

SECTION 200 STORMWATER MANAGEMENT

200.1 General Stormwater Requirements

1. The general design and construction requirements for the City of Puyallup shall be those contained in the Standard Specifications for Road, Bridge, and Municipal Construction (hereinafter referred to as the “Standard Specifications”), Washington State Department of Transportation and American Public Works Association, Washington State Chapter, latest edition; and the Uniform Plumbing Code as adopted by the Washington State Building Code Council, latest edition, unless superseded or amended by the City of Puyallup Design Standards for Public Works Engineering and Construction (hereinafter referred to as the “City Standards”).
2. The following paragraphs outline the requirements specific to the City of Puyallup which shall be used in conjunction with the regulations noted above and the design principles outlined in the following referenced stormwater manuals. Any conflict or inconsistency in the information provided by these documents shall be resolved by giving precedence in the following order:
 1. City of Puyallup Phase II Municipal Stormwater Permit (NPDES Permit)
 2. City of Puyallup Municipal Code (PMC)
 3. City of Puyallup Design Standards including Standard Details
 4. City of Puyallup Stormwater Management Plans (Comprehensive Plans, Basin Plans, and/or Water Clean-up Plans)
 5. 2005 Dept. of Ecology Stormwater Management Manual for Western Washington (Ecology Manual)
 6. 1990 King County Surface Water Design Manual with 1994/95 Revisions
3. The City may adopt a comprehensive stormwater plan, individual watershed basin plan(s), or water clean-up plans which may place additional stormwater requirements on a proposed project. The applicant shall incorporate any conditions required by these plans which are applicable to the proposed project. Current stormwater management plans are available on the City’s website at:

<http://www.cityofpuyallup.org/services/public-works/stormwater-management/>
4. Public right-of-way runoff shall be detained and treated independently from the private stormwater facilities. This shall be accomplished by providing separate publicly maintained storm facilities within a tract or dedicated right-of-way; enlarging the private facilities to account for bypass runoff; or other methods as approved by the Engineering Services Manager.
5. All stormwater facilities associated with single-family residential plats and subdivisions shall be located in public right-of-way or within a separate dedicated tract of appropriate dimensions and improved to the standards set forth below and in accordance with the Puyallup Municipal Code (PMC).
6. All private storm drainage facilities shall be covered by a maintenance agreement provided by the City and recorded with Pierce County. Under this agreement, if the owner fails to properly maintain the facilities, the City, after giving the owner written notice, may perform necessary maintenance at the owner’s expense in accordance with PMC 21.10. See Section 205 for additional information.

7. Stormwater will not be permitted to discharge directly onto City roads or into a City system without the prior approval of the City with the exception of single family residences. Discharges to a City system shall be into a structure such as a catch basin, manhole, through an approved curb drain, or into an existing or created City ditch. Concentrated drainage will not be allowed to discharge across sidewalks, curbs, or driveways.
8. All buildings are required to have roof downspouts and subsurface drains directed to either an infiltration system, dispersion system, or to the stormwater conveyance system. Refer to the appropriate stormwater design manual chosen from Section 201 below for additional information on roof downspout infiltration and dispersion.
9. All stormwater facilities installed within paved areas shall be designed to withstand HS-20 load requirements.
10. Ecology block walls will not be permitted within the City of Puyallup's stormwater facilities as baffles.
11. For wetpond designs, the City of Puyallup will require the use of berms. Baffles shall be second preference for the City of Puyallup, and when allowed through the use of the Alternative Methods Request (AMR) process approved by the City Engineer, shall be cast in place concrete as designed by a licensed civil engineer (structural engineer if exceeding the limitations of civil licensing).

