GRADE BOARDS CAN BE MADE OF ANY MATERIAL THAT WILL WITHSTAND WEATHER AND SOLAR DEGRADATION. TRENCHES USED AS LEVEL SPREADERS CAN BE FILLED WITH WASHED CRUSHED ROCK, PEA GRAVEL, OR SAND.
13. **CHECK DAMS:** REQUIRED FOR OVER 4% SLOPE, SHALL BE SPACED AT A MAXIMUM 2-FOOT ELEVATION INTERVALS. MAINTAIN 4 TO 10 INCH DEEP ROCK CHECK DAMS AT DESIGN INTERVALS.

	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING
		FILTER STRIP	SWM -07




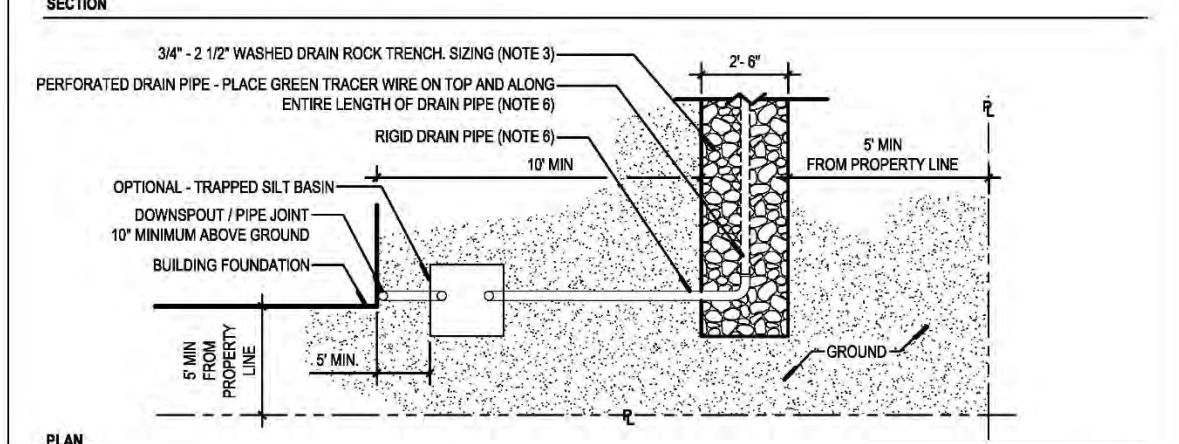
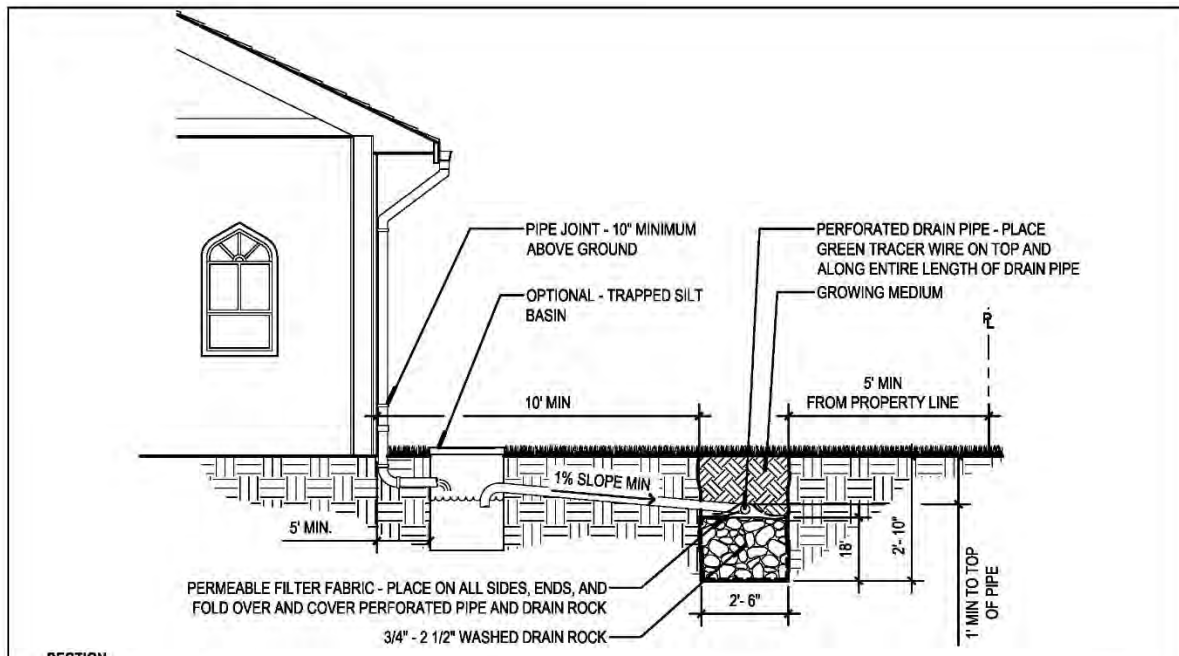
12" THICK LAYER OF 3/4" - 2-1/2" WASHED DRAIN ROCK BETWEEN THE PIT LINING AND THE EARTH WALL, AND UP TO THE LID
SEE DRYWELL SIZING CHART FOR REQUIRED DEPTH AND DIAMETER

GENERAL NOTES:

1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION.
2. **SITING CRITERIA:** GRAVELLY SAND, GRAVELLY LOAMY SAND OR OTHER EQUALLY POROUS MATERIAL MUST OCCUR IN A CONTINUOUS 5' DEEP STRATUM WITHIN 12' OF THE GROUND SURFACE. DRYWELL SHALL NOT BE PLACED WHERE BASE OF FACILITY HAS LESS THAN 5' OF SEPARATION TO WATER TABLE.
3. **SIZING:** DRYWELL SIZING CHART IS USED TO SIZE THE DRYWELL(S) BASED ON IMPERVIOUS AREA.
4. **TOP OF DRYWELL** MUST BE BELOW LOWEST FINISHED FLOOR.
5. **SETBACKS:** DRYWELL MUST BE 10' FROM FOUNDATIONS, 5' FROM PROPERTY LINES, AND 20' FROM CESSPOOLS.
6. **PIPING** MUST BE CAST IRON, ABS OR PVC. 3" PIPE REQUIRED FOR FACILITIES DRAINING UP TO 1500 SF, OTHERWISE 4" MINIMUM PIPE. UNIFORM PLUMBING CODE ALSO APPLIES.
7. **TRAPPED SILT BASIN:** OPTIONAL FOR ROOF RUNOFF OR PEDESTRIAN ONLY PAVED AREAS.


DRYWELL SIZING CHART								
ONCE APPROVAL HAS BEEN GIVEN FOR ON-SITE INFILTRATION OF STORMWATER, THE FOLLOWING CHART SHALL BE USED TO SELECT THE NUMBER AND SIZE OF DRYWELLS. GRAY BOXES ARE ACCEPTABLE								
IMPERVIOUS AREA (SQ-FT)	28" DIAMETER				48" DIAMETER			
	DRYWELL DEPTH				DRYWELL DEPTH			
	5'	10'	15'	20'	5'	10'	15'	20'
1000								
2000								
3000								
4000								
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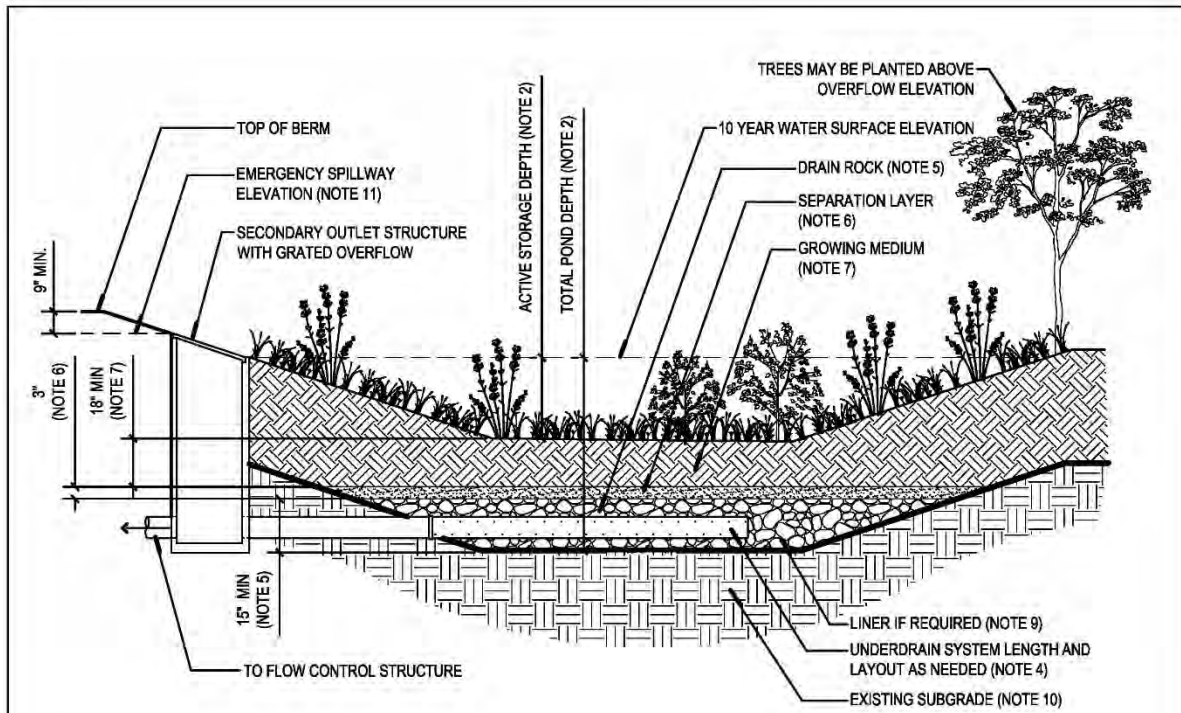
 <p>CLACKAMAS WATER ENVIRONMENT SERVICES</p>	<p>CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045</p>	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING
		<p>SIMPLIFIED DESIGN APPROACH DRYWELL</p>	<p>SWM -08</p>



GENERAL NOTES:


1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION.
2. SITING CRITERIA: INFILTRATION RATE MUST BE 2" PER HOUR MINIMUM. INFILTRATION TRENCH SHALL NOT BE PLACED WHERE BASE OF FACILITY HAS LESS THAN 5' SEPARATION TO WATER TABLE.
3. SIZING: 2'-6" WIDE X 1'-6" TALL X 20' LONG PER 1000 SQUARE FEET OF IMPERVIOUS SURFACE.
4. SETBACKS: SOAKAGE TRENCH MUST BE 10' FROM FOUNDATIONS, 5' FROM PROPERTY LINES, AND 20' FROM CESSPOOLS.
6. PIPING MUST BE CAST IRON, ABS OR PVC. 3" PIPE REQUIRED FOR FACILITIES DRAINING UP TO 1500 SF, OTHERWISE 4" MINIMUM PIPE. UNIFORM PLUMBING CODE ALSO APPLIES.
7. TRAPPED SILT BASIN: OPTIONAL FOR ROOF RUNOFF OR PEDESTRIAN ONLY PAVED AREAS.

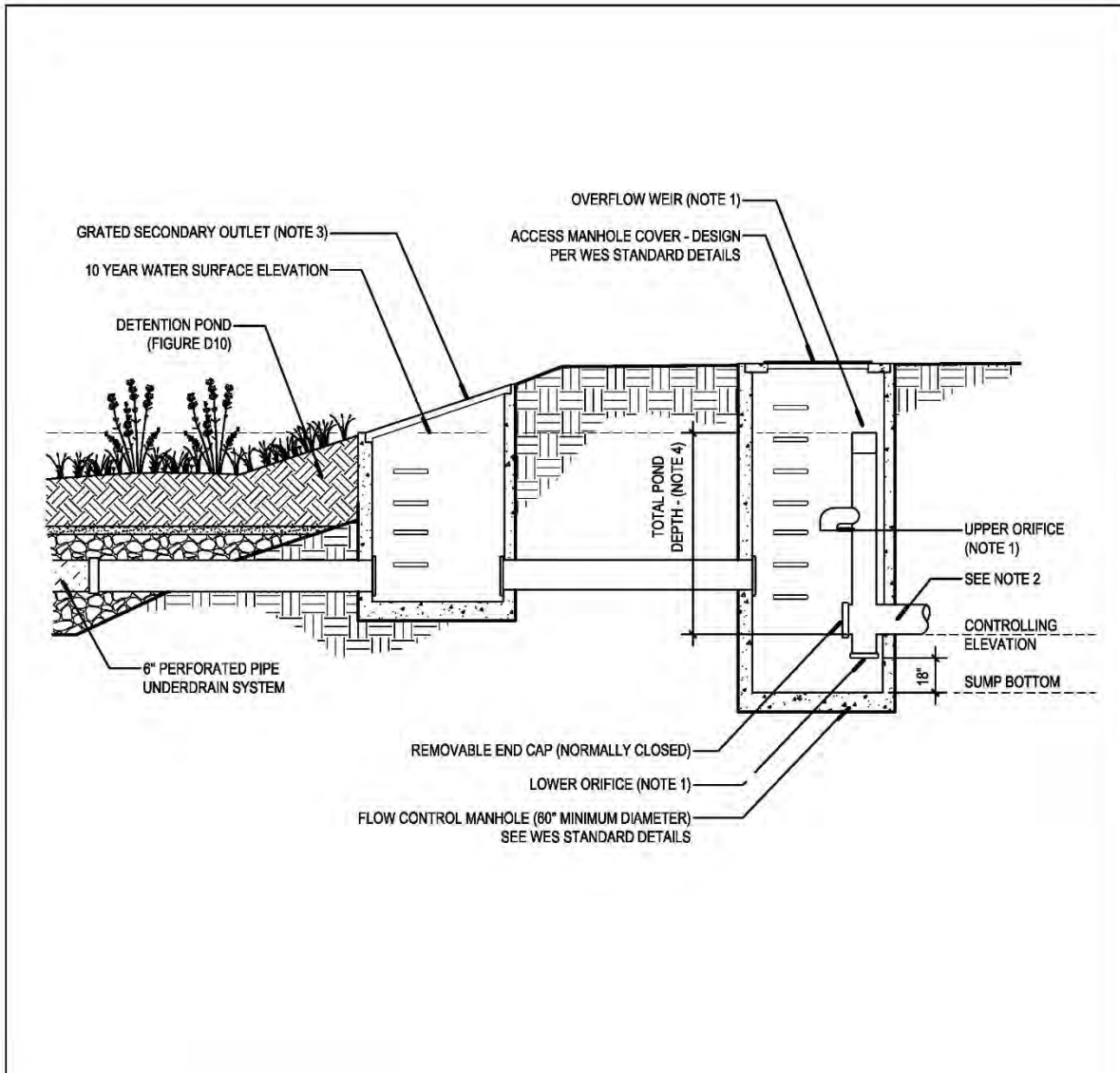
	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING SWM -09
		SIMPLIFIED DESIGN APPROACH INFILTRATION TRENCH	



GENERAL NOTES:


1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION. UNLESS REQUIRED BY SITE CONDITIONS, UNLINED PONDS ARE PREFERRED TO ALLOW MAXIMUM INFILTRATION.
2. DIMENSIONS:
 - ACTIVE STORAGE DEPTH (FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION): PER FACILITY SIZING MODEL
 - TOTAL POND DEPTH: 4' MINIMUM, PER FACILITY SIZING MODEL
 - BOTTOM SLOPE: 2.0% OR LESS
 - SIDE SLOPES OF DETENTION POND: 3:1 MAXIMUM
3. SETBACKS:
 - DETENTION POND MUST BE 10' FROM FOUNDATIONS AND 5' FROM PROPERTY LINES UNLESS APPROVED BY BUILDING OFFICIAL.
4. PIPING:
 - PERFORATED UNDERDRAIN PIPING: SHALL BE ABS SCH. 40, DUCTILE IRON OR PVC SCH. 40. 6" MINIMUM DIAMETER. PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
5. DRAIN ROCK:
 - SIZE: 1 1/2" - 3/4" WASHED
 - DEPTH: 15" MINIMUM
6. SEPARATION BETWEEN DRAIN ROCK AND GROWING MEDIUM: SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
7. GROWING MEDIUM:
 - 18" MINIMUM
8. VEGETATION: FOLLOW LANDSCAPE PLANS
9. WATERPROOF LINER (IF REQUIRED): SHALL BE 30 MIL PVC OR EQUIVALENT FOR DETENTION POND.
10. SEASONAL HIGH GROUNDWATER SEPARATION:
 - SEPARATION DISTANCE AS REQUIRED BY WES.
11. EMERGENCY SPILLWAY SIZED TO CONVEY THE 100 - YEAR DESIGN STORM. PROVIDE 6" MINIMUM FREEBOARD ABOVE THE 100 - YEAR DESIGN STORM.

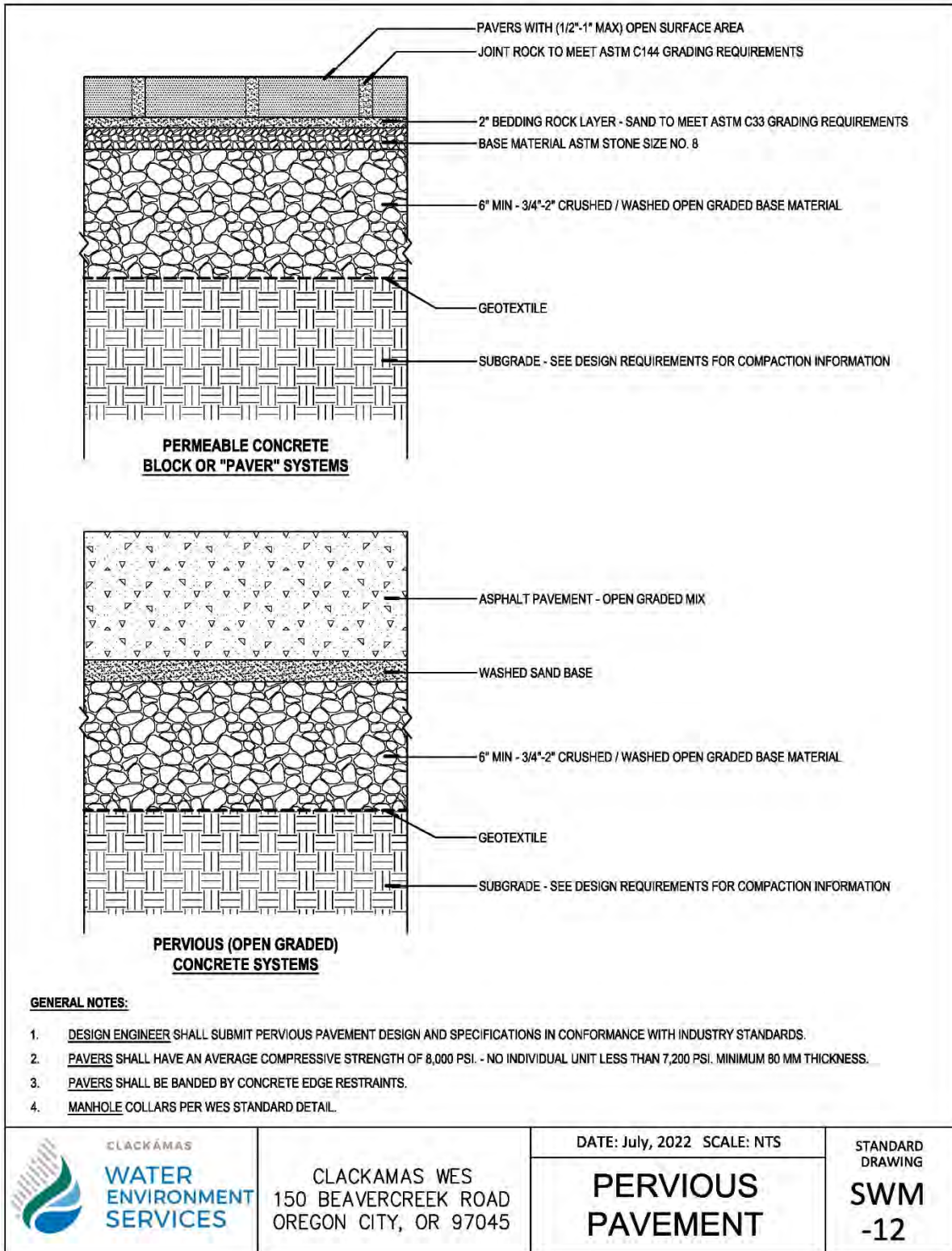
	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING
		<h1>DETENTION POND</h1>	<h1>SWM -10</h1>

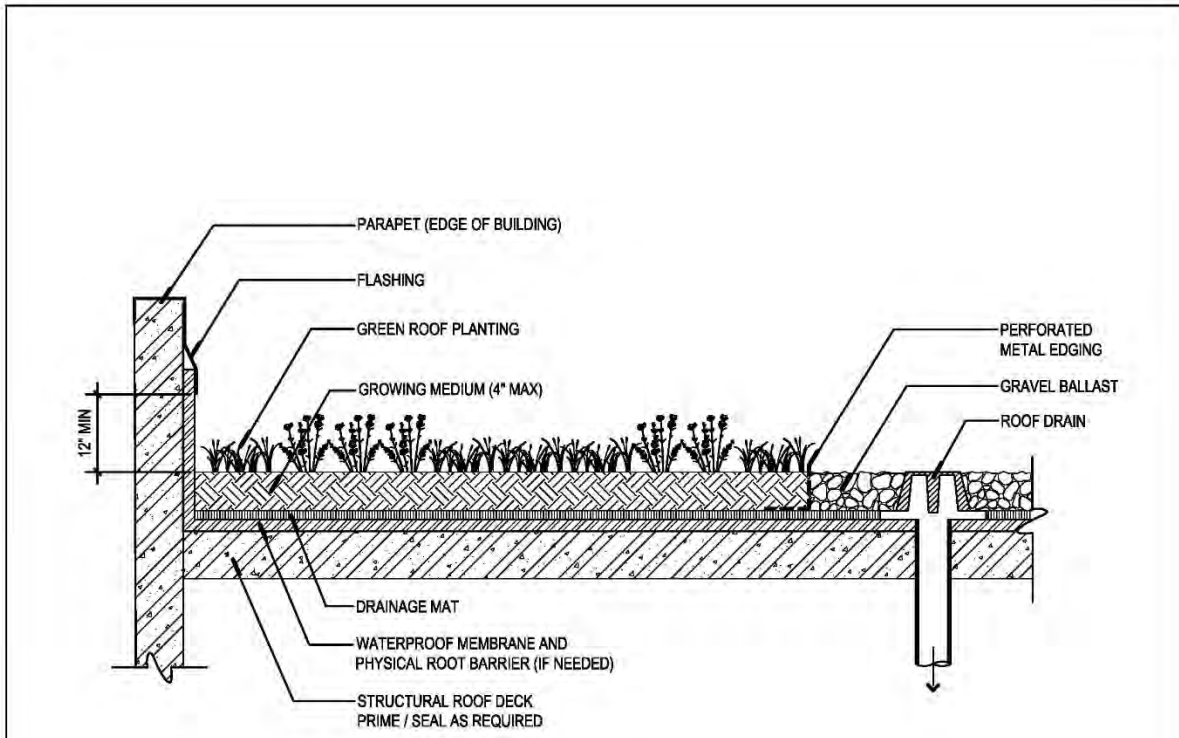


GENERAL NOTES:

1. ORIFICE AND WEIR DIMENSIONS AND ELEVATION DETERMINED THROUGH FACILITY SIZING MODEL.
2. PIPE SIZING DETERMINED BY ENGINEER.
3. SECONDARY OUTLET SIZED FOR PEAK DESIGN STORM.
4. TOTAL POND DEPTH - PER FACILITY SIZING MODEL, INCLUDES GROWING MEDIA, SEPARATION LAYER, AND DRAIN ROCK AS SHOWN ON FIGURE D1.


	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING
		DETENTION POND FLOW CONTROL STRUCTURE	SWM -11

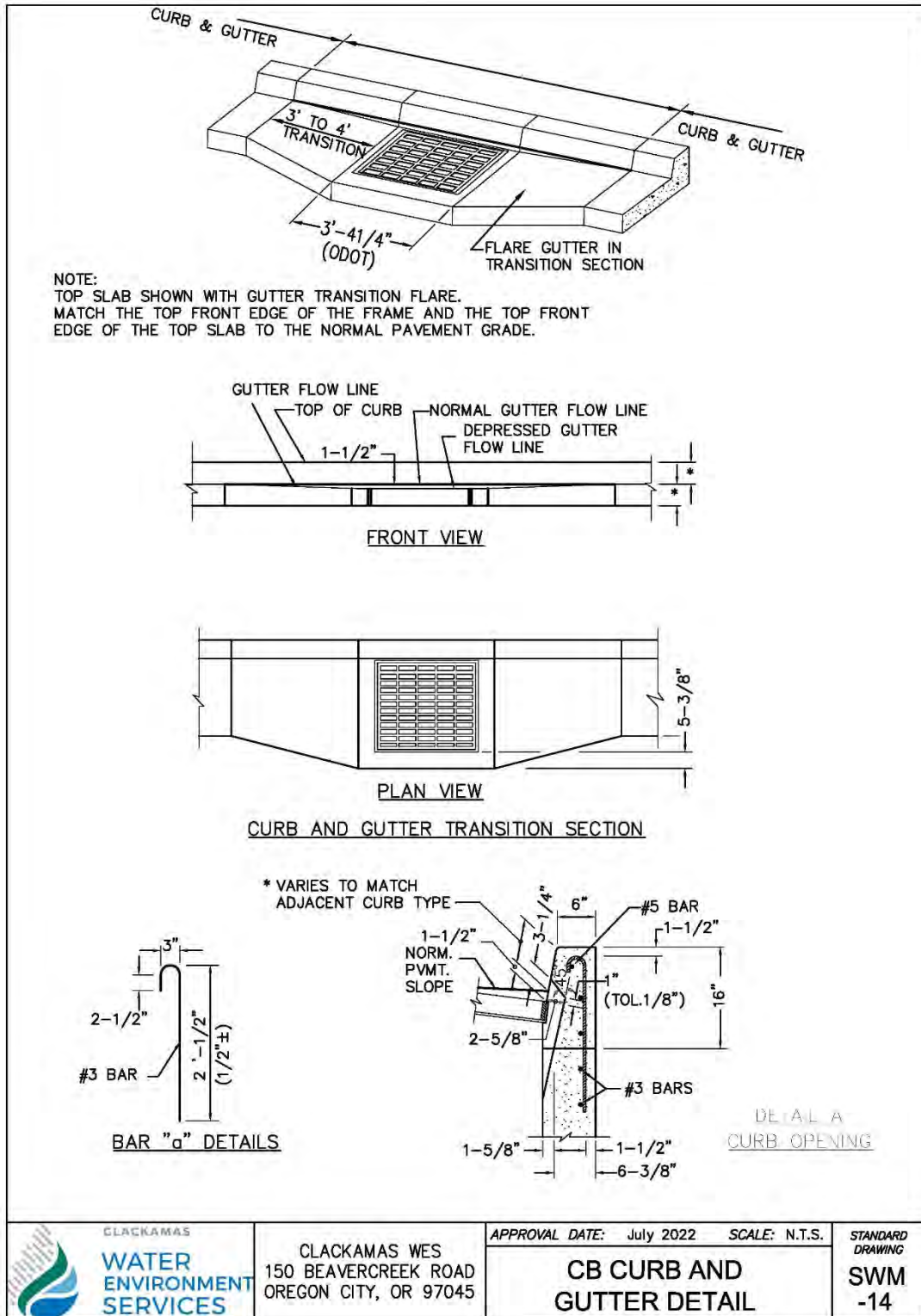




GENERAL NOTES:

1. DESIGN ENGINEER OR LANDSCAPE ARCHITECT SHALL SUBMIT GREEN ROOF DESIGN AND SPECIFICATIONS IN CONFORMANCE WITH INDUSTRY STANDARDS.

	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July 2022 SCALE: NTS	STANDARD DRAWING
		GREEN ROOF	SWM -13

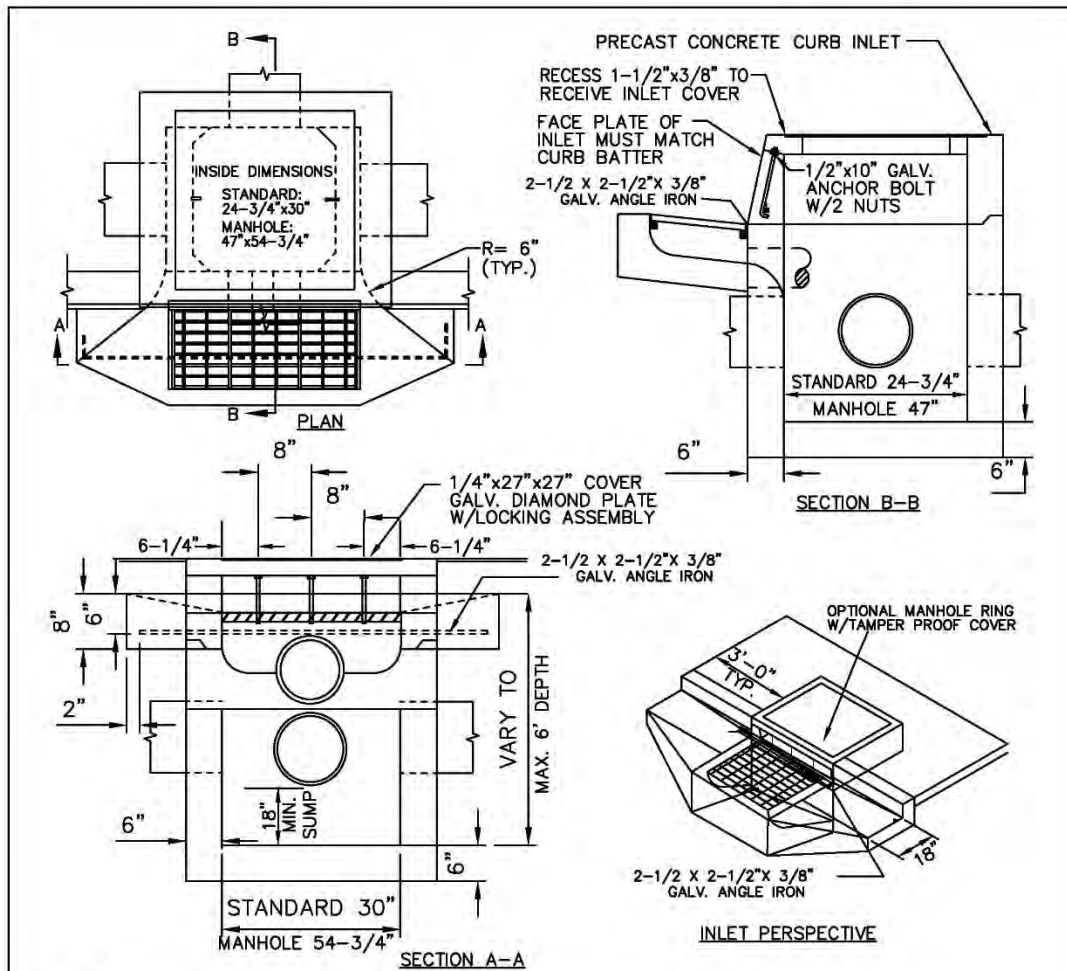


CLACKAMAS WES
 150 BEAVERCREEK ROAD
 OREGON CITY, OR 97045

APPROVAL DATE: July 2022 SCALE: N.T.S.


**CB CURB AND
 GUTTER DETAIL**

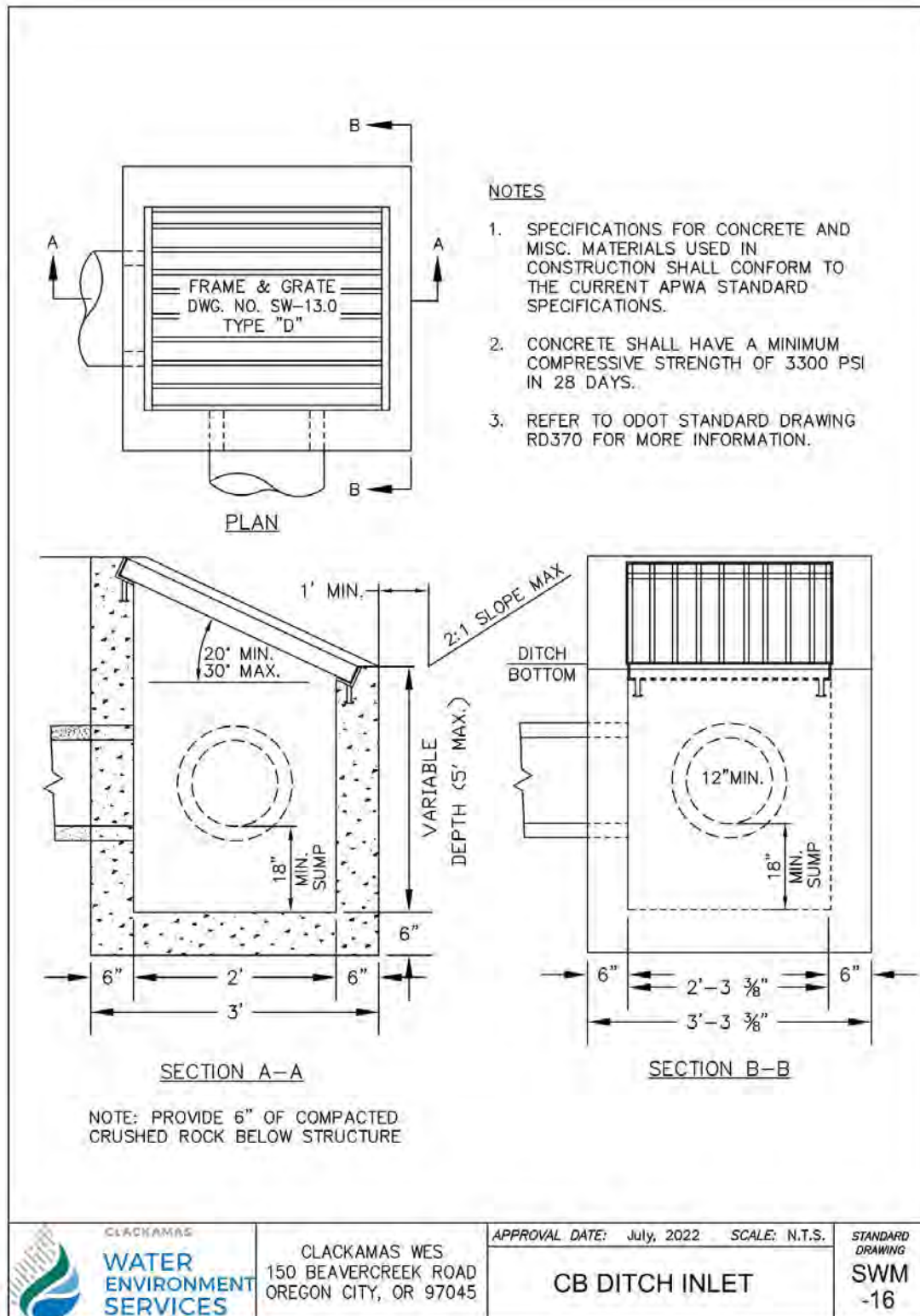
STANDARD
 DRAWING
**SWM
 -14**

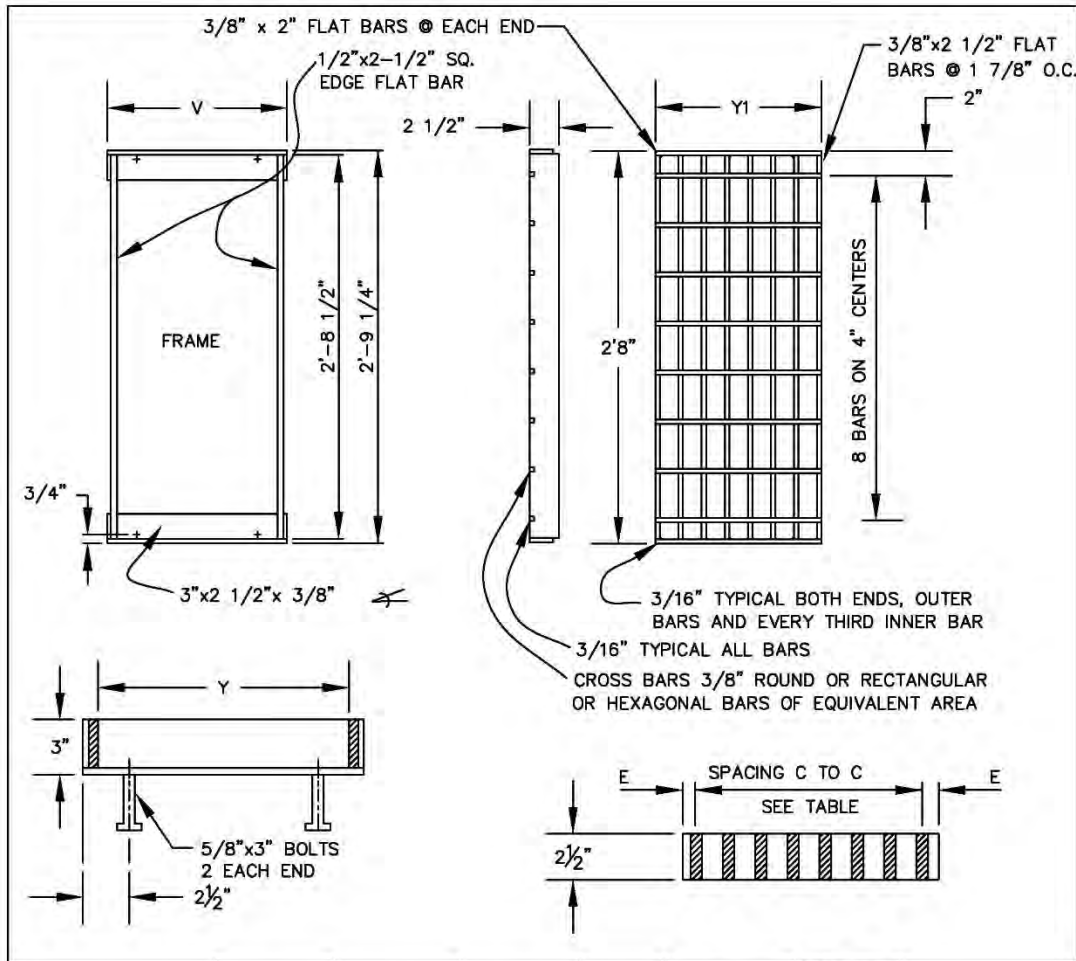


NOTES

1. CURB INLET CATCH BASIN SHALL CONFORM TO CURRENT ODOT/APWA SPECIFICATION. THE INLET SHALL HAVE AN 8" CURB EXPOSURE AT THE GRATE.
2. GRATED INLET SHALL BE POURED IN PLACE, A SHALLOW PRECAST INLET, OR A COMBINATION INLET GUTTER PLATE WITH LID (NEENAH R-3335-B CURB PIECE OR APPROVED EQUAL.)
3. CONNECT THE GRATED INLET TO THE CATCH BASIN BY A MINIMUM 12" DIAMETER CONCRETE PIPE GROUTED INTO BOTH SECTIONS. A SLOT MAY BE USED IF THE CURB INLET SECTION IS PRECAST AND DESIGNED TO CARRY THE LOADING. A METAL CURB PIECE MAY BE USED.
4. THE CURB INLET CATCH BASIN MAY USE A GB INLET WITH A SINGLE GRATE.
5. AN 18" SUMP IS REQUIRED.
6. ALL METAL PARTS MUST BE HOT DIPPED GALVANIZED AFTER FABRICATION.
7. THE LATCH SPRING MUST HAVE 50 LB. OF COMPRESSIVE STRENGTH.
8. SPECIFICATIONS FOR CONCRETE AND MISC. MATERIALS USED IN CONSTRUCTION SHALL CONFORM TO THE CURRENT ODOT/APWA STANDARD SPECIFICATIONS.
9. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3300 PSI IN 28 DAYS.

	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	APPROVAL DATE: July, 2022 SCALE: N.T.S.	STANDARD DRAWING
	CB CURB INLET		SWM -15





CATCH BASIN TYPE	V	Y	Y1	E	SPACING C TO C	NO. OF BARS PER GRATE	REMARKS
GB-2	2'-4 3/4"	2'-3 3/8"	1'-1 1/2"	5/8"	1 3/4"	8	2-GRATES
D	2'-4 3/4"	2'-3 3/8"	2'-3"	1 1/2"	3"	9	
GB	1'-3 1/4"	1'-1 7/8"	1'-1 1/2"	5/8"	1 3/4"	8	1-GRATE

NOTES

1. MATERIALS AND FABRICATION SHALL CONFORM TO THE CURRENT APWA STANDARD SPECIFICATIONS.
2. 3/8" CROSS BARS SHALL BE FLUSH WITH THE GRATE SURFACE AND MAY BE FILLET WELDED, RESISTANCE WELDED OR ELECTROFORGED TO BEARING BARS.
3. GB CATCH BASIN FOR USE WITH CURB INLET CATCH BASIN WITH GRATE ONLY.

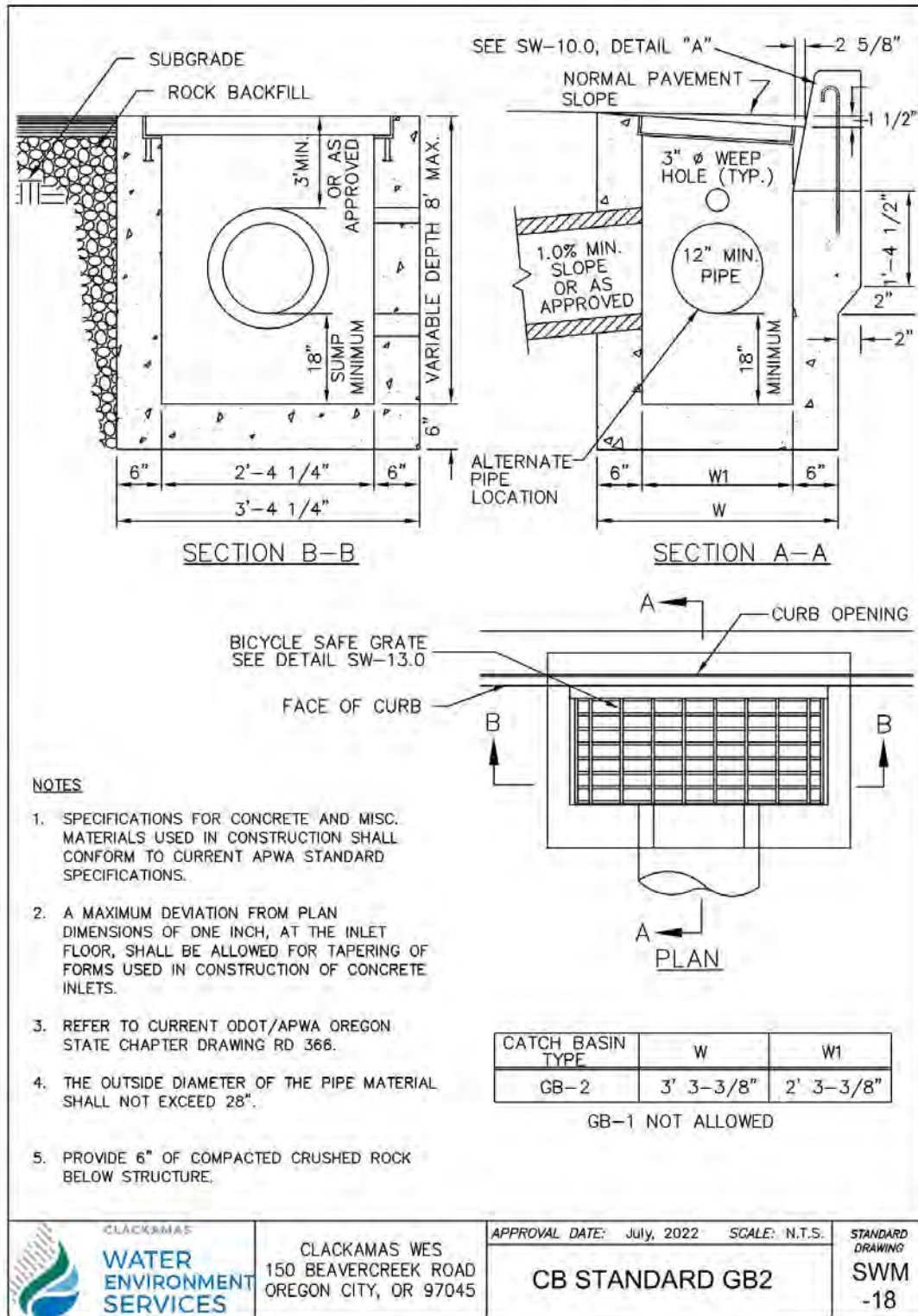


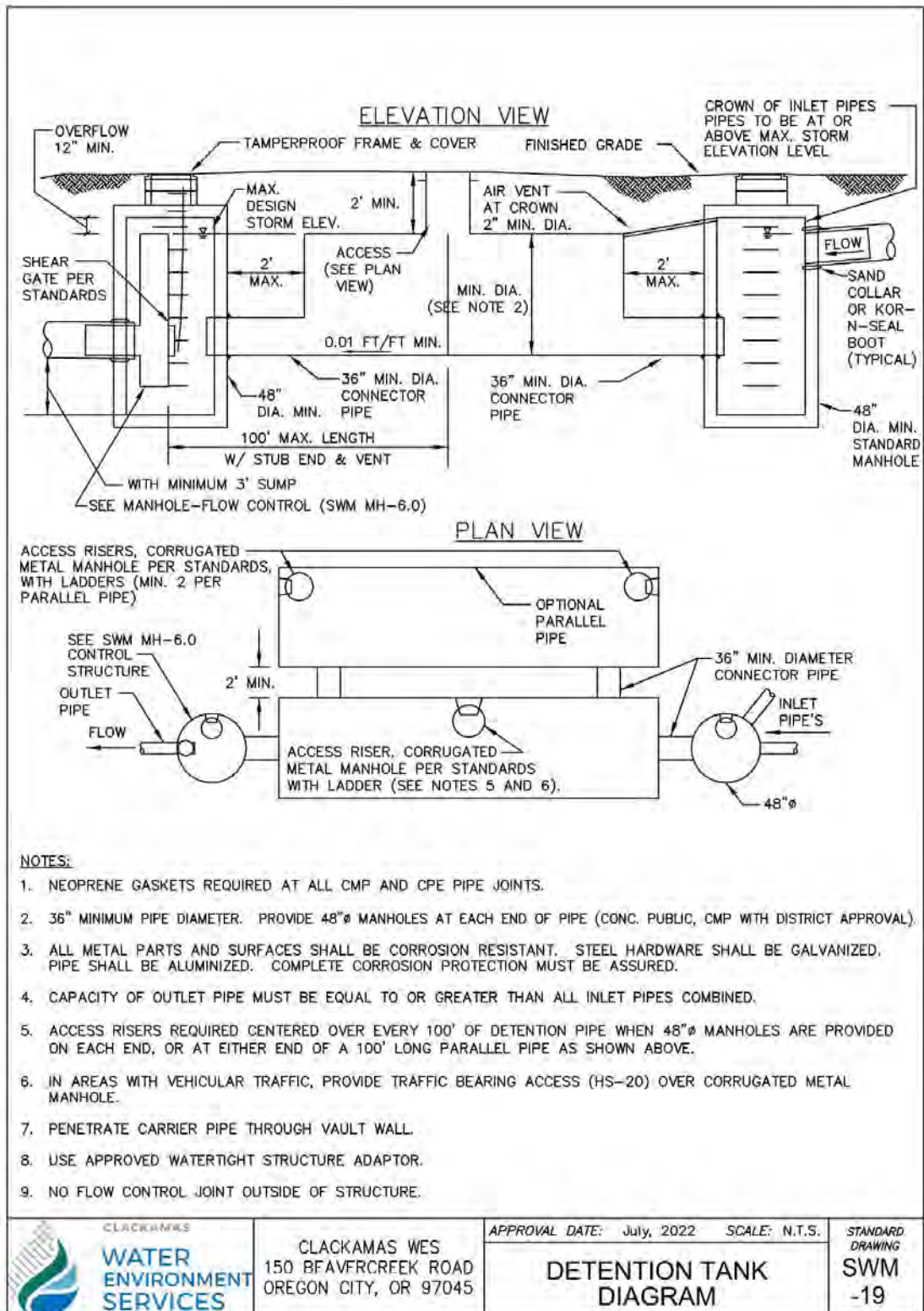
CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

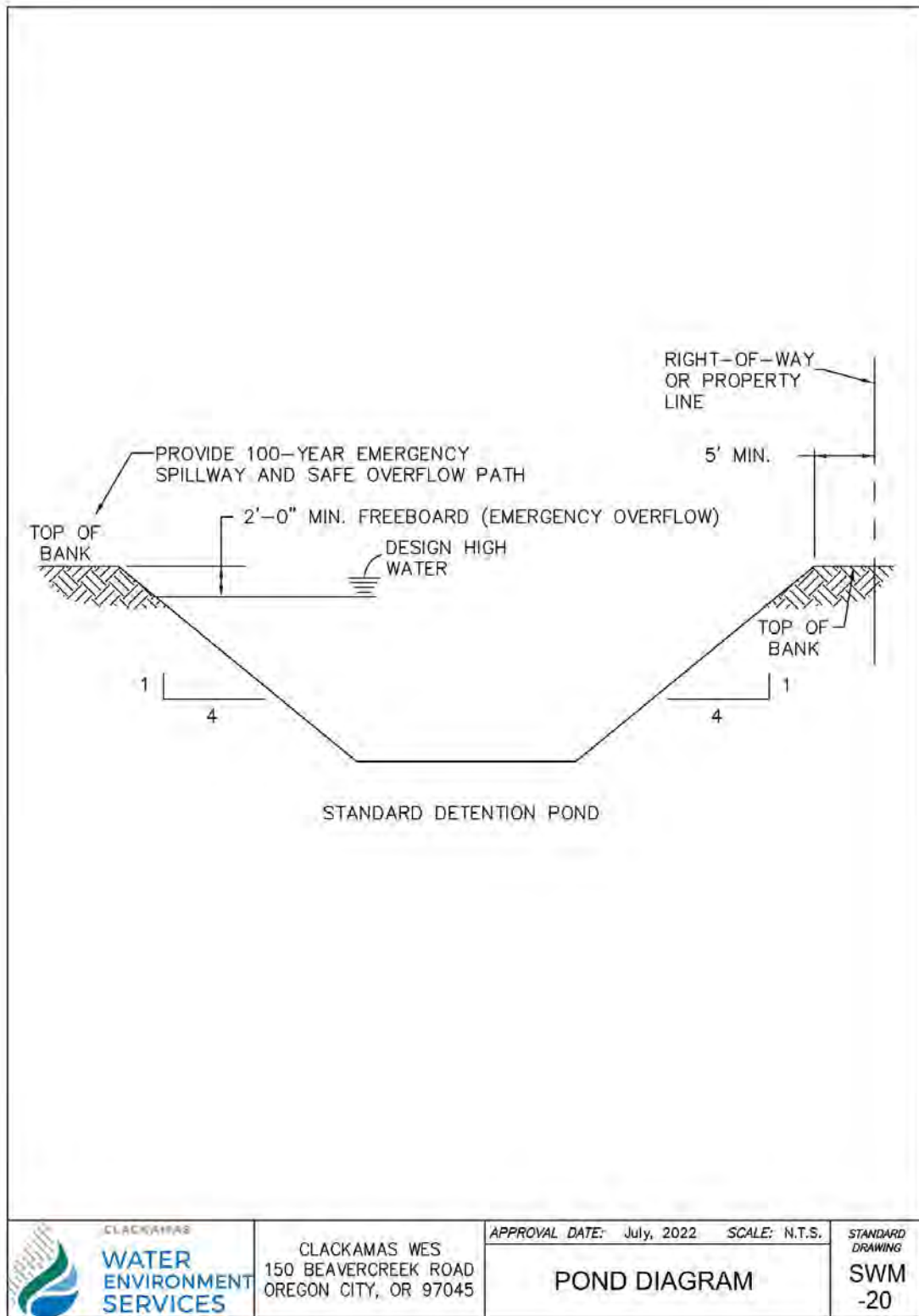
APPROVAL DATE: July, 2022 SCALE: N.T.S.


**CB FRAME
AND GRATE**

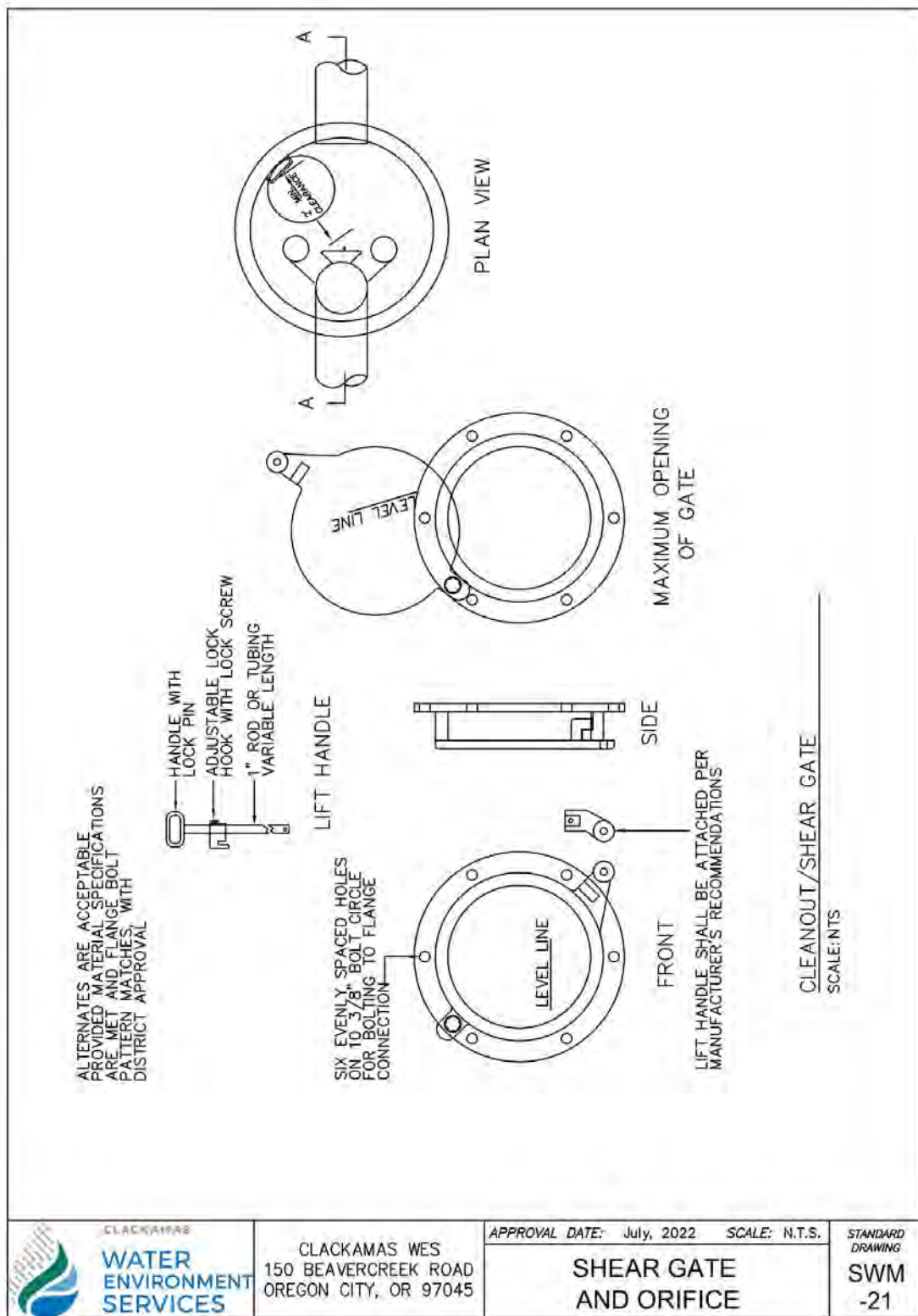
STANDARD
DRAWING
SWM
-17







 <p>CLACKAMAS WATER ENVIRONMENT SERVICES</p>	<p>CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045</p>	<p>APPROVAL DATE: July, 2022 SCALE: N.T.S.</p>	<p>STANDARD DRAWING</p>
		<p>POND DIAGRAM</p>	<p>SWM -20</p>



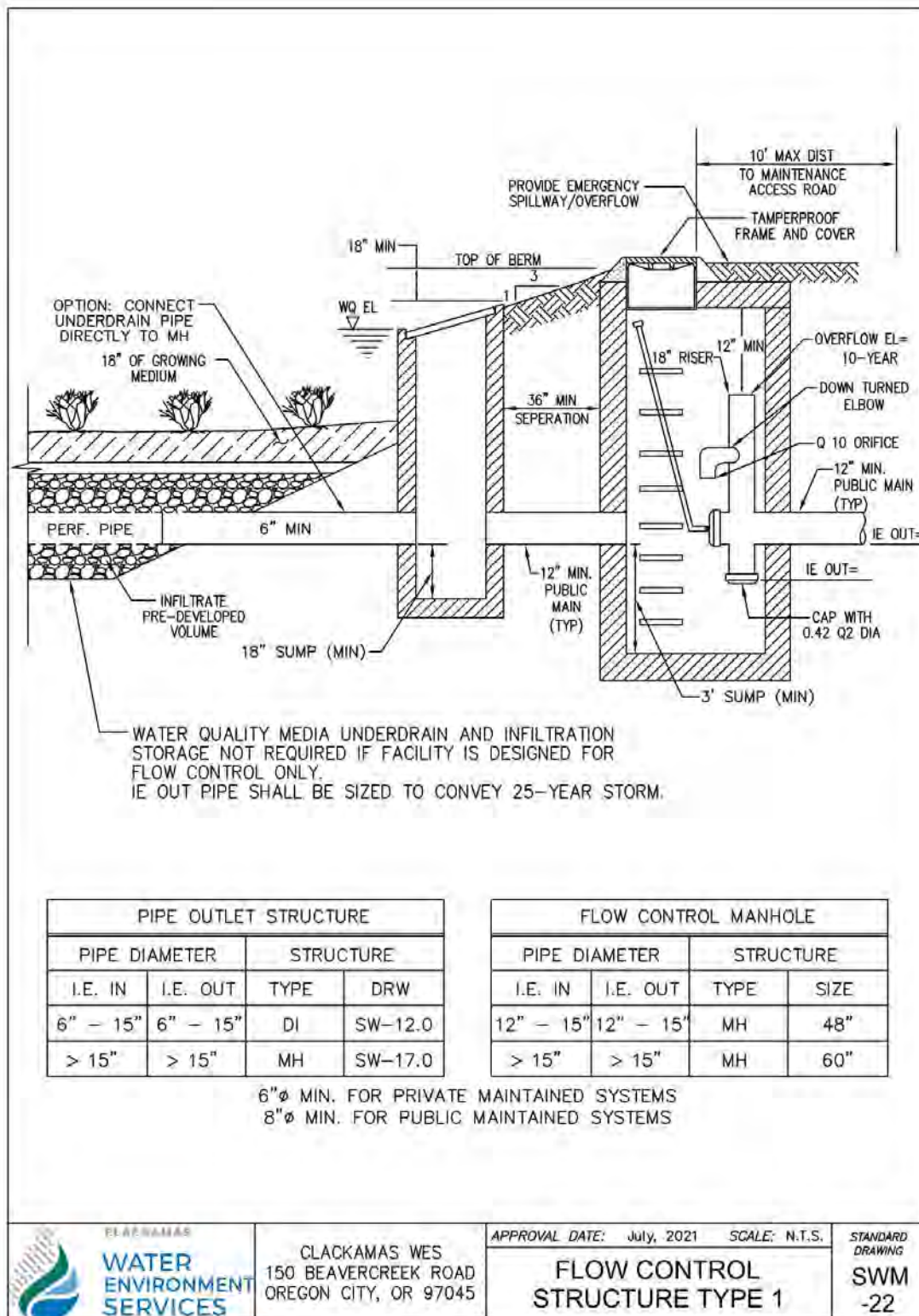
CLACKAMAS
WATER ENVIRONMENT SERVICES

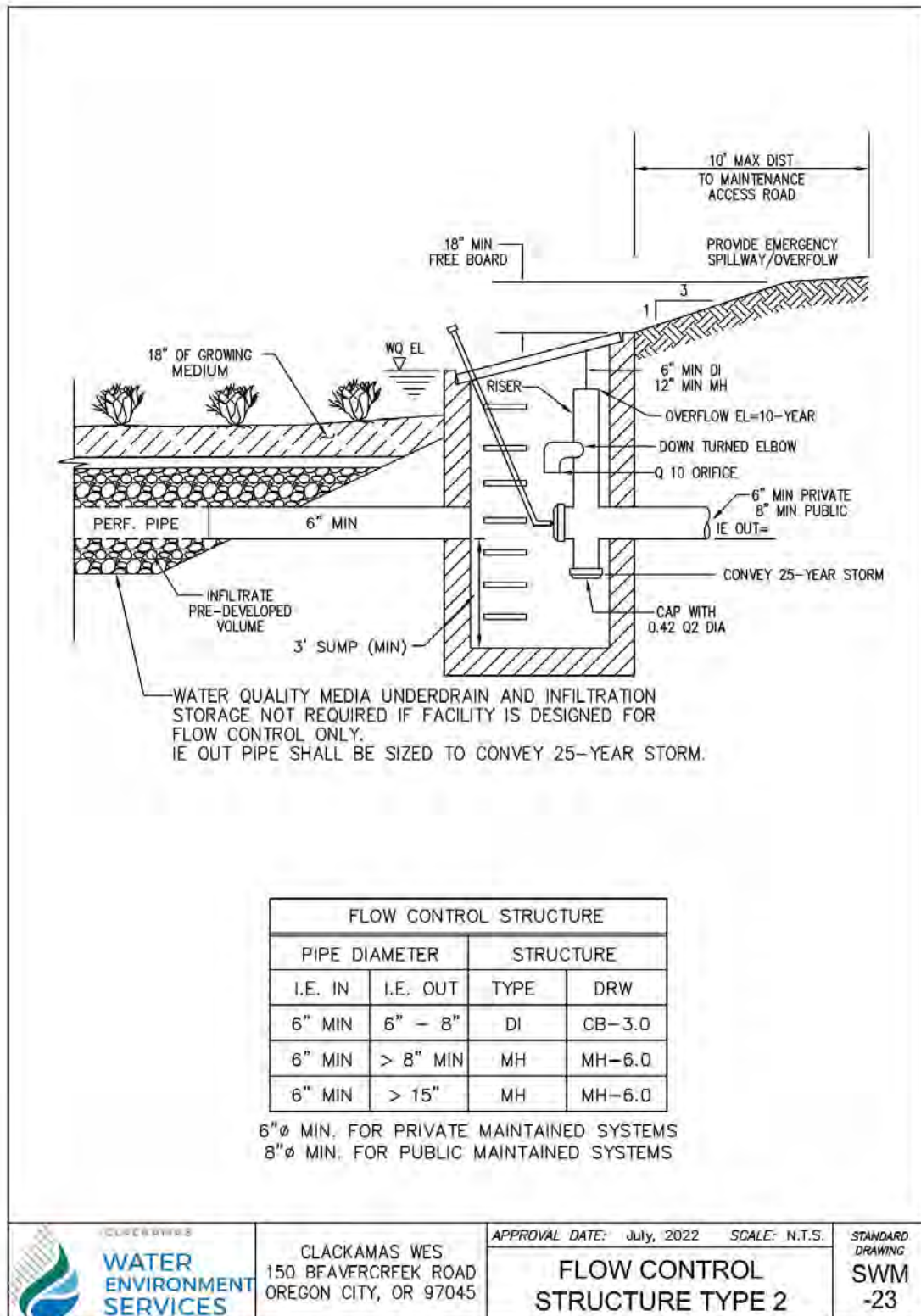
CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

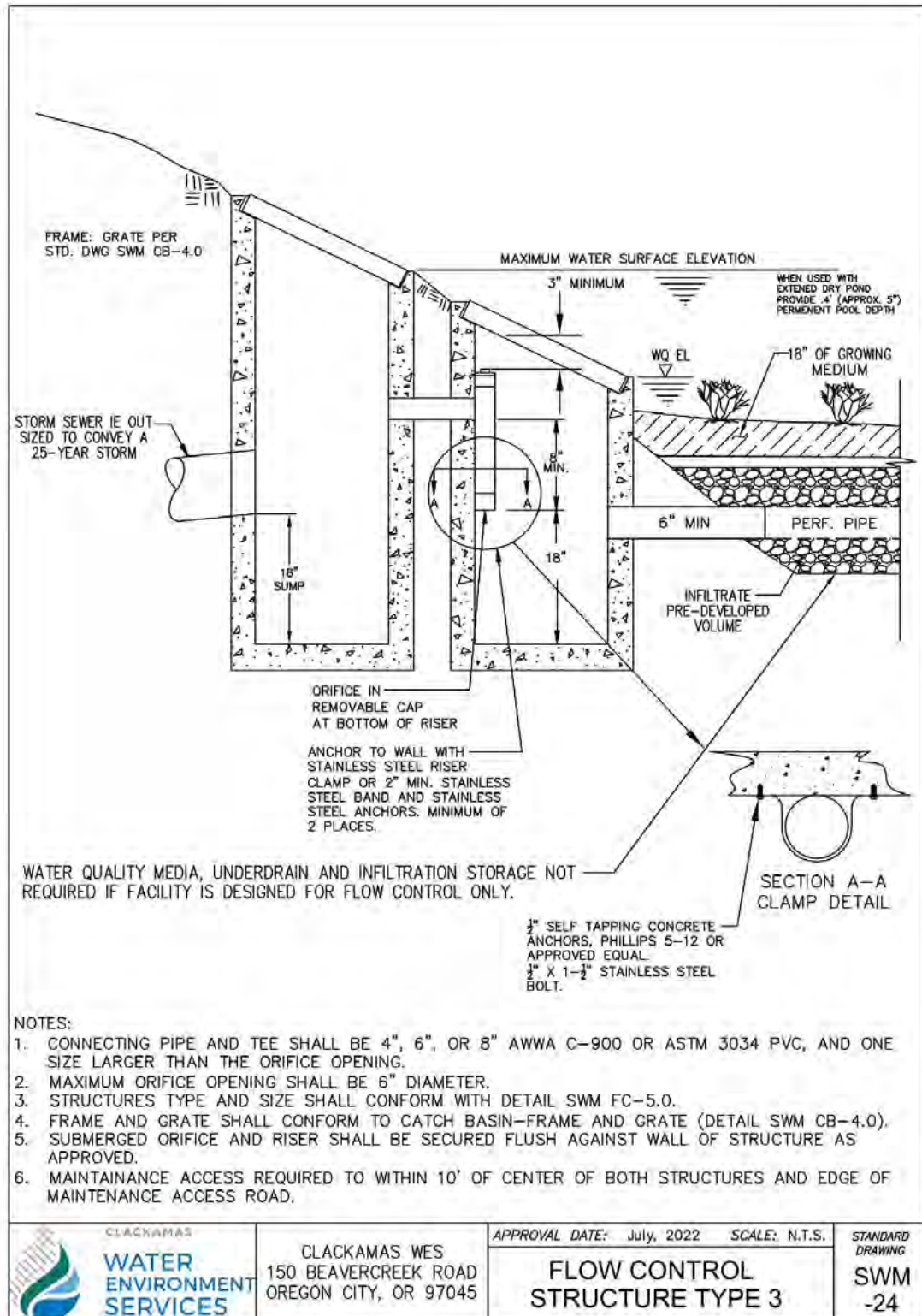
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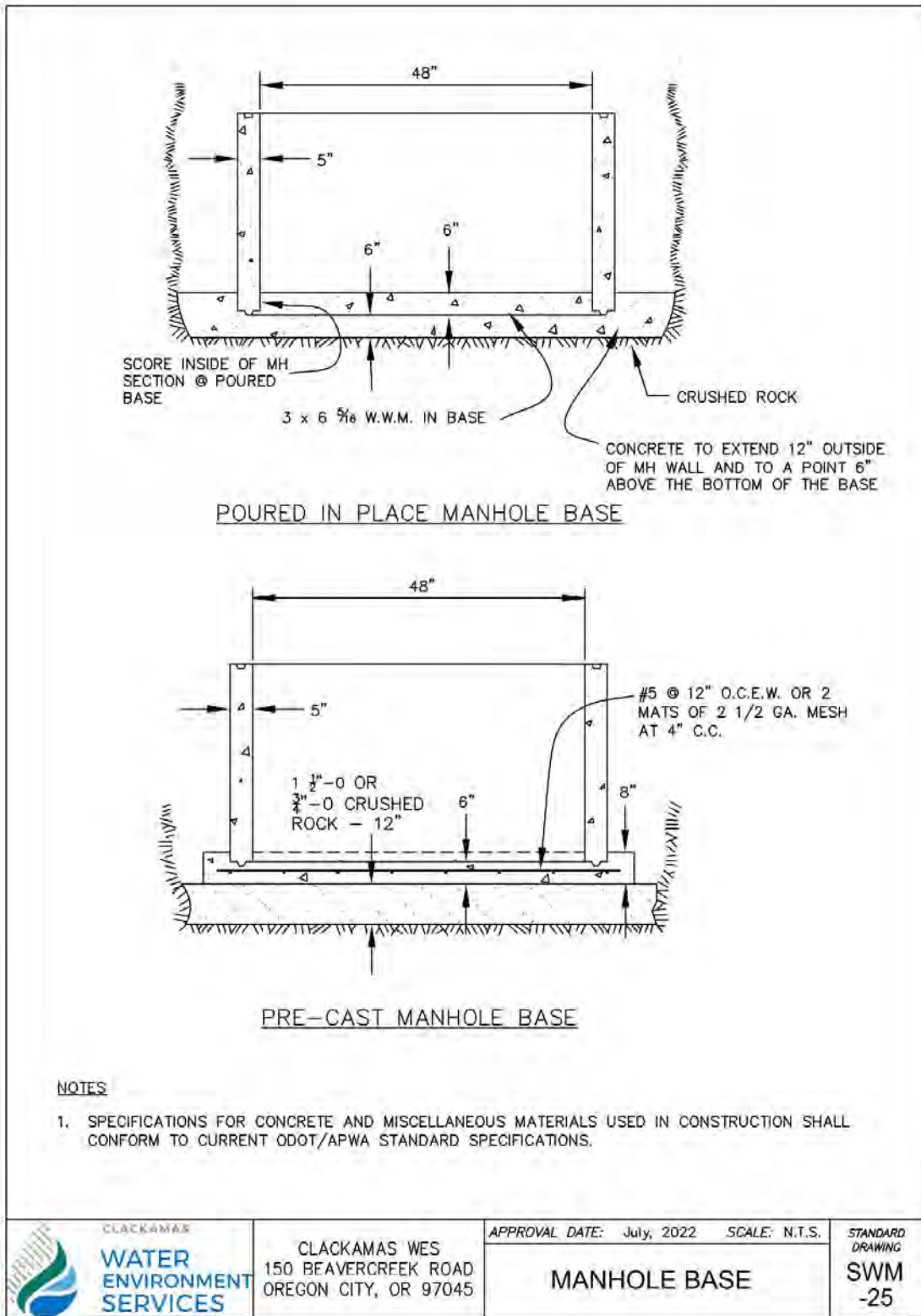
SHEAR GATE AND ORIFICE

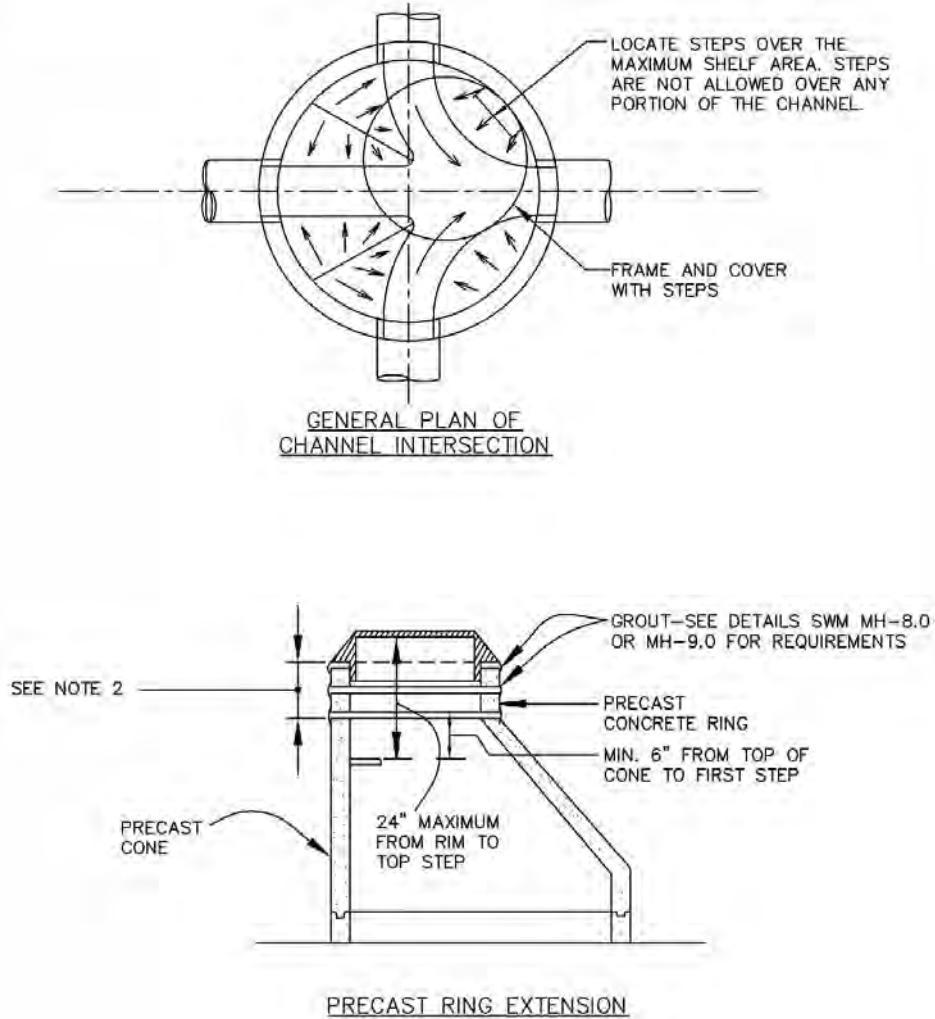
STANDARD DRAWING
SWM -21








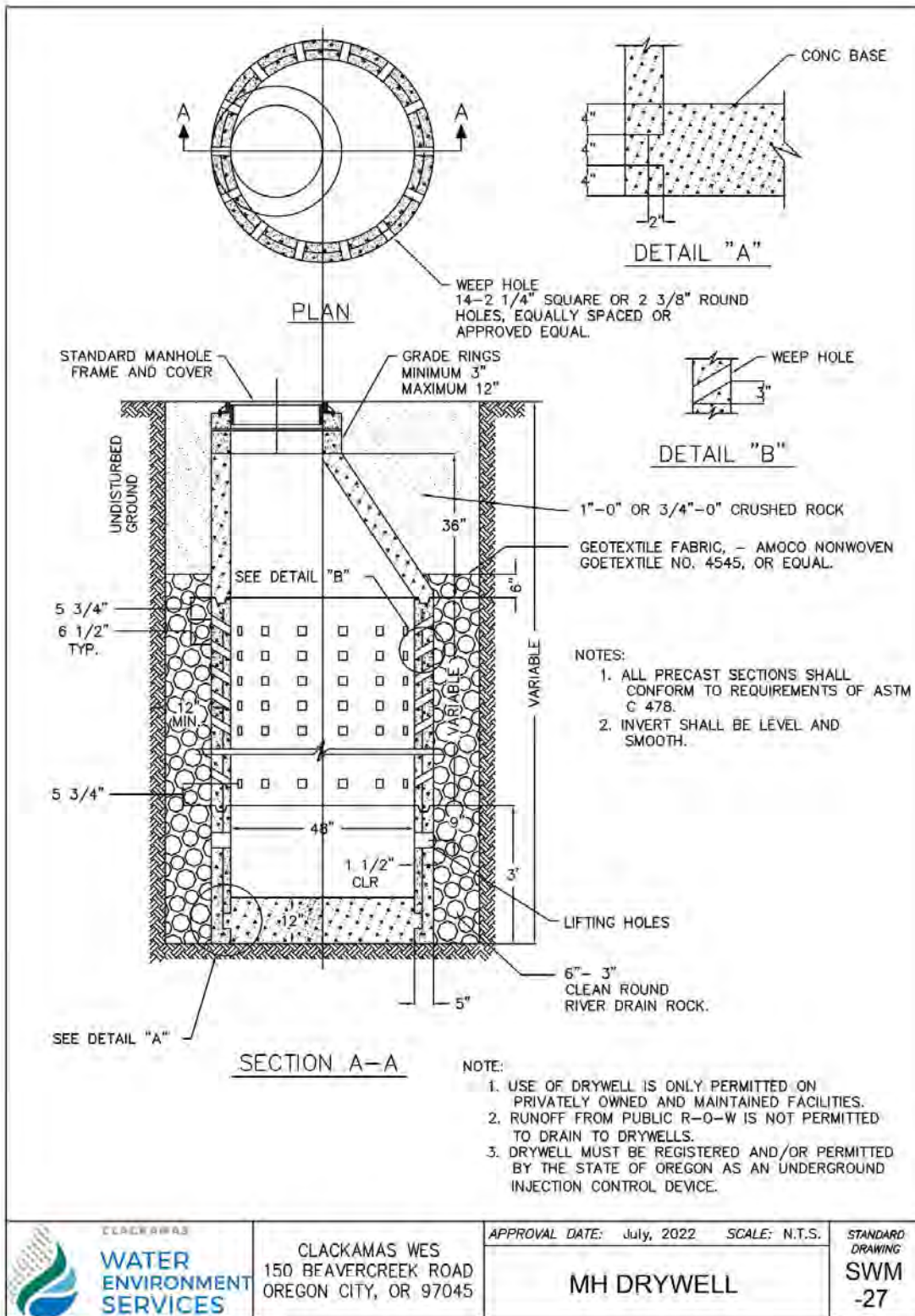




NOTES

1. SPECIFICATIONS FOR CONCRETE AND MISCELLANEOUS MATERIALS USED IN CONSTRUCTION SHALL CONFORM TO CURRENT APWA STANDARD SPECIFICATIONS.
2. NUMBER OF RISER RINGS ALLOWED SHALL NOT EXCEED 12" MAXIMUM.

