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SECTION 5 - STORM DRAINAGE

PURPOSE

The City's *Engineering Design and Construction Standards* define the requirements for development to treat and detain stormwater. Stormwater is the runoff from impervious surfaces such as streets, roofs and parking lots that flows to storm drains, ditches and culverts, and then to the nearest river, stream or wetland. When it rains, stormwater runoff may pick up oil, sediment, bacteria, grease and chemicals that can pollute local waterways.

To meet the City goals for stormwater management, stormwater drainage and stormwater quality as prescribed in the City of Newport Stormwater Master Plan, the City has adopted best management practices for addressing stormwater drainage in the City of Newport.

Designs of stormwater facilities and conveyance systems within the right-of-way (ROW) shall conform to the *Engineering Design and Construction Standards* and the applicable Oregon Department of Environmental Quality (DEQ) regulations. When discovering a conflict between City and DEQ requirements, the Design Engineer shall notify the City Engineer of the issue; the most stringent practice shall apply.

Refer to Newport Municipal Code 5.20 Stormwater Drainage Utility for information about City stormwater codes.

PERFORMANCE STANDARDS

Make adequate provisions for collecting, treating, detaining and conveying all stormwater runoff in all storm system designs. The system shall accommodate all runoff from upstream tributary areas whether or not such areas are within the proposed development. Base amount of runoff accommodated in the new system on the ultimate development of all upstream tributary areas. Do not adversely-impact any inadequate downstream system with new or modified existing storm drain systems.

Do not place utility infrastructure within one (1) foot of a survey monument location noted on a subdivision or partition plat, per ORS 92.044 (7).

Storm drainage design shall comply with all required Erosion and Sediment Control Measures. Include adequate provisions to control runoff from the development area: all public and private streets and the roof, footing, and area drains of residential, multi-family, commercial, or industrial buildings. The design must ensure future extension of the drainage system to the entire drainage basin in conformance with the adopted Storm Drainage Master Plan and these *Engineering Design and Construction Standards*. These provisions include:

- Surface and/or subsurface drainage, caused or affected by the alteration of the natural grade, removal of natural ground cover/vegetation, or placement of impervious surfaces, shall not be allowed to flow over adjacent public or private property in a volume, velocity or location materially different from that which existed before development occurred. Manage, treat, and convey infiltrated or collected surface and/or subsurface drainage in an approved manner to an approved point of discharge.

- Receive surface water entering the subject property at the naturally occurring locations and

discharge surface water exiting the subject property at the natural locations with adequate flow control and energy dissipation, to prevent adverse impacts from flooding, erosion, or sedimentation.

- Approved points of discharge for storm water may include but not be limited to a storm drain, existing open channel, creek, low impact development approach facility, detention pond, or retention pond, as approved by the City Engineer. Acceptance of suggested facilities will depend upon the prevailing site conditions, capacity of existing downstream facilities, and feasibility of alternate designs. Use curb weep holes only for single home developments.

- A drainage report with the required analysis of downstream system conditions is required with all plan submittals. Planning applications shall include a draft/preliminary report.

- When crossing private property with City infrastructure to reach an approved point of disposal, the developer is responsible to acquire a recorded public drainage easement on a city form prior to commencement of construction. The drainage facility installed must be a closed conduit system.

- Engineer approved temporary drainage ditch facilities to contain the storm water without causing erosion or other adverse effects to the public and/or private property.

- Drainage from roofs, footings, and downspouts may drain directly to a street through the curb under the following circumstances:
  - The building-pad finish elevation is at least twelve (12) inches above the existing street curb.
  - The existing street crowns adequately to avoid sheet flow across the street.
  - Design engineer has satisfactorily addressed storm water quantity and quality facility provisions.
  - Springs/ sump pumps shall connect to a piping system, unless approved by the City Engineer.
  - Weep hole is utilized for a single home development.

CONFLICTS AND OBSTRUCTIONS

Utility Notification

The contractor shall comply with the rules and regulations of the Oregon Utility Notification Center: OAR 952-001-0010 through 952-001-0090 and ORS 757.993. Provide at least forty-eight (48) hours' notice to all utility offices affected by the construction operation.

General

Contractor may encounter various obstructions during the course of the work. Obtain maps and information regarding underground utilities from the utility owning and operating such utilities, but the City does not guarantee the location of such utilities. If the contractor interrupts the utility services because of the construction operation, the contractor shall notify the utility owner and the City authorized representative immediately.

Protection

The contractor shall exercise all due care in protecting existing underground and surface facilities and property along the route of the project. This protection shall include, but not be limited to, trees, yards,

fences, drainage lines, mailboxes, driveways, shrubs, and lawns. Any existing facilities not specifically designated for alteration or removal that are damaged during construction shall be restored or replaced to an "in kind" or better condition, at the expense of the contractor.

Property Access

The contractor shall maintain access to all property, including normal delivery service, mail service, and emergency services.

Abandoned Utilities

Properly remove, grout, or plug all abandoned utilities at the discretion of the City authorized representative.

PRIVATE STORM DRAINS

Properties that slope and drain away from the public storm drain systems may need to provide a private drainage system in private easements. This system shall be for collection of roof drains, footing drains, and surface runoff. Design this system to meet the Uniform Plumbing Code requirements. For multifamily, commercial and industrial laterals, a manhole is required at the connection between private and public storm systems.

Mainlines crossing multiple lots may be required to be public, such as rear lot drain lines as approved by the City Engineer on a case-by-case basis. Install a cleanout at the lateral connection between private and public storm system. When required by the City Engineer, install a backflow preventer on the private side at the lateral connection between private and public storm systems. Site designers shall consider potential drainage from sump pumps and/or flow from perennial flowing wall/ building footing drains. Such drainage systems shall not connect to curb weep holes; connect stormwater to a storm drain piping system.

