

SOUTHWEST REGIONAL/OAK RUN WASTEWATER TREATMENT FACILITY

MARION COUNTY, FLORIDA COLLECTION SYSTEM ACTION PLAN

PREPARED FOR: Marion County Utilities Department

11800 South U.S. Highway 441 Belleview, FL 34420

FDEP DOMESTIC WASTEWATER FACILITY PERMIT NO. FLA012697

TREATMENT FACILITY INFORMATION

The Southwest Regional Wastewater Treatment Facility (WWTF) has a permitted capacity of 1.6 million gallons per day (MGD) annual average daily flow (AADF) and is operated by Marion County Utilities (MCU). The facility is located at 11400 SW 90th Terr. Ocala, FL 34481. The Florida Department of Environmental Protection (FDEP) facility operating permit (FLA272060) was issued on January 11, 2023, and expires on April 23, 2033.

OWNERSHIP OF COLLECTION SYSTEMS SERVED BY THE WWTF

Marion County Utilities owns and maintains all components of the Southwest Regional wastewater collection system that are located within the public right of way. Facilities located outside public right of way are privately owned and maintained. Domestic and industrial wastewater flows are collected throughout the service area by gravity sewer and pressure force mains. Sanitary sewer flow from the collection system is pumped to the WWTF through a network of lift stations and pressurized force mains.

INVENTORY

Southwest Regional's collection system service area is served by one (1) wastewater treatment facility. The system serves approximately 9687 residential customers and 200 commercial and industrial customers. The collection system(s) in the service area is comprised of manholes, gravity sewer pipes, lift stations, and force main pipes. Table 1.1-1 summarizes the service area's collection system assets, meeting the requirements of 62-600.702(2), F.A.C.

<u>Assets</u>	<u>Unit</u>	<u>Quantity</u>
Manholes	Number	2605
Gravity Sewer Pipe	Feet	112.56 Miles/594,312.3 feet
Lift Stations	Number	90 Total
Force Main Pipe	Feet	74.66/394,200.5 feet
Air Release Valves	Number	96

MANHOLES DESCRIPTION

Based on MCU's GIS database, there are 2605 manholes in the SW service area. The Marion County Land Development Code (LDC) requires manholes be spaced no greater than every 400 linear feet of gravity sewer pipe.

Manholes within the SW collection system are inspected by MCU staff as part of normal operations. To meet the requirements of 62-600.705(2), F.A.C., MCU will inspect at least 130 manholes annually over the five-year planning horizon. This inspection rate will meet the 25% inspection threshold over the next five years. Manholes will be visually inspected by MCU for signs of deterioration, debris buildup, and infiltration / exfiltration. Corrective actions will be taken when indicated by findings from visual inspection. MCU utilizes a manhole inspection form to document the results of visual inspections conducted by MCU staff.

A minimum of 130 manholes will be inspected each year over the next five years, which accounts for 5% of the manholes in the SW collection system each year, totaling 25% over five years. MCU may inspect more manholes within SW as necessary each year, but not less than 130. All manhole inspections are documented with an inspection report.

GRAVITY SEWER PIPE

DESCRIPTION Based on MCU's GIS database, approximately 594,312.5 linear feet (LF), or 112.56 miles, of gravity sewer pipes are located within the SW service area. Gravity sewer is used to collect and convey wastewater from service connections to lift stations for pumping to the SW WWTF. Most gravity sewers in the collection system consist of 8-inch pipe with limited amounts of 10-inch and 12-inch in use as dictated by flow requirements.

MAINTENANCE, TASKS, SCHEDULE AND PROCEDURES

MCU performs regular maintenance to avoid sanitary sewer overflows, sewer blockages, and ensured normal operation of the sanitary sewer system. Common maintenance tasks include jetting, debris removal, and repair of service lateral cleanouts. Most maintenance is performed by MCU staff using in-house resources. Third-party maintenance support is utilized when needed under direct supervision by MCU staff.

Existing collection systems are inspected using surface inspection, closed circuit television (CCTV) inspection, smoke testing, dye testing, and lamping / mandrel testing. The methods utilized depend on site-specific inspection needs, and in some cases multiple methods may be used (e.g. CCTV may be used to identify (Inflow & Infiltration) I&I and then smoke will be used to specific areas where I&I originates).

To meet the requirements of 62-600.705(2), F.A.C., MCU will inspect a minimum of 5% of the SW gravity sewer system (29,715.60 LF, or 5.63 miles) each year. Inspection will be used to identify sources of I&I; buildup of fat, oil, and

grease (FOG); joint separations and pipe breaks; sand and grit deposit; and other conditions that negatively impact reliable system operations.