 <p>CLACKAMAS WATER ENVIRONMENT SERVICES</p>	<p>CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045</p>	<p>APPROVAL DATE: July, 2022 SCALE: N.T.S.</p>	<p>STANDARD DRAWING</p>
		<p>MH CHANNEL AND RING EXTENSION</p>	<p>SWM -26</p>

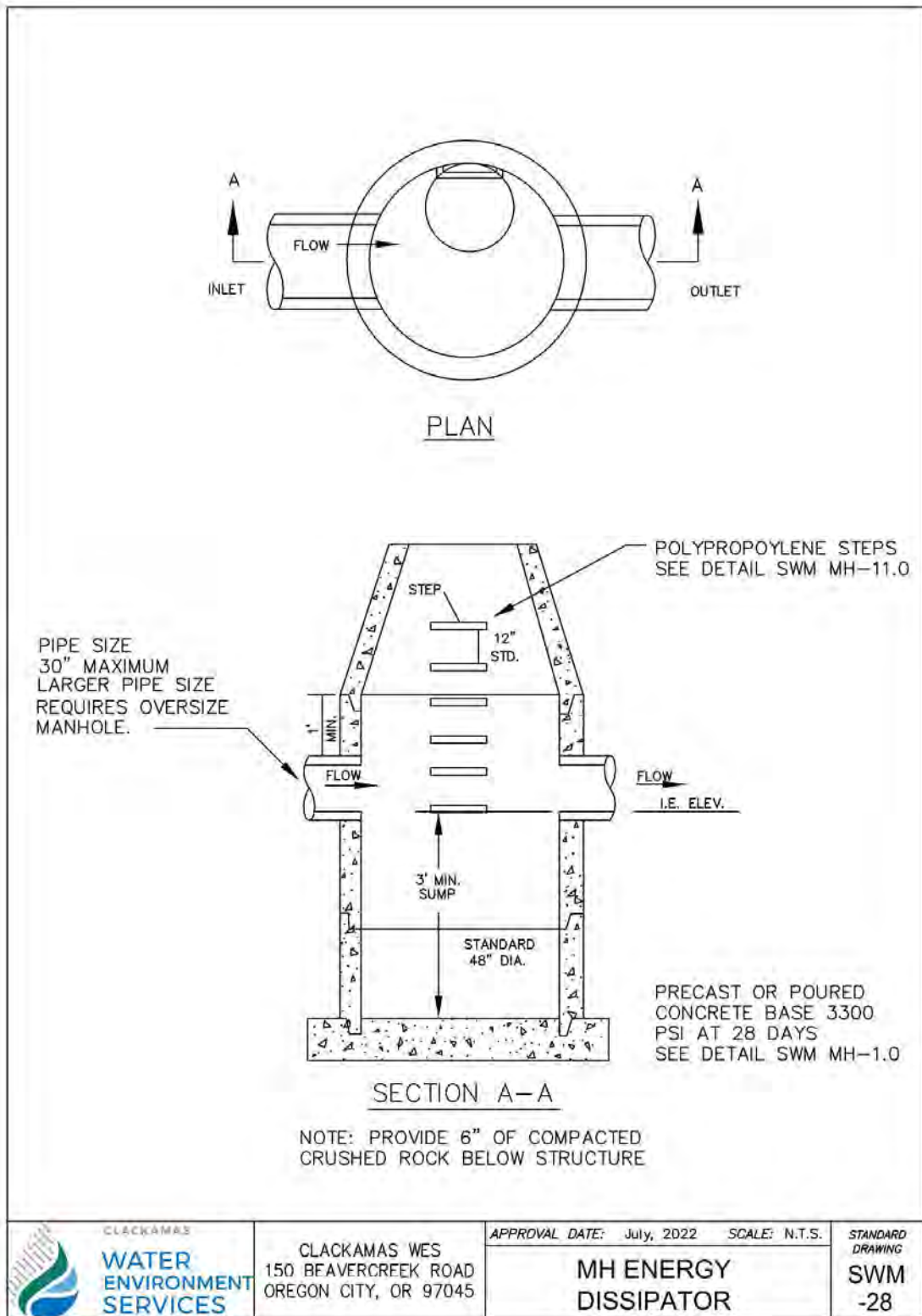


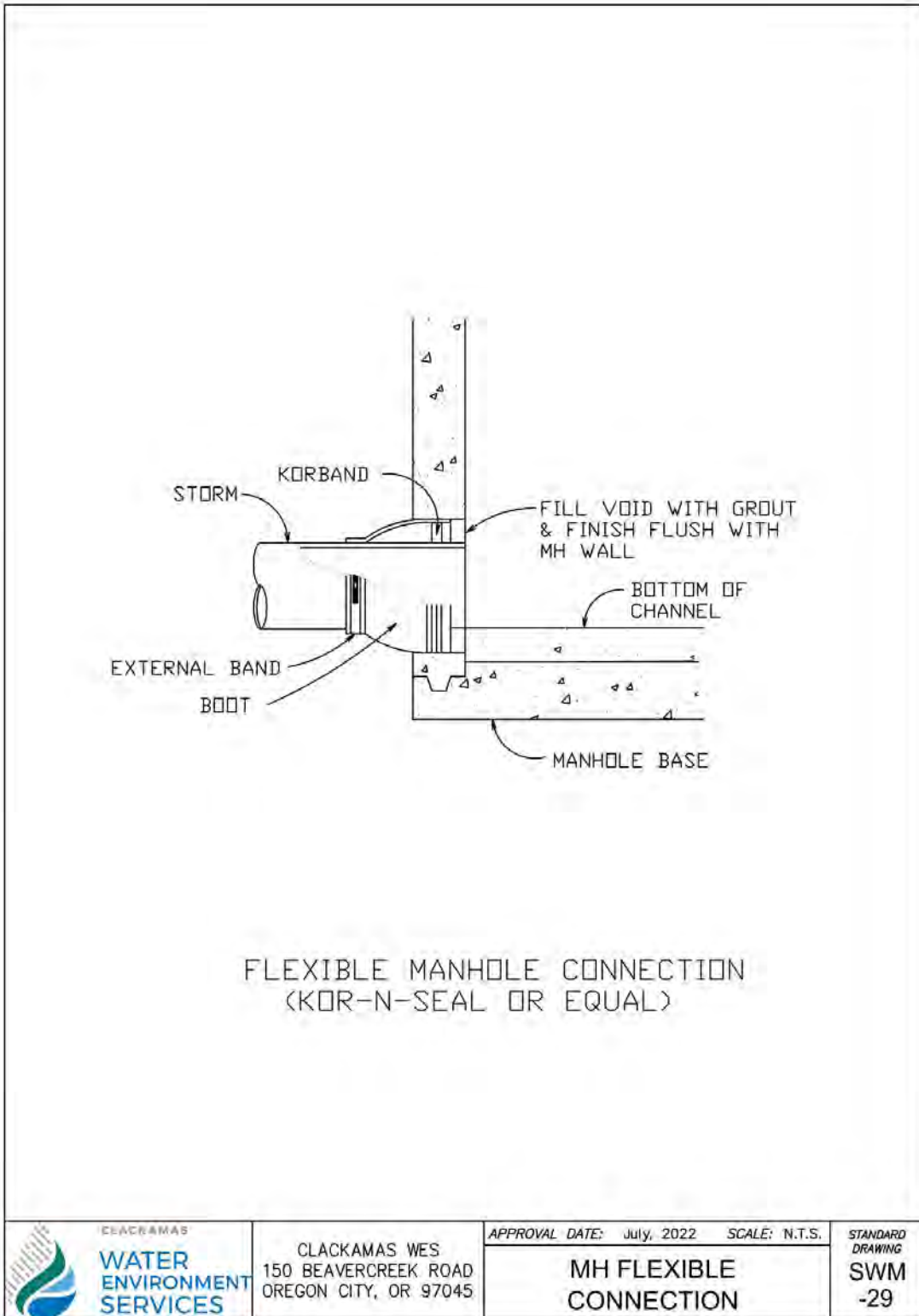
CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

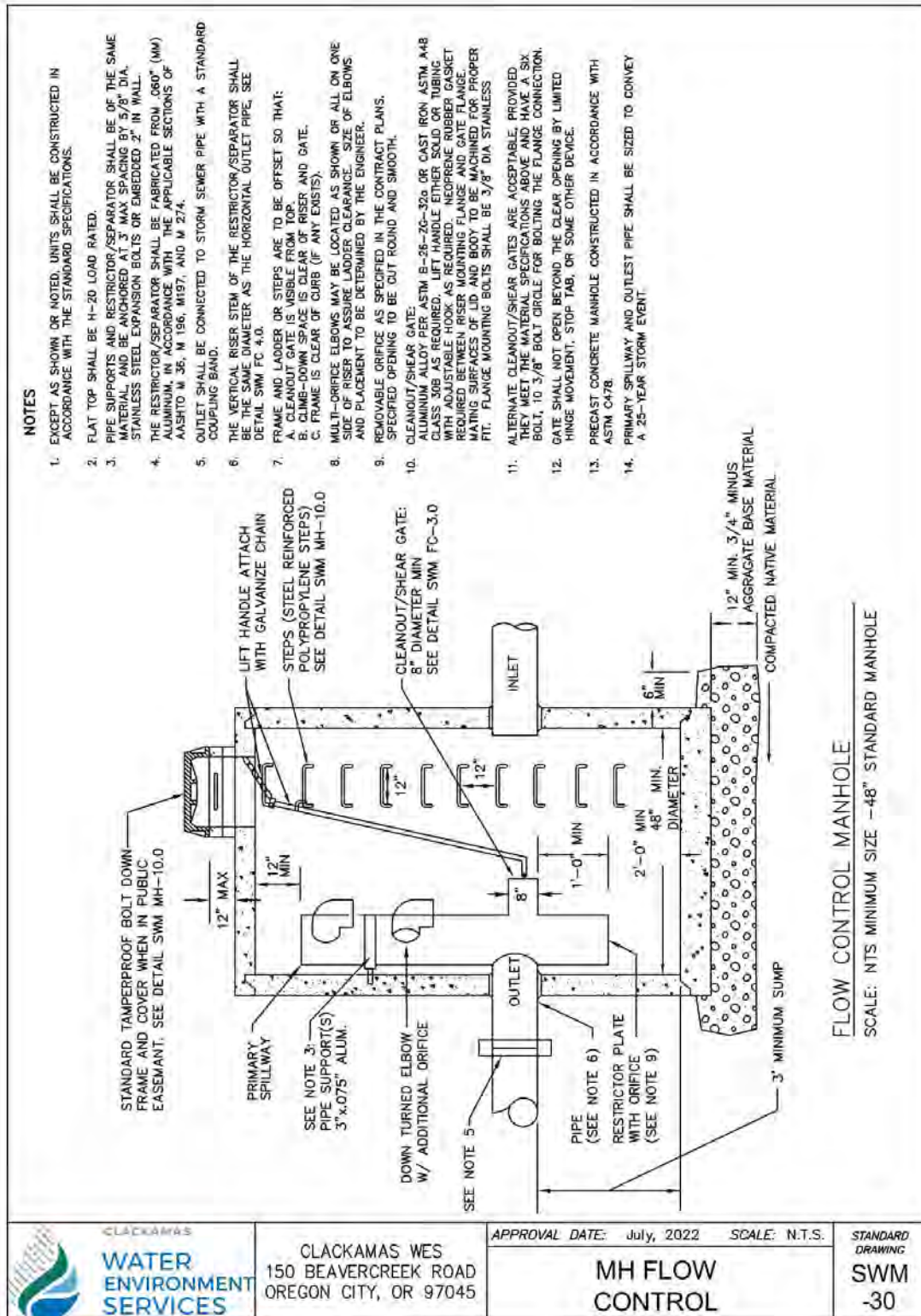
APPROVAL DATE: July, 2022 SCALE: N.T.S.

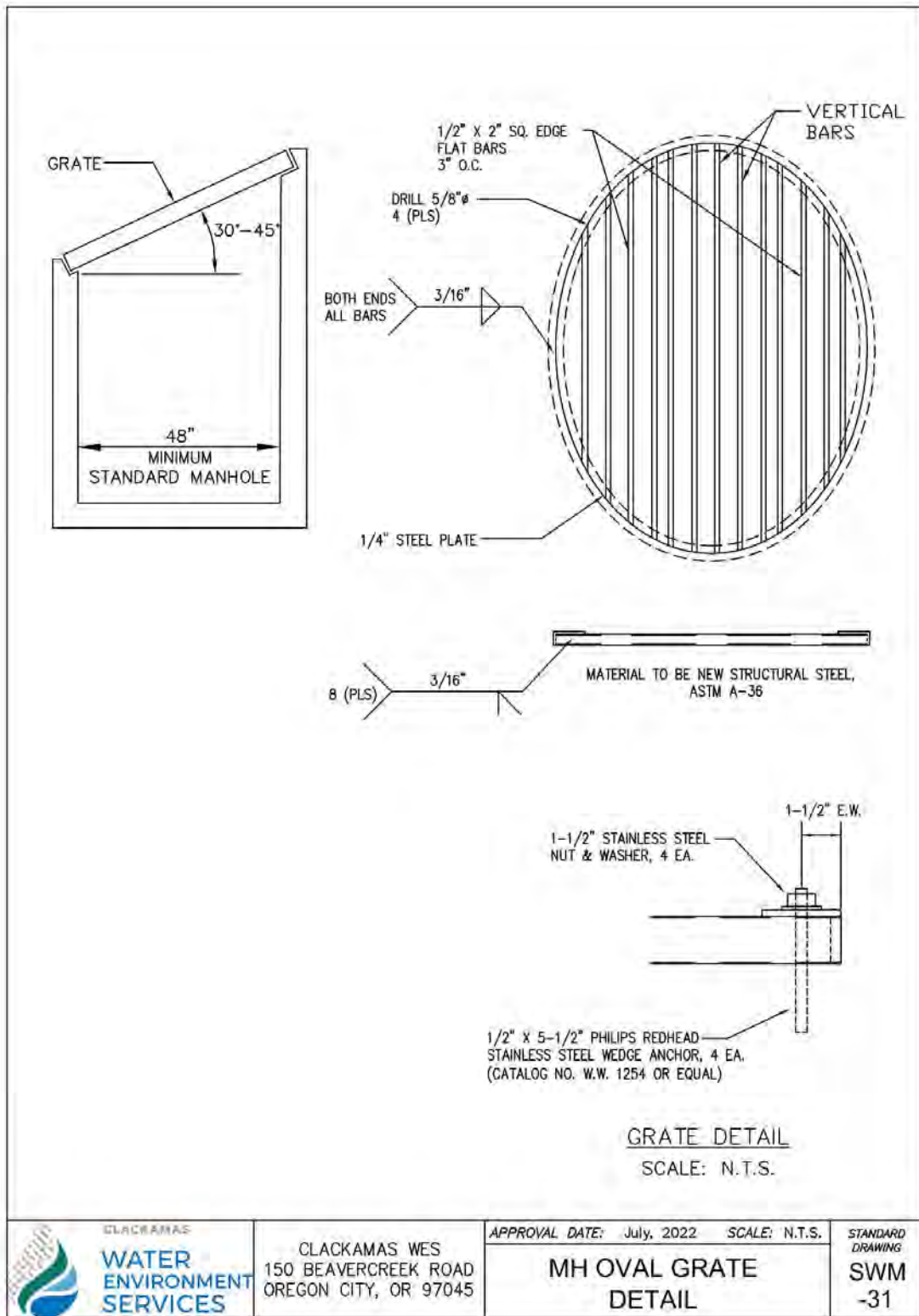
MH DRYWELL

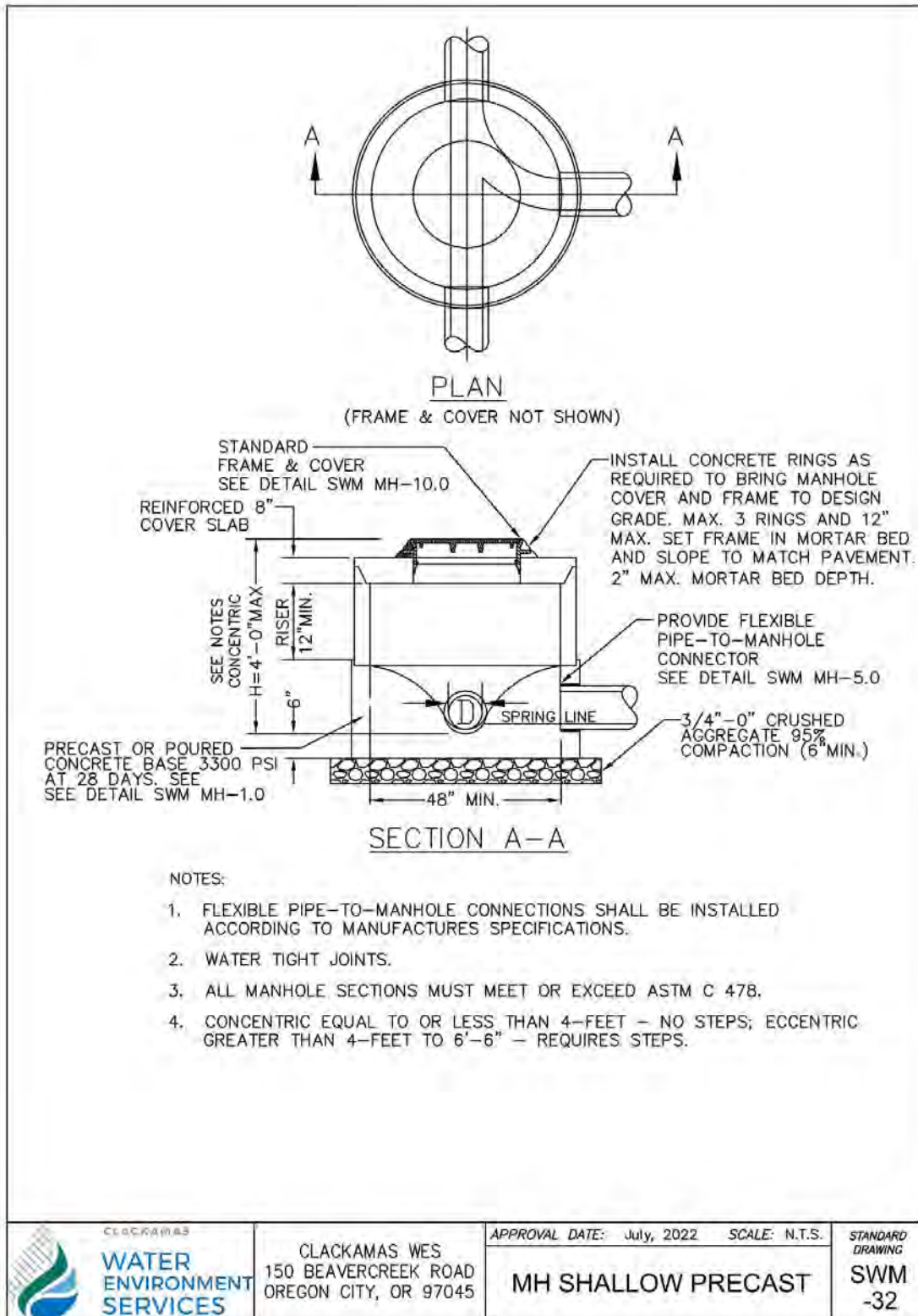
STANDARD DRAWING
SWM
-27

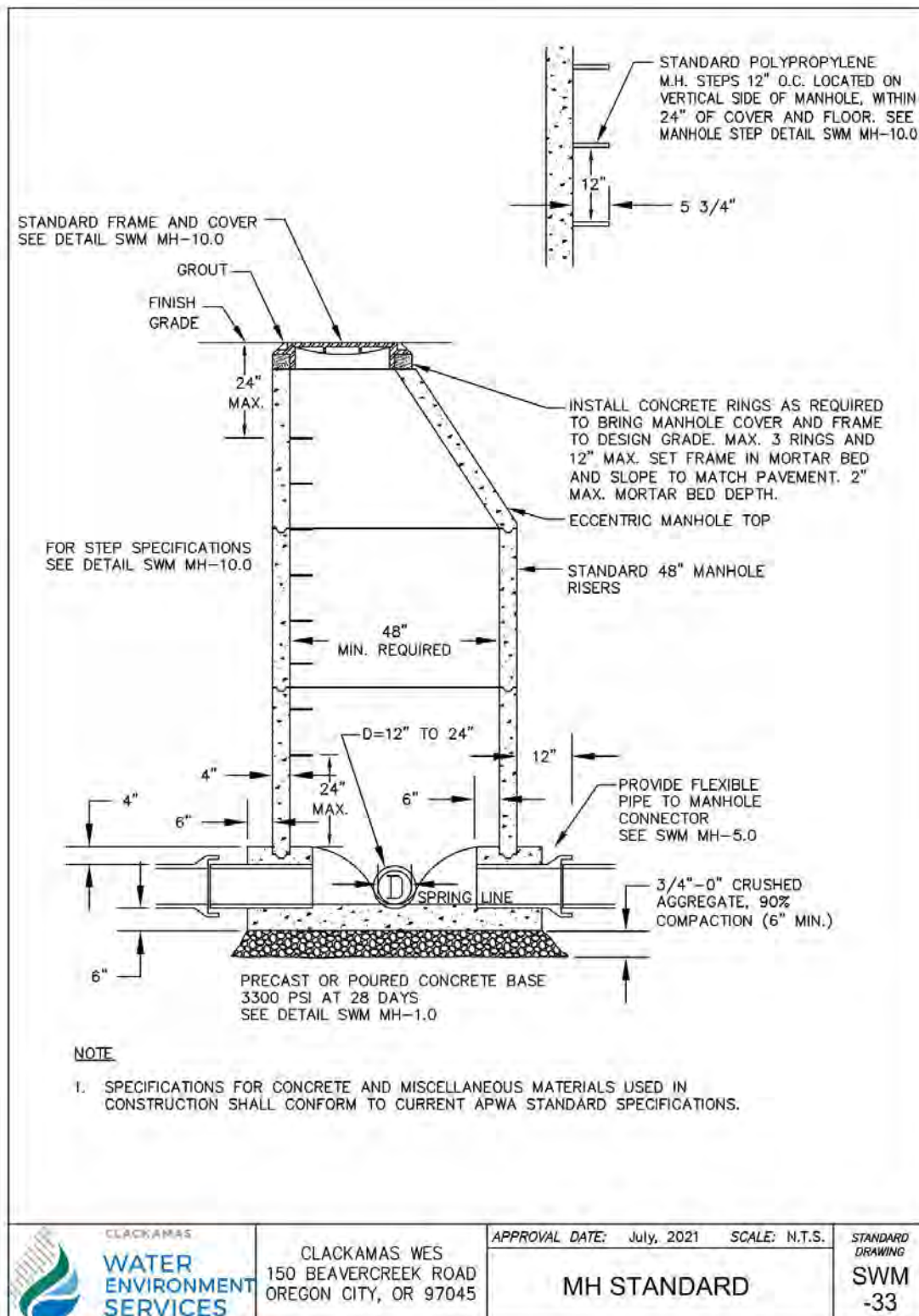


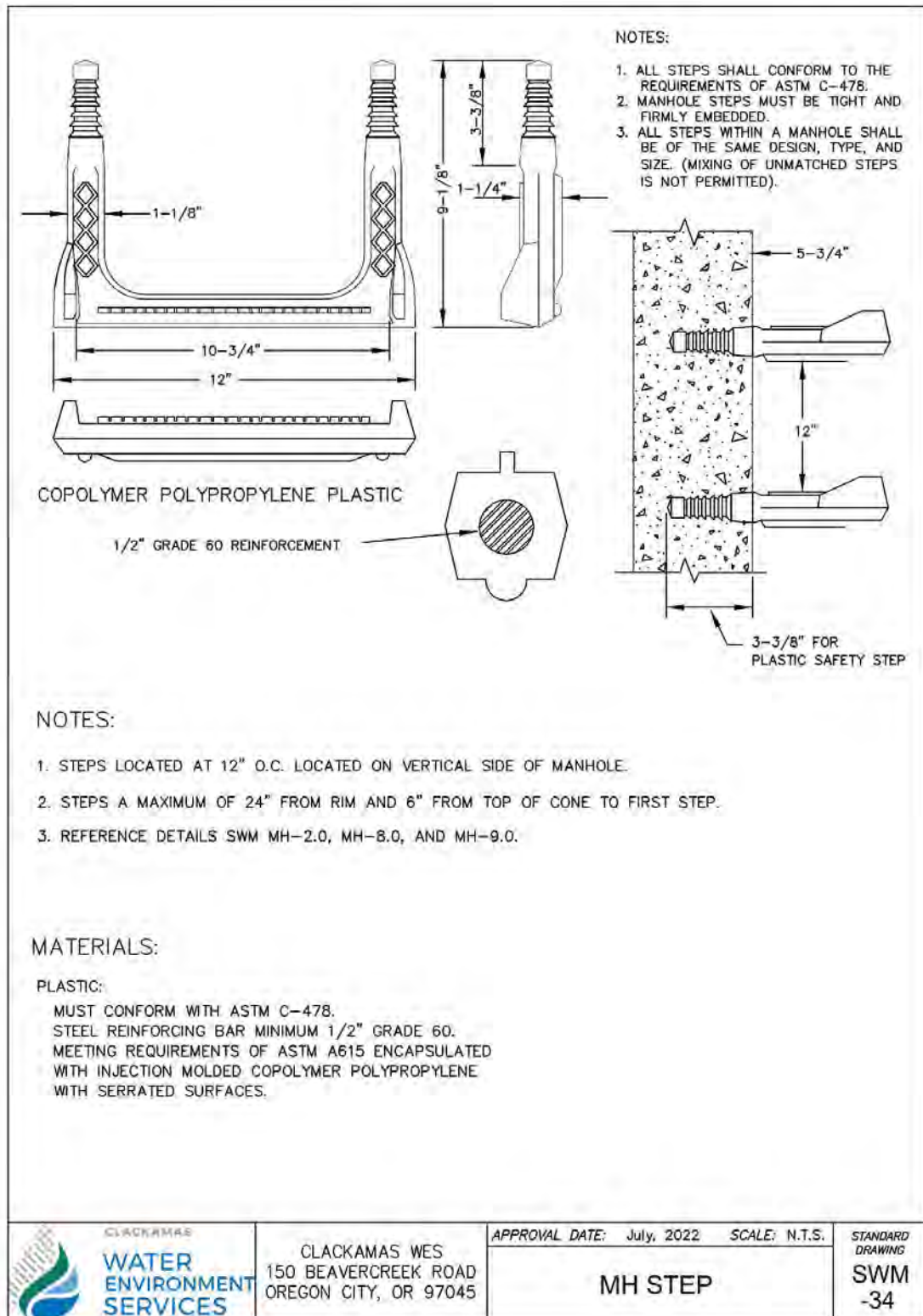


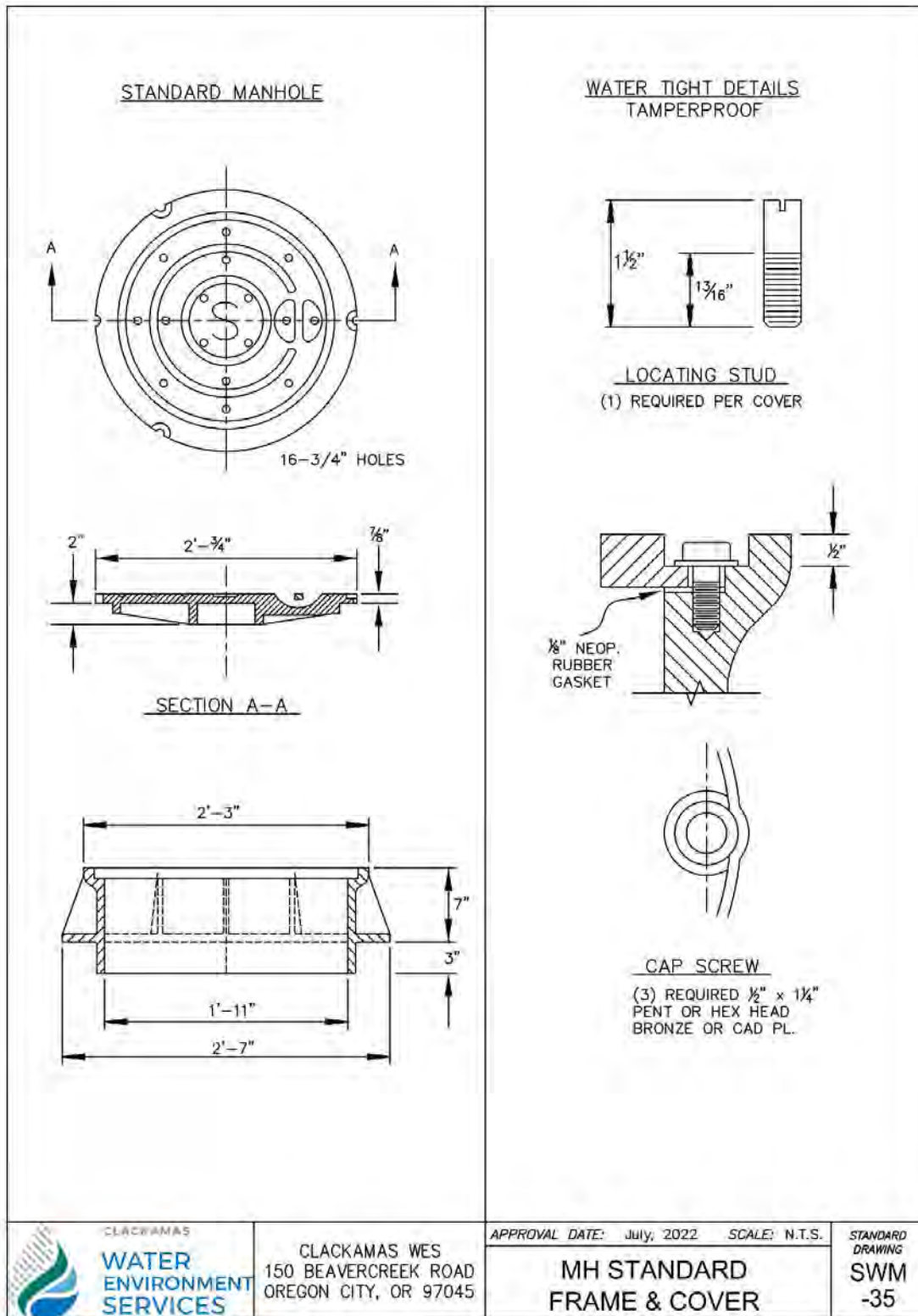


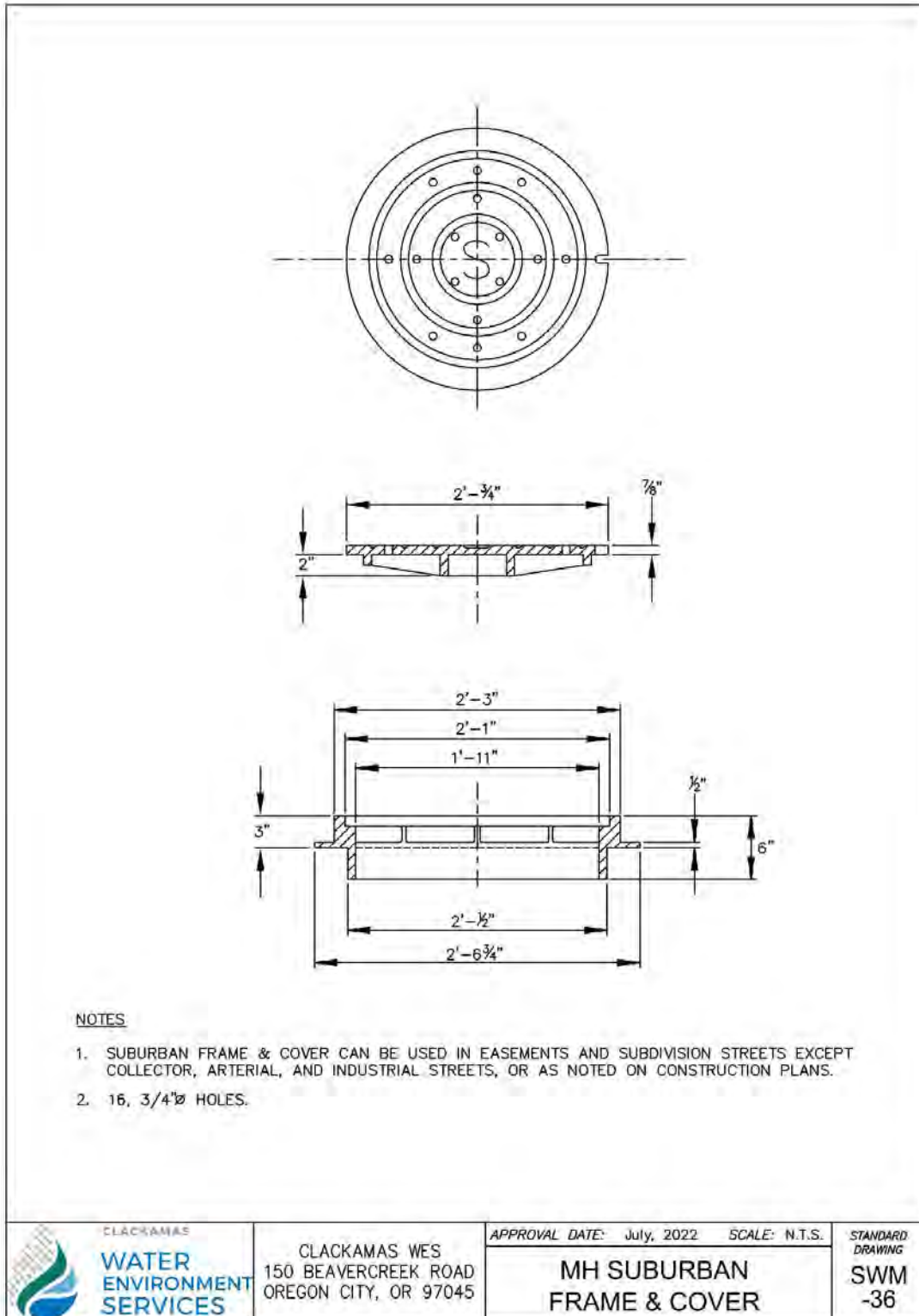


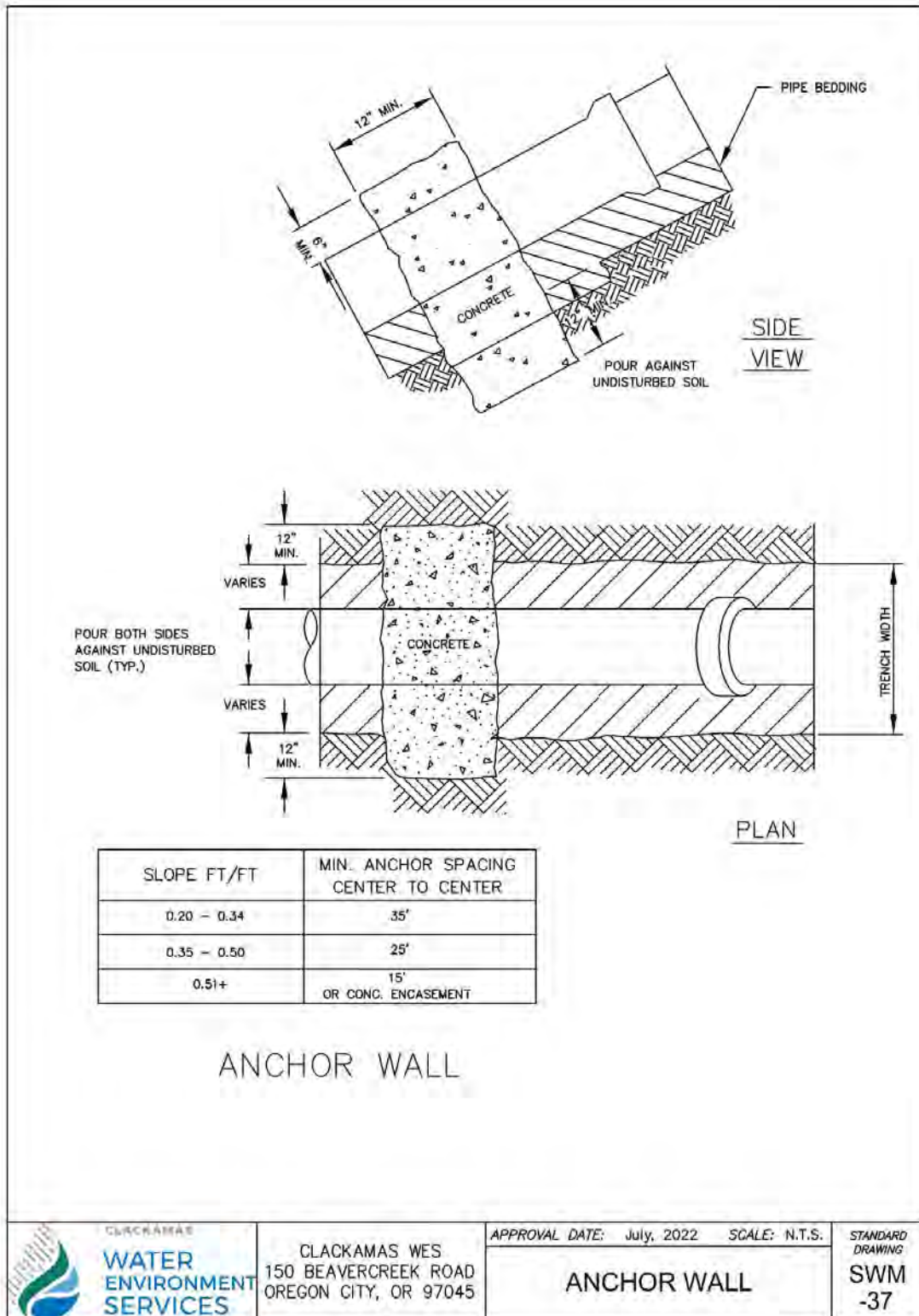


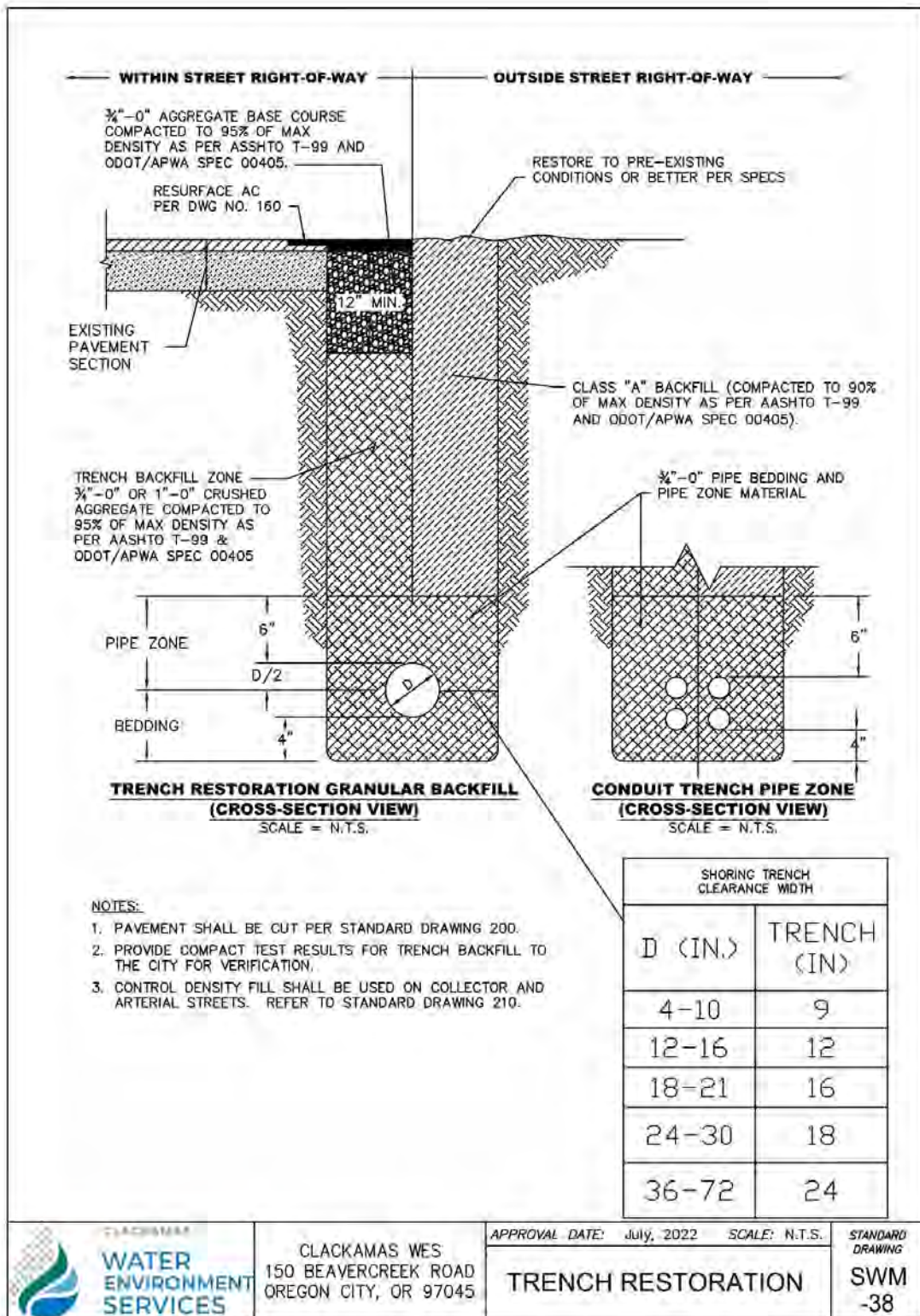








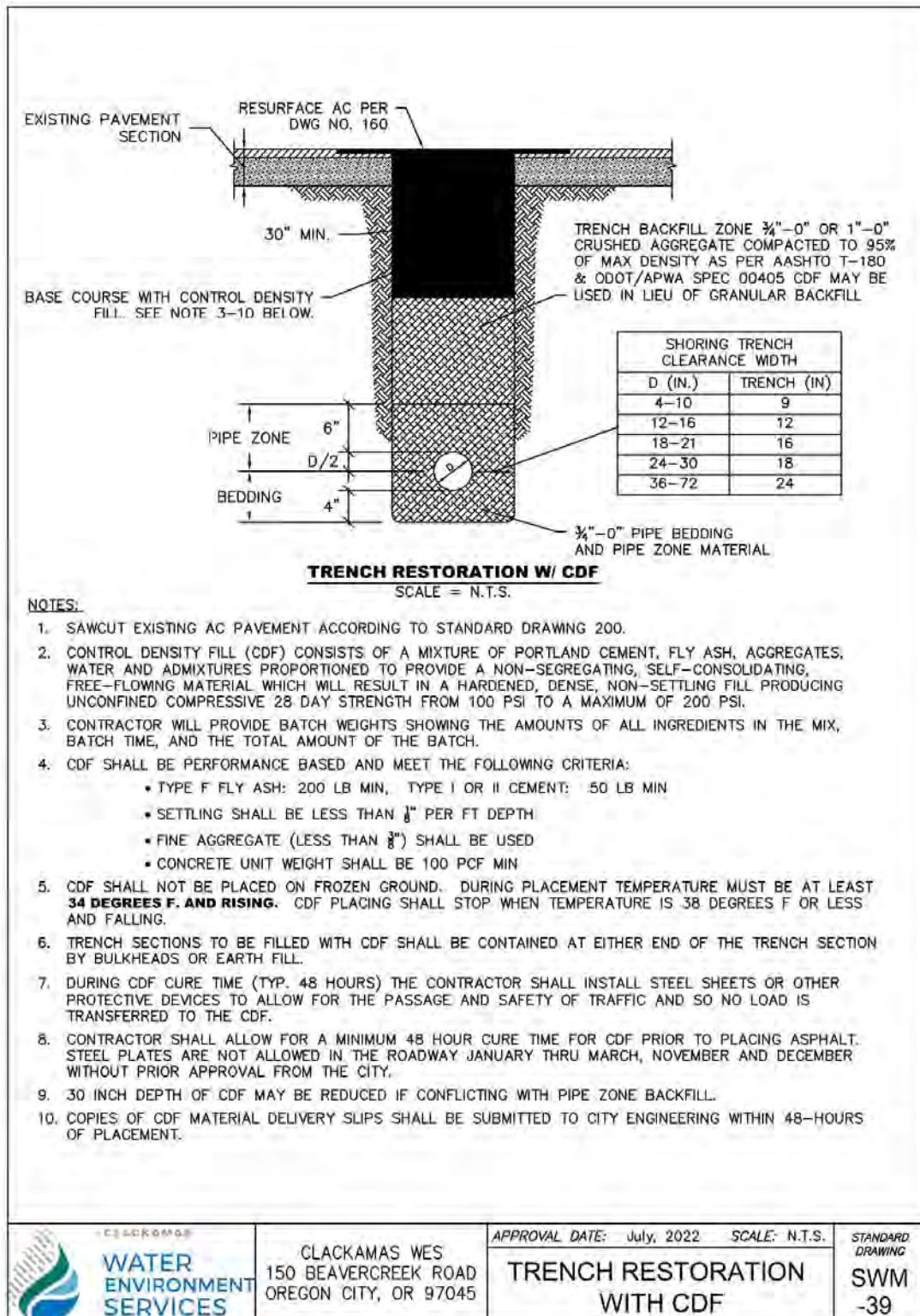




CLACKAMAS WES
 150 BEAVERCREEK ROAD
 OREGON CITY, OR 97045

APPROVAL DATE: July, 2022 SCALE: N.T.S.
TRENCH RESTORATION

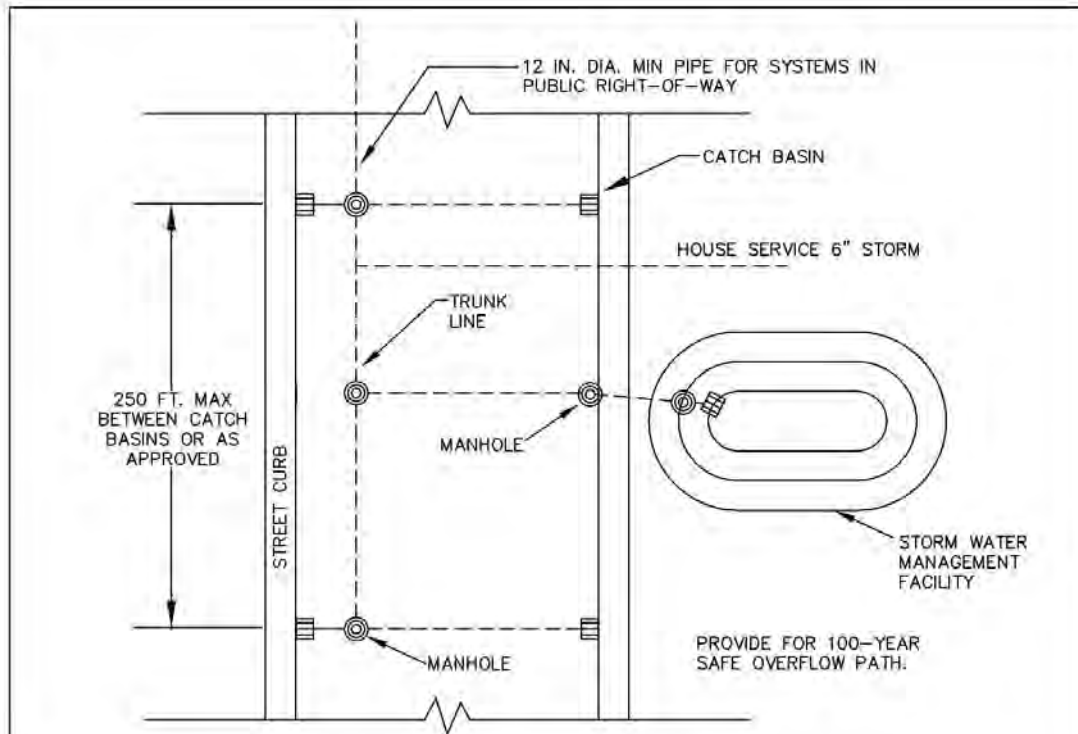
STANDARD DRAWING
SWM -38



CLACKAMAS WES
150 BEAVERCREEK ROAD
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APPROVAL DATE: July, 2022 SCALE: N.T.S.
TRENCH RESTORATION WITH CDF

STANDARD DRAWING
SWM -39



STORM COLLECTION			
STORM COLLECTION	MAX. DISTANCE BETWEEN M.H.	MIN. VELOCITY	MIN. GRADE
12-INCH PIPE	250-400 FEET	4 FT/SEC	.01 SLOPE
	0-250 FEET	3 FT/SEC	.005 SLOPE
15-INCH PIPE	250-400 FEET	4 FT/SEC	.006 SLOPE
	0-250 FEET	3 FT/SEC	.004 SLOPE
18-INCH PIPE	250-400 FEET	4 FT/SEC	.005 SLOPE
	0-250 FEET	3 FT/SEC	.003 SLOPE
24-INCH PIPE	300 FEET	3 FT/SEC	.002 SLOPE
30-INCH PIPE	300 FEET	3 FT/SEC	.002 SLOPE
36-INCH PIPE	300 FEET	3 FT/SEC	.002 SLOPE

NOTES

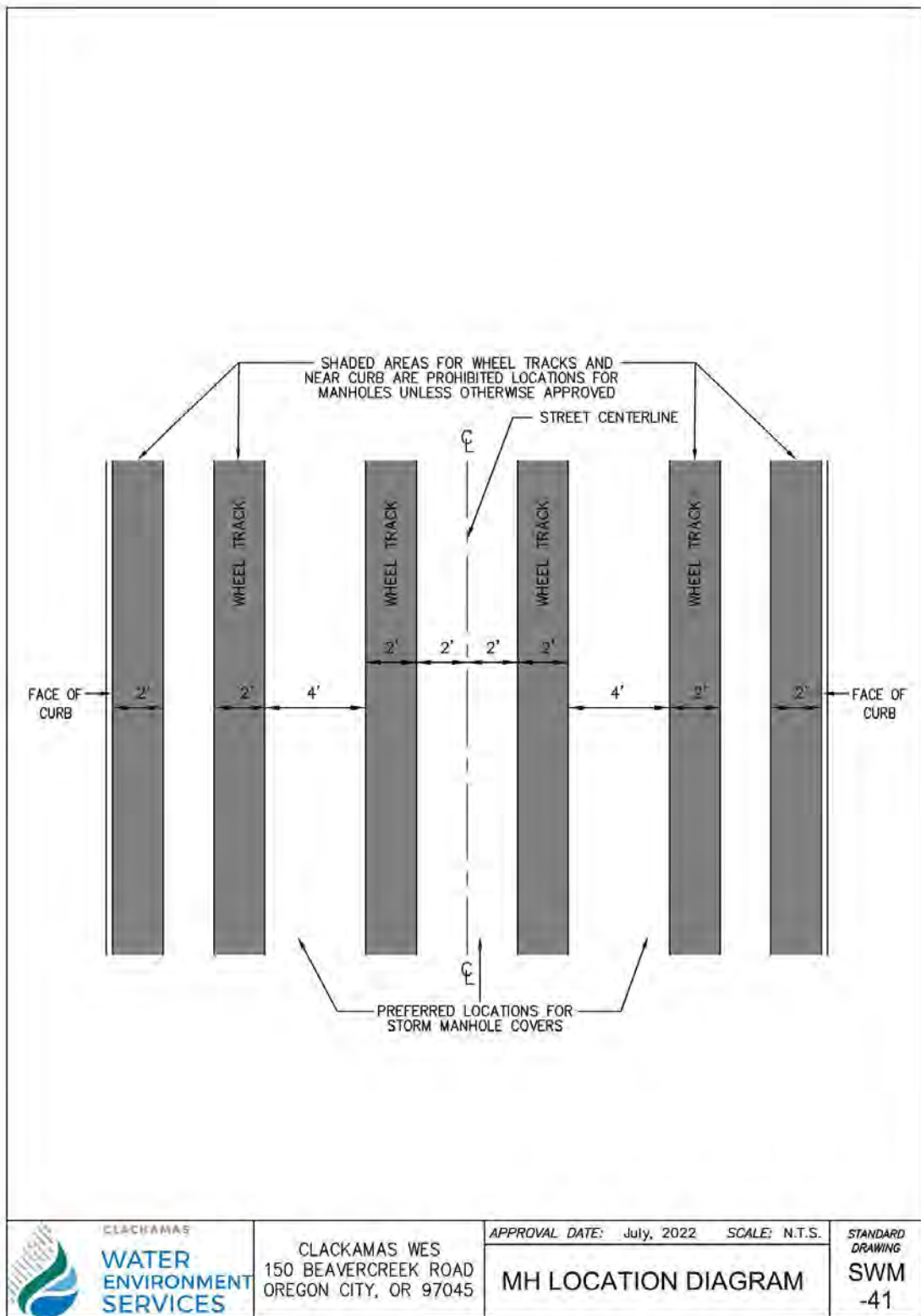
1. A MAXIMUM OF THREE CATCH BASINS MAY BE ALLOWED TO BE CONNECTED TOGETHER WITHOUT A MANHOLE AS APPROVED BY THE DISTRICT.
2. DETENTION/WATER QUALITY FACILITIES SHALL CONNECT TO A STRUCTURE.
3. MINIMUM VELOCITY IS 3 FT/SEC.

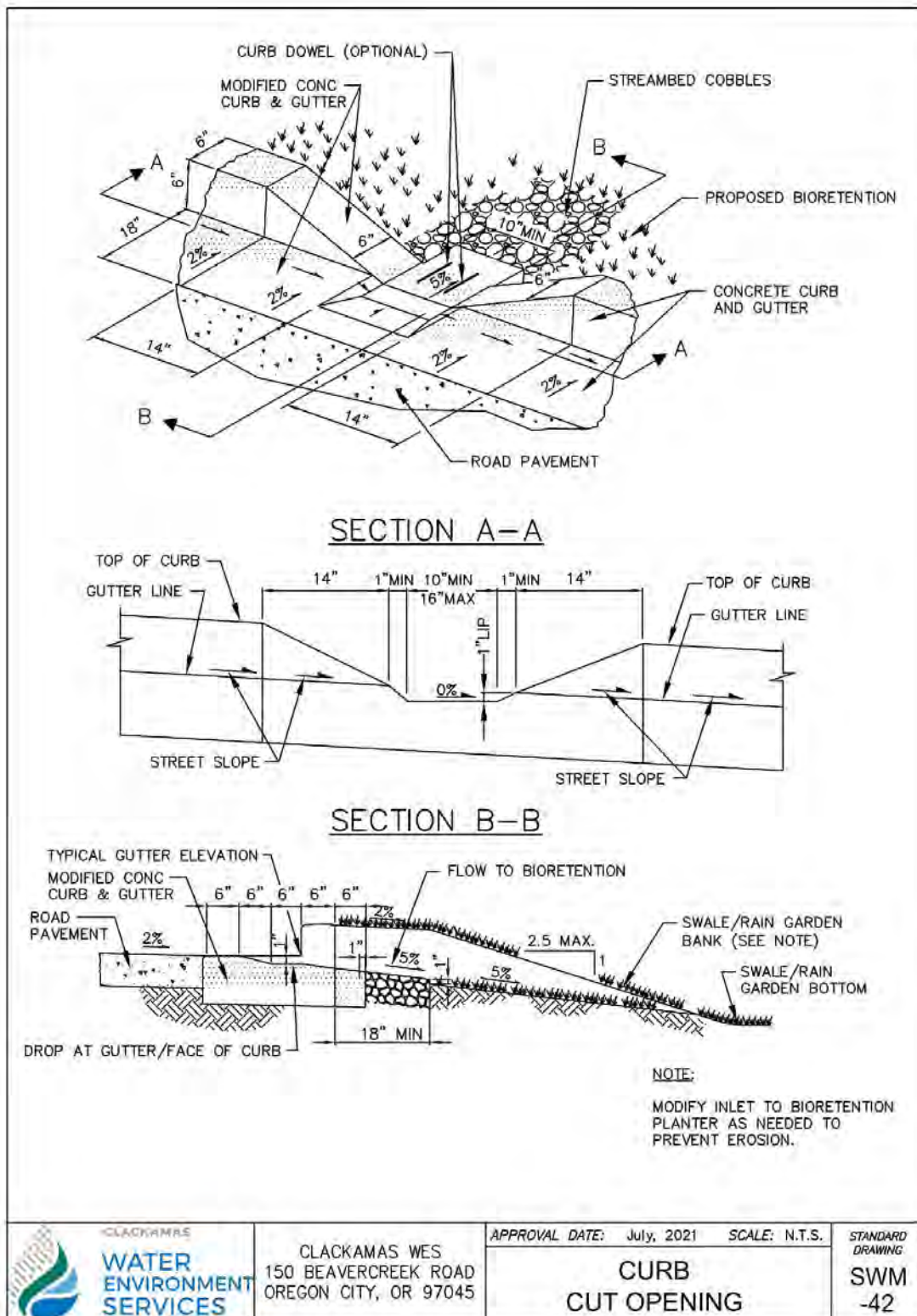


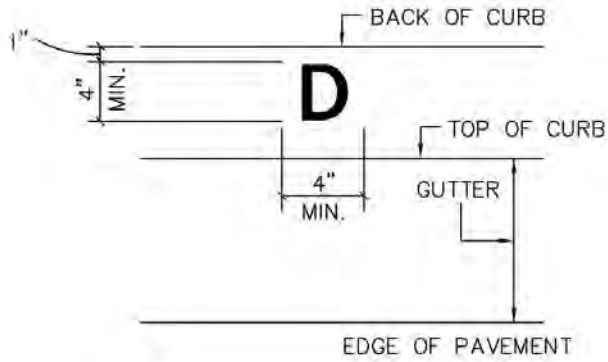
CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

APPROVAL DATE: July, 2022 SCALE: N.T.S.
COLLECTION SYSTEM DIAGRAM

STANDARD DRAWING
SWM -40






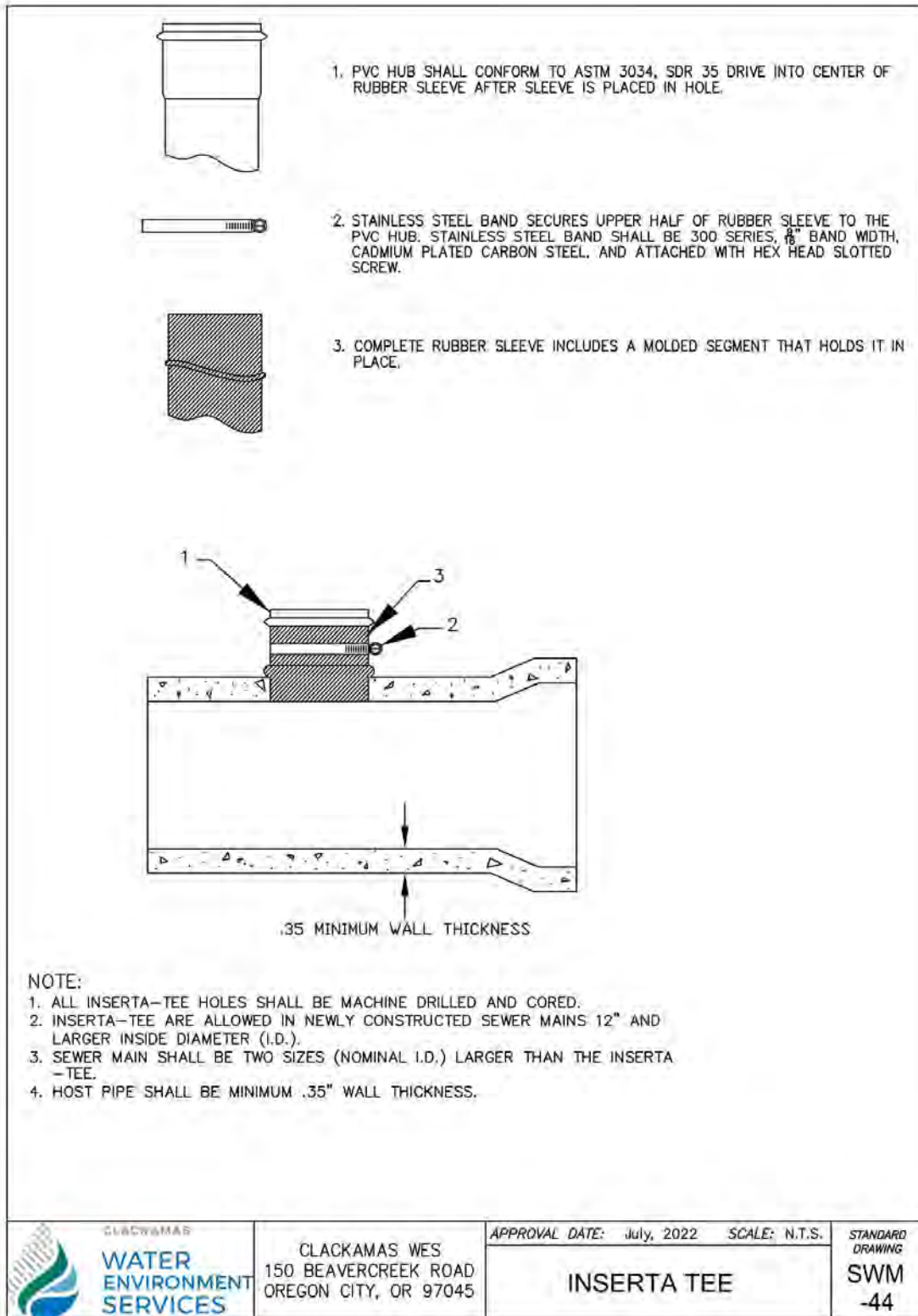


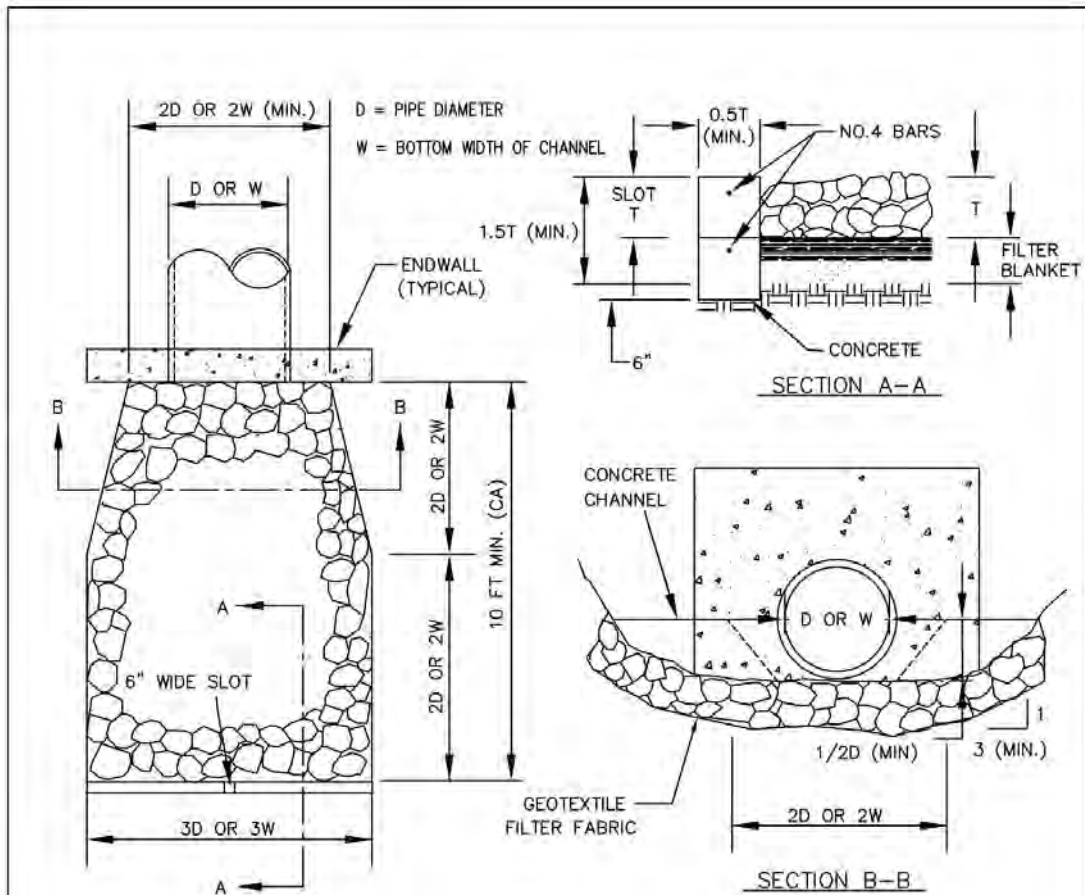
PLAN VIEW
(TYPICAL)

NOTES:

1. ALL STORM AND SANITARY SERVICE LATERALS SHALL BE MARKED APPROXIMATELY AS FOLLOWS:
 STORM DRAIN LATERAL "D" TOP OF CURB
 SANITARY SEWER LATERAL "S" TOP OF CURB
2. LETTERS SHALL HAVE A 1/2" MAX. WIDTH.


 <p>CLACKAMAS WATER ENVIRONMENT SERVICES</p>	<p>CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045</p>	<p>APPROVAL DATE: July, 2022 SCALE: N.T.S.</p>	<p>STANDARD DRAWING</p>
		<p>CURB STAMP DETAIL</p>	





NOTES

1. PLANS SHALL SPECIFY:
 - A) ROCK CLASS AND THICKNESS (T)
 - B) FILTER MATERIAL, NUMBER OF LAYERS AND THICKNESS.
2. RIP RAP SHALL BE EITHER QUARRY STONE OR BROKEN CONCRETE (IF SHOWN ON THE PLANS). COBBLES ARE NOT ACCEPTABLE. SEE DETAIL SWM ST-10.1 FOR SIZING.
3. RAP RAP SHALL BE PLACED OVER FILTER BLANKET WHICH MAY BE EITHER GRANULAR MATERIAL OR PLASTIC FILTER CLOTH.
4. PLACEMENT
 - A) MINIMUM DEPTH = 1-1/2 TIMES AVERAGE STONE SIZE.
 - B) ROCKS SHALL BE PLACED TO PROVIDE A MINIMUM OF VOIDS.
 - C) SURFACE ROCKS SHALL PROTRUDE AT LEAST 1/2 THEIR VERTICAL DIMENSION.
 - D) RIPRAP IS TO BE PLACED OVER A GEOTEXTILE FABRIC ON A NATURAL BEDDING, OR IT MAY BE GROUTED OR PLACED OVER A GRAVEL BEDDING AS REQUIRED BY THE DISTRICT.

 <p>CLACKAMAS WATER ENVIRONMENT SERVICES</p>	<p>CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045</p>	APPROVAL DATE: July, 2021 SCALE: N.T.S.	STANDARD DRAWING
		<p>OUTFALL RIP RAP</p>	

RIP RAP SIZING AT OUTFALLS FOR PIPES GREATER THAN 6 INCHES IN DIAMETER

DISCHARGE VELOCITY AT DESIGN FLOW (FPS)	REQUIRED PROTECTION MINIMUM DIMENSIONS				
	TYPE	DEPTH*	WIDTH	LENGTH**	WIDTH
0 - 5	RIPRAP*	2 X (MAX STONE SIZE)	DIAMETER +6 FEET	10' MIN. OR AS CALCULATED IF LONGER	CROWN +1 FOOT
6 - 10	RIPRAP*	2 X (MAX STONE SIZE)	DIAMETER +6 FEET OR 3 X DIA. WHICH-EVER IS GREATER	AS CALCULATED	CROWN +1 FOOT
11 - 20	GABION OR RIPRAP*	2 X (MAX STONE SIZE)	DIAMETER +6 FEET OR 4 X DIA. WHICH-EVER IS GREATER	AS CALCULATED	CROWN +1 FOOT
OVER 20	ENGINEERED ENERGY DISSIPATER REQUIRED				

* RIPRAP SIZE SHALL BE DETERMINED USING THE FOLLOWING FORMULAE***

- V = AVERAGE VELOCITY (FT/S)
- Do = PIPE DIAMETER (FT)
- ds = RIPRAP DIAMETER (FT)
- Lsp = APRON LENGTH (FT)
- depth = THICKNESS (FT)
- Fo = $V/(g \cdot Do)^{0.5}$
- *RIPRAP SIZE $ds=0.25 \cdot Do \cdot Fo$ (6" MINIMUM)
- DEPTH=2*ds (1-FOOT MINIMUM)
- **APRON LENGTH $Lsp=Do(8+17 \cdot \text{Log } Fo)$
- $g= 32.2 \text{ FT/S}^2$

*** US ARMY CORPS OF ENGINEER DESIGN FORMULAS FROM EROSION AND RIPRAP REQUIREMENTS AT CULVERT AND STORM OUTLETS, JANUARY 1970.

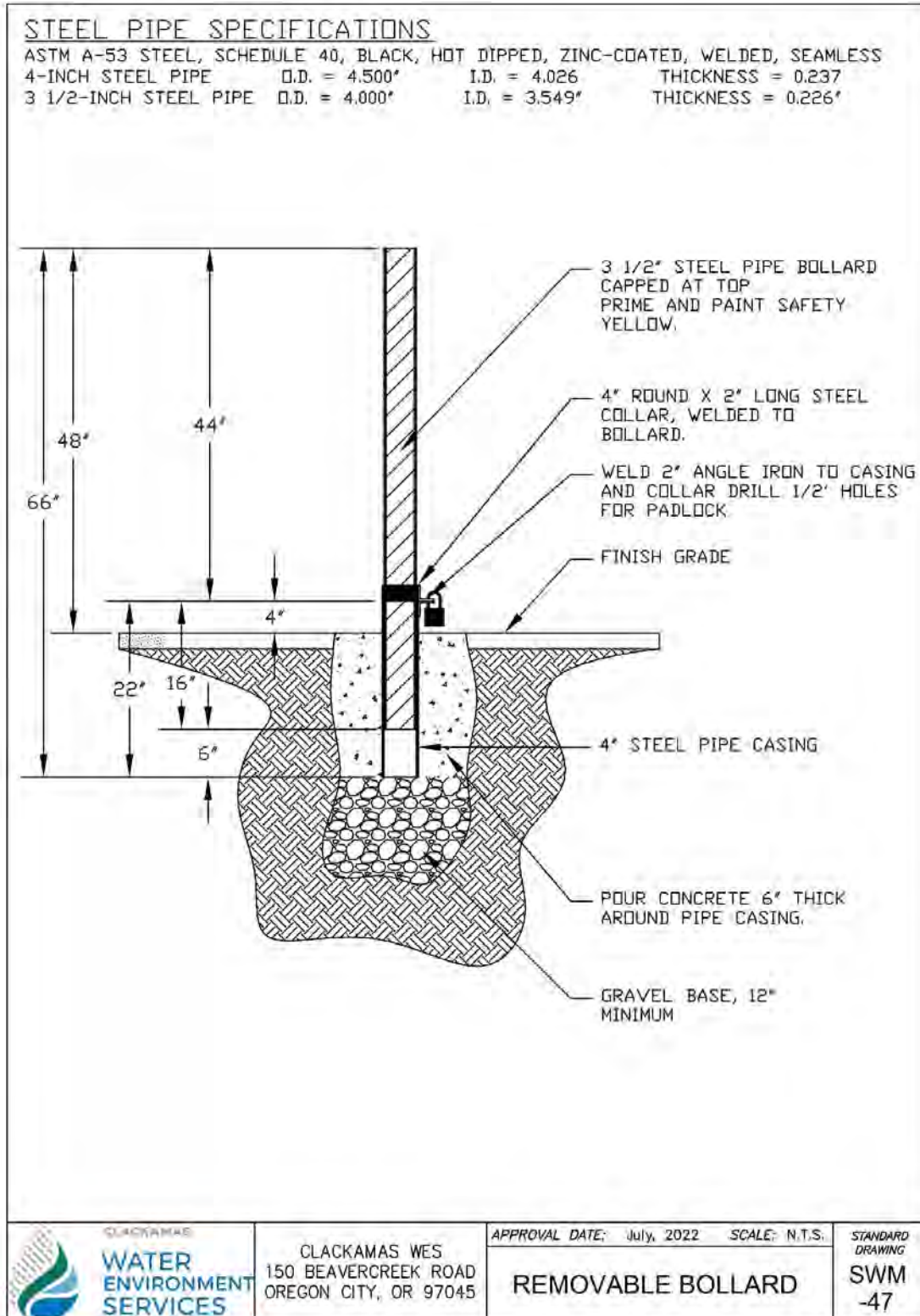


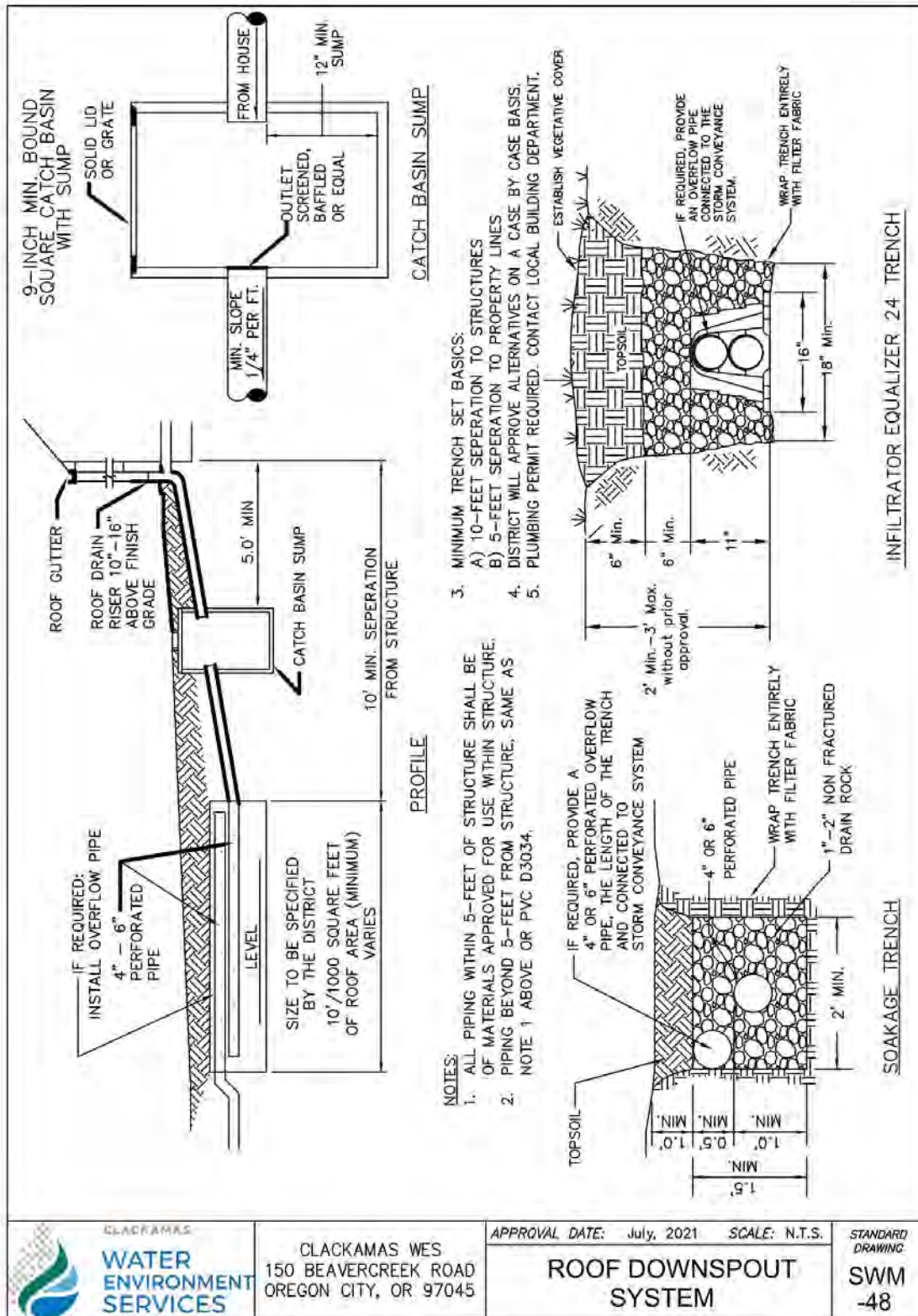
CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

APPROVAL DATE: July, 2022 SCALE: N.T.S.

OUTFALL RIP RAP SIZING

STANDARD DRAWING
SWM -46



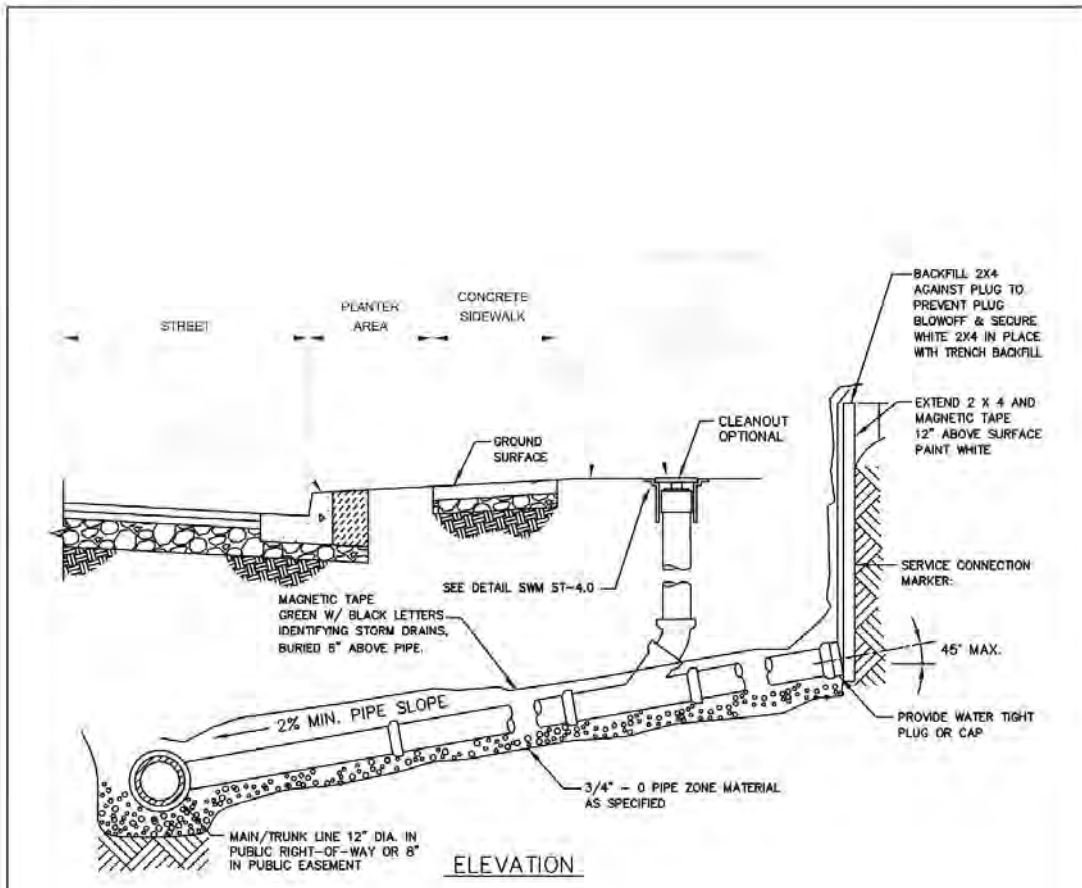


CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

APPROVAL DATE: July, 2021 SCALE: N.T.S.


ROOF DOWNSPOUT SYSTEM

STANDARD DRAWING
SWM -48



STORM SEWER LATERAL SERVICE CONNECTION

NOTE: EVERY PROPERTY SHALL HAVE A SEPARATE SERVICE CONNECTION CONNECTED DIRECTLY TO THE MAINLINE, UNLESS OTHERWISE APPROVED BY THE DISTRICT. SHARED SERVICES ARE NOT ALLOWED.

 <p>CLACKAMAS WATER ENVIRONMENT SERVICES</p>	<p>CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045</p>	<p>APPROVAL DATE: July, 2022 SCALE: N.T.S.</p>	<p>STANDARD DRAWING SWM -49</p>
		<p>SERVICE CONNECTION</p>	

Appendix D: Facility Sizing Methodology and Resources

1. Santa Barbara Urban Hydrograph Method

The Santa Barbara Urban Hydrograph (SBUH) method is a single-event model that estimates a flow hydrograph for a representative rainfall event. The SBUH method was developed by the Santa Barbara County Flood Control and Water Conservation District. Applicable to urban areas, it converts design storm incremental rainfall depths into instantaneous unit hydrographs.

Elements of the SBUH Method

The SBUH method depends on several variables:

- Pervious (A_p) and impervious (A_{imp}) land areas
- Time of concentration (T_c) calculations
- Runoff curve numbers (CN) applicable to the site
- Design storms

Assumptions for these variables must be explained and justified in the design report.

Land Area

The total area, including the pervious and impervious areas within a drainage basin, shall be quantified in order to evaluate critical contributing areas and the resulting site runoff. Each area with a basin shall be analyzed separately and their hydrographs combined to determine the total basin hydrograph. Areas shall be selected to represent homogenous land use/development units.

Time of Concentration

Time of concentration, T_c , is the time for a theoretical drop of water to travel from the furthest point in the drainage basin to the facility being designed. In this case, T_c is derived by calculating the overland flow time of concentration and the channelized flow time of concentration. T_c depends on several factors, including ground slope, ground roughness, and distance of flow. The formula for determining T_c is found on 3. Standard Equations.

When calculating T_c , the following limitations apply:

- Overland sheet flow (flow across a flat area that does not form into channels or rivulets) shall not extend for more than 300 feet.
- For flow paths through closed conveyance facilities such as pipes and culverts, standard hydraulic formulas shall be used for establishing velocity and travel time
- Flow paths through lakes or wetlands may be assumed to be zero (i.e., $T_c = 0$).

Runoff Curve Numbers

Runoff curve numbers were developed by the NRCS after studying the runoff characteristics of various types of land. Curve numbers (CN) were developed to reduce diverse characteristics such as soil type, land usage, and vegetation into a single variable for use in runoff calculations. The runoff curve numbers approved by the District for water quantity/quality calculations are included in **Table 28**.

The curve numbers presented in **Table 28** are for wet antecedent moisture conditions. Wet conditions assume previous rainstorms have reduced the capacity of soil to absorb water. Given the frequency of storms in Clackamas County, wet conditions are most likely, and result in conservative hydrographic values.

Design Storm

The SBUH method also requires a design storm to perform the runoff calculations. For flow control calculations, the District uses an NRCS Type 1A 24-hour storm distribution. The rainfall depths for 2-year through 100-year storm events are shown in **Table 26**.

Table 26. WES Design Storms

Design Storm/Recurrence Interval (years)	24-Hour Rainfall Depth (inches)
Water Quality	1.0
2-year	2.4
5-year	2.85
10-year	3.2
25-year	4.0
50-year	4.13
100-year	4.8

2. Soils Information

Soils information can be found in the current NRCS Soil Survey for Clackamas County, Oregon. Soils information may be obtained electronically from the NRCS Soil Survey at <https://websoilsurvey.nrcs.usda.gov/app/>.

1. Select “Start WSS”.
2. Under the “Area of Interest”, use the State and County drop down menus to select Oregon and Clackamas and select “View” and the Area of Interest Interactive Map will show Clackamas County.
3. Use the Area of Interest Interactive Map to navigate to the project site location.
4. Determine the areas of the site that fall under each of the four hydrologic soil groups in **Table 27**.