PRIVATE AND PUBLIC PROPRIETARY TREATMENT SYSTEMS

Proprietary treatment systems shall meet the removal efficiency requirements of the City Engineer who shall allow proprietary treatment systems in situations meeting one of the following criteria:

Private

- Treatment of runoff from a single parcel.
- Treatment of runoff from an adjoining commercial, industrial, multi-family, or condominium parcels which share a common parking lot.
- Treatment of runoff from high-density zoning classifications where the development is primarily single family residential and the average lot size is ≤3,000 square feet.
- Property owner shall maintain proprietary treatment systems by private parties, except for systems approved by the City Engineer on a case-by-case basis, to treat runoff from a public street.
- Proprietary systems require a long-term maintenance plan identifying maintenance techniques, schedule, and responsible parties. Submit maintenance plan for approval with submission of the drainage report for the project.

Public

The City requires treatment of runoff from all new and expanded collector and arterial roadways where no other opportunities exist for treatment without necessitation of the removal of homes or businesses. All public and private water quality proprietary treatment systems shall be in conformance with Contech

Stormwater Management Storm Filter system or approved equivalent.

In the case of a remodel or redevelopment that does not increase the previous volume of storm runoff, treatment may be waived by the City Engineer. A written request for waiver must be sent to the City Engineer during the design phase. Written approval must be received from City Engineer prior to plan review.

SMALL DEVELOPMENTS

Two (2) and three (3) parcel single-family home partitions that can demonstrate (storm report required) adequate downstream conveyance capacity are eligible for a fee in lieu of construction of stormwater quality/quantity facility payment. The City does not consider large parcel single-family home partitions with the potential for additional dwelling units and/or future subdividing/partitioning small developments.

PUBLIC IMPROVEMENTS REQUIREMENTS

Storm Water Analysis Report

Developer or Design Engineer shall submit a drainage report to the City Engineer containing the information listed below at the time of initial construction plan review by the City. The City may waive some or all of these report requirements for single-family residential partition projects and projects where post-development impervious surfaces constitute less than twenty-five (25) percent of the parcel. In order to apply for a waiver, the applicant must submit a written request to the City and the applicant or applicant's Engineer must participate in a pre-design meeting to discuss the proposed project and the stormwater impacts prior to the land use approval process submittal.

Properly drafted construction plans and supporting documents should also facilitate the operation and maintenance of the proposed drainage system long after design and construction. The City of Newport reviews the Drainage Submittal for compliance with these Design Standards and other applicable standards. The Drainage Submittal includes the Construction Plans, Full Drainage Report, and, other documentation to support the proposed stormwater management methods for the project. Depending on the complexity of the project, the City of Newport may request that a Concept Drainage Report (CDR) submittal for review with the planning application or during the preliminary design process. The submittal and/or approval of the CDR does not replace the Drainage Submittal requirements. State law requires that a qualified Engineer perform or direct all engineering work. A registered Professional Engineer shall sign and stamp final Drainage report.

- Narrative, with tables where appropriate, describing
  - Areas and flows used for design calculations per this design manual.
  - Results of downstream analysis.
  - How the project meets the water quality and quantity requirements of these rules.
- Project Description
- Summary of Basin Requirements and other conditions/permits
- Summary of Geotechnical Site Characterization
- Maps showing the following information
  - Upstream basin flowing through the site with contours.
  - Downstream basin to the point where analysis is required, with contours.
  - Site plan showing development layout with contours.
  - Existing stormwater facilities on and adjacent to the site.

    - Proposed Stormwater facilities constructed by the project.
    - Delineated basins contributing to the stormwater facility including labels and area calculations.
- Hydrology Assumptions
- Calculations for
    - Hydrological calculations for both existing and post development conditions.
    - Conveyance system sizing, including calculations showing portions of proposed alterations to existing conveyance system that have adequate capacity according to the criteria in these rules.
    - Sizing of water quality and quantity facilities.
- Downstream Analysis
    - A stamped certificate of investigation stating that the design engineer has considered downstream impacts required for each development constructing, collecting or discharging more than 2,877 square feet of new impervious area.
    - When the downstream analysis does not continue for at least one-quarter (1/4) mile, the design engineer shall provide a stamped certification of investigation that states the design Engineer has visually investigated the downstream system for at least one-quarter (1/4) mile downstream and is aware of no observable downstream impacts to the conveyance system.

Include the Long Term Maintenance section of the report on a separate page; attach completed form to a Storm Water Maintenance Agreement (SWMA), if applicable for the site work.

DESIGN PARAMETERS

Design Storm

The storm defines both the volume and rate of runoff. Design stormwater quality facilities using the six-month National Resource Conservation Service (NRCS) Type IA, 24-hour storm event designated water-quality storm event for both volume and flow rate-based water quality best management practices (BMP's).

Design Volume

Volume-based treatment BMPs are sized the same whether located upstream or downstream from detention facilities. Define the water-quality design volume as the volume of runoff predicted for the Proposed Conditions Pollutant Generating Impervious Surface (PCPGIS) areas from the NRCS Type IA, 24-hour storm with a three (3) stage two (2), five (5), and ten (10) year interval discharge flow rate and storage curve..

Design Flow

For runoff treatment facilities preceding detention facilities, or when detention facilities are not used, define the water-quality design flow as the peak flow rate predicted for the proposed conditions Pollutant Generating Surfaces (PGS) areas from the NRCS Type IA, twenty-four (24) hour storm with a one (1) year minimum, preferably two (2) flow rate for treatment parameters.

