

**ENGINEERING SPECIFICATIONS
AND STANDARD DETAILS
CHAPTER 3 STORMWATER FACILITIES**

Table of Contents

CHAPTER 3.00	STORMWATER FACILITIES	2
3.00.010	GENERAL CONSIDERATIONS	2
3.00.020	DESIGN STANDARDS	2
3.00.030	LANDSCAPE CONSIDERATIONS	3
3.00.040	CONVEYANCE	4
3.00.050	STAKING	5
3.00.060	EROSION CONTROL	5
3.00.070	TRENCH EXCAVATION	5
3.00.080	BACKFILLING	5
3.00.090	STREET PATCHING AND RESTORATION	5
3.00.100	MAINTENANCE	5
	GENERAL NOTES (STORMWATER CONSTRUCTION)	7

CHAPTER 3.00 STORMWATER FACILITIES

3.00.010 General Considerations

The standards established by this chapter are intended to represent the minimum standards for the design and construction of storm drainage facilities.

The City of Yelm (City) has adopted the latest edition of the Department of Ecology Stormwater Management Manual of Western Washington (SWMMWW) by reference and is hereinafter referred to as the Manual. The Manual is considered a part of these standards and sets forth minimum drainage and erosion control requirements. Where conflicting information occurs between this chapter and the Manual, the most appropriate standard as determined by the Civil Review Engineer shall apply.

3.00.020 Design Standards

The design of storm drainage and/or retention/detention system shall depend on their type and local site conditions. The design elements of storm drainage systems shall conform to City standards as set forth herein and follow current design practice as set forth in Chapter 1. The following design considerations shall apply:

- A. No retention/detention facility shall be located in an area that is used to satisfy an open space requirement unless it is approved during Site Plan Review.
- B. Use of designated open space areas for stormwater detention / retention and for infiltration shall satisfy all conditions of the City for usability and landscape conformity. See Section 3.00.030 for landscape considerations.
- C. The City shall make the sole determination whether the proposed stormwater facilities are compatible with open space and satisfy the intent of the City for open space amenities.
- D. Infiltration trenches shall not be located under a public roadway prism. Infiltration trenches and swales may be located within the public right-of-way within a planter strip or green belt as long as the trench or swale does not interfere with the original intent of the planter strip or green belt.
- E. Stormwater facilities shall not have other utilities located within them unless approved during the civil plan review. Adequate separation (as determined by the City) between stormwater facilities and other utilities will also be required.
- F. Swales designed for transporting, storing and/or infiltrating stormwater shall not be located on a lot designated for single family

occupancy. Easements proposed for such swales shall not be allowed. This is necessary due to the complexity of operating and maintaining the integrity of such facilities within fenced and landscaped private property.

- G. The use of commercial parking lots for detention of storm water will be reviewed by the Civil Review Engineer and approved or denied based on the design. The detention area shall be situated away from areas of pedestrian movement unless means for the rapid closing of the area is incorporated into the design. The maximum depth of water in parking lot storage shall be limited to 12 inches.
- H. Maximum catch basin spacing shall be 300 feet on boulevards, arterials and collectors and 500 feet on all other street classifications.
- I. The maximum depth of a retention or detention basin shall be 4.5 feet from the pond bottom to the top of the side slope (not the water elevation). Deeper basins may be allowed by the City's Civil Review Engineer. If basins over 4.5 feet deep have side slopes steeper than 4:1 (horizontal:vertical), then benches that are a minimum 3 feet wide shall be required for every 4.5 feet of depth. If basins over 4.5 feet deep have sides flatter than 4:1, benches are not required.

3.00.030 Landscape Considerations

The final landscape design shall be prepared by a licensed landscape architect or certified nursery technician. Wherever possible, existing trees and other native vegetation around the facility shall be saved. This allows for a smooth transition to other undeveloped areas and helps retain the character of the site.

New vegetation will need to be planted regardless of how much is cleared. Plantings should be designed with specific functions in mind: soil preservation, erosion control, evapotranspiration, screening, space definition, sun and shade, and others. Use a combination of trees, shrubs and groundcovers to provide variety and interest. Plant at least three different species of trees and shrubs.

Native plants that will tolerate flooding and wet conditions are preferred. To ensure survival of newly planted native vegetation, it is recommended that the plants be irrigated for the first season. In wet ponds with standing water, wetland herbaceous species (cattails, sedges, rushes, etc.) must be included.

Regional wet basins located in commercial developments should be designed with consideration for pedestrian and passive recreation facilities. Amenities around regional wet basins such as picnic tables, benches, gazebos, etc. are encouraged. Aeration and/or recirculation of

the water, such as waterfalls, cascades and fountains, should be considered to reduce the potential for odors to develop during the warmer months, to add visual interest, and to mask unwanted traffic noise.

Consult the City's Associate Planner for additional details on plant and landscape design criteria.

3.00.040 Conveyance

Pipe: Storm drainpipe within a public right-of-way or easement shall be sized to carry the maximum anticipated runoff from the possible contributing area using a 25-year, 24-hour storm event model or a continuous time series model with 25-year conditions, whichever is more stringent.

