




Date: March 23, 2007

From: Wes Jorgenson 
Assistant Director for Engineering
City of Bellevue Utilities

Subject: Utilities Engineering Standards Amendment

Effective immediately, the following amendments are made to the City of Bellevue Utilities Engineering Standards, last updated September 15, 1998.

These revisions incorporate changes to the Surface Water Engineering Standards that:

1. Allow detention vaults/tanks to be located underneath structures in areas where 100% lot coverage is allowed by Land Use Code section 20.25A.020.
2. Provide requirements for non-gravity systems (pumps) for properties where 100% lot coverage is allowed by Land Use Code section 20.25A.020.

Under D4-06 RUNOFF CONTROL, replace Section D4-06.6 Underground Detention Systems with the following:

D4-06.6 Underground Detention Systems

A. General

Use the criteria and methods set forth in Chapter III-4 of the DOE Manual as modified herein.

All stormwater shall be routed through a catch basin prior to discharging to detention vaults or pipes to facilitate the easy removal of transported sediments and debris except for projects that have 100% lot coverage which would not be required to install this catch basin.

B. Design Criteria

Detention Vault/Tank Setbacks

Detention vaults/tanks shall not be located:

- underneath any structure (e.g. buildings, sheds, decks, carports, retaining walls, etc.); except for areas where 100% lot coverage is allowed by Land Use Code section 20.25A.020 where under building detention vaults/tanks shall be allowed and

- within the 1: 1 plane from the bottom edge of the vault or the bottom of the excavation at the outside diameter for tanks, to the finished grade at an adjacent structure foundation; and
- within the 1: 1 plane from the bottom edge of the vault or the bottom of the excavation at the outside diameter for tanks, to the property line when an easement is not provided on the adjacent property; and
- where such facilities interfere with other underground utilities.

If vaults are constructed above ground, they shall be provided with visual screening and landscaping.

When the design of vaults does not take into account buoyancy or hydrostatic pressure, footing drains shall be provided. Footing drains shall be backfilled to within two (2) feet of the top of the vault with Gravel Backfill for Drains conforming to Section 9-03.12 (4) of the Standard Specifications. The gravel backfill shall be protected from contamination by soil fines.

When the design of tanks or pipes does not take into account buoyancy, underdrains shall be provided. Underdrains within the pipe trench shall be backfilled from the bottom of the pipe to the crown with Gravel Backfill for Drains conforming to Section 9-03.12 (4) of the Standard Specifications. The gravel backfill shall be protected from contamination by soil fines.

Clean-outs on footing drains and underdrains shall be provided every 100 feet and at bends or drain pipe junctions. Connection to the stormwater conveyance system shall be at a point where the hydraulic grade line in the conveyance pipe does not affect the free draining ability of the footing drains or underdrains.

C. Minimum Size

The minimum diameter of a detention pipe shall be as shown on standard detail for detention pipes.

The minimum height of any detention vault shall be as shown on standard detail for detention vaults.

D. Pipe Depths

For high density polyethylene pipe (AASHTO M 294 Type S), the maximum fill depth is 15 feet measured to the top of the pipe.

For PolyVinyl chloride pipe (profile and solid wall), the maximum fill depth is 20 feet.

For reinforced concrete pipe, the maximum fill depth is 15 feet for class III pipe and 25 feet for class V pipe.

For pipes buried greater than 25 feet deep, pipe type shall be determined on a case-by-case basis with back up calculations provided by the Developer.

Minimum cover is 2 feet from the top of pipe to the finished grade or as recommended in writing by the manufacturer, whichever is greater.

For installations where minimum cover requirements cannot be met, use Ductile Iron (DI), Class 52 pipe, or AWWA C900 PVC pipe.

E. Structural Design

Use the criteria set forth in Chapter III-4.5 of the DOE Manual and by the currently adopted construction codes for Bellevue. Note that where the top of a vault is in a traveled way, additional loading requirements to accommodate fire trucks will apply. Consult the Building Division of the Department of Planning and Community Development for available information on *Structural Slab Design Loadings for Fire Trucks* in the Development Services Center.

Detention vaults/tanks located beneath buildings shall be reinforced concrete and meet all applicable building codes. A detention vault building permit and a separate plumbing permit must be obtained.

Hydrostatic Pressure & Buoyancy

Use the criteria set forth in Chapter III-4.5 of the DOE Manual as modified herein.

If permanently lowering the groundwater in the vicinity is not feasible, then pipes and vaults shall be designed to accommodate hydrostatic loading and buoyancy effects.

