



## 6. MUNICIPAL WASTEWATER PUMPING STATIONS

### 6.1 Pumping Station Overview

There are currently four (4) municipally owned pumping stations and three (3) privately owned pumping stations throughout the collection system. The municipally owned pumping stations are listed in the City's sewer regulations. All other pumping stations and/or low-pressure sewer connections are the responsibility of the property owner. The regulations require the property owners to maintain the private pumping stations properly. If it is found that a private pumping station has become a hazard to public health the WPCA will repair/replace the pump station at the cost of the private pumping station owner. Below is a list of the municipal and private pumping stations found throughout the City.

- Municipal Wastewater Pumping Stations
  - South Division Street PS - Collects flow from Subarea 5 and the Division Street inverted siphon and discharges to Subarea 6.
  - Burtville Avenue PS – Collects flow from Subarea 9 and discharges to Subarea 10.
  - Roosevelt Drive PS - Collects flow from Subareas 1&2 and discharges to Subarea 4.
  - Patty Ann Terrace PS – Collects flow from Patty Ann Terrace in the northern section of Subarea 1 and discharges to the gravity sewer on Joyce Avenue in Subarea 1.
- Privately Owned and Operated Pumping Stations
  - Pershing Drive PS – Collects flow from the Pershing Drive area in Subarea 5 and discharges to gravity sewer in Subarea 5.
  - Derby Avenue PS – Collects flow from an apartment complex located on Derby Avenue in Subarea 6 and discharges it to the gravity sewer on Derby Avenue in Subarea 6.
  - BJ's Wholesale Club PS – Collects flow from the BJ's Wholesale Club and discharges to the gravity sewer in Subarea 5.

A summary of pump station information for all municipally owned pump stations is provided below in **Table 6-1**.



Table 6-1: Existing Pump Station Information

Pump Station	Municipal Pumping Stations			
	South Division Street	Burtville Avenue	Roosevelt Drive	Patty Ann Terrace
Pump Type	Two Constant Speed Close-Coupled Pumps	Two Constant Speed Close-Coupled Pumps	Three Variable Speed Close-Coupled Pumps	Two Constant Speed Pumps
Pump Manufacturer	HOMA	HOMA	Cornell	Xylem/Flygt
Pump Model	AMS434-260/20P/C FM	AMS434-260/20P/C FM	6NHTA VC18DB	NP-3102.090
Motor Horsepower	20 hp	20 hp	50 hp	6.5 hp
Pump Speed (rpm)	1,750	1,750	1,700	3,445
Pump Rate (gpm)	350 (each)	250 (each)	1,400 (each)	200 (each)
Design TDH (ft)	96	100	100	68
Installation Year	2017	2017	2019	2013
Force main Dia. (in), Type	6 Cast Iron	4 Cast Iron	12 Cast Iron	4 Cast Iron
Force Main Length (ft)	683	643	1,118	450
Flow Velocity (ft/s)	4.0	6.4	4.0 @ 1,400 GPM 6.8 @ 2,400 GPM	5.1
Backup Generator	Yes	Yes	Yes	Yes
Submersible (Yes/No)	Yes	Yes	No	Yes
Overall Condition	Excellent	Excellent	Excellent	Excellent



## 6.2 South Division Street Pumping Station

### 6.2.1 *Existing Conditions*

The South Division Street pumping station was originally a Smith and Loveless packaged steel can pumping station, which was constructed in 1966. The pumping station is located on South Division Street on the East Derby side of the Naugatuck River. The pumping station force main is of 6-inch cast iron construction with an approximate length of 680 lf. The force main connects to a 10-inch VC gravity sewer on Derby Avenue. The pumping station is fed via two 8-inch VC gravity sewers and two 8-inch cast iron siphon barrels (Division Street – West Derby).

### 6.2.2 *Equipment Updates*

The pumping station was upgraded in 2017 in accordance with the 2014 Wastewater Facilities Plan. The upgrades converted the pumping station from a packaged steel can dry pit configuration to a submersible configuration with the re-use of the wet well for the submersible pumps. The pumping station upgrade also included the installation of a precast concrete valve vault. The valve vault includes 6-inch discharge piping, discharge check and plug valves and a 6-inch magnetic type flow meter.

### 6.2.3 *Structural Updates*

A precast concrete building was also provided to house the electrical and control systems as well as a new diesel-powered generator. The entire electrical and control systems were replaced, and a new 480-volt three phase electrical service provided. The influent sanitary sewers were re-directed such that one influent sewer to the wet well is provided, with the exception of the inverted siphon discharge. An auto dialer is provided to send alarm conditions. The site is paved, and site fencing is provided to secure the entire pumping station site. The pumping station has sufficient pumping capacity to handle the existing and projected influent flows and the associated peak flows.