Table 27. Hydrologic Soil Groups

Group A	Soils having a high infiltration rate (low runoff potential) when thoroughly wet (deep, well drained to excessively drained sands or gravelly sands)
Group B	Soils having a moderate infiltration rate when thoroughly wet (moderately deep or deep, moderately well drained, or well drained soils that have moderately fine texture to moderately coarse texture)
Group C	Soils having a slow infiltration rate when thoroughly wet (soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture)
Group D	Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet (clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material)

3. Standard Equations

MANNING'S EQUATION: (Open Channel Flow)

$$Q = \left(\frac{1.486}{n} \right) A R^{2/3} S^{1/2}$$

$$V = \left(\frac{1.486}{n} \right) R^{2/3} S^{1/2}$$

Manning's Equation for circular pipe
flowing full $\left\{ \begin{array}{l} Q = \frac{0.463}{n} D^{2/3} S^{1/2} \\ V = \frac{0.590}{n} D^{2/3} S^{1/2} \end{array} \right.$

- Q Quantity of flow, cubic feet per second
 V Velocity of flow, feet per second
 n Manning's coefficient of roughness (see Table 29 and Table 30 of these Standards)
 A Cross-sectional area, square feet
 R Hydraulic radius (area of flow divided by wetted perimeter), feet
 S Slope of the pipe or energy line, feet per foot
 O Diameter of pipe, feet

RATIONAL METHOD: (Stormwater Design Flows)

$$Q = CIA \text{ (Max. drainage area=100 acres-- Max. time: 60 minutes)}$$

- Q Quantity of runoff, cubic feet per second
 C Coefficient of runoff (ratio of runoff to rainfall), percent (See Table 29)
 I Intensity of rainfall, inches per hour
 A Area of tributary drainage basin, acres

GUTTER FLOW CAPACITY: (Manning's Equation Modified)

$$Q = 0.56 \frac{1}{n} S^{0.5} d^{2.67} \quad \text{or} \quad Q = \frac{0.56}{n} S_x^{1.67} S^{0.5} T^{2.67} \quad V = \frac{1.12}{n} S^{0.5} S_x^{0.67} T^{2.67}$$

- Q Quantity of flow, cubic feet per second
 S_x Street cross slope, feet per foot
 S Street longitudinal slope, feet per foot
 n Manning's coefficient of roughness for the gutter, (normally 0.018)
 D Depth of flow at the curb, feet
 T Total width of flow in the gutter, feet

TIME OF CONCENTRATION: (Overland Stormwater Flow)

$$T_t = L/60V \text{ (for conversion of velocity to travel time)}$$

$$T_c = T_{11} + T_{12} + \dots + T_{1m}$$

$$T_t = \frac{0.42 (nL)^{0.8}}{1.58 (S)^{0.4}} \text{ (Manning's kinematic solution for sheet flow less than 300 feet)}$$

$$V = 16.1345 (S)^{0.5} \text{ (Unpaved surfaces)}$$

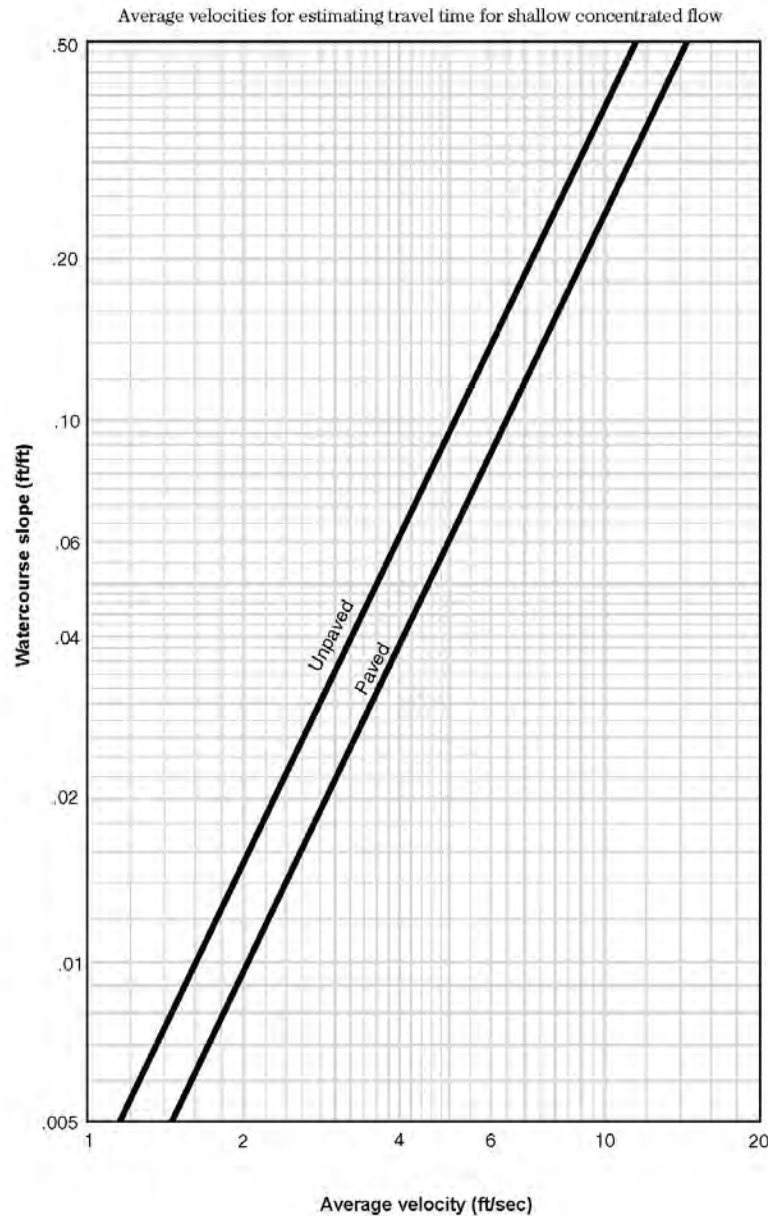
$$V = 20.3282 (S)^{0.5} \text{ (Paved surfaces)}$$

$\left\{ \begin{array}{l} \text{Shallow concentrated flow for slopes less than 0.005 ft/ft. For steeper slopes,} \\ \text{see Figure 13.} \end{array} \right.$

- T_t Travel time, minutes
 L Flow length, feet
 V Average velocity of flow, feet per second
 60 Conversion factor from seconds to minutes
 T_c Total time of concentration, minutes (minimum T_c = 5.0 minutes)
 n Manning's roughness coefficient for various surfaces, (see Table 29 and Table 30)
 S Slope of the hydraulic grade line (land or watercourse slope), feet per foot
 1.58 A factor derived from Ref. No. 8 (P2, from 2-year, 24-hr precipitation chart, for the Portland, Oregon area [P²·5 = 2.5²·5=1.58])

Figure 13. Average Velocities for Shallow Concentrated Flow

Figure from Technical Release 55: Urban Hydrology for Small Watersheds, published by the United States Department of Agriculture, Natural Resources Conservation Service, Conservation Engineering Division (1986, updated 1999).



¹ Figure from Technical Release 55: Urban Hydrology for Small Watersheds, published by the United States Department of Agriculture, Natural Resources Conservation Service, Conservation Engineering Division (1986, updated 1999).

Table 28. Runoff Curve Numbers²

Description	Curve Numbers for Hydrological Soil Groups			
	A	B	C	D
Open space (lawns, parks, golf courses, cemeteries)				
Poor condition (< 50% grass coverage)	68	79	86	89
Fair condition (50 to 75% grass coverage)	49	69	79	84
Good condition (>75% grass coverage)	39	61	74	80
Impervious Areas				
Paved areas (parking lots, roofs, driveways)	98	98	98	98
Streets and roads				
Paved with curbs	98	98	98	98
Paved with open ditches	83	89	92	93
Gravel	76	85	89	91
Dirt	72	82	87	89
Urban Districts				
Commercial and business (85% impervious)	89	92	94	95
Industrial (72% impervious)	81	88	91	93
Residential districts by average lot size				
1/8 acre or less (65% impervious)	77	85	90	92
1/4 acre (38% impervious)	61	75	83	87
1/3 acre (30% impervious)	57	72	81	86
1/2 acre (25% impervious)	54	70	80	85
Woods (Good Hydrologic Condition)			70*	

* CN for Predeveloped Forest Condition is assumed to be equivalent to Woods condition with Hydrologic Soil Group C.

² Urban Hydrology for Small Watersheds (TR-55), USDA Soil Conservation Service Engineering Division (1986).

Table 29. Runoff Coefficients for Developed Areas (Average Impervious Area Percent for Typical Land Uses, Ground Slopes, and Hydrological Soil Groups)

% Impervious	Soil Type	Drainage Area Slope			Typical Land Use
		Under <5%	5% to 10%	Over 10%	
0-10	A	0.19	0.24	0.29	Open Spaces, Parks, Cemeteries, Playgrounds
	B	0.24	0.30	0.36	
	C	0.29	0.36	0.44	
	D	0.33	0.43	0.52	
11-20	A	0.26	0.31	0.36	Residential (1 unit/20,000 square feet or greater)
	B	0.30	0.37	0.43	
	C	0.35	0.42	0.50	
	D	0.39	0.48	0.57	
21-30	A	0.34	0.39	0.44	Residential (1 unit/10,000 square feet)
	B	0.37	0.44	0.50	
	C	0.41	0.49	0.56	
	D	0.45	0.54	0.62	
31-40	A	0.41	0.46	0.51	Residential (1 unit/5,000 – 7,000 square feet)
	B	0.44	0.50	0.56	
	C	0.47	0.55	0.61	
	D	0.51	0.59	0.67	
41-50	A	0.49	0.54	0.59	Residential (1 unit/less than 5,000 square feet)
	B	0.52	0.57	0.63	
	C	0.55	0.61	0.67	
	D	0.57	0.65	0.72	
51-60	A	0.56	0.61	0.66	Mixed-Use Residential Residential Streets Schools/Campuses
	B	0.58	0.64	0.70	
	C	0.61	0.67	0.74	
	D	0.63	0.70	0.77	
61-70	A	0.64	0.69	0.74	Mixed Use Residential Mixed-Use Commercial Collector Streets
	B	0.66	0.72	0.77	
	C	0.67	0.74	0.80	
	D	0.69	0.76	0.82	
71-80	A	0.71	0.76	0.81	Mixed Use Residential Mixed-Use Commercial Arterial Streets Hospitals
	B	0.72	0.78	0.83	
	C	0.73	0.80	0.85	
	D	0.75	0.81	0.87	
81-90	A	0.79	0.84	0.89	Commercial Centers High Density Residential
	B	0.80	0.85	0.90	
	C	0.81	0.86	0.91	
	D	0.81	0.87	0.92	
91-100	A	0.86	0.91	0.96	Commercial Centers High Density Residential Arterial Streets
	B	0.87	0.92	0.97	
	C	0.87	0.92	0.97	
	D	0.88	0.92	0.97	

① Any of the runoff coefficients may be adjusted to the nearest 0.05 to reflect any departure from these typical values. Any adjustment must be applied uniformly throughout a drainage area.

② Soil Types: A = gravel and sandy loam; B = light clay and silt loam; C = tight clay.

③ The land uses are typical for a given percent of impervious surface. Where there is or will be any significant variation from typical conditions, another percentage range should be used.

Source: City of Portland, 2020 Sewer and Drainage Facilities Manual

Table 30. Runoff Coefficients for Undeveloped Areas (General Surface Characteristics, Ground Slope, and Hydrologic Soil Groups)

Surface Characteristics	Soil Type	Drainage Area Slope		
		Under 5%	5% to 10 %	Over 10%
Woodland	A	0.10	0.15	0.20
	B	0.15	0.25	0.30
	C	0.30	0.35	0.40
Lawn, Pasture, and Meadow	A	0.15	0.20	0.25
	B	0.25	0.30	0.35
	C	0.30	0.40	0.50
Cultivated Land	A	0.25	0.35	0.50
	B	0.40	0.55	0.70
	C	0.50	0.65	0.80
Gravel Areas and Walks	Loose	0.30	0.40	0.50
	Packed	0.70	0.75	0.80
Pavement and Roof		0.90	0.95	1.00

4. Hydraulics

The following figures are from the Oregon Department of Transportation Hydraulics Design Manual (2014), Chapter 7, Appendix A.

Figure 14. Rainfall I-D-R Curve Zone Map

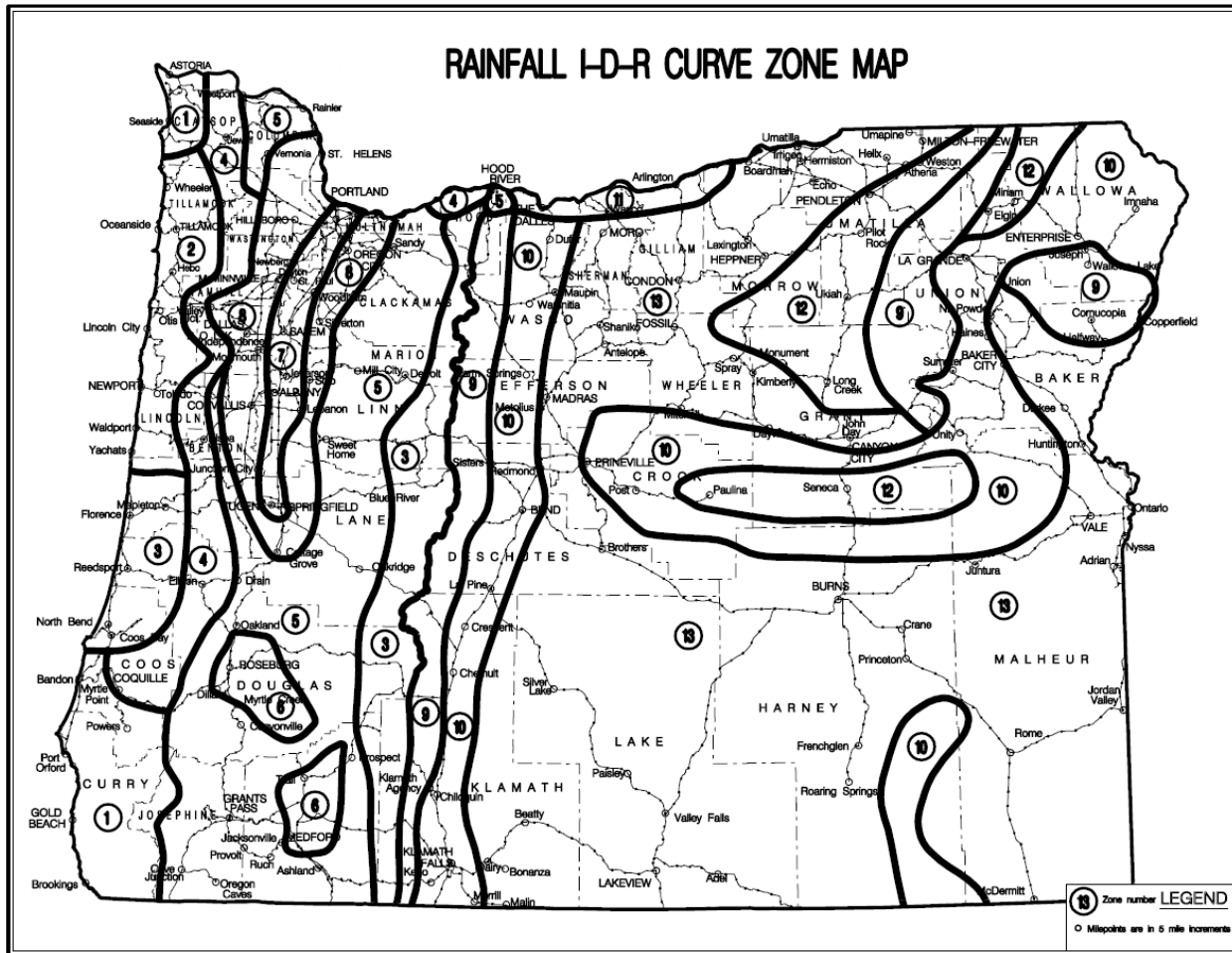


Figure 15. Rainfall Intensity Recurrence Curves (Zone 5)

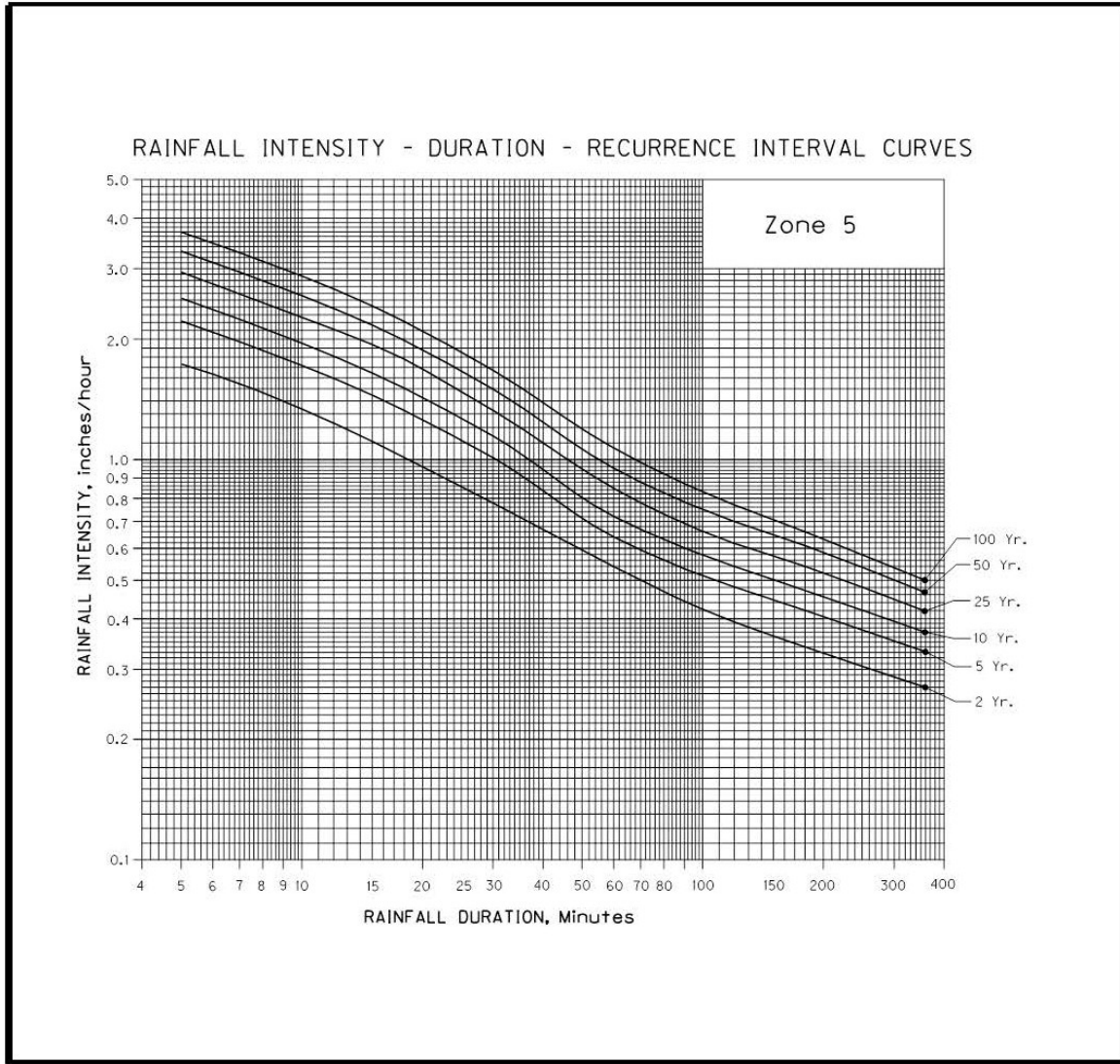


Figure 16. Rainfall Intensity Recurrence Curves (Zone 7)

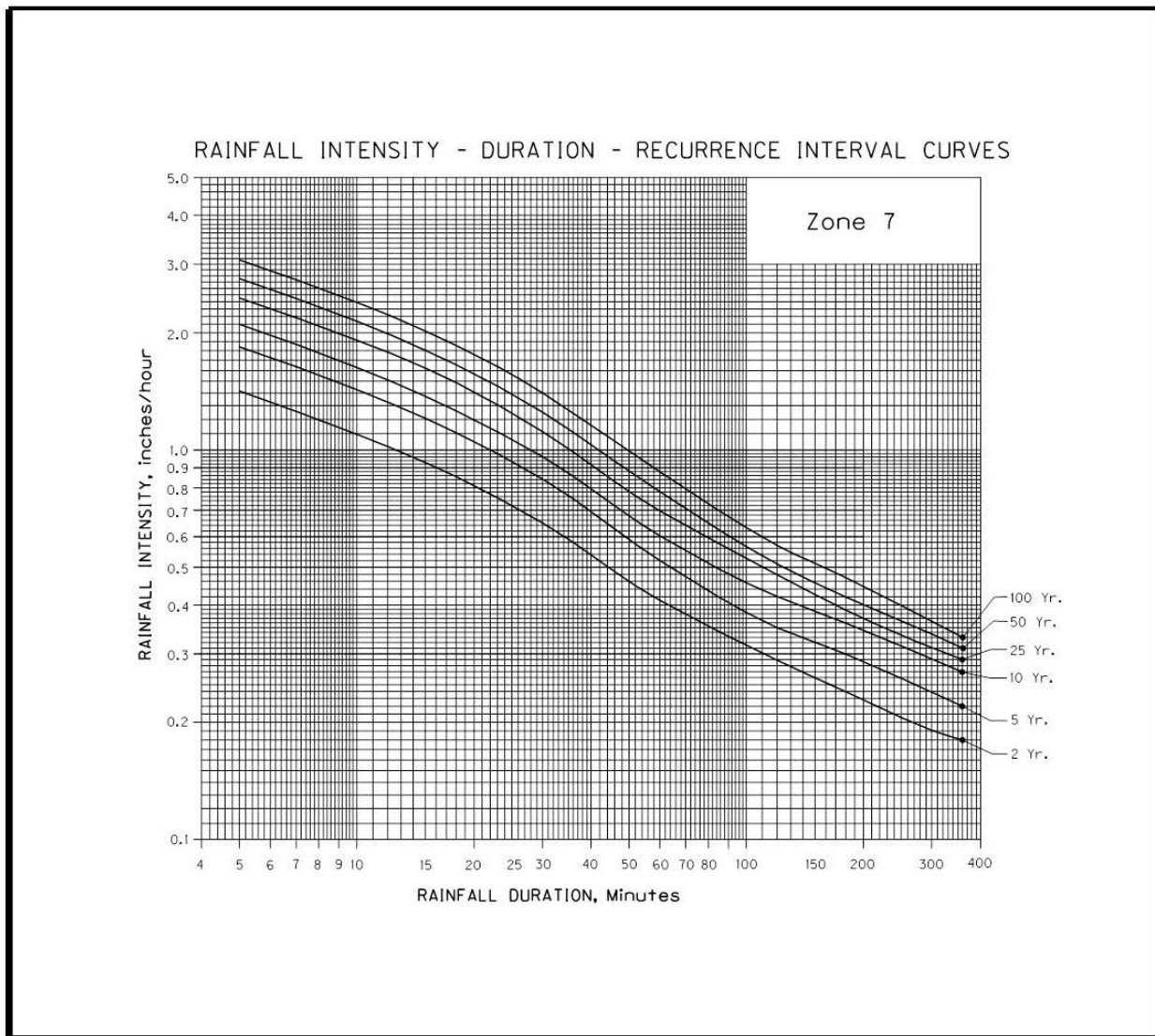
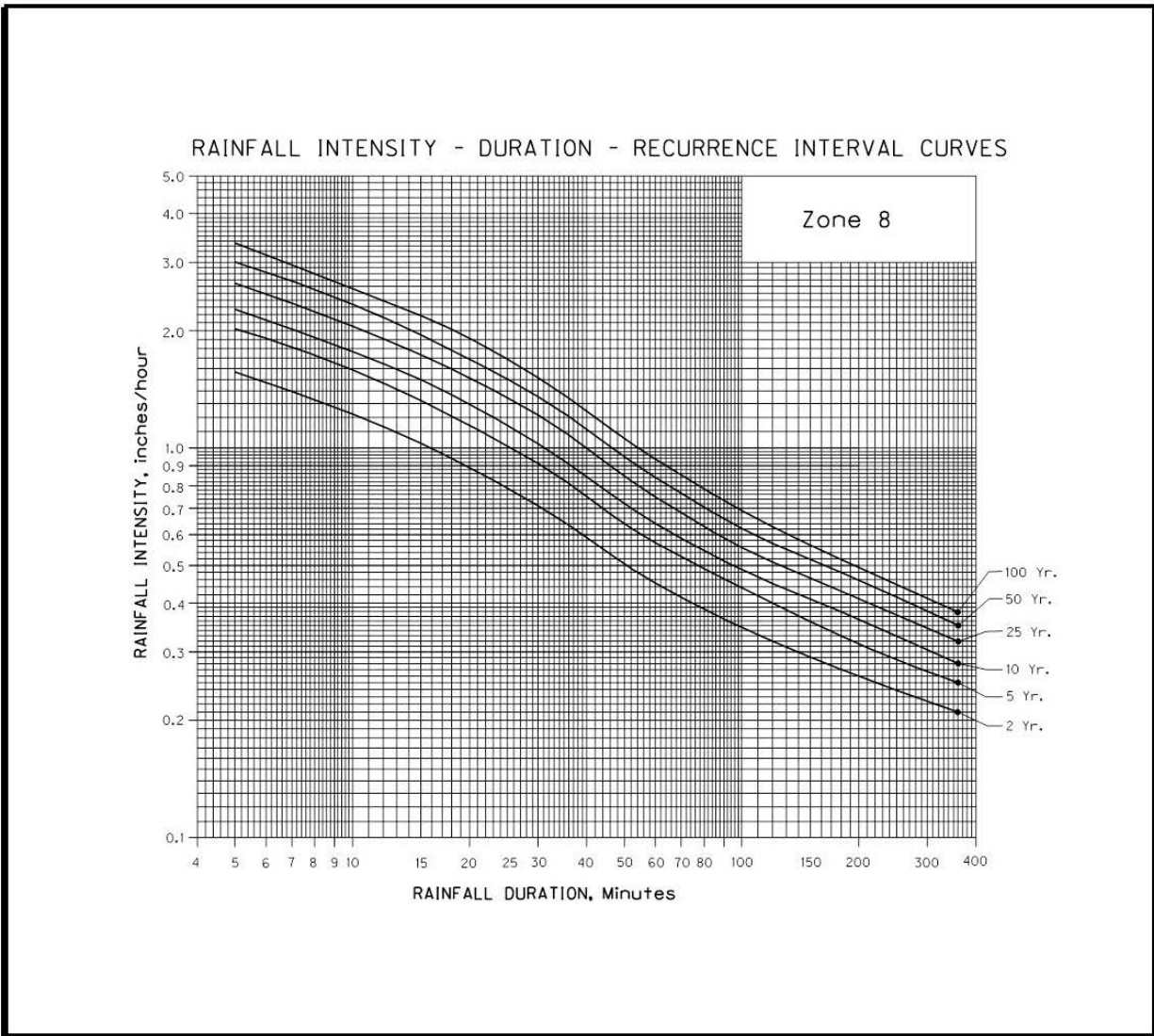


Figure 17. Rainfall Intensity Recurrence Curves (Zone 8)



5. NOAA Isopluvial Maps

The following figures are from the Precipitation-Frequency Atlas of the Western United States (Volume X – Oregon), published by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service (1973).

Figure 18. Isopluvials of 2-YR, 24-HR Precipitation in Tenths of an Inch

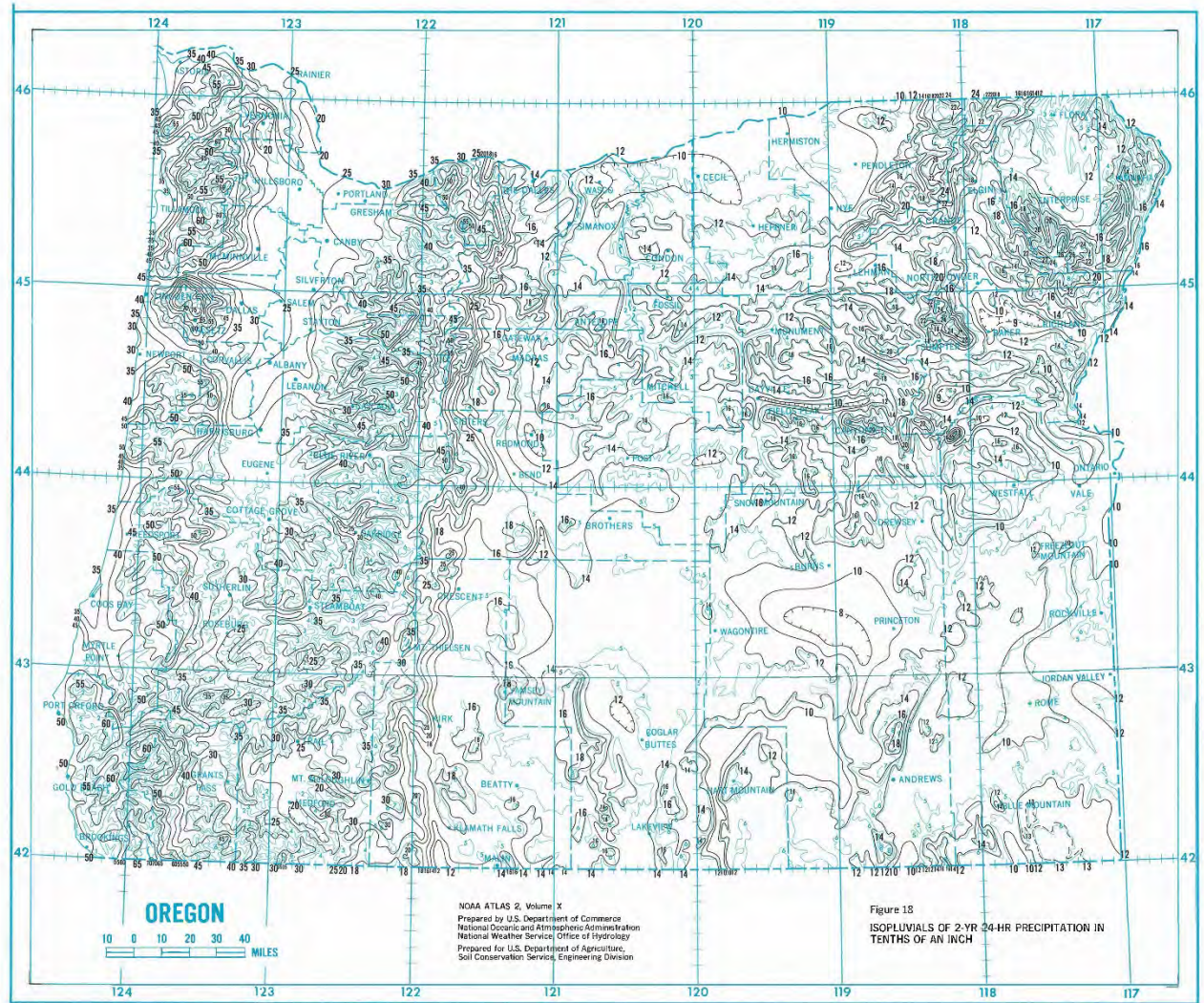


Figure 19. Isopluvials of 5-yr, 24-hr Precipitation in Tenths of an Inch

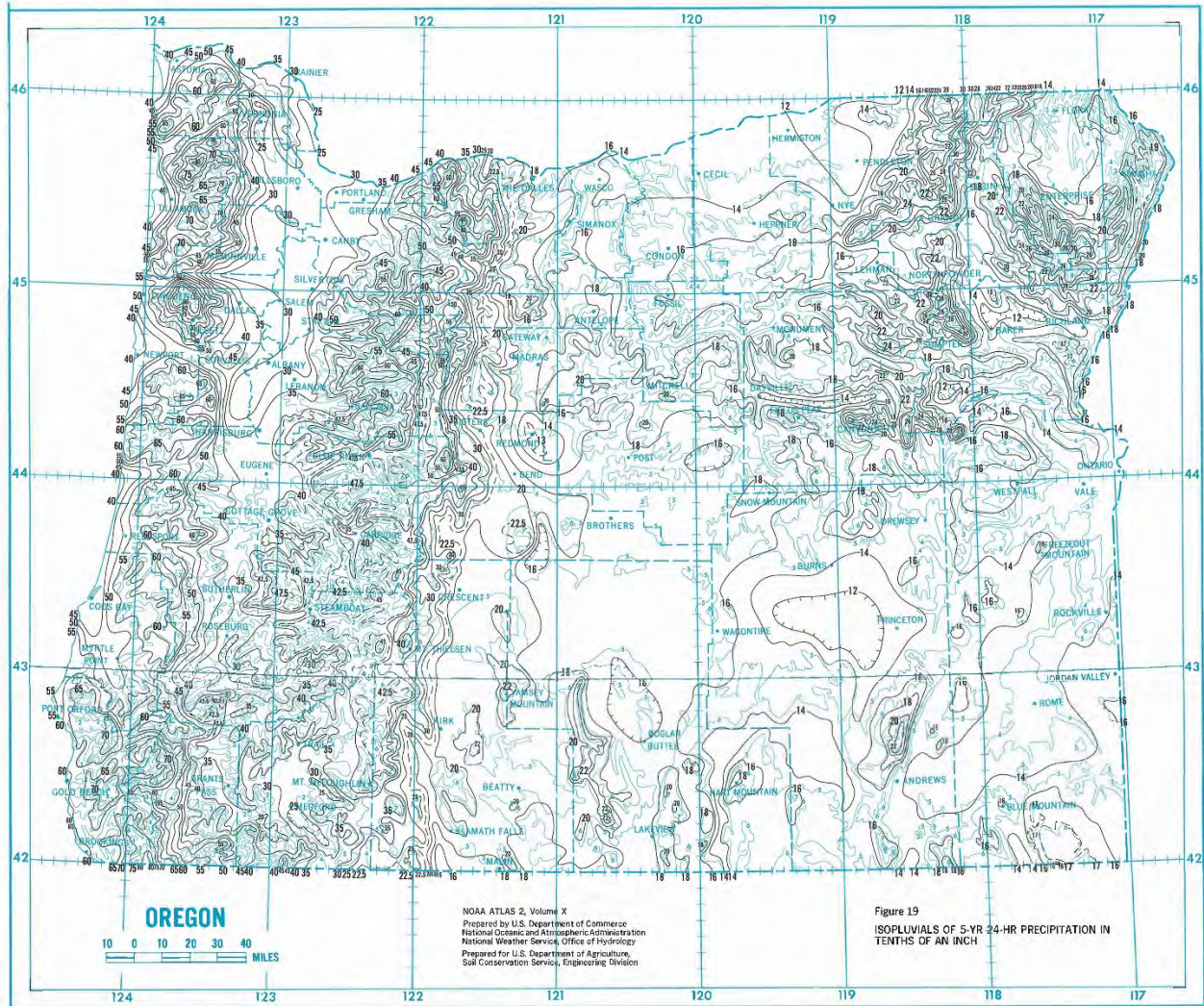


Figure 20. Isopluvials of 10-yr, 24-hr Precipitation in Tenths of an Inch

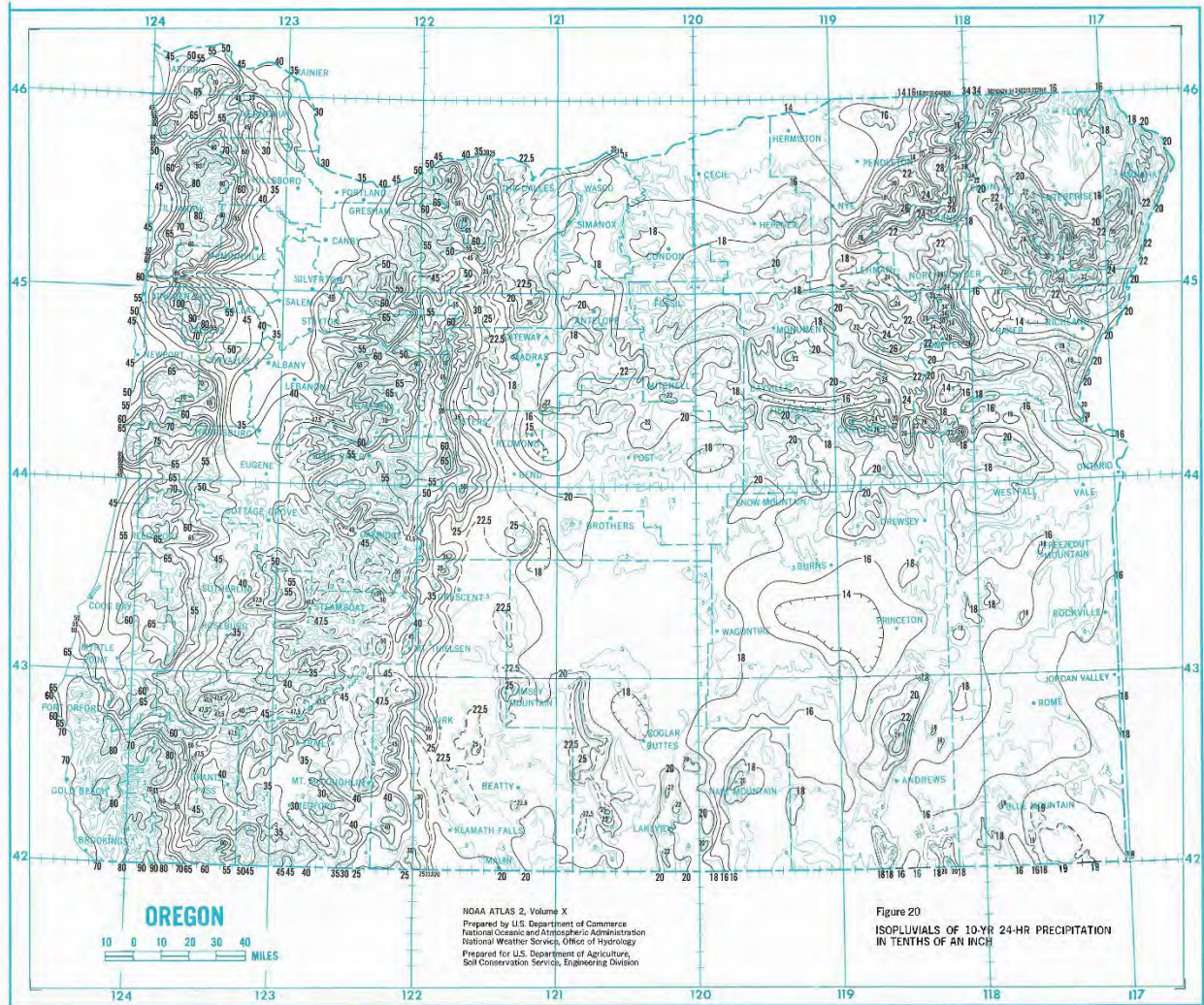


Figure 21. Isopluvials of 25-yr, 24-hr Precipitation in Tenths of an Inch

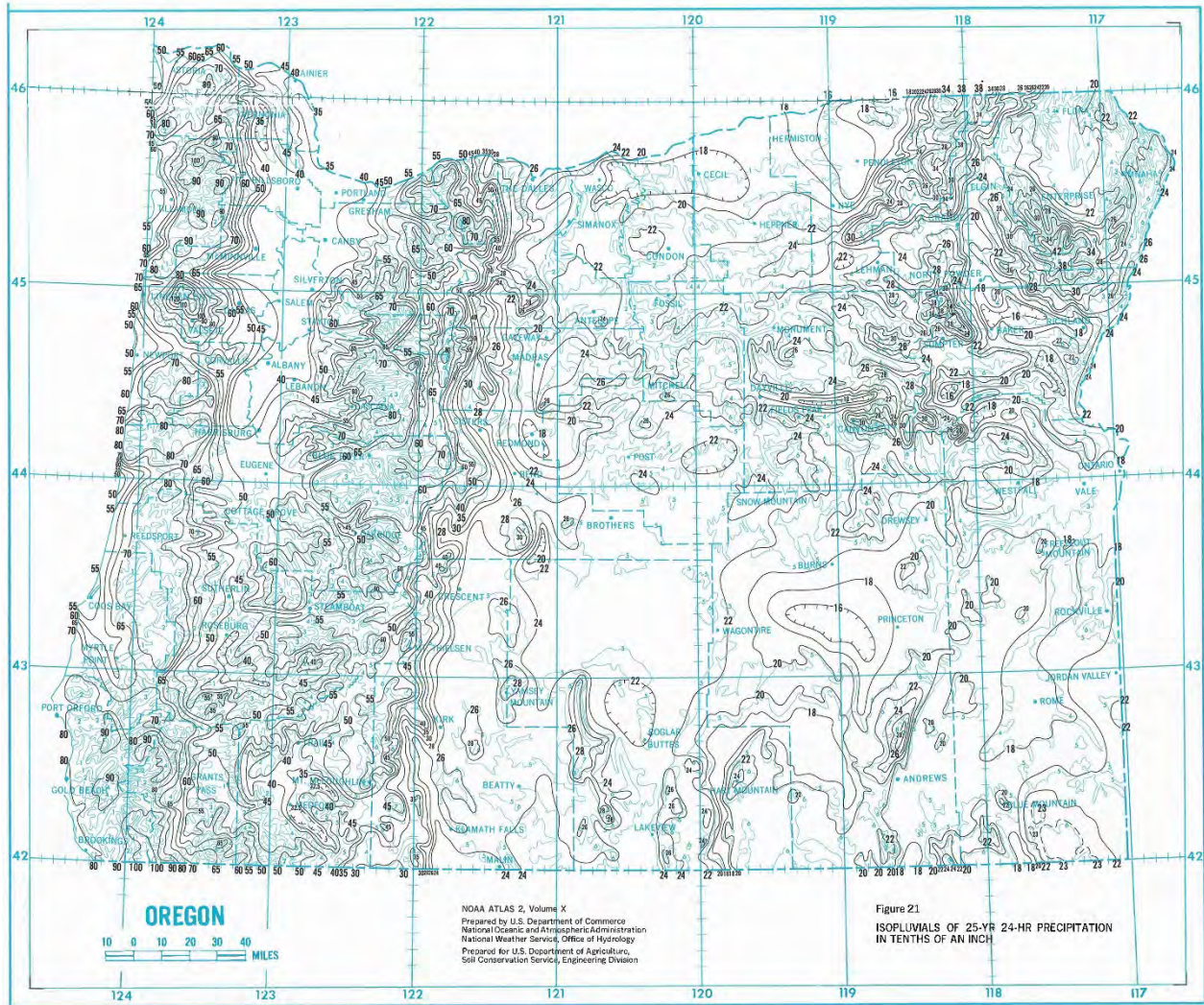


Figure 22. Isopluvials of 50-yr, 24-hr Precipitation in Tenths of an Inch

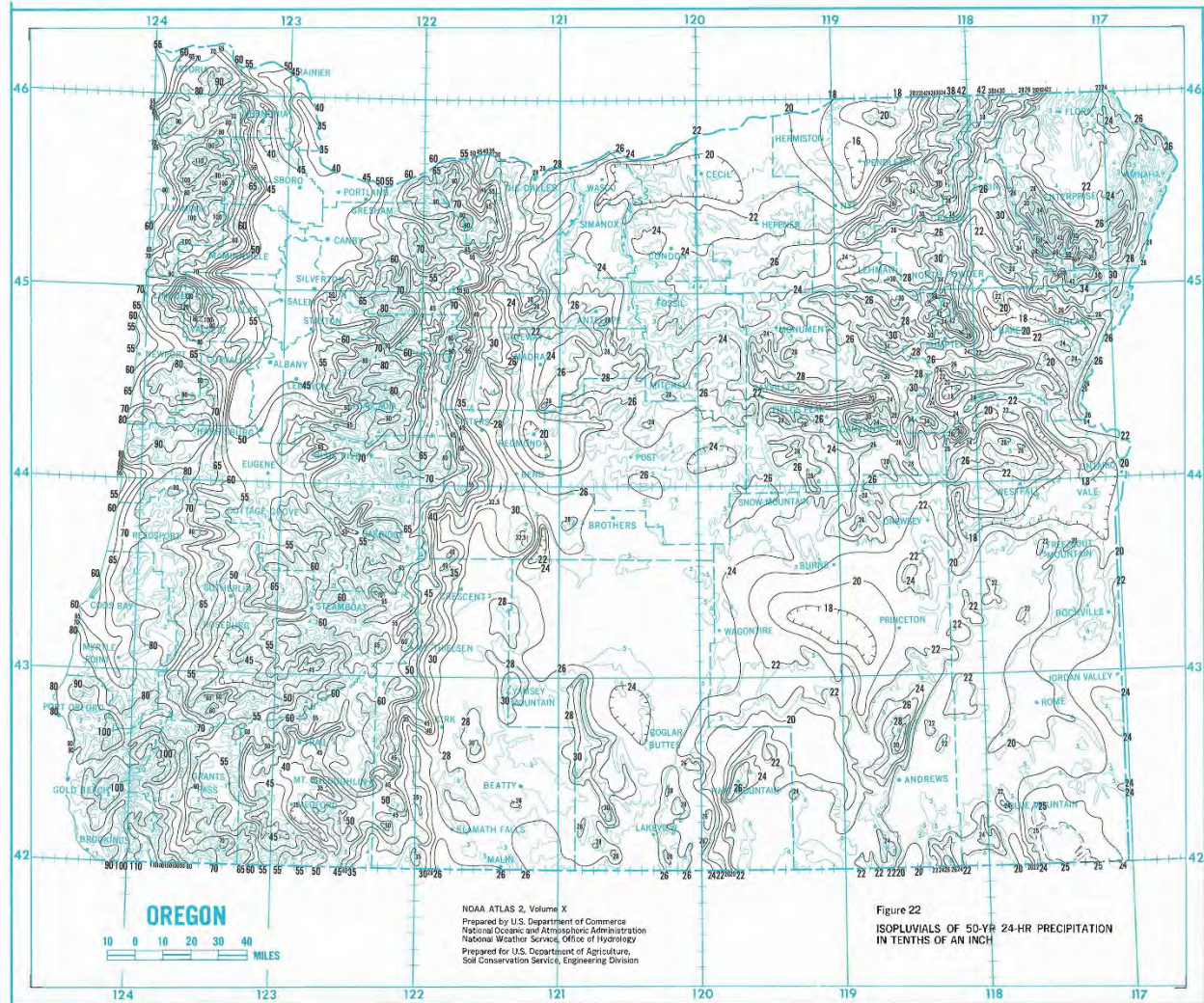


Figure 23. Isopluvials of 100-yr, 24-hr Precipitation in Tenths of an Inch

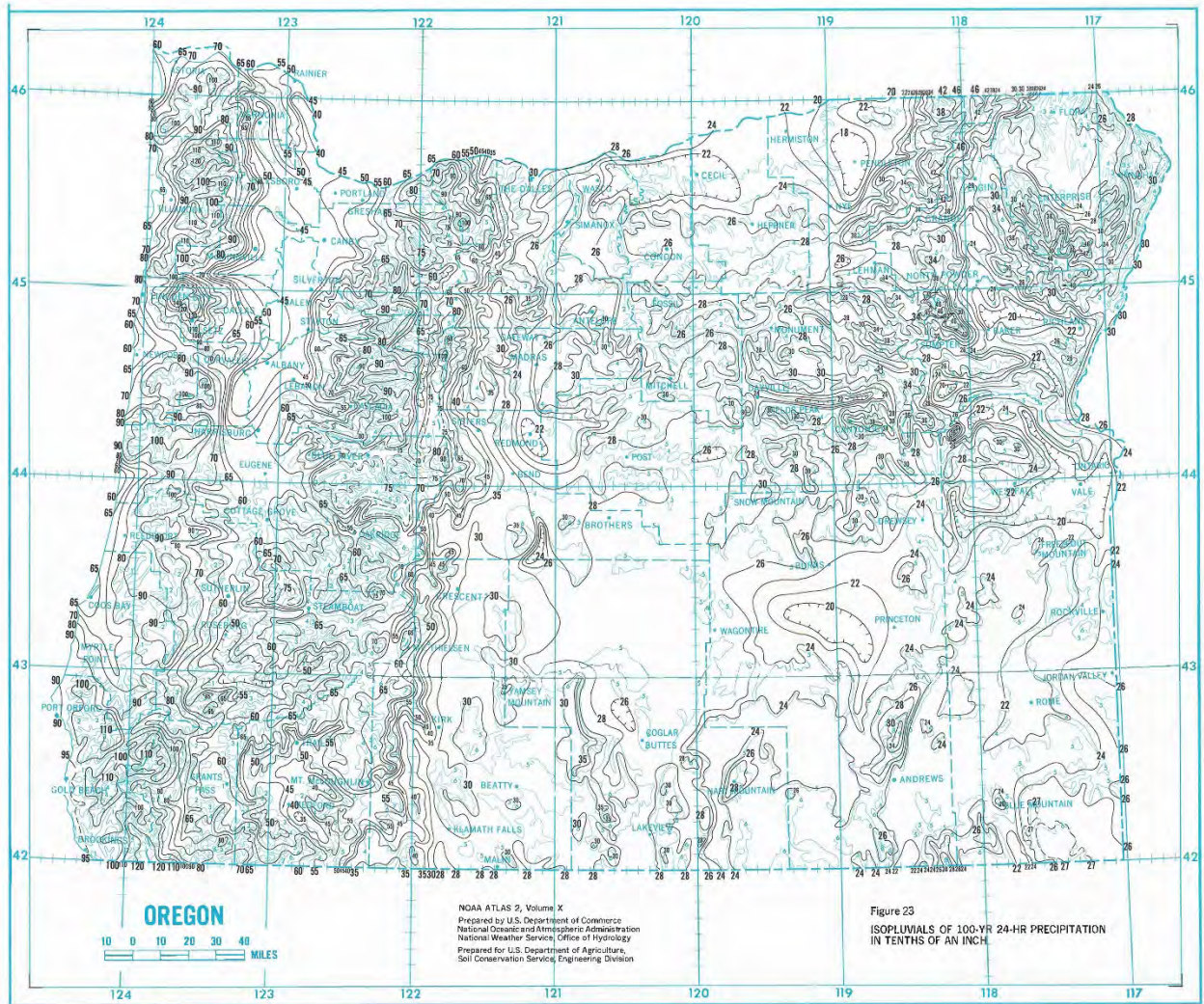


Figure 23
ISOPLUVIALS OF 100-YR 24-HR PRECIPITATION
IN TENTHS OF AN INCH

Water Environment Services Buffer Standards

February 2023



Buffer Standards

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Buffer Standards

1. Definitions

Words, terms, and acronyms specific to these Standards are defined below.

1.1 Words and Terms

The Water Environment Services (WES) Rules and Regulations (Rules) contains definitions that apply to and are consistent across the Rules and all adopted standards. Unless the context specifically indicates otherwise, the following words and terms, as used in these Buffer Standards, shall have the meanings hereinafter designated:

Applicant. See the WES Rules.

Bankfull Stage. The stage or elevation at which water overflows the natural banks of streams or other waters of the state and begins to inundate the upland. The bankfull stage may be approximated using either the 2-year recurrence interval flood elevation or 1-foot measured vertically above the ordinary mean high-water line.

Created Wetlands. Wetlands developed in an area previously identified as a non-wetland to replace, or mitigate, wetland destruction or displacement. A created wetland shall be regulated and managed the same as an existing wetland.

Constructed Wetlands. Wetlands developed as a water quality or quantity facility, subject to change and maintenance as such. These areas must be clearly defined and separated from naturally occurring or created wetlands.

Contractor. See the WES Rules.

Debris. Discarded human made objects that would not exist in an undeveloped stream corridor or wetland. Debris includes, but is not limited to, tires, vehicles, litter, scrap metal, construction waste, lumber, plastic, yard debris, or styrofoam. Debris does not include objects necessary to a use allowed by Section 709, "Water Quality Resource Area District", of the Clackamas County Zoning and Development Ordinance, or ornamental and recreational structures. Debris does not include existing natural plant materials or natural plant materials that are left after flooding, downed, or standing dead trees, or trees that have fallen into protected water resources.

Development. See the WES Rules.

Disturb. Anthropogenic changes to the existing physical status of the land, which are made in connection with development.

Drip Line. The outermost edge of a tree's canopy; when delineating the drip line on the ground, it will appear as an irregularly shaped circle defining the canopy's perimeter.

Engineer. See the WES Rules.

Enhancement. The process of improving upon the natural functions and/or values of an area or resource that has been degraded by human activity. Enhancement activities may or may not return the site to a pre-disturbance condition but create/recreate beneficial processes and resources that occur naturally.

Erosion. See the WES Rules.

Flood Management Areas. Areas defined by Section 703, "Floodplain Management District", of the Clackamas County Zoning and Development Ordinance.

Invasive Non-Native Vegetation. Plant species that are listed in the Clackamas Weed List maintained by the Clackamas Soil and Water Conservation District on behalf of Clackamas County.

Intermittent Stream. See the WES Rules.

Landscape Architect. See the WES Rules.

Maintenance. Routine, recurring, and usual work for the preservation, protection and keeping of any facility for its intended purpose.

Mitigation. The reduction of adverse effects of a proposed project by considering, in the following order:

- A. Avoiding the impact altogether by not taking a certain action or parts of an action;
- B. Minimizing impacts by limiting the degree or magnitude of the action and its implementation;
- C. Compensating for the impact by replacing or providing comparable substitute Water Quality Resource Areas.
- D. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

Native Vegetation. Vegetation native to the Portland metropolitan area provided that it is not invasive non-native or noxious vegetation. See the Portland Plant List maintained by the City of Portland Bureau of Planning and Sustainability.

Noxious Vegetation. See Invasive Non-Native Vegetation.

Ordinary Mean High-Water Line. See the WES Rules.

Owner. See the WES Rules.

Perennial Stream. See the WES Rules.

Practicable. Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purpose.

Professional Engineer (PE). See the WES Rules for the definition of Engineer.

Public Right-of-Way (ROW). See the WES Rules.

Restoration. The process of returning a disturbed or altered area or water resource to a previously existing natural condition. Restoration activities reestablish the structure, function, or diversity to that which existed prior to impacts caused by human activity.

Riparian. Those areas associated with streams, lakes, and wetlands where vegetation communities are predominately influenced by their association with water.

Sensitive Area. See the WES Rules.

Stormwater. See the WES Rules.

Stormwater Management Facility. See the WES Rules.

Stream. See the WES Rules.

Stream, Intermittent. See Intermittent Stream.

Stream, Perennial. See Perennial Stream.

Structure. A building or other major improvement that is built, constructed, or installed, not including minor improvements—such as fences, utility poles, flagpoles, or irrigation system components—that are not customarily regulated through zoning codes.

Utility Facilities. Buildings, structures, or any constructed portion of a system that provides for the production, transmission, conveyance, delivery, or furnishing of services including, but not limited to, heat, light, water, power, natural gas, sanitary sewer, stormwater, telephone, and cable television. Utility facilities do not include stormwater management facilities.

Vegetated Corridor. The area between bankfull stage of a protected water resource and the delineated edge of the Water Quality Resource Area.

Water Features. All rivers, streams (regardless of whether they carry year-round flow, i.e., including intermittent streams), springs which feed streams and wetlands and have year-round flow, Flood Management Areas, wetlands, and all other bodies of open water.

Water Quality Resource Area. Water features and adjacent vegetated corridors subject to regulation in order to preserve and enhance water quality, as established in Title 3 of the Metro Urban Growth Management Functional Plan.

Water Year. October 1 through September 30

Wetlands. See the WES Rules.

1.2 Abbreviations

Unless the text specifically indicates otherwise, the following abbreviations are used in these standards to refer to the following:

Abbreviation	Definition
DEQ	Oregon Department of Environmental Quality
DSL	Oregon Division of State Lands
EM	Emergent Marsh
EPSC	Erosion Prevention and Sediment Control
FW	Ash Forested Wetland
IPM	Integrated Pest Management
DSL	Oregon Department of State Lands
ORS	Oregon Revised Statutes
OW	Oak Woodland/Savanna
PE	Professional Engineer
RF	Riparian Forest
ROW	Right-of-Way
SS	Shrub/Scrub Wetland
UF	Upland Forest
USACE	United States Army Corps of Engineers
WES	Water Environment Services
WQRA	Water Quality Resource Area

Buffer Standards

2. General Information

2.1 Authority and Purpose

The District requires vegetated corridors along protected water resources, including perennial and intermittent streams and wetlands, to buffer the development impacts on water quality resources. These Buffer Standards protect water quality, set standards for vegetated corridors associated with protected water resources, and establish minimums for required mitigation.

2.2 Applicability

All parcels containing a water resource or within 200-feet of a water resource located on an adjacent parcel must submit to the District for a Water Quality Resource Area (WQRA) Boundary Verification prior to any development activity. Any parcel with a WQRA must submit to the District for a WQRA Development Permit prior to any development activities.

Parcels governed by a municipality or county planning agency that implements WQRA protections are excluded from these standards.

2.2.1 Exemptions

The following uses and activities are exempt from the requirements of Buffer Standards:

- A. Uses and activities that do not constitute development, except if the use or activity is prohibited by Section 4;
- B. Farming practices, as defined in Oregon Revised Statutes (ORS) 30.930, and farm uses, as defined in ORS 215.203, in zoning districts where agricultural uses are a primary use, except that this exemption does not apply to buildings associated with farm practices or farm uses;
- C. Forest practices, as defined in ORS 30.930, on forestlands, as defined in ORS 30.930, outside the Portland Metropolitan Urban Growth Boundary;
- D. Installation of erosion prevention and sediment control (EPSC) measures pursuant to an EPSC plan approved by the EPSC regulatory authority.
- E. Projects with the sole purpose of restoring or enhancing wetlands, streams, or fish and wildlife habitat areas, provided that the project is part of an approved local, regional, state, or federal restoration or enhancement plan;
- F. Maintenance of existing structures, roadways, driveways, utility facilities, septic systems, accessory uses, and other development;
- G. Removal of invasive non-native or noxious vegetation and the planting or propagation of native vegetation.
- H. Removal of dead or diseased trees or trees that pose an imminent hazard to persons or property, provided that a consulting arborist's report, or other credible evidence, is provided by the owner of the subject property and verifies the dead, diseased, or hazardous condition of the trees proposed for removal;
- I. Repair, replacement, or improvement of existing utility infrastructure provided that the facility footprint is not increased where the disturbed portion of the WQRA or associated buffer is restored and vegetation is replaced with native vegetation;

- J. Additions, alterations, rehabilitation, or replacement of existing structures, roadways, driveways, accessory uses, and other development that do not increase existing structural footprints in the WQRA and associated buffer where the disturbed portion of the WQRA is restored and vegetation is replaced with native vegetation;
- K. Measures to remove or abate nuisances, or any other violation of statute, administrative rule, or ordinance, where such measures are required by government order and the disturbed portion of the WQRA and associated buffer is restored and vegetation is replaced with native vegetation; and
- L. Work necessary to protect, repair, maintain, or replace existing structures, utility facilities, roadways, driveways, accessory uses, and exterior improvements in response to emergencies, provided that such remedial or preventative action must take place within a timeframe too short to allow for compliance with the requirements of this section and the adverse impacts are mitigated in accordance with **Table 3**.

2.3 Variance

Alternative materials and methods will only be accepted if the applicant can demonstrate that the existing standards are not appropriate for a given site and the proposed alternative provides the same or greater level of protection as defined in these standards. Alternate materials or methods not explicitly approved herein will be considered for approval through the variance process outlined below.

2.3.1 Variance Request

A variance request to the (Standards) shall be submitted in writing to the District. The written request for a variance should be submitted to the District prior to land use approval if a land use action is required. Land use conditions of approval are commonly written so there is little, if any, flexibility after land use approval is issued. If land use approval has already been issued or not required, then the variance request should be submitted in writing along with the first plan review submittal.

Once the District approves the plans, a variance request will only be accepted at the discretion of the District, and if the request is the only feasible solution without regards to delays or cost. Only minor variance requests will be considered during the construction phase of the project to address a specific design or construction problem. It is the responsibility of the applicant to obtain all approvals from any local, county, state or federal authority having any jurisdiction or permitting of the activities before proceeding with an approved variance.

This written request shall include the following:

- A. The desired variance(s);
- B. The reason(s) for the request(s);
- C. A comparison between the specification(s) and standard(s), and the variance(s) for performance, function, maintainability, safety, etc.;
- D. References to regionally and/or nationally accepted standards, records of successful use by other agencies, or other supportive information.

2.3.2 Criteria for Variance

The District may grant a variance when the request does not compromise the following: public safety, environmental protection, maintenance/repair/replacement, and when any one of the following conditions are met:

- A. Topography or other geographic conditions impose an environmental or safety concern and the request is considered an equivalent alternative, which can accomplish the intent and criteria that is provided in these standards.
- B. A minor change to the standard is required to address a specific design or construction problem which, if not enacted, will result in an unreasonable or disproportionate burden or obstacle to development. The financial viability of meeting the requirements of these design standards is not in itself a justification for a design exception.
- C. The variance request is in the public interest and requirements for safety, function, appearance, and maintainability are based upon sound engineering and functionality of the proposed system is a feasible alternative.

All requests will be evaluated on a case-by-case basis, and approval of alternative materials and methods for one development proposal will not imply an approval under similar circumstances in another proposal. Approval of a variance, or denial of a site-specific request shall not constitute a precedent for use at other locations with potentially similar circumstances.

2.3.3 Review Process

The variance request shall be reviewed by the District and a decision will be issued, in writing, to the applicant within 30 calendar days indicating one of the following:

- A. Approve as proposed, or
- B. Approve with changes, or
- C. Deny with an explanation.

It is the responsibility of the applicant to obtain all approvals from any local, county, state or federal authority having any jurisdiction or permitting of the activities before proceeding with an approved variance.

2.3.4 Appealing Variance Request Decision

The applicant may make a written request to the District to appeal the variance request decision as outlined in the appeals process contained in Section 3.7 of the District Rules and Regulations.

Buffer Standards

3. General Requirements

3.1 Classifying Primary or Secondary Resources

Protected water resources are classified as primary or secondary.

A wetland shall be a primary protected water resource if the wetland meets any one of the following criteria and is not a constructed wetland:

- A. The wetland is fed by surface flows, sheet flows, or precipitation, has evidence of flooding during the growing season, has 60-percent or greater vegetative cover, and is over one-half-acre in size;
- B. The wetland qualifies as having “intact water quality function” under the 1996 Oregon Freshwater Wetland Assessment Methodology;
- C. The wetland is in a Flood Management District, has evidence of flooding during the growing season, is five-acres or more in size, and has a restricted outlet or no outlet;
- D. The wetland qualifies as having “intact hydrologic control function” under the 1996 Oregon Freshwater Wetland Assessment Methodology; or
- E. The wetland or a portion of it is within a horizontal distance of less than one-fourth mile from a water body that meets the Oregon Department of Environmental Quality’s (DEQ) definition of a “water quality limited water body.”

Rivers, perennial streams, intermittent streams draining more than 100-acres, natural lakes, and springs that feed streams and wetlands and have year-round flow during a year with wet to average precipitation patterns are primary protected water resources.

Intermittent streams draining 100-acres or less are secondary protected water resources.

3.1.1 Methodology for Documenting Intermittent Status of Streams

- A. A stream shall be determined to be intermittent through one of the following methods. Water year precipitation patterns are determined by the National Water and Climate Center, United States Department of Agriculture¹.
 - a. Method 1: The stream channel is dry (without visible flow or standing water) for a period of 30 consecutive days during a year with wet to average precipitation patterns. This method requires a minimum of two observations per 100-feet of stream length, collected at the beginning and end of the 30-day period, with supporting data (including maps with photos keyed to each sample location), indicating that the stream is dry. During a year with a dry precipitation pattern, all observations must be completed prior to August 15. If standing water is present at the first site visit, Method 2 shall be used, or the applicant must wait until the project reach is completely dry to start the 30-day observation period. For the purposes of this section, the District shall have the discretion to accept data taken up to 37 consecutive days apart.
 - b. Method 2: The channel must not have saturated soil in the upper 12-inches, during a year with wet to average precipitation patterns. This method requires

¹ See <https://www.nrcs.usda.gov/wps/portal/wcc/home/> and use the interactive map to determine

representative observations (one per 100-feet of stream length) on only one date. Observations shall include supporting data (including soil texture, level of saturation, and maps with photos keyed to each observation location). During a year with a dry precipitation pattern, all sampling must be completed prior to August 15.

If the applicant attempts to make a determination of intermittence during the wet season (November 1 – June 30), the applicant should consider all other available data (historic photos, data, reports, eyewitness accounts, etc.). The District shall review the available data and, if approved, the intermittent determination shall be considered preliminary until status can be definitively confirmed through one of the field methodologies described in Method 2.

If other long-term precipitation data is used, provide location and statistical analysis with submittal.

To determine status of the precipitation levels, review the previous Water Year to date. For determinations conducted during the month of October, use the previous complete Water Year to determine precipitation levels. Daily and monthly data are available online at a variety of government websites.

3.2 Development Review Requirements

3.2.1 Boundary Verification and Permit Required

In order to confirm the presence of a water resource and verify the boundaries of a WQRA, a WQRA Boundary Verification is required for development on a parcel or parcels that contain a WQRA or have a WQRA within 200-feet of the parcel boundary. The verification shall be required prior to issuance of a Service Provider Letter by WES or a Preliminary Statement of Feasibility, as required by the Clackamas County Planning Division. If credible evidence (e.g., aerial photographs, topographic maps, expert studies) indicates that the proposed development is clearly outside a WQRA (as determined by WES/County Planning), the requirement for WQRA Boundary Verification may be waived.

A WQRA Development Permit is required for development in a WQRA. Notice of approval of a WQRA Development Permit shall be mailed to all Owners of record within 300-feet of the subject property, and contiguous properties under the same ownership.

A WQRA Development Permit shall be approved if the applicant provides evidence substantiating compliance with the following criteria:

- A. No practicable alternative locations exist for the requested development that will not disturb the WQRA;
- B. No reasonably practicable alternative design or method of development exists that would have a lesser impact on the WQRA than the one proposed. If no such reasonably practicable alternative design or method of development exists, the development shall be conditioned to:
 - a. Limit its disturbance and impact on the WQRA and the associated vegetated corridor to the minimum extent necessary to achieve the proposed development; and

- b. Ensure that impacts to the functions and values of the water quality resource area and the associated vegetated buffer will be mitigated or impacted areas restored to the extent practicable.
- c. Additional vegetated corridor planting can be found in **Appendix A – Planting Guide for Buffers**.

Approval of WQRA Boundary Verification or a WQRA Development Permit shall be valid after the conclusion of the appeal period for four years from the date of the final written decision. If the District's final written decision is appealed, the approval period shall commence on the date of the final appellate decision. During this four-year period, if the WQRA Development Permit has not been fully satisfied, the approval will become void.

If the approval of WQRA Boundary Verification or a WQRA Development Permit is not implemented within the initial approval period, a two-year time extension may be approved pursuant to the following standards and criteria:

- A. A time extension application shall be submitted to the WES Director (or their designee) prior to the expiration of the initial approval period for the land use permit.
- B. The proposed development as originally approved, or as modified by approval from WES, shall be consistent with the relevant provisions of these Standards in effect on the date the application for a time extension is submitted, provided that the application is complete when submitted or is made complete pursuant to these Standards. There shall have been no changes on the subject property or in the surrounding area that would be cause for reconsideration of the original decision.

3.2.2 Minimum Vegetated Corridor Width

The minimum width of the vegetated corridor is calculated based on the type of water resource, the adjacent slope, and the edge of the water resource (see **Table 2**).

At least three slope measurements along the water resource, at no more than 100-foot increments, shall be made for each property for which development is proposed. Slope shall be measured in 25-foot increments away from the water resource until slope is less than 25-percent or a point 150-feet from the starting point of measurement is reached, whichever occurs first. The 25-foot increments shall be measured horizontally. Where the protected water resource is confined by a ravine or gully, the top of ravine is the break in the greater-than-25-percent slope.

The width of the vegetated corridor shall be measured horizontally.

A maximum reduction of 25-feet may be permitted in the width of the vegetated corridor beyond the slope break if a geotechnical report demonstrates that the slope is stable.

Vegetated corridors in excess of 50-feet for primary protected resources, or in excess of 25-feet for secondary protected resources, apply on steep slopes only in the uphill direction from the protected water resource.

If an improved, Public Right-of-Way (ROW) runs parallel to and would be included within a WQRA buffer, the WQRA buffer shall not extend beyond the improved, Public ROW.

The width of the vegetated corridor included within a WQRA is specified in **Table 1**. However, if an improved, Public ROW runs parallel to and, based on **Table 1**, would be included within a WQRA, the WQRA shall not extend beyond the improved, Public ROW.

Table 1. Width of WQRA Vegetated Corridor

Protected Water Resource Type	Slope Adjacent to Protected Water Resource	Starting Point for Measurement from Water Resource	Width of Vegetated Corridor
Primary Protected Water Resource	<25-percent	<ul style="list-style-type: none"> Edge of bankfull stage Delineated edge of protected wetland 	50-feet
Primary Protected Water Resource	≥25-percent for 150-feet or more	<ul style="list-style-type: none"> Edge of bankfull stage Delineated edge of protected wetland 	200-feet
Primary Protected Water Resource	≥25-percent for less than 150-feet	<ul style="list-style-type: none"> Edge of bankfull stage Delineated edge of protected wetland 	Distance from starting point of measurement to break in 25-percent slope plus 50-feet
Secondary Protected Water Resource	<25-percent	<ul style="list-style-type: none"> Edge of bankfull stage 	25-feet
Secondary Protected Water Resource	≥25-percent	<ul style="list-style-type: none"> Edge of bankfull stage 	50-feet

3.2.3 Partitions and Subdivisions

A partition or subdivision of property that contains a WQRA shall require that the WQRA and associated buffer shall be platted as a tract rather than as part of any lot. The tract shall be protected from development by restrictive covenant, public dedication or other District approved equivalent. However, the tract may be subject to an easement conveying storm and surface water management rights to the surface water management authority. The tract shall be designated as one of the following prior to final plat approval:

- A. A private natural area owned by a homeowners association or a private non-profit with the mission of land conservation; or
- B. A public natural area where the tract has been dedicated to a public entity

A WQRA Boundary Verification that was valid on the date when the final plat for a subdivision or partition was recorded with the County Clerk shall remain valid for subsequent development on the lots or parcels created by the subdivision or partition.

3.3 Mitigation Required

Development impacts to the WQRA and associated vegetated corridor shall be mitigated. The type and amount of mitigation will depend on the amount and type of encroachment in to the WQRA and vegetated corridor and the existing condition of the vegetated corridor. Mitigated Vegetated Corridor areas must be protected through a tract, restrictive covenant, public dedication, or other District approved equivalent

Mitigation shall be performed in the following order:

- A. Area Mitigation – Adding of additional area onsite to offset the amount of vegetated corridor impacted.
- a. The additional Vegetated Corridor area required for approved encroachments shall be at the ratio of 1.5 square feet of added area to 1.0 square feet of impacted area.
 - b. The additional Vegetated Corridor area shall be in addition to the existing Vegetated Corridor.
 - c. The additional Vegetated Corridor area must be contiguous with an existing Vegetated Corridor.
 - d. Additional Vegetated Corridor areas that are in “marginal” or “degraded” condition shall be improved to “good” condition as described in **Table 2**.
- B. Enhancement Mitigation – Where there is insufficient room for area mitigation onsite, mitigation shall consist of a combination of area mitigation and enhancement mitigation. Enhancement mitigation is removal of non-natives species and planting of natives according to an approved plan to bring the corridor into a Good Condition.
- a. The enhanced Vegetated Corridor area required for approved encroachments shall be at the ratio of 2.0 square feet of enhanced area to 1.0 square feet of impacted area.
 - b. The enhanced Vegetated Corridor areas shall be improved to “good” condition as described in **Table 2**. Applicant shall be responsible for annual monitoring, maintenance, and reporting on success of enhancement for three years after initial enhancement is completed.
- C. Offsite Mitigation – Where full or partial onsite mitigation through area mitigation, enhanced mitigation, or a combination of the two is not possible (e.g., no additional onsite area is available and remaining vegetated corridor is insufficient to meet 2:1 ratio), the balance shall be mitigated through offsite mitigation upon approval of the District.
- a. The offsite Vegetated Corridor area required for approved encroachments shall be at the ratio of 2.0 square feet of offsite mitigation area to 1.0 square feet of impacted area.
 - b. The offsite Vegetated Corridor area shall be in addition to the existing Vegetated Corridor.
 - c. The offsite Vegetated Corridor must be contiguous with an existing Vegetated Corridor.
 - d. Offsite Vegetated Corridor areas that are in “marginal” or “degraded” condition shall be improved to “good” condition as described in **Table 2**. Applicant shall be responsible for annual monitoring, maintenance, and reporting on success of enhancement for three years after initial enhancement is completed.

Table 2. Water Quality Resource Area Mitigation

Existing Condition of Water Quality Resource Area	Mitigation Requirements
<p><u>Good Condition:</u> Combination of native trees, shrubs and groundcover are 80-percent present, and there is more than 50-percent tree canopy coverage in the vegetated corridor.</p>	<p><u>If area is disturbed during construction:</u></p> <ol style="list-style-type: none"> 1. Restore and mitigate according to approved plan using native vegetation to re-establish “good” condition. 2. Remove debris. 3. Prior to construction a qualified professional shall prepare and submit a plan for mitigating water quality impacts related to the development, including: sediments, temperature nutrients, sediment control, temperature control, or any other condition that may have caused the protected water resources to be listed on DEQ’s 303(d) list. 4. Re-vegetation must occur during the next planting season following site disturbance. Seeding may be required prior to establishing plants for site stabilization. Annual replacement of plants that do not survive is required until vegetation representation of natural conditions is established on the site. <p><u>If area is undisturbed during construction:</u></p> <ol style="list-style-type: none"> 1. Remove debris
<p><u>Marginal Condition:</u> Combination of native trees, shrubs and groundcover are 50-80-percent present, and there is 26-50-percent tree canopy coverage in the vegetated corridor.</p>	<p><u>If area is disturbed during construction:</u></p> <ol style="list-style-type: none"> 1. Restore and mitigate according to approved mitigation plan using native vegetation to achieve “good” condition. 2. Remove debris. 3. Re-vegetate during the next planting season following site disturbance. Seeding may be required prior to establishing plants for site stabilization. Annual replacement of plants that do not survive is required until vegetation representative of “good” conditions is established on the site. <p><u>If area is undisturbed during construction:</u></p> <ol style="list-style-type: none"> 1. Remove debris.
<p><u>Degraded Condition:</u> Combination of native trees, shrubs, and groundcover cover less than 50-percent of the community and less than 25-percent tree canopy exists (areal measure).</p>	<p><u>If area is disturbed during construction:</u></p> <ol style="list-style-type: none"> 1. Restore and mitigate according to approved mitigation plan using native vegetation to achieve “good” condition. 2. Remove debris. 3. Re-vegetate during the next planting season following site disturbance. Seeding may be required prior to establishing plants for site stabilization. Annual replacement of plants that do not survive is required until vegetation representative of natural conditions is established on the site. <p><u>If area is undisturbed during construction:</u></p> <ol style="list-style-type: none"> 1. Vegetate bare areas with native vegetation. 2. Remove non-native vegetation and re-vegetate with native vegetation 3. Remove debris.

3.4 Design Requirements

- A. To the greatest extent practicable, existing native vegetation within the WQRA and the associated vegetated corridor shall be retained and protected.
- B. Walkways and bike paths shall be subject to the following standards:
 - a. Where it is not practicable to maintain a setback of greater than 30-feet from the edge a protected water resource, a maximum of 10-percent of the total area of a gravel, earthen, tree bark product or equivalent walkway or bike path may be within 30-feet of the edge of a protected water resource.
 - b. For any paved walkway or bike path, the width of the water quality resource area and associated vegetated buffer on the subject property shall be increased by a distance equal to the width of the paved path. Where it is not practicable to maintain a setback of greater than 30-feet from the edge of a protected water resource, a maximum of 10-percent of the total area of the walkway or bike path may be within 30-feet of the edge of a protected water resource.
 - c. A walkway or bike path shall not exceed 10-feet in width, shall not be constructed closer than 10-feet from the edge of the protected water resource, and shall be constructed so as to minimize disturbance to existing vegetation.
- C. Stormwater pretreatment facilities shall be subject to the following standards:
 - a. A stormwater pretreatment facility may encroach a maximum of 25-feet into the outside boundary of the vegetated buffer of a primary protected water resource.
 - b. A stormwater pretreatment facility may encroach a maximum of 5-feet into the outside boundary of the vegetated buffer of a secondary protected water resource.
 - c. The area of encroachment shall be replaced by adding an equal area to the WQRA and associated buffer on the subject property.
 - d. All post-construction stormwater runoff shall be mitigated in accordance with District Standards, prior to being discharged into the WQRA.

Buffer Standards

4. Prohibited Uses

The following uses and activities are prohibited within a WQRA and associated vegetated buffer:

- A. The planting of invasive non-native or noxious vegetation; and
- B. Uncontained areas of hazardous materials as defined by DEQ.

Buffer Standards

Appendix A: Submittal Requirements

Applications filed pursuant to Buffer Standards shall comply with the following submittal requirements.

1. Application for WQRA Boundary Verification

An application for WQRA Boundary Verification shall include a site plan that complies with the following requirements:

- A. The site plan shall be drawn at a scale of no less than 1-inch equaling 20-feet.
- B. The site plan shall show the location of the proposed development and the lot lines of the property on which development is proposed.
- C. The site plan shall show the location of the protected water resource. If the protected water resource is a wetland, the delineation shall be made by a qualified wetlands specialist pursuant to the Division of State Lands' (DSL) recommended wetlands delineation process. For all other protected water resources, the location shall be established by a registered Professional Engineer (PE), Landscape Architect, or surveyor licensed by the State of Oregon.
- D. The site plan shall show the location of the WQRA and associated vegetated corridor, including slope and drainage information sufficient to classify the protected water resource under **Table 1**.

2. Application for WQRA Development Permit

An application for a WQRA Development Permit shall include the following information in a report stamped by a registered PE, licensed Landscape Architect, or surveyor licensed by the State of Oregon:

- A. A topographic map of the site at contour intervals of 2-foot intervals. Where slopes exceed 15-percent, contours may be shown at 5-foot intervals showing a delineation of the WQRA and associated vegetated corridor;
- B. The location of all existing natural features including, but not limited to, all trees of a caliper greater than 6-inches diameter at a height of 4-feet, natural or historic drainages on the site, springs, seeps, outcroppings of rocks, and boulders within the WQRA;
- C. Location of wetlands that qualify as primary protected water resources. Where such wetlands are identified, a delineation shall be made by a qualified wetlands specialist pursuant to the DSL recommended wetlands delineation process;
- D. An inventory and location of existing debris, nuisance vegetation, and any noxious or hazardous materials;
- E. An assessment of the existing condition of the WQRA and associated vegetated buffer in accordance with **Table 2**;
- F. An inventory of vegetation, including percentage ground and canopy coverage;
- G. An Impact Evaluation and Alternatives Analysis that addresses the requirements of these Buffer Standards;
- H. A mitigation plan containing the following information:

- a. A description of adverse impacts that will be caused as a result of development;
- b. An explanation of how adverse impacts to resource areas and vegetated corridors will be avoided, minimized, and/or mitigated in accordance with, but not necessarily limited to, **Table 2**;
- c. A list of all responsible parties including, but not necessarily limited to, the Owner, Applicant, Contractor, or other persons responsible for work on the subject property;
- d. A map showing where the specific mitigation activities will occur; and
- e. An implementation schedule, including a timeline for construction, mitigation, mitigation maintenance, monitoring, and reporting and a contingency plan. All in-stream work in fish-bearing streams shall be done in accordance with approval by the Oregon Department of Fish and Wildlife and their in-stream timing schedule.

Data from sources other than a field verified delineation of the protected water resource may be used to satisfy the submittal requirements only if the protected water resource is not located on the subject property and access to the water resource is denied for the purpose of supplying the required delineation. In order to use alternate data, an applicant shall submit the following:

- A. A copy of a letter addressed to the owner of the property on which the protected water resource exists requesting access to the property for the purpose of completing a delineation of the protected water resource; and
- B. A copy of a return receipt from the US Postal Service verifying that the letter was mailed certified and was received or refused.

Buffer Standards

Appendix B: Planting Guide for Buffers

1. General

This appendix covers information on plant selection and design guidance for vegetated buffers. Buffers require a specific range of plants based on the location of the area that is being rehabilitated. The following sections outline a range of practices related to selection of the right plant in the right place.

A. Native Plants

Only native plants are approved for Vegetated Buffers. Native plants are plants that are indigenous to the Pacific Northwest. They typically require minimal care once they are planted because they have evolved and adapted to the growing conditions and climate of the region. Because of their place in the local ecology, native plants also have habitat value for birds and other local species. For these reasons, only native plants are allowed in designated stream buffers and sensitive areas, or for revegetation purposes. Alternative plant materials for stormwater facilities must be approved by the District through a variance.

B. Climate and Microclimate

All native vegetation is well-adapted to the northwest regional climate. Although regional climate dictates average seasonal temperatures, amount of rainfall and available daylight, site-specific microclimates can vary considerably and should be factored into the planting design. For example, sword fern is a plant native to woodlands of the Pacific Northwest that likely would not survive if placed in a south facing area with direct sun exposure most of the day. However, sword fern placed in shady area on the north would thrive.

C. Habitat Diversity and Layering of Plants

Natural environments in the Pacific Northwest are characterized by diverse, layered plant habitats. A forest typically has habitats vertically arranged one on top of the other; low-growing groundcovers, topped by shrubs, topped by arborescent shrubs (shrubs that look like small trees) and trees. These layers vary in composition and form from one habitat type to another, such as the different northwest habitats of forest, wetland, and riparian. Different organisms occupy different niches within these habitats, creating greater biodiversity. The structural variety of a diversified planting design can also be very pleasing to the eye. Plantings should reflect this natural ordering, as well as mimicking a mixture of deciduous and evergreen materials.

D. Maintenance

Temporary irrigation is recommended for vegetated buffers if plants are installed during warmer summer months. If a temporary system is installed, it must be removed by the end of the maintenance period. Recommended maintenance procedures are as follows:

- Check regularly for weeds. Remove weeds or invasive plants, such as blackberries and ivy, and implement a weed control program as needed.
- Check regularly to maintain uniform coverage to prevent erosion and moisture loss during dry periods.

- Replant bare patches as necessary to comply with the facility's coverage requirements and maintenance plan.