For runoff treatment facilities located downstream of detention facilities, define the water-quality design flow as the full two (2) year release rate of the detention facility.

Flow Control and Conveyance

At a minimum, the twenty-five (25) year design storm shall be required. Additionally, provide safe passage for the one hundred (100) year event storm via an overflow path that drains toward the natural discharge point of the contributing basin, away from adjacent buildings and residences. High-risk areas, as defined by the City Engineer, with the potential for extensive flooding, safety, or other concern,

provide design capacity for a fifty (50) year storm with safe passage for a one hundred (100) year storm. Design low/sag points within roadways to a minimum one hundred (100) year storm event.

Size flow-control facilities based on the total developed site area (both impervious and pervious areas, regardless of pollution generation); consider the immediate drainage basin(s) wherein the site lies.

FLOW DETERMINATION

Design Event/Storm Frequency

Design all public storm drain systems for the storm recurrence interval and twenty-four (24) hour rainfall depths as in Table 6.1 below. Place curb inlets in lowest elevation (sag points) to catch runoff.

Table 5.1: Drainage System Design Requirements

Drainage System Design Requirements	
Drainage System Elements	**Design Storm Recurrence Interval (years)**
Facilities: Water Quantity & Quality Control	See Figure 6A
Minor: Minor Collector Streets, Local Streets, Curbs, Gutters, Inlets Manholes and Mainlines up to 250 Tributary Acres	25
Major: Major Collector, Arterial Streets, the Drainage System in or under Arterial Streets, and anything greater than 250 Tributary Acres	50
Watercourses: Without FEMA Designated Floodplain	50
Watercourses: FEMA Designated Floodplain	100
Bridges:	100

Table 5.2 Rainfall Depths

24 Hour Rainfall Depths Newport, Oregon	
Recurrence Interval (years)	Total Precipitation Depth (inches)
2	3.5-4.0
5	4.0-4.5
10	4.5-5.0
25	5.0-6.0
50	6.0-7.0
100	6.0-7.0

Precipitation based on Regional Precipitation-Frequency Analysis and Spatial Mapping of twenty-four (24) Hour Precipitation for Oregon, Oregon State Department of Transportation, August 2007

TREATMENT REQUIREMENTS

Owners of new development and other activities, which create new impervious surfaces or increase the amount of stormwater runoff or pollution leaving the site, are required to construct permanent water quality facilities to reduce contaminants entering the storm and surface water system.

Design Considerations

- If developer cannot construct an onsite water-quality facility to treat runoff from the development's impervious surface, then, with City Engineer approval, developer may design an off-site water quality facility to treat runoff from an equivalent area of adjacent untreated impervious surfaces.

- Design facilities such that pretreated flow from the development processed off-line from the storm conveyance system reconnects to upstream flows following treatment.

- Discharges to riparian and/or wetland sensitive areas shall maintain the flows of predevelopment site conditions to the extent necessary to protect the characteristic functions of the sensitive area. Conversely, the City does not allow discharge of flows into other catchments that may be damaging to downstream water quality sensitive areas.

Design these controls to the guidelines included in the standard drawings, with the City's standard drawing configurations and sizing taking precedence in case of a discrepancy. Given the importance of water quality, the City wishes to see preferred strategies in different areas of the City.

Table 5.3. Preferred Stormwater Strategies by Area

AREA	STRATEGY	TYPES OF CONTROLS
Areas that drain to surface water	• Reduce flows to river/surface waters Provide highest level treatment for remaining Minimize sediment Prevent facility clogging	• Drywells or infiltration trench with spill protection Bioretention/Infiltration swale, pond, basin, planter box
Wellhead Protection Areas (One through 10 year Time of Travel)	• Spill Protection Surface Infiltration Controls Direct runoff to outside area if can for UIC use Prevent facility clogging	• Water Quality Sediment Manholes, Oil/water separator TAPE approved manufactured spill control Bioretention/ infiltration swale, pond, basin with treatment vegetation, planter boxes
Other Areas	• Dispersed System UICs and regional controls Prevent facility clogging	• Drywell or infiltration trench with spill protection (e.g., Water Quality Sediment Manholes) Bioretention/infiltration, swale, pond, or basin Planter boxes Vegetated filter strip • Grassy swale

Storm Runoff and the Seawall

The Community Development Department has an Estuary Permit that starts the review for treatment requirements pertaining to the seawall outfall.

Impervious Surface Area

- For all sites, base the threshold and approach for the design of water quality and quantity facilities on Table 6.3 (above).

- For single family and duplex residential subdivisions, size stormwater quality and quality facilities for all net impervious area created by the subdivision. For design purposes, estimate the impervious area on an individual single-family lot at the rate of 2,877-square feet of impervious surface area per dwelling unit. Show concept facility design on the subdivision plan.

- Except as noted above, for all developments other than single family and duplex, including row houses and condominiums, base the sizing of stormwater quality facilities on the net impervious area created by the development, including structures, roads, and other impervious areas. Impervious areas shall be determined based upon building permits, construction plans, or other appropriate methods of measurement deemed reliable by the City.

Storm Water Master Plan 2016

The Storm Water Master Plan says the following about on-site detention:

On-site detention facilities shall be constructed when any of the following conditions exist:

- An identified downstream deficiency along with upstream detention, rather than downstream conveyance system enlargement, is determined to be the more effective solution.
- There is an identified regional detention site within the boundary of the development.
- The need for pre-treatment of stormwater discharge dictates that flows be detained for water quality processes.
- There is a need to mitigate flow impacts on receiving streams.
- There is a need for additional detention due to an increase in impermeable surface area.

