

Storm**General**

Plans for the existing stormwater system are maintained in digital and printed form by the City. Copies may be obtained from the Utility Division of the Public Works Department.

All design, materials, and work (methods) shall conform to the following list. *All design, materials, and methods not specifically referenced in these City standards and specifications shall comply with the applicable sections of the standards listed below.* In the case of differences among the standards and specifications, the most restrictive standards shall apply unless directed otherwise by the Public Works Director. The Public Works Director retains the authority to modify, revise, or deviate from the approved plans at his discretion. Approval of the plans does not warrant the accuracy of the plans.

- a. The latest edition of the Kitsap County Stormwater Management Design Manual and subsequent revisions; and
- b. The Washington State Department of Ecology (DOE) Stormwater Management Manual for the Puget Sound Basin (1992); and
- c. The latest edition of the City of Poulsbo Construction Standards and Specifications adopted by the City of Poulsbo, and subsequent revisions; and
- d. The latest edition of “Standard Specifications for Road, Bridge, and Municipal Construction” and “Standard Plans For Road, Bridge and Municipal Construction” prepared by the Washington State Chapter American Public Works Association (APWA) and the Washington State Department of Transportation (WSDOT), and subsequent revisions.

A. Planning Criteria

All development shall provide for the management of stormwater in accordance with the Comprehensive Stormwater Plan and adopted standards and specifications.

Downstream drainage ways and/or facilities between the subject property and a well-defined creek or drainage channel of adequate capacity may be required to be improved, to the extent necessary to accommodate project impacts.

Where open channel construction is used to manage drainage within the subject property, a minimum setback of 15 feet shall be provided between any structures and the top of the bank of the defined channel.

B. General Design and Drawing Standards

Design

1. All main and trunk lines shall be designed to convey the one hundred (100) year storm event. Storm service laterals shall convey the ten (10) year storm event.
2. A spill control type oil/water separator shall be provided at the most downstream point of all parking lots.
3. The design of both public and private detention systems shall include appropriate access for maintenance vehicles and personnel as determined by the Public Works Department.
4. For commercial projects, whenever possible, stormwater treatment shall be via vegetative treatment or filtering. The use of a bio-filtration treatment system may be *required* when determined appropriate by the Public Works Director. Bioswales and biofilters may be within a required landscaped area as long as the design allows for proper functioning of the filter and does not impact the growing conditions necessary for the health of the landscape plants.
5. Low Impact Development (LID) design guidelines are included in the Kitsap County Stormwater Management Manual.
6. Provision shall be made for the conveyance of any upstream off-site water that naturally drains across the applicant's site. If that upstream stormwater is part of a public stormwater system, then appropriate easements shall be granted through the applicant's property.
7. The entire perimeter of detention ponds shall be fenced with a minimum 6' high chain link fence. Gate locations and design shall conform to the requirements of the Public Works Department.
8. For publicly owned/maintained water quality treatment systems, compost/cartridge systems are not allowed.
9. Primary storm drainage systems shall be designed at an appropriate depth to accommodate footing drains. Additional depth of the main line may be required in order to accommodate the footing drains. The applicant's engineer must take into account Building Code requirements for foundation depths. The footing drainage system and the roof

downspout system shall not be interconnected unless such connection is at least one foot below the footing drainage system and down slope of the building foundation. The Public Works Director may require calculations which show how the storm drainage depths were determined. Service connections to the primary system may be either single or double and shall include a cleanout at the property line.

Secondary drainage systems are allowed subject to the following requirements:

- a. The minimum pipe diameter shall be 6 inches.
 - b. The pipe shall be smooth wall interior PVC D-3034 or CPE (N-12 Blue Seal or equal).
 - c. Cleanouts are required on the secondary line on the upstream side of every lot connection, at every change of direction, and at the upstream end of the secondary line.
 - d. Pipe slope requirements shall be the same as for sanitary sewer.
 - e. The secondary system shall connect to the primary system via a catch basin or manhole.
 - e. Secondary systems shall remain privately owned and maintained.
10. If stormwater is discharged to a stream, a Hydraulic Project Approval (HPA) permit may be required from the Washington Department of Fisheries and Wildlife (WDFW). The applicant is responsible for providing the City Engineer with a copy of the approved HPA or satisfactory evidence that an HPA is not required. The applicant is responsible for obtaining final written construction completion approval from WDFW and providing a copy to the City Engineer.
11. All street ends with the possibility for extension must have utilities stubbed out of the paved area a minimum of six feet or as directed by the City Engineer.

Drawings

1. The drawings shall conform to all requirements listed in Section 1 of these standards and specifications under Drafting Requirements.
2. The drawings shall show existing drainage structures or give reference distances to existing structures near the project, including invert and rim elevations and the reference datum.
3. Plan View
 - a. List pipe length, size and material along side of pipe, e.g. 150 L.F. 12" PVC.