2. Planting Plan Methods

Vegetated buffer mitigation or enhancement requires use of plants. Four major components shall be addressed: hydrology, soils, plant materials, and maintenance. When developing planting plans, the following steps should be used:

A. Assess Plant Community Type

Identify location of vegetated buffer and its adjacent plant community type(s). Assign appropriate plant community type to design:

- Riparian Forest (RF)
- Upland Forest (UF)
- Oak Woodland/Savanna (OW)
- Ash Forested Wetland (AF)
- Scrub/Shrub Wetland (SS)
- Emergent Marsh (EM)

B. Assess Soil Conditions and Assign Appropriate Preparation Specifications to Plans

- a. Preservation: Every effort shall be made to protect a site's existing soils. Native soil along Sensitive Areas and Vegetated Buffers shall be retained to the maximum extent practicable. Determine the organic content and non-native, invasive seed bank likely in the soil. The conditions in Sensitive Areas and Vegetated Buffers vary greatly.
- b. For upland sites with at least one foot of native topsoil, but containing a non-native, invasive seed bank or plants, add notes to the plan to remove the undesirable plants, roots, and seeds (see District Integrated Pest Management (IPM) Plan) prior to planting.
- c. For upland sites with either disturbed and compacted soils or less than one foot of topsoil and invasive, non-native seed bank or plants that have become established, the following notes shall be added to the plan:
 - a. Remove the undesirable plants, roots, and seeds (see District IPM Plan) prior to adding topsoil.
 - b. Till the sub-grade in these areas to a depth of at least 4-inches and add at least 12-inches of clean compost-amended topsoil. The compost-amended topsoil shall have the following characteristics to ensure a good growing medium:
 - i. Texture – material passes through 1-inch screen
 - ii. Fertility – 35-percent organic matter
 - c. For wet areas in Sensitive Areas, the soil conditions shall be hydric or graded to hold sufficient water to promote hydric soil formation. The addition of organic muck soil will improve plant establishment for some bulbs and tubers.
 - d. Other amendments, conditioners, and bio-amendments may be added as needed to support the specified plants or adjust the soil pH. Traditional fertilization techniques (applying nitrogen, phosphorous, and potassium) are not necessary for native plants.

- C. Identify Plants to be Preserved; Select Revegetation Plant Materials, Quantities, and Placement; Assign Planting Zones and Specifications to Plans
- a. Preservation: Every effort shall be made to protect a site's existing native vegetation. Native vegetation along Sensitive Areas and Vegetated Buffers shall be retained to the maximum extent practicable.
 - d. Selection: Plant selection shall be from a native species palette and shall consider site soil types, hydrologic conditions, and shade requirements. Containerized or bare root plants may be used. A list of common native plant community types appropriate for planting Sensitive Areas and Vegetated Buffers is provided below in **Tables B-1** through **B-5**. Unless approved by District staff, planting restrictions are the following:
 - i. Deep rooting trees and shrubs (e.g., willow) shall not be planted on top of concrete pipes, or within 10-feet of retaining walls, inlet/outlet structures or other culverts; and
 - ii. Large trees or shrubs shall not be planted on berms over 4-feet tall that impound water. Small trees or shrubs with fibrous root systems may be installed on berms that impound water and are less than 4-feet tall.
 - e. Quantities: Trees and shrubs shall be planted using the following equations to achieve the specified densities on a per acre basis.
 - i. Total number of trees per acre = area in square feet x 0.01
 - ii. Total number of shrubs per acre = area in square feet x 0.05
 - iii. Groundcover = plant and seed to achieve 100-percent area coverage
 - f. Size: See **Tables B-1** through **B-5** for minimum rooted plant size.
 - g. Placement: Plant placement shall be consistent with naturally occurring plant communities. Trees and shrubs shall be placed in singles or clusters of the same species to provide a natural planting scheme. This arrangement may follow curved rows to facilitate maintenance. Distribution and relative abundance shall be dependent on the plant species and on the size of the revegetation area. The Vegetated Corridor revegetation area shall be overseeded with native seed mixes appropriate to the plant community and hydrologic zone of the site (see **Tables B-1** through **B-5**). Plant placement and seeding shall promote maximum vegetative cover to minimize weed establishment. Where feasible and applicable, planting plans shall consider effective shading considerations (i.e., southern and western exposures).
- D. Determine Plant Installation Requirements and Assign Specifications to Plans
- a. Timing: Containerized stock shall be installed only from February 1 through May 1 and October 1 through November 15. Bare root stock shall be installed only from December 15 through April 15. Seeding shall occur only from March 15 through October 15. Planting or seeding outside these times may require additional measures to ensure survival which shall be specified on the plans and require District approval.
 - b. Erosion Control: Grading, soil preparation, and seeding shall be performed during optimal weather conditions and at low flow levels to minimize sediment impacts. Site disturbance shall be minimized and desirable vegetation retained where possible. Slopes shall be graded to support the establishment of vegetation. Where seeding is used for erosion control, an appropriate native

grass, Regreen (or its equivalent), or sterile wheat shall be used to stabilize slopes until permanent vegetation is established. Biodegradable fabrics (coir, coconut, or approved jute matting (minimum ¼-inch square holes) may be used to stabilize slopes and channels. Fabrics such as burlap may be used to secure plant plugs in place and to discourage floating upon inundation. No plastic mesh that can entangle wildlife is permitted. Erosion control must meet the standards of the District's Erosion Prevention and Sediment Control Planning and Design Manual.

- c. **Mulching:** Areas shall be mulched a minimum of 3-inches in depth and 24-inches in diameter, to retain moisture and discourage weed growth around newly installed plant material. Appropriate mulches are made from composted bark or leaves that have not been chemically treated.
- d. **Plant protection from Wildlife:** Depending on site conditions, appropriate measures shall be taken to limit wildlife-related damage (see District IPM Plan).
- e. **Irrigation:** Appropriate plant selection, along with adequate site preparation and maintenance, reduces the need for irrigation. However, unless site hydrology is currently adequate, a District approved irrigation system or equivalent shall be used during the two-year plant establishment period (unless otherwise approved by the District). Watering shall be at a rate to maintain all plantings in a healthy thriving condition during establishment. Other irrigation techniques, such as deep watering, may be allowed with prior approval by District staff.
- f. **Access:** Maintenance access for plant maintenance shall be provided for Sensitive Areas and Vegetated Corridors.

E. Determine Plant Monitoring and Maintenance Requirements

- a. *Monitoring:* Site visits are necessary throughout the growing season to assess the status of the plantings, irrigation, mulching, etc. and ensure successful plant establishment.
- b. *Weed Control:* The removal of non-native, invasive weeds shall be necessary throughout the maintenance period, or until a healthy stand of desirable vegetation is established (see District IPM Plan).
- c. *Plant Placement and Preservation:* At the end of the maintenance period, all plants not in a healthy growing condition will be noted and as soon as seasonal conditions permit, shall be removed from the site and replaced with plants of the same species and size as originally specified. Prior to replacement, the cause of loss (wildlife damage, poor plant stock, etc.) shall be documented with a description of the corrective actions taken.

F. Prepare Construction Documents and Specifications

The construction documents and specifications shall include:

- a. Sensitive Area and Vegetated Buffer boundaries as shown on the Service Provider Letter, including limits of approved, temporary construction encroachment. Orange construction fencing shall be noted at Vegetated Buffer boundaries as well as at encroachment limits during construction. Note: permanent type fencing and signage between the development and the Vegetated Corridor for project completion is required.
- b. Site preparation plan and specifications, including limits of clearing, existing plants and trees to be preserved, and methods for removal and control of

- invasive, non-native species, and location and depth of topsoil and or compost to be added to revegetation area.
- c. Planting plan and specifications, including all of the following
 - i. Planting table that documents the common name, scientific name, distribution (zone and spacing), condition, and size of plantings
 - ii. Installation methods for plant materials.
 - iii. Mulching
 - iv. Plant tagging for identification
 - v. Plant protection (non-plastic)
 - vi. Seeding mix, methods, rates, and areas
 - G. Irrigation plan and specifications, including identification of water source, and maintenance of the system.
 - H. Maintenance schedule, including responsible party and contact information, dates of inspection (minimum three per growing season and one prior to onset of growing season), and estimated maintenance schedule (as necessary) over the 2-year monitoring period.
 - I. Easement descriptions for all Vegetated Buffers and Sensitive Areas that are required as part of the development.
 - J. Notes describing vegetated corridor conditions and steps to achieve a “good” condition following mitigation, i.e., invasive species removal resulting in cleared areas exceeding 25 square feet shall be replanted with native vegetation.
 - K. Access points for installation and maintenance including vehicle access if available.
 - L. Standard drawing details (north arrow, scale bar, property boundaries, project name, drawing date, name of Professional Engineer and/or Landscape Architect and Owner).

3. Plant Selection

The plant lists provided for buffer remediation are generally grouped according to the ecosystem that is being restored. These include broad plant communities such as riparian forest, upland forest, oak woodland/savannah, ash forested wetland, shrub/scrub wetland, and emergent marsh.

Each plant list contains characteristics (such as water and light requirements) as well as minimum standards for meeting mitigation and submittal requirements, such as planting size and recommended spacing. Each plant community also contains a minimum species composition (plants that must be included as a minimum variety) to ensure adequate biodiversity.

TABLE B-1: Buffer Restoration Plant: Riparian Forest (RF)

Species name Botanical, common	Minimum Species Composition	Plant Category	Water Requirements	Light Requirements	Minimum Rooting Size	Minimum Plant Height	Spacing Format
<i>Adiantum aleuticum</i> , Maidenhair fern		Herb	Moist	Shade	4" pot	n/a	Cluster
<i>Agrostis exarata</i> , Spike bentgrass	•	Grass	Moist	Part	Seed	n/a	Mass
<i>Agrostis scabra</i> , Hair bentgrass		Grass	Moist	Part	Seed	n/a	Mass
<i>Alnus rubra</i> , Red alder	•	Tree	Moist	Sun	1 gal.	3'	Single
<i>Athyrium filix-femina</i> , Lady fern		Herb	Moist	Shade	1 gal.	n/a	Cluster
<i>Carex deweyana</i> , Dewey's sedge		Herb	Dry	Shade	Plugs/4" pot	4"	Mass
<i>Claytonia sibirica</i> , Candy flower		Herb	Moist	Shade	4" pot	n/a	Cluster
<i>Cornus stoniferia</i> , Red-osier dogwood	•	Shrub	Wet	Part	1 gal.	2'	Cluster
<i>Glyceria elata</i> , Tall manna-grass	•	Grass	Moist	Part	Seed	n/a	Mass
<i>Lonicera involucrata</i> , Black twinberry		Shrub	Moist	Part	1 gal.	1.5'	Single
<i>Lysichiton americanum</i> , Skunk cabbage		Herb	Wet	Shade	Bulbs	n/a	Cluster
<i>Maianthemum dilatatum</i> , False lily-of-the-valley		Herb	Moist	Shade	Bulbs/4" pot	n/a	Cluster
<i>Montia perfoliata</i> , Miners lettuce		Herb	Moist	Shade	4" pot	n/a	Cluster
<i>Oemleris cerasiformis</i> , Indian plum	•	Shrub	Moist	Shade	2 gal.	2'	Cluster
<i>Pysocarpus capitatus</i> , Pacific ninebark		Shrub	Moist	Shade	1 gal.	2'	Single
<i>Rosa pisocarpa</i> , Swamp rose		Shrub	Moist	Shade	1 gal.	1.5'	Cluster
<i>Rubus spectabilis</i> , Salmonberry	•	Shrub	Moist	Shade	1 gal.	1.5'	Cluster
<i>Sambucus racemosa</i> , Red elderberry	•	Shrub	Moist	Part	1 gal.	1.5'	Single
<i>Symphoricarpos albus</i> , Snowberry	•	Shrub	Dry	Part	1 gal.	1.5'	Cluster
<i>Tolmiea menziesii</i> , Youth-on-age		Herb	Moist	Shade	4" pot	n/a	Cluster
<i>Thuja plicata</i> , Western red cedar	•	Tree	Moist	Part	1 gal.	1.5'	Single
<i>Vancouveria hexandra</i> , Insideout flower		Herb	Moist	Shade	4" pot	n/a	Cluster
<i>Viola glabella</i> , Stream violet		Herb	Moist	Shade	4" pot	n/a	Cluster

TABLE B-2: Buffer Restoration Plant: Upland Forest (UF)

Species name <i>Botanical, common</i>	Minimum Species Composition	Plant Category	Water Requirements	Light Requirements	Minimum Rooting Size	Minimum Plant Height	Spacing Format
<i>Alnus rubra</i> , Red alder	•	Tree	Moist	Sun	1 gal.	3'	Single
<i>Acer macrophyllum</i> , Big leaf maple	•	Tree	Dry	Sun	2 gal.	3'	Single
<i>Pseudotsuga menziesii</i> , Douglas fir	•	Tree	Dry	Sun	2 gal.	3'	Single
<i>Abies grandis</i> , Grand fir	•	Tree	Dry	Sun	2 gal.	2'	Single
<i>Taxus brevifolia</i> , Pacific yew		Tree	Moist	Shade	2 gal.	2'	Single
<i>Rhamnus purshiana</i> , Cascara		Tree	Dry	Part	2 gal.	2'	Single
<i>Cornus nuttallii</i> , Pacific dogwood		Tree	Moist	Shade	1 gal.	2'	Single
<i>Prunus emarginata</i> , Bitter cherry		Tree	Moist	Part	2 gal.	2'	Single
<i>Acer circinatum</i> , Vine maple	•	Tree	Moist	Part	2 gal.	2'	Single
<i>Holodiscus discolor</i> , Oceanspray	•	Shrub	Dry	Sun	1 gal.	1.5'	Single
<i>Sambucus racemose</i> , Red elderberry	•	Shrub	Moist	Part	1 gal.	1.5'	Single
<i>Ribes sanguineum</i> , Red flowering currant	•	Shrub	Dry	Sun	1 gal.	1.5'	Cluster
<i>Mahonia nervosa</i> , Cascade Oregon grape		Shrub	Moist	Part	1 gal.	4"	Cluster
<i>Mahonia aquifolium</i> , Tall Oregon grape		Shrub	Dry	Sun	1 gal.	6"	Single
<i>Vaccinium parvifolium</i> , Red huckleberry		Shrub	Moist	Shade	1 gal.	1.5'	Cluster
<i>Rubus pariflorus</i> , Thimbleberry		Shrub	Moist	Shade	1 gal.	1.5'	Cluster
<i>Symphoricarpos albus</i> , Snowberry	•	Shrub	Dry	Part	1 gal.	1.5'	Cluster
<i>Rosa gymnocarpa</i> , Baldhip rose	•	Shrub	Dry	Part	1 gal.	1.5'	Cluster
<i>Almelanchier alnifolia</i> , Serviceberry		Shrub	Dry	Part	2 gal.	2'	Single
<i>Polystichum munitum</i> , Sword fern		Shrub	Moist	Shade	2 gal.	n/a	Cluster
<i>Blechnum spicant</i> , Deer fern		Herb	Moist	Shade	1 gal.	n/a	Cluster
<i>Lonicera ciliosa</i> , Orange honeysuckle		Herb	Moist	Shade	2 gal.	n/a	Single
<i>Gaultheria shallon</i> , Salal		Herb	Moist	Part	1 gal.	4"	Cluster
<i>Fragaria vesca</i> , Wood strawberry		Herb	Moist	Shade	4" pot	n/a	Cluster
<i>Trillium ovatum</i> , Western trillium		Herb	Moist	Shade	4" pot	n/a	Cluster
<i>Mitella pentandra</i> , Five-stemmed miterwort		Herb	Moist	Shade	1 gal.	n/a	Cluster
<i>Aquilegia Formosa</i> , Red columbine		Herb	Dry	Part	4" pot	n/a	Cluster
<i>Smilacina racemose</i> , False Solomon's seal		Herb	Moist	Shade	4" pot	n/a	Cluster
<i>Bromus carinatus</i> , Native California brome	•	Grass	Dry	Sun	Seed	n/a	Mass
<i>Elymus glaucus</i> , Blue wildrye	•	Grass	Dry	Part	Seed	n/a	Mass

TABLE B-3: Buffer Restoration Plant: Oak Woodland/Savanna (OW)

Species name Botanical, common	Minimum Species Composition	Plant Category	Water Requirements	Light Requirements	Minimum Rooting Size	Minimum Plant Height	Spacing Format
<i>Almelanchier alnifolia</i> , Serviceberry	•	Shrub	Dry	Part	1 gal.	2'	Single
<i>Bromus carinatu</i> , Native California brome	•	Grass	Dry	Sun	Seed	n/a	Mass
<i>Elymus glacus</i> , Blue wild-rye	•	Grass	Dry	Part	Seed	n/a	Mass
<i>Holodiscus discolor</i> , Oceanspray	•	Shrub	Dry	Sun	1 gal.	1.5'	Cluster
<i>Mahonia nervosa</i> , Cascade Oregon grape		Herb	Moist	Part	1 gal.	4"	Cluster
<i>Quercus garryana</i> , Oregon white oak	•	Tree	Dry	Sun	2 gal.	2'	Single
<i>Rubus ursinus</i> , Training blackberry		Shrub	Dry	Sun	1 gal.	1.5'	Cluster
<i>Symphoricarpos albus</i> , Snowberry	•	Shrub	Dry	Part	1 gal.	1.5'	Cluster

TABLE B-4: Buffer Restoration Plant: Ash Forested Wetland (FW)

Species name Botanical, common	Minimum Species Composition	Plant Category	Water Requirements	Light Requirements	Minimum Rooting Size	Minimum Plant Height	Spacing Format
<i>Carex deweyana</i> , Dewey's sedge		Herb	Dry	Shade	Plugs	4"	Mass
<i>Carex obnupta</i> , Slough sedge	•	Herb	Moist	Part	Plugs	6"	Mass
<i>Claytonia sibirica</i> , Candy flower		Herb	Moist	Shade	4"	n/a	Cluster
<i>Cornus sericea</i> , Red-osier dogwood	•	Shrub	Wet	Part	1 gal.	2'	Cluster
<i>Fraxinus latifolia</i> , Oregon ash	•	Tree	Moist	Part	2 gal.	3'	Single
<i>Glyceria elata</i> , Tall mannagrass	•	Grass	Moist	Shade	Seed	n/a	Mass
<i>Montia parvifolia</i> , Streambank springbeauty		Herb	Moist	Shade	4"	n/a	Cluster
<i>Physocarpus capitatus</i> , Pacific ninebark	•	Shrub	Moist	Shade	2 gal.	2'	Single
<i>Symphoricarpos albus</i> , Snowberry	•	Shrub	Dry	Part	1 gal.	1.5'	Cluster
<i>Scirpus microcarpus</i> , Small fruited bulrush		Herb	Wet	Sun	Plugs	4"	Mass

TABLE B-5: Buffer Restoration Plant: Shrub/Scrub Wetland (SS)

Species name Botanical, common	Minimum Species Composition	Plant Category	Water Requirements	Light Requirements	Minimum Rooting Size	Minimum Plant Height	Spacing Format
<i>Cornus sericea</i> , Red-osier dogwood	•	Shrub	Wet	Part	1 gal.	2'	Cluster
<i>Crataegus douglasii</i> , Douglas hawthorne		Tree	Moist	Part	2 gal.	2'	Cluster
<i>Bidens cernua</i> , Nodding beggarstick		Herb	Wet	Sun	1 gal.	1.5'	Cluster
<i>Glyceria occidentalis</i> , Western manna-grass	•	Grass	Wet	Sun	Seed	n/a	Mass
<i>Juncus patens</i> , Spreading rush		Herb	Moist	Part	Plugs	6"	Mass
<i>Malus fusca</i> , Pacific crabapple	•	Tree	Moist	Part	2 gal.	2'	Cluster
<i>Rosa pisocarpa</i> , Clustered rose		Shrub	Wet	Part	1 gal.	1.5'	Cluster
<i>Salix lasiandra</i> , Pacific willow	•	Tree	Wet	Sun	1 gal.	3'	Single
<i>Salix sitchensis</i> , Sitka willow		Tree	Moist	Sun	1 gal.	3'	Cluster
<i>Salix scouleriana</i> , Scouler's willow	•	Shrub	Moist	Sun	1 gal.	3'	Cluster
<i>Spiraea douglasii</i> , Douglas's spiraea	•	Shrub	Wet	Sun	1 gal.	1.5'	Cluster

Water Environment Services Sanitary Standards

February 2023



Sanitary Standards

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Sanitary Standards

1. Definitions

Words, terms, and acronyms specific to these Standards are defined below.

1.1 Words and Terms

The Water Environment Services (WES) Rules and Regulations (Rules) contains words and terms that apply to and are consistent across the Rules and all adopted standards. Unless the context specifically indicates otherwise, the following words and terms, as used in these Sanitary Standards, shall have the meanings hereinafter designated:

Annexation. A boundary change according to the provisions of ORS Chapter 198.

ASTM Specifications. The standard specifications or methods of ASTM International. Unless otherwise stated, it shall refer to the latest adopted revisions of said specifications.

Board. See the WES Rules.

Bond. See the WES Rules.

Bond, Warranty. A warranty bond is a legal document that guarantees to the Owner that the Contractor who did the work will come back and fix defective work or material should an issue arise during the warranty period specified in the contract.

Building. Any structure containing plumbing.

Building Drain. See the WES Rules.

Building Sewer. See the WES Rules.

Capital Improvement Plan. See the WES Rules.

Cleanout. A sealed aperture extending to the ground surface permitting access to a sanitary sewer pipe for access cleaning and maintenance or testing purposes.

Contractor. A person duly licensed or approved by the State of Oregon to perform the type of work to be done under a permit or contract.

Conveyance System. See the WES Rules. As relates to these Standards, conveyance system refers to the sanitary sewer conveyance system and includes gravity mains, force mains, pumping or lift facilities, manholes, and related facilities.

County. See the WES Rules.

Day. See the WES Rules.

Developer. See the WES Rules. As relates to these Standards, a Developer would propose development that would contribute sewage to the District's public sanitary sewer system.

Development. See the WES Rules.

Director. See the WES Rules.

District. See the WES Rules.

District Personnel. See the WES Rules for definition of District Employee.

Dwelling Unit. See the WES Rules.

Easement. See the WES Rules.

Emergency Work. Work that must be performed to ensure the safety and health of the public or the environment.

Engineer. See the WES Rules.

Developer's Engineer. See the WES Rules.

Developer's Engineer's Inspector (Engineer's Inspector). The Developer's Engineer's Inspector(s) shall be the Developer's Engineer of record, or recognized as representatives of the Developer's Engineer, and their duties shall be to approve materials and workmanship as required by the plans and specifications in accordance with District Sanitary Standards.

Infiltration and Inflow (I&I) or Inflow and Infiltration. The United States Environmental Protection Agency defines infiltration and inflow as combined contributions from infiltration and inflow. I&I causes dilution in sanitary sewers. Dilution of sewage decreases the efficiency of treatment and may cause sewage volumes to exceed design capacity. Although inflow is technically different from infiltration, it may be difficult to determine which is causing dilution problems in inaccessible sewers.

- A. Infiltration is water other than sanitary wastewater that enters a sewer system from the ground through defective pipes, pipe joints, connections, or manholes. Infiltration does not include inflow.
- B. Inflow is water other than sanitary wastewater that enters a sewer system from sources such as roof leaders, cellar/foundation drains, yard drains, area drains, drains from springs and swampy areas, manhole covers, cross connections between storm sewers and sanitary sewers, and catch basins. Inflow does not include infiltration.

Inspector. See the WES Rules.

Installer. Either the Owner of the property being served or a Contractor doing work in connection with the installation of a Building Sewer or conveyance system under a permit from the District, City, or County.

May. See the WES Rules.

Owner. See the WES Rules.

Parcel. See the WES Rules.

Performance Surety. Also known as a **Performance Bond.** A performance bond is issued to one party of a contract as a guarantee against the failure of the other party to meet obligations specified in the contract. It is also referred to as a contract bond. A performance bond is usually provided by a bank or an insurance company to make sure a contractor completes designated projects.

Permit. See the WES Rules.

Permittee. See the WES Rules.

Person. See the WES Rules.

Plan(s). Construction plans submitted to the District for review and approval, in accordance with the Sanitary Standards.

Private Sanitary Sewer System. A privately owned and maintained sanitary sewer conveyance system installed to serve non-single-family residential structures on a single ownership property, which cannot legally be further divided, such as apartments, mobile home parks and schools or installed in commercial or industrial subdivisions. A single-family residence with an unattached garage or shop with sanitary facilities is exempt from this definition.

Private Sanitary Sewer Easement. An easement that grants rights from one Owner to another to install and maintain a Building Drain to a Service Connection.

Public Right of Way. See the WES Rules.

Public Sanitary System. See the WES Rules.

Public Sanitary Sewer Easement or Public Easement. Any easement in which the District or other public agency has the right to construct and maintain a Public Sanitary Sewer System.

Public Sanitary Sewer Extension. Any extension or addition of the public sanitary conveyance system.

Public Sanitary Sewer Mainline. See the WES Rules for Public Mainline. As relates to these Standards, Public Sanitary Sewer Mainline refers to the portion of the Public Sanitary Sewer System which conveys wastewater through a piping system flowing by gravity.

Sanitary Sewer Mainline. See Public Sanitary Sewer Mainline.

Sanitary Sewer. See the WES Rules.

Sensitive Areas. See the WES Rules.

Service Connection. See the WES Rules.

Sewage. See the WES Rules.

Sewer. See the WES Rules. As relates to these Standards, sewer will typically mean sanitary sewer.

Shall. See the WES Rules.

Storm Sewer. See the WES Rules.

Stormwater. See the WES Rules.

Stormwater Management Facilities. See the WES Rules.

Trunk Sanitary Sewer. Any conveyance system sized and located to serve general topographical areas and mainline sanitary sewers (the minimum pipe size is normally 12-inches in diameter or larger). Trunk Sanitary Sewers are located within public Right-of-Way or Public Sanitary Sewer Easements.

Useful Life. See the WES Rules.

Variance. See the WES Rules.

Waters of the State. See the WES Rules.

Water Resource Recovery Facility. An arrangement of devices, structures, and equipment for treating sewage.

1.2 Abbreviations

Unless the text specifically indicates otherwise, the following abbreviations are used in these standards to refer to the following:

Abbreviation	Definition
AASHTO	American Association of State Hwy and Transportation Officials
APWA	American Public Works Association
ASTM	American Society of Testing and Materials
BMP	Best Management Practice
CDF	controlled density fill
cfm	cubic feet per minute
CFR	Code of Federal Regulations
DEQ	Oregon Department of Environmental Quality
EPSC	Erosion Prevention and Sediment Control
ft.	feet
HDPE	high density polyethylene pipe
IE	invert elevation
I.D.	inside diameter
in.	inches
mm	millimeter
OAR	Oregon Administrative Rules
OD	outside diameter
OR	Oregon
ORS	Oregon Revised Statutes
OSHA	Occupational Safety and Health Authority
PDF	Portable Document Format
psi	pounds per square inch
psig	pounds per square inch gage
PVC	polyvinyl chloride
sec.	seconds
SDR	Standard Dimensional Ratio
Si	Slope (inlet)
So	Slope (outlet)
SS	Sanitary Sewer
ST	Storm Sewer

Abbreviation	Definition
UNI	Unibell Publications
UPC	Uniform plumbing code
WES	Water Environment Services
WQRA	Water Quality Resource Area

Sanitary Standards

2. General Information

These Sanitary Sewer Standards (“Sanitary Standards”) present the adopted policies, standards, and specification requirements necessary to meet all provisions of the Water Environment Services (“WES” or “District”) Rules and Regulations. Implementing these standards help protect public health and the environment.

This chapter describes the authority, purpose, applicability, and administrative review requirements of these sanitary standards.

2.1 Authority and Purpose

WES, located in Clackamas County, Oregon, is an intergovernmental entity formed pursuant to Oregon Revised Statutes Chapter 190 for the purpose of providing regional sewerage works, including all facilities necessary for collecting, pumping, treating, and disposing of wastewater and sewage within its boundaries. It is further declared to be the policy of the District to provide and offer sewage disposal service for such areas adjacent to the District as may, in the judgment of the District, be feasibly served upon such terms, conditions, and rates as the District shall determine, and as provided in other applicable federal and state laws.

The District, through its Director or other authorized designee or representative, shall have the authority to administer all the requirements, regulations, and provisions set forth in these Sanitary Standards.

The District may promulgate new or amended standards in accordance with the process outlined in the Water Environment Services (WES) Rules and Regulations.

Conformance with these standards shall not be a substitute for, or eliminate the necessity of, conforming with any and all federal, state, and local laws, ordinances, rules and regulations which are now, or may in the future, be in effect.

Any provisions or limitations of these standards are suspended and supplemented by any applicable federal, state, or local requirements existing or adopted subsequent hereto which are more stringent than the provisions and limitations contained herein. In the event of a conflict, the most stringent local, state, or federal regulations generally apply.

The purpose of these Sanitary Standards is to provide a consistent policy under which certain physical aspects of sanitary sewer design will be implemented. Most of the elements contained in this document are public works oriented and most are related to public improvements; however, it is intended these Standards apply to both public and private work designated herein.

2.2 Objectives

The objectives of the Sanitary Standards are as follows:

- To advance public health and welfare.
- To support the long-term operation and maintenance of the Public Sanitary Sewer System.
- To prevent the introduction of pollutants that will interfere with the operation of the Public Sanitary Sewer System or contaminate the resulting biosolids.

- To prevent the introduction of pollutants that will pass through the Public Sanitary Sewer System, inadequately treated, into receiving waters or the atmosphere, or otherwise be incompatible with the system.
- To protect District Personnel who may come into contact with sewage, sludge, and effluent in the course of their employment, as well as protecting the general public.
- To ensure that the District complies with its National Pollutant Discharge Elimination System waste discharge permit conditions.
- To ensure all development shall be planned, designed, constructed, and maintained to:
 - Improve the opportunity to recycle and reclaim wastewater and biosolids from the system.
 - Provide for the equitable distribution of the costs of the Public Sanitary Sewer System.
 - Construct a cost efficient and low maintenance conveyance system.

2.3 Applicability

These Sanitary Standards shall govern design, construction, and upgrading of all publicly and privately financed public sewerage facilities in the District and applicable work within the District, unless it is shown that the District's authority to impose these standards are superseded by another local jurisdiction.

2.4 Variance

Alternative materials and methods will only be accepted if the applicant can demonstrate that the existing standards are not appropriate for a given site and the proposed alternative provides the same or greater level of performance as defined in these standards. Alternate materials or methods not explicitly approved herein will be considered for approval through the variance process outlined below.

2.4.1 Variance Request

A variance request to the (Standards) shall be submitted in writing to the District. The written request for a variance should be submitted to the District prior to land use approval if a land use action is required. Land use conditions of approval are commonly written so there is little, if any, flexibility after land use approval is issued. If land use approval has already been issued or not required, then the variance request should be submitted in writing along with the first plan review submittal.

Once the District approves the plans, a variance request will only be accepted at the discretion of the District, and if the request is the only feasible solution without regards to delays or cost. Only minor variance requests will be considered during the construction phase of the project to address a specific design or construction problem. It is the responsibility of the applicant to obtain all approvals from any local, county, state or federal authority having any jurisdiction or permitting of the activities before proceeding with an approved variance.

This written request shall include the following:

- A. The desired variance(s);
- B. The reason(s) for the request(s);
- C. A comparison between the specification(s) and standard(s), and the variance(s) for performance, function, maintainability, safety, etc.;

References to regionally and/or nationally accepted standards, records of successful use by other agencies, or other supportive information.

2.4.2 Criteria for Variance

The District may grant a variance when the request does not compromise the following: public safety, environmental protection, maintenance/repair/replacement, and when any one of the following conditions are met:

- A. Topography or other geographic conditions impose an environmental or safety concern and the request is considered an equivalent alternative, which can accomplish the intent and criteria that is provided in these standards.
- B. A minor change to the standard is required to address a specific design or construction problem which, if not enacted, will result in an unreasonable or disproportionate burden or obstacle to development. The financial viability of meeting the requirements of these design standards is not in itself a justification for a design exception.
- C. The variance request is in the public interest and requirements for safety, function, appearance, and maintainability are based upon sound Developer's engineering and functionality of the proposed system is a feasible alternative.

All requests will be evaluated on a case-by-case basis, and approval of alternative materials and methods for one development proposal will not imply an approval under similar circumstances in another proposal. Approval of a variance, or denial of a site-specific request shall not constitute a precedent for use at other locations with potentially similar circumstances.

2.4.3 Review Process

The variance request shall be reviewed by the District and a decision will be issued, in writing, to the applicant within 30 calendar-days indicating one of the following:

- A. Approve as proposed, or
- B. Approve with changes, or
- C. Deny with an explanation.

It is the responsibility of the applicant to obtain all approvals from any local, county, state or federal authority having any jurisdiction or permitting of the activities before proceeding with an approved variance.

2.4.4 Appealing Variance Request Decision

The applicant may make a written request to the District to appeal the variance request decision as outlined in the appeals process contained in Section 3.7 of the District Rules and Regulations.

Sanitary Standards

3. General Sanitary Standards

Chapter 3 of the Sanitary Standards presents an overview of the general policies, methods, and processes associated with the Sanitary Standards as a whole.

3.1 General Policy

Public improvements are conditioned through the development review and land use approval process, described, and administered under the local planning department administering the zoning and development ordinance, or by federal, state, or other local government regulation. These Sanitary Standards cannot provide for all situations and are intended to assist, but not to substitute for competent work by design professionals. It is expected that the design professionals will bring to each project the best of skills from their respective disciplines.

- A. These Sanitary Standards are not intended to limit unreasonably any innovative or creative effort that could result in better quality, cost savings, or both.
- B. Pursuant to the objectives found in Chapter 1 of these Sanitary Standards, any conveyance system designed and constructed shall:
 - a. Be of adequate design to carry the expected flow, within the design life, and at sufficient size and depth to serve adjacent properties;
 - b. Have sufficient slope as determined by the District to maintain a conveyance system that will self-clean as specified in these Sanitary Standards;
 - c. Have sufficient structural strength to withstand all external loads which may be imposed;
 - d. Be of materials resistant to both corrosion and erosion with a minimum design life of 100-years;
 - e. Be economical and safe to build and maintain; and
 - f. Prevent infiltration or inflow of ground and surface waters and exfiltration of sewage.

3.2 Development Policy

When development of a property or tract of land is proposed, all residential dwelling units and commercial, and industrial buildings with sewer drains within the boundaries of the proposed tract shall be connected to the Public Sanitary Sewer System as part of an approved plan.

3.2.1 Existing Onsite Sewage Disposal Systems

All existing onsite sewage disposal systems shall be abandoned per Oregon Department of Environmental Quality (DEQ) Regulations. For additional information contact Clackamas County Septic and Onsite Wastewater Program.

3.2.2 Point of Service for Upstream Parcels

A point of service for upstream parcels shall be provided to facilitate an orderly extension of the Public Sanitary Sewer System. This shall include the extension of Public Sanitary

Sewer Systems in Right-of-Way or easements across the property to serve the upstream properties in a location as approved by the District.

Development projects that construct Public Sanitary Sewer Extensions, which can directly serve adjacent properties may qualify for the establishment of a Reimbursement District as defined in Section 5.6 of the WES Rules and Regulations.

3.2.3 Trunk Line Sanitary Sewers

Trunk line sanitary sewers, if required, will be sized to provide capacity for the entire future development of the upstream basin based on projected zoning. Public Sanitary Sewer System for future development shall be designed per the District's Master Plan or, in absence of such plan, the system shall be developed on a case-by-case basis as approved by the District.

3.3 Developer's Engineering Policy

It shall be the policy of the District to require compliance with ORS 672 for Professional Engineers, Surveyors, Photogrammetrists, and Geologists.

All engineering plans, reports, or documents shall be prepared by a registered professional Developer's Engineer, or by a subordinate employee under the Developer's Engineer's direction and shall be stamped with the Developer's Engineer's seal and signed to indicate the Developer's Engineer's responsibility for the design. It shall be the Developer's Engineer's responsibility to review any proposed Public Sanitary Sewer System, variance, or other change with the District prior to Developer's engineering or proposed design work, to determine any special requirements and/or whether the proposal is permissible. A "Plans Approved for Construction" (or equivalent) stamp of the District on the Plans, etc., for any project, does not in any way relieve the Developer's Engineer of responsibility to meet all requirements of the District or obligation to provide a Public Sanitary Sewer System in accordance with the Rules and Regulations, and Sanitary Standards, and protect life, health, and property of the public. The District reserves the right to change the Plan for any project prior to final acceptance at any time it is determined that the full requirements of the District Rules and Regulations have not been met.

All Drawings submitted for approval shall be stamped and signed by a registered Professional Developer's Engineer. No Plan review or approval shall be made without the Plans being stamped and signed by the Professional Developer's Engineer.

3.4 Sanitary Sewer Standard Detail Drawings

Except as otherwise provided by these Sanitary Standards, the Developer's engineering design and construction shall be in accordance with the most updated revision of the Sanitary Sewer Standard Detail Drawings included in **Appendix B**.

3.5 Approval of Alternate Materials and Methods

Any substitution of materials or alternate methods not explicitly approved herein will be considered for approval as set forth in Section 2.4 of these Sanitary Standards. Persons seeking such approvals shall make application in writing. Approval of any deviation from these Sanitary Standards shall be provided in writing. Approval of minor matters will be made in writing, if requested.

Any alternative materials and/or methods must meet or exceed the minimum requirements set forth in these Sanitary Standards.

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

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

3.6 Special Design Applications

Special applications not covered in these Sanitary Standards require review and approval by the District. Submittal of full design calculations, supplemental drawings, and other information shall be required before any approval is considered.

Sanitary Standards

4. Public Sanitary Sewer Extension

The provisions presented in this section of the Sanitary Standards specify the responsibilities of the parties involved and the process followed by the District prior to acceptance of a Public Sanitary Sewer Extension that is not constructed by the District. These requirements are intended to meet the goals and objectives of the District in combination with all other state, federal, county, and local laws, and ordinances.

4.1 Sewer Extension Permit

Prior to the commencement of construction of any Public Sanitary Sewer System, a valid Sewer Extension Permit shall be issued by the District in accordance with these Standards. An Extension Permit is required to construct or reconstruct any Public Sanitary Sewer appurtenances which are owned by, or intended to be conveyed to, the District. All other sanitary sewer piping not intended to be conveyed to the District shall be permitted by the Local Plumbing Authority.

The Developer and the Developer's Engineer shall submit a signed Sanitary Sewer Engineering Agreement on a District-supplied form (form can be found online) which outlines the responsibilities of the Developer and Developer's Engineer, with regard to surveying, costing, design, inspection, testing, certification, and as-built requirements of the District for acceptance of the proposed Sewer Extension Permit project.

A pre-construction meeting shall be arranged by the Developer's Engineer to be held at either the District, County, or City offices prior to issuing of the Sewer Extension Permit. Attendees must include the Developer, Developer's Engineer, Contractor, and the District representatives. Other interested parties may also attend the meeting. The purpose of the meeting is to discuss issues surrounding the project including, but not limited to, materials, construction, standard detail drawings, sequencing, Developer's Engineer testing and inspection requirements. If requested by the District, the Contractor shall present certification by the State of Oregon and any other licensing body having jurisdiction over the work to demonstrate appropriate construction qualifications.

It is the sole responsibility of the Developer, Developer's Engineer and Contractor to obtain all other applicable authorization from local agencies, state, and federal approvals prior to proceeding with any construction that is approved by the District.

4.2 Project Construction

The requirements for project construction are defined in the following subsections.

4.2.1 Variance or Deviation from the Approved Plans

No variance, deviation, or minor change from the approved Plans and specifications shall be made without the prior written approval of the District. When any variance or deviation of the approved Plans is requested by the Developer's Engineer, two sets of Plans showing the revisions shall be submitted to the District for approval. No construction of the modified section can commence until these revised Plans are reviewed and approved by the District. Approvals shall be made by the District in writing.

4.2.2 Inspection and Testing

The Developer's Engineer is responsible for all testing and inspection services as required by the District and to certify the material, construction, and testing results to the District. The Developer's Engineer or the Developer's Engineer's Inspector shall be allowed full access to all parts of the work; and shall be furnished with every reasonable facility for ascertaining whether or not the work, as performed, is in accordance with the requirements and intent of the approved Plans and specifications.

The Contractor shall furnish, at the Contractor's own expense, such samples as are customarily required for testing purposes. The District does not furnish inspection of sanitary sewer construction. For this reason, it is imperative that the Developer and/or the Developer's Contractor provide prompt and complete notification to the Developer's Engineer and the District as to the progress of the construction of sanitary sewer improvements.

Notification must be given to the Developer's Engineer when the following work is to be scheduled:

- A. Excavation and installation of the Public Sanitary Sewer Mainlines.
- B. Compaction testing/proof roll of trench backfill and fill areas.
- C. Construction of structures (including manholes, Service Connections, and cleanouts).
- D. All required manhole and sanitary sewer line testing, including vacuum, air, mandrel, and video testing.

Failure to give the Developer's Engineer proper notification (48 hours) of the Contractors work schedule may invalidate the work performed and make necessary, testing and inspection from an independent testing laboratory for compliance with the District's construction specifications. Such tests shall be furnished, at no expense to the District.

4.3 Acceptance and Warranty

Acceptance of the Public Sanitary Sewer Extension will be made in writing by the District after all conditions of the Sewer Extension Permit have been met. The following subsections outline the District's post-construction requirements prior to final acceptance.

4.3.1 Video Inspection of Gravity Sewers

After the Developer's Engineer certifies the construction is completed, then the entire Public Sanitary Sewer System shall be video inspected and recorded prior to the District conducting the final construction inspection in preparation of the acceptance of the Public Sanitary Sewer Extension. All pipes shall be thoroughly flushed immediately prior to the video inspection.

The video recording shall:

- A. Be in color electronic format acceptable to the Developer's Engineer and be continuous from beginning to end of each pipe run.
- B. Be clear, usable, and free of visual distortions; the image in the video shall appear level.
- C. Include a visual footage meter recording on the tape.
- D. Include a voice recording of suspected deficiencies.

- E. Provide a means of gauging the depth of deflection within the pipe system.
- F. Be performed by experienced personnel trained in locating pipe and grade breaks, obstacles, and Service Connections by remote video inspection utilizing a 360-degree pan and tilt camera.
- G. Identify visually, with audio and on the written report, the location of the beginning and end of each pipe run, the lineal feet of pipe, all deficiencies, the name of the company creating the tape recording, name of the operator, and date and time of the recording.
- H. Include a 360-degree inspection of each joint.
- I. Include a clear view up each Service Connection.
- J. Identify groundwater infiltration sources associated with construction or material defects.
- K. Video inspection for District review shall be performed at the end of the project once all construction is complete.

The Developer's Engineer shall review the video recordings and inspection report(s) prior to submitting them to the District.

The video and report shall record all horizontal and vertical deflection in the piping system. Any vertical deflection is unacceptable. Horizontal deflection that creates a ½-inch belly in the Public Sanitary Sewer Piping System is unacceptable. The Developer's Engineer shall be immediately notified, the deficiency corrected, and re-videoed prior to submitting the final video inspection and report to the District.

Once the Developer's Engineer has reviewed and approved the video recording in accordance with these Standards, a copy of the video recordings, and written inspection report(s) shall be submitted to the District for review and approval. Illegible, or incomplete video, or inspection report(s) will be returned to the Developer's Engineer.

The District shall approve the video recording prior to scheduling the District inspection of the Public Sanitary Sewer System.

4.3.2 Test Results

The installation and/or construction of Public Sanitary Sewer System in accordance with the District Standards, including the mainline, manhole, and Service Connection testing shall be observed by the Developer's Engineer or Developer's Engineer's Inspector and the results shall be certified to the District on the approved District forms (form can be found online). All required testing, including but not limited to low air, mandrel or vacuum testing, and video recording shall be performed. Dye testing shall be performed for non-single-family developments.

4.3.3 Service Connection Drawings

Provide appropriate information to locate newly installed Service Connection for each lot or parcel within the project boundaries. Provide stationing, depth, and horizontal dimensions at the end of the pipe to permanent physical objects in the field to assure that the Service Connection can be located after construction is completed. Service connection drawings shall become the property of the District and are public records. The form can be found online.

4.3.4 As-built Plan Requirements

The Developer's Engineer is responsible for record keeping, inspection, and preparation of the as-built drawings. Final as-built drawings will be submitted as detailed in **Appendix A**. For all Public Sanitary Sewer Extensions, the Developer's Engineer shall submit certified as-built Plan and Profile drawings. Record drawings shall be submitted for all other connections to the Public Sanitary Sewer system. As-built drawings shall meet the District's requirements and shall be of archival quality. Each page shall be stamped and signed by the Developer's Engineer and state, in writing, that this is an as-built drawing. As-built drawings shall become the property of the District and are Public records.

Drawings shall also be submitted electronically in a release of AutoCAD and Portable Document Format (PDF) file acceptable to the District. The electronic submittal shall become the property of the District.

4.3.5 Certification of Completion

A stamped and signed Certificate of Completion (form can be found online) shall be provided by the Developer's Engineer. This statement certifies to the District that all construction methods, workmanship, and materials, have been inspected, tested by approved methods, and found to conform to the approved Plans and the specifications of the District.

4.3.6 Final Inspection

A final inspection of the Public Sanitary Sewer System by the Developer's Engineer shall be conducted to determine that the construction was completed in conformance with Plans, specifications, and these Sanitary Standards. The Developer's Engineer shall inspect and verify that all newly constructed structures meet the District's Sanitary Standards. Once inspected and verified, the Developer's Engineer may notify the District upon completion of construction and request a final inspection conducted by District Personnel. Any deficiencies resulting in non-acceptance of the work shall be identified in writing and presented to the Developer's Engineer for correction. Upon correction of the noted deficiencies the Developer's Engineer shall inspect and verify corrections have been made and then notify the District and request a re-inspection. If the work is accepted, the Developer's Engineer will be notified.

4.3.7 Construction and Developer's Engineering Cost

The Developer's Engineer shall calculate and submit on District forms the actual construction and Developer's engineering cost of the Public Sanitary Sewer Extension. The Construction and Developer's engineering Cost Data Sheet can be found online. District plan review fees shall be based on the cost to construct the Public Sanitary Sewer Extension.

4.3.8 Letter of Conveyance

The Developer/Owner shall convey (at no cost to the District) all right, title, and interest in the Public Sanitary Sewer Extension to the District. The Conveyance of Public Sanitary Sewer Main Extension form can be found online.

4.3.9 Warranty Bond

A warranty bond or cash security in an amount equal to 25-percent of the actual construction and engineering cost to complete the Public Sanitary Sewer Extension shall

be provided to the District by the Developer/Owner at no cost to the District. This surety bond shall guarantee the workmanship and materials of the Public Sanitary Sewer Extension for a minimum period of two-years from the date of acceptance by the District unless a longer period is required by the District. A sample Warranty Bond form can be found online. Upon default, the District may draw upon the surety or available funds to remedy violations or required corrections. The different types of acceptable surety are provided in **Appendix A**.

4.3.10 Letter of Acceptance

Upon completion of all the requirements of the Sewer Extension Permit, District Rules and Regulations, and these Sanitary Standards, the District shall issue a letter stating the District will accept for ownership and maintenance the Public Sanitary Sewer Extension and specify the date the warranty period will begin.

4.3.11 Warranty Period

The Developer/Owner or Contractor's warranty period shall be in effect for a minimum period of two-years from the date specified in the Letter of Acceptance unless a longer period is required by the District.

Prior to the end of the warranty period, the District will conduct a warranty bond inspection of the Public Sanitary Sewer Extension and notify the Developer/Owner, or the Developer's Engineer of any deficiencies found. The request and scheduling of the warranty bond is the responsibility of the Developer/Owner. Any faulty workmanship and/or defective materials which are discovered within the warranty period shall be corrected and/or replaced by the Developer/Owner at no expense to the District. Such warranty period and warranty bond may be extended upon the disclosure of a defect for a minimum of two-years after the correction of the defect is completed at the sole discretion of the District.

All repair work required during the warranty period shall be performed within 30-days of issuance of written notification to the Developer/Owner. Emergency work performed by the District and all work performed by the District due to the nonperformance of the Contractor shall be reimbursed to the District within 30-days of invoice. If the Contractor fails to reimburse the District in 30-days, the District may file a bond claim.

After the warranty inspection and completion of all work required to bring the Public Sanitary Sewer Extension into conformance with these Sanitary Standards, all sureties shall be released unless the warranty period and warranty bond is extended at the sole discretion of the District.

Sanitary Standards

5. Sanitary Sewer Design

This section provides the design requirements required by the District for Public Sanitary Sewer System construction projects.

5.1 General Design Requirements

Except where these Sanitary Standards specify otherwise, the design detail, workmanship, construction specifications, and materials shall be in accordance with the following (in the following order of precedence):

- A. WES Rules and Regulations
- B. District Sanitary Sewer Standard Detail Drawings
- C. District Sanitary Standards
- D. District Stormwater Standards
- E. Clackamas County Transportation Standard Detail Drawings (if applicable)
- F. Local City Standard Detail Drawings (if applicable)
- G. Current American Public Works Association (APWA) Standard Specifications and Drawings for Public Works Construction published by the Oregon Chapter of the APWA, and Clackamas County Road Use Ordinance
- H. Oregon Department of Transportation (ODOT) Standard Specifications
- I. American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications

It is the Developer's Engineer's responsibility to comply with other applicable federal, state, and local regulations, particularly with respect to wetland regulations and other development requirements.

5.1.1 Performance Sanitary Standards

- A. Public Sanitary Sewer Extension design shall meet the policies and guidelines of OAR Chapter 340 Division 52 Section 0020 and its updates. Design shall comply with Oregon Department of Environmental Quality (DEQ) sanitary sewer design guidelines.
- B. The Public Sanitary Sewer System capacity shall be designed for ultimate development density of the drainage basin. The system shall allow for future system extensions and for future development. The Public Sanitary Sewer System shall be designed to provide gravity conveyance to the lowest Building Drain including from basements of houses, commercial or industrial buildings, and all public and private establishments where possible. Only District owned and maintained regional pump stations that are included in the District's Capital Improvement Plan will be permitted to convey (pump) wastewater collected by the Public Sanitary Sewer System. Private pump stations may be allowed as specified in Section 5.4.9.

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

5.2 Sanitary Sewer Requirements

The following subsections provide design details for sanitary sewer construction within the District.

5.2.1 Pipe and Fitting Material and Size

- A. All Public Sanitary Sewers shall be designed with materials as specified in these Sanitary Standards. Where required for added strength, C900 or C905 PVC shall be used. Public Sanitary Sewer Mainline, Service Connections, and fitting material shall be the following types or equal when approved in writing by the District:
 - a. Polyvinyl Chloride (PVC) Pipe:
 - ASTM D3034 SDR 35, 4 to 24-inches
 - ASTM C-900 D-1784 DR, 4 to 24-inches (preferred by District)
 - ASTM C-905 D-1784 DR, 4 to 24-inches (preferred by District)
 - b. High Density Polyethylene (HDPE) Pipe: ASTM D-3035
 - c. Tees, Service Connections, and Fittings:
 - i. A factory tee shall be installed in the mainline for each Service Connection.
 - ii. All fittings shall be of sufficient strength to withstand all handling and load stresses encountered.
 - iii. All tees, Service Connections, and fittings shall be of the same materials as the Sanitary Sewer Mainline pipe unless otherwise approved.
 - iv. Tees and fittings shall be free from cracks and shall adhere tightly to each joining surface.
 - v. All tees and fittings shall have a gasket with the same material as the mainline pipe joint.
- B. All Sanitary Sewer Mainlines shall be a minimum diameter of 8-inches and shall begin at a manhole and shall terminate at a manhole, unless otherwise approved by the District.
- C. Private sanitary sewer systems constructed on private property shall be permitted by the local plumbing authority and meet the appropriate sections of the Uniform Plumbing Code (UPC), excluding Service Connection within the Public Right-of-Ways and Public Easement that will be constructed in accordance with these Standards.

5.2.2 Design Sewage Flow

- A. Design flows shall be determined by using the factors of the specific Sanitary Sewer Master Plan, if available, in which the development is situated.
- B. In the absence of a Master Plan the District shall determine the applicable location, depth, slope, and pipe diameter of the Public Sanitary Sewer Mainline.

5.2.3 Minimum Slope Design

The District requires the Public Sanitary Sewer System be designed with the minimum slope of 0.0100-ft/ft (1.0%), except for dead-end lines, for which the District requires a minimum slope of 0.0200-ft/ft (2.0%). See **Table 1** for exceptions based on topography challenged sites where the minimum design slope as stated above cannot be designed. The minimum slope design as specified in the table is based on the number of Service Connections upstream

Newly constructed mainlines in the Public Sanitary Sewer System shall be designed with sufficient slope to obtain a flow and velocity that will self-clean the system.

Table 1. Minimum Pipe Slope Design for 8-inch Diameter Pipe

Number of Homes Upstream	Minimum Pipe Slope for Segment Design
1-5	0.0200-ft/ft, 2-percent
6-20	0.0100-ft/ft, 1-percent
21-40	0.0075-ft/ft, 0.75-percent
>40	0.0050-ft/ft, 0.50-percent

The Developer's Engineer may design pipe slope in accordance with Oregon Administrative Rules (OAR) 340, Division 52 – Review of Plans and Specifications, Appendix A – Sewer Pipelines. The Developer's Engineer must submit calculations that demonstrate the proposed design slope(s) will achieve the minimum velocity based on the anticipated flow including, but not limited to the following design guide criteria.

OAR 340, Division 52, Appendix A, Section (2) Guidelines for Sewer Pipelines:

- Section (2)(b) Velocity (A): Sewers should be laid on a gradient which will produce a mean velocity, when flowing full or half full, of at least 2-feet per second, based upon the Manning formula with "n", the coefficient of roughness, valued at 0.013.
- Section (2)(b) Velocity (B): Sewers with minimal flow such as upper reaches of laterals or those sewers serving few dwellings should be steepened and/or reduced in diameter to approach a 2-feet per second self-cleaning velocity. Actual flows during initial years of use should be carefully evaluated in this regard. (Section 5.2.1 Pipe and Fitting Material and Size specifies that all Sanitary Sewer Mainlines shall be a minimum diameter of 8-inches.)
- Section (2)(b) Velocity (D): The minimum gradient for 8-inch sewers should be no less than 0.4-percent regardless of pipe material.

Anchor Walls: Sanitary sewers on slopes in excess of 20-percent shall be secured with concrete anchor walls. Spacing for anchors shall be as shown in **Table 2**.

Table 2. Minimum Anchor Spacing

Slope (%)	(Center to Center)
20-34	35-feet
35-50	25-feet
51+	15-feet or Concrete Encasement

Impervious Zone: When designing the sewer corridors through steep topography identified on the Plans, an impervious zone shall be placed as required to limit the migration of water through the length of the trench. The Developer's Engineer will make a final determination of the locations and the number required. See 6.3.10 for further details on impervious zones.

5.2.4 Velocity Design

Where flow velocities are determined to be greater than 8-feet per second, the pipe material shall be C900 or C905 PVC and special provision shall be made to protect manholes against erosion and displacement by shock. This may be accomplished by installing one additional manhole to decrease the slope or to split a 90-degree horizontal direction change into two, 45-degree incremental changes. The flow must be fully contained in the channel.

5.2.5 Alignment and Cover

Curved alignments in Public Sanitary Sewer Mainlines or Service Connection are not permitted. All pipe shall be laid on a straight line and grade. Horizontal deflection that creates a ½-inch or more of belly in the Public Sanitary Sewer Piping System is unacceptable. All Public Sanitary Sewer Extensions shall be located within the public Right-of-Way or in a Public Sanitary Sewer Easement as determined by the District. Generally, Public Sanitary Sewer Mainlines within the right of way must be a minimum of 8-feet deep, and 6-feet deep within a Public Easement.

5.2.6 Right-Of-Way

Public Sanitary Sewer Mainlines shall be constructed in a straight line and grade from manhole to manhole, and outside of the normal wheel path of a vehicle. The general location is about 5-feet north or west from the Right-of-Way centerline. All changes in the direction of the pipe shall be made at a manhole. Public Sanitary Sewer Systems shall generally be located in the street Right-of-Way. If streets have curved alignments, the center of the manhole shall not be in the wheel path, sidewalk, curb, or gutter.

5.2.7 Sanitary Sewer Easement

Sanitary Sewer Mainlines shall be placed within a Right-of-Way whenever possible. Sanitary Sewer Mainlines in easements shall only be allowed as determined by the District.

- A. All Public Sanitary Sewer Easements relevant to Plan approval shall be reviewed and approved prior to final Plan approval and issuance of the Sewer Extension Permit. All easements granted to the District must be recorded via plat map or deed instrument. The District requires an easement granted to "Water Environment

- Services” and will not accept easements granted to the public, or as a public utility easement. Public Sanitary Sewer Easements granted by deed instrument shall be granted on District forms or forms approved by the District. There shall be no cost to the District for obtaining or processing the easements. Public Sanitary Sewer Easements shall provide for restrictions of permanent construction within the easement, ingress and egress for maintenance, reconstruction, and connection to the conveyance system. Some easements may require temporary construction easements adequate to allow construction activities.
- B. Subdivision plats shall contain all existing and proposed Public Sanitary Sewer Easements and Private Sanitary Sewer Easements. A Public Sanitary Sewer Easement granted to WES via a plat shall be labeled in accordance with the plat notes.
 - C. For other than subdivision plats, dedication of Public Sanitary Sewer Easements to the District shall occur by means of recording a Public Sanitary Sewer Easement that encumbers a parcel of property, which references a recorded deed record. All Public Sanitary Sewer Easements must be furnished to the District for review and approval and must be accepted by the District prior to recording. A surveyor shall provide the District with dedication documents, site maps, and descriptions necessary to convey the easements during the plan review process, at which time the width of permanent and temporary easements will be determined. A record of survey meeting all requirements of ORS 209.250, as amended, must accompany the dedication. Acceptance and recording of this dedication deed instrument will be provided free of charge by the District.
 - D. Placement of permanent structures within the Public Sanitary Sewer Easement shall not be allowed, unless authorized by the District as a separate Encroachment Agreement.
 - E. When locating Sanitary Sewer Mainlines in Public Sanitary Sewer Easements the mainline shall be centered in the easement, unless otherwise approved by the District, and the conditions of the easement shall be such that the easement shall not be used for any purpose that would interfere with the unrestricted use of the Sanitary Sewer Mainline.
 - F. Sanitary Sewer Mainlines placed in easements along a property line where both properties are owned by the same Owner shall have the location of the mainline and easement line determined by the District.
 - G. Public Sanitary Sewer Easements for Sanitary Sewer Mainlines shall have a minimum width of 15-feet. Easements for Trunk Sanitary Sewers shall have a minimum easement width of 20-feet. The District has the right to require additional width at the sole discretion of the District. Easements that combine both mainline sanitary sewers and storm sewers shall have a minimum width of 20-feet.
 - H. Public Sanitary Sewers with more than 8-feet of cover or combined with public storm sewers will require wider easements, which will be determined by the District. A slope of one horizontal to one vertical from the invert of the Sanitary Sewer Mainline to ground surface will be used to determine easement width. Easement widths shall vary from the 15-foot minimum by 5-foot increments; 20, 25-feet, etc.
 - I. Public Sanitary Sewer Easement locations for Public Sanitary Sewer Mainlines serving a planned unit development, subdivisions, condominium, apartment complex, or commercial/industrial development shall be located in parking lots, private drives, or similar open areas which will permit unobstructed vehicle access for maintenance

by District Personnel. Common easements for other utilities will be reviewed on a case-by-case basis. Separation of utilities must meet DEQ and Oregon Department of Health requirements. Slope easements are required when necessary to encompass cut or fill slopes.

- J. Combined easements shall be a minimum of 20-feet wide with a minimum separation of 5-feet between utilities and be approved by the District on a case-by-case basis.

5.2.8 Relation to Water Lines and Other Utilities

No Public Sanitary Sewer shall be located less than 50-feet from any well, spring, or other source of domestic water supply unless approved by the District. All Public Sanitary Sewers or parts thereof that are located within 50-feet of any source of domestic water supply shall be designed of C905 PVC pipe with watertight joints, or of other approved pipe.

The basic separation requirements apply to all gravity and pressure sanitary sewers of 24-inch diameter or less. Trunk Sanitary Sewers may create special hazards because of flow volumes and joint types, and accordingly require additional separation requirements. The special design requirements given below are for the normal conditions found with sewage and water systems. More stringent requirements may also be necessary in areas of high ground water, unstable soil conditions, etc.

- A. **No Special Conditions (Parallel):** A minimum horizontal separation of 10-feet between sanitary sewers and any existing potable water lines, and a minimum vertical separation of 18-inches between the bottom of the water line and the crown of the sanitary sewer, shall be maintained. The distance shall be measured edge to edge.
- B. **Justification Required (Parallel):** When conditions prevent the separations described above, a sanitary sewer may be laid closer than 10-feet horizontally or 18-inches vertically to a water line, provided:
 - a. It is laid in a separate trench from the water line.
 - b. The elevation of the crown of the Sanitary Sewer Mainline must be at least 18-inches below the bottom of the water line. When this vertical separation cannot be obtained, the sanitary sewer shall be designed of materials and joints that are equivalent to water main standards of construction and shall be pressure tested to ensure water tightness prior to backfilling. Adequate restraint should be provided to allow testing to occur.
 - c. If sanitary sewers must be located in the same trench as a potable water line, special construction and mitigation is required. Both water lines and Sanitary Sewer Mainlines shall be designed with a casing pipe of pressure-rated pipe material designed to withstand a minimum static pressure of 150-pounds per square inch (psi). The water line shall be placed on a bench of undisturbed earth with the bottom of the water pipe at least 18-inches above the crown of the sanitary sewer and shall have at least 5-feet of horizontal separation at all times.
- C. **Minimum Separation (Perpendicular):** Sanitary Sewer Mainlines that cross water lines shall be laid below the water lines whenever possible to provide a separation of at least 18-inches between the invert of the water line and the crown of the sanitary sewer. See Special Conditions (Section 5.2.9) if this is not possible.

5.2.9 Special Conditions

When conditions prevent a vertical separation as described above, the design shall be as follows:

- A. **Gravity Sanitary Sewers Passing Over or Under Water Lines:** Gravity sanitary sewers shall be designed as specified with material as described below:
 - a. Standard bell and spigot C900 or C905 PVC pipe shall be required. The length of sanitary sewer pipe shall be centered at the point of crossing so that the joints will be equidistant and as far as possible from the water line. The sanitary sewer pipe shall be the longest standard length available from the manufacturer.
 - b. Pipe Material: PVC (ASTM C900 or C905 D-1784 DR, 4 to 24-inches)
- B. **Water Lines Passing Under Gravity Sanitary Sewers:** Water Lines shall be protected by providing the following:
 - a. There shall be a vertical separation of at least 18-inches between the invert of the sanitary sewer and the crown of the water line.
 - b. There shall be adequate structural support for the sanitary sewers to prevent excessive deflection of joints and settling on and breaking of the water lines.
 - c. The length of sanitary sewer pipe shall be centered at the point of crossing so that the joints will be equidistant and as far as possible from the water line. The sanitary sewer pipe shall be the longest standard length available from the manufacturer. Any design implementing the measures described in this Section 5.2.9 shall obtain written approval from both the District and local water authority.

5.2.10 Relation to Stream and Drainage Channels

The design requirements in relation to stream and drainage channels are described below.

- A. Sanitary sewers crossing streams or drainage channels shall be designed to cross the stream as nearly perpendicular to the stream channel as possible and shall be free from change of slope.
- B. The Sanitary Sewer Mainline shall be the same material type installed in the entire run from the downstream to the upstream manhole. No fittings will be allowed to transition from different pipe types, manufactures or repairs.
- C. The top of all sanitary sewers entering, crossing or adjacent to streams shall be at sufficient depth below the natural bottom of the stream bed to protect the Sanitary Sewer Mainline. One-foot of cover is required where the sanitary sewer is in rock, 3-feet of cover is required in other materials and a minimum of 6-inches cover is required in paved channels.
- D. Pipe material shall be bell and spigot C900 or C905 as determined by the District, with the longest pipe length that the manufacturer can provide. The pipe shall extend to a point, where a one-to-one slope, which begins at the top of the bank and slopes down from the bank away from the channel centerline, intersects the top of the pipe.
- E. Sanitary sewers located parallel to streams shall be located outside of the stream bed. All manhole covers, at or below the 100-year flood elevation shall be watertight.
- F. Check dams are required in trench lines to prevent migration of groundwater.

- G. All construction shall be designed to comply with the latest regulations as determined by the Army Corps of Engineers and Department of State Lands for removal and filling in waterways. In addition, all requirements for the Federal Endangered Species Act must be met. The activities authorized by the approval of the request in this application may be subject to other laws and regulations not addressed in this process. River crossings shall be approved on a case-by-case basis.

5.2.11 Minimum Cover

- A. All Public Sanitary Sewers shall be laid at sufficient depth to drain Building Sewers, protect against damage from traffic and afford protection from other utilities. Sufficient depth shall mean the cover from the top of the pipe to finish grade along the sanitary sewer alignment.
- B. Under normal conditions, Public Sanitary Sewer Mainlines shall be placed with a minimum cover of 8-feet in roadways and 6-feet of cover in Public Sanitary Sewer Easements.
- C. In hillside subdivisions, Public Sanitary Sewers shall be placed in the street at a depth sufficient to drain Building Sewers by gravity on the low side of the street, unless otherwise approved by the District.
- D. If approved by the District, where less than 3-feet of cover is proposed, the pipe material which will be PVC (ASTM C900 D-1784 DR, 4 to 12-inches or ASTM C905 D-1784 DR, 4 to 12-inches).

5.3 Manholes

The following subsections provide the design requirements for manholes.

5.3.1 Location

Manholes shall be placed at the following locations:

- A. At every change in slope, alignment, or size of pipe.
- B. At each intersection or junction of a Sanitary Sewer Mainline.
- C. Where practical, manholes shall be located at street intersections.
- D. At the upper end of all sanitary sewers, except as provided under Section 5.3.
- E. At intervals of 500-feet or less. Deviation from this requirement shall be reviewed on a case-by-case basis for approval, considering whether maintenance equipment can adequately service the proposed Sanitary Sewer Mainline.
- F. At Service Connections of 8-inches or larger.
- G. At new 6-inch Service Connections into an 8-inch mainline.
- H. Where required by the Industrial Pretreatment Program for sampling.

Manholes shall not be placed in the following locations:

- A. In the wheel path, curb, or gutter.
- B. Behind the curb line. Placement of manholes behind the curb shall be reviewed on a case-by-case basis for approval. Consideration shall be given to Sanitary Sewer Mainlines which already exist behind the curb.

5.3.2 Slope of Manhole Channel

Standard elevation differences or the drop across the manholes have been established to compensate for normal energy losses and to prevent surcharging of a sanitary sewer. The intent of this subsection is to prevent the difference in pipe inverts at the manhole wall on steep sanitary sewers from exceeding 1-foot, which renders it impossible to insert closed-circuit television equipment into the outfall mainline if the average slope exceeds 25-percent.

The rules for elevation differences at manholes are provided below:

- A. The drop across a standard 48-inch manhole shall be two-tenths (0.20-ft) of a foot unless the mainline sanitary sewer has a slope greater than 20-percent, or otherwise directed by the District.
- B. If incoming pipes are smaller in diameter than the outgoing pipe the crowns of all incoming pipes shall match the crown of the outgoing sanitary sewer pipe.
- C. For mainline sanitary sewer with slopes greater than 20-percent the slope in the channel will be determined on a case-by-case basis by the District.
- D. In general, the slope shall be determined to the center of the manhole. The average between any inlet Slope (S_i) and outlet Slope (S_o) in percent across the manhole shall not exceed 25-percent.

$$\frac{S_i + S_o}{2} = \text{less than } 25\% \text{ (feet per 100-feet)}$$

The above formula will limit the difference between the inlet and outlet inverts measured at the manhole walls from exceeding 1-foot for an average manhole diameter of 4-feet. This formula applies to sanitary sewers with a slope in excess of 20-percent.

Generally, a vertical offset in slope exceeding 25-percent will not be permitted. Exceptions will be the following:

- A. When a smaller diameter connects to a larger diameter sanitary sewer.
- B. When a grade conflict exists with an existing utility, the maximum vertical drop may not exceed 1-foot or as approved.
- C. When a vertical drop greater than 1-foot is approved, an outside drop must be installed.

5.3.3 Drop Manholes

Drop manholes shall only be used in extreme cases of slope difference between existing and proposed Sanitary Sewer Mainlines or when special conditions exist such as a conflict with existing facilities which cannot be relocated. Outside drops into manholes shall be designed per standard detail drawing. Inside drops apparatuses into manholes shall not be allowed.

5.3.4 Rim Elevations of Manholes

In areas used by vehicles (paved or unpaved streets) the manhole rim elevation shall match the finished grades. In other areas the height of the manhole rim shall be 6-inches above finished grade, high-water mark, or above the top of future fill areas.

5.3.5 Design and Size

All manholes shall be a minimum of 48-inches inside diameter. All manholes shall be designed per standard detail drawing.

5.3.6 Connection

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

- A. No pipe shall enter an existing manhole where the angle between the incoming flow and the outgoing flow is less than 90-degrees. When the incoming flow and the outgoing flow is less than 90-degrees, two manholes shall be installed. Spacing of such manholes shall be a minimum of 10-feet apart measured outside to outside. An oversized manhole, such as 60-inch, or 72-inch in diameter, may be an option if approved by the District for use.
- B. New or existing manhole walls shall be core drilled (not jack hammered) to connect a new Sanitary Sewer Mainline or Service Connection. Core drilled manholes shall include use of a boot to connect the pipe. Sand collars can only be used if approved on a case-by-case basis by the District.
- C. New mainlines should enter an existing manhole at a minimum of 0.20-feet of drop across a standard 48-inch manhole.
- D. The flow entering the manhole shall follow a smooth unobstructed concrete channel transition from the inlet pipe into the mainline channel. The base and channel of the manhole will be rebuilt if damaged in this process. All manhole and piping apparatuses shall be water-tight to prevent exfiltration and infiltration of ground water.

5.3.7 Anticipated Future Extensions

When future extensions are being designed/constructed, the existing connecting manhole will be cored at the appropriate location and alignment. Stub outs on end manholes shall only be installed when permitted by the District. An exception to this section may be made by the District on a case-by-case basis if the direction of the new mainline cannot be established at the time of construction.

5.3.8 Mainline Cleanout

Cleanouts will not be approved as substitutes for manholes, except temporarily at the upper end of a Sanitary Sewer Mainline that will be extended on the same slope and alignment during the next construction phase. The cleanout shall be removed, and the Sanitary Sewer Mainline extended meeting all design criteria in these Sanitary Standards. All mainline cleanouts will be reviewed and approved by the District on a case-by-case basis.

5.4 Service Connections

The following subsections provide the requirements and responsibilities for Service Connections.

5.4.1 Responsibilities

A property shall be served by a single Service Connection designed, constructed, maintained, repaired and/or replaced in the following manner:

- A. Operation and Maintenance of the Service Connection:

- a. The Owner(s) that benefits from the Service Connection is solely responsible to own, operate and maintain the Service Connection from the Building Sewer to the Public Sanitary Sewer Mainline, including the connection to the mainline located within a public Right-of-Way or easement.
 - b. The District is responsible for maintaining Public Sanitary Sewer Mainlines and shall not be responsible for maintenance or repair of damage resulting from inadequate or improper operation of the Service Connection, Building Sewer, or of attached fixtures or appurtenances, such as cleanouts and traps, between the building and Public Sanitary Sewer Mainline.
- B. Property Owner Responsibilities for Repairs:
- a. Inspections and investigations to determine the condition and functionality of the Service Connection from the building to the Public Sanitary Sewer Mainline.
 - b. Repairs of structural and non-structural defects for any portion of the Service Connection that is on private property, including the area within easements granted to the District.
- C. District Responsibilities for Repairs:
- a. Repair of structural defects, as determined by the District, for the portion of the Service Connection that is within the public Right-of-Way.

5.4.2 Diameter

- A. Each residential single-family lot shall be served by a single 4-inch diameter Service Connection.
- B. The diameter of the Service Connection for lots other than residential single family shall be served by a minimum 4-inch diameter pipe, or large if deemed necessary by Oregon Plumbing Specialty Code or permitted at the sole discretion of the District.

5.4.3 Materials

- A. The Service Connection pipe, tee, cleanout, and joint materials shall be designed and constructed of the same material as the Sanitary Sewer Mainline.
- B. All couplings, adapters, etc., used to connect dissimilar pipe materials together shall be approved by the District.

5.4.4 Installation

- A. Service Connections shall be made by means of a manufactured tee. No Inserta Tees, wyes or grouted connections will be allowed in the extension of public sanitary sewers, unless otherwise approved by the District.
- B. Service Connections may be installed into an existing Public Sanitary Sewer Mainline with an installation of an Inserta Tee at the sole discretion of the District. For further details see Section 5.4.10.
- C. Manholes are required for Service Connections 8-inches or larger in diameter, and Service Connections shall be a minimum of one-half the diameter mainline. No Service Connection shall be larger in diameter than the mainline.
- D. Service Connections for properties zoned industrial use shall provide a sampling manhole constructed to these Standards that provides access for monitoring and

sampling the discharge. The location of the manhole shall be in an area on private property easily accessible by District Personnel.

- E. For additional information regarding Service Connection specifications see the Standard Detail drawings.

5.4.5 Location

Generally, the Service Connection shall be located within a Public Right-of-Way, or Public Easement as shown in Standard Detail drawings. Any other proposed location shall be at the sole discretion of the District on a case-by-case basis.

5.4.6 Direct Connection

All Building Sewers and/or sanitary facilities connected to the District Public Sanitary Sewer System shall be directly connected without any intervening private sewage treatment system such as a septic tank, cesspool, or any part of an on-site system, except for permitted Industrial Pretreatment facilities.

5.4.7 Separate Connection

A separate and independent Service Connection shall be provided for each tax lot, parcel of property, or lot of record. The District does not allow shared Service Connections.

A reduced number of connection points or a single point of connection may be utilized to serve parcels of properties for projects such as condominiums, multi-family, commercial and industrial projects, whereas the parcels cannot be further divided. The Owner shall be responsible for the customer account and monthly service charges for all of the properties. The Owner shall not further divide the property, or sell a portion of the development, thus creating a shared Service Connection. If a portion of the property is either sold to another person, or divided to create a separate property, then the Owner shall provide a separate Service Connection connected to the Public Sanitary Sewer System to serve the property.

Any partition of land division that is required to install a Service Connection to serve the additional lot(s), shall construct said Service Connection prior to the recording of the plat, if the Service Connection traverses any part of an adjoining property, common area, private easement, or shared land. The Service Connection will not be required to be constructed to serve the additional lot(s), if the property has direct access to the Public Sanitary Sewer System, and no other jurisdiction is requiring any improvement to be constructed prior to the recording of the plat. Any existing residence not currently connected to the Public Sanitary Sewer System shall construct a Service Connection and connect the residence Building Drain to the Public Sanitary Sewer System prior to the recording of the plat. Any existing Service Connections shall be used where feasible, as determined by WES.

5.4.8 Restricted Connections

No person shall connect any roof, surface, foundation, footing, or exterior area drains to any Service Connection, Building Sewer, or Building Drain which is connected to the Public Sanitary Sewer System. Storm pipes and drains that are connected to the Public Sanitary Sewer System shall be disconnected, and safely conveyed to a Public Storm System.

5.4.9 User Requiring Pumping Facility

If the building is below the available gravity Sanitary Sewer Mainline, the Owner shall install private pumping facilities in accordance with the local plumbing code. Flows from private pumped facilities shall enter the Public Sanitary Sewer Mainline by means of a gravity Service Connection. District shall review and approve all pumped connections on a case-by-case basis at the District's sole discretion.

Privately owned and maintained pump stations that serve multiple ownership properties are prohibited.

A single Owner may utilize a private pumping system permitted by the local plumbing authority, which is owned, maintained, and operated by the Owner for the express purpose of serving only their parcel(s) of property. Each parcel served requires a separate gravity connection to a Service Connection. The private pumping system shall not be located in a Public Easement that encumbers another person's property, or the public Right-of-Way. A pressurized private piping system may be located in a private easement or common areas such as tracts, or private streets, as long as the Owner records the necessary dedication of rights and maintenance responsibilities.

5.4.10 Tap-In Connections

For tap-in connections, the mainline must be at least a minimum of two (2) times the diameter of the Service Connection. Only District Personnel are authorized to tap the Public Sanitary Sewer Mainlines and install a 4- to 18-inch diameter Inserta Tee. The means, material, and method to tap into Public Sanitary Sewer Mainlines greater than 18-inches shall be reviewed and approved by the District, on a case-by-case basis. The installer shall give the District 72 hours advance notice prior to scheduling the tap/inspection. The tap will be scheduled and completed during the District's regularly scheduled business hours. The installer shall excavate completely expose the Public Sanitary Sewer Mainline at the designated point of connection as directed by the District. The District shall tap the Public Sanitary Sewer Mainline and install the 4-inch-diameter Inserta-Tee connection fitting at the Owner's expense. If the installer fails to comply with all local, state and federal safety codes applicable to the work, then the District shall not tap the mainline or perform any inspection, and the tap will be rescheduled. For taps other than a standard 4-inch tap into 3034 PVC, the Owner or contractor must coordinate with the District well in advance of the required tap in case a specialized connections must be ordered in advance.

The District will charge applicable fees to recoup any costs incurred by the District.

5.4.11 Slope and Alignment

The minimum slope for Service Connections shall be 2-percent ($\frac{1}{4}$ -inch per foot). In unusual conditions, a slope of 1-percent ($\frac{1}{8}$ -inch per foot) may be proposed by the Owner's Developer's Engineer and approved by the District. Maximum slope for Service Connections shall not be greater than 100-percent slope (45-degrees). All changes in alignment or slope of the pipe shall be made with manufactured fittings. No bends greater than 22.5-degrees, and a totaling 45-degrees shall be allowed. Any piping system constructed on private property shall be required to obtain a plumbing permit issued by the applicable jurisdictional plumbing authority, such as a city or the County.

5.4.12 Minimum Depth

The minimum depth of the Service Connection shall be 6-feet deep at the edge of the Right-of-Way or Public Sanitary Sewer Easement. Service connections which cannot be

laid at the required minimum depth shall be reviewed and approved by the District on case-by-case basis.

5.4.13 Buried Detectable Tape

Green detectable metallic tape labeled "CAUTION BURIED SEWER LINE BELOW" shall be installed 6-inches above the Service Connection pipe along its entire length from the tee connection at the mainline to the top of the green 2-inch x4-inch stake.

Curbs shall be stamped with "SS" in a location of buried sanitary sewers and Service Connections.

5.4.14 Markings

- A. Each Service Connection shall be marked with a green 2-inch x 4-inch stake extended from the end of the pipe to at least 1-foot above the ground.
- B. The location of the Service Connections shall be indicated by a permanent marker, in one of the following manners:
 - a. Where the Service Connections is located in a street with curbs, the connection marker shall be a permanent stamp on the top of the curb: ST – Storm Sewer; SS – Sanitary Sewer.
 - b. Where the Service Connection is in a street without curbs, the marker shall be on the sidewalk.
 - c. Where the Service Connections is in a street without curbs or sidewalks, the Developer's Engineer shall present to the District for approval an alternative permanent marking method.

5.4.15 Inspection

Service Connections installed with a mainline extension shall be inspected for workmanship and materials and tested by the Developer's Engineer. Tap-In Connections not installed with a Public Sanitary Sewer Mainline extension shall be inspected by District Personnel, and, if applicable, the Developer's Engineer.

Sanitary Standards

6. Construction Requirements

This section provides construction requirements for Public Sanitary Sewer Systems including but not limited to standards relating to sanitary sewer installation, materials, backfill compaction and classification, and testing.

6.1 Erosion Prevention and Sediment Control Required

All construction, regardless of development type or permit status, shall keep sediment laden water and any other forms of stormwater pollution from entering natural drainage systems or the storm drainage system. The requirements for erosion prevention and sediment control (EPSC) shall be implemented in accordance the District's Rules and Regulations, the Stormwater Standards, and the most current version of the EPSC Planning and Design Manual.

6.2 General Construction Materials and Installation

Construction materials and installation shall meet the following specifications unless modified in Sections 6.2 through 6.6 below.

ASTM A48	Manhole Frames and Covers - Gray Iron Castings
ASTM A304	Steel Bars, Alloy, Requirements
ASTM A536-84	Manhole Frames and Covers – Gray Iron Castings
ASTM A615	Billet-Steel Bars for Concrete Reinforcement
ASTM C443	Connections between Precast Manhole Sections
ASTM C478	Precast Reinforced Concrete Manhole Sections
ASTM C923	Connections between Manholes and Pipe
ASTM C1107	Non-Shrink Grout
ASTM D3034	PVC Pipe and Fittings
ASTM D3035	HDPE and connections
ASTM D3212	Elastomeric gasket
ASTM D4832	Testing of Controlled Low Strength Material

6.2.1 Trench Width

Minimum width of trenches in which Sanitary Sewer Mainline is to be laid shall be 12-inches greater than the outside diameter of the pipe. Minimum width of trenches where controlled density fill (CDF) is used as the entire backfill shall be as shown on the Plans or as directed by the Developer's Engineer. In all cases, trenches must be of sufficient width to allow for shoring and permit proper joining of pipe and compaction of the backfill material along sides of the pipe.

6.2.2 Trench Grade

The bottom of the trench shall be carried to the lines and grades shown on the Plans or as established by the Developer's Engineer, with proper allowance for pipe thickness and for gravel bedding. Any part of the trench excavated below grade shall be corrected with material of the type specified in Section 6.2.5, for the full width of the trench.