201 Stormwater Management Requirements

201.1 Stormwater Manual Selection

1. On February 16, 2010 the City of Puyallup adopted new storm water regulations in accordance with the requirements of the City's NPDES Permit. Permit applications shall comply with the new regulations contained in PMC Chapter 21.10 and these City Standards.
2. Any proposed project that will disturb 1-acre or greater, or is part of a larger common plan of development or sale that will ultimately disturb 1-acre or greater, e.g., plats and binding site plans, will be required to adhere to the requirements of the 2005 Dept. of Ecology Stormwater Manual for Western Washington (hereinafter referred to as the "Ecology Manual").
3. If a proposed project will disturb less than 1-acre, and is not part of a larger common plan of development or sale that will ultimately disturb 1-acre or more, and increases the impervious surface of the site by more than 5,000 square feet, then the applicant may elect to use stormwater design requirements in effect prior to February 16, 2010. These requirements are contained in the 1990 King County Surface Water Design Manual with 1994/95 revisions, published by King County Department of Public Works Surface Water Management Division (hereinafter referred to as the "KC Manual"), and as further modified below.
4. Due to downstream constraints, projects located South of 12th Avenue SE within the State Highway Basin, regardless of size, shall use the Ecology Manual as a means to prevent downstream impacts from the proposed development.
5. All applicants shall complete and submit the stormwater flowchart, Figures 3.1, 3.2, and 3.3, contained in the City's Phase II Municipal Stormwater Permit, Appendix I. The completed flowchart shall be submitted with the permit application and included in the Stormwater Site Plan (SSP). The link below may be used to obtain the flowchart from the Dept. of Ecology's website:

<http://www.ecy.wa.gov/programs/wq/stormwater/municipal/phaseIIww/wwphiipermit.html>

201.2 Stormwater Site Plan (SSP)

1. All projects requiring stormwater management shall submit a Stormwater Site Plan (SSP) in accordance with Volume I, Chapter 3 of the Ecology Manual.
2. All projects requiring stormwater management shall provide an offsite analysis and mitigation report, contained in the SSP, that conforms to the description and specific task elements described in Volume I, Section 2.6.2 of the Ecology Manual.
3. Each section of the SSP shall be individually indexed and tabbed with each permit application, and every re-submittal thereafter, prior to review by the City.

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204 Conveyance Systems

204.1 Conveyance System Design Flows

1. Design flows for sizing conveyance systems shall be determined using an approved calibrated continuous simulation hydrologic model, i.e., HSPF, Western Washington Hydrology Model (WVHM), MGS Flood, or KCRS. Conveyance capacity shall be based on the historic September 17, 1969 25-year storm flow event.

Exception: For project sites in the City with tributary areas less than 10-acres, and a developed time of concentration less than 60-minutes, either the Rational Method or Santa Barbara Urban Hydrograph Method (SBUH) may be used to determine conveyance design flows. The 25-year, 24-hour storm event total precipitation used for analysis shall be 3.5-inches.

2. Design flows for conveyance facilities that also operate as water quality or flow control BMP's, shall be determined using the hydrologic design method described in the stormwater manual chosen in Section 201.
3. Culverts shall be designed in accordance with Section 204.5.

204.2 Conveyance System General Requirements

1. All new pipe systems, both onsite and offsite, shall be designed with sufficient capacity to convey and contain (at minimum) the 25-year storm flow event, assuming developed conditions for onsite tributary areas, and existing conditions for any offsite tributary areas.
2. Stormwater may be discharged directly to the Puyallup River provided the following conditions are met:
 - the project site is located within one of the direct discharge basins outlined in the 2012 Comprehensive Stormwater Drainage Plan
 - the discharge is consistent with federal, state, and city regulations governing water quality and flow control
 - the discharge is solely through a stable, man-made stormwater conveyance system that extends from the project site to the mean high water line of the river
 - the man-made conveyance system has adequate hydraulic capacity (Note: The applicant shall provide supporting calculations of system capacity which may be subject to third party review prior to project approval.)
 - the discharge will not cause, or aggravate, downstream flooding problems
 - the discharge does not reduce natural flows to other streams or wetlands
3. On projects considering direct discharge to the Puyallup River, conveyance capacity shall be determined based on the 25-year storm flow event *and* the corresponding river elevations at the specific river outfall. Reference City of Puyallup Comprehensive Storm Drainage Plan, Appendix C, Table C-9.
4. Pipe system structures may overtop for runoff events that exceed the 25-year design capacity provided the overflow from a 100-year runoff event does not create or aggravate an existing flooding problem or erosion problem. Any overflow occurring onsite for runoff events up to and including the 100-year event must discharge at the natural location for the ***project site***. In

residential subdivisions, this overflow must be contained within an onsite drainage easement, tract, covenant, or public right-of-way.

