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FOREWORD

All personnel should be AWARE that there are certain potential safety and health hazards associated with any job and the daily operation and maintenance of storm retention facility and its appurtenances are no exception.

This manual is intended to AID in the daily operations of the retention treatment structure and its maintenance; it is no substitute for actual experience. Furthermore, this manual contains detailed information on the operation and maintenance of these facilities. The untrained operator should not attempt to perform any operations or services until he has received the proper training or instruction. It is recommended practice that the management at these facilities institute regular training sessions to instruct inexperienced personnel on the proper operation of equipment associated with the retention treatment structure.

A WORD OF CAUTION pertaining to sewage gas and oxygen deficient atmosphere. DO NOT ENTER manhole or other structure unless the atmosphere has been checked for hazardous and or explosive gases. If the check proves positive, do not enter unless the area has been properly ventilated and rechecked REMEMBER, IT TAKES ONLY ONE ACCIDENT OR MISTAKE THAT COULD CAUSE A CRIPPLING OR DISABLING INJURY, OR A LOSS OF LIFE.

CHAPTER 1—INTRODUCTION

1.0—Purpose

The system of relief drains for the cities of Southgate and Wyandotte have been constructed by the Southgate-Wyandotte Relief Drains Drainage District and managed the Southgate-Wyandotte Relief Drainage Board, herein after, referred to as the Board.

This volume has been prepared for the Board as a means of providing instructions, guidelines, procedures, and objectives to direct the personnel with respect to operation and maintenance of the various units and equipment associated with the storm retention structure.

1.1—Scope

This volume presents the operation and maintenance procedure for the chlorination, polymer, flushing, and sampling processes, plus the pump instrumentation and various other appurtenances associated with the storm retention structure.

1.2—Format

This volume presents the same basic format as presented in Subchapter 1.2—Format in Volume 1. In order to prevent needless repetition and excessive bulkiness, this volume will cover only those specific items associated with storm retention structures, and will reference the general material to the proper chapter in Volume 1.

All pump station PERSONNEL are URGED to study the Guidebook for general procedures, before they study the individual volumes for specific procedures. Fig. 1 shows the location of the retention structure. Fig. 2, shows a site plan of the retention structure.

BEFORE any decanting and sludge draw-off, and flushing of the retention basin can take place, the operator in charge must check with the Wayne County DPW, Wyandotte Treatment Plant, to ensure that the PLANT can handle the water and sediment from the basin.

The number to call is AV 2-2880, and the person in charge is Robert De Long.

CHAPTER 2—SYSTEMS DESCRIPTION

2.0—General (Flow and Process Pattern Fig. 3 and 4)

Combined stormwater is pumped to the retention structure via the pump station, through the 13 ft influent sewer. Disinfection is accomplished by the addition of sodium hypochlorite, and increased solids settling is accomplished by the addition of polymer to the stormwater as it enters the pump station wet well or influent sewer.

The combined stormwater enters the retention structure via the north or south influent channel, then the stormwater flows into either tank (NORTH or SOUTH) of the retention basin. The solids in the combined stormwater are allowed to settle before the water is discharged (decanted) to the river. When the water level in the tank reaches the outlet weir, the water will overflow the weir, into the effluent channel and is discharged to the river.

The major portion of the combined stormwater in the retention structure is discharge to the river after storm. The combined stormwater that remains is drawn off via the interceptor sewer system, to the sewage treatment facility. The retention tank is then flushed out after the sludge draw-off process. All sedimentation remaining in the tank is returned to the sewage treatment plant via the interceptor (sanitary) sewer.

2.1—Meter Chamber and Building

The meter chamber automatically controls the flow from the retention structure into the 24 in. interceptor (sanitary) sewer system. The rate of flow through the regulator structure is controlled by a magnetic flowmeter. The rate of flow signal (which is set at the main control panel MCP) is used to automatically throttle a knife gate valve, in order to maintain a preset flow into interceptor (sanitary) sewer.

During a storm, flows in excess of the regulator setting will flow into the retention structure.

The combined stormwater that is drawn off from the retention structure passes through the meter chamber. This insures that the sewage treatment plant is not overloaded during the sludge draw-off operation.

The level in the sanitary sewer system is measured by an air bubbler system. This system measures the level in the sewer system and records the level automatically at the MCP.

2.2—Polymer System

The polymer feed system provides an automatically controlled, flow proportionate polymer solution feed to the combined stormwater flow for increased solids settling.

The six polymer pumps all interlocked to the six stormwater pumps (No. 6 thru 11) in the pump station. During the dewatering of the wet well, when one stormwater pump is started, the corresponding polymer pump is automatically started. The polymer is discharged into the 13 ft influent channel to the retention basin, the pumping rates of the pumps can be manually adjusted.

2.3—Sodium Hypochlorite System

The sodium hypochlorite system includes a sodium hypochlorite building, and one concrete underground structure divided into two ($10 \times 12\frac{1}{2} \times 28$ ft) (15,000 gal.) tanks for the storage of the sodium hypochlorite solution, with provisions for dilution to the proper strength for storage. Two influent sodium hypochlorite pumps (one pump is used at one time, with one in reserve), a constant head tank, and six (6) air operated pinch valves with solenoid valves.

The pumping rate of the sodium hypochlorite is controlled by the six (6) air operated pinch valves and their respective solenoid valves, in proportion to the rate of flow into the 13 ft influent. The pumping rate of the sodium hypochlorite can be manually adjusted.

The two sodium hypochlorite pumps and six (6) pinch valves are interlocked to the six (6) stormwater pumps in the pump station. With the stormwater pumps running, all solenoid valves, except for those pumps running are energized, thus closing off all pinch valves that are not in operation.