All storm pipe shall be a minimum of 12-inch diameter for mains within the right-of-way. Laterals less than 12 inch in diameter must be approved by City's Civil Review Engineer as supported by situation variables. When private stormwater (i.e. roof, lot or footing drains) cannot be infiltrated on individual lots, the minimum standard piping connection to the public system shall be 8 inch PVC. The 8-inch main used for connection shall begin at the right-of-way, the connection to the catch basin or manhole shall be cored.

The minimum cover above the top of the storm drainpipe shall be 2 feet. Where the minimum depth includes the roadway section, structural calculations for the appropriate H-loading shall be submitted along with the plans. All pipe specified where the cover is 2 feet or less shall be concrete or ductile iron of a class determined by the structural calculations.

All pipe for storm mains shall comply with the requirements specified in the Storm General Notes at the end of this chapter.

Channels: The City encourages the use of open vegetated channels to convey stormwater runoff when possible. Any open channels proposed to be located within public right-of-way shall require special approval from the Director of Public Works.

Private stormwater conveyance piping shall not be located within the public right-of-way. Where soils or other conditions prohibit infiltration on individual parcels (as determined by the City's Civil Review Engineer), stormwater may be conveyed to the stormwater facilities associated with the residential or commercial development. In that case, the stormwater conveyance system located in the public right-of-way shall be sized to accommodate the additional stormwater. The minimum private stormwater conveyance pipe size within the right of way shall be 8 inch in diameter. Multiple roof drains shall be terminated at a common junction structure outside of the Right of Way (i.e. catch basin or manhole). The connection from the common junction structure to the City's storm system

shall be through an 8-inch main connecting to a City catch basin or manhole.

3.00.050 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The surveyor directing such work shall be licensed as a Professional Land Surveyor by the State of Washington.

The minimum staking of storm sewer systems shall be as follows:

- A. Stake centerline alignment every 50 feet with station and cut or fill to invert of pipe.
- B. Stake location of all catch basins, manholes and other fixtures for grade and alignment with cut or fill to rim and invert of all pipes.
- C. Grade stake or slope stake (as appropriate) at intervals, sufficient to control location, size and depth of retention/detention facilities.

3.00.060 Erosion Control

See Volumes I and II of the Manual for specific erosion control requirements. Sites subject to a Construction Stormwater Pollution Prevention Plan (SWPPP) must have the SWPPP approved prior to any site disturbing activity. All erosion control measures shall be implemented and maintained throughout the entire site development process and a financial vehicle shall be provided to ensure removal of temporary erosion control measures after the project is developed.

3.00.070 Trench Excavation

See Chapter 4.00.170 for requirements regarding trench excavation.

3.00.080 Backfilling

See Chapter 4.00.190 for requirements regarding backfilling.

3.00.090 Street Patching and Restoration

See Sections 2.10.130 and 2.10.140 YDS for requirements regarding street patching and trench restoration.

3.00.100 Maintenance

All stormwater facilities in the City, both public and private, shall be maintained according to this Chapter, maintenance guidelines specific to the stormwater facility, and the Minimum Maintenance Requirements and Standards of the Stormwater Management Manual for Western Washington, as published by the Washington State Department of Ecology (the Manual). The City shall maintain all stormwater system elements located within the public rights-of-way. The developer, homeowner

association, or other responsible entity shall maintain stormwater system elements located outside of the rights-of way.

- A. All stormwater facilities shall be inspected at regular intervals and maintained and repaired as needed to comply with this Chapter, the approved designs for stormwater facilities, stormwater permits that may be issued by the City, the State Department of Ecology or the Environmental Protection Agency (EPA), applicable construction standards, and the minimum requirements as stated in the Manual.
- B. Disposal of waste from maintenance activities shall be conducted in accordance with the minimum Functional Standards for Solid Waste Handling, Chapter [173-304](#) WAC, guidelines for disposal of waste materials from stormwater maintenance activities, and where appropriate, the Dangerous Waste Regulations, Chapter [173-303](#) WAC.
- C. Unless otherwise specified by agreement, property owners are responsible for the maintenance, operation, and repair of stormwater systems and BMP's within their property. Property owners shall maintain, operate, and repair these facilities in compliance with the requirements of this Chapter and the Manual.

The General Notes on the following pages shall be included on any plans dealing with storm systems in the City.

GENERAL NOTES (STORMWATER CONSTRUCTION)