6.2.3 Shoring and Sheeting

All sheeting, shoring, and bracing shall be designed and installed in accordance with Oregon Occupational Safety and Health Administration (OSHA) Technical Manual for Construction Operations (Chapter 2: Excavation), and the OSHA Excavation Standards (29 CFR 1926.651 and 1926.652). Take special care to prevent movement of the pipe after installation when laid within a moveable trench shield.

6.2.4 Trench Dewatering

- A. The Contractor during construction of the sanitary sewer system shall at all times provide and maintain ample means and devices with which to promptly remove and dispose of all water entering the trench excavation during the time the trench is being prepared for the pipe laying, during the laying of the pipe, and until backfill has been completed. Dispose of water in accordance with state and local regulations.
- B. The control of groundwater shall be such that softening of the bottom of excavations, or formation of "quick" conditions or "boils" during excavation shall be prevented. Dewatering systems shall be designed and operated to prevent removal of the natural soils.
- C. At no time shall stormwater or ground water be permitted to be discharged into the Public Sanitary Sewer System. The discharge of stormwater or ground water in the Public Sanitary Sewer System is a violation of District Rules and Regulations.

6.2.5 Trench Foundation

When, in the opinion of the Developer's Engineer, the material in the bottom of the trench is unsuitable for supporting the pipe, excavate as directed by the Developer's Engineer, and backfill with approved materials to the required grade. Any part of the trench excavated below grade shall be corrected with approved material for the full width of the trench and thoroughly compacted in layers not to exceed 6-inches, to the established grade.

6.3 Sanitary Sewer Installation

6.3.1 Sub-Grade

The bottom of the trench shall be carried to the line and grade shown on the Plans or as established by the Developer's Engineer, with proper allowance for pipe thickness and for gravel pipe bedding.

6.3.2 Pipe Base/Bedding

Bedding material as specified in Section 6.4 shall be placed in the trench to a minimum depth of 6-inches below the bottom of the pipe. The pipe bedding shall be placed and leveled to approximate grade in advance of the pipe laying and shall provide a firm, unyielding support along the entire pipe length. Immediately following the placement of each pipe section, the crushed gravel pipe bedding shall be placed to the springline of

the pipe. Special effort to properly bed the pipe by slicing backfill in the pipe haunches up to the springline shall be provided. The pipe bedding shall be a minimum of 6-inches for Service Connections.

6.3.3 Bell Holes

At the location of each joint, bell holes of ample dimensions shall be dug in the bottom of the pipe bedding to permit the joint to be properly fitted, to permit easy inspection of the entire joint; and to provide uniform bearing for the barrel of the pipe for its entire length.

6.3.4 Preparation of Sanitary Sewer Pipe

All pipes and fittings shall be carefully inspected before being laid and no cracked, broken, or defective pipe or fittings shall be used in the work. Surface irregularities, in the form of air pockets or voids, will be cause for rejection as enumerated in ASTM D3034. The ends of the pipe shall be cleaned with a brush, washed, and thoroughly scrubbed where necessary to remove dirt or other foreign material.

6.3.5 Line and Grade

- A. Sanitary sewer pipe shall be laid in full lengths as manufactured and shall be laid on a constant grade and in a straight alignment from manhole to manhole, or cleanout.
- B. Survey control hubs for both line and grade shall be provided by the Developer's Engineer in a manner consistent with accepted practices. The Contractor shall establish line and grade for pipe by the use of lasers or by transferring the cut from the offset stakes to the trench at whatever intervals necessary to maintain the line and grade. The Contractor shall check line and grade, as necessary. In the event that the limits prescribed in this Section are not met, the work shall be immediately stopped, the Developer's Engineer notified, and the cause remedied before proceeding further with the work.
- C. Deviation from the established line and grade shall not exceed ½-inch for line and ¼-inch for grade, provided that such variation does not result in a level or reverse-sloping invert.
- D. The vertical variation of the grade line shall not create standing water in a pipe that exceeds ½-inch in height.

6.3.6 Manhole Connections

Unless otherwise provided, connections to existing District manholes shall be made using a core drilling method. Use of a jackhammer or other pneumatic devices is prohibited. Connect PVC pipe to concrete manholes by means of an approved coupling with an elastomeric gasket or flexible sleeve conforming to ASTM C923, (Kor-N-Seal or equal). The use of Portland Cement grout for connecting PVC pipe to manholes is prohibited. The use of a sand collar will only be reviewed and approved by the District on a case-by-case basis.

6.3.7 Pipe Installation

- A. The installation of sanitary sewer pipe shall commence at the lowest point in the sanitary sewer system and shall proceed so that the spigot end of the section being laid is placed into the bell end of the pipe already laid. The pipe shall be bell and spigot, same size diameter of pipe from manhole to manhole, same pipe manufacture, same pipe material without any couplings or repairs. Foreign materials

- shall be prevented from entering the pipe while it is being placed in the trench. During laying operations, no debris, tools, clothing, or other materials shall be placed in the pipe.
- B. Sanitary sewer pipe shall be installed in accordance with the manufacturers' installation procedures and these Sanitary Standards.
 - C. At no time shall stormwater or ground water be permitted to be discharged into the Public Sanitary Sewer System. The discharge of stormwater or ground water in the Public Sanitary Sewer System is a violation of District Rules and Regulations.

6.3.8 Waterline Crossings

- A. Sanitary Sewer Mainline pipe material specifications shall be in accordance with Sections 5.2 and 6 for a minimum distance of approximately 10-feet on either side of a water main crossing, when there will be less than 18-inches of clearance between the outside diameters of the water main and sanitary sewer. One standard length of pressure pipe shall be centered under the waterline.
- B. It is required to maintain a consistent material type and specification in the type of sanitary sewer pipe within any manhole-to-manhole run.

6.3.9 Anchor Blocks

Anchor blocks shall be constructed of concrete 1-foot thick parallel to the pipe, extending 1-foot below the bottom of the pipe to 3-feet above the top of the pipe, and extending 1-foot beyond each side of the trench wall.

6.3.10 Impervious Zones

The impervious zone shall be constructed of CDF 2-feet thick parallel to the pipe, extending 1-foot below the bottom of the pipe zone to within 3-feet of the ground surface, and extending 1-foot beyond each side of the trench wall. The Contractor shall minimize the length of trench impacted by installing CDF using temporary forms or other means to no greater than 3-feet along the axis of the pipe. The trench in the top 3-feet shall meet all requirements of the backfill classification shown on the drawings or otherwise specified.

6.3.11 Service Connection Installation

- A. The Contractor shall place a 90-degree factory tee at the locations indicated on the Plans or specified by the Developer's Engineer. The tee shall be installed at a maximum angle of approximately 45-degrees with the horizontal or as directed by the Developer's Engineer. After the tee is in position, special pipe bedding material and select backfill shall be hand-placed around the tee to prevent any movement of the tee when the next pipe is laid.
- B. Unless otherwise specified on the Plans or directed by the Developer's Engineer, each Service Connection shall be laid in a separate trench on a straight line and gradient from the tee to the end of the Service Connection. The Service Connection shall be at least 6-feet deep at the property line crossing. No Service Connection shall be laid on a grade of less than 2-percent, unless approved by the District and directed by the Developer's Engineer or shown on the Plans.
- C. Unless otherwise directed by the Developer's Engineer, the Contractor will use a grading line to lay the pipe and the pipe shall be installed with the same accuracy as the mainline sanitary sewer.

- D. Service connections and cleanouts shall be installed as shown on the approved plans.
- E. Upon extension of the Building Sewer, a cleanout will be permitted by the local building code division and installed near the building foundation in accordance with Oregon Plumbing Specialty Code (OPSC).

6.3.12 Manhole Installation

All manholes shall be made of concrete as specified on the Plans. All manholes shall be a minimum of 48-inches inside diameter. Larger diameter manholes shall be specified per the approved Plans.

Base

- A. The base shall be constructed per the standard detail drawing and in locations as noted on the Plans. Knockouts for pipe extensions will be based upon the alignment as shown or directed. Minor adjustments to alignment as directed by the Developer's Engineer may be necessary to better position manholes.
- B. The Contractor may, at their option, use precast or poured-in-place manhole bases, provided all details of construction are approved by the Developer's Engineer.
- C. Precast manhole bases shall be installed on a level compacted layer of gravel bedding a minimum of 6-inches thick on a suitable foundation. Poured in place bases do not require additional bedding. The concrete base for the manhole shall be constructed so the first section of the manhole has a uniform bearing throughout the full circumference of the manhole wall. Sufficient non-shrink grout shall be deposited on the concrete base to provide a watertight seal between the base and the manhole wall.
- D. The manhole shelf shall be integrally poured against the wall and over the pipe stub. Construct the shelf in such a manner that when capacity of the pipe is reached, no portion of the shelf surface is used as part of the cross-sectional flow channel required for free flow through the manhole. Manholes shall have full depth channels placed across the base. The shelf shall have a slope of 1-inch per foot. All areas of the shelf shall freely drain into the channel.
- E. The inverts of the manholes shall be constructed in conformance with the details shown on the plans. The manhole channels shall provide a smooth flow-through characteristic. No sharp edges or rough sections which will obstruct the flow of sewerage will be permitted. All cement used in the construction of the channels shall be troweled smooth. All manhole channels must be able to pass a 7-inch x 30-inch cylinder into the mainline pipe.
- F. Manholes added over an existing mainline shall have a base which achieves watertight connections to the existing pipe type. Manholes and adjoining pipe shall be watertight. Any noticeable infiltration shall be repaired, in a means and method approved by the District

Manhole Barrel Sections

- A. Precast concrete sections for manholes shall be in 1 to 4-foot sections placed in such combinations as to achieve the finish grade shown on the Plans. The joints for the manhole sections shall be made watertight with the use of non-shrink grout or flexible material. The wall sections and flexible material used to join them shall be compatible. The walls shall be constructed true to line and grade as established by the Developer's Engineer. Ample non-shrink grout shall be placed into the groove of

- the lower section prior to placing the next barrel section. The entire joint shall be completely filled with non-shrink grout and troweled to a smooth surface. Preformed gaskets may be used in lieu of non-shrink grout type joints and shall be RAM-NEK, manufactured by K.T. Snyder Company, Inc., Houston, Texas; Kent-Seal by Hamilton Kent, Kent, Ohio; or as approved. Manhole sections with a captive groove rubber gasket need not be grouted between sections.
- B. Cones shall be eccentric with the wall thickness and reinforcement like that of manhole pipe sections. The tops and bottoms of the cones shall be parallel.
 - C. Flat-top manhole sections for all size manholes shall be used in lieu of eccentric cones where the depth from shelf to the top of the last barrel section is 4-feet or less. A concentric top is required when the height from the shelf to the top of the last barrel section is 3-feet or less.

Manhole Extensions/Grade Rings

- A. Install precast concrete grade rings on top of manhole cones to positively prevent all infiltration of surface or groundwater into manholes.
- B. Grade rings shall be laid straight and true and set in a bed of non-shrink grout with the grout carried over the frame. Grade rings shall be set so the tops of the frame are flush with the finish grade or grade of adjoining pavement, or 6-inches above the finish grade in areas outside the Right-of-Way.
- C. Extension rings shall be limited to achieve a maximum distance of 28-inches from the top of the first step to the top of the frame.
- D. Precast rings shall be constructed to have an opening of 25-inches.

Manhole Frames and Covers

Frames. Standard frames shall have a total height of 10-inches as shown in Clackamas County Department of Transportation and Development Drawing U600. Frames shall be of the type detailed on the approved Plans or equal.

- Suburban frames shall have a total height of 6-inches and are designed for areas of light traffic loading and may be used as approved in non-traffic areas, easement areas and subdivision streets. Suburban frames are prohibited in collector streets, arterial streets, or streets in industrial areas.
- Tamperproof/locking and watertight (secured) frames shall be installed in locations as noted on the approved Plans. Secured frames shall be installed per the manufacture's specifications. On secured frames with internal lugs, one lug shall be centered above the manhole steps.

Covers. Standard Sanitary Sewer Manhole covers shall have a maximum of two, 7/8-inch pick holes.

- Tamperproof/locking covers shall match frame type and shall be installed per the manufacture's specifications.
- Watertight covers shall have no open pick holes and shall be installed per the manufacture's specifications.

Manhole Steps

Steps shall be placed where there are no incoming or outgoing lines. Steps shall be placed a maximum of 12-inches from the shelf and 28-inches from the top of the frame. Steps shall be 12-inches on center. Steps shall extend from the manhole wall 6-inches. Steps in a manhole shall be of the same type. Steps shall be installed straight and true.

Loose steps shall be cause for rejection of that manhole cone or section. Manholes less than 4-feet in depth do not require steps.

Manholes Future Development

The channeling, boot, and water-tight plug for all end manholes, from which future Public Sanitary Sewer Extensions will be extended, shall be designed as determined by the District.

Drop Manholes

Drop manholes shall be outside drops and constructed at the location shown and as detailed on the Plans. The first run of pipe from the drop assembly shall be a full length of PVC, C900 or C905 (match pipe type to drop assembly type). CDF fill must be encased around the drop assemblies up the springline of the top inlet pipe.

Mainline Cleanout Pad and Cover

The cleanout shall be installed as shown on the Plans or as directed by the Developer's Engineer. The cleanout shall be constructed of the same size and material as the mainline. Special attention should be paid to the details for the concrete pad, frame, and cover required. When using PVC pipe for the cleanout, the concrete support block is not required. The cleanout riser shall be protected by the pad and cover but shall not touch or be a structural part of the pad. A watertight end plug shall be installed on the riser. No load from the frame, pad or cover shall be placed on the pipe or plug. Provide compacted $\frac{3}{4}$ -inch minus crushed gravel up and around the cleanout assembly to finish grade.

6.4 Materials

6.4.1 Trench Backfill Stabilization

Trench backfill stabilization material shall be 2½-inch minus clean pit-run gravel, crushed rock, or gravel, having reasonably even gradation from coarse to fine or open graded. Maximum percent passing the ¼-inch screen shall be 20-percent by weight. Gravel shall be placed in thoroughly compacted layers not to exceed 6-inches to the established grade.

6.4.2 Pipe Base and Pipe Zone

Material for pipe base and pipe zone shall be $\frac{3}{4}$ -inch minus crushed gravel, having reasonably even gradation from coarse to fine, in accordance with the Oregon State Highway Commission Standard Specifications for Highway Construction specification for Aggregate and Aggregate Base, Section 02630.10.

6.4.3 Trench Backfill

- A. Backfill material specifications above the pipe zone within the Right-of-Way shall be $\frac{3}{4}$ -inch minus crushed gravel, having reasonably even gradation from coarse to fine, in accordance with the Oregon State Highway Commission Standard Specifications for Highway Construction specification for Aggregate and Aggregate Base, Section 02630.10.
- B. Backfill material specifications above the pipe zone outside the Right-of-Way shall be of the class (Section 6.5) specified on the approved plans.
- C. Service Connection backfill will be the same as that used for the Public Sanitary Sewer Mainline to which they are connected.

6.4.4 Controlled Density Fill (CDF)

CDF shall not be a replacement for stone pipe base/bedded within the pipe zone. The use of CDF may be required for backfill material associated with the installation of public sanitary sewer system. CDF shall be a mixture of Portland cement, pozzolans, fine aggregate, water and admixtures proportioned to provide a non-segregating, self-consolidating, free-flowing and excavatable material. CDF shall be a hardened, dense, non-settling fill with an unconfined compressive strength at 28-days of 100 to 200 psi.

6.4.5 District Manhole Connection

Connections to District manholes shall be made with an elastomeric gasket or flexible sleeve conforming to ASTM C923, (Kor-N-Seal or equal).

6.4.6 Pipe

Pipe shall be PVC gravity sewer pipe conforming to ASTM D-3034, SDR 35. Pipes shall be the following materials:

A. PVC:

- a. ASTM D3034 SDR 35, 4 to 24-inches, or
- b. ASTM C-900 D-1784 DR, 4 to 24-inches (preferred by District), or
- c. ASTM C-905 D-1784 DR, 4 to 24-inches (preferred by District).

B. HDPE: ASTM D-3035

Minimum stiffness shall be 46 psi. Joint type shall be elastomeric gasket conforming to ASTM D3212.

6.5 Backfill

The design standards for backfill compaction are provided below.

6.5.1 General Compaction

- A. Backfill material shall not be placed in the trench in such a way as to permit free-fall of the material until a minimum of 2-feet of cover is provided over the top of the pipe.
- B. Backfill shall be maintained at proper moisture content so that the material is within 5-percent plus or minus of optimum moisture.
- C. Granular backfill shall be placed and compacted in a maximum of 12-inch lifts, and native material backfill shall be placed and compacted in a maximum of 24-inch lifts.
- D. Maximum density and optimum moisture will be determined using Method A of AASHTO T-99. Granular backfill material must meet 95-percent compaction, AASHTO T-99 within public streets and paved areas, and native backfill must meet 85-percent compaction of AASHTO T-99 in non-paved or unimproved areas.
- E. Compaction testing is required at the minimum frequency of one (1) test every 100-feet of trench, unless otherwise specified by a Geotechnical Developer's Engineer.
- F. Native backfill used in Class A shall be compacted to at least 90-percent of maximum density above the pipe zone and to within 3-feet of the ground surface. The top 3-feet shall be compacted to at least 92-percent of maximum density.
- G. Imported trench backfill used for Class B, Class C, and the lower portions of Class D trenches where designated shall be mechanically compacted. The full trench depth

to within 1-foot of the ground surface shall be compacted to a least 95-percent of maximum density. The top 1-foot shall be compacted to no less than 100-percent of maximum density prior to placement of asphalt concrete.

- H. Unless otherwise noted, the Contractor shall be responsible to provide the proper size, type, and specification of backfill.

6.5.2 Pipe Zone

The pipe zone for both mainline and Service Connection shall be defined as extending from the bottom of the pipe bedding to a point 12-inches above the outside of the pipe for the full width of the trench, for all classes of backfill. The pipe zone shall be backfilled with compacted $\frac{3}{4}$ -inch minus crushed gravel and shall provide a firm, unyielding support along the entire pipe length. Immediately following the placement of each pipe section, the crushed gravel pipe bedding shall be placed and compacted to the springline of the pipe. Special effort to properly bed the pipe by slicing backfill in the pipe haunches up to the springline shall be provided. Backfill shall then be placed and compacted in lifts of not greater than 6-inches to the top of the pipe zone.

6.5.3 Easements

After the Contractor has backfilled the pipe zone of the trench as required, the Contractor shall then backfill the balance of the trench, with the type of backfill specified on the approved plans. The trench backfill shall be mechanically compacted in 1-foot layers, to 95-percent of maximum density in roadways and 85 to 90-percent in all other areas.

6.5.4 Backfill Classifications

The backfill classifications used by the District for construction projects in the Public Sanitary Sewer System are listed below.

Class "A" Backfill

The entire trench above the pipe zone shall be backfilled with native excavated material and compacted to 90-percent of maximum density as per AASHTO T-99 and ODOT/APWA specification 00405. Placement of native backfill material for Class A backfill shall include the working of material to achieve suitable moisture content and compaction to the specified density. In lieu of using native material excavated from the trench for Class A and C backfill, the contractor may at their option place and compact to specified density an approved imported backfill material. Imported material must be approved by the Developer's Engineer prior to placement. Material shall be earth, gravel, rock, or combinations thereof, free of humus, organic matter, vegetative matter, frozen material, clods, sticks, and debris and containing no stones having a dimension greater than 4-inches. Sand or pea gravel will not be an approved backfill material.

Class "B" Backfill

The trench above the pipe zone shall be backfilled with gravel for trench backfill and compacted to 95-percent of maximum density as per AASHOT T-99 and ODOT/APWA specification 00405, except for the top 10-inches. The top 10-inches of the trench shall be backfilled and compacted in successive layers of 4-inches of 1½-inch minus "Crushed Gravel", and 2-inches of $\frac{3}{4}$ -inch minus "Crushed Gravel".

Class "C" Backfill

The trench above the pipe zone shall be backfilled with gravel for trench backfill and compacted according to the specifications of the District, except for the top 11-inches. The top 11-inches of the trench shall be backfilled and compacted in successive layers with 8-inches of 1½-inch minus "Crushed Gravel", and layers of Asphaltic Concrete.

Class "D" Backfill

CDF shall not be a replacement for stone pipe base/bedding within the pipe zone. When CDF is called out on the plans as a requirement by the Developer's Engineer the entire trench shall be backfilled with CDF, except for the Trench Foundation, Pipe Base/Bedding and Pipe Zone which shall be backfilled with crushed gravel to District specifications. In paved areas the top 3-inches of the trench shall be backfilled and compacted in successive layers with two, 1½-inch layers of Asphaltic Concrete. The use of CDF is required for backfill material associated with the installation of manholes constructed of any material except concrete. Contact the appropriate roadway authority for specifications of CDF backfill within a private street or public Right-of-Way.

6.6 Testing

District standards for testing Sanitary Sewer Mainlines and appurtenances are provided below (see also Section 6.6.5 regarding required video testing).

6.6.1 General

- A. Test all gravity Sanitary Sewer Mainlines and Service Connections by "low pressure air testing", all mainlines by deflection testing "mandrel", and video inspection.
- B. Test all manholes using the negative pressure (vacuum) method.
- C. Ensure all gravity sanitary sewers and appurtenances successfully pass the air test prior to acceptance and are free of visible leakage or infiltration.
- D. Conduct a video inspection of all mainline pipe in accordance with the applicable section below.
- E. The Contractor may desire to make an air test prior to backfilling for their own purposes; however, the acceptance air test shall be made after backfilling and compaction has been completed to final grade.
- F. The testing equipment and personnel shall be subject to the approval of the Developer's Engineer.
- G. Acceptance testing shall be conducted on all of the manholes with the exception of existing manholes used to extend new Sanitary Sewer Mainline.
- H. The Developer's Engineer or Developer's Engineer's Inspector shall observe all testing and record and submit the results on the District testing forms.

6.6.2 Low- Pressure Air Test

The Developer's Engineer or Developer's Engineer's Inspector shall observe all testing and record and submit the Low-Pressure Air Test results on the District testing forms. A summary of the Low-Pressure Air Test is as follows:

Summary of Method

Plug the section of the sewer line to be tested. Introduce low-pressure air into the plugged line. Use the quantity and rate of air loss to determine the acceptability of the

section being tested. The Contractor may desire to make an air test prior to backfilling for their own purposes. However, the acceptance air test shall be made after backfilling and compaction has been completed to finish grade.

Preparation of the sewer line

Flush and clean the sewer line prior to testing, to clean out any debris. A wetted interior pipe surface will produce more consistent results. Plug all pipe outlets using approved pneumatic plugs with a sealing length equal to or greater than the diameter of the line being tested to resist the test pressure. Give special attention to Service Connections.

Infiltration

The District does not allow new construction of sanitary sewer piping systems to have any visible sign of ground or surface water infiltration. If infiltration into the sanitary sewer piping system is visible it will need to be corrected prior to proceeding with any sanitary sewer testing.

Ground Water Determination

Install a ½-inch capped galvanized pipe nipple, approximately 12-inches long, through the manhole on top of the lowest sewer line in the manhole. Immediately prior to the line acceptance test, the ground water elevation shall be determined by removing the pipe cap and blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic hose to the pipe nipple. The hose shall be held vertically and a measurement of the height in-feet of water over the invert of the pipe shall be taken after the water has stopped rising in the plastic hose.

Procedures

Determine the test duration for the section under test by computation from the applicable formulas shown in ASTM F1417 & UNI-B-6. The pressure gauge used shall have minimum divisions of 0.10 psi and have an accuracy of 0.0625 psi. Pressure-holding time is based on an average holding pressure of 3-pounds per square inch gage (psig) or a drop from 3.5 psi to 2.5 psig above the groundwater pressure.

- A. Add air until the internal air pressure of the sewer line is raised to approximately 4.0 psig. After an internal pressure of approximately 4.0 psig is obtained, allow time for the air pressure to stabilize. The pressure will normally show some drop until the temperature of the air in the test section stabilizes.
- B. When the pressure has stabilized and is at or above the starting test pressure of 3.5 psi gage, commence the test. Before starting the test, the pressure may be allowed to drop to 3.5 psig. Record the drop-in pressure for the test period. If the pressure has dropped more than 1.0 psig during the test period, the line shall be presumed to have failed. The test may be discontinued when the prescribed test time has been completed even though the 1.0 psig drop has not occurred.
- C. The test procedure may be used as a presumptive test that enables the installer to determine the acceptability of the line prior to backfill and subsequent construction activities.
- D. If the pipe to be tested is submerged in ground water, the test pressure shall be increased by 1.0 psi for every 2.31-feet the ground water level is above the invert of the sewer.

Safety

The air test may be dangerous if, because of lack of understanding or carelessness, a line is improperly prepared. It is extremely important that the various plugs be installed

and braced in such a way as to prevent blowouts. If as much as a force of 250-pounds is exerted on an 8-inch plug by an internal pipe pressure of 5 psi, it should be realized that sudden expulsion of a poorly installed plug or a plug that is partially deflated before the pipe pressure is released can be dangerous. As a safety precaution, pressurized equipment shall include a regulator or relief valve set at perhaps 10 psi to avoid over-pressurizing and damaging an otherwise acceptable line. No one shall be allowed in the manholes during testing.

Calculating Time (T) – Low-Pressure Air Test

- A. The pipeline shall be considered acceptable when tested as described herein before if the section under test does not lose air at a rate greater than 0.0015 cubic feet per minute (cfm) per square foot of internal sewer surface. Minimum Testing Times: See **Table 3**.

Table 3. Low Air Test Minimum Testing Time

(T) Minimum, sec.	(d) Pipe Dia., in.	(L) Minimum, ft	(T) for Addition Length (T/L) seconds/foot
340	6	398	0.855
454	8	298	1.520
567	10	239	2.374
680	12	199	3.419
850	15	159	5.342
1020	18	133	7.693
1190	21	114	10.471
1360	24	100	13.676

- B. The following formula shall be used for calculating (T) for lengths of pipe and diameter of pipes not shown in the table referenced above.

$$T = (d^2) \left(\frac{L}{42} \right)$$

where

T = test duration, seconds

d = pipe diameter, inches

L = section length, feet

42 = conversion factor

and

Test PSI = (4.0) + (G/2.31)

G = Ground Water height, ft

Low Pressure Air Failed Test

- A. If the pipe installation fails to meet these requirements, the Contractor shall determine, at their own expense, the source or sources of leakage, and shall repair or replace all defective materials and correct all faulty workmanship. The type of repairs proposed by the Contractor must be approved by the Developer's Engineer before the repair work is begun.
- B. The portion of Sanitary Sewer Mainline that failed to pass the test(s) shall be repaired and retested for low pressure air and mandrel/deflection. The completed pipe installation shall meet the requirements of the air tests before being considered acceptable.
- C. Infiltration of groundwater, in any amount, following a successful vacuum or low-pressure air test as specified, shall be considered as evidence that the original test was in error or that subsequent failure of the sanitary sewer system has occurred. The Contractor will be required to correct the infiltration of groundwater. The portion of Sanitary Sewer Mainline that was repaired and/or failed to pass the test(s) shall be repaired and retested for low pressure air and mandrel/deflection tests.

6.6.3 Manhole Vacuum Test

- A. Manhole Vacuum Test (Adapted from ASTM C1244-93). The Developer's Engineer or designated inspector shall observe all testing and record and submit the results on the District testing forms.
- B. Plug all lift holes and pipes entering the manhole. A vacuum will be drawn, and the vacuum drop over a specified period of time is used to determine the acceptability of the manhole.
- C. This is not a routine test. The values recorded are applicable only to the manhole being tested and at the time of testing.
- D. Preparation of the Manhole:
 - a. Plug all lift holes with an approved non-shrink grout.
 - b. Plug all pipes entering the manhole, taking care to securely brace the pipes and plugs from being drawn into the manhole. The manhole shall be set to finish grade and all paving (if applicable) completed.
- E. Procedure
 - a. Place the test head at the inside of the top of the frame and the seal inflated in accordance with the manufacturer's recommendations.
 - b. Draw a vacuum of 10-inches of mercury, with the valve on the vacuum line of the test head closed, and the vacuum pump shut off. With the valves closed measure the time for the vacuum to drop to 9-inches.
 - c. The manhole shall pass if the time for the vacuum reading to drop from 10-inches of mercury to 9-inches meets or exceeds the values indicated below.
 - d. Using the formulas that follow, the comparable times for a successful vacuum test for different size manholes are:

Table 4. Times for a Successful Vacuum Test for Different Size Manholes

DEPTH (ft)	TIME (sec)		
	Manhole Diameter		
Depth of MH	4-ft	5-ft	6-ft
8	20	26	33
10	25	33	41
12	30	39	49
14	35	46	57
16	40	52	67
18	45	59	73
20	50	65	81
22	55	72	89
24	59	78	97
26	64	85	105
28	69	91	113
30	74	98	121

6.6.4 Mandrel Test

The Developer's Engineer or Developer's Engineer's Inspector shall observe all testing and record and submit the results on the District testing forms. In addition to low pressure air testing, sanitary sewers constructed of PVC sewer pipe shall be tested for deflection not less than 30-days after the trench backfill and compaction has been completed.

Mandrel Size

The rigid mandrel shall have an outside diameter (OD) equal to 95-percent of the inside diameter (I.D.) of the pipe. The inside diameter of the pipe, for the purpose of determining the outside diameter of the mandrel, shall be the average outside diameter minus two minimum wall thicknesses for OD controlled pipe and the average inside diameter for I.D. controlled pipe. All dimensions shall be per appropriate standard. Statistical or other "tolerance packages" shall not be considered in mandrel sizing.

Mandrel Design

The rigid mandrel shall be constructed of a metal or rigid plastic material that can withstand 200 psi without being deformed. The mandrel shall have nine or more "runners" or "legs" if the total number of legs is an odd number. The barrel section of the mandrel shall have an effective length of not less than the nominal diameter of the pipe. A proving ring shall be provided and used for each size mandrel in use.

Mandrel Type

Adjustable or flexible mandrels are prohibited. A television inspection is not a substitute for the deflection test. Mandrels with removable legs or runners may be accepted on a case-by-case basis. Mechanical devices will not be used to pull the mandrel. The mandrel shall be rigid and nonadjustable with an effective length of not less than its nominal diameter.

Manhole to Manhole

Testing shall be conducted on a manhole-to-manhole basis and shall be done after the line has been completely cleaned and flushed. The tests shall be performed without mechanical pulling devices. Any portion of the sewer which fails to pass the test shall be excavated, repaired or realigned, and retested with both air and deflection tests.

Mandrel/Deflection Failed Test

Any portion of the Sanitary Sewer Mainline which failed to pass the test shall be excavated, repaired, or realigned and retested. The portion of Sanitary Sewer Mainline that failed to pass the test(s) shall be repaired and retested using low pressure air and other relevant tests.

6.6.5 Video Inspection and Reports

- A. All newly installed Public Sanitary Sewer Systems shall be inspected by means of a remote video inspection. The video inspections and reports shall be submitted to the District. The Developer's Engineer must review the video inspection and report prior to submitting it to the District.
- B. The inspections reports must note important features encountered during the inspection. The speed of travel shall be slow enough to full access the installation inspecting each pipe joint, tee connection, structural deterioration, infiltration and inflow sources, and deposits.
- C. The camera must be centered in the pipe to provide accurate distance measurements to provide locations of features in the sewer and these footage measurements shall be displayed and documented on the video. The video inspection must be continuously metered from manhole to manhole. All video recording shall be continuous from structure to structure with no "pausing" of the video recording during each pipeline inspection. The pipe shall be cleaned prior to performing the video inspection to ensure all defects, features and observations are seen and logged.
- D. Just prior to beginning the video inspection, while the camera is in place and recording, water shall be introduced into the upstream manhole of each pipe segment until it is observed and recorded flowing past the camera's field of vision in its entirety.
- E. The camera shall have a water-level measuring device (ball, cylinder, etc.) attached that has ¼-inch markings to show the depth of water in the pipe during the video inspection.
- F. Per these standards the Sanitary Sewer Mainline shall have no more than ½-inch of ponding water to be considered acceptable.
- G. Any noted deficiencies shall be remedied, and the applicable section of the mainline re-video inspected prior to submitting the video inspection and reports to the District.

6.6.6 Dye-Testing for Non-Single-Family Residential Properties

Dye-testing shall be used by the Developer's Engineer's Inspector for non-single-family residential properties to confirm that the Public Sanitary Sewer System is not connected to a stormwater/surface water drainage system. Before commencing dye-tests, sewer maps should be reviewed to identify and confirm access to Service Connections. In addition, to avoid costly and unintended false alarms, the Engineer's Inspector or associated field crews should contact key spill response agencies to provide information regarding when and where dye testing is planned to occur. The Engineer's Inspector should also carry a list of phone numbers, if the need arises, to notify spill response agencies in the event dye is released to a stream.

Fluorescent dye is introduced into the Sanitary Sewer Collection System and the most likely/suspected storm sewer manholes and adjacent outfalls or open channel storm drainage systems are inspected to identify potential cross connections. Two or three crews are needed to conduct proper dye-testing. One member of the crew drops the dye into the sewer trunk line, while the other crew member(s) looks for evidence of the dye in downstream sanitary sewer and storm sewer manhole(s) or outfalls to surface drainage systems. To conduct the investigation, a point of interest or down pipe "stopping point" is identified. Dye is first introduced into manholes upstream of the stopping point to determine if they are connected. The process continues in a systematic manner until an upstream manhole can no longer be identified, whereby a branch or trunk of the system can be defined, updated, or corrected.

Table 5 provides key field equipment necessary for dye testing. The equipment needed is not highly specialized. Often, the most important choice is the type of dye used for testing. It is recommended that liquid dye is used; however, solid dye tablets can also be placed in a mesh bag and lowered into a cleanout on a rope. If a longer pipe network is being tested, and dye is not expected to appear for several hours, charcoal packets can be used to detect dye. Charcoal packets can be secured and left in place for a week or two, and then analyzed for the presence of dye.

Table 5. Key Field Equipment for Dye Testing

	Sewer maps (sufficient detail to locate manholes)
	Site plan and building diagram
	Letter describing investigation
Maps, Documents	Identification (e.g., badge or identification card)
	Educational materials (to supplement pollution prevention efforts)
	List of agencies to contact if the dye discharges to a stream
	Name of contact at the District

Equipment to Find and Safely Lift the Manhole Lid	Probe Metal Detector Crowbar Safety equipment (hard hats, eye protection, gloves, safety vests, steel-toed boots, traffic control equipment, protective clothing, gas monitor)
Equipment for Actual Dye Testing	2-way radio, dye (liquid or test strips), high powered lamps or flashlights, water hoses and camera.

The basic drill for dye-tests consists of four steps:

- A. Flush or wash dye down the relevant sanitary system, fixture, or manhole.
- B. Pop open downgradient sanitary sewer manholes and check to see if any dye appears.
- C. Pop open downgradient storm sewer manholes or observe outfalls for potential appearance of dye.
- D. If no dye is detected in the sewer manhole after 1 to 2 hours, check down gradient sewer manhole or connections for the presence of dye.

APPENDIX A. Permitting And Submittal Requirements

Appendix A outlines the planning, plan review, and project completion requirements for both sanitary and storm sewer projects and is included in both the Sanitary Standards and the Stormwater Standards. This section is intended to standardize the submittals and clearly outline the minimum requirements. The requirement for a complete submittal package is intended to reduce the overall plan approval processing time.

Review and Permitting Requirements

The following is a generalized overview of the District development review and permitting processes. This process may vary from one application, submittal and/or building permit to another and is only shown as a general outline of procedures and processes involved in the review and approval of projects located within the District. To obtain further information on a specific plan review or permit process contact a Development Review staff member. The Developer shall have ultimate responsibility for compliance with all requirements specified in these Sanitary Standards and the District's Regulations. The Developer shall be directly responsible for all administrative requirements including application for service, submittal of all required Plans, bonds and insurance, and payment of fees.

General Plan Review and Approval Process

This subsection describes the most common elements of the general development review process for a typical partition, subdivision, multi-family, commercial or industrial project. Applicants should discuss their project with the District and local planning authority early to understand the review and approval process required for a specific project.

1. **Pre-Application Conference** – The Applicant may elect to meet with the local planning authority, District, and other related departments to discuss the proposed project to better understand the potential requirements. It is best if the Applicant submits a preliminary concept or plan, so the District is better prepared to discuss the proposed development. Contact the local planning authority to schedule the pre-application meeting. The planning authority will invite the District to the meeting.
2. **Service Provider Letter** – Applicants proposing to develop or redevelop property shall obtain a Service Provider Letter from the District prior to submitting the land-use or design review application to the local planning authority.
3. **Water Quality Resource Area Boundary Verification** – If applicable, prior to the District issuing a Service Provider Letter, the local planning authority must approve a WQRA Boundary Verification for vegetated buffer requirements (see the Buffer Standards).
4. **Conditions of Approval** – The local planning authority will process the land use/design review application and route a copy of the application for District review. The District will review the application and submit comments to the local planning authority to be included as conditions.
5. **Jurisdictional Authority**– If the proposed project is outside the service area boundaries of the District, the Developer must petition for annexation to the District. The annexation must be approved by the Board before final occupancy or plat approval. The Applicant shall submit a complete annexation packet to WES prior to any plan approvals by WES.
6. **Pre-Design Meeting** – The Applicant may elect to coordinate a meeting with the local planning authority and/or the District to discuss the project and requirements outlined in the conditions.

7. **Plan Submittal** – Upon land use approval, the Applicant must submit required fees, civil plans and supporting documentation as specified in these standards for plan review and approval.
8. **Other approvals** – Other permits and approvals may be required prior to the District approving the plans (i.e., County, City, State, or Federal).
9. **Approved Plan(s)** – Plans and applicable building permit applications will be reviewed, approved, and then signed by an authorized representative of the District. If applicable, it may be necessary to hold a Pre-Construction Meeting with the Developer's Engineer, Contractor, Applicant, District, and other related agency representatives to discuss project requirements, including processes to complete the project as specified in the Sanitary and Stormwater Engineering Agreements.
10. **Construction** – The public sanitary and stormwater management infrastructure shall be constructed under the supervision of the Developer's Engineer as specified in the Sanitary and Stormwater Engineering Agreements.
11. **Construction Completed** – Upon final completion of the construction, the Developer's Engineer will certify the project was constructed in accordance with the approved plans, and the as-built plans are an actual record of what was constructed.

The following items will be completed and submitted prior to requesting the final inspection of the public sanitary and/or stormwater infrastructure:

- i. All sanitary and/or stormwater infrastructure shall be cleaned of sediment and debris.
 - ii. A *Certification of Completion* shall be submitted – Certifies the project was constructed in accordance with the approved plans and District Standards.
 - iii. If applicable, a *Vegetated Planting Certification* shall be submitted – Certifies water quality plantings were planted in accordance with the approved plans and the Stormwater Standards.
 - iv. Two paper copies of the as-built drawings shall be submitted.
 - v. If applicable, submit the video testing of the public sanitary and stormwater conveyance piping systems, along with the Contractor's reports for review and approval. The Developer's Engineer shall review the video and reports, and note any deficiencies discovered in the system(s) prior to submitting the items to the District.
 - vi. Submit a copy of the Developer's Engineer inspection reports.
 - vii. Submit Service Connection drawings prepared by the Developer's Engineer (if required).
12. **Final Inspection** – The District will review the required as-built submittals and, if acceptable, will schedule the final field inspection. All repairs and corrections shall be made prior to the District deeming the project complete.
 13. **Final As-built Drawings** – When requested by the District, the Developer's Engineer shall submit the corrected final as-built drawings on paper, electronic CAD, and PDF files of the as-built civil construction plan set.
 14. **Warranty Surety** – Upon completion of the public sanitary and stormwater final inspection, the Applicant will submit a sanitary and/or stormwater warranty surety in the amount of 25-percent of the actual cost to construct the public infrastructure. The warranty surety will be held for a minimum period of 2-years from the date of completion, or until all the requested system repairs are completed.

15. **Letter of Completion and Acceptance** – Upon final approval of the construction of the public sanitary and stormwater infrastructure, and all of the above noted items have been reviewed and approved by the District, then the District will issue a letter of completion of the stormwater infrastructure, and letter of acceptance of the public sanitary sewer system and/or Public Stormwater System.
16. **Warranty Surety Inspection** – Between 20 and 24-months after issuance of the letter of completion and acceptance, the District will inspect the public facilities at the request of the Owner. The inspection will include all public sanitary and stormwater infrastructure, included the plantings and other related improvements. Once all deficiencies are corrected, the District will issue a warranty surety release letter.

Service Provider Letter Submittal Requirements

The intent of the Service Provider Letter is that, prior to applying for Land Use/Design Review, the Applicant must demonstrate the proposed development is viable in accordance with District Rules and applicable Standards. The Service Provider Letter will only be issued once the Applicant has provided sufficient plans, reports, studies, and agency approvals needed for preliminary review by the District. Based on the preliminary review, the District may require additional information prior to issuance of the letter or as part of the forthcoming land use application. Receipt of the Service Provider Letter does not imply that all District requirements have been met or guarantee that land use approval for the development will be granted.

Applicants must submit the following to the District for review:

- Preliminary plat (if applicable)
- Preliminary proposal for public and private sanitary infrastructure
- Proposed sanitary system layout, including compliance with minimum design standards
- Points of connection to public sanitary sewer system
- Service proposal for upstream properties
- Preliminary Stormwater Management Plan and Drainage Report
- Site assessment and maps
- Proposed storm drainage system and stormwater facilities:
 - Infiltration, detention, and water quality facilities
 - Conveyance System design
 - Point of discharge
 - Emergency overflow pathway
 - Service proposal for upstream properties
- Soils report and analysis
- Drainage area maps
- Infiltration testing results
- Drainage system analysis (upstream and downstream)
- Sizing and conveyance calculations
- Other supporting reports and information (as deemed necessary by the District)

- BMP Sizing Tool calculations
- WQRA Boundary Verification or Natural Resource Assessment
- Preliminary approval for off-site easements
- Offsite mitigation measures for downstream conveyance

Land Use Submittal Requirements

As part of the land use/design review application process, the local planning agency will route applicable sanitary and stormwater plans and reports to District for comment. The Applicant must provide sufficient plans, reports, studies, and agency approvals needed for preliminary review by the District, as including, but not limited to the Service Plan Submittal Requirements, above. The Applicant's materials shall include any additional information or revisions requested by the District with issuance of the Service Provider Letter.

The land use review stage includes WES issuance of 1) a Service Provider Letter, prior to land use application submittal, and 2) land use conditions of approval, following receipt of a complete land use application from the local planning agency.

Plan Review Submittal Requirements

The Developer's Engineer shall submit sufficient supporting information to indicate that the proposed plan design meets all the provisions within these Standards, including the land-use conditions. The submittal information shall include, but not be limited to, the items listed within this section.

Initial/First submittal requirements:

The following is a list of application submittals required by the District for a typical development:

- Water Quality Resource Area (WQRA) Boundary Verification and WQRA Development Permit, submit to the local planning authority as required (see Buffer Standards)
- Complete set of drawings for the Stormwater Management Plan
- Existing conditions
- Infiltration testing
- Proposed on-site storm drainage system and stormwater facilities
- Proposed grading plan
- Existing and proposed off-site improvements
- EPSC Plan
- Details and notes
- Stormwater Management Report that includes:
 - The engineered or BMP Sizing Tool method used to size the stormwater facilities.
 - A Storm Drainage System/Hydrologic and Hydraulic Calculations Report
 - Hydrology and hydraulic calculations with drainage area maps
 - Tributary drainage areas shall be calculated in table form and identified on maps submitted with the report
 - Geotechnical/Geologist Report

- Infiltration Testing
- Soils Report
- Geology Report

Other submittal requirements required by the District as applicable prior to final plan approval.

- Standard Forms
 - Storm System Engineering Agreement
 - Storm System Construction and Engineering Costs Data Sheet
 - Sanitary Sewer Engineering Agreement
 - Sanitary Sewer Construction and Engineering Costs Data Sheet
- Non-Residential Questionnaire Easements/Agreements as applicable
 - Public/Private Sanitary and Stormwater Easements
 - Public/Private Storm Facility Operation and Maintenance Plan/Agreements

Periodically, the District may require additional information to support design assumptions used for sanitary sewer design. When required, the information shall be included on the Plans or submitted in memorandum form to the District. The following may be required:

- Potential size of drainage basin
- Number of potential EDUs

Sanitary Sewer Extension Submittal

The Public Sanitary Sewer Extension submittal shall include all required information along with any other information requested by the District. The required information includes, but is not limited to the following:

- Two sets of complete civil construction Plans.
- Sanitary Sewer Engineering Agreement (form can be found online).
- Construction and Engineering Cost Estimate (form can be found online).
- Sanitary Plan review fees.

All submittals will be reviewed for completeness and the Developer's Engineer will be notified if required information is missing. Upon acceptance of a complete submittal, subsequent project review and approval steps shall be undertaken.

Partition/Subdivision Plat Review and Approval

The Applicant shall submit a preliminary plat to the local planning authority, who will coordinate plat review with the District. The District will only perform an official review of plats received from the local planning authority. The District will review the plat in accordance with the approved Sanitary Plans and Stormwater Management Plans and return comments to the local planning authority. Prior to final plat approval by the District, the Developer shall address the following:

- All associated agreements and easements shall be reviewed and approved by the District. The District will deliver the signed documents to the County Surveyor's Office at the time of plat approval.
- Sanitary and Stormwater Improvements shall be:
 - Fully constructed in accordance with the approved plans, or

- The Applicant shall obtain a performance surety for all proposed sanitary and stormwater improvements on the approved plan. If the construction work is partially completed, the surety will be based on a status report submitted by the Developer's Engineer.
- Public easement documents shall include a site plan and specify the entitlements within the boundary of the easement.
- Deferred Improvements – In some situations, the responsibility to construct improvements may be deferred to the future Owner of a specific lot. Deferrals are at the discretion of the District and will be reviewed on a case-by-case basis. All deferred improvement(s) shall be fully constructed and completed in accordance with the Rules and applicable Standards, prior to any future occupancy permit approvals by the District. All responsibilities of the future Owner to construct the deferred improvements shall be stipulated in a separate document recorded as a covenant with the plat.
 - Subdivision Plats – Any deferred improvements must be part of a District-approved subdivision improvement plan.
 - Partition Plats – Eligible improvements are limited to Service Connections, Conveyance System, pervious surfaces, and stormwater facilities that either benefit one lot, or are shared facilities. In the case of shared facilities, the deferred improvements will be the responsibility of the first future lot Owner to submit a building permit application.
 - Other related agreements and documents (i.e., Homeowner's Association covenants, conditions and restrictions; maintenance agreements, etc.)

Plan Submittals

This section contains specific information and drawing specifications for submittals made to the District. This section is intended to standardize the submittals and clearly outline the minimum requirements. The requirement for a complete submittal package is intended to reduce the overall plan approval processing time. Plans will not be reviewed until a complete plan has been submitted. A complete plan shall include at a minimum all requirements listed in this section.

a. Specific Sheet Submittal Requirements and Specifications

The following sheets are required as part of a complete plan submittal:

- Title Sheet
- Composite Utility Plan
- Composite Stormwater Management Plan Cover Sheet
- Stormwater and Sanitary Sewer Plans and Profiles
- Grading Plan
- EPSC Plan
- Vegetated Buffer Planting Plan
- Stormwater Management Facility Planting Plan
- Standard and Non-Standard Drawings/Detail Sheets
- Standard and Non-Standard Construction Notes
- All applicable Standard Drawings shall be included on a separate sheet in a clear and legible size.

b. Title Sheet

As a minimum the following information shall be found on the title sheet:

- Index of Sheets.
- Complete legend of symbols used.
- Vicinity Map to a scale of not less than 1-inch = 800-feet showing the project location.
- Site Plan of the entire project showing street ROW and/or subdivision layout.
- Temporary and permanent benchmarks including their descriptions. Total acreage including streets directly served.

c. Composite Utility Plan

The Composite Utility plan shall be scaled to show the entire site on one sheet unless otherwise approved by the District and shall show:

- All proposed sanitary and storm improvements
- All other proposed improvements
- All existing utilities and utilities adjacent to and within 100-feet of the project
- Existing natural or artificial drainage features
- Tract names and numbers
- Property lines with tax lot numbers and addresses
- Street names at a minimum shall be shown

d. Composite Plan Cover Sheet (separate sanitary and storm)

The following information shall be included on the Composite Plan cover sheet:

- The scale shall be scale-appropriate to fit the entire site on one sheet, unless otherwise approved by the District
- Show the appropriate contour lines to demonstrate the overall site topography. Generally, these are 1-, 2-, 5-, or 10-foot contour lines. The topography must extend a minimum of 50-feet to 100-feet beyond the proposed limits of development
- Show the entire system
- Show the SMFs
- Shade all other utilities not related to sanitary sewer or stormwater drainage systems.
- Show drainageway(s) as existing and/or proposed.
- Show emergency overflow pathway(s) to an acceptable point of discharge.
- Show existing and/or proposed storm drainage and conservation easements.
- Show vegetated buffers and associated sensitive areas.
- Show all site and roadway improvements.
- Show the subdivision, phase lines or plat boundaries.

e. Plan and Profile Views

Plan and profile views shall include the following information:

Plan View

Plan views shall contain as a minimum the following information:

- The scale shall be 1-inch = 50-feet horizontal. Alternative scales may be approved by the District on a case-by-case basis. The scale shall be shown for each plan and profile view.
- Entire sanitary and storm sewers clearly shown and labeled.
- Plan views showing north predominantly to the top or left of each sheet.
- Plan views showing accurate 1- or 2-inch contour lines and extending a minimum of 50-inches to 100-feet beyond the limits of the development. Alternative contour spacing may be approved by the District on a case-by-case basis.
- All proposed extensions of the Conveyance Systems showing mainlines, manholes and Service Connections.
- Manholes identified and stationed to facilitate comparison of the plan view and the profile view.
- Manhole callouts in District format.
- District stationing formats for new lines and manholes.
- Size and type of pipe, backfill material, and location.
- Sanitary/Storm Service Connection tees off the mainline. For each lot being served, show the mainline stationing, pipe size, length, and depth of lateral at end of pipe.
- Public ROW, property, and easement lines.
- Location of water courses, stream and railroad crossings, culverts and storm drains that cross the alignment.
- Subdivision names, roadway names and lot/parcel numbers or tax lot numbers.
- Existing and proposed Sensitive Areas and the required Vegetated Buffer.
- Existing utilities, all manholes, water mains, services, gas mains, underground power, and other utilities and structures, including hydrants, pedestals, signs, mailboxes, light poles, wells, water mains, valves, pumps stations, and blowoff structures, manholes, valves, meter boxes, power poles, handicap ramps, striping, and trees.
- Existing and proposed edge of pavement on both sides of the street, including shoulders, curb, sidewalk, ditch line, culverts, and driveways.
- Plan view including the above items for a minimum distance of 50-feet to a maximum of 500-feet may be required beyond the proposed improvement in order to prevent future improvement conflicts.
- Location and dimensions of all SMFs, including the following:
 - Setbacks from property lines and structures,
 - Facility wall material, if required, and geotextile/waterproofing membrane specifications,
 - Growing medium specifications,
 - Drain rock and filter fabric specifications,
 - All stormwater piping associated with each facility including pipe materials, sizes, slopes, IEs at bends and connections,

- Ground elevations at catchment locations, channel inverts, top and toe of slope surrounding detention/retention areas,
- Ground slopes of channel inverts and sides, parking lots, bottoms and sides of facilities and adjacent surroundings,
- Invert and top or bottom elevations (if applicable) of pipes, catch basins, overflows, manholes or other similar structures.
- Location of construction fencing used to protect proposed SMFs from compaction and other construction disturbance.
- Location of all drainageways and the 100-year flood plain.
- Show the location and direction of any surface stormwater conveyance path(s).
- Location and detail of all existing facilities on which work is to be performed, i.e., installation, repair, or removal.
- Location and description of all known existing property monuments, including, but not limited to, section corners, quarter corners, donation land claim corners and any other county control monuments.
- Street stationing may be shown on the construction plans, but later removed on the final as-built plans.
- Roof drain connection points shall be shown using the ® symbol.
- Sanitary and storm structures should be easily visible and shown drawn at least 2x the size of the line width and in proportion to the line weight.

Profile View

Profile views shall contain as a minimum the following information:

- Plan and profiles on each sheet shall match and line up on at least one edge of the drawing (i.e., profile to show pipe in same direction as the plan view and lined up plan view over profile).
- The scale shall be 1-inch = 50-feet horizontal and 1-inch = 10-feet vertical. Alternative scales may be approved by the District on a case-by-case basis. The scale shall be shown for each plan and profile view.
- Location of existing and proposed manholes and other appurtenances with each manhole numbered and stationed. Manhole numbers to be provided by District, if applicable. Manhole callouts shall be in the District format. The benchmark used as a basis for vertical control in the design shall be referenced on the plans.
- The location and elevation of an approved benchmark shall be shown on the plans or, if not within the proposed area of work, shall be referenced by number and location. Elevations shall be based on the NGVD88 datum if the project is within ½-mile of a County benchmark. A conversion factor to relate the existing connection point elevations to the plan elevations and benchmark.
- Grid lines using the horizontal and vertical scale.
- Existing and proposed ground and/or pavement surface with elevations noted at critical points.
- Sanitary/Storm lines shall be labeled with the name of the mainline centered under the profile view in large bold letters.

- Sanitary/Storm lines shall be labeled with the pipe size, material, slope (as a %), length and type of backfill between manholes.
- Nonstandard manholes must be labeled with the type (i.e., tamperproof, drop, flat top, etc.).
- Railroad, culvert, ditch, or stream crossings with elevations of the ditch or streambed and casing details.
- All existing and proposed storm, water, and any other crossing utility lines greater than 6-inches in diameter.
- Non-standard SMFs and appurtenances shall show a typical cross-section with dimensions.

f. Grading Plan

Projects requiring grading and/or fill activities will require the submittal and approval of grading plans prior to the beginning of such operations. The District will review the grading plan in the context of the overall Stormwater Management Plan. Generally, an additional grading permit and/or approval are required by the local authority or State agency governing such activities. It is the responsibility of the Applicant to obtain all necessary permits and approvals prior to beginning any grading activity.

Grading plan views shall contain as a minimum the following information:

- Total land area and proposed Disturbed Area,
- Existing topography and impervious area,
- Proposed topography and impervious area,
- 1-, 2-, or 10-foot contour intervals (as applicable),
- Elevations of all existing and proposed streets, alleys, utilities, sanitary and stormwater sewers, and existing buildings and structures,
- Natural or artificial drainageways,
- Limits of flood plains (as applicable),
- Existing and proposed slopes, terraces, or retaining walls,
- All existing and proposed SMFs, drainage structures and/or features, and devices used to protect these areas during construction,
- All stormwater structures/features on-site, upstream, and downstream of the site,
- EPSC Plan (as applicable),
- Drainage calculations when required,
- Drainage easements when required,
- Geotechnical report (if applicable),
- Any other supporting documentation necessary to evaluate the existing and/or proposed site conditions for stormwater management.

g. Erosion Prevention and Sedimentation Control Plan

The general process and requirements for EPSC Plans is outlined in the Stormwater Standards. For specific details on erosion control BMP measures and applications see the **Erosion Prevention and Sediment Control Planning and Design Manual** adopted by the District. A link to this manual can be found on the District website.

If a 1200-C or 1200-CN Permit is required, the EPSC Plan shall meet the requirements of the 1200-C Program, in addition to the following list:

- The total acreage of the site and the total acreage of the proposed Disturbed Area.
- Adjacent offsite drainage patterns indicated by arrows.
- Contours at 2-foot intervals. Where slopes exceed 15-percent, contours may be shown at 5-foot intervals.
- North arrow.
- Existing and proposed structures for the project site.
- Existing and proposed access location for the project site.
- Existing project boundaries, rights-of-way, easements, and jurisdictional boundaries clearly identified by note, symbol, or key.
- Adjacent streets with street names and ROW boundaries.
- Capacity and condition of existing drainage facilities, including roadside or other drainage ditches, that transport surface water onto, across, or from the project site.
- Existing Sensitive Areas, vegetated corridors, and water quality and quantity facilities. For natural drainage features, show direction of flow, drainage hazard areas, and the 100-year floodplain.
- Clearing and grubbing limits.
- Proposed ground contours.
- For multi-phase projects, phasing of any EPSC work clearly indicated on the plan.
- Details of proposed EPSC BMPs.
- EPSC Plan to include a key signifying BMP measure used and placement on EPSC Plan.
- When sedimentation ponds are proposed, at least one cross section detail shall be shown.
- Vegetation/permanent site stabilization measures.
- If submitted independently of the full project plans, a cover sheet with the proposed name of the development, the name and address of the Applicant and Developer, the name and address of the Developer's Engineer, and the land use case file number from the local planning authority.

h. Vegetated Buffer Planting Plan

If restoration of a Water Quality Resource Area or vegetated buffer is required in the **Stormwater Standards**, a plan addressing the requirements shall be submitted.

The construction plans and specifications shall include:

- Water Quality Resource Area and required vegetated buffer boundaries.
- The limits of any approved, temporary construction encroachment.
- Orange construction fencing noted at vegetated buffers as well as at encroachment limits during construction.
- Permanent type fencing and signage at the development and the vegetated buffer boundary noted and details shown.

- Conservation easement documents prepared and easement area shown on the plan.
- Site preparation plan and specifications, including limits of clearing, existing plants, and trees to be preserved, and methods for removal and control of invasive, non-native species, and location and depth of topsoil and or compost to be added to re-vegetation area.

Planting plans and specifications shall include the following information:

- Planting table that documents the common name, scientific name, distribution (planting zone, spacing, and quantity), condition and size of plantings, and installation methods for plant materials listed.
- Mulching rates.
- Plant tagging for identification noted.
- Plant protection methods.
- Seeding mix, methods, rates, and areas delineated.
- Irrigation plan and specifications, including identification of water source, watering timing and frequency, and maintenance of the system.
- Maintenance schedule, including responsible party and contact information; dates of inspection (minimum three per growing season and one prior to onset of growing season); and estimated maintenance schedule (as necessary) over the two-year monitoring period.
- “Good” rated corridor notes (i.e., invasive species removal shall be replanted with native vegetation).
- Access points for installation and maintenance, including vehicle access if available.
- Standard drawing details (north arrow, scale bar, property boundaries, project name, drawing date, Developer’s Engineer and Owner).

i. **Stormwater Management Facility Planting Plan**

The Stormwater Management Facility Planting Plan shall include planting information for each SMF based on requirements of the **Stormwater Standards**.

Planting plan specifications and plans must address all elements that ensure plant survival and overall SMF functional success. At a minimum, landscape specifications and plans must include:

- A planting plan that indicates existing vegetation to be preserved; protective construction fencing; the location of all landscape elements; and the size, species, and location of all proposed plantings. The plant species should be selected and placed in accordance with proper delineation and location of moisture zones where appropriate.
- A plant list or table that includes botanic and common names; size at time of planting; quantity; spacing; type of container; evergreen or deciduous; and other information related to the facility-specific planting in accordance with landscape industry standards. Also include the square footage of each plant zone and the numbers and types of each plant required and provided in each zone.
- A soil analysis for the SMF growing medium (required for all public facilities and may be required for private facilities. A soil analysis is not required for single-family residential sites). The source of the growing medium must be provided. The location of all stockpiles must be indicated on plans, and erosion protection measures included on the EPSC Plan.
- The method of temporary irrigation to be used for the plant establishment period.

- Stormwater Management Facility Planting Plan shall also include all areas requiring protective construction fencing to shield the area from construction traffic and compaction.

j. Landscape Plan

Landscape plans for publicly maintained SMFs shall be prepared, stamped with the seal of, and signed by, a Landscape Architect, registered in the State of Oregon. Plans for privately maintained SMFs do not require the involvement of a Landscape Architect. Landscape Plans shall include the following a detailed landscape plan, at a scale of 1-inch equals 20-feet shall be provided for each landscaped SMF. This plan may be combined with the grading plan. The landscape plan shall include the following:

- Existing vegetation to be preserved and protective construction fencing.
- Areas of SMFs to be designated with construction fencing to protect from construction traffic and compaction.
- Final ground contours at a minimum of a 2-foot contour interval.
- Location of top and toe of slope.
- Limits of embankment designed to impound water.
- Location of all drainage structures as well as any other piped utilities in the vicinity.
- Limits of areas to receive amended topsoil and growing medium.
- A plant list or table, including botanic and common names, size at time of planting, quantity, spacing, type of container, evergreen or deciduous, and other information related to the facility-specific planting, in accordance with landscape industry standards.
- Location of stockpiles (erosion protection measures must be shown on the EPSC Plan).
- Method of temporary irrigation to be used for the establishment period.
- Location of maintenance access, as applicable.

k. Standard Drawings/Detail Sheets

The construction plans shall include a sheet containing all the standard details applicable to a specific project.

The purpose of the District Standard Drawings and Details is to provide basic information as a convenience to those who use them in their designs. These drawings and details are also intended to communicate design standards and practices to the Developer's Engineer.

Detailed drawings shall be included with all construction plans where Standard Drawings do not apply. If a standard drawing, such as a manhole, must be modified to fit existing, or unique conditions, the modified detailed drawing shall be shown on the plan and profile sheet. When appropriate, due to required detail complexity, a separate detail sheet shall be used.

Standard Drawings are available for use on development projects and cannot be modified by designers on a project-by-project basis. It is the responsibility of the Developer's Engineer to incorporate these drawings as originally intended.

Non-standard detail drawings shall be the responsibility of the Developer's Engineer to demonstrate that site conditions require a non-typical device or structure and submit the specifications and supporting documentation to the District for approval. All non-standard details shall be shown on the Stormwater Management Plan.

Stormwater Management Facility Detail sheets are included in the **Stormwater Standards**. A link to additional Standard Details can be found on the District website.

I. General Sanitary/Stormwater Construction Notes

General construction notes required on the plans can be found on the District website or provided upon request. These general construction notes shall be included on the sanitary and Stormwater Management Plans. These notes are required, and the design professional may include other applicable notes they deem necessary.

m. General Sheet Submittal Specifications and As-built Requirements

The following subsections outline general submittal specifications for sheet size, scales, north arrow, text, labeling callout, and title block specification requirements.

Sheet Dimension Requirements

Construction plans shall be clear and legible and submitted on blue-line paper 22 by 34-inches or 24 by 36-inches in size with a 1½-inch clear margin on the left edge and ½-inch margins on all other edges.

Title Block

Located on the bottom edge or at the right side of the drawing, showing the project name, drawing name/type, completed modification date table, the submittal date, drawing number, Developer's Engineer's name, address and official stamp, the Developer/Owner's name, address and, where applicable, the name of the plat of subdivision and/or name of development.

Drawing Scale Requirements

The following general layout guideline shall be used:

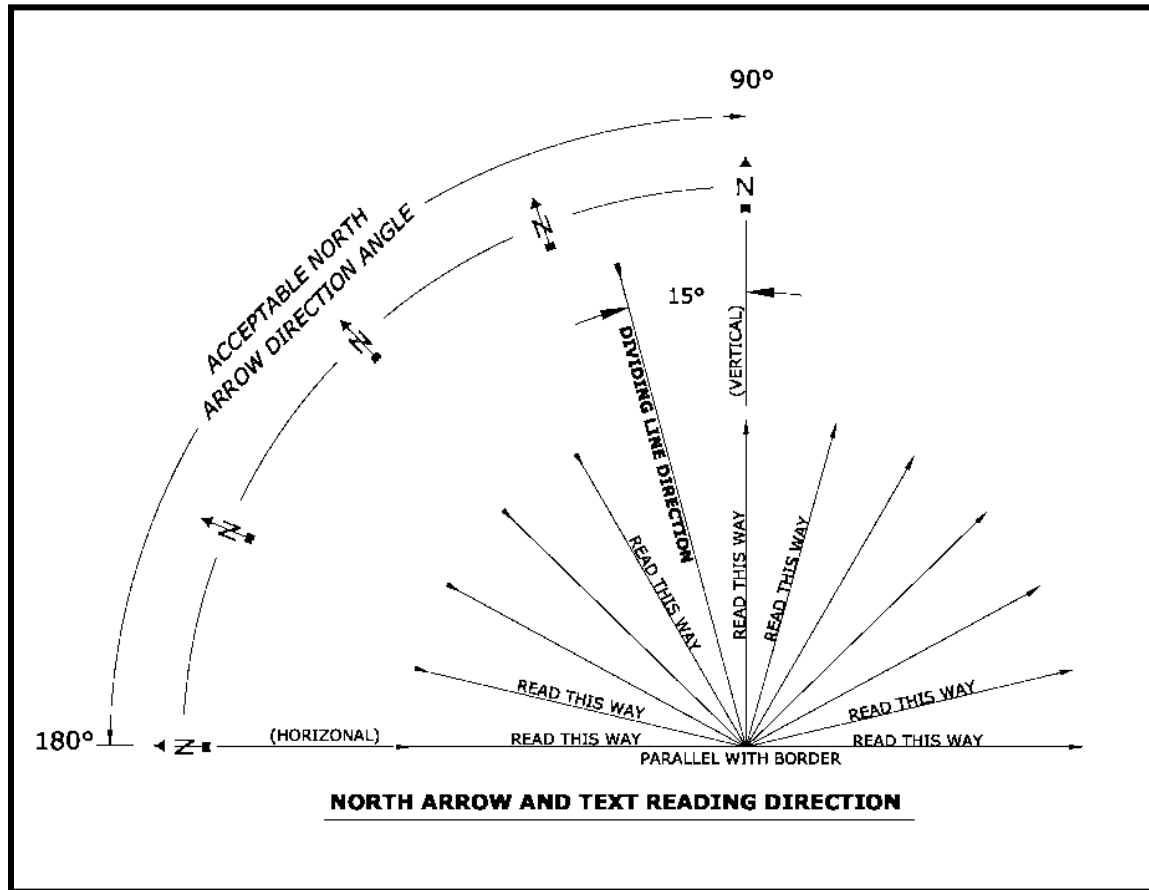
- Plan and Profile sheets shall be 1-inch = 50-feet horizontal and 1-inch = 10-feet vertical. The District may approve alternative scales on a case-by-case basis.
- Each sheet shall include a bar scale with text.

North Arrow Requirements

Each sheet shall include a north arrow. Each separate view on each sheet shall have its own north arrow. The north arrow in each view should face the top (VERTICAL) on the sheet if possible. It is acceptable to align the north arrow off vertical if the project does not fit vertically facing north; it can be rotated counterclockwise as much as 90-degrees.

For acceptable north arrow angle directions see Figure 1.

Figure 1. North Arrow and Text Reading



Lettering/Text Requirements

- Text Rotation
 - Text should be readable from either the bottom or right edge of the sheet. For acceptable text reading direction, see Figure 1.
- Lettering Size and Style
 - Lettering Size
 - The minimum lettering size shall be eight-hundredths (0.08) of an inch high for existing items and a minimum lettering size shall be ten-hundredths (0.10) of an inch high for new items. Items shall be legible and reproducible.
 - Lettering Style
 - Standard text styles should be used. All lettering should be upper case.

Labeling Requirements

- Sanitary and storm structures, proposed and existing, shall be labeled on each sheet.
- All street names are to be labeled in each model space window.
- All tax lots and easements within the development and surrounding area pertaining to the project shall be clearly labeled.
- Non-standard storm structures (e.g., Flat Top Manhole) shall be labeled with the unique structure type after the structure name.

Plan and Profile Views-Structure and Pipe Callouts

Plan View Leader Line Requirements (see Figure 2)

- Leader lines must angle off horizontal and vertical planes from the center point of the structure in plan view. Horizontal and vertical leader lines are acceptable in profile view.
- Leader lines should have an arrow.
- The leader line arrow should touch the edge of the symbol and point to the center of the structure.

Figure 2. Accepted Leader Practice

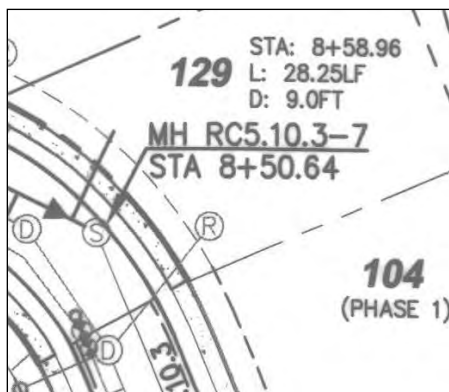
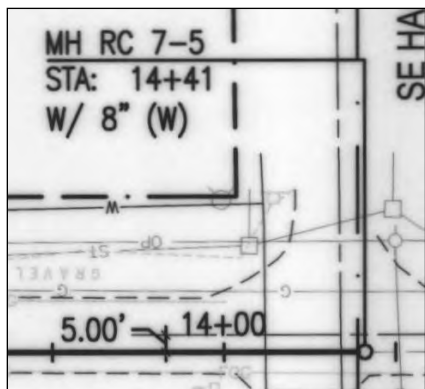


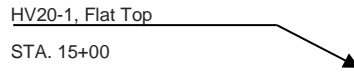
Figure 3. Not Accepted Leader Practice



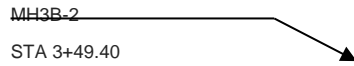
General Sanitary/Storm Structure Callouts in Plan and Profile Views

Street stationing and other related information is allowed on the construction plans; however, this must be removed on the accepted as-built plans.

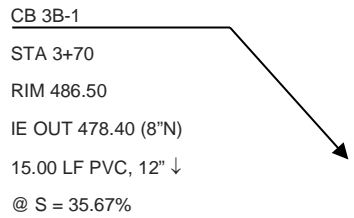
Plan View–Non-Typical Manhole Callout:



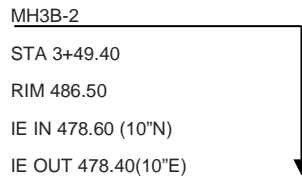
Plan View–Manhole Callout:



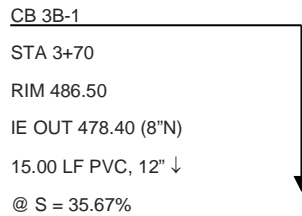
Plan View–Catch Basin and Other Structures:



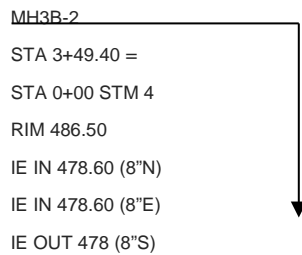
Profile View–Manhole Callout:



Profile View–Catch Basin and Other Structures:



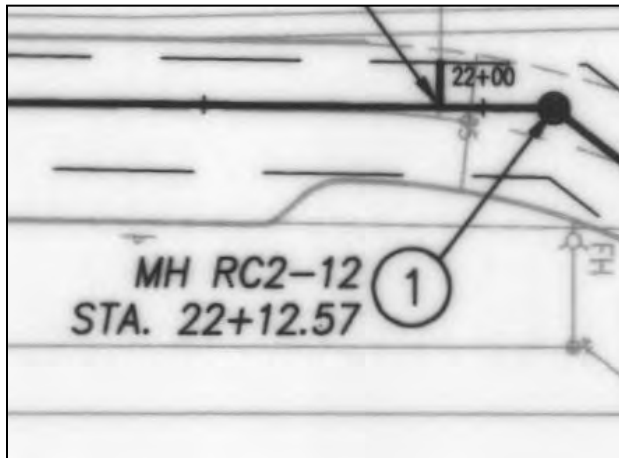
Profile View–Manhole Callout with Multi IE IN:



Reference Balloons

In general, note reference balloons are not allowed. The District will determine the type and format of all callouts on the final as-built drawings if notes are included. If reference balloons are used on construction drawings then the structure name callout must precede the number as shown below in Figure 4.

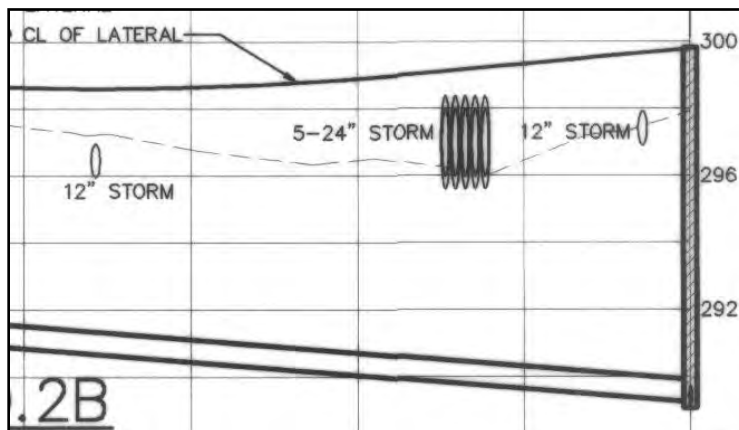
Figure 4. Reference Balloon



Utility Crossings

Show and label all storm, sanitary, waterline, gas and all other utilities that are 6-inches or larger that cross the pipeline alignment in the profile view. Utility invert and crown elevations may be required if they are in close proximity to a proposed storm line. See Figure 5.

Figure 5. Utility Profile



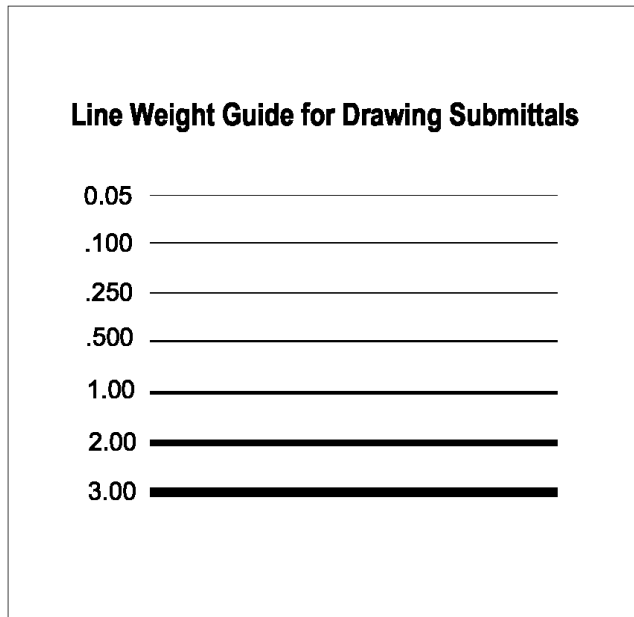
n. Plan and Profile View Sheet Specifications

Plan and Profile Views shall contain the following information:

- Follow the Line Weight Guide for Drawing Submittals, Figure 6.
- Screening layers during plotting will not be permitted for any line types on plots except for widely spaced hatching. Screening lines are not allowed on as-built record drawings.

- The primary structures and pipes (storm) shall appear **BOLD** and stand out against all other background features in both the plan and profile views, i.e., only the applicable conveyance lines and appurtenances should appear bold on submittals.

Figure 6. Line Weight Guide



Plotted Line Widths:

Lines shall be plotted in millimeters and widths and plotted at 1-inch = 50-feet in model space and 1:1 in paper space. The line widths should be plotted the thickness of the lines as illustrated in Figure 6.

Screening of line weights is prohibited for illustration of line weights. Solid gray lines may be used in place of screening lines.

Plan View:

The plan and profile showing the proposed mainline extensions and Service Connections shall have a line weight of 3.00 millimeter (mm) (black). The sanitary or storm in the background shall have a width of 1.00 mm.

Existing contour lines in the plan view may be drawn as a dashed or solid line type; black or gray; between 0.250-0.500 mm in weight.

Profile View:

Profile view of the proposed system mainline shall be drawn at a line weight of 2.00 mm. Other utilities shown in the background shall be drawn at a line weight of 0.500 mm in either black or gray.

Existing sanitary/storm lines shall be shown in the profile view as a dashed black or a gray line in a line weight of 1.00 mm.

Other associated line specifications for plan and profile views:

Profile view gridlines:

- Primary – 0.250 mm/black
- Secondary – 0.050 mm/black
- Tax lots, parcels, property, and easement lines – 1.00 mm/black
- Roadway improvements – 0.500 mm/black
- All other utilities – 0.250 mm/black or gray
- Subdivision or plat boundary – 2.00 mm/black or gray

As-Built Submittal Requirements

The District requires the sanitary and storm plans shall be as-built prior to the acceptance of the project. As-built drawings are necessary to assure the project was constructed per the approved plans and/or meet the requirements of these Standards. The Developer's Engineer of record is responsible for record keeping, inspection, and preparation of the as-built drawings. Final as-built drawings will be submitted in the following manner, paper(s), CAD files and PDF files.

a) Survey requirements

The following Public Sanitary System structures shall be surveyed, and the as-built elevation and location shall be noted on the final as-built drawings:

- i. i.e., ins, outs and rim elevations of the:
 - Point of connection, existing downstream manholes, and structures,
 - Dead end manholes, cleanouts, and structures,
 - Any manhole or structure that may be extended in the future,
 - Any substantial change in the approved plans that deviate more than 0.250-feet in elevation or alignment.
 - A table listing the Service Connections for each building lot noting the mainline stationing, the measurement in linear feet of the location of the Service Connection from the center of the upstream and downstream manholes, pipe size, pipe length, and pipe depth at the property line crossing.
 - Show alignment changes, slope changes, IE changes, pipe size changes and changes in construction materials.
 - Measured depth from existing ground surface of all storm, sanitary, waterline and utilities that cross the pipeline alignment in profile.
 - Type of pipe, backfill material and location.

b) Paper As-built Drawing Requirements

As-built drawings shall contain, at a minimum, the following information:

- For all publicly maintained systems and all public and private detention and SMFs, the Developer's Engineer shall submit certified as-built plans and profile drawings.
- Each page shall be stamped by the Developer's Engineer and stated in writing that it is an as-built drawing.
- Show final pipe alignment, slope, pipe size, and pipe material type in the appropriate view.
- Indicate areas of rock removal not completed by standard backhoe, i.e., splitter or blasting.

- As-built drawings and electronic drawings shall become the unencumbered property of the District and are public records that may be distributed as the District deems necessary.
- Two (2) sets of full sized “Draft” as-built drawings on blue-line shall be submitted to the District for review and redline mark-up prior to final paper, electronic file format submittal, and PDF files.
- The final as-built drawings shall be black-line drawings on paper. High quality plotting preferences must be used so the paper, when photocopied and/or scanned, is capable of being reproduced with all details legible at an archival quality.
- On the applicable Plan View sheet show a table listing the following information for each sanitary and/or storm Service Connection; mainline stationing, measurement in linear feet of the location of the Service Connection from the center of the upstream and downstream manholes, pipe size, pipe length, and pipe depth of the service lateral at the property line.
- Street stationing and information not related to the storm system construction is not allowed on the as-built plans; however, this information is acceptable on the construction plans.
- Remove all hatching associated with material type.
- The subdivision name shown in the title block shall match the name shown on the plat.

c) CAD Requirements for As-Built Drawings

General Requirements:

- AutoCAD electronic files must be compatible with the AutoCAD version the District is currently running.
- Standard fonts, shapes and line types are required.
- All drawings are to be plotted in paper space at a scale of 1:1.
- For specific line weight requirements see **Section A.3.7**.
- Show the project boundary in **BOLD** type.
- All manholes, catch basins, fire hydrants, valves, meters, etc. are to be inserted as blocks. All blocks are to be created on layer 0.
- Not allowed are blocked x-refs and preferences or permissions set, so that the District cannot access each layer individually.
- All drawings are to be seamless and drawn in model space.
- Drawings are NOT to be rotated off of world coordinate bases.
- Drawings are to be delivered purged of all unused layers, blocks, line types, and styles.
- The drawing files saved to disk shall be ready to plot when opened and be the same dated file used to plot the as-built.
- SoftDesk point files are not requested and should not be transmitted. Combination files are acceptable.
- The final as-built drawing files are to be saved under one file folder. All drawings, x-refs, plot files, images, text, and shape files are to be in this one file folder.
- Only pertinent files are to be submitted in this project folder. NO revisions, SoftDesk files, log times, or miscellaneous DWGs are to be submitted.

- Before approval will be given, the digital file and hard copy will be evaluated to verify that they are the identical drawings and to make sure all required and only necessary files are included.
- The electronic as-built drawings shall be submitted along with a completed “As-built Release of Liability Form” and all contents shall become the property of the District.
- Provide the CAD as-built project drawings in digital data and saved to compact disk or flash drive for transmittal to the District.
- Use of a self-extracting PKZIP file format is acceptable. Use of compressed file(s) is allowed only if the decompression program is included.

Disks Labeling Requirements:

- Title of project
- The District (WES Log#) project file number
- Specify contents of the disk (DWGs)
- Name of the Developer’s engineering firm submitting the files
- The project completion date.

d) PDF File Requirements for As-Built Drawings

AutoCAD electronic files must be compatible with AutoCAD version the District is currently running.

As-built drawings and electronic drawings shall become the unencumbered property of the District and are public records that may be distributed as the District deems necessary.

The PDF files shall represent an exact copy of the as-built drawings.

General Conditions for Performance And Warranty Surety

The District may require the Applicant to submit a surety, cashier’s check, or irrevocable letter of credit from an acceptable financial institution to guarantee performance or warranty in completion of the improvements required by these standards. Upon default, the District may draw upon the surety or available funds to complete the remaining work or remedy violations. The different types of acceptable surety are listed below.

a) Surety – Types of Acceptable Guarantees

Surety shall be provided only through State regulated surety companies while assignment or commitment of savings or loan proceeds shall be through State regulated financial institutions. Cash Acknowledgment is a cash surety held directly by the District.

b) Surety Forms

All sureties shall be submitted with forms provided by the District or other authority having jurisdiction to permit or regulate the activity. All sureties are subject to review and approval by the District’s legal department.

c) Performance Surety

The Applicant shall provide a Performance Surety acceptable to the District prior to recording of the plat for residential developments or the issuance of building permits for commercial or industrial developments, if the required public improvements are not completed and/or accepted by the District.