### 6.2.4 *Cost*

The total project cost of the pumping station upgrade was approximately \$915,000 including design, construction, and engineering services during construction. The project was funded by the WPCA using funds available through the 2014 Referendum.

Overall, the Division Street Pumping Station is in excellent condition.



## 6.3 Burtville Avenue Pumping Station

### 6.3.1 *Existing Conditions*

The Burtville Avenue pumping station was originally a Smith and Loveless packaged steel can pumping station, which was constructed in 1965. The pumping station is located at the bottom of Burtville Avenue on the East Derby side of the Housatonic River off, of Route 34. The pumping station force main is constructed of 4-inch cast iron pipe and has an approximate length of 640 linear feet. The 4-inch force main connects to an 18-inch PVC gravity sewer on Route 34. The pumping station is fed via an 8-inch PVC gravity sewer to a the wet well. In addition to residential flows, the pumping station collects flow from several commercial properties including Derby Glass, retail properties, and an oil company.

### 6.3.2 *Equipment Updates*

The pumping station was replaced in 2017 with a new submersible duplex pumping station in accordance with the 2014 Wastewater Facilities Plan. The new pumping station consists of a precast concrete wet well with two (2) explosion proof submersible wastewater pumps. The pumping station is also equipped with an integral concrete valve vault. The valve vault includes 4-inch discharge piping, discharge check and plug valves and a 4-inch magnetic type flow meter.

### 6.3.3 *Structural Updates*

A new precast concrete control building, which house the electrical and control systems and an emergency diesel-powered generator has been provided. The pumping station has sufficient pumping capacity to handle the existing and projected influent flows and the associated peak flows. The site is paved, and site fencing is provided to secure the entire pumping station site.

### 6.3.4 *Cost*

The total project cost of the pumping station upgrade was approximately \$940,000 including design, construction, and engineering services during construction. The project was funded by the WPCA using funds available through the 2014 Referendum.

**Overall, the Burtville Avenue Pumping Station is in excellent condition.**



## 6.4 Roosevelt Drive Pumping Station

### 6.4.1 Existing Conditions

The Roosevelt Drive pumping station was originally a Smith and Loveless packaged steel can pumping station, which was constructed in 1965. The pumping station is located at the intersection of Route 34 (Roosevelt Drive) and Cemetery Avenue next to the Housatonic River. The pumping station force main is 12-inch cast iron and has an approximate length of 1,120 lf. The 12-inch force main connects to a 15-inch RCP gravity sewer on Route 34. The original pumping station was fed via an 18-inch cast iron gravity sewer to an 8-foot diameter precast concrete wet well. The wet well was equipped with a 4-foot wide operator access platform and a manual bar rack. Due to the quantity of flow the bar rack was routinely and frequently cleaned with one to two buckets of rags and debris removed per cleaning. A wet well ventilation system was provided but not operational thus the wet well was classified as a confined space requiring significant attention from the operations staff during the manual cleaning of the bar rack. A 9.5-foot diameter steel can dry pit structure with a 3-foot diameter steel access tube was provided to house the wastewater pumps, process piping, valves as well as the electrical and instrumentation systems. The dry pit was equipped with two constant speed 40-horsepower Smith and Loveless (pump model S8D4A) close-coupled wastewater pumps each designed for 2,040 gpm at 56 feet of head. The original pumping station electrical system consisted of a 400-amp, 4-wire, 240-volt, three phase electrical service. The electrical and instrumentation systems were housed in a NEMA 3R cabinet, located above grade next to the Housatonic River and the steel can dry pit. The electrical cabinet was equipped with a 300-amp main service breaker. The pumping station was equipped with a standby generator that was non-functional and is beyond repair. The existing pumping station was considered to be in poor condition.

### 6.4.2 Equipment Updates

The Roosevelt Drive Pumping Station was replaced in 2019 in accordance with the 2014 Wastewater Facilities Plan. The new pumping station was built completely off-line adjacent and to the east of the existing station. Once the new pumping station was made operational, the flow to the existing station was diverted to the new station, and the existing station was abandoned in place.

### 6.4.3 Improvements

A Basis of Design Report for the proposed improvements at the Roosevelt drive Pumping Station, dated February 15, 2017 was prepared to summarize and document the decisions made related to the proposed improvements.

### 6.4.4 Recommendations

The following is a list of recommended improvements that were implemented during the 2018 / 2019 construction seasons:

1. Design Capacity: The pumping station was designed with a firm capacity of 2,800 gpm in order to provide the capacity of handling the estimated wastewater flows over the next 20 years.
2. Station Configuration: A precast concrete wet well / dry well station was constructed because this configuration provided better access to the various components of the pumping station



and facilitated the continued visual monitoring of the pumping systems. This configuration is also consistent with similar pumping stations across Connecticut. The wet well was provided with an influent channel equipped with a screen and an internal bypass. A ¼-inch mechanically activated bar screen with a conveyor to bring the screenings above the wet well was provided for operational purposes such that limited routine operator access to the wet well is required. An above grade structure has been provided above the wet well to house mechanical screening equipment and to provide interior access to the wet well to facilitate the removal of screenings. An above grade control building has been provided above, and adjacent to, the dry pit to house the electrical and control systems.