When required, on-site stormwater detention facilities shall be designed to capture run-off so the run-off rates from the site after development do not exceed the predevelopment conditions, based upon a 25-year, 24-hour return storm. Volume and duration of predevelopment conditions will be considered.

When required, due to an identified downstream deficiency, on-site stormwater detention facilities shall be designed so that peak run-off rates will not exceed predevelopment rates for the specific range of storms that cause the downstream deficiency.

Construction of on-site detention shall not be allowed as an option if such a detention facility would have an adverse effect upon receiving waters in the basin or sub-basin in the event of flooding, or would increase the likelihood or severity of flooding problems downstream of the site.

STORM DESIGN & CONTROL STANDARDS

Conveyance

A conveyance system includes all natural or constructed components of a storm drain system that collects stormwater runoff and conveys it in a manner that adequately drains areas, sites, structures, and roadways, minimizing the potential for flooding and erosion. The City defines an underground injection control (UIC), system as a drywell. The Department of Environmental Quality (DEQ) defines a UIC as structures that are deeper than wide at the land surface and utilize infiltration by a perforated pipe or drain field. UIC regulations do not apply to swales, french drains, or footing drains. Place UICs outside the groundwater two (2) year time of travel zones for drinking water source areas and not within five hundred (500) feet from a water well. Refer to DEQ UIC registration and rule authorization guidelines.

The City of Newport does not permit drill-holes within ROW. Projects that contribute to or front an existing drill-hole will either be decommissioned in accordance to DEQ requirements or have upstream infrastructure (sedimentation manholes and/or City of Newport catch basins with sumps, as approved by the City Engineer) constructed.

General Requirements

- Each new development shall incorporate techniques for mitigating its impacts on the public stormwater system in accordance with the Newport Municipal Code, Chapter 5 by the construction of permanent on-site stormwater quantity detention facilities designed in accordance with this chapter.

- Design all water quantity facilities in accordance with City guidance documents and be consistent with this Chapter.

- When required, design stormwater quantity on-site detention facilities to capture runoff so the post-development runoff rates from the site do not exceed the predevelopment runoff rates from the site, based on twenty-four (24) hour storm events ranging from the one-half (½) of the two (2) year return storm to the twenty-five (25) year return storm. Specifically, the one-half (½) of the two (2), two (2), ten (10), and twenty-five (25) year post-development runoff rates will not exceed their respective one-half (½) of the two (2), two (2), ten (10), and twenty-five (25) pre-development runoff rates; unless other criteria are identified in an adopted watershed management plan or storm drainage basin master plan.

- Design for Full Build Out
  Designed and constructed storm drainage and conveyance to accommodate all future full build-out flows generated from the upstream drainage basin. Demonstrate adequacy of conveyance system by performing a backwater analysis. Calculate hydraulic grade line at lower than a two (2) foot minimum from finished grade at all structure locations. The City Engineer shall determine the hydraulic grade line for shallow conveyance systems on a case-by-case basis.

- Velocity and Slope
  All storm drains shall be on a grade that produces a mean velocity, when flowing full, of at least three (3) feet per second (fps).

- Pipe Roughness Coefficient
  Use a minimum Manning's roughness coefficient of 0.013 in conveyance calculations.

- Open Channels
  Design open channel systems, provided design water surface elevation does not impact any structures, for a minimum one (1) foot freeboard from full bank.

- Natural Channels
  Control of discharge from developed areas to natural channels shall be such that the average velocity resulting from all design storms less than or equal to the ten (10) year event remains below the erosive velocity of the channel.

- Manmade Channels (Ditches)

City allows ditches only as temporary facilities; rock lining is required when flows are in excess of three (3) feet per second (fps). Design manmade channels for a ten (10) year storm with a maximum depth of two (2) feet and three-horizontal-to-one-vertical (3:1) side slopes. Water Quality Facilities are not considered ditches.

- Overflow Analysis
  Overland/Overflow analysis shall be performed for all conveyance, water quality & water quantity systems that demonstrate that the one hundred (100) year event will not impact or inundate any buildings. Designer shall submit documentation indicating the overland/ overflow path during the permitting process to the City.

Hydraulic Design Criteria

- Assess detention design by dynamic flow routing through all the conveyance components within the basin. Documentation of the proposed design shall be included in the drainage report. Acceptable analysis programs include those listed below, as well as others using the SBUH or TR-55 methodology.
  - HEC-1
  - HEC-HMS
  - SWMM
  - HYDRA
  - Others as approved by the City Engineer

- A pond overflow system shall provide for discharge of the design storm event without overtopping the pond embankment or exceeding the capacity of the emergency spillway. III. Provide an emergency spillway sized to pass the one hundred (100) year storm event or an approved hydraulic equivalent. Emergency spillway shall be located in existing soils when feasible and armored with riprap or other approved erosion protection extending to the toe of the embankment. The emergency spillway shall direct flows away from proposed or existing structures.

Facility Design Criteria

- Provided the design meets all relevant criteria, the facility can be a combined water quality and quantity facility.

- Provide an approved outlet structure for all flows; include an approved secondary flow route/path in the design should the primary outlet and/or conveyance system fail.

- Certain situations require use of multiple orifice plates to achieve desired outflow rates.

- All water quality/ quantity facilities shall have a maximum depth of five (5) feet unless approved by the City Engineer.

Walls in Water Quantity Facilities

- If a registered professional engineer prepares and stamps a wall design, retaining walls may serve as pond walls if the design includes a fence along the top of the wall. At least twenty-five (25) percent of the pond perimeter shall be vegetated with a side slope of three-horizontal-to-one-vertical (3:1) or flatter allowing for maintenance access. All retaining walls in publicly maintained facilities, shall be cast-in-place concrete with a decorative surface finish, unless otherwise approved by the City

Engineer.