The following conditions shall be met prior to acceptance of the Performance Surety:

- The Performance Surety shall be in the amount of 125-percent of the Developer's Engineer's cost estimate for all approved but uncompleted sanitary and stormwater improvements, including landscaping requirements. The Developer's Engineer's cost estimate for the required improvements will be approved by the District.
- Nothing herein shall limit the Owner's responsibility for repair and maintenance to the amount of the surety.

The following conditions shall be met prior to release of the Performance Surety:

- All improvements must be completed as shown on the approved plans and accepted by the District in accordance with the Rules, Regulations, and Standards.
- A warranty surety shall be provided to the District prior to release of the Performance Surety.

If the Applicant fails to comply with the conditions of approval and the approved plans, the District may call upon the Performance Surety to complete the improvements according to the approved plans.

At the end of the surety period when all conditions are satisfied, the residual surety amount shall be released.

d) Warranty Surety

In general, the Warranty Surety is posted by the surety principal to the District to ensure the principal will maintain, repair, replace and be responsible for damage to the improvements for a period of 2-years following the date the District deems the improvements complete and a letter of completion and/or acceptance is issued.

The following conditions shall be met prior to acceptance of the Warranty Surety:

- The Warranty Surety shall be in the amount of 25-percent of the actual constructed cost for all constructed sanitary, stormwater, and vegetated buffer vegetated buffers are covered in the warranty bond improvements. The Developer's Engineer's cost data sheet will be approved by the District.
- The Warranty Surety shall be in favor of the District and be issued for a minimum two-year period from the date of completion of the sanitary or storm system.
- Nothing herein shall limit the Owner's responsibility for repair and maintenance to the amount of the surety.
- Upon notification from the District, the principal shall, within 30-days complete corrective measures to the satisfaction of the District.
- The District may perform emergency work without notice to the principal or surety.
- All work performed by the District due to the nonperformance of the principal or in response to an emergency shall be reimbursed to the District within 30-days of invoice.
- If the principal fails to reimburse the District in 30-days, the District may demand payment from the Surety.
- The warranty period may be extended, if the required improvements show any signs of failure during a final warranty release inspection.

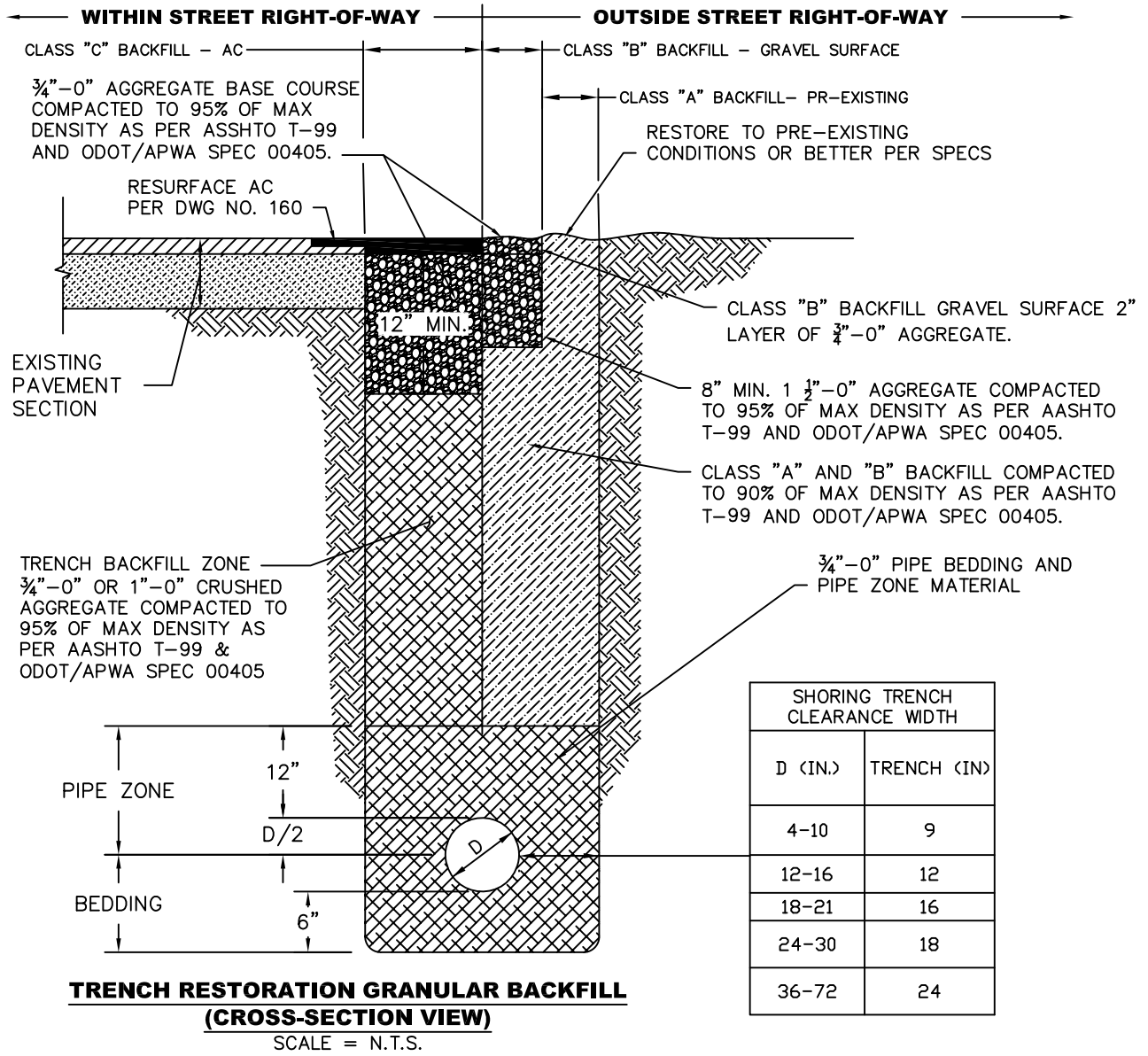
The following conditions shall be met prior to release of the Warranty Surety:

- The Owner or Developer shall perform a thorough cleaning of all sanitary and stormwater improvements.

- The District shall make a determination of final completion in conformance with the approved plans, specifications, and District standards as well as conduct a final warranty surety inspection of all sanitary and stormwater improvements, including landscaping in any SMF and vegetated buffer. If more than 20% of the total area within a SMF or Vegetated Buffer is not in compliance with the approved plans, then the vegetated plantings will be replanted and/or repaired to meet the requirements of the approved plans. If replanting of the SMF or Vegetated Buffer is required, then an additional 1-year warranty surety in the amount of 25-percent of the cost of replanting all of the effected vegetated planting areas shall be required. The additional 1-year warranty surety will be renewed annually until the vegetated plantings are acceptable to the District.
- Any deficiencies resulting in non-acceptance of the work permitted shall be identified in writing on a final punch list and presented to the Developer's Engineer and/or Permittee with a date named for correction and completion. Upon correction of the noted deficiencies and the determination that all work is in conformance with District Standards, the work will be deemed complete and all sureties shall be released.

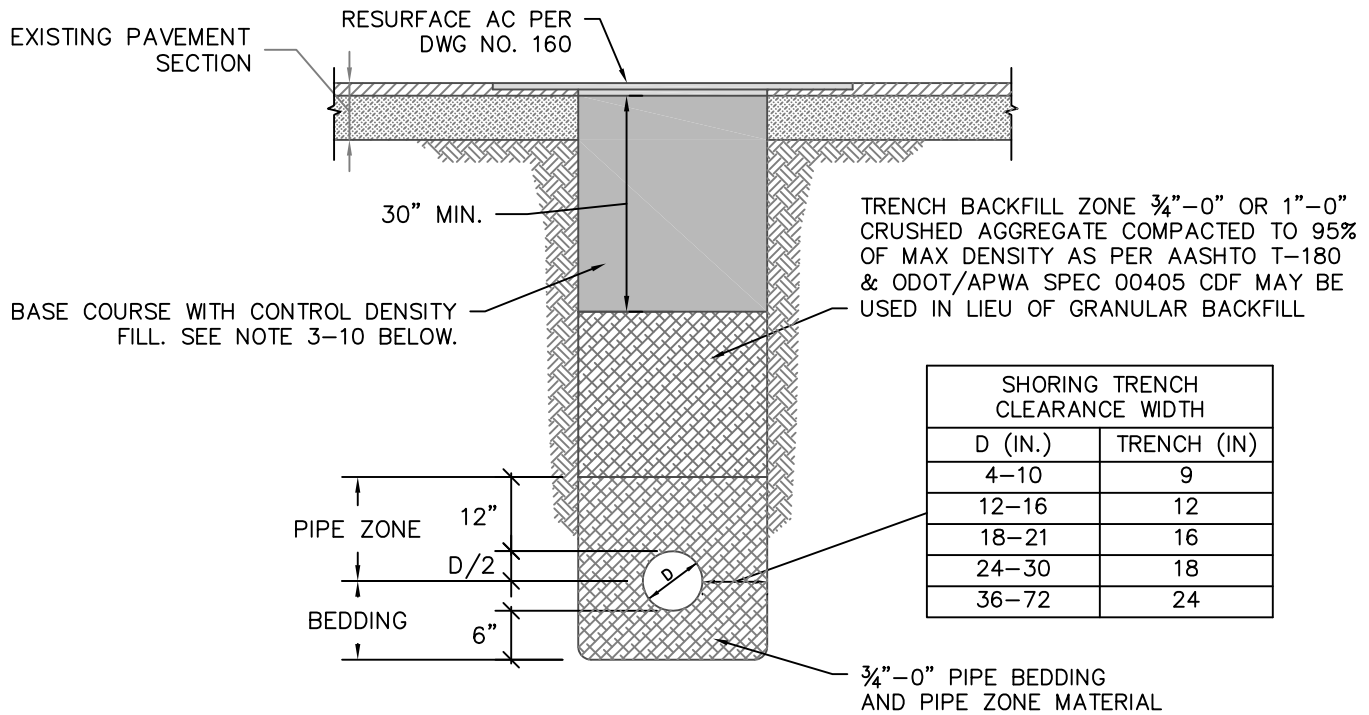
Appendix B: Standard Detail Drawings

SAN -001	TRENCH RESTORATION CLASS BACKFILL "A", "B" & "C"
SAN -002	TRENCH RESTORATION WITH CDF
SAN -003	MANHOLE - TYPICAL
SAN -004	MANHOLE – FLAT TOP
SAN -005	MANHOLE _ OUTSIDE DROP
SAN -006	MANHOLE - BASE
SAN -007	MANHOLE – CONNECTION FLEXIBLE
SAN -008	MANHOLE - STEP
SAN -009	MANHOLE – NEW OVER EXISTING PIPE
SAN -010	STANDARD FRAME & COVER
SAN -011	SURBURBAN FRAME & COVER
SAN -012	FRAME & COVER SECURE FOR TRAFFIC AREAS
SAN -013	FRAME & COVER WATERTIGHT FOR NON TRAFIC AREAS
SAN -014	CHANNEL – INTERSECTION
SAN -015	CHANNEL – 90 DEGREES
SAN -016	CHANNEL - SLIDE
SAN -017	ANCHOR WALL
SAN -018	CLEANOUT PAD
SAN -019	SANITARY CURB STAMP
SAN -020	SERVICE CONNECTION CLEANOUT
SAN -021	SERVICE CONNECTION
SAN -022	SERVICE CONNECTION INTO MANHOLE
SAN -023	CONCRETE CAP
SAN -024	CONCRETE ENCASEMENT / CLOSURE COLLAR
SAN -025	CONCRETE MANHOLE CLOSURE COLLAR
SAN -026	MANHOLE CHIMNEY SEAL
SAN -027	PRECAST RING EXTENSION
SAN -028	INSERTA TEE



NOTES:

1. PAVEMENT SHALL BE CUT PER STANDARD DRAWING 200.
2. PROVIDE COMPACT TEST RESULTS FOR TRENCH BACKFILL.

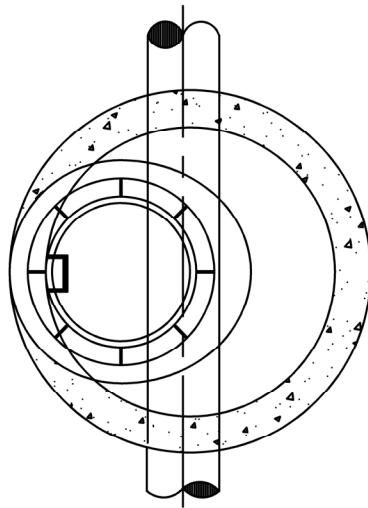


TRENCH RESTORATION W/ CDF

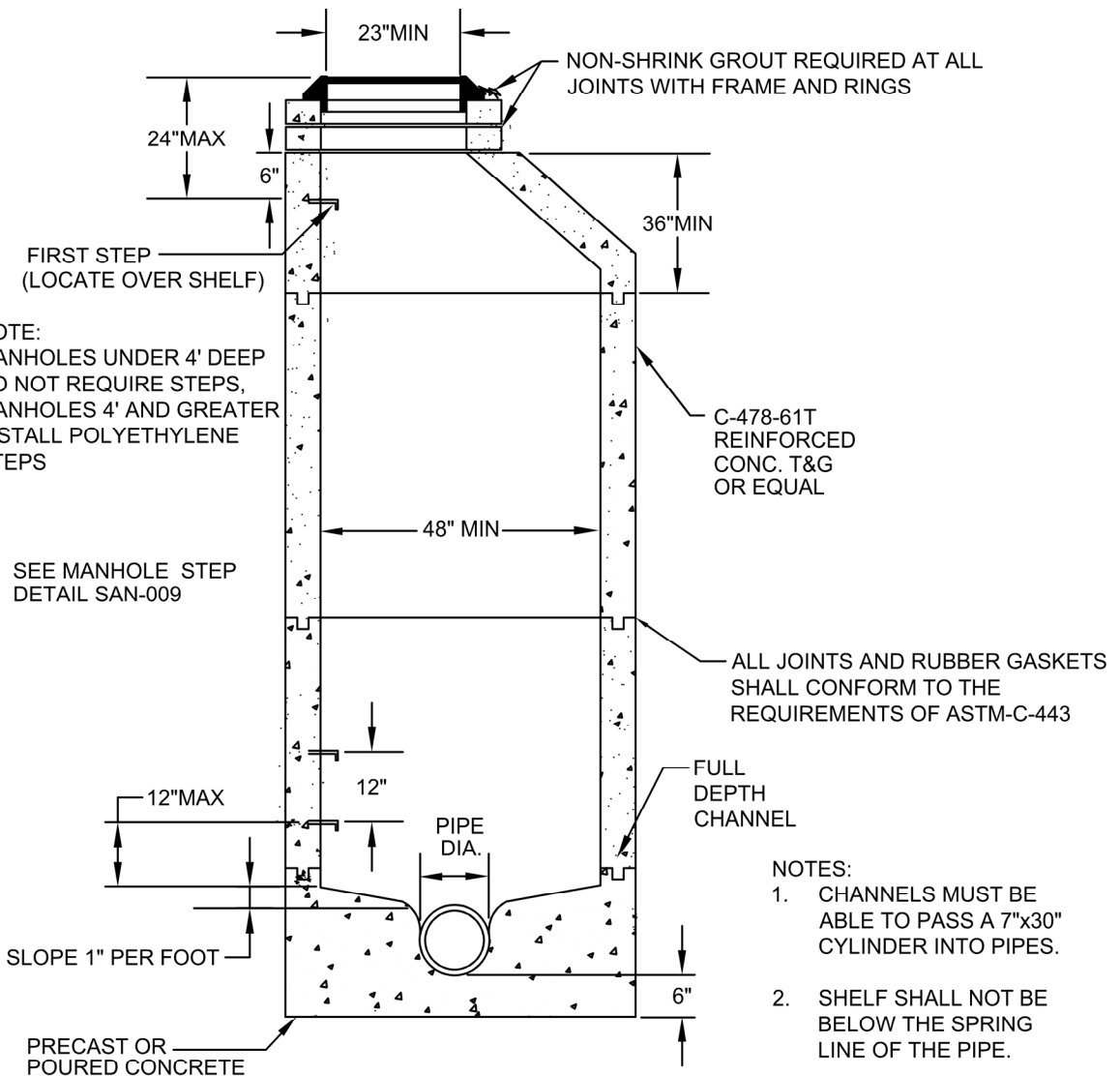
SCALE = N.T.S.

NOTES:

- SAWCUT EXISTING AC PAVEMENT ACCORDING TO CITY/COUNTY SPECIFICATIONS.
- CONTROL DENSITY FILL (CDF) CONSISTS OF A MIXTURE OF PORTLAND CEMENT, FLY ASH, AGGREGATES, WATER AND ADMIXTURES PROPORTIONED TO PROVIDE A NON-SEGREGATING, SELF-CONSOLIDATING, FREE-FLOWING MATERIAL WHICH WILL RESULT IN A HARDENED, DENSE, NON-SETTLING FILL PRODUCING UNCONFINED COMPRESSIVE 28 DAY STRENGTH FROM 100 PSI TO A MAXIMUM OF 200 PSI.
- CONTRACTOR WILL PROVIDE BATCH WEIGHTS SHOWING THE AMOUNTS OF ALL INGREDIENTS IN THE MIX, BATCH TIME, AND THE TOTAL AMOUNT OF THE BATCH.
- CDF SHALL BE PERFORMANCE BASED AND MEET THE FOLLOWING CRITERIA:
 - TYPE F FLY ASH: 200 LB MIN, TYPE I OR II CEMENT: 50 LB MIN
 - SETTLING SHALL BE LESS THAN 1/8" PER FT DEPTH
 - FINE AGGREGATE (LESS THAN 3/8") SHALL BE USED
 - CONCRETE UNIT WEIGHT SHALL BE 100 PCF MIN
- CDF SHALL NOT BE PLACED ON FROZEN GROUND. DURING PLACEMENT TEMPERATURE MUST BE AT LEAST **34 DEGREES F. AND RISING.** CDF PLACING SHALL STOP WHEN TEMPERATURE IS 38 DEGREES F OR LESS AND FALLING.
- TRENCH SECTIONS TO BE FILLED WITH CDF SHALL BE CONTAINED AT EITHER END OF THE TRENCH SECTION BY BULKHEADS OR EARTH FILL.
- DURING CDF CURE TIME (TYP. 48 HOURS) THE CONTRACTOR SHALL INSTALL STEEL SHEETS OR OTHER PROTECTIVE DEVICES TO ALLOW FOR THE PASSAGE AND SAFETY OF TRAFFIC AND SO NO LOAD IS TRANSFERRED TO THE CDF.
- CONTRACTOR SHALL ALLOW FOR A MINIMUM 48 HOUR CURE TIME FOR CDF PRIOR TO PLACING ASPHALT. STEEL PLATES ARE NOT ALLOWED IN THE ROADWAY JANUARY THRU MARCH, NOVEMBER AND DECEMBER WITHOUT PRIOR APPROVAL FROM THE CITY AND/OR COUNTY.
- 30 INCH DEPTH OF CDF MAY BE REDUCED IF CONFLICTING WITH PIPE ZONE BACKFILL.



NOTE:
MANHOLE LID TO
BE FLUSH WITH
ROADWAY OR
6" ABOVE FINISH
GRADE IN EASEMENTS

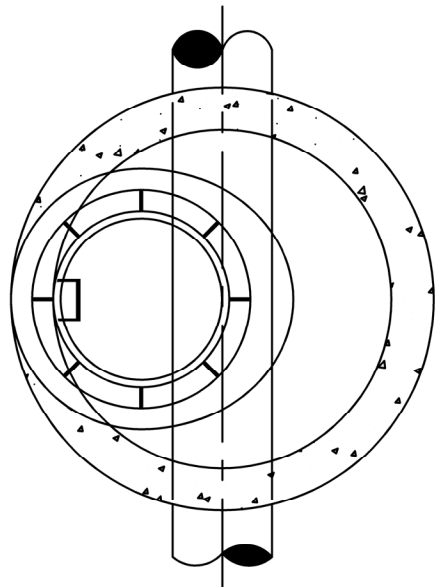


NOTE:
MANHOLES UNDER 4' DEEP
DO NOT REQUIRE STEPS,
MANHOLES 4' AND GREATER
INSTALL POLYETHYLENE
STEPS

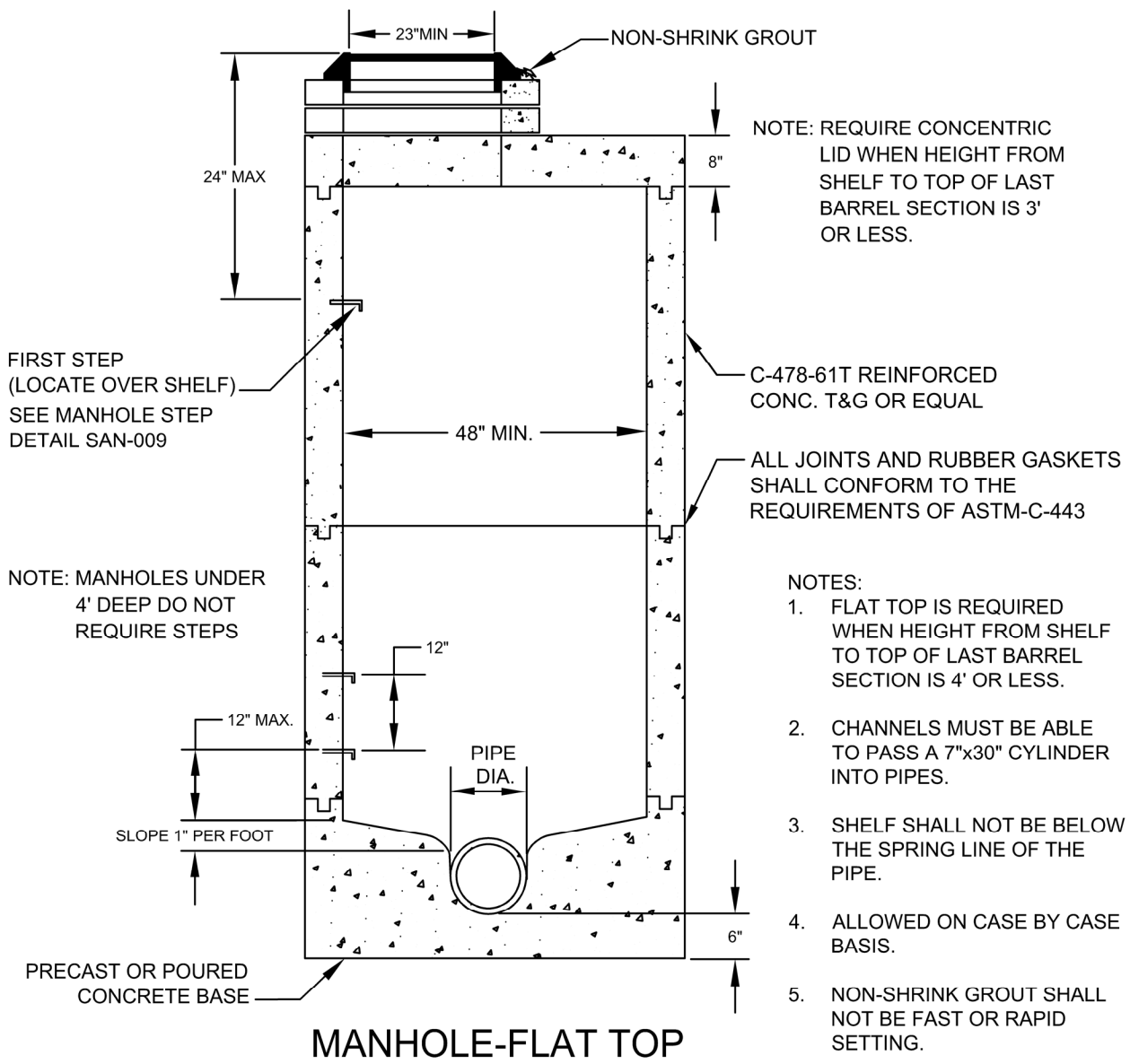
SEE MANHOLE STEP
DETAIL SAN-009

- NOTES:
1. CHANNELS MUST BE ABLE TO PASS A 7"x30" CYLINDER INTO PIPES.
 2. SHELF SHALL NOT BE BELOW THE SPRING LINE OF THE PIPE.
 3. NON-SHRINK GROUT SHALL NOT BE FAST OR RAPID SETTING.

MANHOLE-TYPICAL



NOTE: MANHOLE LID TO BE 6" ABOVE FINISH GRADE IN EASMENTS
BARREL SECTION IS 3'



CLACKAMAS
**WATER
ENVIRONMENT
SERVICES**

CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

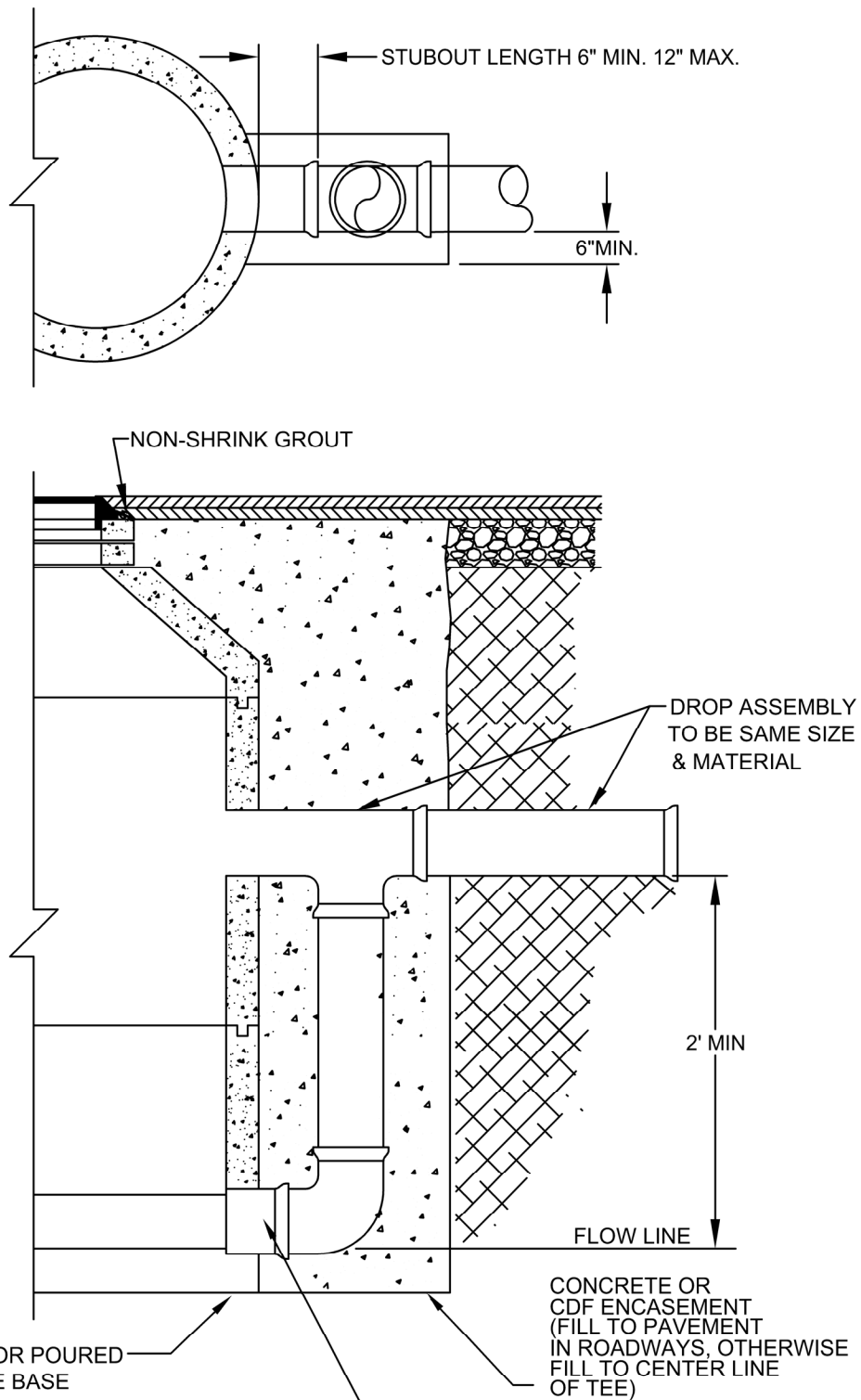
APPROVAL DATE: July, 2021

SCALE: N.T.S.

STANDARD
DRAWING

MANHOLE-FLAT TOP

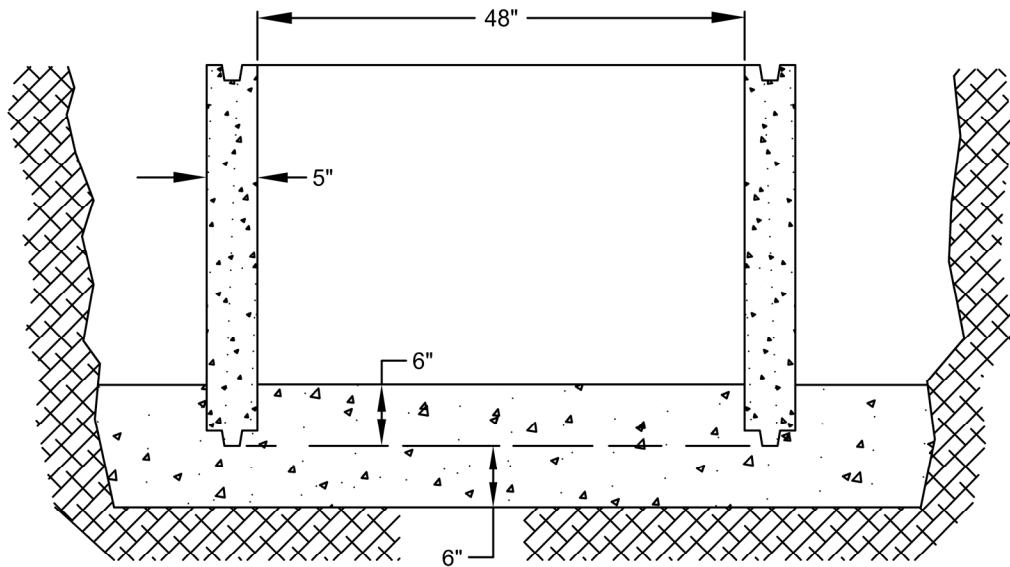
**SAN-
004**



NOTES:

1. SEE THE APPROVED PLANS FOR IE IN & IE OUT ELEVATIONS.
2. NON-SHRINK GROUT SHALL NOT BE FAST OR RAPID SETTING.

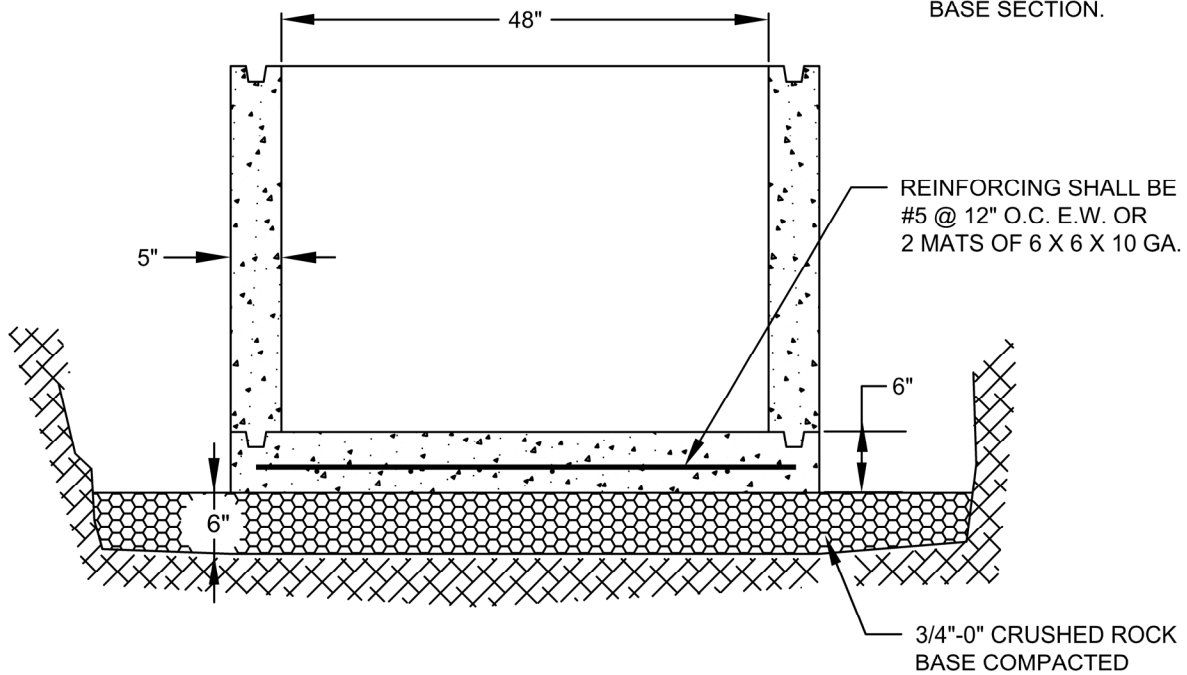
MANHOLE-OUTSIDE DROP



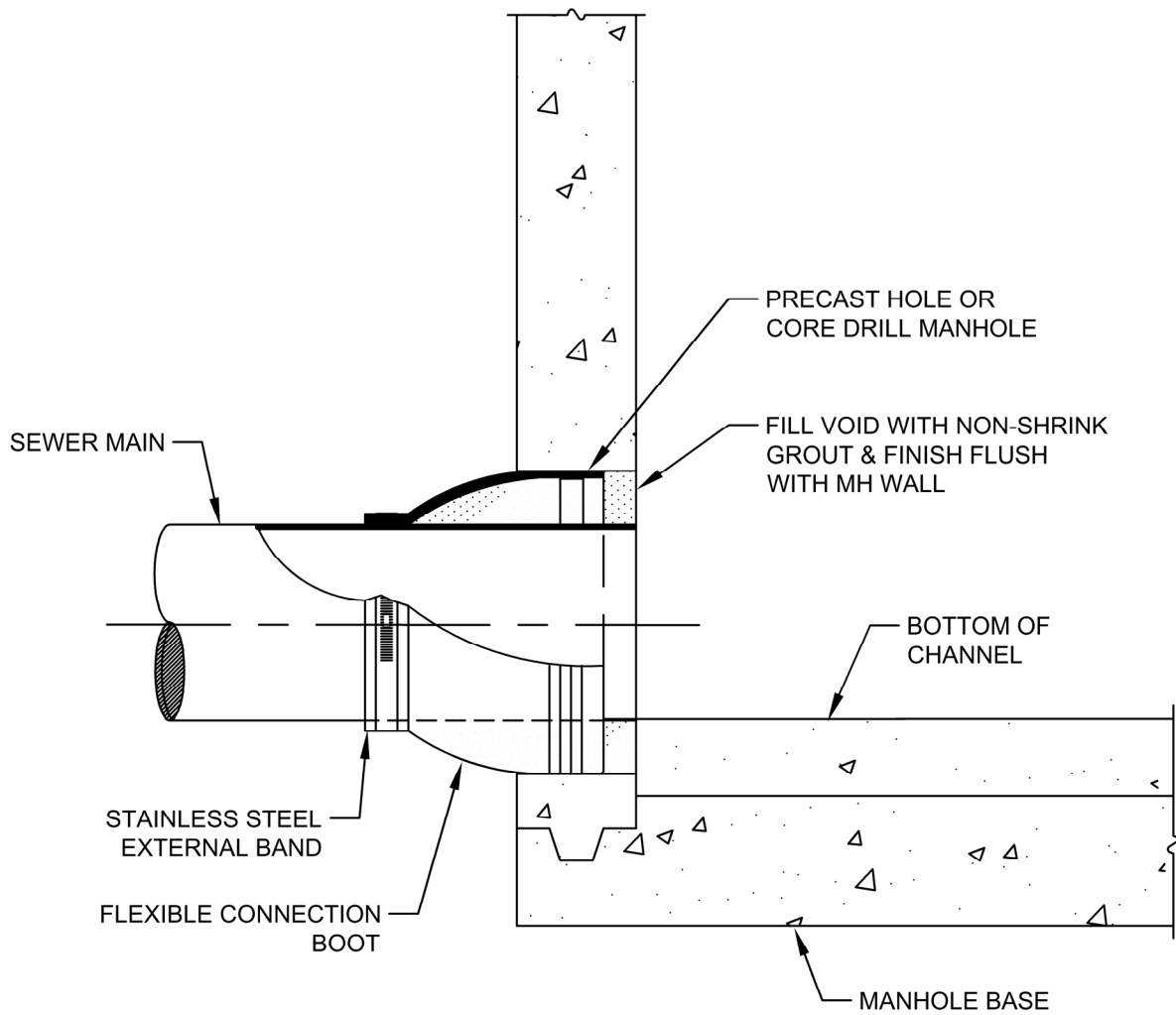
POURED IN PLACE MANHOLE-BASE

NOTE:

1. CONCRETE TO EXTEND 12" OUTSIDE OF MH WALL AND 6" ABOVE THE BOTTOM OF THE BASE SECTION.



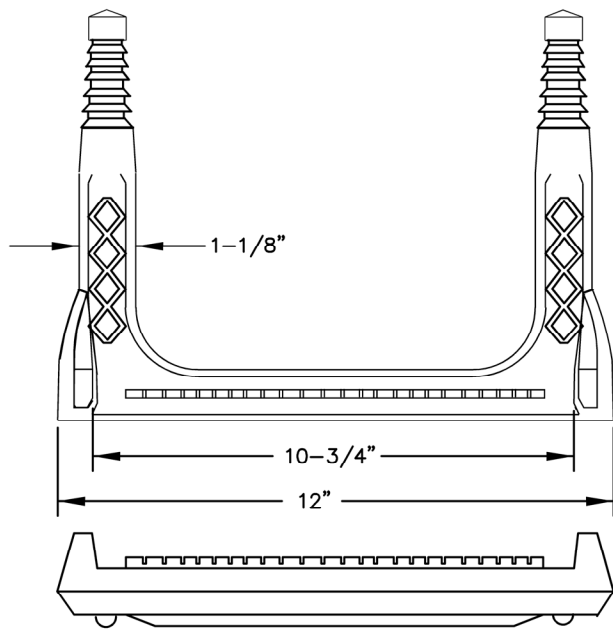
PRECAST MANHOLE-BASE



NOTE:

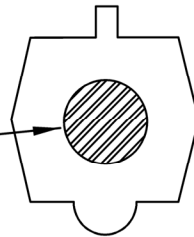
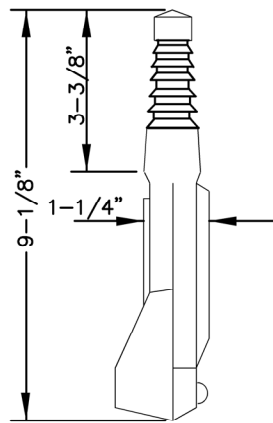
1. NON-SHRINK GROUT SHALL NOT BE FAST OR RAPID SETTING.

MANHOLE-CONNECTION FLEXIBLE
(KOR-N-SEAL OR EQUAL)

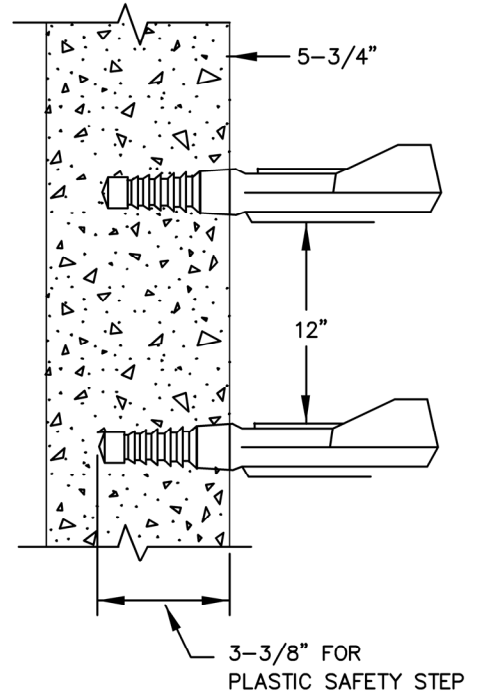


COPOLYMER POLYPROPYLENE PLASTIC

1/2" GRADE 60 REINFORCEMENT



- NOTES:
1. ALL STEPS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478.
 2. MANHOLE STEPS MUST BE TIGHT AND FIRMLY EMBEDDED.
 3. ALL STEPS WITHIN A MANHOLE SHALL BE OF THE SAME DESIGN, TYPE, AND SIZE. (MIXING OF UNMATCHED STEPS IS NOT PERMITTED).



NOTES:

1. STEPS LOCATED AT 12" O.C. LOCATED ON VERTICAL SIDE OF MANHOLE.
2. STEPS A MAXIMUM OF 24" FROM RIM AND 6" FROM TOP OF CONE TO FIRST STEP.

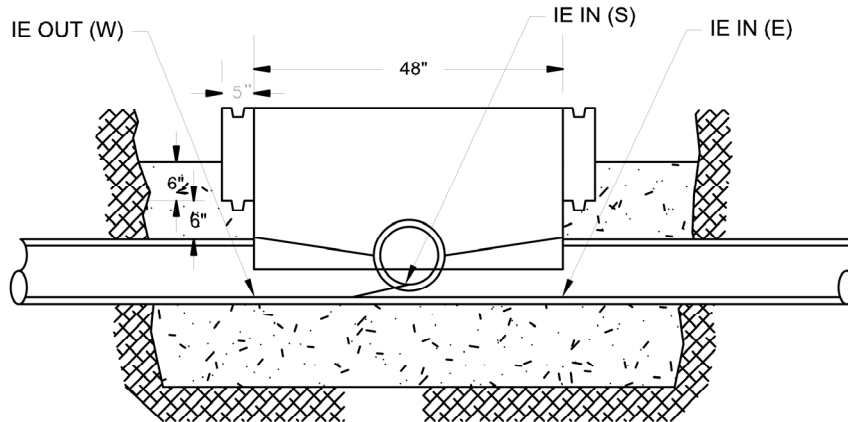
MATERIALS:

PLASTIC:

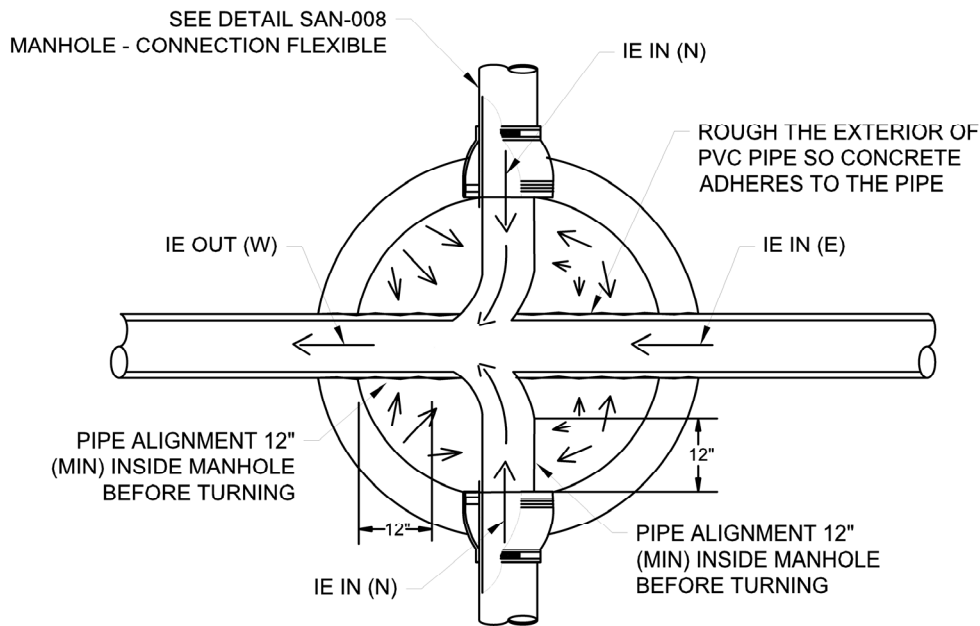
MUST CONFORM WITH ASTM C-478.
 STEEL REINFORCING BAR MINIMUM 1/2" GRADE 60.
 MEETING REQUIREMENTS OF ASTM A615 ENCAPSULATED
 WITH INJECTION MOLDED COPOLYMER POLYPROPYLENE
 WITH SERRATED SURFACES.

NOTES:

1. CONSTRUCT THE MANHOLE WITH THE IE INS AND OUTS PER THE APPROVED PLANS.
2. WES INSPECTION REQUIRED PRIOR TO BACKFILLING/COVERING THE EXISTING PIPES AND AROUND THE MANHOLE CONTACT OUR OFFICE AT 503-742-4567 AND ASK FOR DEVELOPMENT SERVICES, OR EMAIL WES-PERMIT SERVICES@CLACKAMAS.US TO SCHEDULE THE INSPECTION. INSPECTION RESPONSE TIMES CAN VARY, THEREFORE PLAN TO WORK ACCORDINGLY.
3. SET BARREL SECTION OVER EXISTING CONCRETE PIPE; POUR MANHOLE BASE AND NEW CHANNEL. CUT OUT PIPE AND CLEAN, GROUT AND SMOOTH CHANNEL.
4. CHANNELS MUST PASS A 7-INCHES DIA. BY 30-INCHES LONG CYLINDRICAL OBJECT FOR MAINTENANCE PURPOSES.
5. POURED CONCRETE BASSE TO EXTEND 12-INCHES OUTSIDE OF MANHOLE WALL AND 6-INCHES ABOVE AND BELOW THE BOTTOM OF THE BARRELL SECTION.

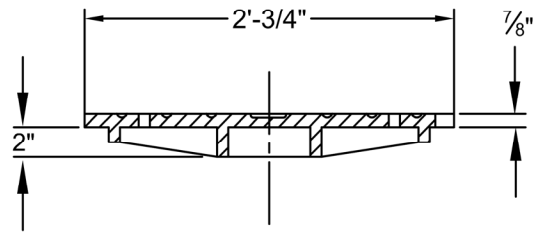
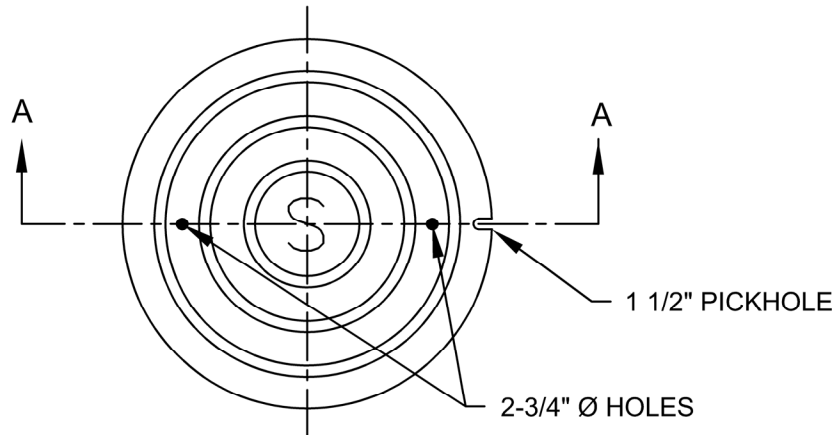


POURED IN PLACE MANHOLE BASE
(SEE DETAIL SAN-007)

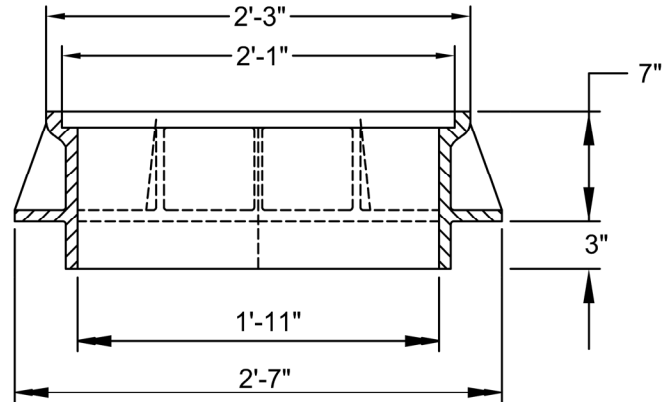


GENERAL PLAN ON
CHANNEL INTERSECTION

STANDARD



SECTION A-A

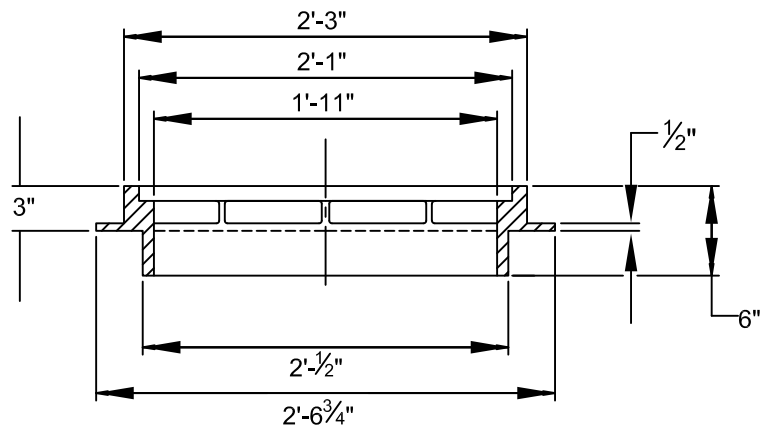
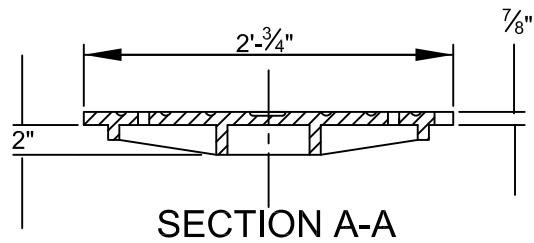
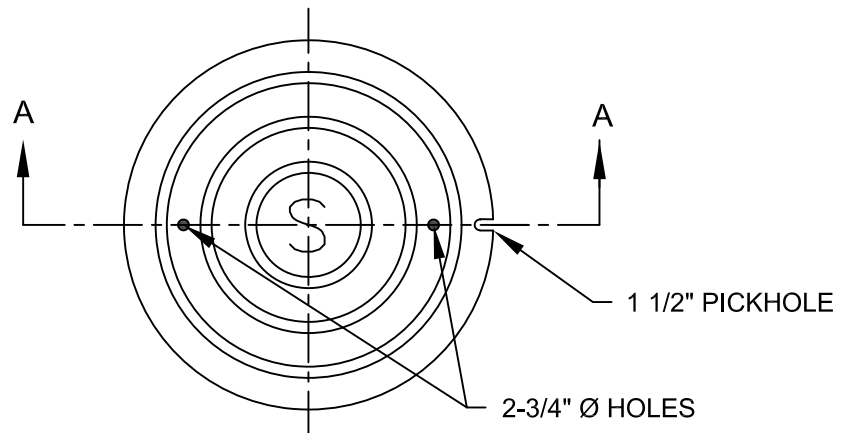


FRAME & COVER STANDARD

NOTES:

- 1. STANDARD FRAME AND COVER TO BE USED ON STREETS OR AS NOTED ON CONSTRUCTION PLANS.
- 2. SANITARY COVER WILL HAVE 2 - 3/4" Ø HOLES AND 1 - 1 1/2" PICKHOLE IN LID FOR LIFTING HOOK.

SUBURBAN



FRAME & COVER SUBURBAN

NOTES

1. SUBURBAN FRAME & COVER CAN BE USED IN EASEMENTS OR AS NOTED ON CONSTRUCTION PLANS.
2. SANITARY COVER WILL HAVE 2 -3/4" Ø HOLES AND 1 - 1 1/2" PICKHOLE IN LID FOR LIFTING HOOK.



CLACKAMAS
**WATER
ENVIRONMENT
SERVICES**

CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

APPROVAL DATE: July, 2021

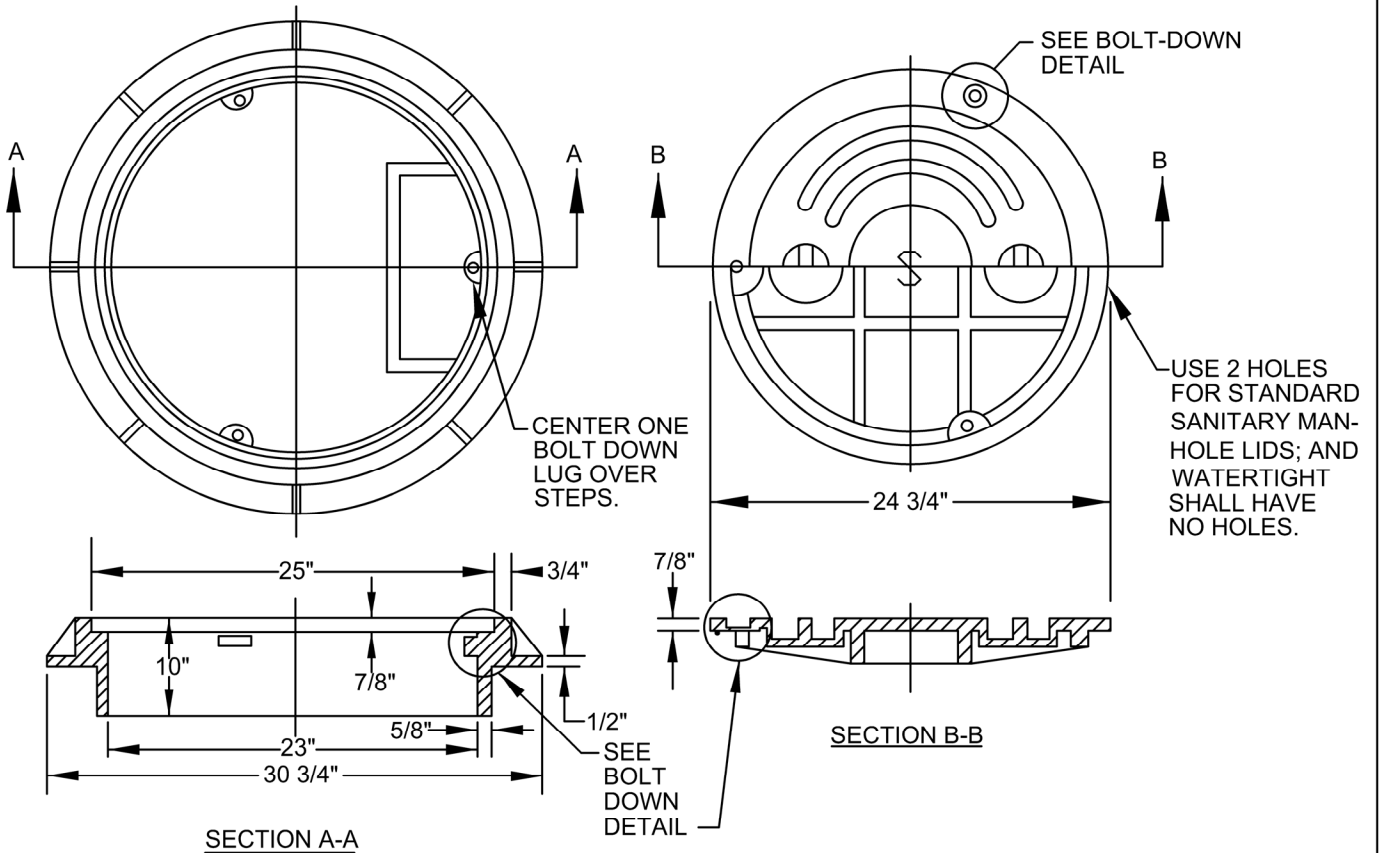
SCALE: N.T.S.

**SUBURBAN FRAME
& COVER**

STANDARD
DRAWING
**SAN-
011**

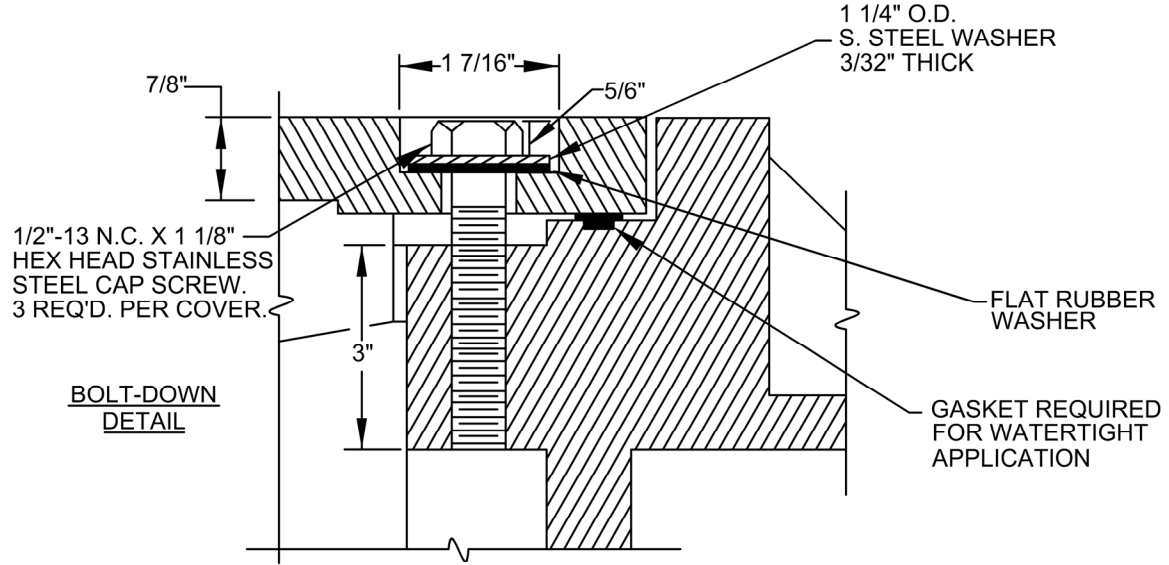
TAMPERPROOF MANHOLE RING

3-BOLT DOWN COVER



SECTION A-A

SECTION B-B



**BOLT-DOWN
DETAIL**

**SECURE MANHOLE DETAIL
FOR USE IN TRAFFIC AREAS**

NOTE: COVER AND FRAME SHALL BE OF GRAY CAST IRON A.S.T.M. A-48 CLASS 30.

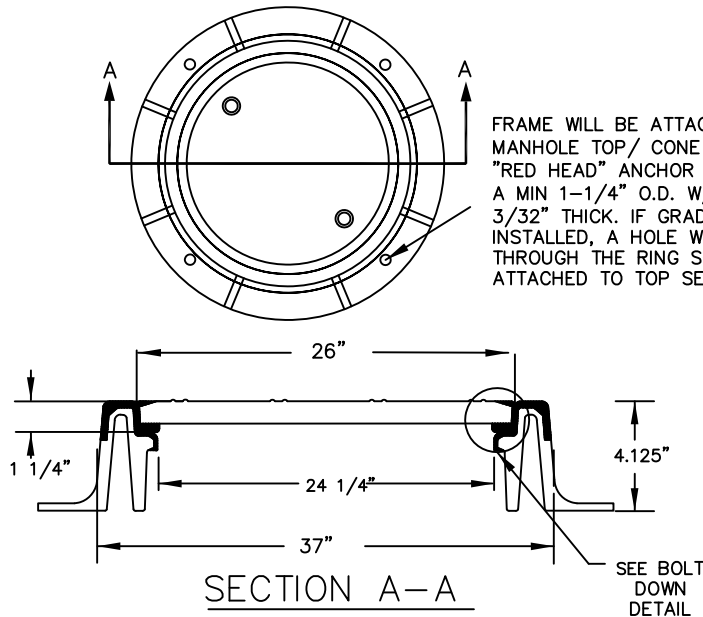


CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

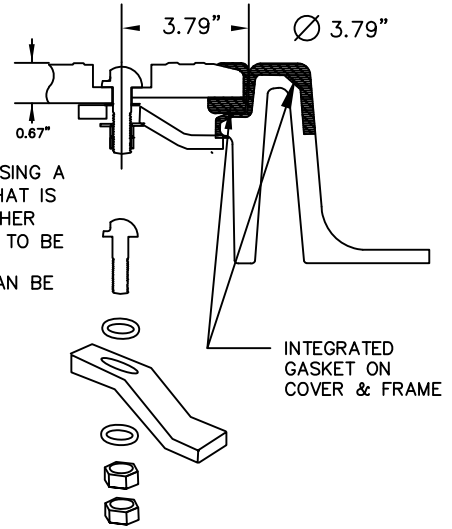
APPROVAL DATE: July, 2021 SCALE: N.T.S.
**FRAME & COVER
SECURE
FOR TRAFFIC AREAS**

STANDARD DRAWING
SAN-012

WATERTIGHT MANHOLE RING



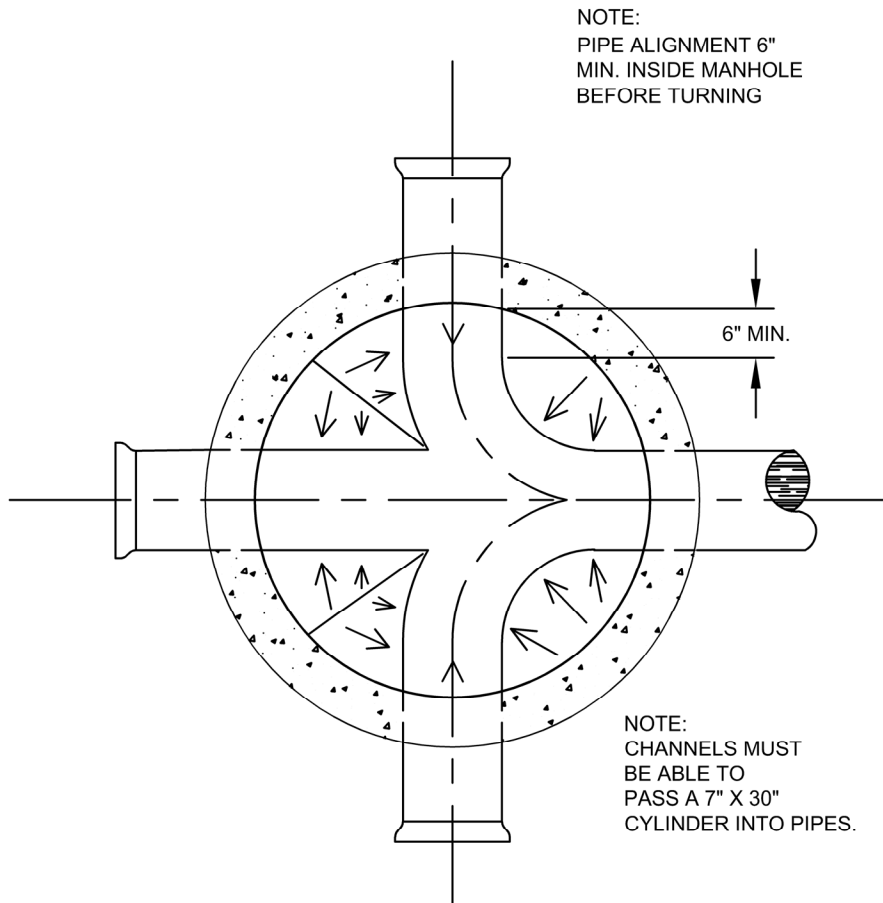
FRAME WILL BE ATTACHED TO THE MANHOLE TOP/ CONE SECTION BY USING A "RED HEAD" ANCHOR (OR EQUAL) THAT IS A MIN 1-1/4" O.D. W/S. STEEL WASHER 3/32" THICK. IF GRADE RINGS NEED TO BE INSTALLED, A HOLE WILL BE CORED THROUGH THE RING SO THE BOLT CAN BE ATTACHED TO TOP SECTION.




BOLT-DOWN DETAIL

NOTES:

1. COMPOSITE WATERTIGHT/TAMPER PROOF MANHOLE FRAME AND COVER SHALL BE USED IN ALL EASEMENT AND OFF STREET OR BEHIND PROPERTY AREAS SUSCEPTIBLE TO FLOODING.
2. THE WATERTIGHT MANHOLE COVER FRAME SHALL BE GMI 2600 SERIES COMPOSITE FRAME AND COVER MANUFACTURED BY TITUS INDUSTRIAL GROUP, INC. OR ITS EQUAL.
3. THE LOCKING MECHANISM SHALL BE A TWISTLIFT® MANUFACTURED BY TITUS INDUSTRIAL GROUP, INC. OR ITS EQUAL.
4. THE TWISTLIFT® COMPOSITE ACCESS COVER LOCK IS DESIGNED AS A SECURITY BOLT REQUIRING A SPECIAL TOOL TO OPERATE THE QUARTER TURN BOLT AND LIFT THE COVER FROM THE FRAME. IT FUNCTIONS WITH EITHER THE STANDARD CAM LOCK QUARTER TURN PADDLE, OR THE EXTENDED 'SURCHARGE' PADDLE.
5. THE BOLT SHALL BE MACHINED FROM 316 STAINLESS STEEL.
6. THE BOLT FEATURES A DOMED HEAD WITH 3 EQUALLY SPACED 'J' SLOTS RUNNING HORIZONTALLY AROUND THE BOLT HEAD.
7. STANDARD BOLT SIZES ARE 14 MM COARSE THREAD WITH A FLAT MACHINED ON TWO SIDES TO ENGAGE PADDLE.
8. THE PADDLE IS DIE CAST FROM 304 STAINLESS STEEL AND ALSO AVAILABLE IN BOTH STANDARD CAM LOCK DESIGN, OR EXTENDED SURCHARGE CONFIGURATION.
9. THE BOLT AND PADDLE WILL BE ASSEMBLED USING TWO STAINLESS STEEL 14 MM NUT'S, THE BOTTOM NUT IS A STANDARD NUT THAT WILL BE TORQUE TO 35 FT. LBS. TO GIVE THE DESIRED TENSION ON THE BOLT. A SECOND NYLOCK™ LOCK NUT IS USED AS A JAM NUT, AND TORQUE TO 90 FT. LBS. STAINLESS STEEL WASHERS ARE USED TO PROVIDE CONSISTENT TURNING RESISTANCE.
10. A 5/16 STAINLESS STEEL SET SCREW, SET IN A THREADED HOLE IN THE COVER PROVIDES FOR A STOP AT ¼ TURN OF OPERATION.
11. THE BOLT WILL BE OPERATED BY MEANS OF A SPECIALLY MADE OPENING KEY CONSISTING OF A SPECIAL SOCKET ATTACHED TO A 'T' HANDLE USED TO BOTH TURN THE BOLT, AND LIFT OUT THE COVER.
12. ONE SET OF REPLACEMENT OPENING KEYS WILL BE PROVIDED TO WATER ENVIRONMENT SERVICES AT TIME OF INSTALLATION.
13. THE BOLT HEAD IS PROTECTED BY A WEATHER RESISTANT PLASTIC DEBRIS CAP. THE CAP IS INCLUDED WITH EACH LOCK.

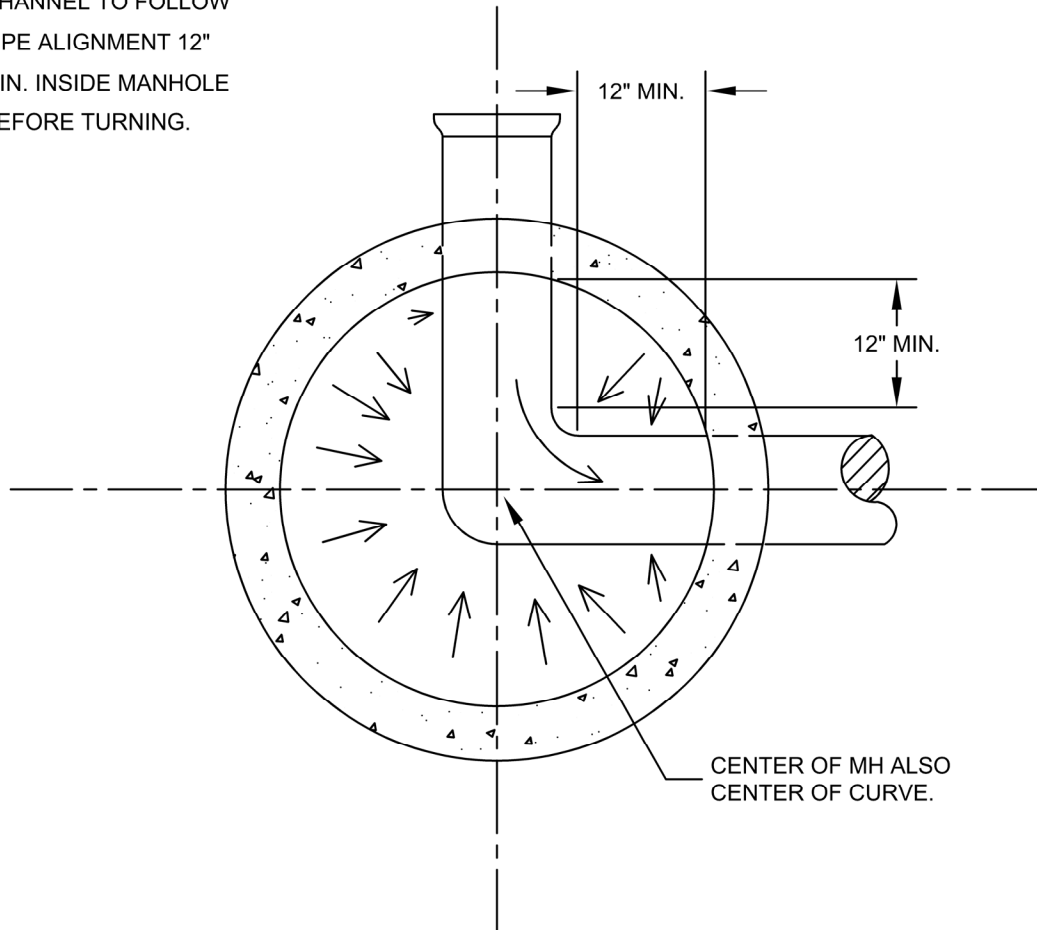


CHANNEL-INTERSECTION

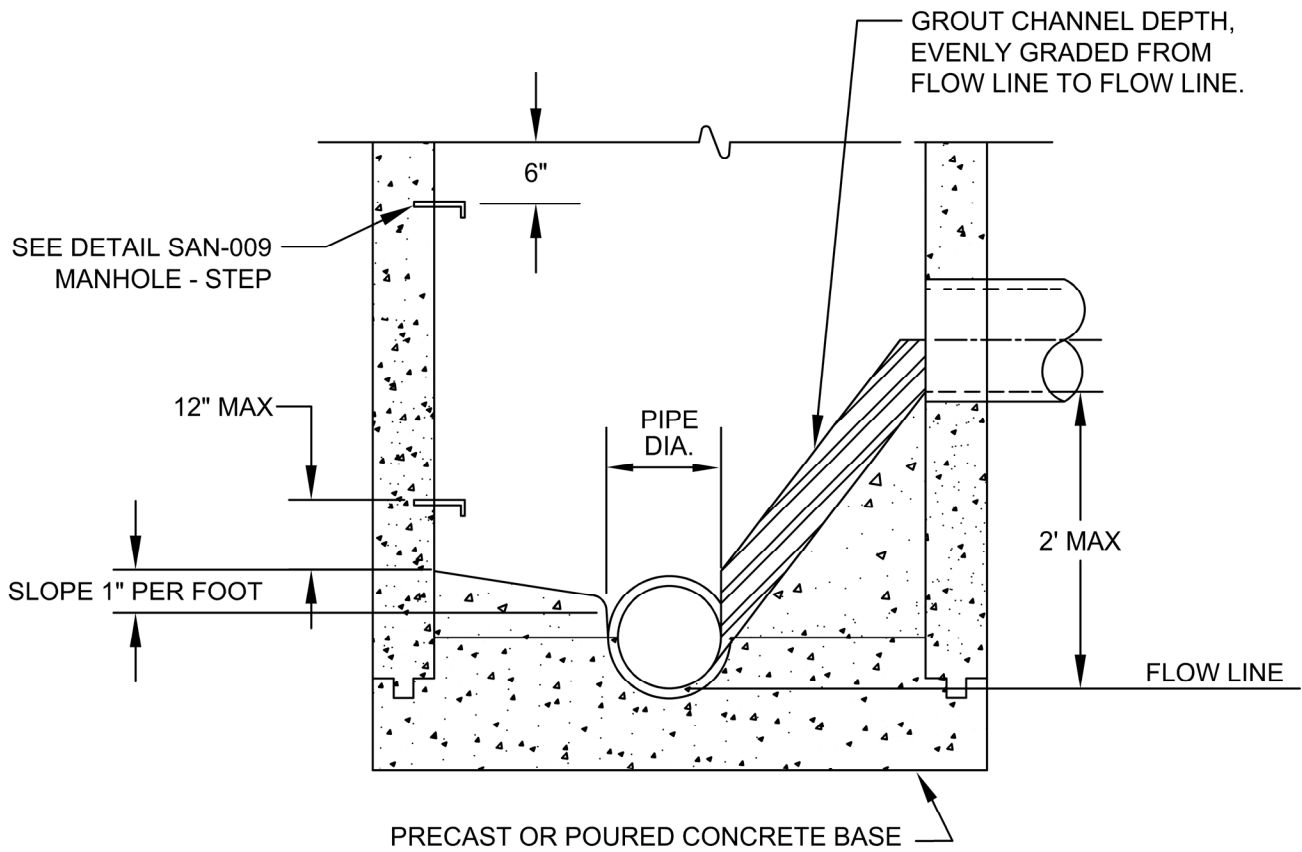
 <p>CLACKAMAS WATER ENVIRONMENT SERVICES</p>	<p>CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045</p>	<p>APPROVAL DATE: July, 2022 SCALE: N.T.S.</p>	<p>STANDARD DRAWING</p>
		<p>CHANNEL-INTERSECTION</p>	

NOTES:

1. CHANNELS MUST BE ABLE TO PASS A 7" X 30" CYLINDER INTO PIPES.
2. CHANNEL TO FOLLOW PIPE ALIGNMENT 12" MIN. INSIDE MANHOLE BEFORE TURNING.



CHANNEL-90 DEGREE MANHOLE

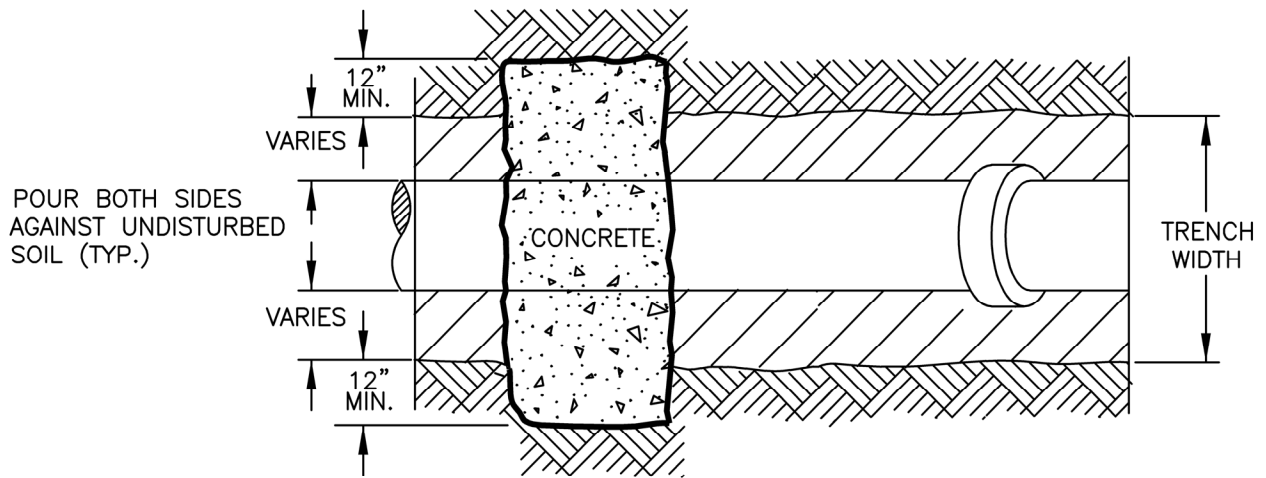
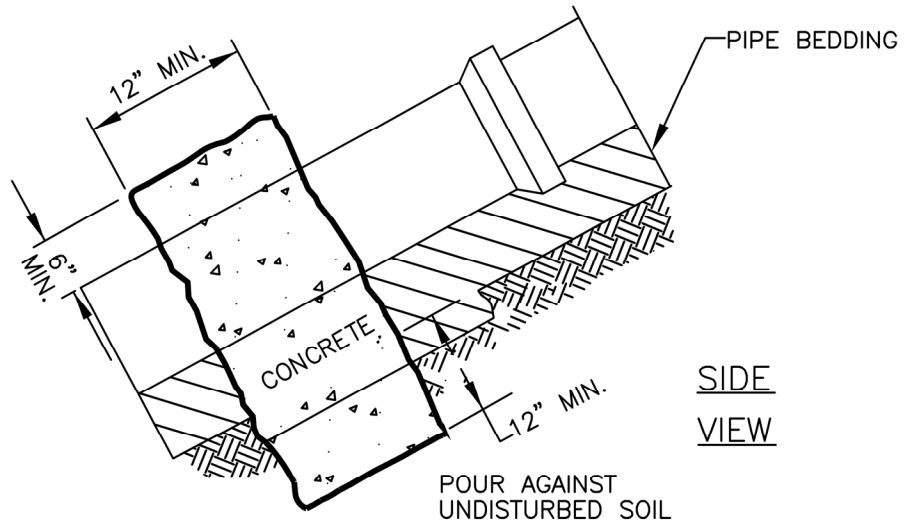


CHANNEL-SLIDE

(BY DISTRICT PRE-APPROVAL ONLY)

NOTES:

1. CHANNELS MUST BE ABLE TO PASS A 7" X 30" CYLINDER INTO PIPES.
2. GROUT SHALL NOT BE FAST OR RAPID SETTING.



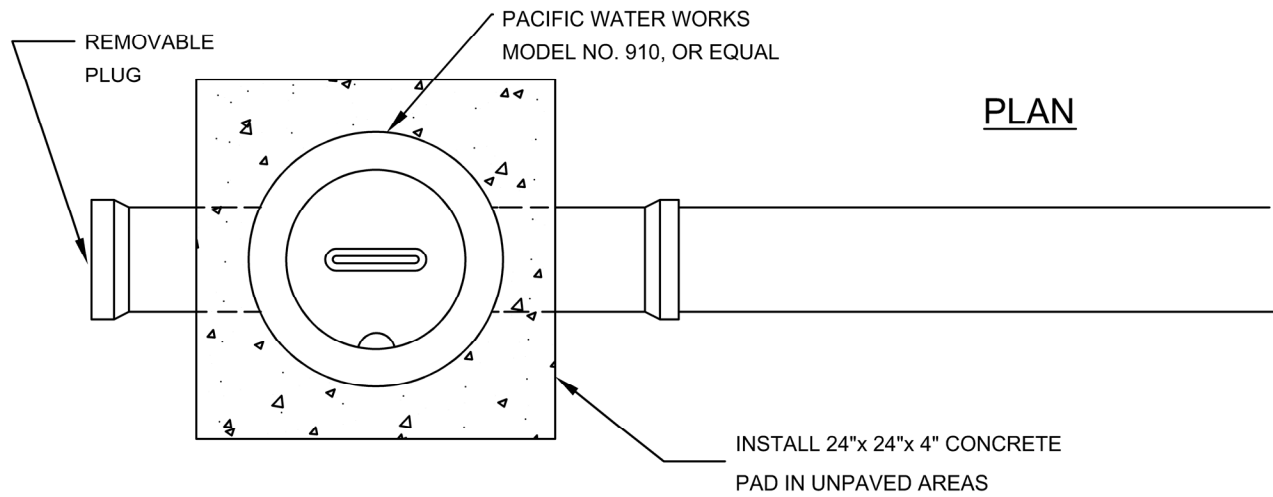
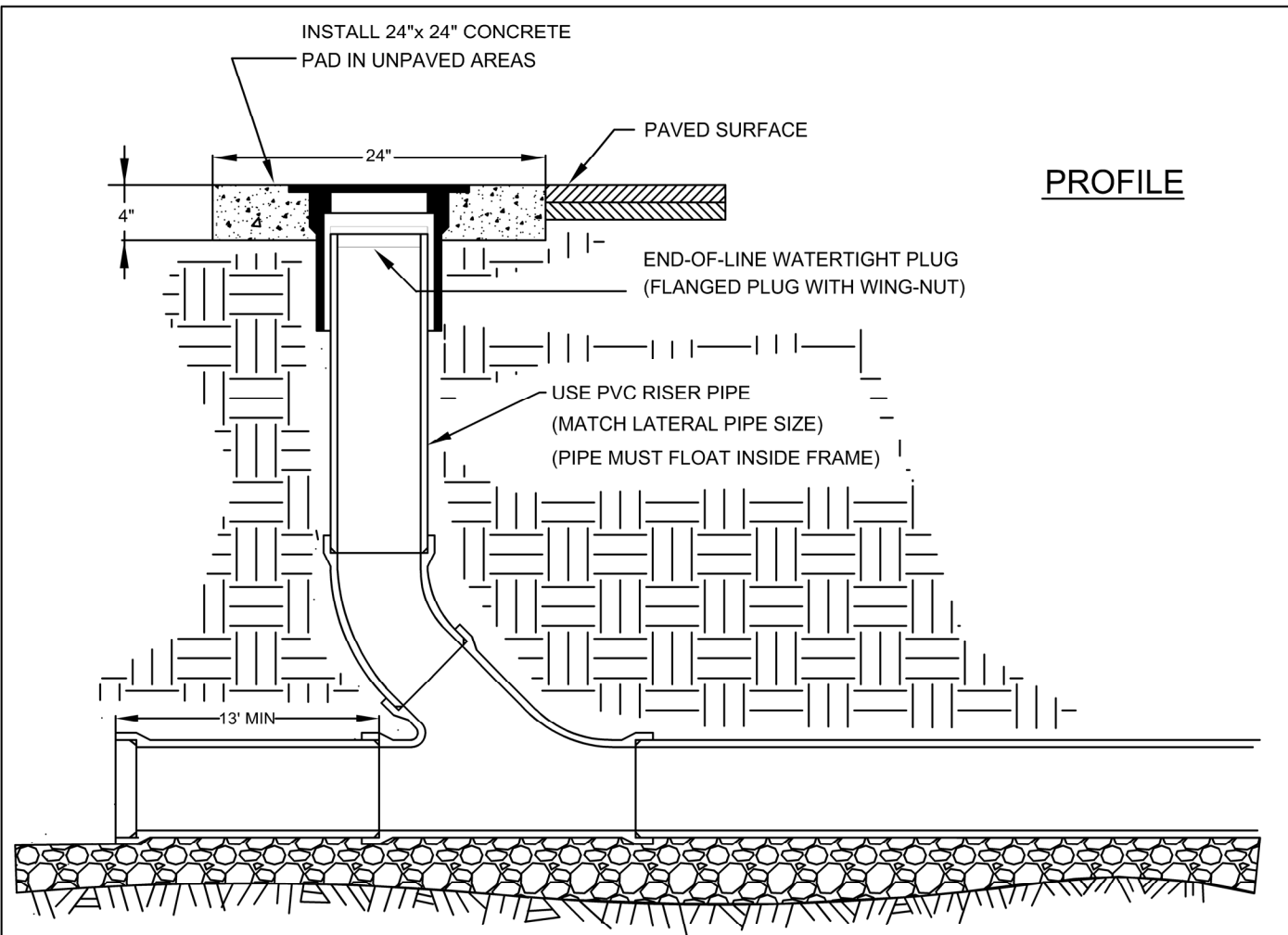
PLAN

SLOPE FT/FT	MIN. ANCHOR SPACING CENTER TO CENTER
0.20 - 0.34	35'
0.35 - 0.50	25'
0.51+	15' OR CONC. ENCASEMENT


NOTES:

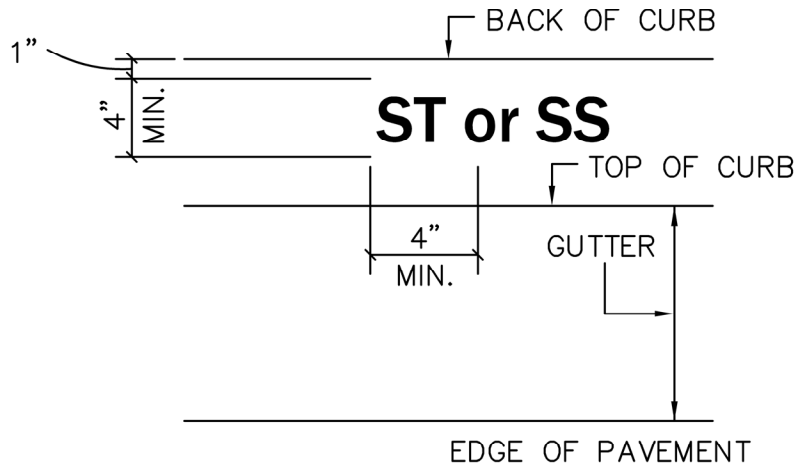
1. CONCRETE ANCHORS TO BE INSTALLED IMMEDIATELY DOWNHILL OF PIPEBELL.
2. CONCRETE SHALL HAVE A 28 DAY STRENGTH OF 3000 PSI. AND 2" TO 4" SLUMP.
3. ODOT "METAL PIPE SLOPE ANCHORS" ARE AN ACCEPTABLE ALTERNATIVE.

