

**CHAPTER 3
STORM DRAINAGE AND EROSION CONTROL**

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STORM DRAINAGE AND EROSION CONTROL

3A STORMWATER MANAGEMENT

3A.01 General

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

3A.02 Definitions

- A. **Impervious Surface** – Any surface that cannot be effectively and easily penetrated by water.

3A.03 General Design Criteria

- A. The "City of Vader Stormwater Management Plan" and the most recent version of the "Stormwater Management Manual for the Puget Sound Basin" documents are considered a part of this chapter, except as supplemented herein. The Stormwater Management Plan sets forth the minimum drainage and erosion control requirements as supplemented herein.
- B. The specific design details of storm drainage and/or retention/detention systems will depend on their type and local site conditions. Properties shall not be developed in such a way as to discharge stormwater onto adjacent lots.
- C. Stormwater conveyance and detention systems shall be designed in accordance with the following design criteria:

Hydrologic Model

Conveyance Design

<50 acres
>50 <200 acres
>200 acres

Rational Method
SCS-based Hydrograph Method
Continuous Simulation Method

Detention Design

<50 acres

>50 acres

SCS Unit Hydrograph Method
with Level Pool Routing
Continuous Simulation Method

Design Storm Frequency

Conveyance	Capacity to handle: Pipes - 25-year storm event Ditches – 50-year storm event
Detention	Prevent peak flow increase: 2-year storm event 25-year storm event 100-year storm event
Water Quality	Capture and treat: 50% of 2-year storm event

Design Storm Duration/Distribution

Hydrograph Method	24-hour duration
SCS Unit Hydrograph Method	24-hour durations SCS Type 1A distribution
Rational Method	Time of concentration Constant rainfall intensity

3A.04 Conveyance

- A. Pipe. Storm drainpipe within a public right-of-way or easement shall be sized to carry the maximum anticipated runoff from the contributing area. The calculations of anticipated runoff and pipe sizing shall be developed by a professional engineer licensed in the State of Washington. The Developer shall provide the calculations and all associated information to the City of Vader.
- B. The minimum pipe size shall be twelve (12) inch diameter, The City may require the installation of a larger main if it is determined that a larger size is needed to serve adjacent areas or for future service. The installation of a larger main may allow the Developer to seek partial reimbursement through a Latecomers Agreement. (see Chapter 1 for details)
- C. All pipe used for storm mains shall comply with one of the following types:
 1. High-density polyethylene smooth interior pipe conforming to AASHTO M252 types or AASHTO M294 type S, with a gasketed bell and spigot joints.

2. Where required or as directed by the City to meet specific site constraints, ductile iron pipe conforming to the requirements of AWWA C 151, thickness class 50 or greater or reinforced concrete pipe conforming to the requirements of AASHTO M 170.
 3. Aluminized steel helical or spiral rib pipe in diameters of thirty (30) inches or greater, with a Manning's value of 0.020 or less.
- D. Channels: Open vegetated channels may be utilized for stormwater conveyance when deemed appropriate by the City. Open channels located in a public right-of-way shall be sized to carry the maximum anticipated runoff from the contributing area without exceeding the confines of the channel. In addition, when the end of the "new" conveyance system is within twenty (20) feet of another piped drainage system, the "new" system shall be extended through the open portion to complete the closed system. Extensions to complete closed drainage systems will only be required along the property where the "new" system originates, unless deemed necessary by the City.
- E. When the flow of an open channel is interrupted by the construction of a driveway, the entire channel across the property shall be enclosed with a piped system, unless deemed impractical by the City. However, the culvert under the driveway must be installed to accommodate closure of the ditch in the future. The channel enclosure may necessitate the inclusion of manholes and/or catchbasins. (For Manholes please refer to Chapter 5 Standard Details).

3A.05 Catchbasins

- A. Maximum catchbasin spacing shall be 300-feet on all street classifications. No surface water shall cross any roadway to private property. Additional manholes and/or catchbasins may be required by the City to accommodate the maintenance needs of the storm system.

3A.06 Staking

- A. All surveying and staking shall be performed by an engineer or surveyor licensed by the State of Washington and capable of performing such work. Staking shall be maintained throughout the construction operation.
- B. A pre-construction meeting shall be held with the City prior to commencing staking.
- C. The minimum staking of storm sewer systems shall be as follows:
 1. Stake centerline alignment every twenty-five (25) feet with cuts and/or fills to bottom of trench.
 2. Stake location of all catchbasins/manholes and other fixtures for grade and

alignment.

