



# SECTION 6.0

## LIFT STATIONS



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## 6.1 GENERAL

Gravity systems should be pursued whenever possible. Lift stations shall be permissible when gravity system challenges prevent an effective solution due to physical or economical limitations.

## 6.2 SUBMISSIONS

The detailed design submission shall consist of drawings, specifications and supporting documents, and should be preceded by the submittal of a design report, which would include the following sections:

- a. General – Service Area Justification
- b. Location
- c. Access
- d. Configuration
- e. Design flows
- f. Pumps
- g. Wet well capacity
- h. Staging
- i. Forcemain analysis
- j. Structural and Building Design
- k. HVAC Design, including odour control
- l. Power Supply and Electrical
- m. Controls, SCADA and Alarms
- n. Emergency Response Plan
- o. Maintenance Requirements

Developer shall work with the City of Beaumont to identify and incorporate any site specific requirements that may exist.

## 6.3 LIFT STATION STANDARDS

### 6.3.1 Location and Access

1. All new lift stations shall be located on a separate Public Utility Lot (PUL) with appropriate land-use designation and must have a legal and physical address. The final legal plans must be



submitted to the City.

2. Special consideration should be given to the location of lift stations relative to existing or proposed adjacent development, in order to minimize the facilities aesthetic impact in terms of visibility, odour and noise. The location of pump stations in the immediate proximity of school sites and playgrounds should be avoided if possible. Safety and security measures are to be given special consideration in such cases.
3. Direct access to power and roadways shall be provided with a suitable loading area, parking and turning movements for the typical design vehicle and general function of the station.
4. The lift station shall be situated at a functional location for the drainage system to limit excess piping and forcemain length.
5. Lift stations are to be located outside the limits of any area subject to surface ponding or inundation by surface flow during major runoff events so that they are accessible in all weather conditions. The location of the lift station shall be protected from flooding with the surface elevation 500mm above the 1:100 year flood event.

### 6.3.2 Configuration

1. Two types of lift stations shall be permissible:
  - a. Wet well and dry well
    - i. Lift stations should preferably be built with a wet well and dry well configuration, where pumps are installed in a dry well with pump suction from the wet well
  - b. Wet well only
    - i. Wet well only configurations are allowable for smaller stations with pump sizes less than 75kW, and depth less than 8.0m

### 6.3.3 Design Flows

1. Pumping system shall be designed to exceed the peak design flow determined for sanitary systems, and shall be designed to meet the allowable release requirements determined for stormwater systems
2. Design flows shall be calculated in accordance with City of



## Beaumont design standards

### 6.3.4 Pumps

1. Redundancy – Lift stations shall have a minimum of two pumps, where one pump is capable of handling the peak flow requirements. When two pumps are used, pumps shall be identical and interchangeable. When three pumps are used, peak flow requirements can be satisfied by the two smallest pumps operating in parallel.
2. Pumps shall be able to alternate usage automatically. Impellers shall be non-clog, capable of passing 75mm solids.
3. All pumps must be able to be serviced locally, with regional access to spare parts.
4. Each pump shall have a dedicated inlet pipe

### 6.3.5 Piping and Valves

1. All pipe within lift station shall be stainless steel or epoxy coated steel. Pressure pipes shall have a minimum pressure rating of 900kPa.
2. All brackets, hangars and supports shall be non corrosive. Nuts and bolts shall be stainless steel.
3. All equipment shall have adequate spacing and clearances for access and maintenance or replacement.
4. Check valves are required on each pump discharge line, prior to an isolation valve. Isolation valves are required on the discharge line after the check valve, and on the suction side. Air release valves are required at the high points of the discharge system. Drain valves are required at the low points of the discharge system, and must drain back to the wet well.

### 6.3.6 Well Structure

1. Wet well sizing shall be designed with the operation of the pumps considered such that pump run times do not exceed 1 hour per cycle.
2. Inlet piping shall be designed to prevent surcharge upstream, and to minimize turbulence to mitigate air entrainment and odour.



3. Dry well structures shall be accessible for maintenance in accordance with Occupational Health and Safety Standards.
4. Design shall account for potential buoyancy issues.

### 6.3.7 Staging

1. Design of systems where interim and ultimate staging requirements for development are required shall be designed to ultimate structure size with interim functional elements to facilitate effective use during interim periods whenever possible. Lift stations with staging requirements shall allow for equipment upgrades to be completed without disruption to ongoing flow requirements.
2. All stage plans shall be provided in the Design Report for review. All stages of the system must be designed in detail prior to the initial stage approval.