ANCHOR WALL



CLEANOUT PAD

	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	APPROVAL DATE: July, 2022 SCALE: N.T.S.	STANDARD DRAWING
	CLEANOUT PAD		SAN-018



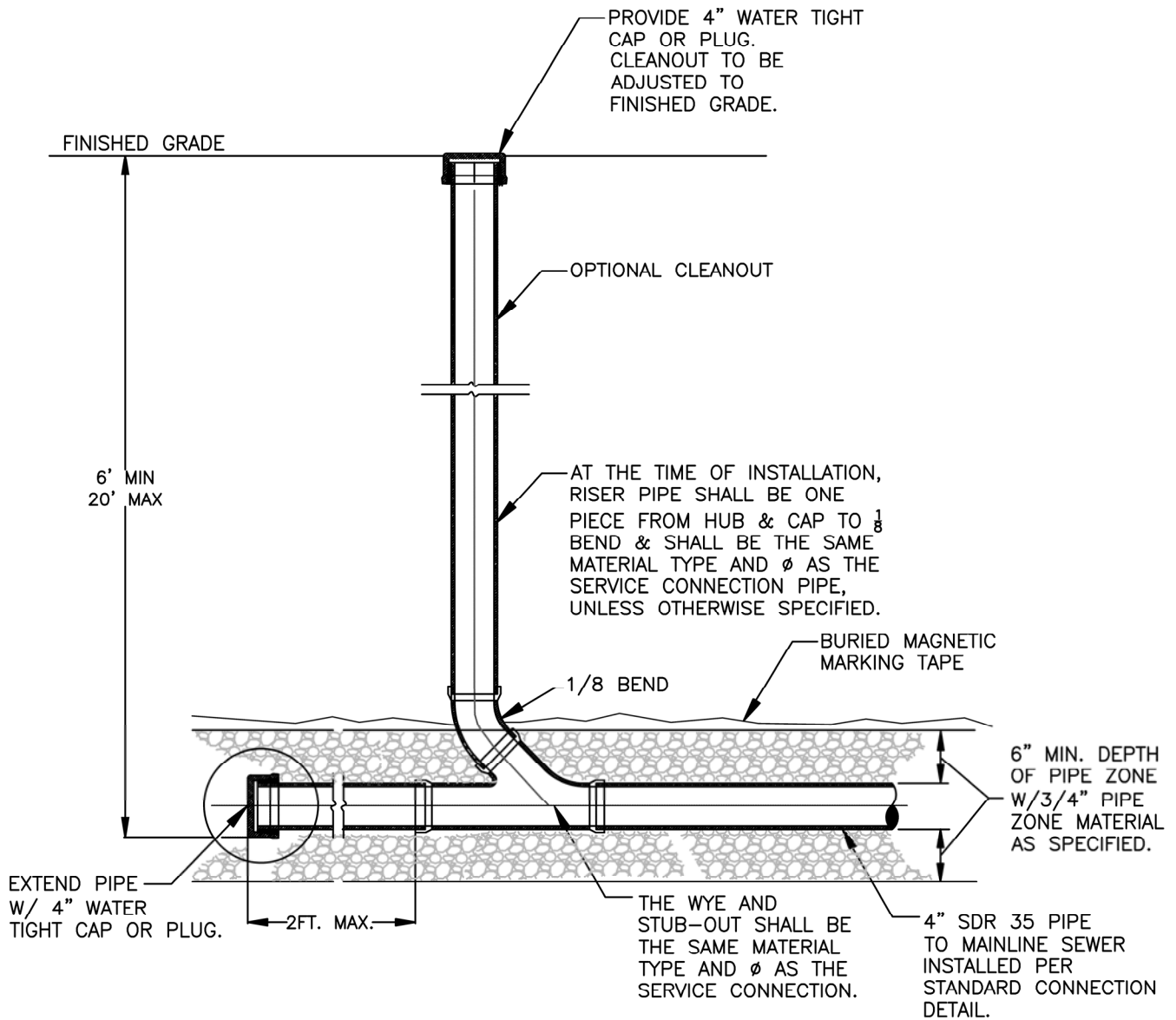
PLAN VIEW
(TYPICAL)

NOTES:

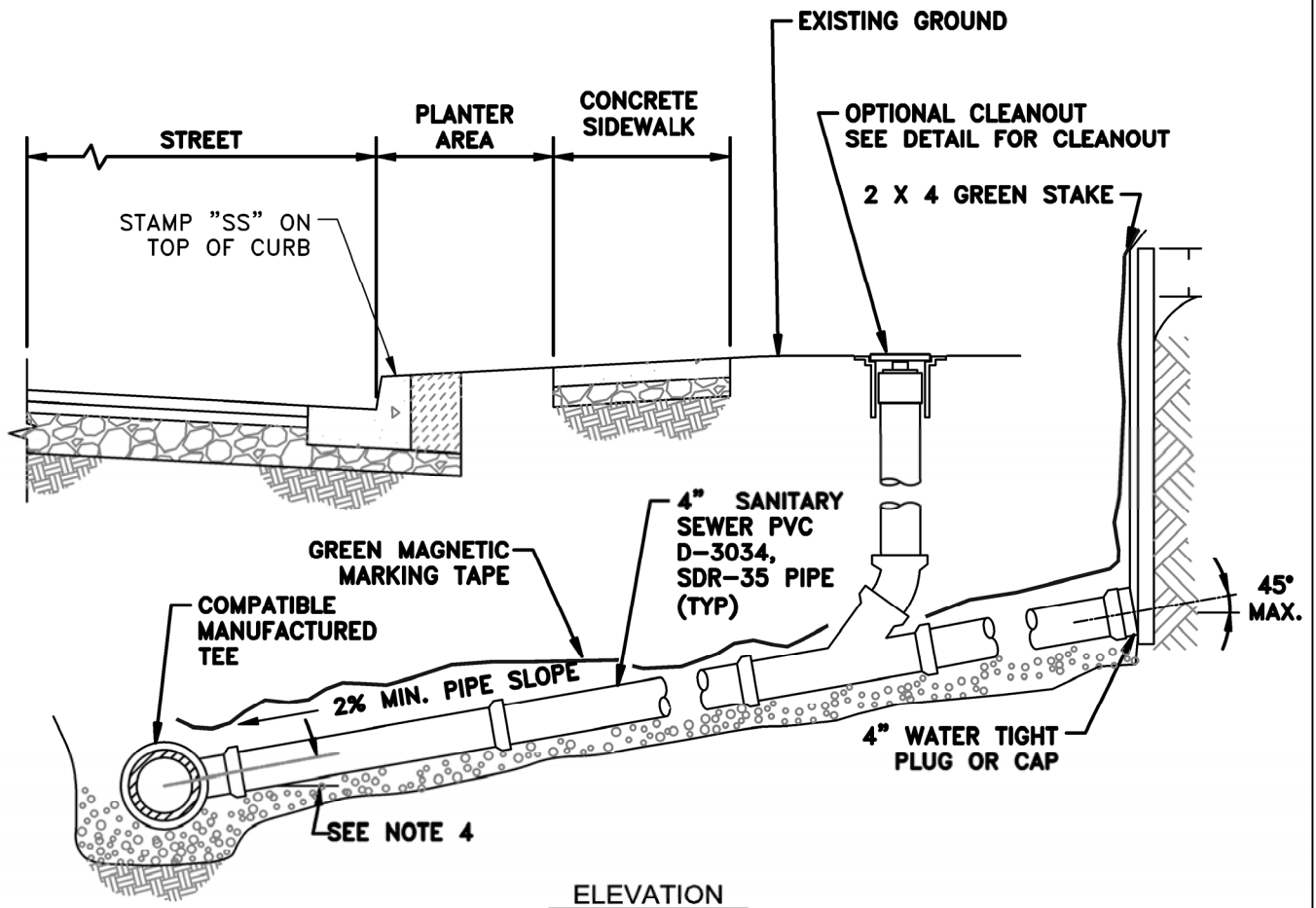
1. ALL STORM AND SANITARY SERVICE LATERALS SHALL BE MARKED APPROXIMATELY AS FOLLOWS:

 STORM DRAIN LATERAL "ST" TOP OF CURB
 SANITARY SEWER LATERAL "SS" TOP OF CURB

2. LETTERS SHALL HAVE A 1/2" MAX. WIDTH.



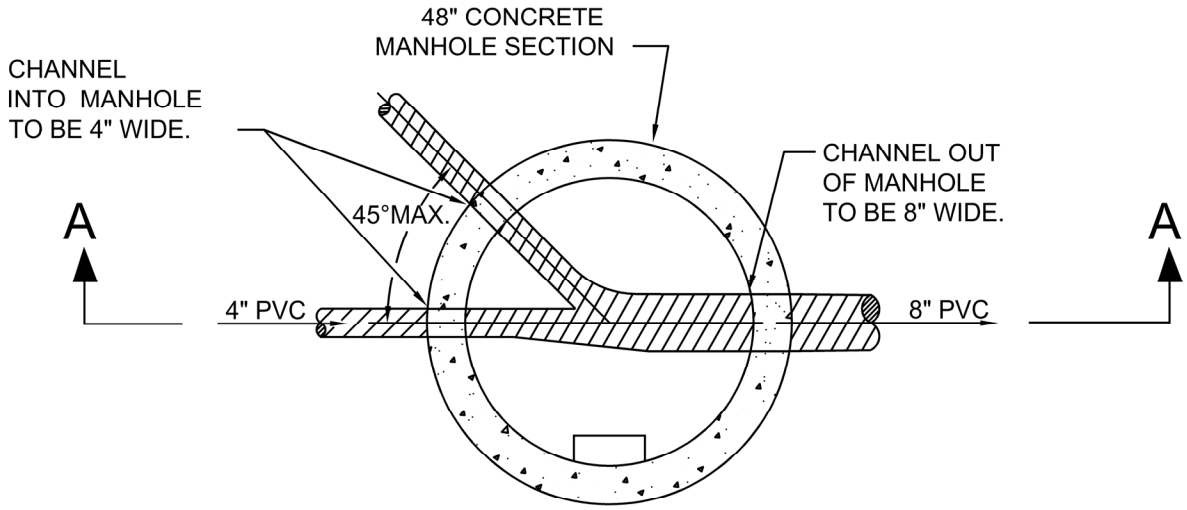
1. ALL PIPE AND FITTINGS SHALL BE ASTM D-3034, SDR 35.
2. ON LOTS WITH EXISTING HOMES, CONTRACTOR SHALL INSTALL APPROVED HUBS AND CAPS FLUSH WITH FINISHED GRADE.
3. CLEANOUTS SHALL NOT BE CONSTRUCTED SO THE CLEANOUTS CAP WILL END UP IN SIDEWALKS, STEPS OR DRIVEWAYS.



ELEVATION

NOTES:

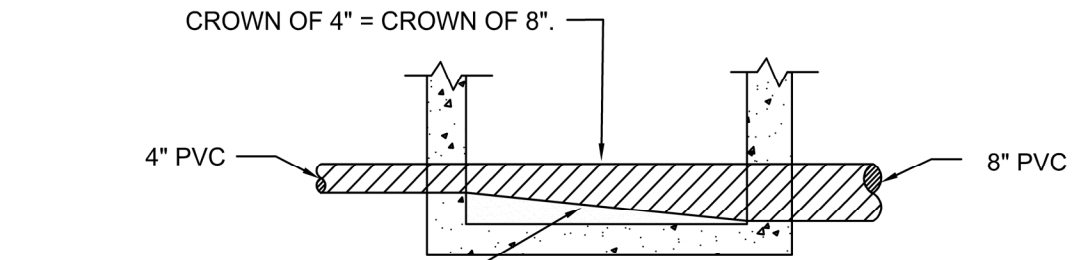
1. INSTALL OPTIONAL CLEANOUT PER STANDARD DRAWING.
2. VIDEO INSPECT SERVICE CONNECTION IN ACCORDANCE WITH STANDARDS.
3. 2" x 4" TREATED STAKE FROM INVERT TO 1' ABOVE FINISH GRADE. SERVICE CONNECTION MARKER SHALL BE CONTINUOUS AND REMAIN VERTICAL AFTER BACKFILLING. END SHALL BE PAINTED GREEN.
4. CENTERLINE OF SERVICE OUTLET ON TEE SHALL BE ABOVE SPRINGLINE.
5. SANITARY SEWER SERVICE CONNECTIONS SHALL BE A FACTORY TEE INSTALLED 90° PERPENDICULAR TO SANITARY SEWER MAIN.
6. EVERY PROPERTY SHALL HAVE A SEPARATE SERVICE CONNECTED DIRECTLY TO THE MAINLINE, UNLESS OTHERWISE APPROVED BY THE DISTRICT. SHARED SERVICE CONNECTIONS ARE NOT ALLOWED.
7. THE SERVICE CONNECTION LOCATION SHALL GENERALLY BE LOCATED TEN FEET (10') OFFSET FROM THE PROPERTY LINE ON THE LOW SIDE OF LOT.
8. TEES FOR SERVICE CONNECTIONS SHALL BE LOCATED NO CLOSER THAN FIVE FEET (5') TO MANHOLES. SEPARATION BETWEEN WATER LINE, SANITARY SERVICE CONNECTION AND STORM SERVICE CONNECTION SHALL GENERALLY BE TEN FEET (10') WITH A MINIMUM OF FIVE FEET (5').
9. ANY OTHER PROPOSED LOCATION SHALL BE AT THE DISCRETION OF THE DISTRICT ON CASE BY CASE BASIS.



PLAN

NOTE:

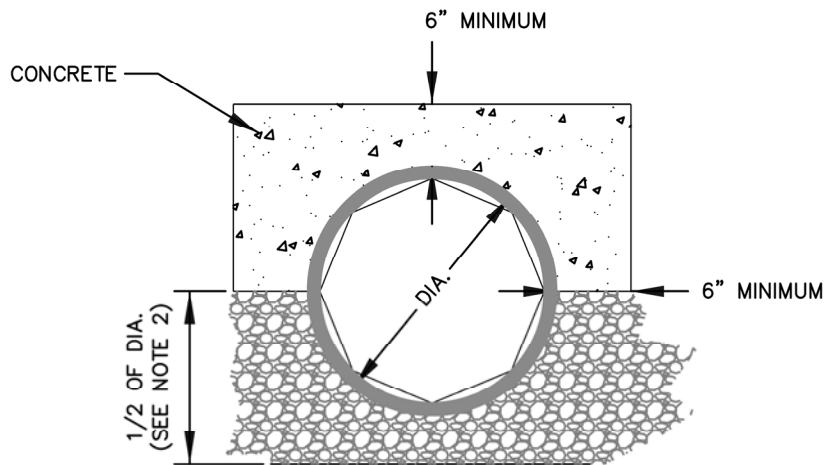
- 1. THIS TYPE OF CONNECTION IS ALLOWED ONLY ON END OF RUN MANHOLES WITH DISTRICT APPROVAL.
- 2. MAXIMUM NUMBER OF SERVICE CONNECTIONS INTO A MANHOLE IS TWO.



SECTION A-A

SERVICE CONNECTION
INTO MANHOLE

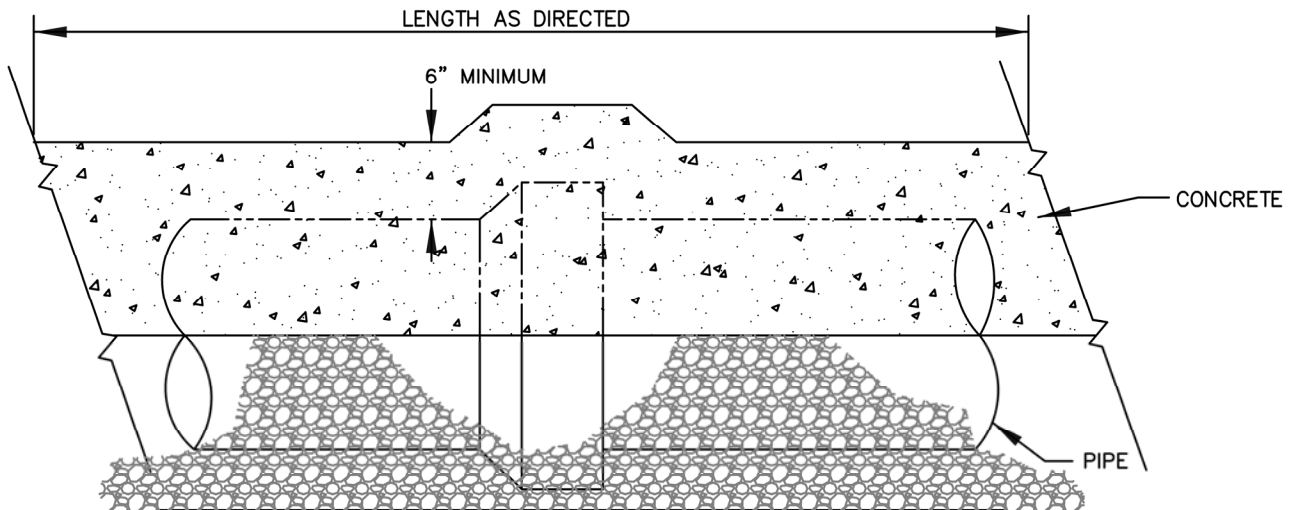
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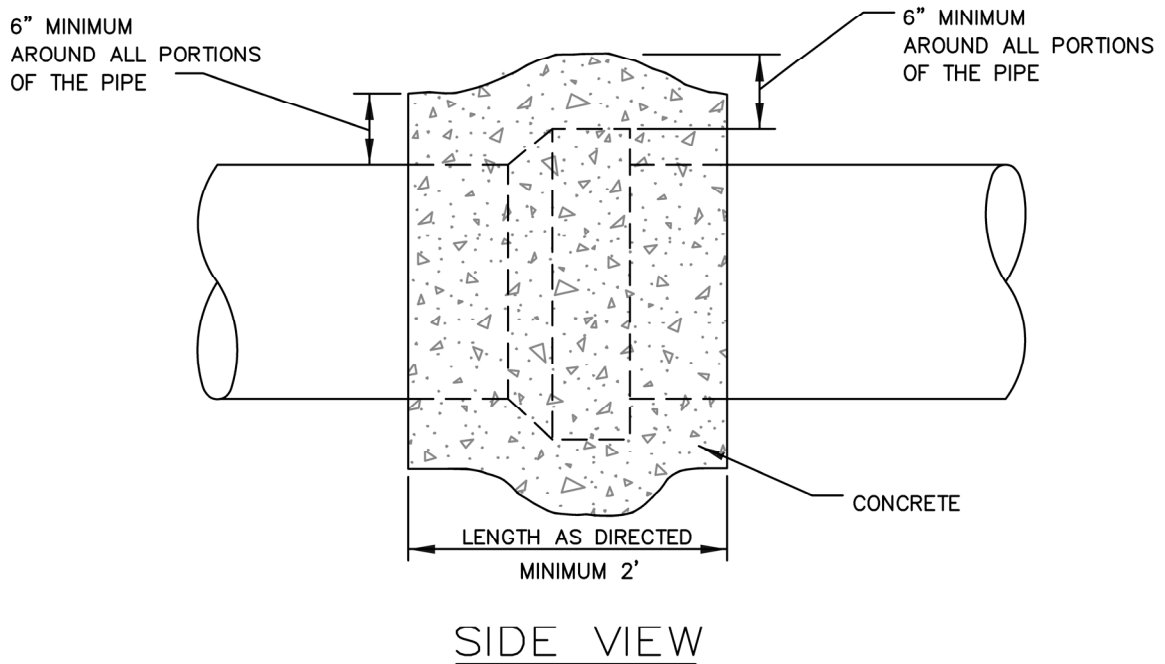
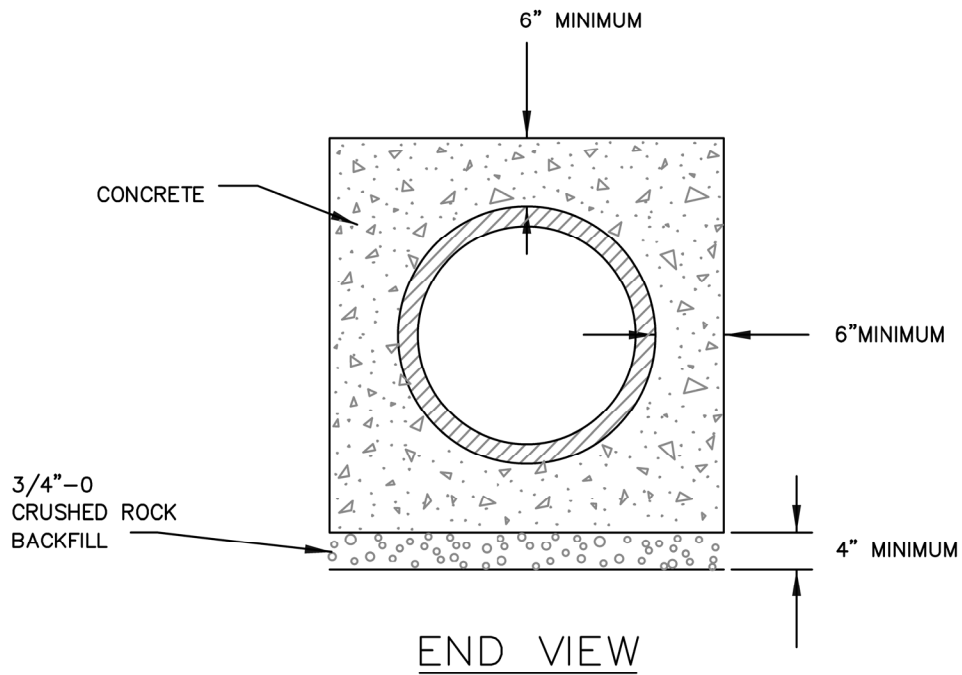
END VIEW

NOTES:

1. CONCRETE SHALL HAVE A 28 DAY STRENGTH OF 3000 PSI AND 2" TO 4" SLUMP.
2. SEE APPLICABLE DETAIL FOR PIPE BEDDING INFORMATION.



SIDE VIEW

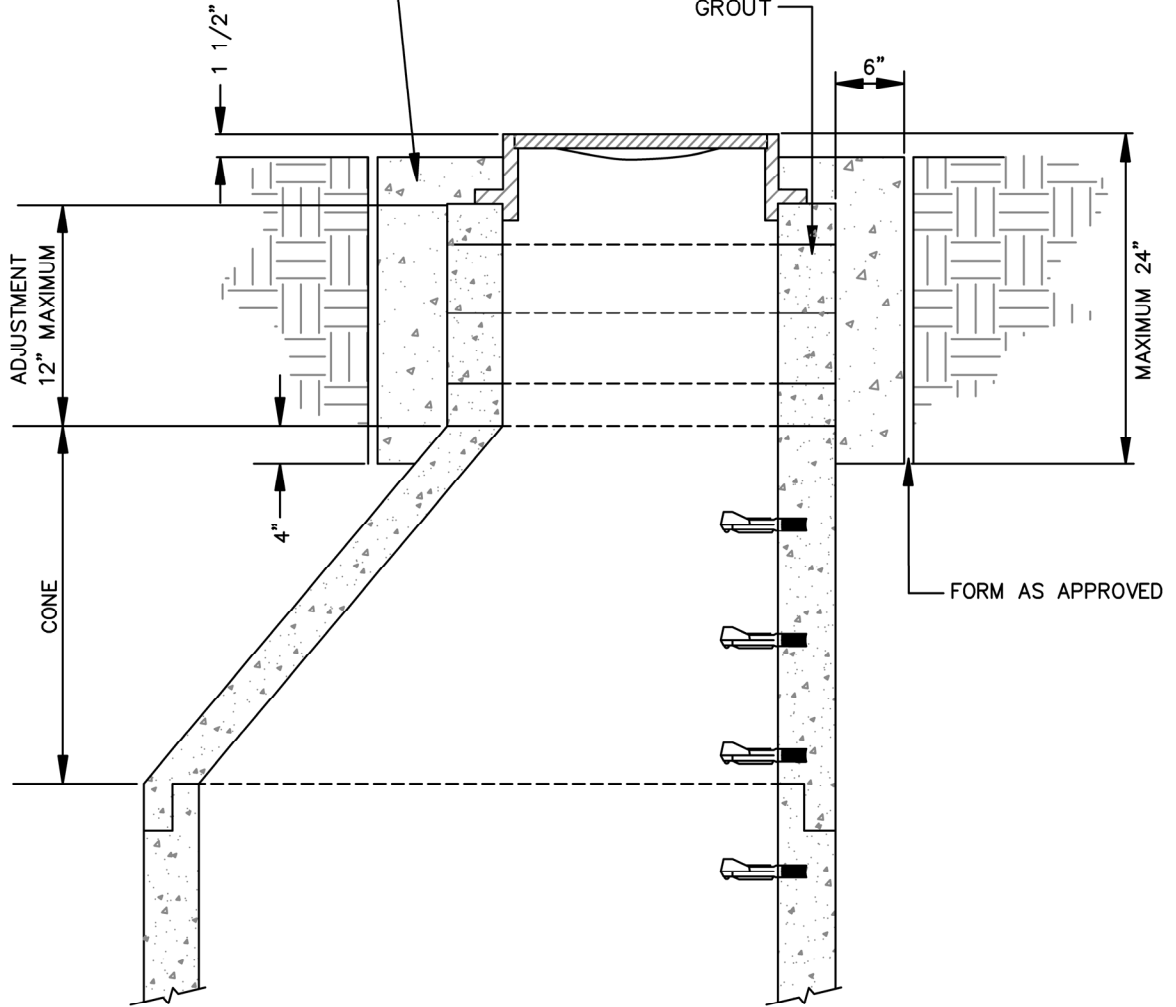


NOTES:

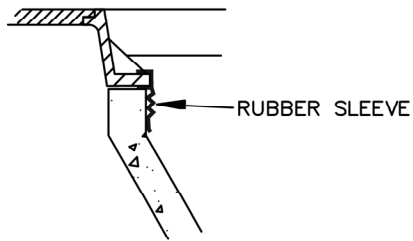
1. CONCRETE SHALL HAVE A 28 DAY STRENGTH OF 3000 PSI AND, 2" TO 4" SLUMP.
2. PRIOR TO INSTALLING THE CONCRETE ENSURE THE JOINT IS SEAL IN A MANNER AS NOT TO ALLOW CONCRETE TO ENTER INTO THE INTERIOR OF PIPE.

CONCRETE FOR CLOSURE COLLAR SHALL BE READY-MIXED CONFORMING WITH ASTM C94, ALTERNATE 2 AND SHALL HAVE A COMPRESSIVE STRENGTH OF 3000 PSI @28 DAYS.

ADJUSTMENT GRADE RINGS AND CASTING FRAME SET IN 1" OF NON-SHRINKING GROUT



NOTE:
 1. NON-SHRINK GROUT SHALL NOT BE FAST OR RAPID SETTING.



NARROW EXTERNAL RUBBER SEAL

TO SPAN CHIMNEY HEIGHTS OF:

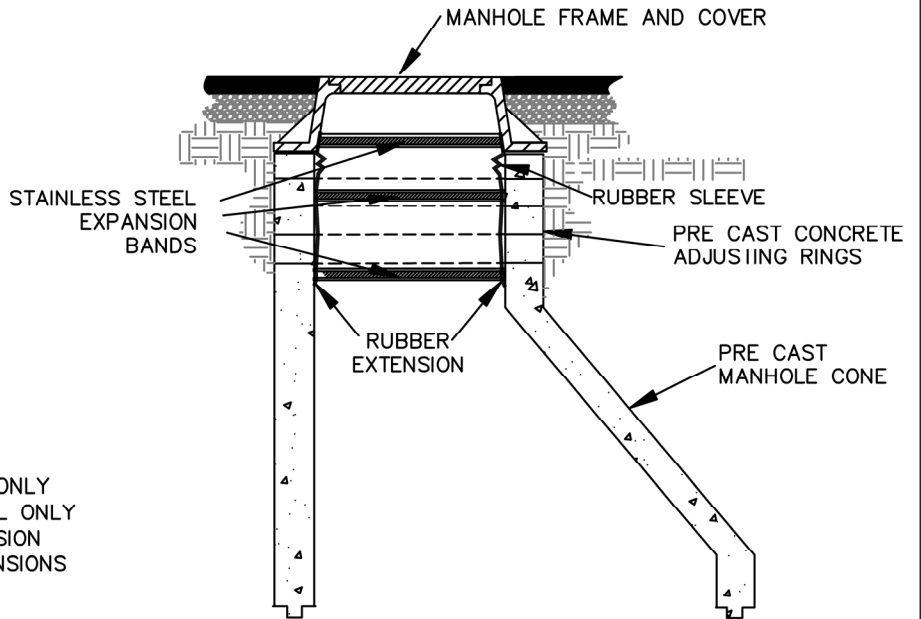
- 0-3" - NARROW (6") SEAL ONLY
- OVER 3" - 6 1/2" - STANDARD (9") SEAL ONLY
- OVER 6 1/2" - 12" - STD. SEAL + EXTENSION
- OVER 12" - SEAL + MULT. EXTENSIONS

NOTES:

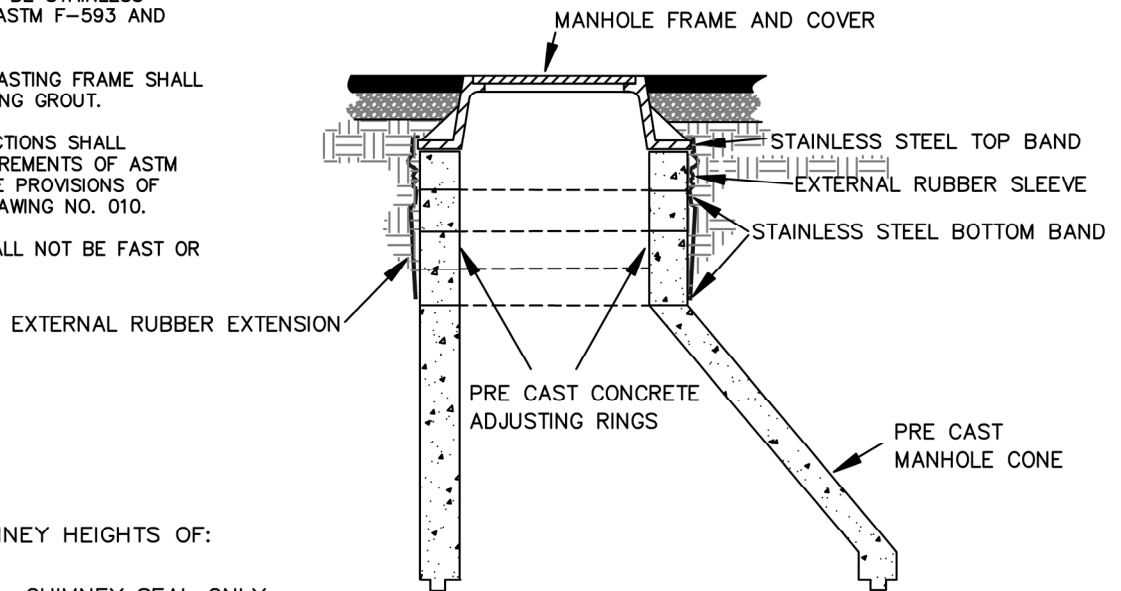
1. SLEEVES AND EXTENSIONS SHALL HAVE A MINIMUM OF $\frac{3}{16}$ " THICKNESS.
2. RUBBER SHALL BE EXTRUDED HIGH GRADE COMPOUND CONFORMING TO ASTM C-923.
3. BANDS SHALL BE FABRICATED FROM 16 GAUGE STAINLESS STEEL CONFORMING TO ASTM A-240, TYPE 304.
4. NUTS AND BOLTS SHALL BE STAINLESS STEEL CONFORMING TO ASTM F-593 AND 594, TYPE 304.
5. ALL GRADE RING AND CASTING FRAME SHALL BE SET IN NON-SHRINKING GROUT.
6. PRE CAST MANHOLE SECTIONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478, AND APPLICABLE PROVISIONS OF STANDARD MANHOLE DRAWING NO. 010.
7. NON-SHRINK GROUT SHALL NOT BE FAST OR RAPID SETTING.

TO SPAN CHIMNEY HEIGHTS OF:

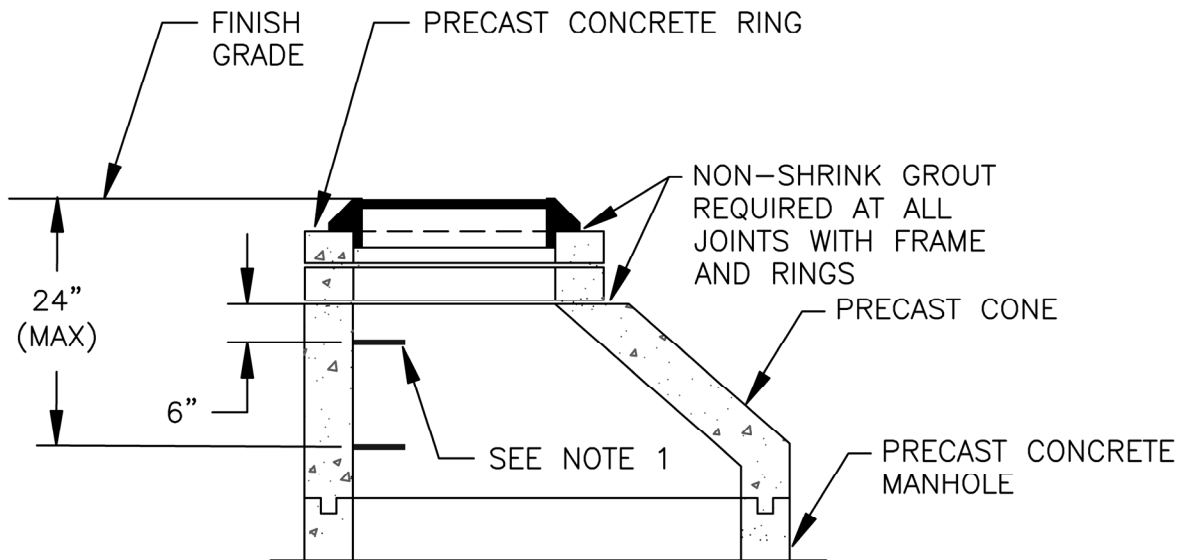
- 0-4 1/2" - CHIMNEY SEAL ONLY
- OVER 4 1/2" - 9" - SEAL + 7" EXTENSION
- OVER 9" - 12" - SEAL + 10" EXTENSION
- OVER 12" - SEAL + MULT. EXTENSIONS



INTERNAL MANHOLE CHIMNEY SEAL

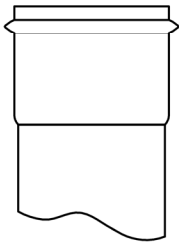


EXTERNAL MANHOLE CHIMNEY SEAL

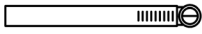


NOTES:

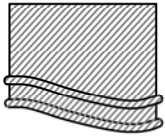
1. FIRST STEP SHALL BE 6" MINIMUM FROM RINGS TO MAXIMUM 24" FROM RIM.
2. NON-SHRINK GROUT SHALL NOT BE RAPID OR FAST SETTING.



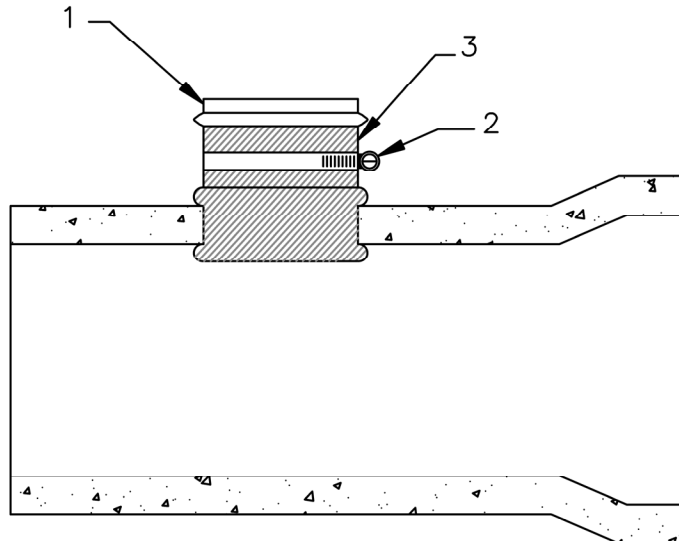
1. PVC HUB SHALL CONFORM TO ASTM 3034, SDR 35 DRIVE INTO CENTER OF RUBBER SLEEVE AFTER SLEEVE IS PLACED IN HOLE.



2. STAINLESS STEEL BAND SECURES UPPER HALF OF RUBBER SLEEVE TO THE PVC HUB. STAINLESS STEEL BAND SHALL BE 300 SERIES, $\frac{3}{16}$ " BAND WIDTH, CADMIUM PLATED CARBON STEEL, AND ATTACHED WITH HEX HEAD SLOTTED SCREW.



3. COMPLETE RUBBER SLEEVE INCLUDES A MOLDED SEGMENT THAT HOLDS IT IN PLACE.



NOTES:

1. ALL INSERTA-TEE HOLES SHALL BE MACHINE DRILLED AND CORED.
2. INSERTA-TEES ARE NOT ALLOWED IN NEWLY CONSTRUCTED SEWER MAINS.
3. SEWER MAIN SHALL BE TWO SIZES (NOMINAL I.D.) LARGER THAN THE INSERTA-TEE.



CLACKAMAS
**WATER
 ENVIRONMENT
 SERVICES**

CLACKAMAS WES
 150 BEAVERCREEK ROAD
 OREGON CITY, OR 97045

APPROVAL DATE: July, 2021

SCALE: N.T.S.

INSERTA TEE

STANDARD
 DRAWING
**SAN-
 028**

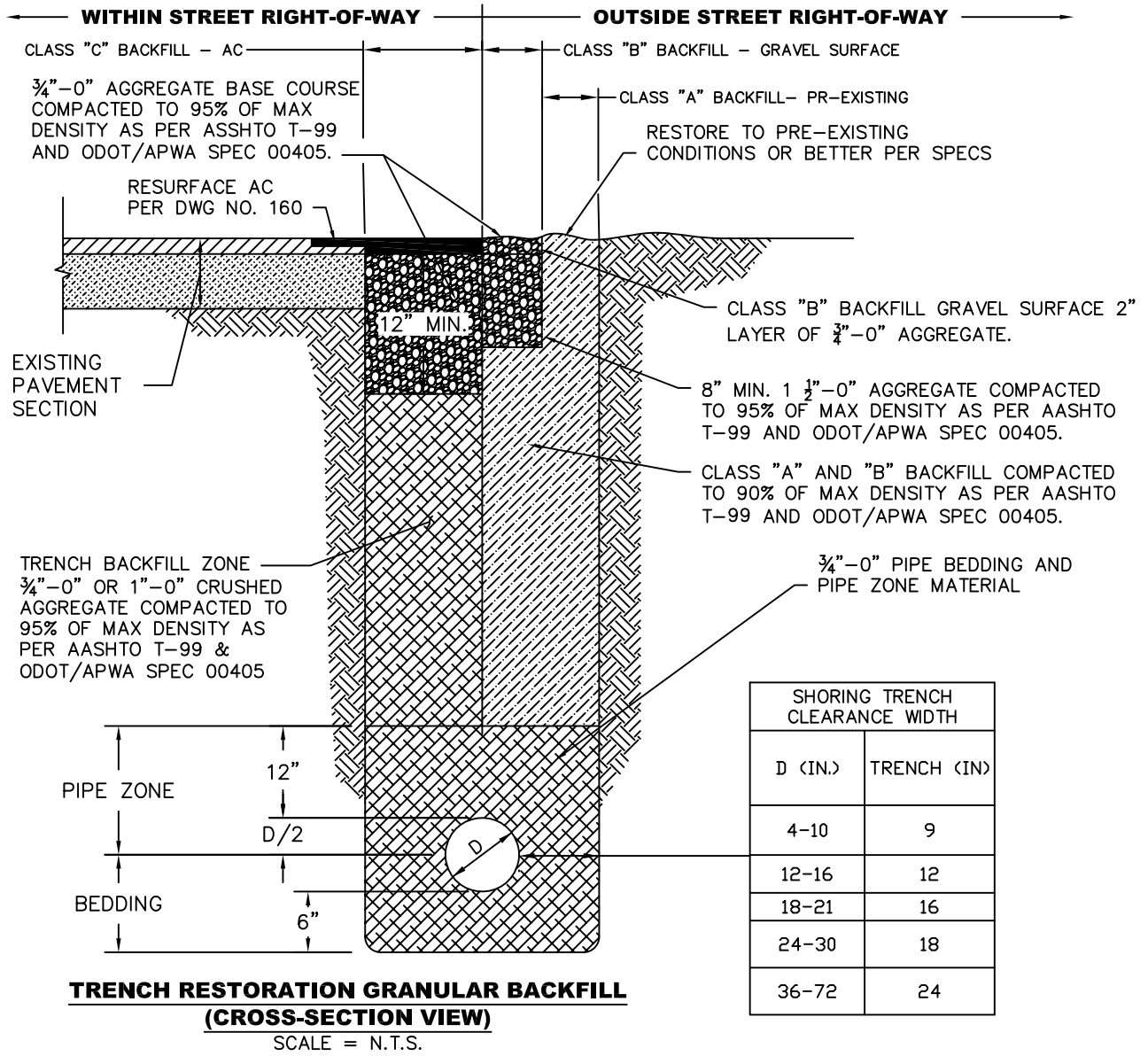
Appendix B: Standard Detail Drawings

SAN -001	TRENCH RESTORATION CLASS BACKFILL "A", "B" & "C"
SAN -002	TRENCH RESTORATION WITH CDF
SAN -003	MANHOLE - TYPICAL
SAN -004	MANHOLE – FLAT TOP
SAN -005	MANHOLE _ OUTSIDE DROP
SAN -006	MANHOLE - BASE
SAN -007	MANHOLE – CONNECTION FLEXIBLE
SAN -008	MANHOLE - STEP
SAN -009	MANHOLE – NEW OVER EXISTING PIPE
SAN -010	STANDARD FRAME & COVER
SAN -011	SURBURBAN FRAME & COVER
SAN -012	FRAME & COVER SECURE FOR TRAFFIC AREAS
SAN -013	FRAME & COVER WATERTIGHT FOR NON TRAFIC AREAS
SAN -014	CHANNEL – INTERSECTION
SAN -015	CHANNEL – 90 DEGREES
SAN -016	CHANNEL - SLIDE
SAN -017	ANCHOR WALL
SAN -018	CLEANOUT PAD
SAN -019	SANITARY CURB STAMP
SAN -020	SERVICE CONNECTION CLEANOUT
SAN -021	SERVICE CONNECTION
SAN -022	SERVICE CONNECTION INTO MANHOLE
SAN -023	CONCRETE CAP
SAN -024	CONCRETE ENCASEMENT / CLOSURE COLLAR
SAN -025	CONCRETE MANHOLE CLOSURE COLLAR
SAN -026	MANHOLE CHIMNEY SEAL
SAN -027	PRECAST RING EXTENSION
SAN -028	INSERTA TEE

Table of Contents

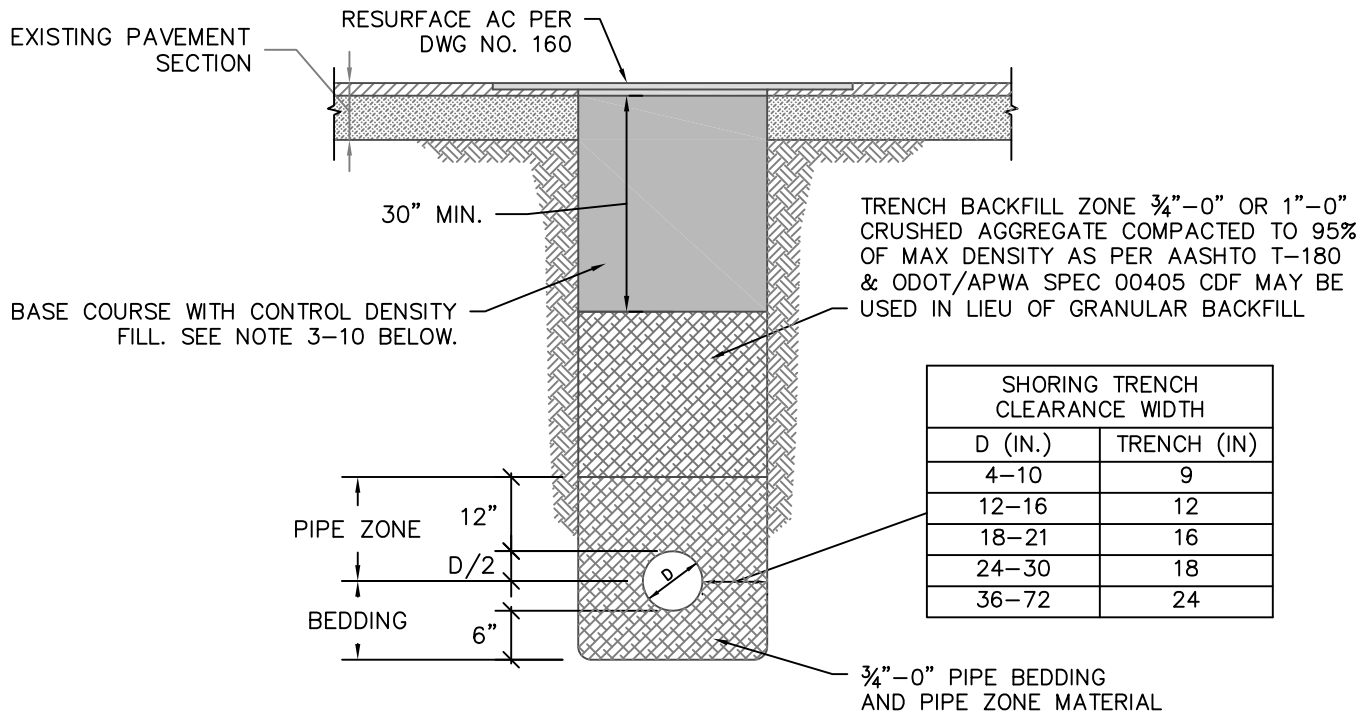
APPENDIX B – SANITARY STANDARD DETAIL DRAWINGS

<u>Drawing No.</u>	<u>Name</u>
SAN-001	TRENCH RESTORATION CLASS BACKFILL "A", "B" & "C"
SAN -002	TRENCH RESTORATION WITH CDF
SAN -003	MANHOLE - TYPICAL
SAN -004	MANHOLE – FLAT TOP
SAN -005	MANHOLE _ OUTSIDE DROP
SAN -006	MANHOLE - BASE
SAN -007	MANHOLE – CONNECTION FLEXIBLE
SAN -008	MANHOLE - STEP
SAN -009	MANHOLE – NEW OVER EXISTING PIPE
SAN -010	STANDARD FRAME & COVER
SAN -011	SURBURBAN FRAME & COVER
SAN -012	FRAME & COVER SECURE FOR TRAFFIC AREAS
SAN -013	FRAME & COVER WATERTIGHT FOR NON TRAFIC AREAS
SAN -014	CHANNEL – INTERSECTION
SAN -015	CHANNEL – 90 DEGREES
SAN -016	CHANNEL - SLIDE
SAN -017	ANCHOR WALL
SAN -018	CLEANOUT PAD
SAN -019	SANITARY CURB STAMP
SAN -020	SERVICE CONNECTION CLEANOUT
SAN -021	SERVICE CONNECTION
SAN -022	SERVICE CONNECTION INTO MANHOLE
SAN -023	CONCRETE CAP
SAN -024	CONCRETE ENCASEMENT / CLOSURE COLLAR
SAN -025	CONCRETE MANHOLE CLOSURE COLLAR
SAN -026	MANHOLE CHIMNEY SEAL
SAN -027	PRECAST RING EXTENSION
SAN -028	INSERTA TEE



NOTES:

1. PAVEMENT SHALL BE CUT PER STANDARD DRAWING 200.
2. PROVIDE COMPACT TEST RESULTS FOR TRENCH BACKFILL.

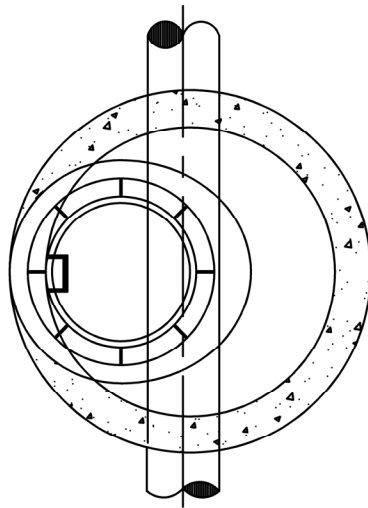


SHORING TRENCH CLEARANCE WIDTH	
D (IN.)	TRENCH (IN)
4-10	9
12-16	12
18-21	16
24-30	18
36-72	24

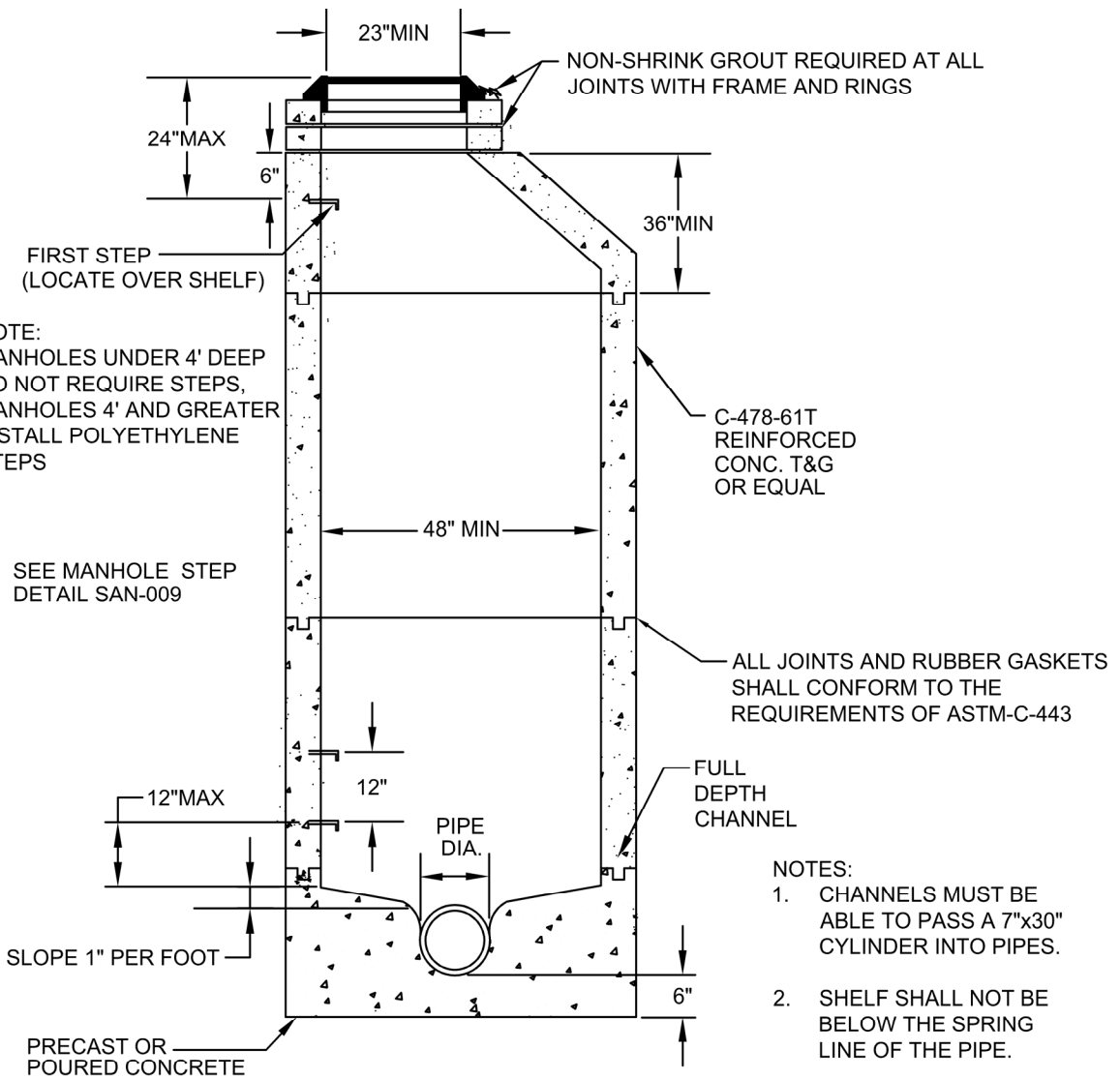
TRENCH RESTORATION W/ CDF
SCALE = N.T.S.

NOTES:

1. SAWCUT EXISTING AC PAVEMENT ACCORDING TO CITY/COUNTY SPECIFICATIONS.
2. CONTROL DENSITY FILL (CDF) CONSISTS OF A MIXTURE OF PORTLAND CEMENT, FLY ASH, AGGREGATES, WATER AND ADMIXTURES PROPORTIONED TO PROVIDE A NON-SEGREGATING, SELF-CONSOLIDATING, FREE-FLOWING MATERIAL WHICH WILL RESULT IN A HARDENED, DENSE, NON-SETTLING FILL PRODUCING UNCONFINED COMPRESSIVE 28 DAY STRENGTH FROM 100 PSI TO A MAXIMUM OF 200 PSI.
3. CONTRACTOR WILL PROVIDE BATCH WEIGHTS SHOWING THE AMOUNTS OF ALL INGREDIENTS IN THE MIX, BATCH TIME, AND THE TOTAL AMOUNT OF THE BATCH.
4. CDF SHALL BE PERFORMANCE BASED AND MEET THE FOLLOWING CRITERIA:
 - TYPE F FLY ASH: 200 LB MIN, TYPE I OR II CEMENT: 50 LB MIN
 - SETTLING SHALL BE LESS THAN 1/8" PER FT DEPTH
 - FINE AGGREGATE (LESS THAN 3/8") SHALL BE USED
 - CONCRETE UNIT WEIGHT SHALL BE 100 PCF MIN
5. CDF SHALL NOT BE PLACED ON FROZEN GROUND. DURING PLACEMENT TEMPERATURE MUST BE AT LEAST **34 DEGREES F. AND RISING.** CDF PLACING SHALL STOP WHEN TEMPERATURE IS 38 DEGREES F OR LESS AND FALLING.
6. TRENCH SECTIONS TO BE FILLED WITH CDF SHALL BE CONTAINED AT EITHER END OF THE TRENCH SECTION BY BULKHEADS OR EARTH FILL.
7. DURING CDF CURE TIME (TYP. 48 HOURS) THE CONTRACTOR SHALL INSTALL STEEL SHEETS OR OTHER PROTECTIVE DEVICES TO ALLOW FOR THE PASSAGE AND SAFETY OF TRAFFIC AND SO NO LOAD IS TRANSFERRED TO THE CDF.
8. CONTRACTOR SHALL ALLOW FOR A MINIMUM 48 HOUR CURE TIME FOR CDF PRIOR TO PLACING ASPHALT. STEEL PLATES ARE NOT ALLOWED IN THE ROADWAY JANUARY THRU MARCH, NOVEMBER AND DECEMBER WITHOUT PRIOR APPROVAL FROM THE CITY AND/OR COUNTY.
9. 30 INCH DEPTH OF CDF MAY BE REDUCED IF CONFLICTING WITH PIPE ZONE BACKFILL.



NOTE:
MANHOLE LID TO
BE FLUSH WITH
ROADWAY OR
6" ABOVE FINISH
GRADE IN EASEMENTS



NOTE:
MANHOLES UNDER 4' DEEP
DO NOT REQUIRE STEPS,
MANHOLES 4' AND GREATER
INSTALL POLYETHYLENE
STEPS

SEE MANHOLE STEP
DETAIL SAN-009

- NOTES:
1. CHANNELS MUST BE ABLE TO PASS A 7"x30" CYLINDER INTO PIPES.
 2. SHELF SHALL NOT BE BELOW THE SPRING LINE OF THE PIPE.
 3. NON-SHRINK GROUT SHALL NOT BE FAST OR RAPID SETTING.

MANHOLE-TYPICAL



CLACKAMAS
**WATER
ENVIRONMENT
SERVICES**

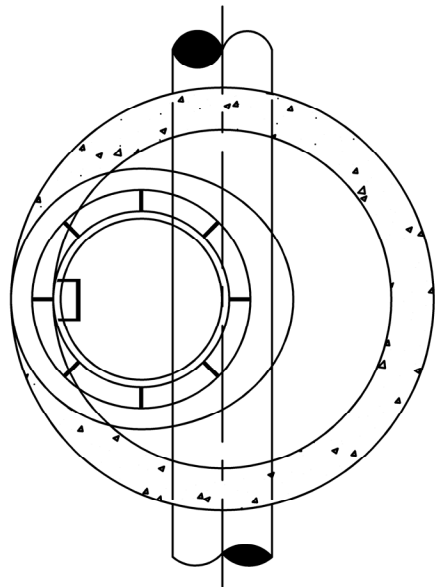
CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

APPROVAL DATE: July, 2021

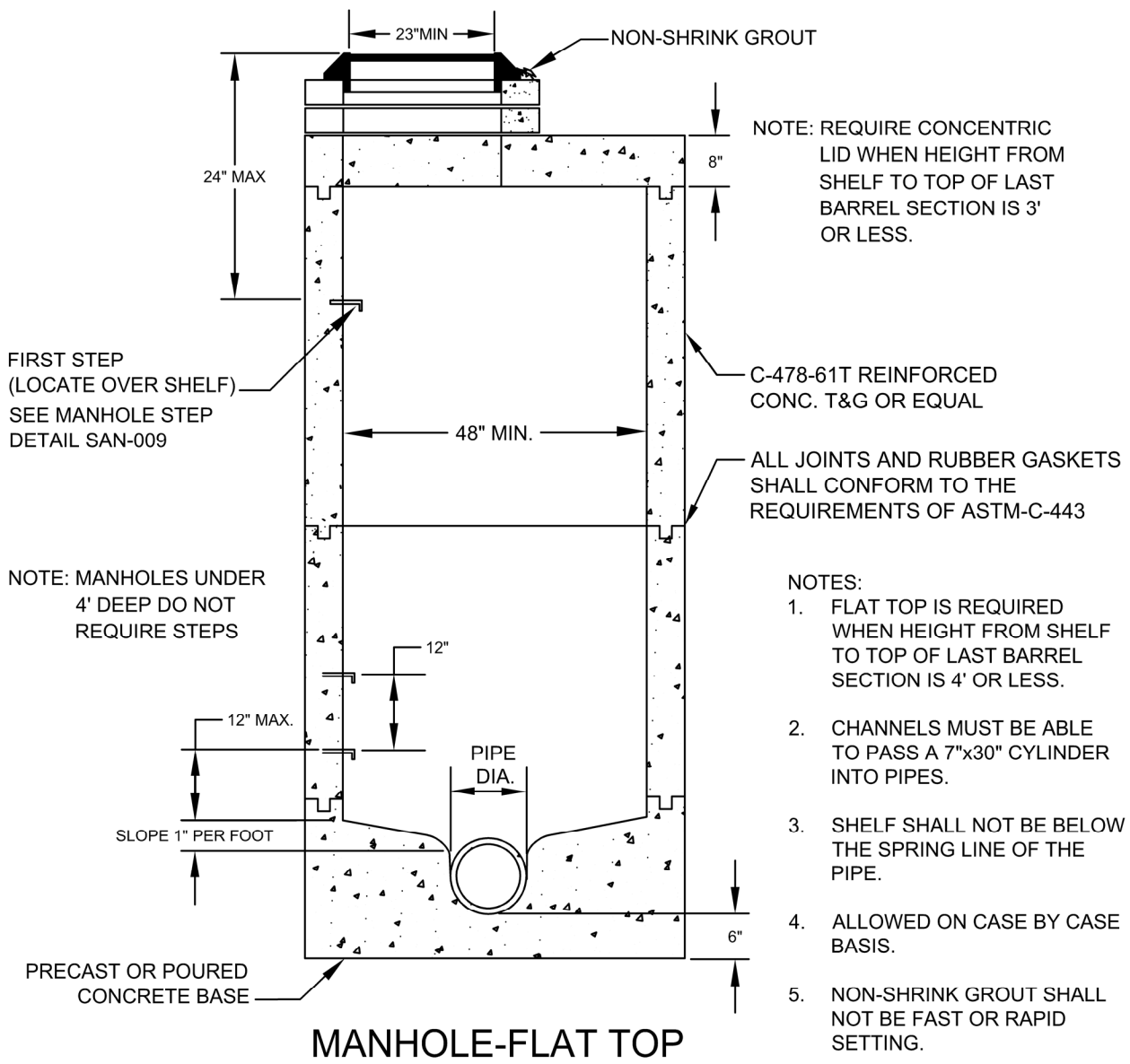
SCALE: N.T.S.

MANHOLE-TYPICAL

STANDARD
DRAWING
**SAN-
003**



NOTE: MANHOLE LID TO BE 6" ABOVE FINISH GRADE IN EASMENTS
BARREL SECTION IS 3'



CLACKAMAS
**WATER
ENVIRONMENT
SERVICES**

CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

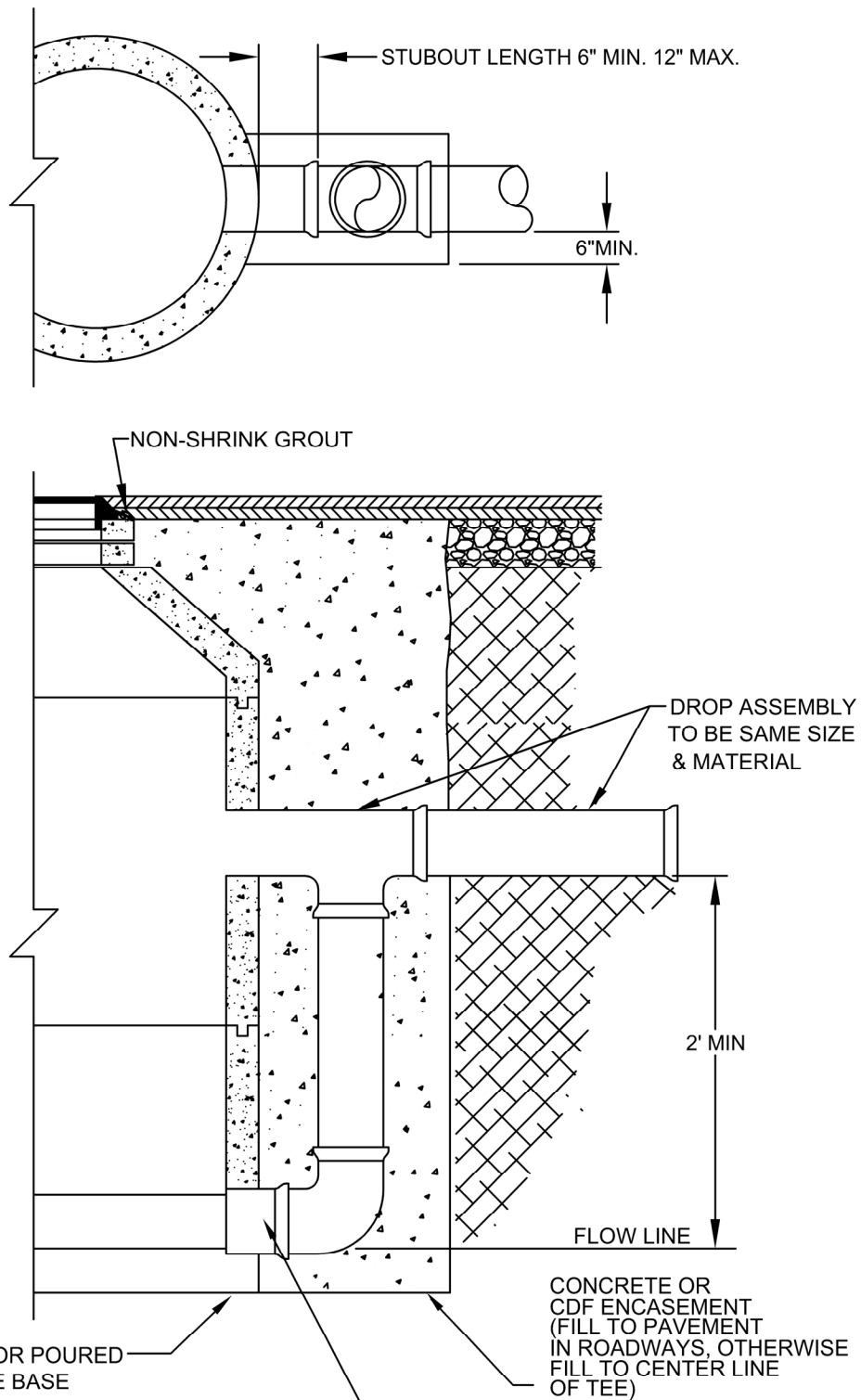
APPROVAL DATE: July, 2021

SCALE: N.T.S.

STANDARD
DRAWING

MANHOLE-FLAT TOP

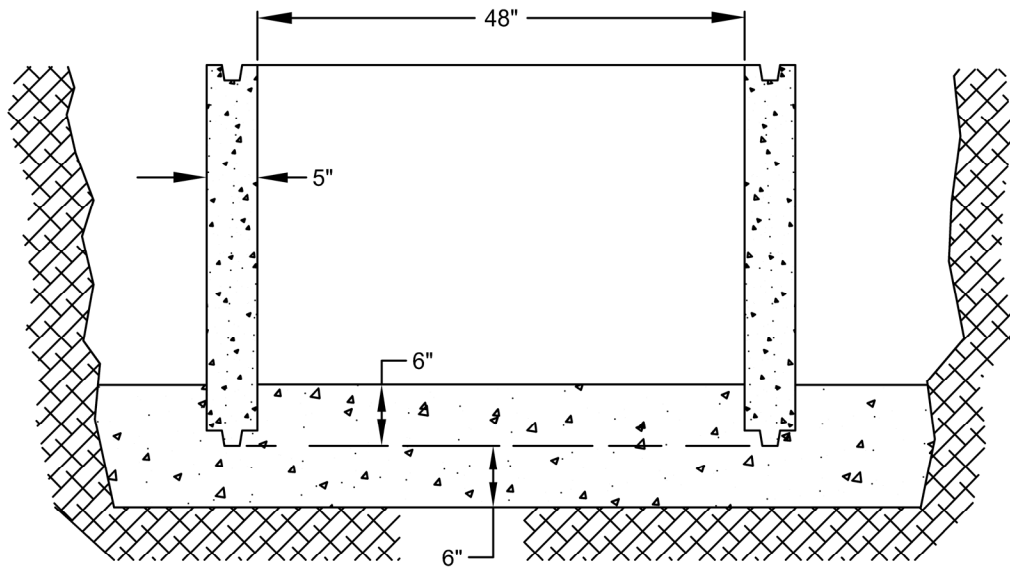
**SAN-
004**



NOTES:

1. SEE THE APPROVED PLANS FOR IE IN & IE OUT ELEVATIONS.
2. NON-SHRINK GROUT SHALL NOT BE FAST OR RAPID SETTING.

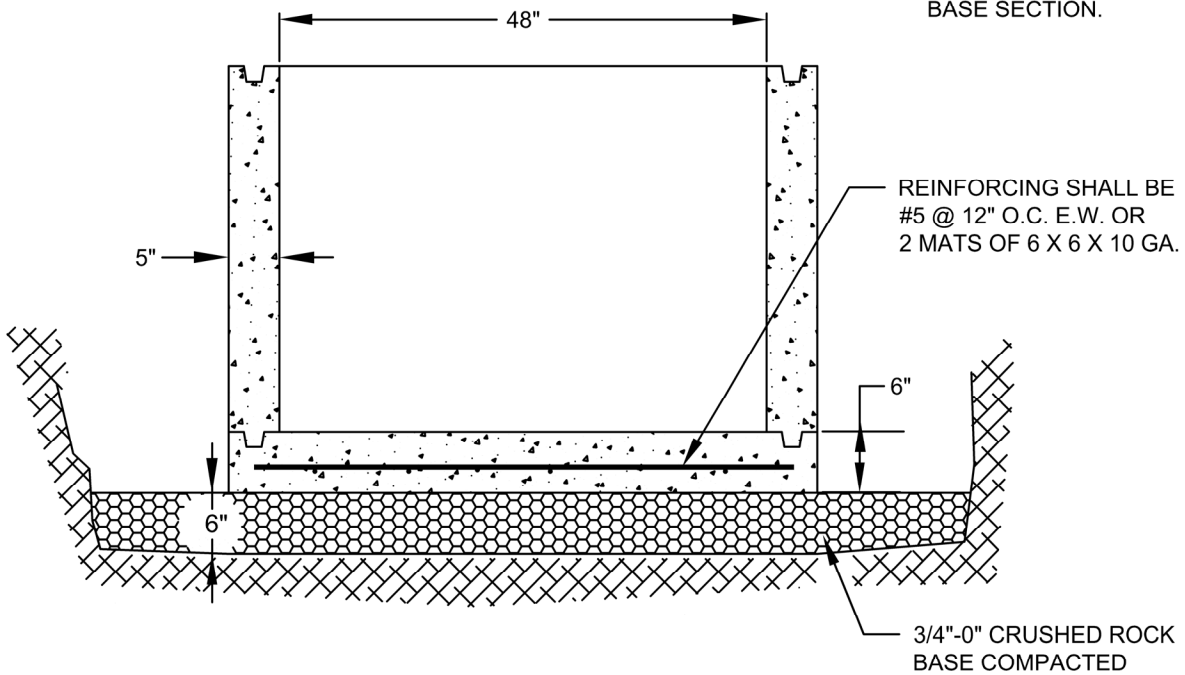
MANHOLE-OUTSIDE DROP



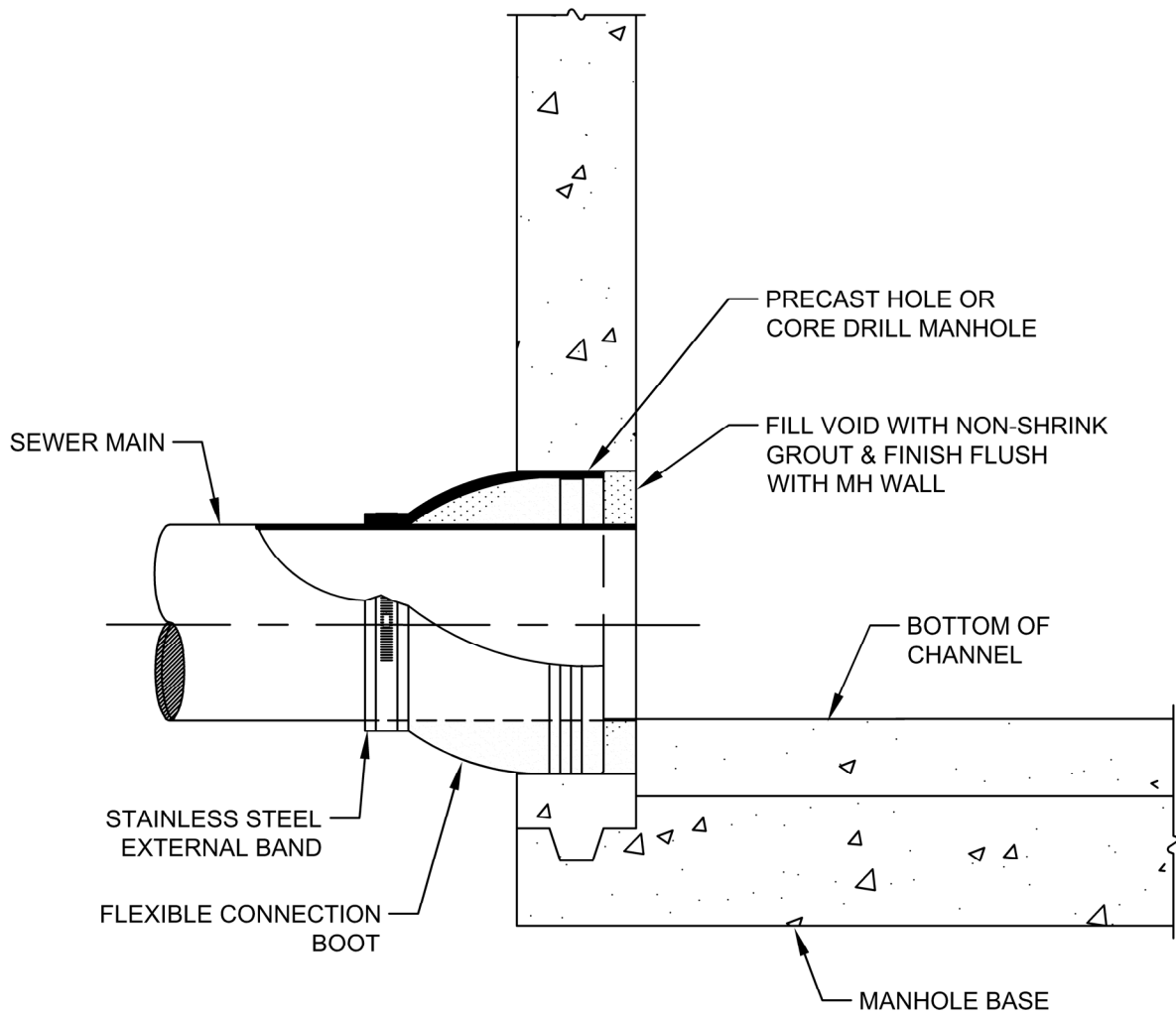
POURED IN PLACE MANHOLE-BASE

NOTE:

1. CONCRETE TO EXTEND 12" OUTSIDE OF MH WALL AND 6" ABOVE THE BOTTOM OF THE BASE SECTION.



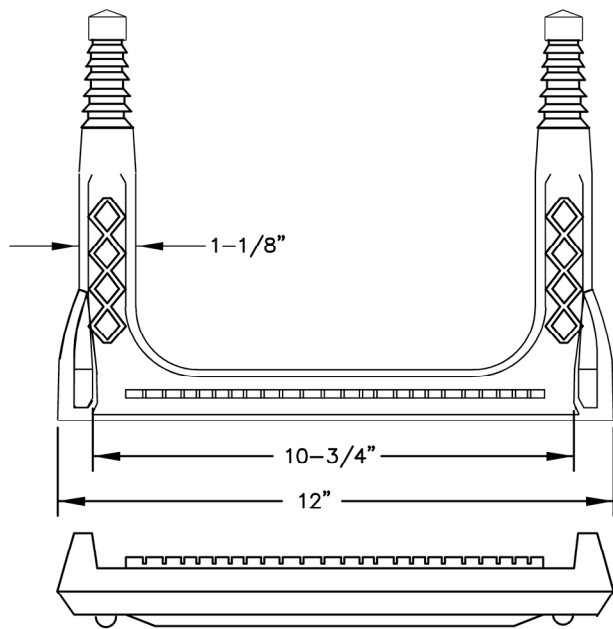
PRECAST MANHOLE-BASE



NOTE:

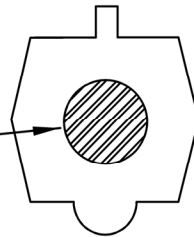
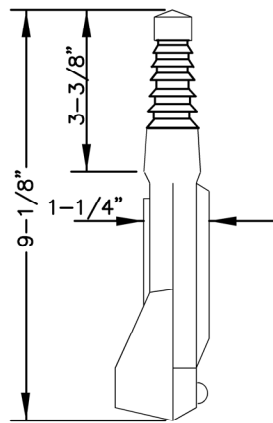
1. NON-SHRINK GROUT SHALL NOT BE FAST OR RAPID SETTING.

MANHOLE-CONNECTION FLEXIBLE
(KOR-N-SEAL OR EQUAL)

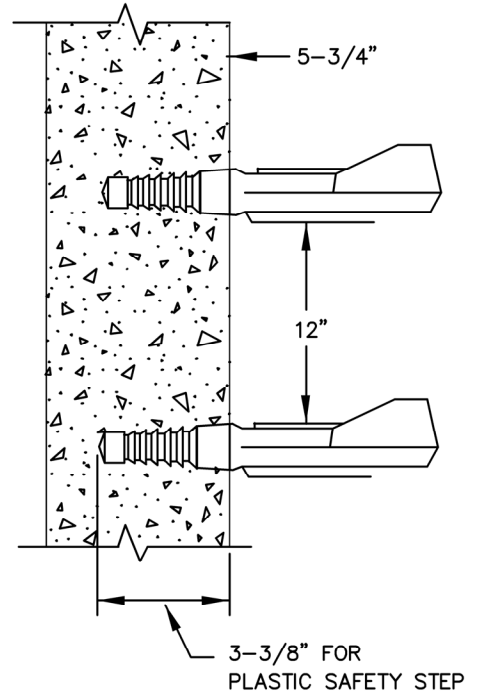


COPOLYMER POLYPROPYLENE PLASTIC

1/2" GRADE 60 REINFORCEMENT



- NOTES:
1. ALL STEPS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478.
 2. MANHOLE STEPS MUST BE TIGHT AND FIRMLY EMBEDDED.
 3. ALL STEPS WITHIN A MANHOLE SHALL BE OF THE SAME DESIGN, TYPE, AND SIZE. (MIXING OF UNMATCHED STEPS IS NOT PERMITTED).



NOTES:

1. STEPS LOCATED AT 12" O.C. LOCATED ON VERTICAL SIDE OF MANHOLE.
2. STEPS A MAXIMUM OF 24" FROM RIM AND 6" FROM TOP OF CONE TO FIRST STEP.