1. The contractor shall obtain all approvals and permits required by the City of Yelm (City) prior to the start of construction. A grading permit for storm pond construction may be required.
2. Storm drain pipe shall be on the WSDOT Qualified Products list for the specification listed below:
 - a. Plain Concrete Storm Sewer Pipe or Reinforced Concrete Storm Sewer Pipe per WSDOT Standard Specification 9-05.7.
 - b. Solid Wall PVC Storm Sewer Pipe per WSDOT Standard Specification 9- 05.12(1).
 - c. Ductile Iron Sewer Pipe per WSDOT Standard Specification 9-05.13.
 - d. Hancor Blue Seal [™] and Advanced Drainage Systems (ADS/Hancor) N-12 HDPE and (ADS/Hancor) SaniTite up to 36" in diameter per WSDOT Standard Specifications 9-05.20 and 9-05.24.
 - e. Contech DuroMaxx steel rib reinforced polyethylene pipe, in diameters from 24 inch to 60 inch per WSDOT Standard Specification 9-05.22.
3. All storm drainage systems shall be air tested at 4 psi except concrete pipe, which shall be tested per WSDOT/APWA standard for concrete storm pipe. All flexible pipe shall be mandrel tested per WSDOT/APWA standards. Testing shall be done by the contractor.
4. Testing of the storm sewer shall include videotaping of the main by the contractor. Immediately prior to videotaping, enough water shall be run down the line so it comes out the lower catch basin. A copy of the video tape shall be submitted to the City. Acceptance of the line will not be made until after the tape has been reviewed and approved by the City. Testing shall take place after all underground utilities are installed and compaction of the roadway subgrade is complete.
5. Special structures, oil/water separators and outlet controls shall be installed per plans and manufacturers' recommendations. Where oil/water separators are connected to a sewer system, they shall be installed with a P-trap or check valve to prevent odors.
6. All disturbed areas shall be stabilized in accordance with Minimum Requirement 2 of the latest edition of the Department of Ecology Stormwater Management Manual for Western Washington (SWMMWW). For sites where vegetation has been planted through hydro seeding, the financial guarantee will not be released until the vegetation has been thoroughly established.
7. Where connections require "field verification", the contractor shall expose such connection points and fittings 48 hours prior to distributing shutdown notices.

8. Any changes to the design shall first be reviewed and approved by the Project Engineer and the City's Civil Review Engineer.
9. All storm pipe shall be a minimum of 12-inch diameter for mains and crossings. When private stormwater (i.e. roof, lot or footing drains) cannot be infiltrated on individual lots, the minimum standard piping connection to the public system shall be 8-inch PVC. The 8-inch main used for connection shall begin at the right-of-way, and the connection to the catch basin or manhole shall be cored and grouted.
10. All storm mains and retention/detention areas shall be staked for grade and alignment by an engineering or survey firm licensed to perform such work.
11. The minimum staking of storm sewer systems shall be in accordance with Section 3.00.050 of these standards, and as follows:
 - a. Stake location of all catch basins, manholes and other fixtures for grade and alignment.
 - b. Stake location, size, and depth of retention/detention facility.
 - c. Stake finished grade of all stormwater features, including but not limited to catch basin/manhole rim elevations, overflow structures, weirs, and invert elevations of all pipes in catch basins, manholes, and pipes that daylight.
12. Pipe materials used for stormwater conveyance shall be as approved by the City. Pipe size, slope, cover, etc., shall be as specified in the City of Yelm Development Guidelines and Engineering Standards.
13. All driveway culverts shall be of sufficient length to provide a minimum 3:1 slope from the edge of the driveway to the bottom of the ditch. Culverts shall have beveled end sections to match the side slope.
14. If drainage outlets (stub-outs) are to be provided for each individual lot, the stub outs shall conform to the following:
 - a. Each outlet shall be located at the lowest elevation on the lot, to service all future roof downspouts and footing drains, driveways, yard drains, and any other surface or subsurface. Each outlet shall have free-flowing, positive drainage to an approved storm water conveyance system or to an approved outfall location.
 - b. Outlets on each lot shall be located with a 5-foot high, 2"x 4" stake marked "storm" or "drain." The stub-out shall visibly extend above surface level and be secured to the stake.
 - c. Pipe material shall be as approved by the City.
 - d. Drainage easements are required for drainage systems designed to convey flows through individual lots.
 - e. The developer and/or contractor is responsible for coordinating the locations of all stub-out conveyance lines with respect to the utilities (e.g., power, gas, telephone, television).

- f. All individual stub-outs shall be privately owned and maintained by the lot homeowner.
- 15. The storm drainage system shall be constructed according to approved plans on file with the City. Any material deviation from the approved plans will require written approval from the City.
- 16. All disturbed areas shall be seeded and mulched or similarly stabilized to the satisfaction of the City. For sites where grass has been planted through hydro seeding, the performance bond will not be released until the grass has been thoroughly established, unless otherwise approved by the City.
- 17. All building downspouts on commercial sites shall be connected to the storm drainage system, unless otherwise approved by the City.
- 18. All erosion control and stormwater facilities shall be regularly inspected and maintained by the contractor during the construction phase of the development project.
- 19. No final cut or fill slope shall exceed two (2) horizontal to one (1) vertical without stabilization by rockery or by a structural retaining wall.
- 20. The Project Engineer shall verify the locations, widths, thicknesses, and elevations of all existing pavements and structures, including utilities and other frontage improvements, that are to interface with new work, and provide all trimming, cutting, saw cutting, grading, leveling, sloping, coating, and other work, including materials necessary to cause the interface with existing works to be proper, without conflict, acceptable to the Project Engineer and the City's Civil Review Engineer, complete in place, and ready to use.
- 21. Compaction of all fill areas shall be per current APWA specifications. Fill shall be provided in 6" maximum lifts and shall be compacted to 95 percent of its maximum relative density.