F. Maintenance Access

Use the criteria set forth in Chapter III-4.5 of the DOE Manual as modified herein. Since underground detention facilities are subject to confined space entry regulations, such facilities shall be designed to facilitate safe inspection and maintenance.

Access structures at each end of the facility shall be required. Spacing between access openings shall not exceed 50'. Covers, grates, and hatches shall be bolt locking. If the vault or pipe contains cells, one access minimum per cell is required.

Access openings shall be 24" in diameter per Standard Detail D-22 and centered over a ladder and/or steps. For control structures, access must be located so that an 8" rigid vector tube can reach the sump directly from the top, and so that a person entering the structure can step off the ladder or steps onto the floor.

The opening shall allow visual inspection of the restrictor pipe, while maintaining vertical vector access to the sump area.

In order to achieve both requirements, it may be necessary to increase the control structure size, provide two 24" access openings or a hatched cover that conforms to the loading requirements given the proposed location.

Orifice elbows shall be located on the side of the stand pipe nearest the ladder for clear visual inspection from above.

Gates and/or removable bollards may be required to restrict access to drainage facilities. Such measures shall comply with the Land Use Code and these engineering standards. Cables and/or chains stretched across access roads are not acceptable

Under D4-06 RUNOFF CONTROL, replace Section D4-06.9 Non-Gravity Systems (Pumps) with the following:

D4-06.9 (1) Non-Gravity Systems (Pumps) for Properties where 100% lot coverage is not allowed by the Land Use Code

Pump systems (includes the pumps, force mains, electrical and power supply equipment, structures and appurtenances) are not an approved method of conveying, storing, or treating storm water. A deviation must be approved in order to pump storm water. If the deviation for a pump system is approved, the system shall meet the following minimum requirements:

- A. The pump system shall not be used to circumvent any code, engineering standard, or permit condition. The construction and operation of the pump system shall not violate any other City requirements.
- B. The Developer shall demonstrate that the pump system is the only feasible alternative available to provide drainage.
- C. Pump systems shall be owned, operated, maintained, repaired, and replaced (as needed) by property owner(s) served by such system.
- D. Pumped flows shall not exceed the allowable discharge rates set forth herein. Each pump shall be capable of discharging the design flow rate for the 100-year, 24-hour design storm.
- E. If a stormwater detention system is not required the pump system shall have a storage facility (pond, tank, or vault) sized to hold 25 percent of the total volume of runoff for the developed tributary drainage area for the 2-year, 24-hour design storm.
- F. The pump system has dual, alternating pumps with emergency on-site, back-up power supply and an external alarm system for system failure and high water level indicator.
- G. A safe emergency overflow route shall be provided, if possible.
- H. The pump system shall discharge to an elevation higher than the downstream design water surface elevation to prevent backwater/backflow conditions.
- I. A Maintenance and Operation Schedule shall be prepared and submitted for review prior to permit issuance.
- J. A note on the approved plan shall stipulate that the private property owner(s) shall be responsible for any and all claims for injuries and damage due to the operation or non-operation of the pump system.

D4-06.9 (2) Non-Gravity Systems (Pumps) for Properties where 100% lot coverage is allowed by Land Use Code

The pump system shall not be used to circumvent any code, engineering standard, or permit condition. The construction and operation of the pump system shall not violate any other City requirements.

Pump systems shall be owned, operated, maintained, repaired, and replaced (as needed) by property owner(s) served by such system.

Storm detention facilities with flow restrictors shall be installed upstream and discharge by gravity to the pump station.

The pump system shall have a minimum of two pumps with emergency on-site, back-up power supply and an external alarm system for system failure and high water level indicator. The pump chamber shall be sized no greater than a 5-minute on/off cycle time for one pump, however, the pump chamber shall not be larger than 1,000 gallons. The total pump capacity shall not exceed the design flow rate for the 100-year, 24 hour storm . All installation work for the pump, electrical connections, and piping will require applicable building, electrical and plumbing permits.

The pump system force main shall connect into the top of a private storm drain pipe or connect to a private catch basin and gravity flow to the public storm sewer system. Direct pressure discharge to a gutter, ditch or stream shall not be allowed.

No public drainage shall be conveyed to the private pumped system.

A Maintenance and Operation Schedule shall be prepared and submitted for review prior to UE acceptance and building occupancy.

A note on the approved plan shall stipulate that the private property owner(s) shall be responsible for any and all claims for injuries and damage due to the operation or non-operation of the pump system.