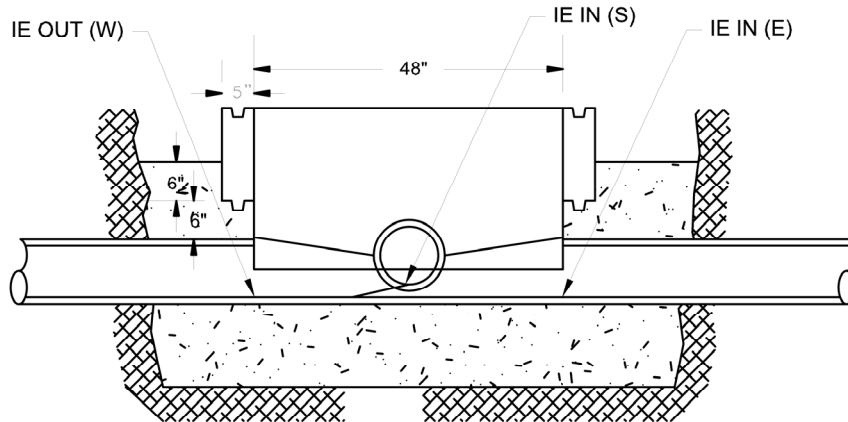
MATERIALS:

PLASTIC:

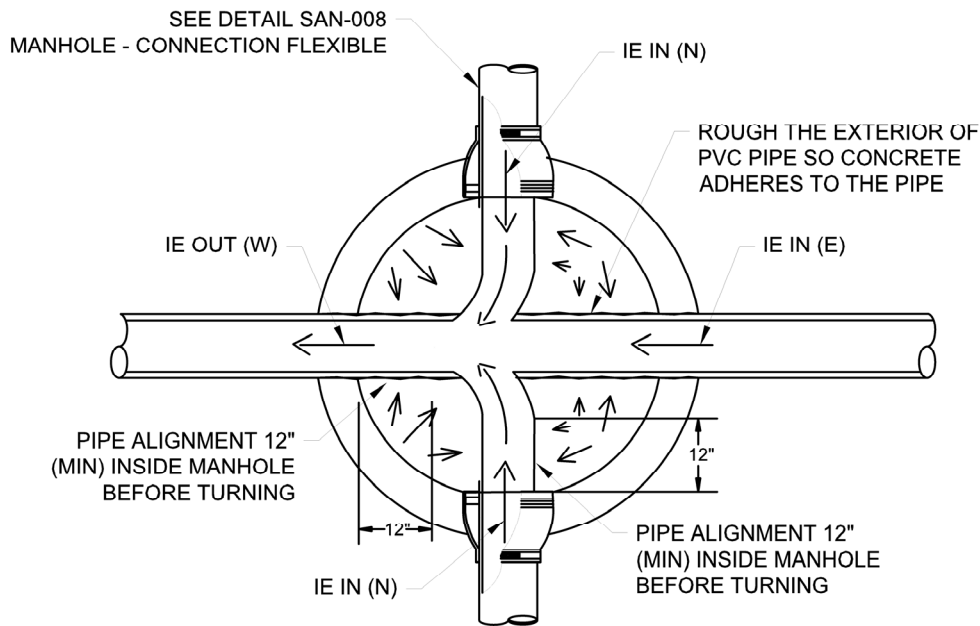
MUST CONFORM WITH ASTM C-478.
 STEEL REINFORCING BAR MINIMUM 1/2" GRADE 60.
 MEETING REQUIREMENTS OF ASTM A615 ENCAPSULATED
 WITH INJECTION MOLDED COPOLYMER POLYPROPYLENE
 WITH SERRATED SURFACES.

NOTES:

1. CONSTRUCT THE MANHOLE WITH THE IE INS AND OUTS PER THE APPROVED PLANS.
2. WES INSPECTION REQUIRED PRIOR TO BACKFILLING/COVERING THE EXISTING PIPES AND AROUND THE MANHOLE CONTACT OUR OFFICE AT 503-742-4567 AND ASK FOR DEVELOPMENT SERVICES, OR EMAIL WES-PERMIT SERVICES@CLACKAMAS.US TO SCHEDULE THE INSPECTION. INSPECTION RESPONSE TIMES CAN VARY, THEREFORE PLAN TO WORK ACCORDINGLY.
3. SET BARREL SECTION OVER EXISTING CONCRETE PIPE; POUR MANHOLE BASE AND NEW CHANNEL. CUT OUT PIPE AND CLEAN, GROUT AND SMOOTH CHANNEL.
4. CHANNELS MUST PASS A 7-INCHES DIA. BY 30-INCHES LONG CYLINDRICAL OBJECT FOR MAINTENANCE PURPOSES.
5. POURED CONCRETE BASSE TO EXTEND 12-INCHES OUTSIDE OF MANHOLE WALL AND 6-INCHES ABOVE AND BELOW THE BOTTOM OF THE BARRELL SECTION.

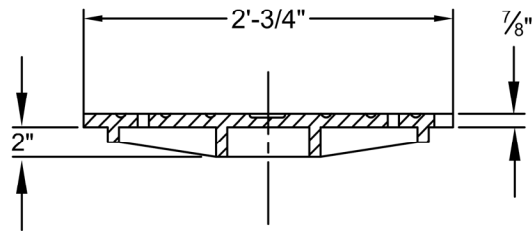
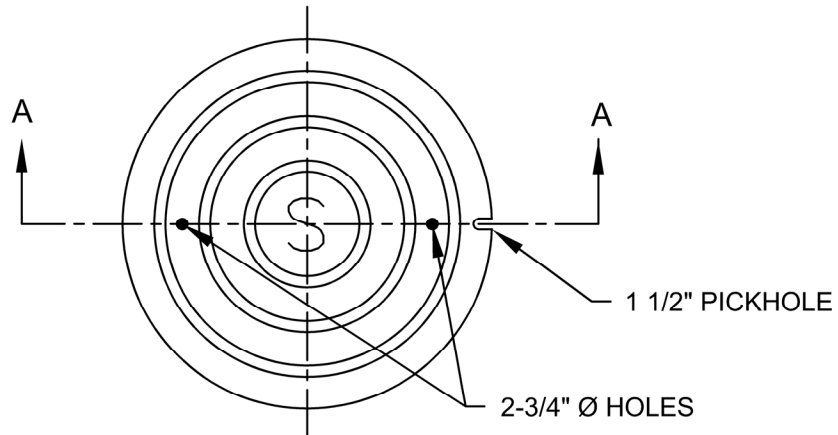


POURED IN PLACE MANHOLE BASE
(SEE DETAIL SAN-007)

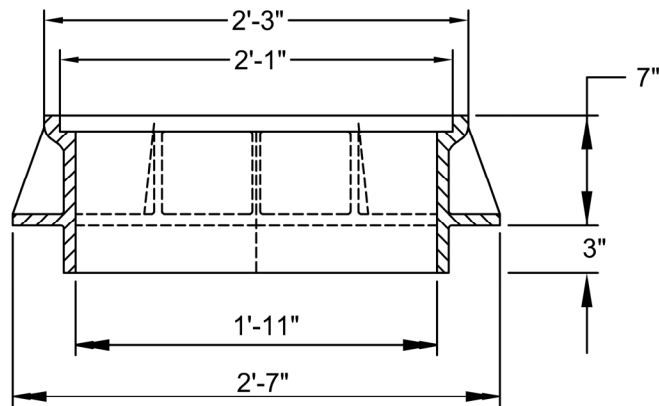


GENERAL PLAN ON
CHANNEL INTERSECTION

STANDARD



SECTION A-A

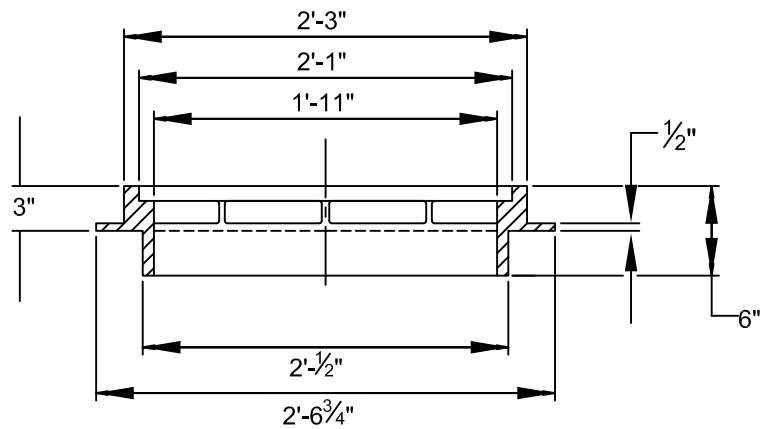
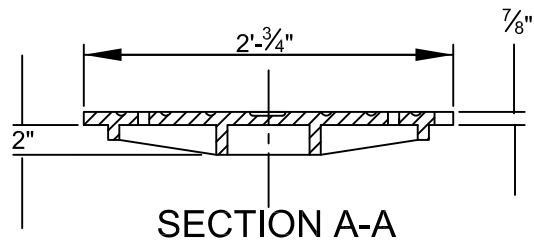
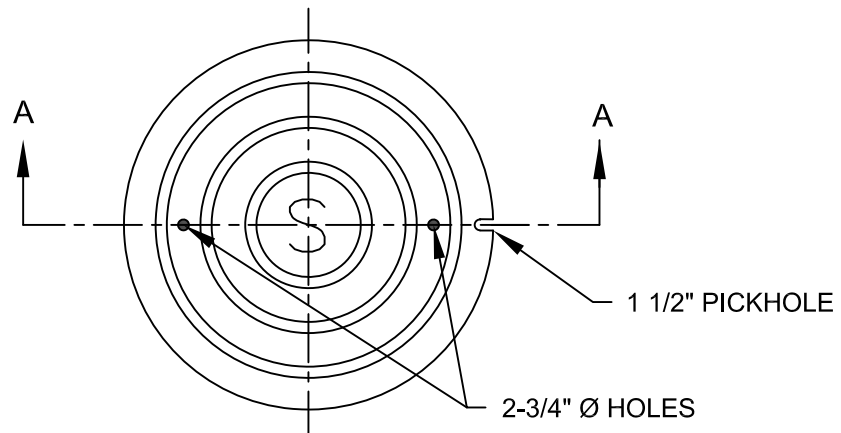


FRAME & COVER STANDARD

NOTES:

1. STANDARD FRAME AND COVER TO BE USED ON STREETS OR AS NOTED ON CONSTRUCTION PLANS.
2. SANITARY COVER WILL HAVE 2 - 3/4" Ø HOLES AND 1 - 1 1/2" PICKHOLE IN LID FOR LIFTING HOOK.

SUBURBAN



FRAME & COVER SUBURBAN

NOTES

1. SUBURBAN FRAME & COVER CAN BE USED IN EASEMENTS OR AS NOTED ON CONSTRUCTION PLANS.
2. SANITARY COVER WILL HAVE 2 -3/4" Ø HOLES AND 1 - 1 1/2" PICKHOLE IN LID FOR LIFTING HOOK.



CLACKAMAS
**WATER
ENVIRONMENT
SERVICES**

CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

APPROVAL DATE: July, 2021

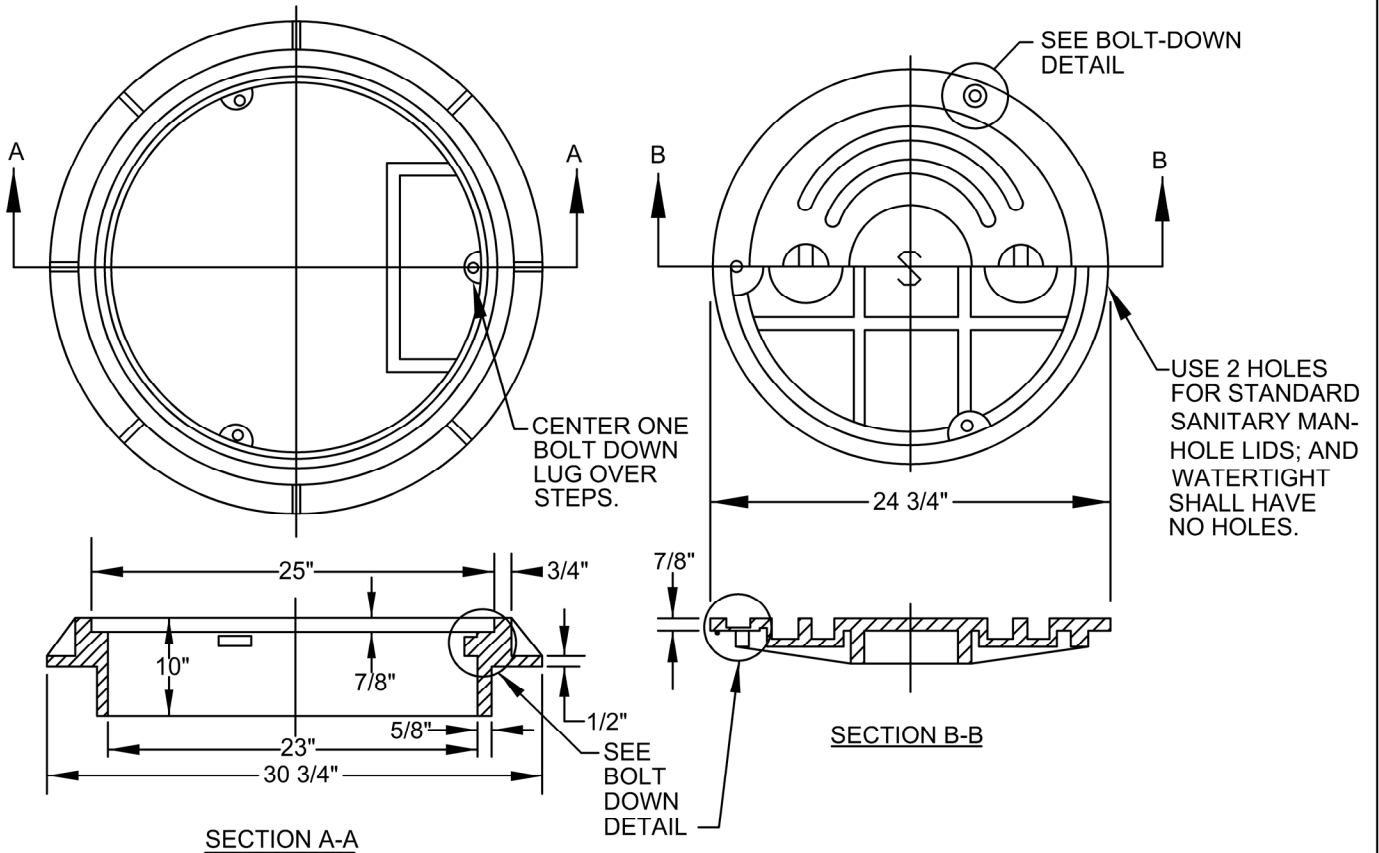
SCALE: N.T.S.

**SUBURBAN FRAME
& COVER**

STANDARD
DRAWING
**SAN-
011**

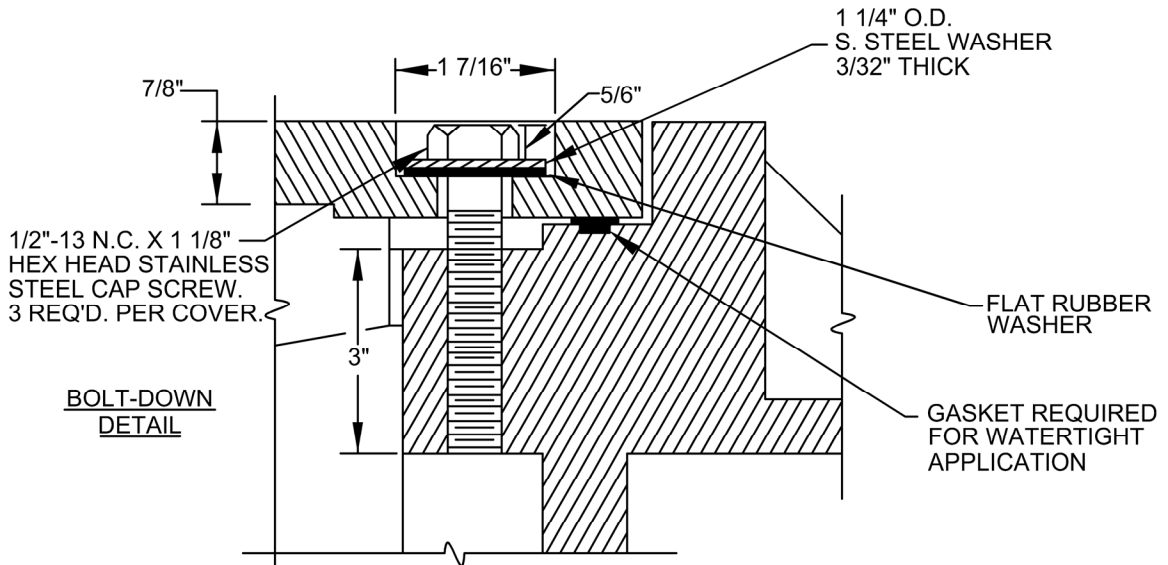
TAMPERPROOF MANHOLE RING

3-BOLT DOWN COVER



SECTION A-A

SECTION B-B



BOLT-DOWN DETAIL

**SECURE MANHOLE DETAIL
FOR USE IN TRAFFIC AREAS**

NOTE: COVER AND FRAME SHALL BE OF GRAY CAST IRON A.S.T.M. A-48 CLASS 30.

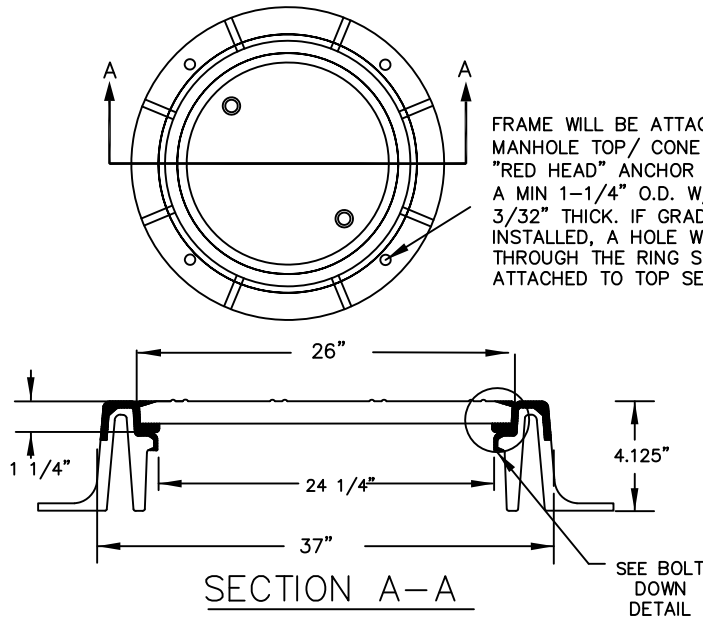


CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

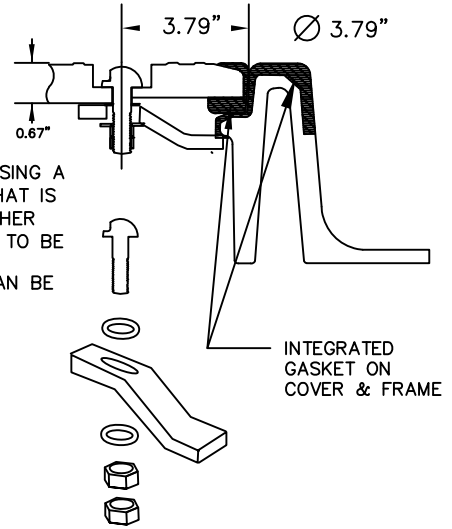
APPROVAL DATE: July, 2021 SCALE: N.T.S.
FRAME & COVER
SECURE
FOR TRAFFIC AREAS

STANDARD DRAWING
SAN-012

WATERTIGHT MANHOLE RING



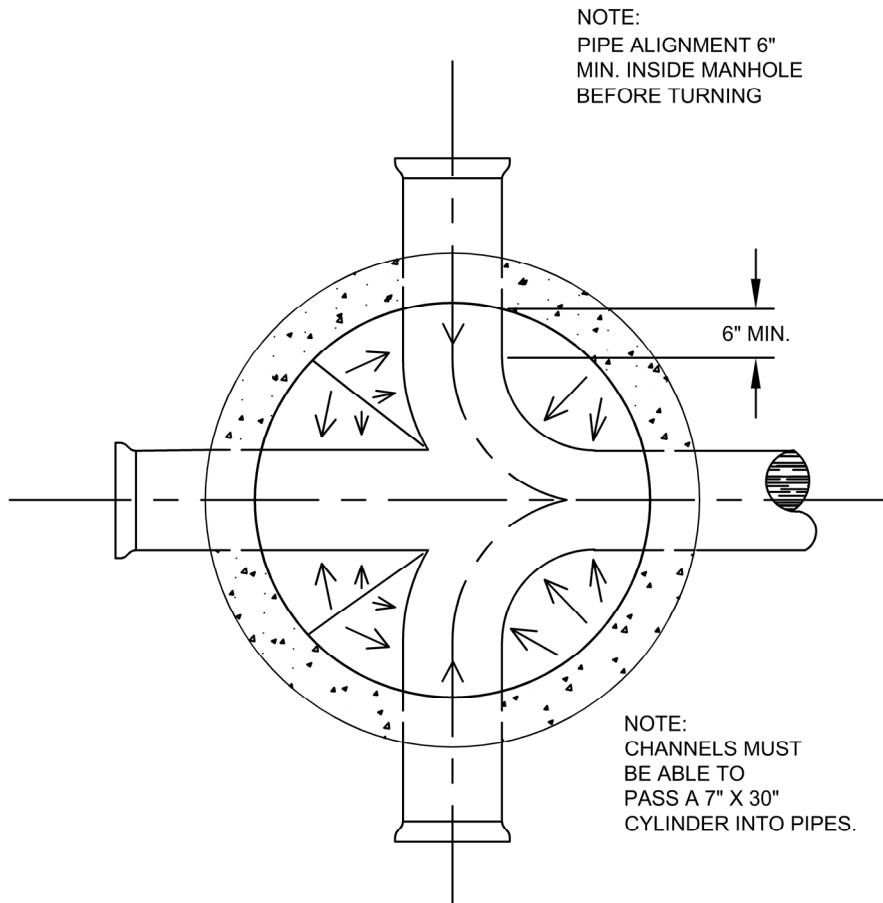
FRAME WILL BE ATTACHED TO THE MANHOLE TOP/ CONE SECTION BY USING A "RED HEAD" ANCHOR (OR EQUAL) THAT IS A MIN 1-1/4" O.D. W/S. STEEL WASHER 3/32" THICK. IF GRADE RINGS NEED TO BE INSTALLED, A HOLE WILL BE CORED THROUGH THE RING SO THE BOLT CAN BE ATTACHED TO TOP SECTION.




**BOLT-DOWN
DETAIL**

NOTES:

1. COMPOSITE WATERTIGHT/TAMPER PROOF MANHOLE FRAME AND COVER SHALL BE USED IN ALL EASEMENT AND OFF STREET OR BEHIND PROPERTY AREAS SUSCEPTIBLE TO FLOODING.
2. THE WATERTIGHT MANHOLE COVER FRAME SHALL BE GMI 2600 SERIES COMPOSITE FRAME AND COVER MANUFACTURED BY TITUS INDUSTRIAL GROUP, INC. OR ITS EQUAL.
3. THE LOCKING MECHANISM SHALL BE A TWISTLIFT® MANUFACTURED BY TITUS INDUSTRIAL GROUP, INC. OR ITS EQUAL.
4. THE TWISTLIFT® COMPOSITE ACCESS COVER LOCK IS DESIGNED AS A SECURITY BOLT REQUIRING A SPECIAL TOOL TO OPERATE THE QUARTER TURN BOLT AND LIFT THE COVER FROM THE FRAME. IT FUNCTIONS WITH EITHER THE STANDARD CAM LOCK QUARTER TURN PADDLE, OR THE EXTENDED 'SURCHARGE' PADDLE.
5. THE BOLT SHALL BE MACHINED FROM 316 STAINLESS STEEL.
6. THE BOLT FEATURES A DOMED HEAD WITH 3 EQUALLY SPACED 'J' SLOTS RUNNING HORIZONTALLY AROUND THE BOLT HEAD.
7. STANDARD BOLT SIZES ARE 14 MM COARSE THREAD WITH A FLAT MACHINED ON TWO SIDES TO ENGAGE PADDLE.
8. THE PADDLE IS DIE CAST FROM 304 STAINLESS STEEL AND ALSO AVAILABLE IN BOTH STANDARD CAM LOCK DESIGN, OR EXTENDED SURCHARGE CONFIGURATION.
9. THE BOLT AND PADDLE WILL BE ASSEMBLED USING TWO STAINLESS STEEL 14 MM NUT'S, THE BOTTOM NUT IS A STANDARD NUT THAT WILL BE TORQUE TO 35 FT. LBS. TO GIVE THE DESIRED TENSION ON THE BOLT. A SECOND NYLOCK™ LOCK NUT IS USED AS A JAM NUT, AND TORQUE TO 90 FT. LBS. STAINLESS STEEL WASHERS ARE USED TO PROVIDE CONSISTENT TURNING RESISTANCE.
10. A 5/16 STAINLESS STEEL SET SCREW, SET IN A THREADED HOLE IN THE COVER PROVIDES FOR A STOP AT ¼ TURN OF OPERATION.
11. THE BOLT WILL BE OPERATED BY MEANS OF A SPECIALLY MADE OPENING KEY CONSISTING OF A SPECIAL SOCKET ATTACHED TO A 'T' HANDLE USED TO BOTH TURN THE BOLT, AND LIFT OUT THE COVER.
12. ONE SET OF REPLACEMENT OPENING KEYS WILL BE PROVIDED TO WATER ENVIRONMENT SERVICES AT TIME OF INSTALLATION.
13. THE BOLT HEAD IS PROTECTED BY A WEATHER RESISTANT PLASTIC DEBRIS CAP. THE CAP IS INCLUDED WITH EACH LOCK.

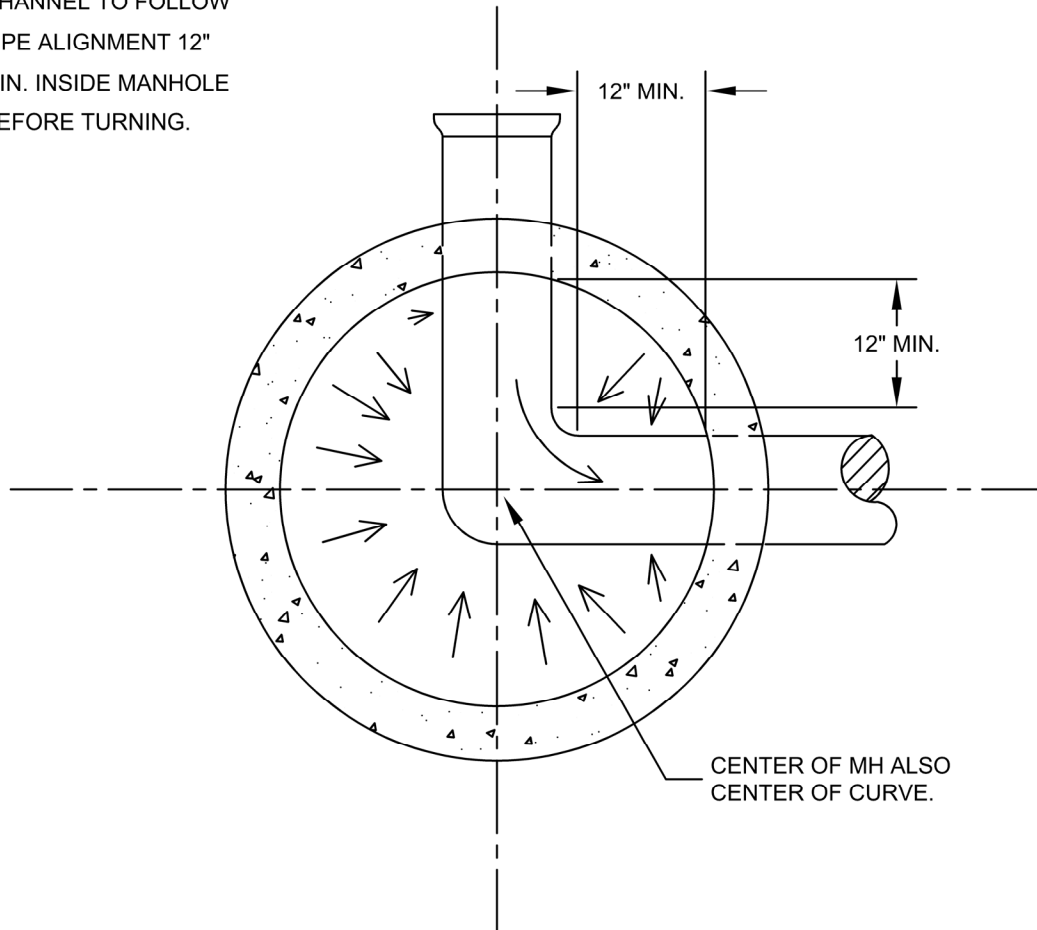


CHANNEL-INTERSECTION

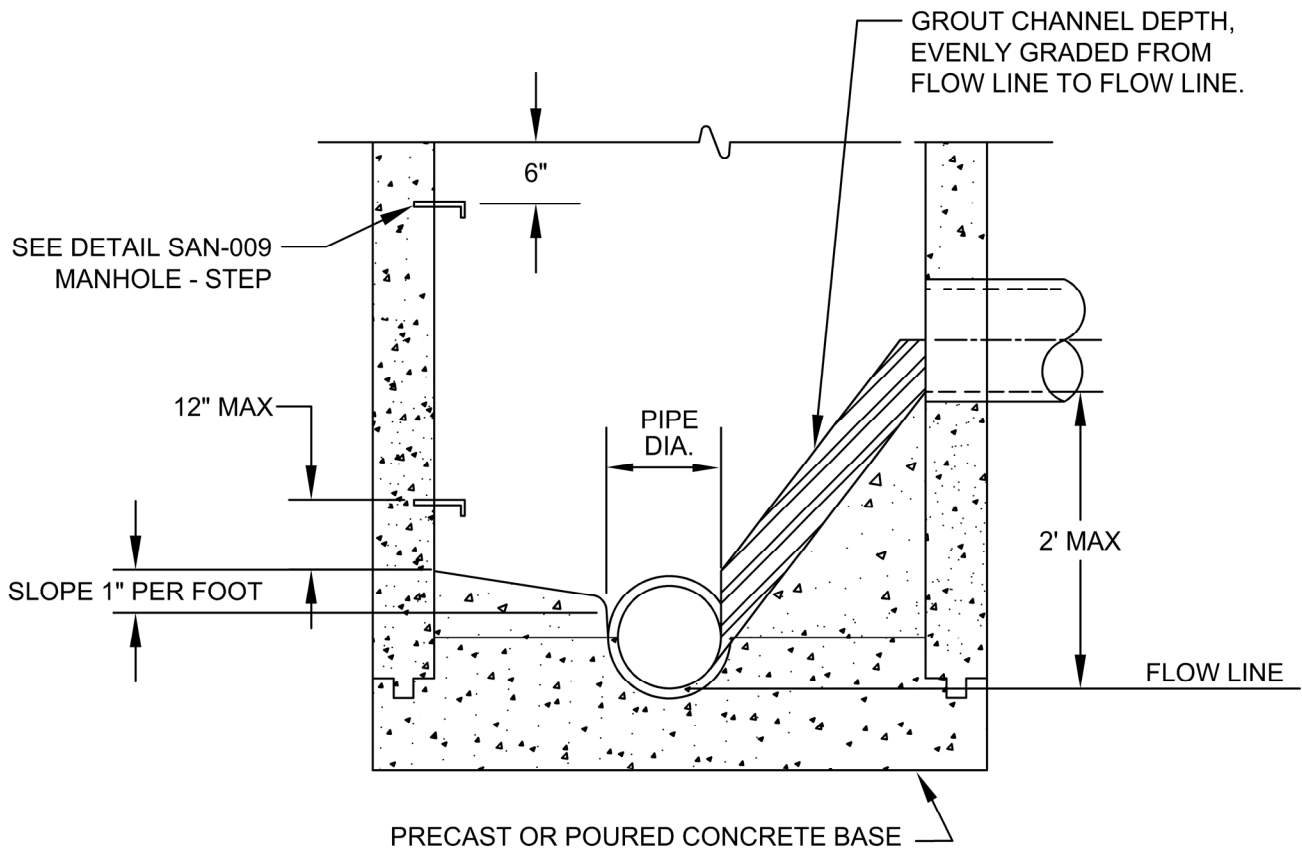
 <p>CLACKAMAS WATER ENVIRONMENT SERVICES</p>	<p>CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045</p>	<p>APPROVAL DATE: July, 2022 SCALE: N.T.S.</p>	<p>STANDARD DRAWING</p>
		<p>CHANNEL-INTERSECTION</p>	

NOTES:

1. CHANNELS MUST BE ABLE TO PASS A 7" X 30" CYLINDER INTO PIPES.
2. CHANNEL TO FOLLOW PIPE ALIGNMENT 12" MIN. INSIDE MANHOLE BEFORE TURNING.



CHANNEL-90 DEGREE MANHOLE

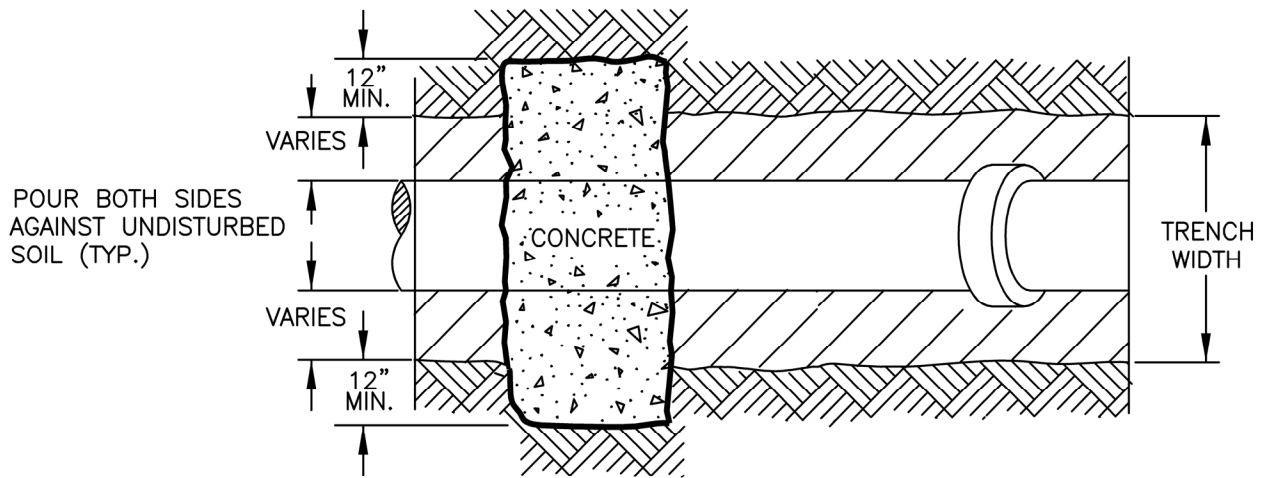
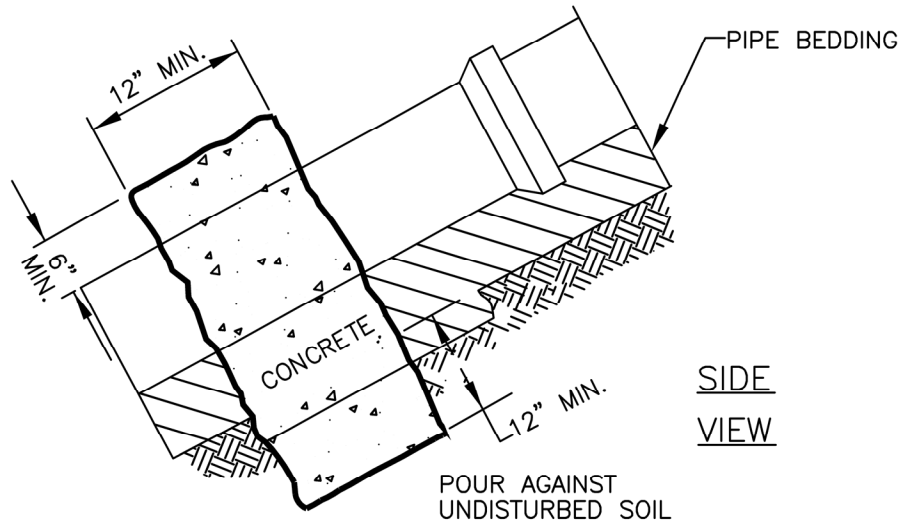


CHANNEL-SLIDE

(BY DISTRICT PRE-APPROVAL ONLY)

NOTES:

1. CHANNELS MUST BE ABLE TO PASS A 7" X 30" CYLINDER INTO PIPES.
2. GROUT SHALL NOT BE FAST OR RAPID SETTING.



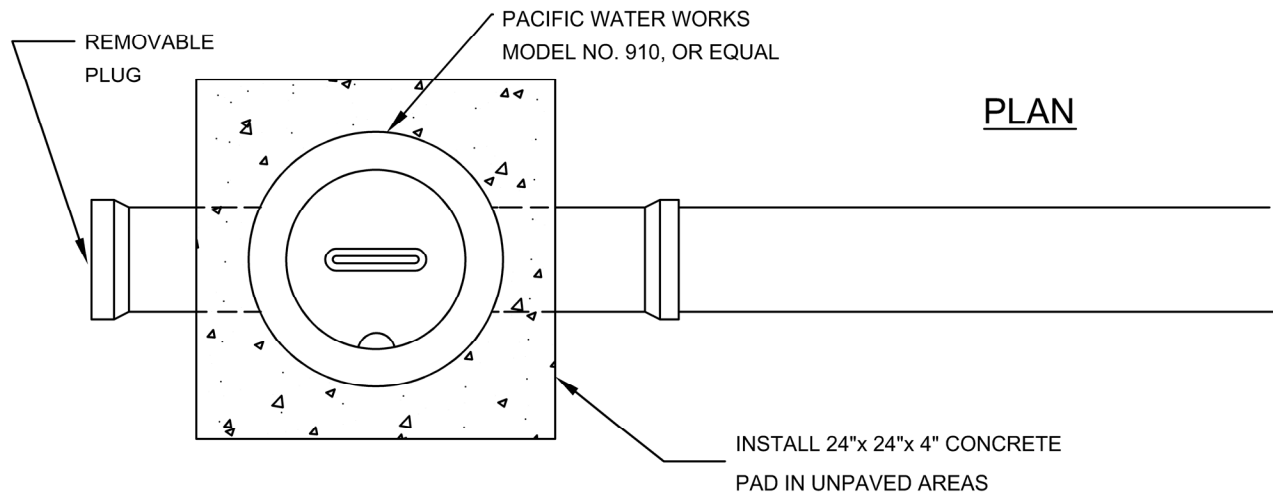
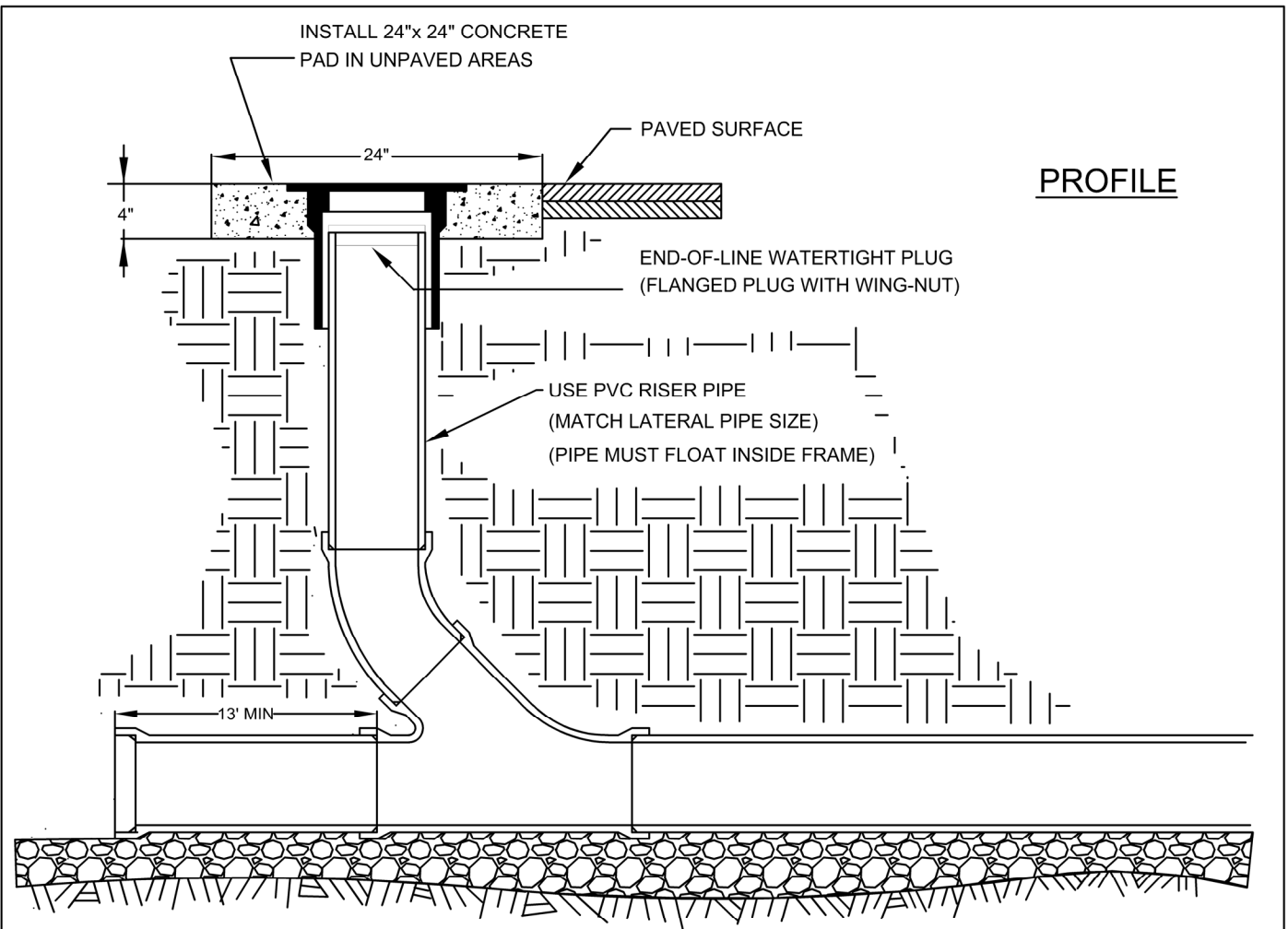
PLAN

SLOPE FT/FT	MIN. ANCHOR SPACING CENTER TO CENTER
0.20 - 0.34	35'
0.35 - 0.50	25'
0.51+	15' OR CONC. ENCASEMENT

NOTES:

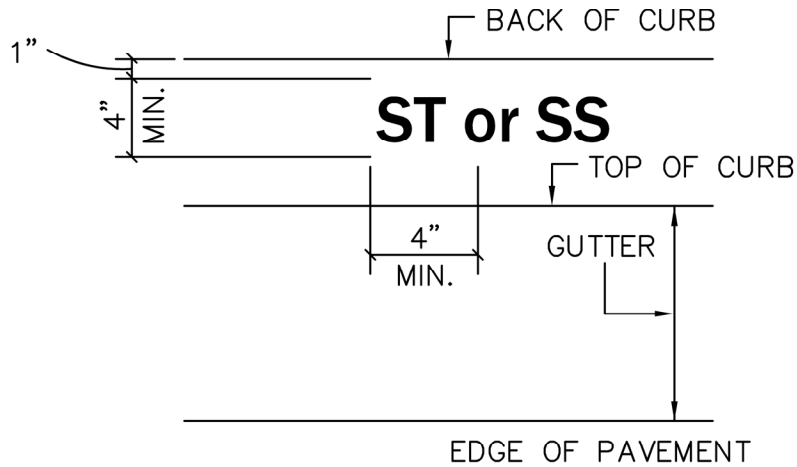
1. CONCRETE ANCHORS TO BE INSTALLED IMMEDIATELY DOWNHILL OF PIPEBELL.
2. CONCRETE SHALL HAVE A 28 DAY STRENGTH OF 3000 PSI. AND 2" TO 4" SLUMP.
3. ODOT "METAL PIPE SLOPE ANCHORS" ARE AN ACCEPTABLE ALTERNATIVE.

ANCHOR WALL



CLEANOUT PAD

	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	APPROVAL DATE: July, 2022 SCALE: N.T.S.	STANDARD DRAWING
	CLEANOUT PAD		SAN-018



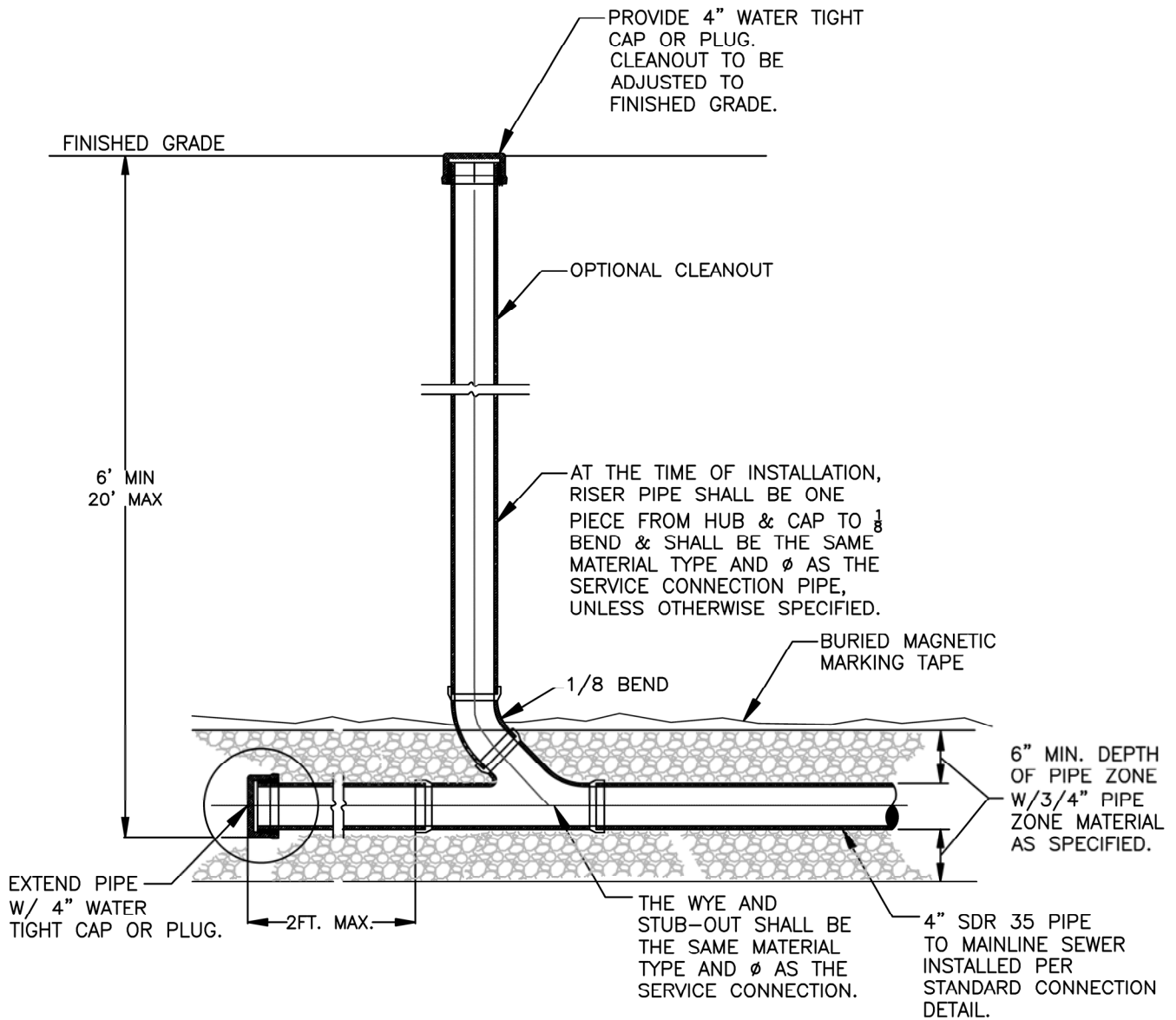
PLAN VIEW
(TYPICAL)

NOTES:

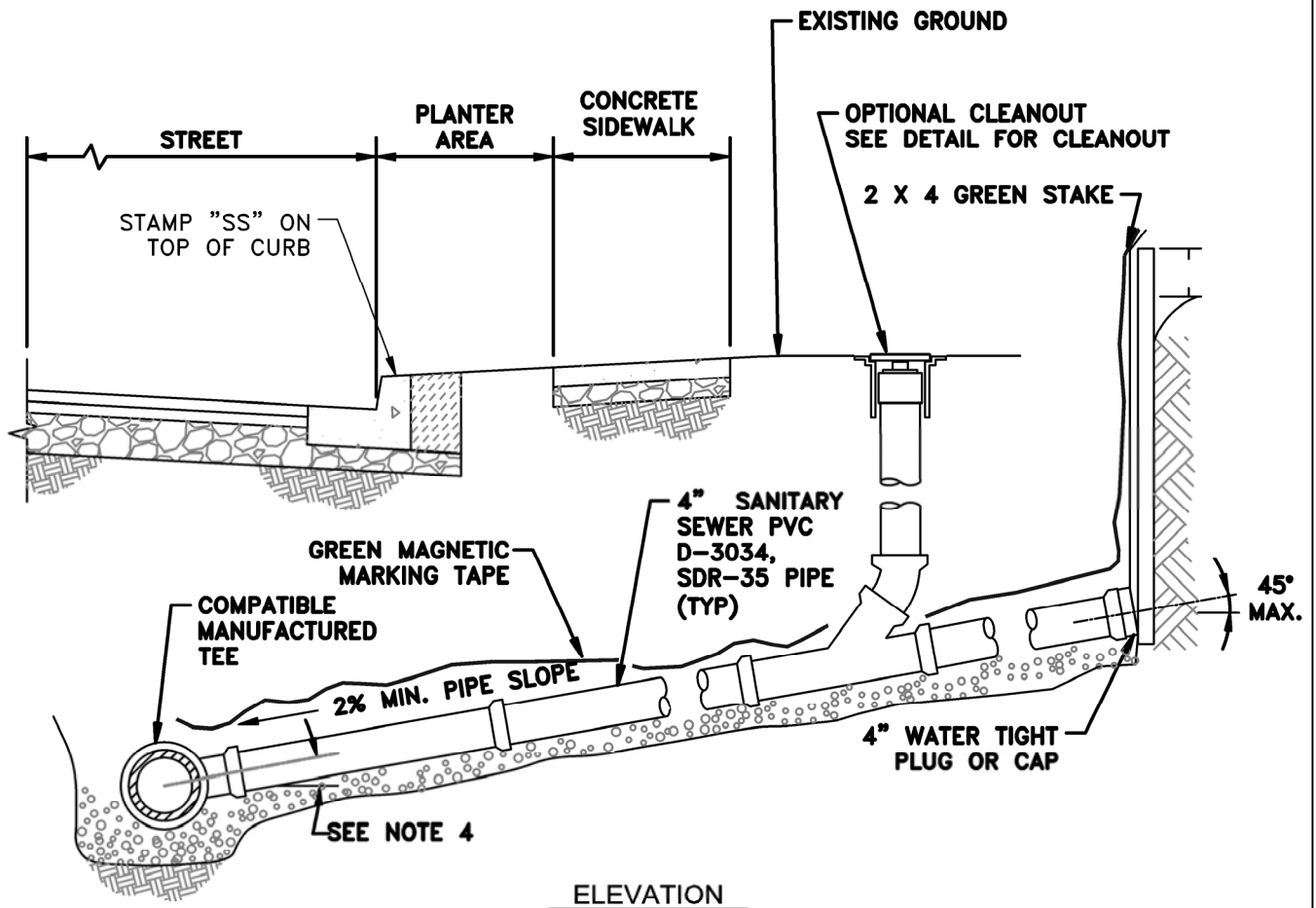
1. ALL STORM AND SANITARY SERVICE LATERALS SHALL BE MARKED APPROXIMATELY AS FOLLOWS:

 STORM DRAIN LATERAL "ST" TOP OF CURB
 SANITARY SEWER LATERAL "SS" TOP OF CURB

2. LETTERS SHALL HAVE A 1/2" MAX. WIDTH.



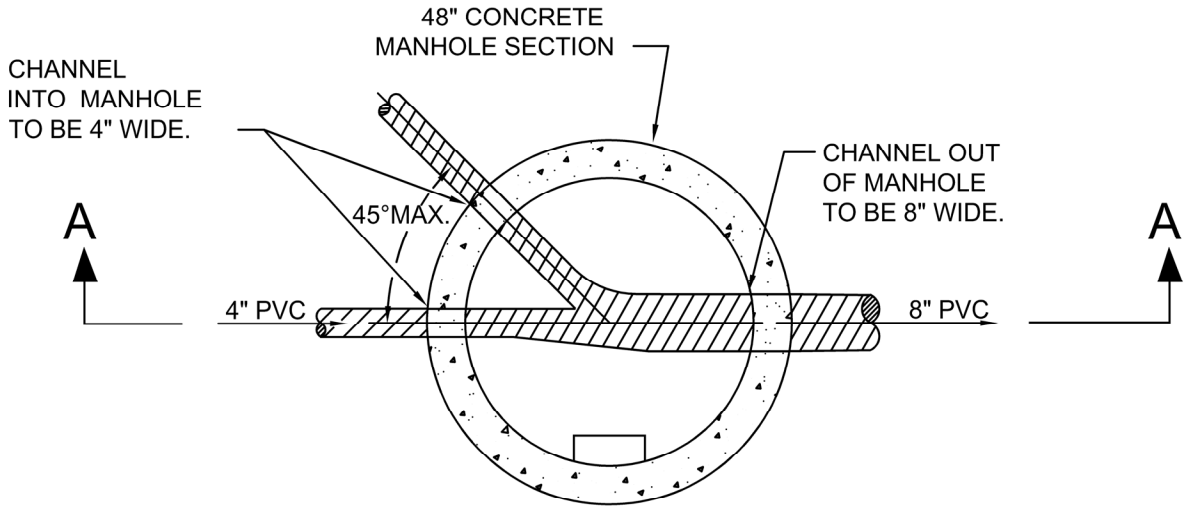
1. ALL PIPE AND FITTINGS SHALL BE ASTM D-3034, SDR 35.
2. ON LOTS WITH EXISTING HOMES, CONTRACTOR SHALL INSTALL APPROVED HUBS AND CAPS FLUSH WITH FINISHED GRADE.
3. CLEANOUTS SHALL NOT BE CONSTRUCTED SO THE CLEANOUTS CAP WILL END UP IN SIDEWALKS, STEPS OR DRIVEWAYS.



ELEVATION

NOTES:

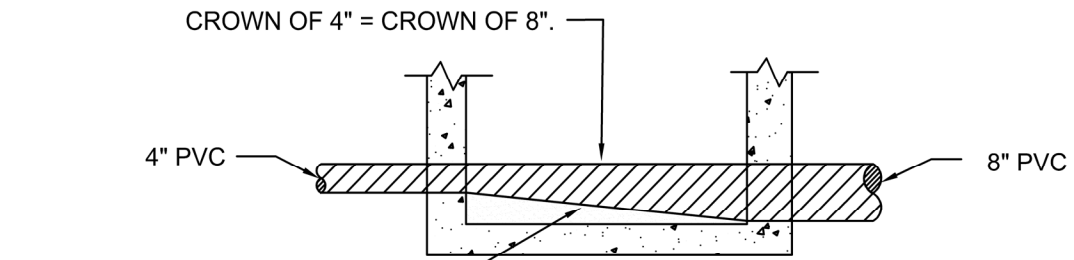
1. INSTALL OPTIONAL CLEANOUT PER STANDARD DRAWING.
2. VIDEO INSPECT SERVICE CONNECTION IN ACCORDANCE WITH STANDARDS.
3. 2" x 4" TREATED STAKE FROM INVERT TO 1' ABOVE FINISH GRADE. SERVICE CONNECTION MARKER SHALL BE CONTINUOUS AND REMAIN VERTICAL AFTER BACKFILLING. END SHALL BE PAINTED GREEN.
4. CENTERLINE OF SERVICE OUTLET ON TEE SHALL BE ABOVE SPRINGLINE.
5. SANITARY SEWER SERVICE CONNECTIONS SHALL BE A FACTORY TEE INSTALLED 90° PERPENDICULAR TO SANITARY SEWER MAIN.
6. EVERY PROPERTY SHALL HAVE A SEPARATE SERVICE CONNECTED DIRECTLY TO THE MAINLINE, UNLESS OTHERWISE APPROVED BY THE DISTRICT. SHARED SERVICE CONNECTIONS ARE NOT ALLOWED.
7. THE SERVICE CONNECTION LOCATION SHALL GENERALLY BE LOCATED TEN FEET (10') OFFSET FROM THE PROPERTY LINE ON THE LOW SIDE OF LOT.
8. TEES FOR SERVICE CONNECTIONS SHALL BE LOCATED NO CLOSER THAN FIVE FEET (5') TO MANHOLES. SEPARATION BETWEEN WATER LINE, SANITARY SERVICE CONNECTION AND STORM SERVICE CONNECTION SHALL GENERALLY BE TEN FEET (10') WITH A MINIMUM OF FIVE FEET (5').
9. ANY OTHER PROPOSED LOCATION SHALL BE AT THE DISCRETION OF THE DISTRICT ON CASE BY CASE BASIS.



PLAN

NOTE:

1. THIS TYPE OF CONNECTION IS ALLOWED ONLY ON END OF RUN MANHOLES WITH DISTRICT APPROVAL.
2. MAXIMUM NUMBER OF SERVICE CONNECTIONS INTO A MANHOLE IS TWO.

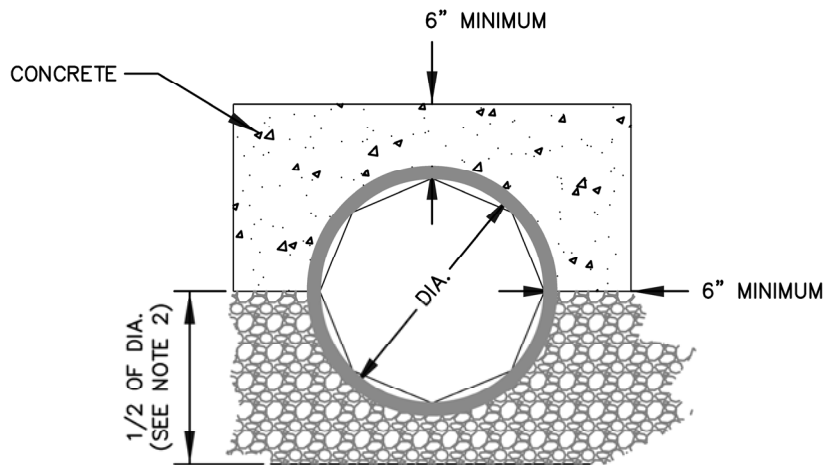


MAKE SMOOTH TRANSITION FROM 4" TO 8" CHANNEL.

SECTION A-A

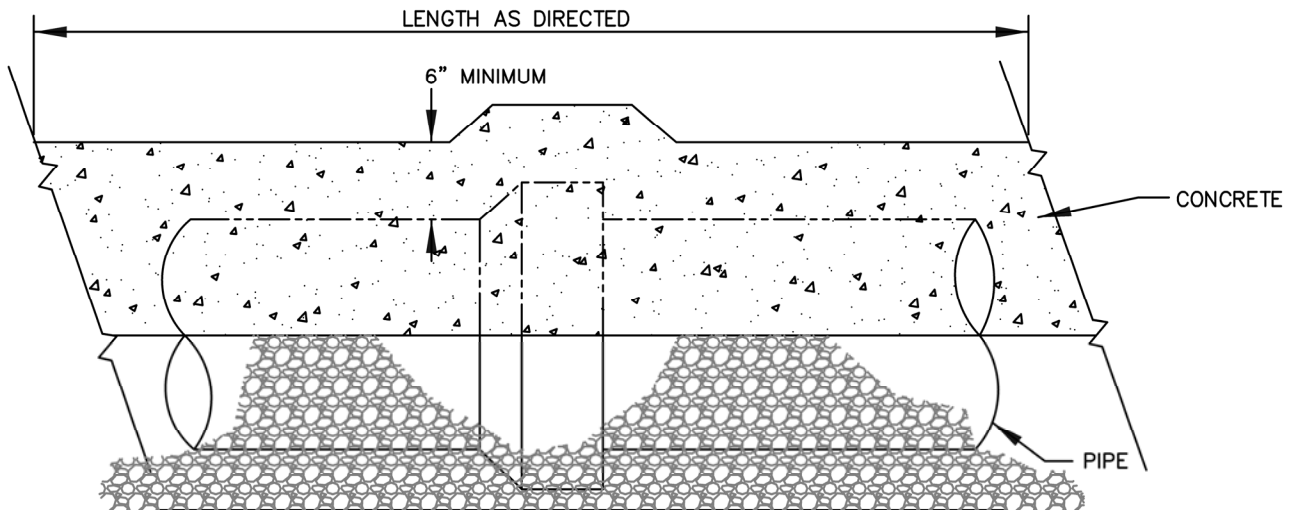
SERVICE CONNECTION
INTO MANHOLE

SCALE: NTS

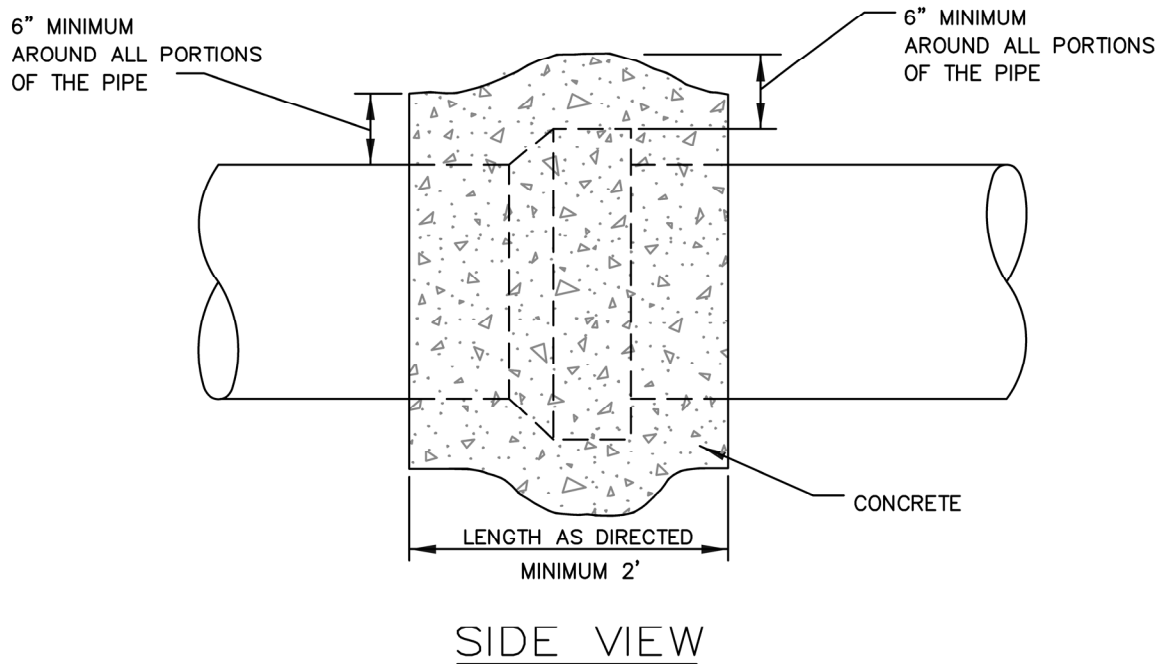
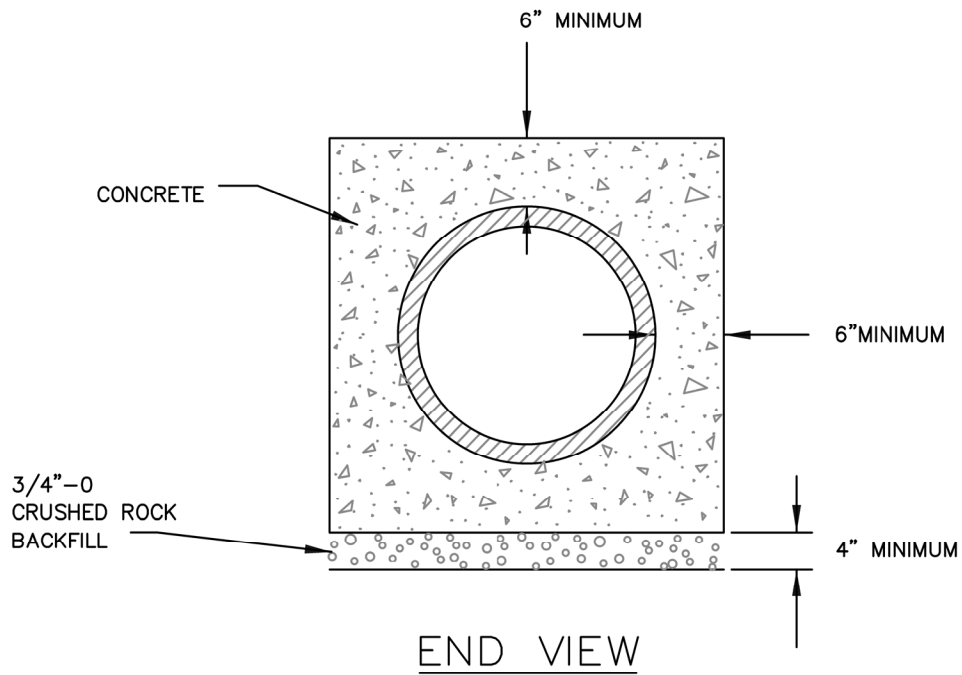


END VIEW

- NOTES:
1. CONCRETE SHALL HAVE A 28 DAY STRENGTH OF 3000 PSI AND 2" TO 4" SLUMP.
 2. SEE APPLICABLE DETAIL FOR PIPE BEDDING INFORMATION.



SIDE VIEW

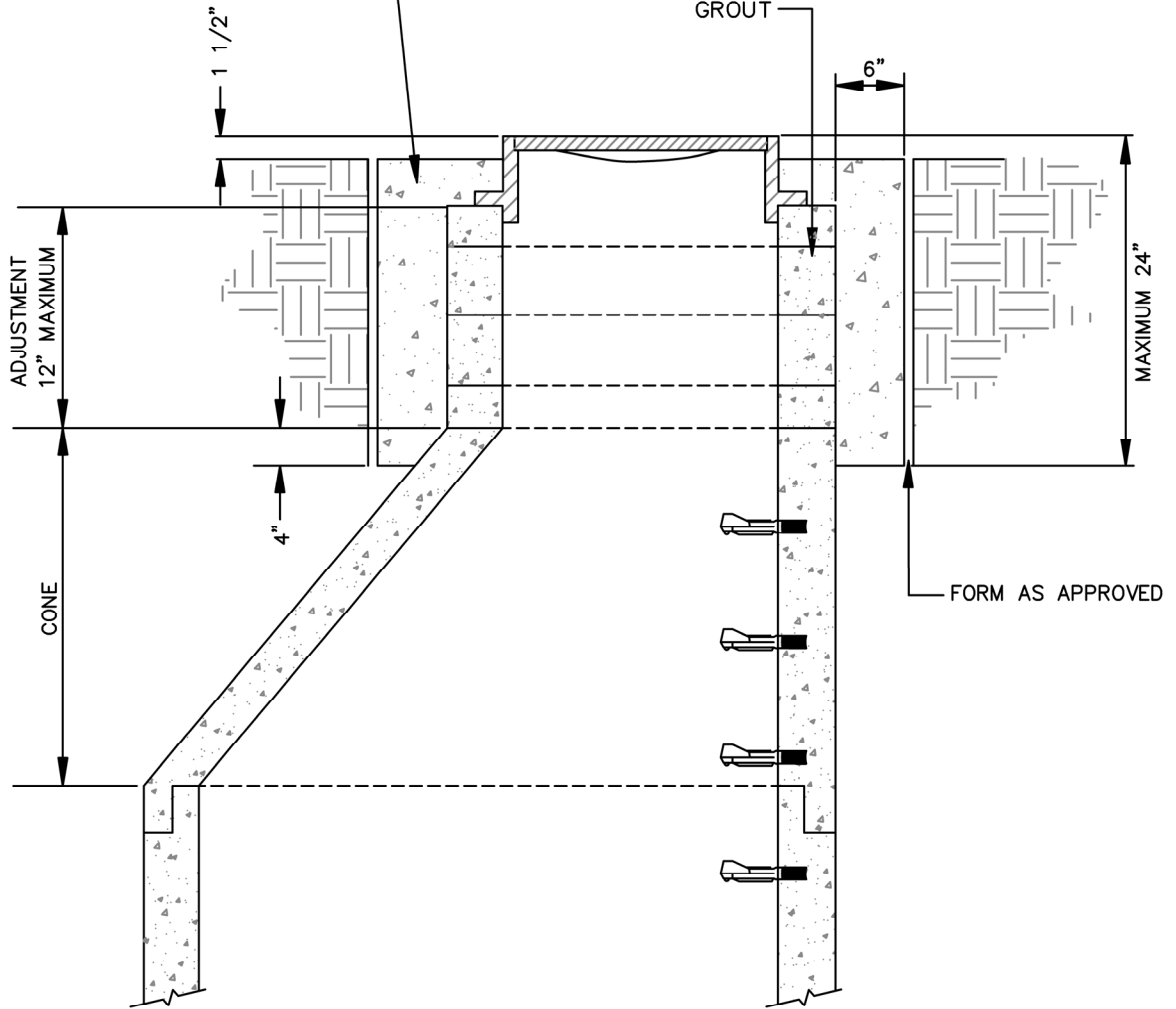


NOTES:

1. CONCRETE SHALL HAVE A 28 DAY STRENGTH OF 3000 PSI AND, 2" TO 4" SLUMP.
2. PRIOR TO INSTALLING THE CONCRETE ENSURE THE JOINT IS SEAL IN A MANNER AS NOT TO ALLOW CONCRETE TO ENTER INTO THE INTERIOR OF PIPE.

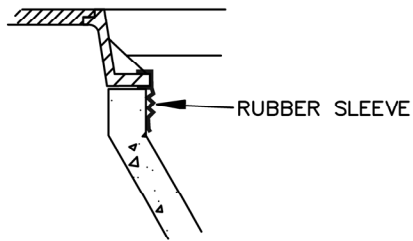
CONCRETE FOR CLOSURE COLLAR SHALL BE READY-MIXED CONFORMING WITH ASTM C94, ALTERNATE 2 AND SHALL HAVE A COMPRESSIVE STRENGTH OF 3000 PSI @28 DAYS.

ADJUSTMENT GRADE RINGS AND CASTING FRAME SET IN 1" OF NON-SHRINKING GROUT



NOTE:

1. NON-SHRINK GROUT SHALL NOT BE FAST OR RAPID SETTING.



NARROW EXTERNAL RUBBER SEAL

TO SPAN CHIMNEY HEIGHTS OF:

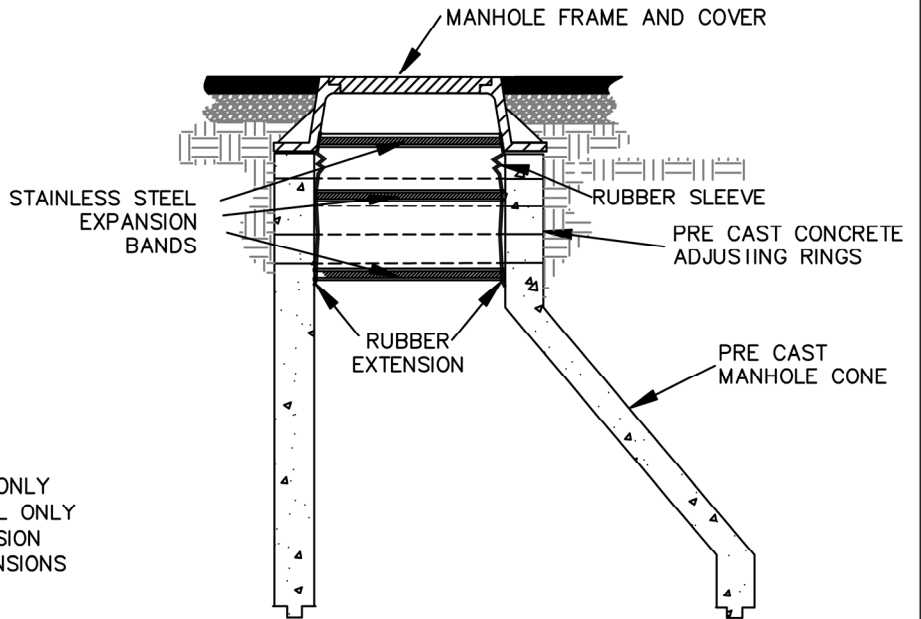
- 0-3" - NARROW (6") SEAL ONLY
- OVER 3" - 6 1/2" - STANDARD (9") SEAL ONLY
- OVER 6 1/2" - 12" - STD. SEAL + EXTENSION
- OVER 12" - SEAL + MULT. EXTENSIONS

NOTES:

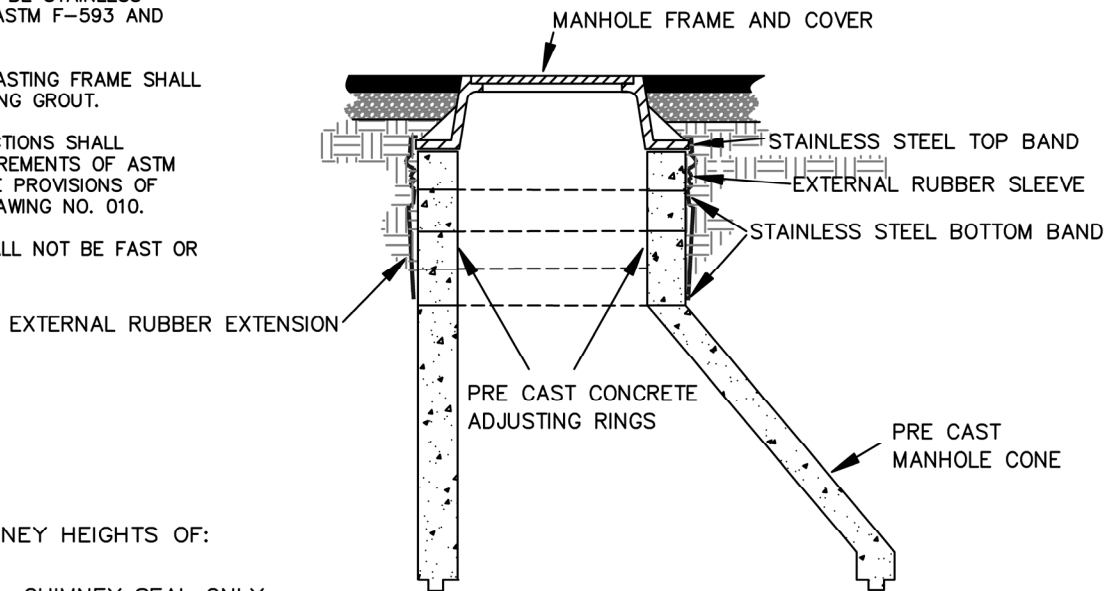
1. SLEEVES AND EXTENSIONS SHALL HAVE A MINIMUM OF $\frac{3}{16}$ " THICKNESS.
2. RUBBER SHALL BE EXTRUDED HIGH GRADE COMPOUND CONFORMING TO ASTM C-923.
3. BANDS SHALL BE FABRICATED FROM 16 GAUGE STAINLESS STEEL CONFORMING TO ASTM A-240, TYPE 304.
4. NUTS AND BOLTS SHALL BE STAINLESS STEEL CONFORMING TO ASTM F-593 AND 594, TYPE 304.
5. ALL GRADE RING AND CASTING FRAME SHALL BE SET IN NON-SHRINKING GROUT.
6. PRE CAST MANHOLE SECTIONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478, AND APPLICABLE PROVISIONS OF STANDARD MANHOLE DRAWING NO. 010.
7. NON-SHRINK GROUT SHALL NOT BE FAST OR RAPID SETTING.

TO SPAN CHIMNEY HEIGHTS OF:

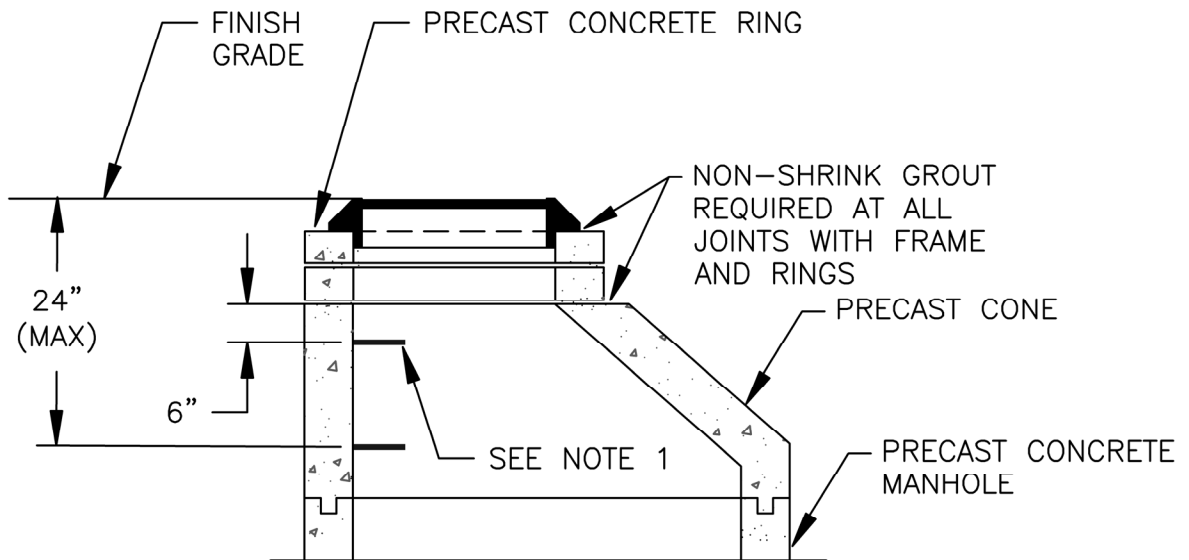
- 0-4 1/2" - CHIMNEY SEAL ONLY
- OVER 4 1/2" - 9" - SEAL + 7" EXTENSION
- OVER 9"- 12" - SEAL + 10" EXTENSION
- OVER 12" - SEAL + MULT. EXTENSIONS



INTERNAL MANHOLE CHIMNEY SEAL

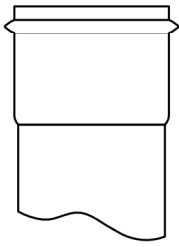


EXTERNAL MANHOLE CHIMNEY SEAL

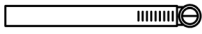


NOTES:

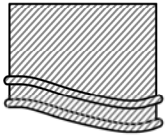
1. FIRST STEP SHALL BE 6" MINIMUM FROM RINGS TO MAXIMUM 24" FROM RIM.
2. NON-SHRINK GROUT SHALL NOT BE RAPID OR FAST SETTING.



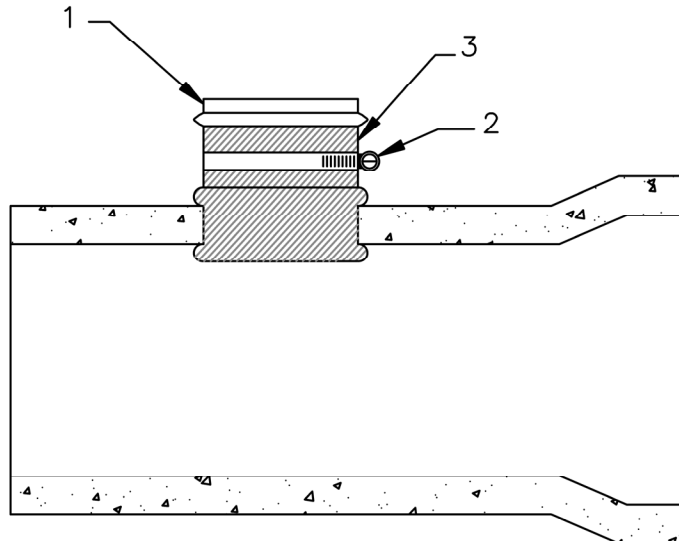
1. PVC HUB SHALL CONFORM TO ASTM 3034, SDR 35 DRIVE INTO CENTER OF RUBBER SLEEVE AFTER SLEEVE IS PLACED IN HOLE.



2. STAINLESS STEEL BAND SECURES UPPER HALF OF RUBBER SLEEVE TO THE PVC HUB. STAINLESS STEEL BAND SHALL BE 300 SERIES, $\frac{3}{16}$ " BAND WIDTH, CADMIUM PLATED CARBON STEEL, AND ATTACHED WITH HEX HEAD SLOTTED SCREW.



3. COMPLETE RUBBER SLEEVE INCLUDES A MOLDED SEGMENT THAT HOLDS IT IN PLACE.



NOTES:

1. ALL INSERTA-TEE HOLES SHALL BE MACHINE DRILLED AND CORED.
2. INSERTA-TEES ARE NOT ALLOWED IN NEWLY CONSTRUCTED SEWER MAINS.
3. SEWER MAIN SHALL BE TWO SIZES (NOMINAL I.D.) LARGER THAN THE INSERTA-TEE.



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OREGON CITY, OR 97045

APPROVAL DATE: July, 2021

SCALE: N.T.S.

INSERTA TEE

STANDARD
DRAWING

**SAN-
028**