4. Profile View
 - a. List pipe length, size, material and slope (ft per ft), e.g. 150 L.F. 12" PVC $s=0.0125$. All lengths to be nominal except slope which shall be to 4 decimal places (1/10,000).
 - b. Slope shall be calculated based on the invert elevation (i.e.) out of the upstream structure and the invert elevation into the downstream structure. Horizontal distances shall be calculated between the centers of the connecting structures.

C. Hydraulic Analysis

1. A preliminary drainage report and plan shall be submitted with the land use application and include both an upstream analysis and a Level 1 downstream analysis. Further levels of analysis may be required at the discretion of the City Engineer.
2. For Planned Residential Developments (PRDs): The post-developed quantities and calculations/methodologies shall be provided for each pervious and impervious element and be individually listed/presented. Elements include, but are not limited to, roofs, driveways, streets, sidewalks, offsite paved improvements, and storm pond surface area.
3. For long plats: One of the two following methods must be used to determine the post-developed area:
 - a. In addition to the percent impervious area based on dwelling units per acre, as listed in the Modified Curve Number table in the Kitsap County Stormwater Management Manual, the post-developed area calculations shall add the impervious area attributable to roads, sidewalks, and detention pond surface area. Quantities and calculations/methodologies shall be provided for each pervious and impervious element and be individually listed/presented;
OR
 - b. The post-developed quantities and calculations/methodologies shall be provided for each pervious and impervious element and be clearly listed and presented. Elements include, but are not limited to, roofs, driveways, streets, sidewalks, offsite paved improvements, and storm pond surface area.
4. A final drainage report is required at the time of submittal of construction drawings, unless required earlier at the discretion of the City Engineer. The final drainage report shall include an analysis of the proposed drainage design which satisfies the City Engineer that the design complies with all City requirements and protects downstream properties and the surrounding area from damage and any adverse impacts. An Operations and Maintenance manual shall be provided with the "as-built"/record drawings.

5. In the case of conflicts among the standards and manuals, the more restrictive shall apply unless determined otherwise at the discretion of the Public Works Director. Requirements of the permit/approved plans are a minimum. Other actions may be necessary to comply with State statutes for clean water. The applicant is ultimately responsible for compliance.
6. The cover page of the report shall be stamped by the applicant's engineer and shall include the following statement:

"I hereby state that this Drainage Report has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community of professional engineers. The analysis has been prepared utilizing procedures and practices specified by the City of Poulsbo and within the standard accepted practices of the industry. I understand that the City of Poulsbo does not and will not assume liability for the sufficiency, suitability or performance of drainage facilities prepared by me."

7. For individual lot infiltration in short or long plats the following shall apply:
 - a. Section 5.3.6 and Appendix 5A of the Kitsap County Stormwater Management Manual are only for *individual single-family infill* lots.
 - b. An SBUH analysis for individual lot infiltration in new plats shall use both the 100-year/7-day and 100-year/24-hour events.
 - c. Soil logs (geo-technical report) from a geo-technical engineer must be submitted to the City Engineer which has a sufficient number of test pits to determine if infiltration is possible and which includes any recommendations or requirements by the geo-technical engineer. A soil log from every lot location is not necessarily required. The applicant's engineer shall submit a "template" design for infiltration at the time of civil construction drawing approval. The template shall be included with each building permit for lots that are utilizing infiltration. At the time of each building permit's trench excavation, the soils shall be inspected by the geo-technical engineer for conformance with the soil log that the template was based on. If significant differences in soil horizons are encountered, a new design for those specific soil conditions is required.

D. Ownership and Maintenance

1. Stormwater systems on private property shall be operated and maintained by the owner in accordance with the City's adopted

stormwater manuals. The City may inspect the system periodically for conformance with the operation and maintenance requirements.

2. In plats, the stormwater facility tract shall be dedicated to the City upon Final Plat approval. When the surface of detention vaults in plats is proposed for public use, appropriate legal agreements must be addressed in the preliminary plat conditions of approval and on the face of the recorded final plat.
3. For plats, the developer shall be responsible for providing regular and adequate maintenance and supportive maintenance records for the stormwater detention system for a minimum of two-years or until 80% of the residences have been completed, whichever is longer. At the end of this time, the City will inspect the system and, if acceptable, the City will take over maintenance and operation of the system.
4. The Public Works Director will determine on a case-by-case basis if the City will assume ownership and maintenance responsibilities for any storm pipe and structures which are not within public right-of-way. Storm pipe and structures owned and maintained by the City shall be within easements which meet the City's criteria for dimension and access as described in Section 1 of these standards.