- Walls that are four (4) feet or higher that are surcharged and/or are periodically inundated shall meet all of the following criteria:
  - Permitted through the City Building Division.
  - Clearly identify party responsible to maintain walls within the water quantity tract or easement area on the final plat, or in alternate form, both with review and approval by the City Attorney and City Engineer.

Dry Wells
Controlled by the DEQ.

Wet Wells
See SECTION 3 WASTEWATER for design criteria.

Upstream Impacts
Modifications to the existing on-site storm drainage facilities shall not restrict flows thereby creating backwater onto off-site property to levels greater than the existing situation, unless approved by the impacted off-site Property Owners and the City. When approved, the off-site Property Owner(s) shall agree to and sign a permanent easement legally describing the location of the backwater storage and authorizing the use of their property for stormwater drainage and detention purposes. The easement shall be in a form approved by the City.

Downstream Impacts
The City may require developer to remove any downstream restrictions that create backwater during the twenty-five (25) year design storm in the current or post-development condition. The engineer of record shall evaluate downstream impacts and submit findings to City Engineer.

The City Engineer shall not allow the removal of downstream obstructions if the removal will cause, contribute, or exacerbate flooding and/or erosion damages to existing buildings, dwellings or properties in the one hundred (100) year design storm.

When downstream restrictions remain, an on-site detention facility shall be required.

Intersection Valley Gutters
See SECTION 6 STREETS for flow design requirements at intersections.

Cross-Lot Drainage
Developments shall accommodate existing off-site drainage entering the site so there is no impact to upstream property owners or a negative impact on the new development.

Outlet Protection/Dissipation of Runoff
Discharge runoff exiting a development site with adequate energy dissipation to prevent downstream damage. Storm drain lines shall enter a creek or drainage channel at ninety (90) degree or less to the direction of flow. The outlet shall have a head wall and appropriate scour protection to prevent erosion of the existing bank or channel bottom. The inflow size of pipe or channel will govern which protective measures are required. All protective measures must conform to the erosion control requirements of these *Engineering Design and Construction Standards Manual*.

Subsurface Drains

Provide subsurface drains (under drains) at the following locations:

- For all existing springs and field tile intercepted during construction activity for other facilities; i.e., wastewater, water, mains, street excavations, foundations, etc.

- Where high ground water exists or when it is necessary to reduce the piezometric surface to an acceptable level to prevent land slippage or under floor flooding of buildings.

- Subsurface drainage shall not discharge into a street or a street gutter.

Erosion Protection

- Protect Inlets to water quality and quantity facilities from erosive flows by using an energy dissipater or riprap stilling basin of appropriate size, based on flow velocities. Evenly distribute flow across the treatment area.

- All exposed areas of water quality and quantity facilities shall be protected using coconut or jute matting. Use coconut matting or high-density jute matting (Geojute Plus or approved equal) in the treatment area of swales and below the water quality volume levels of ponds. Developers may use Low-density jute matting (Econojute or approved equal) on all other zones.

PLANTING/VEGETATION

Planting/vegetation shall be in accordance with SECTION 8. A developer shall not plant or permit to remain within a facility, any invasive species that affects its function, including, but not limited to, the following:

- Himalayan blackberry (Rubus discolor)
- Reed canarygrass (Phalaris arundinacea)
- Teasel (Dipsacus fullonum)
- English Ivy (Hedra helix)
- Nightshade (Solanum sp.)
- Clematis (Clematis ligusticifolia and C. vitabla)
- Cattail (Typhus latifolia)
- Thistle (Cirsium arvense and C. vulgare)
- Scotch Broom (Cytisus scoparius)

FENCING IN RETENTION/DETENTION AREA

Any facility with the potential of storing eighteen (18) inches or more of runoff at any time shall require delineation fencing around facilities and/or tracts containing facilities.

Fencing or other barriers shall be required to protect the health, welfare, and safety of the public under the following circumstances:

- Ponds with the first overflow at three (3) or more feet above the pond bottom
- Ponds with side slopes in excess of three-horizontal-to-one-vertical (3:1)
- Drainage facilities with retaining walls two-and-one-half (2.5) feet high or taller The City of Newport reserves the right to require a fence around any drainage facility should there be a concern for safety.

The minimum fencing requirements are as follows:

- The fencing shall be at least four (4) feet tall unless otherwise specified by the City of Newport, and provide visual access per the City of Newport building code requirements for fence height and openings.
- Provide gates where drainage facilities are fenced. The gates shall be a minimum of twelve (12) feet wide with provisions for locks. Install separate gates where the maintenance access drive connects to a public or private roadway.
- At the discretion of the City of Newport, the City may allow marking fences (that is, vegetation, boulders, etc.), terraces, steeper side-slopes, egress bars, etc.
- If a facility is located adjacent to a riparian corridor, utilize wildlife friendly fencing, as approved by the City Engineer and Planning Division.

PIPE AND STRUCTURE REQUIREMENTS

Construct storm pipe under roadways or in areas that have traffic loads with AWWA C900 PVC pipe for depths of less than 30 inches. For depths 30 inches and greater use ASTM D3034. Where storm pipe is within the landscape strips beyond the street curb, the Engineer has the option of using ASTM D3034 PVC sewer pipe. All pipe installed shall conform to City of Newport specifications.