5. In areas of the City with insufficient conveyance capacity (25-year storm), new development and redevelopment must either enlarge on-site stormwater facilities to reduce downstream flows, or construct any necessary capital improvement(s).
6. Project related off-site conveyance systems are permitted only if the downstream property owner(s) grant easements for construction, operation, and maintenance of the system. If easements are not provided, runoff management shall conform to drainage law and shall, at a minimum, include provisions for detention, water quality, and/or dispersion prior to leaving the development site.
7. New stormwater mains shall be extended along the entire frontage of the property to be served.

204.3 Pipe System Design Criteria

1. Basic conveyance system design shall be accomplished using the Uniform Flow Analysis Method (Manning's Equation). When using this method, each pipe within the conveyance system shall be sized and sloped such that its barrel capacity at normal full flow is equal to, or greater than, the required conveyance capacity described above. Pipes should not be designed to surcharge.
2. The City, at its discretion, may request a Backwater Analysis for the conveyance system design. When a backwater calculation is required, the design engineer shall analyze the system for the 25-year and 100-year peak flows.
 - If overtopping occurs, the additional flow over the ground surface shall be analyzed using the methods for open channel flow. Any additional surface flow shall not exceed 4-inches depth at its deepest point, and shall not extend beyond half the lane width of the outside lane of the traveled way.
3. Pipe systems shall be designed to accommodate the developed condition 25-year storm flow event with 0-feet of freeboard without overtopping catch basins and manholes.
4. Public stormwater pipe shall be minimum 12-inch diameter. Private stormwater pipe shall be minimum 12-inch diameter for mains, and minimum 8-inch diameter for laterals.
5. The minimum design velocity at full flow should be 3-feet per second. If site constraints result in velocities less than 3-feet per second at full flow, concerns associated with sedimentation in the pipe system shall be addressed with larger pipes, closer spacing of structures, sediment basins, or other similar measures.
6. The minimum slope of the pipe shall be 0.5%.
7. All pipe reaches shall be summarized in a Conveyance Table containing the following minimum information and included in the TIR:

- | | |
|-----------------------------|------------------------------------|
| ○ Pipe Reach Name | ○ Pipe-Full Flow (cfs) |
| ○ Structure Tributary Area | ○ Water Depth at Design Flow (in) |
| ○ Pipe Diameter (in) | ○ Critical Depth (in) |
| ○ Pipe Length (ft) | ○ Velocity at Design Flow (fps) |
| ○ Pipe Slope (%) | ○ Velocity at Pipe-Full Flow (fps) |
| ○ Manning's Coefficient (n) | ○ Percent full at Design Flow (%) |
| ○ Design Flow (cfs) | ○ HGL for each Pipe Reach (elev) |

204.4 Closed System Requirements

1. Publicly maintained stormwater pipe shall be only PVC, concrete, ductile iron, or dual walled Polypropylene pipe as follows:
 - a. PVC pipe shall be per ASTM D3034, SDR 35 for pipe size 15-inch and smaller and F679 for pipe size 18- to 27-inch. Minimum cover on PVC pipe shall be 3-feet.
 - b. Concrete pipe shall conform to AASHTO M 86, Class 2 only, for unreinforced pipe and AASHTO M 170, Classes II through V, for reinforced concrete pipe. Minimum cover on concrete pipe shall be 3-feet.
 - c. Ductile iron pipe shall be Class 50, conforming to AWWA C151. Minimum cover on ductile iron pipe shall be 1-foot.
 - d. Polypropylene Pipe (PP) shall be dual walled, have a smooth interior and exterior corrugations and meet WSDOT 9-05.24(1). 12-inch through 30"-inch pipe shall meet or exceed ASTM F2736 and AASHTO M330, Type S, or Type D. 36-inch through 60-inch pipe shall meet or exceed ASTM F2881 and AASHTO M330, Type S, or Type D. Testing shall be per ASTM F1417. Minimum cover over Polypropylene pipe shall be 3-feet.
2. Solid wall, fusion-welded high density polyethylene pipe (HDPE), may be used in unique situations, i.e. steep slopes or horizontal directional boring, upon approval of the Engineering Services Manager or Public Works Director. Projects utilizing HDPE pipe shall include consideration of the material's thermal expansion/contraction properties for the design of connections and anchorages. Minimum cover on buried HDPE pipe shall be 3-feet.