### 6.3.8 Superstructures

1. All wet well/dry well configuration lift stations as well as all sanitary lift stations shall require a superstructure. Equipment sizing for operational requirements may also dictate superstructure need.
2. When superstructures are required, architectural requirements shall meet relevant land use bylaws and be reviewed with the City of Beaumont to comply with additional surrounding aesthetic needs.
3. Superstructures shall include a wash station for facility cleaning and appropriate storage for supplies such as tools, spare parts, or safety equipment.
4. Lift stations shall be secure facilities. Building/hatch door locks shall be as indicated by the City of Beaumont. Superstructures shall be secured with a building entry alarm system compatible with the City of Beaumont needs. No external controls should be accessible, unless a security chain link fence is provided. All below grade lift stations shall have fencing to provide additional security.
5. All lift stations must have provisions for pump removal. When a superstructure is provided, overhead girder mounted cranes are to be included in the facility design for pump removal. Smaller stations can be accommodated through use of an appropriately rated davit system for pump removal.



### 6.3.9 HVAC

1. Mechanical systems shall be designed to provide proper ventilation, heating and odour control. Ventilation shall be continuous to prevent buildup of moisture and gases. Heating of the lift station spaces shall be required to prevent freezing of any functional areas. All lift station mechanical systems shall comply with AEP Wastewater Systems Standard and Guidelines.

### 6.3.10 Electrical

1. Backup power shall be provided for all stations capable of supporting the entire load for the building. Diesel generators are required unless exemption is granted from the City of Beaumont. Diesel fuel shall be stored in an appropriately sized double walled tank, sufficient for 24 hours of operation. Automatic load transfer switch shall be provided to automatically transfer station loads to standby power generator in the event of utility power failure.
2. A hazardous area classification shall be completed and all building electrical work shall be completed in accordance with the Canadian Electrical Code. Electrical equipment such as pumps and motors shall be able to be locked out for maintenance.
3. TVSS unit, digital power meter, and UPS systems will be required unless exemption is granted from the City of Beaumont.

### 6.3.11 Controls and Alarms

1. Pumps shall be controlled for continuous, unattended operation and to cycle through duty/assist/standby operations. Each pump cycle will be controlled by sensors for start/stop requirements. Level sensors shall be hydrostatic level and radar, with a high and low level float backup. Flow and pressure monitoring is also required. A detailed control philosophy is to be submitted for review by the City for approval.
2. SCADA for lift stations shall have sensors and measurement devices connected to a PLC that communicate through internet to the City's system. A local touch screen operator interface (HMI) shall be provided for local monitoring and setpoints entry. All SCADA systems shall be developed in consultation with the City to ensure site specific requirements are met. Backup radio/cell





systems shall be required, unless exemption is granted from the City of Beaumont. Minimum alarms for lift stations include wet well high level, wet well low level, pump failure, ventilation failure, building/cabinet low temperature, intrusion. Wet well level sensors shall include dual sensor systems as backup in case of primary failure.

### 6.3.12 Emergency Response Plan

1. An Emergency Response Plan will be required with features included in the design where required.
2. In the event of a mechanical or electrical failure, redundancy of pumps and backup power will be the primary response, with alarm notification of failures sent to operators through the communications system. Further levels of emergency response shall be reviewed for implementation such as a gravity overflow to a suitable pipe system that does not impact backup to the upstream system. Portable pumping and piping requirements to a suitable downstream system should be identified. Site plan design shall identify overflow of the station during complete failure of all levels of emergency backup that minimizes impact to the environment.
3. Site access to the station for maintenance and emergency vehicles shall be provided.
4. Design shall limit the operational need to enter into the wet well, however fall arrest system design shall be incorporated throughout the lift station system.

### 6.3.13 Operations and Maintenance

1. Design of lift stations should provide for functional and safe operations and maintenance activities.
2. The design for lift stations should include the preparation of an Operation and Maintenance Manual for the facility.

### 6.3.14 Forcemains

1. Forcemains shall be HDPE or non water pressure rated PVC, capable of handling the pumping system forces. Surge analysis calculations are to be used in developing the forcemain system to confirm issues related to water hammer or transient pressures



are mitigated. The level of detail for the surge analysis is relative to the risks identified in the Design Report.

2. The minimum allowable velocity is 0.9m/s and the maximum allowable velocity is 3.5m/s. The preferred velocity of flows in the system is between 0.9m/s and 2.0m/s
3. Forcemains shall have air release valves located at the high points of the system, and drain valves located at the low points. Valves must be placed in concrete manhole chambers and in accessible locations for maintenance. Forcemains shall not be installed flat to avoid ponding when not in use. Minimum cover shall be provided as per applicable sewer design standards.