Pipe Diameter and Length

The minimum pipe diameter shall be eight (8) inches. Calculate pipe diameter to ensure it is of proper size to convey a minimum twenty-five (25) year storm event. When in the sag/low point, design engineer shall calculate pipe size based on a one hundred (100) year storm event. The maximum length of pipe between junctions shall be no greater than three hundred (300) feet. Do not downsize pipe diameters for downstream runs.

Placement and Alignment

No storm pipe in a drainage easement shall have its centerline closer than five (5) feet to a private rear or side property line or ten (10) feet from building foundations or other structures. For a storm drain located under the road, place the storm drain in accordance with the City of Newport standard detail. If anticipating expansion of a storm drain system in the future, incorporate provisions for the expansion into the current design. Minimum depth of pipe is twelve (12) inches below street base to top of pipe.

Construct drywell perforations in native soils, outside fill material; construct the drywell barrel foundation on native ground.

Storm pipes shall meet the separation requirements of a sewer pipe: ten (10) feet from water mains and services. Storm pipe vertical separation from water mains/services shall be eighteen (18) inches unless installed storm pipe is AWWA C-900 PVC with a full stick of pipe centered at the water crossing.

Mandrel Testing

A mandrel inspection is required for all new storm pipe. Conducted after pipe installation, test verifies pipe did not been bend under compaction stress or pressure from soil above pipe. Mandrel test completed before City accepts new infrastructure.

Outfalls

New outfalls to water bodies designated as waters of the United States require regulatory agency approval. The Community Development Department as an estuary permit process to accommodate outfalls to water bodies.

Sequential Implementation

In general, for any activity that creates, alters, or modifies a natural or manmade drainage system implement the following control measures sequentially:

- Reduce runoff volumes and polluted runoff through Low Impact Development designs and source control measures.
- Address stormwater drainage with surface systems, such as above ground vegetated infiltration swales.
- If surface control does not provide adequate capacity, treat the water quality storm in a surface facility and provide an overflow to an approved regional above ground retention facility or rule authorized UIC.

EMBANKMENTS

Measure the height of an embankment from the top of the bank to the catch point of the native soil at the lowest elevation. Embankments shall meet the following minimum requirements:

- Construct embankments, four (4) feet in height or more, as directed by a Licensed Geotechnical Engineer.
- Construct embankments on native consolidated soil, free of loose surface soil materials, roots, and other organic debris.
- The embankment compaction to ninety-five (95) percent of the Modified Proctor Density, ASTM Procedure D698. Placement moisture content should lie within one (1) percent dry to three (3) percent wet of the optimum moisture content.

ACCESS ROAD

Provide maintenance access roads to control structures and other drainage structures associated with the stormwater facility (that is, inlet or bypass structures). Where storm infrastructure is away from paved ROW, a fourteen (14) foot wide two (2) inch thick paved all weather access road, with a six (6) inch base, or as approved by the City Engineer, shall be installed centered over the sewer line with six foot by six foot (6’ x 6’) asphalt or concrete pad around manholes. In ponds and swales, an access ramp is required.

Provide access roads for maintenance of all water quality and quantity facilities. Consider the following criteria the minimum required for facilities maintained by the City. If the design Engineer anticipates not meeting the requirements due to the configuration of the proposed development, the design Engineer shall meet with the City Engineer to gain approval for the deviation prior to submittal.

Standard Road Design

- Design road section according to Standard Drawing T-050 and Standard Drawing T-050A; the subgrade shall be compacted to ninety-one (91) percent AASHTO T-180; or, the design Engineer may submit an alternate design certified as capable of supporting a 30-ton maintenance vehicle in all weather conditions.
- Strengthened sidewalk and driveway sections according to Standard Drawing T-210, T-150, T-151 and T-152.
- Maximum longitudinal grade shall be ten (10) percent with a maximum three (3) percent cross-slope.
- Minimum width shall be twelve (12) feet on straight runs and fifteen (15) feet on curves. Minimum gravel shoulder width shall be one (1) foot, matching the cross slope of the access road.
- Curves shall have a minimum forty (40) foot interior radius.

- Access shall extend to within ten (10) feet of the center of all structures unless otherwise approved by the City.
- The City may require a curb or other delineator at the edge of the road for drainage, a curb stop, or to demarcate the road where the road edge is not apparent.
- The side slope for road embankments shall be two-horizontal-to-one-vertical (2:1) or flatter, as approved by the Geotechnical Engineer for the project.
- A vehicle turnaround shall be provided when the access road exceeds one-hundred-fifty (150) feet in length.
- The road shall provide access to within ten (10) feet of all structures.

ALIGNMENT, LOCATION AND COVER

Alignment

All pipes shall run in straight lines, with a constant slope, material and diameter from manhole to manhole.

ROW Location

Locate public storm lines within the public ROW, as directed by the City Engineer, for ease of maintenance and access, control and operation of the facility, and to facilitate replacement and/or repair. Please reference Standard Drawing G-051.

Pipe Cover

Reference Standard Drawing G-051 for required stormwater cover. City Engineer must approve any storm pipe with less than thirty (30) inches of cover. Shallow pipe shall be C-900 rather than standard SDR 3034.

STRUCTURES

Manholes

Manholes shall be located at all changes in slope, alignment, pipe size, and at all pipe junctions with existing or proposed storm drain connections. Manhole spacing shall not exceed five hundred (500) feet.

Manholes are required to be water tight. See note on Standard Drawings D-200 and D-205.

When standard manholes are required at pipe junctions use flat top manholes when rim to lowest pipe invert elevation is less than five (5) feet. City Engineer may approve short cones with a standard manhole on a case-by-case basis.

When the downstream pipe size increases, the crown of all upstream pipes shall not be lower than the crown of the larger downstream pipe. Design all manholes with a minimum drop of 0.2 feet from the inlet and outlet invert elevations.