If approved, HDPE pipe shall conform to the following criteria:

- compliance with the requirements of Type III C5P34 as tabulated in ASTM D1248;
 - shall have the PPI recommended designation of PE3408;
 - shall have an ASTM D3350 cell classification of 345534C;
 - a hydrostatic design stress rating of 800-psi based on a material with a 1600-psi design basis determined in accordance with ASTM D2837-69;
 - a design working pressure of 50-psi at 73.4° F and an SDR value of 32.5.
3. Privately maintained stormwater pipe shall be PVC, concrete, or ductile iron meeting the same criteria as specified above.

Exception: The use of corrugated polyethylene pipe (CPEP) in accordance with WSDOT Standard Specifications Section 9-05.20 is acceptable for private stormwater systems. Minimum cover on CPEP pipe shall be 3-feet.

4. The use of any other pipe material shall only be allowed upon submission and approval of an "Alternative Methods Request". The Alternative Methods Request form shall clearly indicate the justification for a substitute pipe material other than cost savings.
5. The conveyance pipe diameter, length, material, and slope shall be included on the 'plan view' in addition to the 'profile view' for each pipe reach.
6. Steep slope areas (over 30%) shall require all drainage to be piped from the top to the bottom in fusion-welded HDPE pipe. If slopes exceed 40%, then pipe shall be installed on the surface of the slope, with the minimum disturbance possible, and provided with engineered anchorages.
7. Roof drains, or other stormwater pipe, within 2-feet of a building shall consist of material approved by the Uniform Plumbing Code. (i.e. PVC schedule 40, ABS schedule 40, or ductile iron).
8. For stormwater pipe crossing over sanitary sewers, a minimum of 12-inches of vertical clearance shall be provided between the systems. If the stormwater pipe is crossing below the sanitary sewer, a minimum of 18-inches of vertical separation shall be provided.
 - a. A pipe sleeve is required for some installations to provide additional protection of stormwater from potential leakage from other utilities. A pipe sleeve shall be a single section of PVC pipe (no joints) with a minimum length of 10-feet to each side of the pipe crossing. The pipe sleeve shall be placed around the stormwater pipe with the annular space between the sleeve and the stormwater pipe filled with grout.
9. A minimum of 10-feet of separation shall be provided between building structures and any closed system, or 10-feet from the utility easement line in a public system.
10. Trees shall not be located within 10-feet horizontally of stormwater pipes unless root barriers are provided. With root barriers, trees may be no closer than 3-feet to pipes.

204.5 Culvert Design Requirements

1. Culverts and bridges associated with natural channels must convey the 100-year storm event from the contributing area assuming fully developed conditions.
2. All other culverts and bridges shall convey the 25-year peak flow from the contributing area assuming fully developed conditions.
3. Bridges shall be the first choice for crossing streams with salmonids. Bridges proposed in streams with salmonids shall be designed to provide for fish passage in accordance with the City's critical areas regulations and the Washington State Department of Fish and Wildlife (WDFW) requirements. A WDFW Hydraulic Permit Authorization (HPA) or exemption will be required prior to permit approval.
4. Flow capacity shall be determined by analyzing inlet and outlet control for headwater depth. All calculations and nomographs used for culvert design shall be included in the stormwater report.

5. The maximum design headwater depth shall be 1.5 times the diameter of the culvert with no saturation of roadbeds.
Minimum culvert diameters are as follows:
 - Culverts crossing under public roadways – 18-inches minimum
 - Roadside culverts, including driveway culverts – 15-inches minimum
 - Culverts on private property – 8-inches minimum
6. Inlets and outlets shall be protected from erosion by rock lining, riprap, or bio-stabilization.
7. Culvert velocity shall be 2-feet per second minimum and 15-feet per second maximum. For ductile iron, polypropylene or HDPE pipe, no maximum velocity shall be established, but an engineered outlet protection design shall be provided and included in the stormwater report.
8. Driveway culverts shall be a minimum of 20-feet in length. All driveway approaches 24-feet and wider shall have concrete headwalls at each end of the culvert. Culverts shall have beveled end sections to match the side slope.
9. All corrugated metal pipe (CMP) culverts shall be uniformly coated inside and out with a protective coating of asphalt in accordance with WSDOT Section 9-05.4(3) Treatment I criteria.

