

CHAPTER 6

STORM DRAINAGE STANDARDS

6.1 GENERAL

The standards established by this chapter are intended to represent the **minimum** standards for the design and construction of storm drainage facilities. Greater or lesser requirements may be mandated by the City due to localized conditions. Storm drainage revisions, additions, modification, or changes shall be made in compliance with City standards, ordinances, and Best Management Practices as identified in the Washington State Department of Ecology Stormwater Management Manual for Western Washington as adopted by the City, herein after referred to as “Stormwater Manual”. Adequate provisions shall be made for storm drainage, storm sewers, and associated appurtenances sufficient to transmit maximum runoff from the 25-year, 24-hour event. All storm drainage facilities shall be designed by a professional engineer licensed in the State of Washington and shall comply with the Stormwater Manual.

If warranted based on the condition and capacity of the existing storm drainage infrastructure (or lack thereof) and, impacts caused by the proposed development, off-site improvements may be required, at the City Engineer’s discretion, to mitigate impacts caused by the proposed development.

6.2 DESIGN STANDARDS

On-site detention or infiltration systems shall be provided to ensure that post development stormwater discharge is in accordance with the Stormwater Manual. The design of storm drainage and detention systems 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. The following design considerations shall apply:

- A. Plan shall show in tabular format:
 - 1. Site Area;
 - 2. Existing impervious area;
 - 3. Existing impervious area to be converted to pervious;
 - 4. Proposed new pervious area;

5. Net new impervious area.
- B. All runoff shall be captured prior to leaving the property so that neighbors are not impacted by stormwater runoff from new construction, reconstruction of fill and grade activities.
- C. Storm drain detention systems shall be, at a minimum, designed and constructed in strict compliance with the Stormwater Manual and any amendments thereto. Local prevailing conditions may warrant higher standards as determined by the City. Plans for storm drainage shall indicate where the stormwater will be treated, detained, and discharged or infiltrated. The plans and drainage calculations must show that the pipes and channels downstream from the discharge point (a minimum of 1/4 mile) can carry the runoff without damage to the adjoining properties or surcharging of the system. The City Engineer may require that the downstream analysis be continued to incorporate sensitive areas such as steep slopes. Provisions shall be made for detainage and/or retainage of stormwater in order to control the amount of storm runoff to the Standards in the Stormwater Manual.
- D. Maximum catch basin spacing shall be 200 feet on road grades up to 3 percent, 400 feet when the road grade is 3 percent or greater. No surface water (unless otherwise approved in writing by the City Engineer) shall cross any roadway. In addition, catch basins shall be placed whenever the length of surface drainage exceeds 300 feet on road grade, extending either direction from crest or sag on vertical curves. Vaned grates shall be employed on street grades exceeding 6 percent slope.
- E. Where storm drains run outside an existing public right-of-way, permanent easements will be required for public or private maintenance as may be required and warranted. Such easement shall be a minimum of 15 feet in width unless otherwise approved or required by the City. A construction (temporary) easement of suitable width shall also be provided.
- F. The Developer and/or Homeowners Association shall enter into a formal, legally binding agreement, as approved by the City Attorney, regarding the landowner's duties and obligations regarding their ownership, operation and maintenance of the system.
- G. All portions of publicly owned and maintained detention and or infiltration facilities shall be in public right-of-way or dedicated land tracts.
- H. All infiltration systems shall be open at the top to allow for maintenance. No underground, open bottom tanks, vaults, pipes or similar structures are allowed for infiltration.

- I. Storm drainage detention ponds shall have a minimum side slope of 3:1 (H:V). The perimeter fence shall be 6 feet high and landscaped so as to hide the fence. Maintenance vehicle access shall be provided at a maximum of 1:6 (V:H).

6.3 CONVEYANCE

Pipe: Storm drain pipe within a public right-of-way or easement shall be sized to carry the 25-year runoff from the contributing tributary area.

The minimum pipe size shall be 12 inches diameter. Runoff shall be computed and, if the flow requires it, a larger pipe shall be used. Nothing shall preclude the City from requiring the installation of a larger sized main if the City determines a larger size is needed to serve adjacent areas or for future service.

Storm drain gradients shall assume a minimum flow velocity of 2 feet per second. All pipe for storm mains shall be "pre-approved" by the City's Engineer based on localized conditions.

- A. Storm drain pipe shall meet the following requirements:
 1. Plain concrete pipe conforming to the requirements of AASHTO M 86, Class 2.
 2. Reinforced concrete pipe conforming to the requirements of AASHTO M 170.
 3. PVC pipe shall conform to ASTM D 3034-73 SDR 35 for 4" thru 15" diameter PVC pipe, and shall conform to ASTM F 679 for 18" thru 27" diameter PVC pipe, with joints and gaskets conforming to ASTM D 3212 and ASTM F 477.
 4. Ductile iron pipe conforming to the requirements of ANSI A21.51, and AWWA C 151, thickness class as approved by City Engineer.
 5. Polyethylene smooth wall pipe per Advanced Drainage Systems (ADS) N-12, bell and spigot, constructed per Standard Specifications 7-04.
 6. High performance polypropylene smooth wall pipe per ADS, bell and spigot, constructed per Standard Specifications 7-04.

6.4 CONNECTIONS

Connections of storm drain pipe leading from an existing or new street into an existing main storm pipe may only be made with a new structure, such as a catch basin

6.5 STREET PATCHING AND RESTORATION

See Sections 5.15, 5.16, and 5.17 for requirements regarding street patching, trench restoration, and surfacing requirements.

6.6 CLEANING AND TESTING

Upon completion of work, the constructed storm drainage system shall be cleaned and tested in accordance with the Standard Specifications. Videotaping shall be completed in accordance with Section 7.6, Videotaping for Sanitary Sewers.

See Section 4-11 for final acceptance.

If approved by the City Manager, water for flushing shall be made available and obtained from the City. However, the City reserves the right to operate all hydrants at times and locations convenient to their schedules and available personnel. Any connection made to the City water system, at any time, shall have an appropriate backflow prevention device.

6.7 INSPECTION

The Contractor shall request for inspection a minimum of 48 hours prior to the Contractor's scheduled need. Inspection shall be required for the following items of work:

- A. Pipe and bedding installation.
- B. Backfill and compaction.
- C. Grouting catch basins.

Upon completion of the project all storm sewer installations shall be inspected with television inspection equipment. The Contractor shall provide the City with a copy of the inspection and shall have the City present during the television inspection.