3. Stake location, size and depth of retention/detention facility.
4. Stake finished grade of catchbasin/manhole rim elevation and invert elevations of all pipes in catchbasins, manholes, and those that daylight.

3A.07 Construction

- A. Storm drain construction shall be in accordance with the Standard Specifications. See Chapter 2 of these guidelines for requirements regarding street patching and trench restoration.

3B EROSION CONTROL

3B.01 General Design Criteria

- A. Design of erosion control and erosion control plans are required under the following conditions:
 1. Proposed land disturbance activities that could cause sediment runoff beyond the project limits.
 2. A *Clearing, Filling or Grading Permit* is required.
 3. The proposed project could possibly impact a nearby stream, wetland, or body of water.
 4. When deemed necessary by another permitting authority.
- B. Site work shall not commence until all erosion control measures have been set in place in accordance with the approved erosion control plans.
- C. The Contractor/applicant must ensure that all erosion control measures are properly maintained in accordance with standard industry procedures.

3B.02 Best Management Practices

- A. Erosion control shall include the following as applicable to address specific project conditions:
 1. Sedimentation Ponds. Sedimentation ponds are utilized to collect runoff generated on a construction site, thereby allowing sediment to be captured before the runoff leaves the site.
 - a. Sedimentation pond design shall include the following considerations:

- i. computation of the sediment storage volume
 - ii. computation of the settling volume
 - iii. computation of the pond surface area -
(surface area, in sf = 1,250 x 1-yr, 24 hour storm rate, in cfs)
 - b. Minimum pond dimensions are as follows:
 - i. 2-foot depth for settling
 - ii. 3-foot depth for sediment storage
 - iii. 3:1 side slope
 - c. The Contractor shall inspect sedimentation ponds immediately after each rain event to ensure the integrity of the facility. The Contractor shall also remove the majority of the sediment collected in the ponds whenever the storage volume is exceeded or the settling volume is infringed upon. In addition, prior to the final completion of the project, ponds shall be cleaned out in their entirety.
 - d. The length/width ratio of the pond shall be as large as possible. A 5:1 ratio is the preferred minimum, but exceptions may be granted when deemed appropriate by the City. The pond shall be divided into a series of at least two (2) separate chambers. Perforated pipe risers shall be used to convey water between the chambers and at the outlet.
2. Interceptor Channels. Interceptor channels are used to capture runoff generated on a construction site before it can leave the project limits. The channel is often used in combination with a sedimentation pond. The channel is typically grass lined and runs along the perimeter of the site. The grass must be established prior to the start of construction. Therefore, sod is often used to establish the vegetated surface of the channel. Upon completion of the project, the sod can be removed and re-used if the ditch is filled in and restored with a suitable and stable cover material.
3. Sediment Barriers. Sediment barriers are filtering devices that are run along the perimeter of a site to capture sediment while allowing runoff water to continue along its natural path. Silt fencing and hay bales are common examples of sediment barriers. Regular removal of sediment is required to ensure that the barriers function properly. In addition, the structural integrity of the barriers must be maintained at all times. Barriers shall be installed, inspected and repaired, in accordance with the details and requirements included in these guidelines.
4. Stabilized Construction Entrance. A stabilized construction entrance is a rocked access point to a construction site. The entrance reduces material carried from the site onto the public right-of-way. Construction entrances must be cleared of mud and debris regularly to ensure that materials are not being tracked from the construction site, onto the right-of-way and beyond. The Contractor is responsible for all required maintenance of entrances.

5. Detention/Retention Facilities. No retention/detention facility shall be located in an area that is used to satisfy an open space requirement unless it enhances a recreational amenity. Use of designated open space areas for stormwater detention/retention and infiltration must satisfy all conditions of the City of Vader for usability, landscape conformity and ease of access. The City will make the final determination whether or not the proposed stormwater facilities are compatible with and satisfy the intent of an open space.
6. The primary purpose of a consolidated open space is to provide usable area for recreation activities, buffer zones, and green belt areas, and must be designed for this intent. Any use of this area for stormwater detention/retention must clearly be subordinate to and not detract from open space uses. The usable open space shall be predominantly flat, and in no case, exceed 4:1 where drainage facilities are present. A minimum of 50 percent of the linear slope length shall not exceed 7:1.
7. The City will review the use of commercial parking lots for stormwater detention on a case-by-case basis. The detention area shall be situated away from areas of pedestrian movement. The maximum depth of water in parking lot storage shall be limited to twelve (12) inches.