204.6 Open Systems Design Requirements

1. These provisions apply only to “Open Systems” which are not part of a natural drainage system regulated under the City’s Environmentally Critical Areas Management Ordinance (CAO). Design requirements for modification of regulated natural drainage systems shall be site specific and developed in accordance with provisions contained in the CAO and approved by the Planning Department.
2. Open channels shall be sized to adequately carry the design rate of flow without damage. Whenever practical, the channel shall be characterized as slow flowing, be wide and shallow, and natural in its appearance and functioning.
3. Open systems shall be designed with side slopes no steeper than 3H:1V and back slopes no steeper than 2H:1V with adequate slope stabilization and a minimum freeboard of 1-foot.
4. Ditches may be either trapezoidal or ‘V’-shaped.
5. Open ditches designed at 2 to 5-feet per second (fps) shall be hydro-seeded with a grass approved by the City. Steep grades (5 to 15 fps) will require check dams, rock spalls, rip rap, or other approved energy dissipation methods.
6. A minimum of 20-feet shall be provided between a building structure and any open system.
7. Ditch cross sections shall be provided at a minimum of every 50-feet. The cross section shall extend 25-feet beyond the top of bank on either side of the ditch and include the water surface elevation for the 2-yr, 10-yr, 25-yr and 100-yr storm events.

204.7 Pump System Requirements

1. Pumping stormwater is the method least desirable for conveying stormwater and is not an acceptable alternative for publicly maintained systems. When no other alternatives are feasible

for privately owned systems, pump systems may be considered provided they meet the following criteria:

- a. A pump system may be substituted for the City Standard control riser provided the pump system is designed to release detained stormwater in accordance with the discharge requirements specified by the appropriate manual required in Section 201.
- b. The pump system shall be used to convey water from one location or elevation to another within the limits of the project site. Gravity discharge to the downstream public conveyance system is required.
- c. A backup pump shall be incorporated into the system.
- d. An alternative power source shall be provided, i.e., emergency generator or battery backup power. Use of a portable generator as an alternative power source is not acceptable.

Any alternative power source shall include an auto-transfer switch that disconnects the alternative power source from the public grid.

- e. External High water / Pump Failure alarm system shall be provided.
- f. The gravity-flow components of the drainage system to and from the pump system must be designed so that pump failure does not result in flooding of a building, an emergency access route, an adjacent property, or cause overflow to a location other than the natural discharge point for the project site.

204.8 Vaults, Catch Basin and Manhole Requirements

1. All concrete cast-in-place stormwater structures shall be designed by a registered professional engineer licensed in the State of Washington and shall be approved and permitted by the City of Puyallup Building Department. The building permit number shall be referenced on the engineering record drawings prior to final acceptance by the Engineering Services Department.
 - a. Cast-in-place vaults shall be provided with commercially available PVC or rubber waterstop at all cold joints. The waterstop shall be physically embedded and bonded to the concrete on each side of the joint.
 - b. Cast-in-place manholes and catch basins shall be provided with a commercially available flexible waterstop which expands when exposed to water.
 - c. All waterstop material(s) shall be installed in accordance with the manufacturer's recommendations.
2. A stormwater structure shall be installed at the end of all dead-end mainlines, at changes in direction or slope, at changes in pipe size or material, and at pipe junctions.
3. Catch basins shall be provided within 50-feet of the entrance to a pipe system to provide for silt and debris removal.
4. Catch basins and manholes shall be easily accessible to maintenance vehicles, equipment, and personnel.

5. Pipe inverts shall be matched at manholes and catch basins.
6. Maximum spacing between structures (i.e., manholes or catch basins) for closed systems shall be 400-feet of pipe length.
7. Maximum surface run (gutter flow) for storm drains on paved roadway surfaces shall be as follows:

<u>Pavement Slope</u>	<u>Maximum Surface Run</u>
Less than 1%	200 ft
1% to 6%	300 ft
6% to 12%	200 ft
8. For slope grades greater than 6%, or as determined by the Engineering Services Manager or Public Works Director, it may be necessary to use concrete pipe and manholes in lieu of catch basins to help stabilize the storm system and control pipe flow velocities.
9. The maximum depth for catch basins/manholes shall be as follows:
 - a. Type I Catch Basin: 5-feet, measured from the pipe invert to the finished surface.
 - b. Type II Catch Basin: 20-feet, measured from the bottom of structure to the finished surface.
 - c. For depths greater than 20-feet, stormwater structures shall be designed by a licensed professional engineer registered in the State of Washington.
10. Street drainage requirements for public systems shall be as follows:
 - a. The minimum longitudinal gutter slope shall be 0.5%.
 - b. Catch basins shall be installed at all low points in the surface drainage area.
 - c. At gutter line low points, insure positive flow to catch basins. In some situations this may require variation from the vertical curve at the low point in the gutter line.
 - d. A catch basin shall be provided within 20-feet upstream of a reverse slope driveway.
11. Catch basins and manholes within the limits of a new or redevelopment project and located in the public right-of-way, but not in the flow-line, shall be:
 - a. removed, or if not feasible;
 - b. removed and replaced with a Type II Catch Basin, and;
 - c. unless used as an inlet, provided with a round manhole ring and cover.