**E. Pipe
Size**

1. No storm drain pipe between catch basins or manholes in the public right-of-way shall be less than 12 inches in diameter; with the exception that 8-inch pipe may be used between inlets and catch basins in runs of 50 feet or less.
2. Changes of pipe size are allowed only at junctions.
3. Downstream decrease in pipe size is not a recommended practice and will only be allowed under special conditions.

Connections

1. Secondary system connections to the primary (trunk line or main line) pipe system shall be made only at catch basins or manholes.
2. Single or double service roof/footing drain connections may be connected to the primary (trunk line or main line) system with a testable tee.

Cover

1. Ductile iron pipe is required when the pipe cover is less than two (2) feet.
2. When the pipe is under a roadway:
 - a. Six inches of pipe zone backfill is required over the pipe. Gravel base may be used for pipe zone backfill since the specifications for gravel base meet pipe zone backfill specifications.
 - b. When gravel base is used for pipe zone backfill, the minimum cover from the top of the pipe to the surface of the road is 13 inches in residential roadway and 14 inches in commercial roadways.
 - c. If gravel base is not used for pipe zone backfill, then the minimum cover from the top of the pipe to the surface of the road is 19 inches in residential roadways and 20 inches in commercial roadways.

Clearances. Horizontal and vertical clearances from storm main shall be:

Utility	Horizontal (ft)	Vertical (ft)
Cable	5	1
Gas	5	1
Power	5	1
Telephone	5	1
Water	5	1
Sewer	10	1.5

F. Structures

1. A catch basin or manhole will be required at all changes in pipe diameter and changes in grade or alignment.
2. The maximum distance between structures shall be 300 feet.

G. Frames / Lids / Grates / Covers

1. Lids, grates, and covers shall be seated properly to prevent rocking.
2. All catch basins and manholes in unpaved areas shall be equipped with locking frames and lids or grates.
3. All Type II catch basins and all manholes with catches shall be supplied with locking lids or grates.
4. Type II catch basins and manholes shall be equipped with round 24 inch covers and frames.

5. Round lids on all storm drain structures shall have "Drain" cast into the lid.
6. Through-curb grates are only allowed at sag vertical curves or when otherwise specifically approved by the Public Works Director.

H. Cleanouts

1. Cleanouts shall be installed at the property/easement line for both single and double services.
2. Cleanouts installed in streets, driveways, or walkways, whether paved or unpaved, shall have a cast iron frame and cover as shown in the standard detail. The riser pipe shall have a screw cap and not be more than 12 inches or less than 6 inches below the finish grade elevation.

I. Debris Barriers

Debris barriers (trash racks) are required on all pipes entering or leaving a closed pipe system, including pipes entering or leaving a control/restrictor manhole or catch basin from a surface-type BMP (detention pond, infiltration basin, wetpond, biofiltration swale, etc.).

J. Outfall Systems Traversing Steep Slopes

1. Continuously fused, welded or flange bolted mechanical joint pipe systems, such as high density polyethylene pipe (HDPEP), or ductile iron pipe with flange-bolted mechanical joints) with proper anchoring shall be used for outfall systems traversing steep slopes.
2. HDPEP outfall systems must be designed to address the material limitations as specified by the manufacturer, in particular thermal expansion/contraction and pressure design. Sliding sleeve connections to address thermal expansion and contraction shall be used. These sleeve connections consist of a section of the appropriate length of the next larger size diameter of pipe into which the outfall pipe is fitted. These sleeve connections must be located as close to the discharge end of the outfall system as is practical.
3. Flows of very high energy will require a specifically engineered energy dissipation structure.

K. Service Laterals

1. For plats, service laterals must extend a minimum of 12 feet behind the property line in order to terminate outside of the 10-foot utility easement

that parallels the frontage of all lots. The ends of each storm drain stub shall be capped and located with an 8' long 2" x 4" board, embedded to the stub cap and extending at least 3 feet above grade, and marked permanently "STORM". A copper 12 ga. locate wire firmly attached. The stub depth shall be indicated on the marker.

2. Services shall be pressure tested in conjunction with main lines.

L. Cleaning / Inspection / Testing

1. In addition to the temporary erosion control requirements on the approved plans and grading permit, all catch basins shall be protected with sediment socks. It is not acceptable to simply place filter fabric under the grate.
2. Prior to final inspection and acceptance of storm drainage work, pipes and storm drain structures shall be cleaned and flushed. Any obstructions to flow within the storm drain system, (such as rubble, mortar and wedged debris), shall be removed at the nearest structure. Wash water of any sort shall not be discharged to the storm drain system or surface waters.
3. The contractor shall furnish all labor and equipment necessary to make the tests. The City inspector shall witness all tests.
4. Mains and services shall be tested by the low pressure air test method at 3 pounds for 5 minutes with no pressure drop.

