Engineering Standards

Chapter 5
Storm Drainage

5-01 Drainage Plan – Design Criteria

Title 13.33 MVMC, authorizes the Public Works Director, with the approval of the City Council, to develop and implement administrative procedures to administer and enforce the requirements of this chapter.

Drainage facilities for projects shall conform to Title 13.33 MVMC and the Department of Ecology's 2012 Stormwater Management Manual for Western Washington, as currently adopted by the City of Mount Vernon. These contain drainage design criteria and computational methods for sizing storm water facilities, as well as erosion and sediment control methods. In accordance with these requirements, drainage plans for development projects must be submitted to the Engineering Division of the City's Community and Economic Development Department for review and approval.

The Public Works Director, by request only, may allow or disallow a proposed public road project to be designed and constructed in accordance with the WSDOT Runoff Manual approved as equivalent to the DOE Stormwater Management Manual and as approved by the City of Mount Vernon.

Construction, workmanship and materials for drainage facilities for City streets and roads shall conform to Division 7 of the WSDOT/APWA Specifications unless otherwise stated.

Unless otherwise approved, all new detention facilities and water quality facilities that are to be publicly owned and maintained shall be located on tracts or parcels that are dedicated to the city.

The following sections are intended to clarify, revise, or supplement existing code or existing sections of the above-stated manuals.

5-02 Conveyance Systems/Pipe Systems

Spacing between inlets or catch basins:

Road Grades	Space between Inlets or Catch Basins
Under 1%	150 feet

1% - 3%	200 feet
Greater 3%	300 feet

Note: *additional structures as needed to confine drainage to the gutter to prevent sheet flow across roadways and intersections.*

a. Storm sewer pipes shall be minimum 12-inch diameter, unless otherwise approved.

b. Pipes connecting single inlets to main storm sewer by structure, (i.e., catch basins), shall be 12-inch diameter minimum, and single inlets shall be catch basins with sumps.

c. In general, connections to a pipe system should be made only at catch basins. Wyes or Tees will be allowed on roof/footing/yard drain systems for pipes 8 inches in diameter, or less, with cleanouts upstream of each wye or tee.

5-03 Materials

The following pipe materials are acceptable:

1. Plain concrete pipe (12-inch diameter only for use as driveway culvert) [WSDOT/APWA 9-05.3(1)]
2. Reinforced concrete pipe [WSDOT/APWA 9-05.3, 9-05.7]
3. Ductile iron (water supply, Class 50 or 52) [WSDOT/APWA 9-05.13]
4. Lined corrugated polyethylene pipe (LCPE)2 [WSDOT/APWA 9-05.20]
5. Polyvinyl chloride (PVC)4 sewer pipe [WSDOT/APWA 9-05.12]
6. Solid wall polyethylene pipe (SWPE; also known as HDPE pipe or HDPP)

a. Pipe Cover

Pipe cover, measured from the finished grade elevation to the top of the outside surface of the pipe, shall be 2 feet minimum. If less than 2 feet of cover, reinforced concrete or ductile iron is required, unless otherwise approved.

Under private drainage easements and privately maintained areas subject to vehicular loading, pipe cover may be reduced if the design considers expected

vehicle loading and the cover is consistent with pipe manufacturer's recommendations.

b. Storm facility access.
All public catch basins not constructed in the street section, must have an all-weather drivable surface. The all-weather drivable surface must be of adequate grade, width and surfacing to allow access by maintenance vehicles.

5-04 Structures

a. On storm sewers with depths less than five feet to the invert of the lowest pipe, catch basins may be one of the following:

- CB Type 1
- CB Type 1 –L
- CB Type 2 (48", 54")
- CB Type 2 (72", 96")

b. For public storm sewers with depths five feet and over to invert of the lowest pipe, connecting and/or inlet structures shall be CB Type 2 or 1-L.

c. On new subdivisions with curb and/or sidewalks, adequate measures shall be taken to control surface drainage from yards and roof drains so that sheet flow across roadways and walkways is avoided.

d. Runoff from roofs and footing drains shall be tight lined and connected to the street storm drainage system. Dispersion and infiltration as permissible by Department of Ecology.

5-05 Frames, Grates and Covers

a. When a structure does not function as a surface water receiver, a solid cover shall be used.

b. Where grade is 4% or greater on vertical curb and gutter, an approved vaned grate shall be used.

c. A through-curb inlet frame shall be used on arterial roadways where conditions severely limit the effectiveness of a flat surface inlet and where there is a low point within a sag vertical curve.

d. On new Type 2 catch basins not serving as inlets and access structures, a round locking ring and solid cover shall be used.

e. All solid covers and grates shall be secured with 5/8-inch Stainless Steel Socket Head Cap Screws. A coating of anti-seize thread compound shall be applied to the cap screws at time of installation.

f. Block lettering shall be embossed on the top surfaces of grates and covers as follows:
    1. "DRAIN" – 3-inch letters on all solid covers.
    2. "OUTFALL TO STREAM DUMP NO POLLUTANTS" – ½-inch letters on all grates

5-06 Water Quality Design

Water quality treatment facilities must be provided to remove pollutants from runoff prior to discharge from the subject property as required per MVMC Title 13.33 and Department of Ecology Stormwater Manual, currently adopted by the City.

Water Quality Treatment Exemption (Nutrient Control)
Projects discharging into the greater Nookachamps drainage basin are required to provide nutrient control water quality facilities.
The City will consider nutrient generating surfaces (landscaping), separately from conventional pollution generating surfaces.