204.9 Oil Control/Spill Containment

1. Commercial, industrial, and multi-family properties shall include, at a minimum, a spill control device in one of the end-of-the-line (lowest) manholes or catch basins in the onsite conveyance system. (prior to connecting to the public stormwater system). The spill control device shall be installed upstream of any onsite water quality or flow control facility. If no

stormwater facilities are present, then the spill control device must be installed upstream from the final discharge point to the downstream drainage system.

2. The minimum requirement for a spill control device is a T-section, removable for maintenance, located on the outlet pipe leaving a Type 1L or Type-2 catch basin. Depending on the use(s) on the site, the Engineering Services Department may require additional measures for increased protection.

204.10 Grates

1. All grates shall be cast iron or ductile iron castings.
2. Vaned grates shall be used on all public and private systems.

204.11 Storm Drain Stenciling and Marking

1. All storm drains shall be signed as follows:
 - a. Publicly maintained stormwater catch basins shall be signed using glued-down markers supplied by the City and installed by the project proponent.
 - b. Privately maintained stormwater catch basins shall be signed with pre-cut 90ml torch down heavy-duty, intersection-grade preformed thermoplastic pavement marking material. It shall read either "Only Rain Down the Drain" or "No Dumping, Drains to Stream".

204.12 Outfalls

1. All exposed storm lines, 12-inches in diameter and larger, shall have trash racks at both the inlet and outlet ends, in accordance with City Standard Details.

Exception: Trash racks are required on inlet and outlet ends of all culverts greater than 18-inches in diameter. Trash racks are not required on culverts greater than 36-inches in diameter within stream corridors.
2. All concentrated discharges from stormwater conveyance systems shall be provided with energy dissipation/erosion protection measures.

205 Stormwater Maintenance and Operation Requirements

205.1 Stormwater Facilities Maintenance

1. All publicly maintained stormwater facilities shall be within a tract, easement, or right-of-way dedicated to the City of Puyallup. All publicly owned and maintained stormwater tracts/parcels shall be fenced at the property line. Fencing shall meet the minimum requirements of City Standard Detail 06.01.08 – Type 1, Chain Link Fence.
2. The design engineer shall provide the City with a letter certifying the proper installation of permanent stormwater controls and compliance with the approved stormwater site plan.
3. The City of Puyallup will assume maintenance and operation of public facilities located within subdivisions one year after final construction approval of the plat and provided subsequent inspection by the City indicates the facilities have been properly maintained and are operating as designed.
4. Provision shall be made for the long-term maintenance of all stormwater facilities and shall be accessible to maintenance vehicles and personnel. If not located in, or adjacent to a vehicle access way, then access by an improved roadway surface shall be provided.
5. Maintenance access roads shall be provided to the control structure and all drainage structures associated with any retention/detention facility. In no case shall any structure be located further from an access way than 8-feet when measured from the front of a vehicle, or no further than 20-feet when measured from the side of a vehicle.

205.2 Maintenance Access Road Requirements

1. Materials of construction for an improved roadway surface may include asphalt concrete, cement concrete, cement-treated base (CTB), asphalt-treated base (ATB), structurally stabilized vegetated surface, crushed surfacing base course, or other surfacing as approved by the Engineering Services Department.
 - a. Asphalt surfaces shall conform to the City of Puyallup “Private Roadway” standard.
 - b. Concrete surfaces shall conform to the material requirements and thickness specified in City Standard Detail 01.02.17 “Urban Commercial Approach – Alternate 1”.
 - c. CTB and ATB shall be a minimum of 10-inches thick.
 - d. Crushed surfacing base course shall be a minimum of 10-inches thick and conform to City of Puyallup standards.
 - e. Structurally stabilized vegetated surfaces shall only be used on grades less than 8% and shall comply with the manufacturer’s requirements.
2. Access roads shall be designed with 48’-6” outside radius on curves, with a maximum slope not to exceed 12% and a minimum width of 15-feet. Access roads steeper than 8% shall be paved using either asphalt concrete, cement concrete, cement-treated base (CTB), or asphalt-treated base (ATB).