At the end of cul-de-sacs, design storm drainage to prevent manhole placement adjacent to curb inlets/catch basins.

Water Quality Manholes

- Hydraulic Criteria:
  - Minimum Design Flow: Water Quality Flow
  - Design Engineer may use upstream flow splitter to bypass conveyance flows in excess of the

Water Quality flow.

- Design Criteria:
  - Shall conform to City Standard Drawings D-230 and D-231
  - Minimum Manhole Diameter: sixty (60) inch
  - Maximum size of incoming pipe: eighteen (18) inch (high flow splitter may be required.)
  - Sump Depth: No deeper than five (5) feet from invert out to bottom of sump
  - Volume of sump: twenty (20) cubic feet/one (1) cfs of flow into the water quality manhole, up to the twenty-five (25) year flow. Flow calculations shall include the effect of an upstream flow splitter.
  - Maintain a three (3) foot clear access zone between the inside structure.
  - Orient access to structure in a clear zone.
  - Flat Top Section shall have 2 access points and meet ASTM C-478 and H – 20 Traffic Loading

Inside-Drop Manholes

City Engineer shall approve inside-drop connections. City does not allow outside drop manholes. Construct inside drop manholes per Standard Drawing D-225.

Where the invert of the connecting pipe is two (2) feet or less above the invert out elevation, an inside-drop will be constructed utilizing Portland cement concrete. Stormwater entering the manhole will follow a smooth concrete channel transitioning evenly from the invert of the inlet pipe into main channel. City will not approve a stormwater design that allows stormwater to fall freely to the manhole base.

Manhole Pipe Connectors

City prefers all pipes connect to manholes through boots attached to pre-poured manholes. Contractors may connect to existing manholes with a sand collar fabricated of the same material as the connecting pipe by an approved manufacturer in accordance with these standards when approved by City Engineer. Construct sand collars with a bell joint located within twelve (12) inch or half the pipe diameter, whichever is greater, from outside the manhole wall. Do not fabricate sand collars in the field.

Pipe Stub-outs for Future Sewer Connections

- Pipe stub-outs shall be the same type as approved for use in lateral, main, or trunk sewer construction. Strength classifications shall be the same class as in adjacent trenches. Where two or more different classes of pipe exist at a manhole, the City authorized representative shall determine the strength classification. Furnish rubber-gasketed, watertight plugs with each stub-out and shall be adequately braced against air test pressures.
- Gaskets
- Install manhole sections with preformed flexible joint sealant.
- Remove steps prior to project completion.

Curb Inlets And Catch Basins

All structures shall be located in streets at the curb line to receive storm water runoff and provide conveyance to the main storm drain. The City of Newport prefers curb inlets along all curb line. See Standard Drawings D-300.

Structures shall be located at the following locations, but in no case be spaced further than four hundred (400) feet:

- At curb returns on the upstream side of an intersection.
- At the end of all dead end streets with a descending grade.
- At intermediate locations so that storm flows at the curb line do not exceed three (3) feet in width (measured from the curb face) or three (3) inches in depth (measured at the curb face), whichever is less.
- An oversized inlet manhole at low point (sag) of all vertical curves. Street and or vertical curves with flat slopes (slopes <0.3%) may require installation of additional or flanking inlets. Flanking inlets (sags) and spacing shall be designed according to section 6, appendix D, chapter 13 of the current ODOT Hydraulic Design Manual.
- All structures shall be capable of intercepting completely the design storm flow at the curb.

In situations where pipes conflict with the installation of a new curb inlet box, the basin may be placed under the sidewalk. See Standard Drawings d-301 and D-302 for inlet and top options.

Where there are larger pipes that will not fit into 24" x 24" box, the curb inlet grate may be set on a manhole base. See Standard Drawing D-303.

Catch basins are typically used in valley gutters, driveway throats, and areas without curbs. See Standard Drawing D-304

Area Drains

Area drains are common features of properties that have extensive landscaping or in yards with lots of water. They work to drain water from vegetation areas. Area drains can clog like any other drain, causing flooding or sending debris into the City storm conveyance system. Area Drains do not tie into the City drainage through weep holes, they must have a pipe connected to a main line. See Standard Drawing D-311 details.

Ditch Inlets

Ditch inlets convey storm runoff retained in ditches and swales to the piped conveyance storm system. Grates must be sufficient to keep debris from entering the City storm system. See Standard Drawing D-310 for details.

Culverts

Design culverts at road crossings in natural, perennial channels to pass the peak discharge for the specified design storm such that the headwater:

- Does not exceed 0.8 times the culvert diameter; or
- Remains at least one (1) foot below the roadway subgrade, whichever is less.
- Bottomless or fish friendly culverts shall be installed in wetland and/or water quality sensitive areas. The developer/property owner is responsible to ensure applicable regulatory agencies permit final designs. Submit copies of approved permits to the City.
- Culvert material shall have a minimum design life of seventy-five (75) years.

Tidegates

For areas impacted by tidal changes, a tidegate may be required to manage outfalls. See Standard Drawing D-320 for details.

BRIDGES

New and replacement bridges over natural, perennial channels shall be designed to pass the one hundred (100) year peak discharge from the tributary area assuming full development. Vertical clearance between the design water surface and the bottom of any part of the bridge shall be a minimum of two (2) feet.

RETAINING WALLS

When sizing retaining walls, the designer will consider the surcharge caused by vehicles, soil and/ or future building construction on facility walls. All walls in public facilities shall be cast-in-place reinforced concrete, with a decorative surface finish, designed by a registered professional engineer.