5-07 Detention Pond Side Slopes

This section is intended to supplement and clarify the City of Mount Vernon requirements for detention pond side slopes and fencing requirements.

Interior Side Slopes for city maintained storm water facilities must not be steeper than 4H:1V. A perimeter fence is not required for facilities meeting the 4H:1V slopes, however a landscape strip is required. For landscape screening requirements reference MVMC Title 17, Section 93.040

Exemptions from the 4H:1V slope, may be granted for topographic constrains or when large pond volumes are required, provided safety and maintenance issues are addressed and resolved during civil plan review.

- Interior side slopes up to the emergency overflow water surface elevation shall not be steeper than 3H:1V, or where the impoundment is a wall greater than 24 inches in height. A fence need only be constructed for those slopes steeper than 3H:1V
- A perimeter fence is required if more than 10% of the pond side slopes are steeper than 3H:1V
- Pond Walls may be vertical retaining walls, provided:
  a) they are constructed of reinforced concrete;
  b) a fence is provided along the top of the wall;
  c) at least 25% of the pond perimeter will be a vegetated soil slope not steeper than 3H:1V;
  d) the design is stamped by a licensed structural civil engineer

- For private ponds, other retaining walls such as rockeries, masonry unit walls and keystone type wall may be used if designed by an engineer. If the entire pond perimeter is to be retaining walls, ladders should be provided on the walls for safety reasons.

Maintenance for storm water facilities is a priority. As such, during the design and review of these facilities the Development Services Engineering Manager will work very closely with the design Engineer to ensure maintenance concerns such as the following are addressed:

- Minimum 6' setbacks from fences to edge of slopes for mowing of side slopes
- Minimum 6' setbacks from landscape strips to edge of slopes for mowing of side slopes
- Man-gates as necessary for safe and easy access with equipment and maintenance personnel
- Others maintenance concerns as determined by the City's Development Services Engineering Manager in collaboration with the project's design Engineer.

Exterior side slopes shall be no steeper than 2H:1V unless analyzed for stability by a geotechnical engineer.

Fencing shall be 6 feet in height black coated chain link. See WSDOT Standard Plan L-2, Type 1 or Type 3 chain link fence

Fencing Height Exception: The fence may be a minimum of 4 feet in height if the depth of the impoundment (measured from the lowest elevation in the bottom of

the impoundment, directly adjacent to the bottom of the fenced slope, up to the emergency overflow water surface) is 5 feet or less.

Wood Fences are allowed in subdivisions where the fence will be maintained by homeowners associations or adjacent lot owners. Fence maintenance requirements shall be a condition of subdivision final approval, and a statement detailing maintenance responsibilities and requirements must be recorded with the plat.

Wood fences shall have pressure treated posts (ground contact rated) either set in 24-inch deep concrete footings or attached to footings by steel brackets. Rails and fence boards shall be cedar.

Split Rail Fence where only short stretches of the pond perimeter (< 10%) have side slopes steeper than 4H:1V, untreated cedar split rail fences, 4-foot minimum height may be used in place of a standard fence when approved by the Development Services Engineering Manager. Fence maintenance requirements shall be the responsibility of the property owners.

Restrictions: On slopes greater that 40%, no open ponds or biofiltration facilities will be approved. Enclosed tanks will be evaluated on a case-by-case basis with a Geotechnical report provided for review.

For Embankments, Access and other requirements not listed above please reference the most current City of Mount Vernon adopted Department of Ecology Storm Water Manual for Western Washington.

5-08 Low Impact Development (LID)

The City requires the use of low impact development best management practices (BMPs) in the control of storm water where feasible. Engineered LID facilities shall be designed by a professional civil engineer experienced in LID design.

The Engineer is expected to coordinate with landscapers, Master Gardeners or landscape architects during design and plan review, to ensure the proposed plantings for LID facilities meet the Department of Ecology Stormwater Manual requirements.
Plantings for LID facilities are not considered required landscape for project sites, and as such these plans shall be submitted with the civil plans for review and approval by the Development Services Engineering Manager.

During construction, the Engineer of Record is required to provide the soils mix design for LID facilities, for review and approval before installation.

The Engineer of Record is required to certify that the facility has been constructed as approved and as shown on the as-built drawings; meeting City of Mount Vernon standards and specifications.

Maintenance of LID facilities are the responsibility of the property owner or Home Owners Associations. For subdivisions, a statement detailing maintenance responsibilities and requirements must be recorded with the plat.

LID facilities are not allowed inside city right-of-way unless specifically approved by the Public Works Department.

5-09 S. Mount Vernon Commercial Area Detention Facility Standards

Much of the commercial area in the South Mount Vernon UGA, is subject to flooding from the Maddox and Flowers creek drainages. Consequently, detention facilities in this area are allowed to be constructed above ground, with the development runoff being pumped into the facility, while incorporating a gravity release.

Due to the geographic constrains and the unique commercial value of this area, the City may accept detention facilities constructed of vertical cast in place concrete walls or other aesthetically acceptable pre-cast panels.

The following conditions apply:

1. Above ground vertical walls must not exceed 5 feet above the average adjacent developed site grade.
2. The total depth will be site dependent. However maximum depths of 8 feet are anticipated.
3. Design shall allow for natural lighting
4. Aesthetics of these type facilities will play a prominent role in the City's decision to accept a design. In addition, the exterior of these facilities must be landscaped, in compliance with City standards.
5. Operation and maintenance plans must be submitted to and approved by the City of Mount Vernon prior to acceptance.
6. All pump systems must be designed with automatic controls that prevent pumping from receiving streams into detention facilities during high water event, reducing the potential for failure.