2.4—Decanting and Sludge Draw-Off

During or after a storm, when the combined stormwater in the tank (North and South) reaches an elevation of 576 ft, the combined stormwater will overflow the effluent weirs, to the effluent channel, and is discharged to the river.

After the combined stormwater water has stopped flowing over the effluent weirs, the remaining combined stormwater (approx. 80 percent) in the tank (North or South) is decanted to the river.

First, the decant sluice gate (North and South) is opened, allowing the combined stormwater to flow into decant box, and through a 36 in. decant pipe, to the wet well of the retention basin. The two decant pumps in the wet well are used to lift the combined stormwater in the wet well to an elevation of 581 ft. Then it flows by gravity through a 30 in. decant pipe to the 13 ft effluent to the river. The combined stormwater is sampled as it is being discharged by the pump. After the decanting process is completed, the decanting sluice gate is automatically closed.

After completing the decanting process, the remaining 10 percent of combined stormwater in the tank (North and South) is drawn-off and flows by gravity to the meter chamber, and to the sanitary sewer system, to the wastewater treatment plant.

2.5—Flushing System

After the tank (North or South) has been decanted and the sludge draw-off process completed, the sedimentation left in the tank must be flushed out. The flushing system consists of three flushing pumps, with two rotary strainers, and associated piping and valving.

River water is used to flush out the tank (North or South). Before the river water is pumped to the flushing main, the river water must pass through a rotary strainer, which is located on the suction side of the pump, which removes any material that might damage the pump.

The flushing water is then pumped to an individual flushing main in the tank (North or South). The tank is then flushed in sections. After each section has been thoroughly flushed, the system closes the main valve to flushing main located in that section, and automatically opens the main valve to the next flushing main.

The flushing water and sedimentation flows laterally through to the end trough, into the meter chamber, and to the 24 in. sanitary sewer where it is discharged to the waste treatment facility.

2.6—Sampling System

The sampling system consists of the following automatic refrigerated samplers; 1. influent, 2. decanting, 3. effluent and sampler pumps for compositing samples of sewage and stormwater at various points located throughout the retention structure. The influent sampling system is actuated when the combined stormwater in the pump station wet well begins to flow to the 13 ft influent. The effluent sample system is actuated when the water level in the retention basin rises to the elevation of the effluent weir. The decanting sampling system is initiated, whenever the decanting system is operated.

2.7—Instrumentation and Controls

The instrumentation and controls in general consist of instrument and control panels for controlling the chlorination, sampling, decanting, and flushing of the retention basin, together with the meter chamber flow and level controls. All instrumentation and controls are fully automatic. In addition to the remote automatic controls provided in the pump station (WCDD No. 5) and flushing and decanting building, for the various systems and equipment, the operation may be controlled manually by means of selector switches and devices incorporated into the pump station control panel and motor control centers.

2.8—Compressed Air System

The compressed air facility includes air distribution piping, air compressors, and air dryers. This system supplies 250 psig dry air to the flushing water system, air operated valves, and river level air bubbler. Also, air is supplied to the interceptor sewer bubbler system, sodium hypochlorite pumps, and automatically controlled knife gate valve in the meter chamber.

2.9—Industrial Water System

The industrial water system supplies water for filling of the sodium hypochlorite tanks and constant head tank, and the dilution of the polymer. Also, industrial water is used for hose bibs, and for seal water for the sodium hypochlorite pumps.

The industrial water system is separated from the potable water system by means of a backflow preventer.

2.10—Sump Pumps

Sump pumps are utilized for the removal of moisture that accumulates in the low areas of the retention basin wet well, meter chamber, and flushing and decanting building. This is due to condensation, water seal leakage, piping leaks, or floor washing operations.

2.11—Heating and Ventilation

The heating and ventilation system provides a means for controlling the conditions within the

various buildings and galleries of the retention structure.

The heating system allows for the heating of the retention structure in the cold months.

The ventilation system allows for the exhausting of the stale air from these various areas and/or supplying fresh air to those same areas.

A ventilation system is provided for use during maintenance and inspection of the retention basin. The ventilation system consists of supply and exhaust air fans. The ventilation system is manually controlled and interlocked, with the retention basin level measuring system, which automatically shuts off the exhaust fan, when the water level reaches the baffled weir outlet.

2.12—Valves and Gates

The various valves and gates provided in the retention basin as a means to control the flow of wastewater and solids, during the decanting and sludge draw-off operations.

2.13—Hoists

Separate hoists are provided at each end of the retention structure. The hoists are located on the top of the structures to allow for the handling of the maintenance vehicle, during maintenance or cleaning of the retention structure. The maintenance vehicle is lowered into the retention structure through the access hatches provided at each end.

Also, an electric hoist is provided in the flushing and decanting building, to allow for the handling of equipment such as pump, blowers, and motors.

2.14—Maintenance and Inspection Vehicle

The maintenance vehicle provides for the maintenance or inspection of the retention structure. The maintenance vehicle is lowered into the retention basin, to clean any solids accumulation, sedimentation or scum from the troughs after the basin has been flushed.

2.15—Communication System (Interphone System)

This systems provides a means of communications during inspection, maintenance, or troubleshooting of the tanks (North or South), meter chamber, or sodium hypochlorite building. The main control is located at the Master Control Panel in the Flushing and Decanting Building. Plug in call stations are located at the solenoid flushing valve panel, which are in the flushing gallery, meter chamber, and sodium hypochlorite building.

2.16—Electrical System

Power is supplied to the retention structure by the Detroit Edison Co. The system supplies 480/277 volt, 3 phase, 3 wire plus, 60 H, to the retention structure, with a neutral ground at the substation transformer. The lighting system is run off a single phase 120/240 volt, 60 H, alternating current.