3. For ponds with bottom widths of 15-feet or more, the access road shall extend to the pond bottom to a minimum 25-foot long level pad to facilitate cleaning. The access pad shall be designed in accordance with 205.2(1). For ponds less than 15-feet in width, an access road must extend along at least one (1) side of the pond.
4. A paved apron with removable bollards and/or fencing shall be provided where access roads connect to paved public roadways.

205.3 Private Maintenance Agreements

1. All non-residential storm drainage facilities shall be covered by a “Stormwater Management/BMP Facilities Agreement” provided by the City and recorded with Pierce County obligating the property owner to perpetual maintenance of the stormwater system.
2. As a condition of permit issuance, the City of Puyallup may inspect all privately maintained drainage facilities for compliance with specified maintenance requirements. If the property owner(s) fails to maintain their facilities to acceptable standards, the City will follow the procedures contained in PMC Chapter 21.10 to ensure compliance with the necessary maintenance standards.

205.4 Operation and Maintenance Manual

1. An operations and maintenance manual shall be prepared for all stormwater facilities as part of the development proposal.
2. At a minimum, the operations and maintenance manual shall include:
 - a. A description and purpose of the facility;
 - b. the dimensions and other characteristics of the facility (site map);
 - c. the party (parties) responsible for maintenance of the facility, with phone numbers and addresses;
 - d. list of any proprietary components along with information from the vendor describing maintenance schedule and costs;
 - e. what maintenance activities are required, and a proposed schedule of the activity;
 - f. care and maintenance of any powered devices;
 - g. inspection procedures and how the maintenance schedule will be modified if inspections determine the facility is not operating properly;
 - h. the minimum requirements for the type of facility as described in Volume V, Section 4.6, of the Ecology Manual;

206 Public Easements and Tracts

1. Publicly maintained storm conveyance systems which cross private property shall be located within a 40-foot wide easement which has been granted to the City. Stormwater facilities shall be placed in the center of the easement unless otherwise approved by the Engineering Services Manager.
2. Publicly maintained water quality and R/D facilities shall be located in tracts dedicated to the City. The size of the tract shall be based on the size of the stormwater facility. At a minimum, the tract shall include the entire facility, site access area, and at least 5-feet of clearance around the facility.
3. In cases where pipes and/or other facilities are deeper than 8-feet or have other special conditions, larger tracts or easements may be required at the discretion of the Engineering Services Department.
4. All easements needed for City stormwater systems shall be provided by the project proponent in the name of the City. The required easements shall be shown on the construction drawings and a DRAFT easement legal description or plat markup, signed by the property owner, shall be submitted for review at the same time construction drawings are submitted for review. Prior to issuance of an occupancy certificate, the draft easement shall be modified as necessary, signed, and recorded with Pierce County at the property owner's expense.
5. Easements shall be prepared using the City of Puyallup easement form. An alternative to separately recording a City of Puyallup easement form is to record an easement on the face of a plat. If this is the method used, a standard City of Puyallup easement statement shall be included in the plat documents.
6. Easements shall be a minimum of 10-feet clear from any building vertical surface or structure foundation(s).
7. No buildings, structures, garages, carports, dumpster enclosures, decks, rockeries, retaining walls, permanent signs, etc., shall be located within any publicly owned easement. If landscaping is required by the City Planning Department, the landscaping shall be designed and installed to minimize any potential impact to the utility within the easement.

207 Stormwater Plan Notes

The following applicable notes shall be shown on the plans.