M. Materials and Methods

1. General
 - a. All materials and methods not specifically referenced in this manual shall comply with the applicable sections of the most currently adopted editions of the ASTM, APWA, and APWA/WSDOT Standard Specifications. When there are differences between the specifications, the Public Works Director shall determine which shall apply.
 - b. Where reference is made to other specifications, that specification shall be the latest revision at the time of construction, except as noted on the plans or herein.
 - c. When specific manufacturers or models of various materials are listed, no substitutions will be allowed without prior approval by the Public Works Director.

2. Pipe
 - a. All secondary pipe shall be smooth wall interior PVC D-3034 or CPE (N-12 Blue Seal or equal).
 - b. All pipe and fitting shall be testable at 3 pounds for 5 minutes.

3. Catch basins and manholes. Pipe penetrations and joints between catch basin and manhole sections shall be grouted on the inside and outside of the structure.

N. Clearing, Grading, And Erosion Control

1. A Clearing and/or Grading Permit may be / is required prior to any land-disturbing activity on the site. The permit may include restrictions as to the limits of any particular area or phase that can be cleared and graded at any one time or during any construction season. Additional restrictions may be placed on the permit in regard to seasonal weather conditions. At any time, the City Engineer may restrict activities or access to portions of the site which would be detrimental to maintaining erosion and sediment control. Per City ordinance, payment of a deposit for erosion control performance and maintenance shall be posted prior to the issuance of a clearing and/or grading permit.

2. The applicant shall may be required to also provide an analysis by a licensed geo-technical engineer in regard to grading and the design, location, and construction of roads/driveways, parking lots, rockeries/retaining walls, stormwater treatment and detention systems, and buildings on the site. The City Engineer may then hire an independent consultant of his choosing to review and comment on the adequacy of the applicant's proposal and analysis. Acceptance of the proposal and analysis shall be at the discretion of the City Engineer.

3. Per City ordinance, payment of a deposit for erosion control performance and maintenance shall be posted prior to the issuance of a clearing and/or grading permit.

4. A Temporary Erosion and Sediment Control Plan shall be submitted to the City Engineer for approval. The plan shall conform to the standards of the Washington State Department of Ecology (DOE) Stormwater Management Manual for the Puget Sound Basin, the Kitsap County Stormwater Management Design Manual, and City of Poulsbo requirements. Control measures shall be in place prior to any clearing and/or grading activity. The site work contractor shall be responsible for maintaining all erosion and sedimentation control facilities.

5. The erosion and sedimentation control systems depicted on the plans are intended to be the minimum requirements to meet anticipated site

conditions. The permittee should anticipate that more control measures may be necessary to insure complete siltation control on the site. It shall be the obligation and responsibility of the permittee to address any new conditions that may arise or be created by his activities and to provide additional facilities, over and above the minimum requirements shown, as may be needed to protect adjacent properties and the water quality of the receiving drainage system. The City Engineer may require additional measures.

6. Temporary erosion and sediment control shall be maintained on the site at all times. Control measures shall conform to the standards of the Washington State Department of Ecology (DOE) Stormwater Management Manual for the Puget Sound Basin, the Kitsap County Stormwater Management Design Manual, and City of Poulsbo requirements. Control measures shall be in place prior to any ground-disturbing activity. The site work contractor shall be responsible for maintaining all erosion and sedimentation control facilities. The property owner is ultimately responsible for compliance.
7. Measures necessary to insure complete siltation control on the site are required at all times. It shall be the obligation and responsibility of the contractor to address any new conditions that may be created by his activities and to provide additional facilities, over and above any existing measures, as may be needed to protect adjacent properties and the water quality of the receiving drainage system. The City Engineer may also require additional measures.
8. Any dirt or mud tracked onto City streets by construction vehicles shall be cleaned up immediately. Dust control shall be maintained at all times.
9. During grading and utility installation, observed site conditions may result in the City Engineer making a determination that the applicant shall direct a geotechnical engineer to complete detailed geotechnical investigations and provide the City Engineer with results and recommendations prior to completion of the work or issuance of subsequent approvals or permits.
10. The Department of Ecology requires project owners to obtain a Construction Stormwater General Permit for certain projects.
 - a. Initial guidance on this requirement can be found on the Department of Ecology Focus Sheet titled "Focus on Construction Stormwater General Permit" which is available at the City Permit Counter or online at www.ecy.wa.gov/biblio/0710044.html.
 - b. Permit application forms, also called a "Notice of Intent" or "NOI", are available at the City Permit Counter or online at: www.ecy.wa.gov/biblio/ecy02085.html. Construction site operators must apply for the permit 60 days prior to discharging stormwater.

11. On approximately September 15 of any construction year, the City Engineer may schedule a meeting with the developer to discuss winter-season site stabilization/closure requirements. All exposed soils shall be stabilized using Best Management Practices (BMPs) defined by the Department of Ecology and Kitsap County storm water management manuals and as approved by the City Engineer.