MAINTENANCE RESPONSIBILITIES

Public Facilities

- Unless otherwise approved by the City Engineer, maintain newly constructed public water quality or quantity facilities serving public roads to City Standards.
- The developer, or other legally bound party, shall be responsible for Public facility bonding and maintenance, two years from the date of the acceptance of the public facility improvements. The maintenance period may extend beyond the two-year period if facility plant die off is greater than twenty (20) percent at the end of the two (2) year period.
- Publicly maintained water quality or quantity facilities shall be contained within a tract with an approved access road provided and encumbered by a surface/ stormwater management easement dedicated to the City. The City will retain ownership of the tract.
- Provide Irrigation to all public facilities. The system development fees and associated costs are the responsibility of the developer.

Private Facilities

Owner shall maintain private facilities. See Newport Municipal Code 5.20.110. The owner or responsible party shall complete the City standard private maintenance agreement forms and submit to the City for review/approval. The City shall approve a maintenance agreement recorded with Lincoln County before the issuance of building occupancy permits.

A maintenance plan is required for all privately maintained stormwater facilities, it shall:

- Be composed of an agreement signed by the owner of the stormwater facilities and the City and an explanation of the operation, maintenance, and preservation of the stormwater facility including a schedule of required maintenance activities. Append the maintenance plan to the property deed. Developer will provide operations and maintenance manuals to all present and subsequent owners of the facility that describes the stormwater facility, maintenance procedures including methods of waste disposal, maintenance schedule, and the location of the installation and maintenance records of previous years.

- Components
  - Inspection schedule including storm-related inspections
  - Description of facility components, the observable trigger for maintenance, and the method of maintenance including appropriate waste disposal method
  - Type of maintenance for plants and other landscaping material required for proper functioning of the stormwater facility and to maintain a seventy-five (75) percent vegetative cover

- Contain the location for stormwater installation records. Keep installation records until dismantling the facility and no longer discharging to the City's stormwater system. Installation records include, at a minimum, design calculations and assumptions as well as the construction drawings that show the individual components and the entire system.

- Provide requirements for maintenance records. Owner of the stormwater facility shall submit annual reports to the City attesting to the proper maintenance, safety, and functioning of the stormwater facility. The maintenance records will be kept with the facility installation records and be available for inspection by the City for at least five (5) years.

EROSION AND SEDIMENT CONTROL SUBMITTAL PRIOR TO CONSTRUCTION

- Storm water Facility Description, existing and proposed Conveyance System Description
- Erosion and Sediment Control (ESC) Measures Description
- Long Term Maintenance
- Inspection plan / agreement – Provide calendar of required inspections
- Spill Prevention and Control Plan
- ESC Plan
- Storm Basin Map
- Soils Map
- Phasing Map (if applicable)
- Site Photos
- Hydrology Calculations
- Facility Sizing Calculations
- Conveyance Calculations
- 1200C permit plans and application, if applicable
- Grading, drainage facility, and erosion control plans (11x17).

STORM DRAINAGE DESIGN STANDARDS

Standard Storm Manhole Pipes Less Than 24" Diameter

Standard manholes have a cone top and are used for depths over six feet. See Standard Drawing D-200 for construction requirements.

Doghouse Manhole

Doghouse manholes are used when an existing pipe has too much flow to divert during construction. Pipes remain intact until base and doghouse barrel section is in place. See Standard Drawing S-204 for construction details. See Standard Drawings S-210 and S-210B for cast-in-place base requirements.

Flat-Top Manhole

Flat-top manholes are used in shallow depths of six feet or less. See Standard Drawing D-205 for construction details.

Manhole Base Standard Details

Cast-in-place manhole bases require a rebar cage in the pour. See Standard Drawing S-210B for rebar layout. See Standard Drawing D-210 for construction requirements.

Standard Inside Drop Manhole

City does not allow outside drop manholes. If building on a slope and a drop manhole is needed, an

inside drop is recommended. Drop manholes must be approved by the City Engineer. See Standard Drawing D-225 for construction details.

Storm Manhole Cover And Frame Details
See Standard Drawing D-250 for construction requirements.

Storm Manhole Frame Grade Adjustment
See Standard Drawing D-260 for construction requirements.

24" Square Curbside Catch Basin Inlet
Curb inlets are preferred to catch basins due to the amount of water they intake. The round grate on a square box requires grouting to fill gaps caused by differing shapes. The inlet grate adjusts up and down and back to front. Contractors often have a difficult time installing these boxes the first time they see them. City staff must review inlet setup prior to concrete pour. See Standard Drawing D-300 for construction details.

In Sidewalk Curb Inlet
In locations where an existing City pipe may not allow for installation of the City standard curb inlet, the basin may be installed under the sidewalk. This will require a different inlet grate. See Standard Drawing D-301 and D-302 for inlet top options.

In Sidewalk Curb Inlet Tops
See Standard Drawing D-302 and D301 for construction requirements.

Manhole Curb Inlet
When depth of pipe reaches or exceed six feet, the standard curb inlet base is replaced with a manhole. See Standard Drawing D-303 for construction details.

CG-1 Inlet, Frame and Grate
In reasonably flat areas where drainage catches are require, a G-1 with a flat grate may be used. Typically this would be in valley gutters or the throat of a driveway.

Ditch Inlet
Used in drainage ditches. See Standard Drawing D-310 for construction requirements.

Area Drain Inlet
Used in landscaped areas. See Standard Drawing D-311 for construction details.

Headwall With Tidegate
Outfalls in tidal areas may require a tidegate. See Standard Drawing D-320 for construction requirements.

END OF SECTION

STORM DRAINAGE STANDARD DRAWINGS