The dry pit includes discharge piping, discharge check and plug valves, and a magnetic flow meter. All piping within the wet well and dry pit is painted. A hoist system has been installed to facilitate removal of pumps and motors from the dry pit. Both the wet well and the dry pit are mechanically ventilated per TR-16 requirements. Aluminum access stairs have been provided to access lower levels of the wet pit and the dry pit.

3. **Pump System Configuration:** The triplex pump configuration was installed because it allows greater flexibility, both in terms of operational redundancy and greater range in pumping rates. Having the capability of pumping at a lower rate also benefits wastewater treatment plant operations, as a more uniform flow pattern into the plant was achieved, minimizing impacts to treatment processes. The triplex system also offered an overall slightly lower life cycle cost than the duplex pumping configuration. Each pump is variable speed controlled designed to operate in parallel with a total system flow range of 450 to 2,800 gpm.
4. **Pump Motor Type:** Pumps equipped with immersible pump motors were installed due to their lower life cycle costs, minimized repair turnaround times, and ability to be serviced by WPCA staff and/or local repair shops.
5. **Pump Impeller Type:** Pumps equipped with enclosed impellers were installed due to their higher efficiency and resulting lower life cycle costs.
6. **Solids Management:** A mechanical screening and compacting system was installed based on the analysis and recommendations made by the WPCA superintendent and concurrence with Weston & Sampson.
7. **Standby Generator:** A 275 KW natural gas standby generator was provided to maintain electrical power to all of the facilities in the pumping station during grid power outages.
8. **Coastal Resiliency:** In order to be protected from possible flooding damage, as called for under TR-16 Guidelines, the station's pump motor control center and critical electrical and control components are housed in a structure set three (3) feet above the 100-year flood elevation.



#### 6.4.5 Cost

The total project cost of the pumping station upgrade was approximately \$8.4 Million including design, construction, and engineering services during construction. The project was funded by the WPCA using funds available through the 2014 Referendum.

**Overall, the Roosevelt Drive Pumping Station is in excellent condition.**

### 6.5 Patty Ann Terrace Pumping Station

#### 6.5.1 Existing Conditions

The Patty Ann Terrace Pumping Station was originally constructed in 1971 and is located at the end of Patty Ann Terrace. The pumping station is designed to service the lower section of Patty Ann Terrace, which is entirely residential. The area consists of approximately 20 residential houses. The pumping station force main is approximately 450 linear feet and based on the station operations and maintenance manual, it is assumed that the force main is a 4-inch cast iron pipe. The force main connects to an 8-inch asbestos cement pipe (ACP) gravity sewer on Joyce Avenue. The original pumping station was fed via an 8-inch ACP gravity sewer to a 4-foot diameter precast concrete wet well. The wet well was equipped with a Smith and Loveless two pump, suction lift, prefabricated, self-priming, packaged system equipped with a vacuum priming system.

The pumping station electrical system was served by a 70-amp, 4-wire, 230-volt, three phase electrical service. The electrical and instrumentation systems were housed in a NEMA 12 cabinet, which was located next to the wastewater pump fiberglass enclosure. No backup generator was provided; however, a receptacle was provided for a portable generator if needed during emergency power operations. The wastewater pumps were controlled via a float type level sensing system and operational controls. An auto dialer was provided to send alarm conditions. The site was paved, and site fencing provided. The entire pumping station equipment and structures are well beyond their intended useful and design life. Overall, the original Patty Ann Terrace Pumping Station was in poor condition.

#### 6.5.2 Updates

The Patty Ann Terrace Pumping Station was replaced in 2013 with a new submersible duplex pumping station. An 8-foot diameter precast concrete wet well has been provided with two explosion proof submersible wastewater pumps. The pumping station is also equipped with an integral precast concrete valve vault. The valve vault includes 4-inch discharge piping, discharge check and plug valves. A new precast concrete control building, which house the electrical and control systems and an emergency generator has been provided. The pumping station has sufficient pumping capacity to handle the existing and projected influent flows and the associated peak flows. The site is paved, and site fencing is provided to secure the entire pumping station site.

**Overall, the new (2013) Patty Ann Terrace Pumping Station is in excellent condition.**



## 6.6 Summary

Overall, the four (4) existing pumping stations in the City of Derby are in excellent condition, having received major upgrades within the past few years.