STORMWATER NOTES:

1. All work in City right-of-way requires a permit from the City of Puyallup. Prior to any work commencing, the general contractor shall arrange for a preconstruction meeting at the Development Services Center to be attended by all contractors that will perform work shown on the engineering plans, representatives from all applicable Utility Companies, the project owner and appropriate City staff. Contact Engineering Services to schedule the meeting (253) 841-5568. The contractor is responsible to have their own approved set of plans at the meeting.
2. After completion of all items shown on these plans and before acceptance of the project, the contractor shall obtain a "punch list" prepared by the City's inspector detailing remaining items of work to be completed. All items of work shown on these plans shall be completed to the satisfaction of the City prior to acceptance of the water system and provision of sanitary sewer service.
3. All materials and workmanship shall conform to the Standard Specifications for Road, Bridge, and Municipal Construction (hereinafter referred to as the "Standard Specifications"), Washington State Department of Transportation and American Public Works Association, Washington State Chapter, latest edition, unless superseded or amended by the City of Puyallup City Standards for Public Works Engineering and Construction (hereinafter referred to as the "City Standards").
4. A copy of these approved plans and applicable city developer specifications and details shall be on site during construction.
5. Any revisions made to these plans must be reviewed and approved by the developer's engineer and the Engineering Services Staff prior to any implementation in the field. The City shall not be responsible for any errors and/or omissions on these plans.
6. The contractor shall have all utilities verified on the ground prior to any construction. Call (811) at least two working days in advance. The owner and his/her engineer shall be contacted immediately if a conflict exists.
7. Any structure and/or obstruction which require removal or relocation relating to this project, shall be done so at the developer's expense.
8. During construction, all existing and newly installed drainage structures shall be protected from sediments.
9. All storm manholes shall conform to City Standard Detail No. 02.01.01. Flow control manhole/oil water separator shall conform to City Standard Detail No. 02.01.06 and 02.01.07.
10. Manhole ring and cover shall conform to City Standard Detail 06.01.02 and 06.01.03. The cover shall be marked with "storm" or "drain" in 2-inch raised letters. Minimum weight of the frame shall be 210 pounds. Minimum weight of the cover shall be 150 pounds.
11. Catch basins Type I shall conform to City Standard Detail No.02.01.02 and 02.01.03 and shall be used only for depths less than 5 feet from top of the grate to the invert of the storm pipe.

12. Catch basins Type II shall conform to City Standard Detail No.02.01.04 and shall be used for depths greater than 5 feet from top of the grate to the invert of the storm pipe.
13. Cast iron or ductile iron frame and grate shall conform to City Standard Detail No.02.01.05. Grate shall be marked with “drains to stream”. Solid catch basin lids (square unless noted as round) shall conform to WSDOT Standard Plan B-2 (Olympic Foundry No. SM60 or equal). Vaned grates shall conform to WSDOT Standard Plan B-2a (Olympic Foundry No. SM60V or equal).
14. Stormwater pipe shall be only PVC, concrete or ductile iron pipe.
 - a. The use of any other type shall be reviewed and approved by the Engineering Services Staff prior to installation.
 - b. PVC pipe shall be per ASTM D3034, SDR 35 for pipe size 15-inch and smaller and F679 for pipe sizes 18 to 27 inch. Minimum cover on PVC pipe shall be 3.0 feet.
 - c. Concrete pipe shall conform to the WSDOT Standard Specifications for concrete underdrain pipe. Minimum cover on concrete pipe shall not less than 3.0 feet.
 - d. Ductile iron pipe shall be Class 50, conforming to AWWA C151. Minimum cover on ductile iron pipe shall be 1.0 foot.
 - e. Polypropylene Pipe (PP) shall be dual walled, have a smooth interior and exterior corrugations and meet WSDOT 9-05.24(1). 12-inch through 30”-inch pipe shall meet or exceed ASTM F2736 and AASHTO M330, Type S, or Type D. 36-inch through 60-inch pipe shall meet or exceed ASTM F2881 and AASHTO M330, Type S, or Type D. Testing shall be per ASTM F1417. Minimum cover over Polypropylene pipe shall be 3-feet.
15. Trenching, bedding, and backfill for pipe shall conform to City Standard Detail No. 06.01.01.
16. Storm pipe shall be a minimum of 10 feet away from building foundations and/or roof lines.
17. All storm drain mains shall be video inspected by the City of Puyallup Collections Division prior to final acceptance by the City.
18. After all other utilities are installed and prior to asphalt work, all storm pipe shall pass a low pressure air test in accordance with Section 7-04.3(4)d of the Standard Specifications. Products used to seal the inside of the pipe are not to be used to obtain the air test.
19. All storm drain mains shall be mandrelled.
20. All temporary sedimentation and erosion control measures, and protective measures for critical areas and significant trees shall be installed prior to initiating any construction activities.