FORCE MAIN PIPE DESCRIPTION

Based on MCU's GIS database, approximately 95,130 LF (18.0 miles) of force main pipe are located within the SW service area. Force mains are used to convey wastewater from lift stations to a downstream collection system for repumping or directly to the SW WWTF. Most force mains within the SW service area are comprised primarily of PVC, but the system includes sections of ductile iron pipe and HDPE.

MAINTENANCE, TASKS, SCHEDULE AND PROCEDURES

MCU performs regular inspections and maintenance of force main piping and appurtenances as part of normal operations. Typical maintenance includes valve exercising, cleaning air release valve components, and proactive replacement of older ductile iron pipe. Cast iron pipes are replaced as budget allows.

INSPECTIONS

Force main pipe inspection typically consists of monitoring upstream lift station performance. Excessive pump run times can indicate air or debris buildup in the force main system that needs to be removed. Novel inspection techniques are considered by MCU when warranted. Force main appurtenances, such as control valves and air release valves, are regularly inspected as part of the valve exercising program, meeting 62- 600.705(2), F.A.C. Air release valves in the MCU collection system are equipped with pressure gauges to monitor pressures throughout the system, which allows the County to identify blockages or other anomalous conditions.

CLEANING

Force main cleaning is accomplished by pipe jetting or pigging when necessary. For pipe jetting, access to the interior of the pipe is obtained through a tap. The jetter sprays high pressure water to dislodge debris as it is advanced through the pipe. MCU owns two jetting machines which are used throughout the system. Pigging requires access to the full pipe diameter and is obtained by a dedicated port or through removal of a section of a pipe. A pig is pushed through the pipe to dislodge debris.

LIFT STATIONS DESCRIPTION

MCU has 90 lift stations in the Southwest Regional sanitary sewer collection service area. Lift stations are used to convey wastewater uphill to avoid excessive excavation.

INSPECTIONS

MCU regularly inspects all its lift stations within the SW service area. Individual lift stations are typically inspected at least once per month, with some lift stations being inspected more frequently as needed. All MCU lift

stations are monitored using the County's SCADA system, which provides real-time and trending data for each lift station. This data includes pump run time, wet-well level, power monitoring, and alarms. The County uses these trends as a first indicator of condition and risks. For example, increasing run times may be an indication of a leak in the gravity sewer, pump displacement, or a change in down-stream head conditions (potential force main obstructions). If there is an indication that a lift station's condition poses an operational risk, further steps may be taken to diagnose a potential failure point (e.g. pulling a pump for inspection) before a problem arises.

Lift station checks may include:

Inspection of power feed via phase monitor

Inspection of pumps for ragging

Inspection of wet well level (prior to pumping down wet well)

Inspection of wet well floats or level transducers for debris accumulation

Inspection of pump control panel for abnormalities, burning wire odor, etc.

Manual activation of pumps to check operation

Recording pump runtimes

Site inspection for unsafe conditions

ROUTINE MAINTENANCE

Routine maintenance is performed for all components of the SW collection system. Procedures for different sections of the collection system (e.g. gravity sewer, force mains, lift stations, etc.) Gravity sewer maintenance is typically isolated to manhole inspections and cleaning activities, with further maintenance performed if obstructions are discovered such as large deposits of F.O.G. or sand and grit. MCU inspects lift stations monthly or more frequently. Other lift station maintenance activities throughout the year include:

- Cleaning inside pump station and wet well
- Inspection and valve exercise
- Inspection and lubrication of pumps per manufacturer requirement
- Check power draw
- Verification of float switch/level control operation
- Verification of alarm systems

Types of Maintenance

Maintenance can be categorized into preventive, predictive, and corrective maintenance. Preventive maintenance involves inspection of the collection system and analysis of existing data to identify trouble areas. This can

provide guidance in developing the type, degree, and frequency of preventive maintenance required.

The main benefit of predictive maintenance is to allow convenient scheduling of corrective maintenance, and to prevent unexpected equipment failures. Predictive maintenance differs from preventive maintenance because it relies on the actual condition of equipment, rather than average or expected life statistics, to predict when maintenance will be required.

Corrective maintenance refers more to emergency maintenance. This can be an actual collapse of an existing sewer; stoppage due to roots, grease, or other foreign materials; or excessive inflow or infiltration. These conditions require immediate action to correct the problem. The objectives are to improve service, reduce emergency occurrences, and to minimize the cost of the preventive maintenance program.

In general, the greater the amount of preventive and predictive maintenance performed, the less the amount of corrective maintenance that will be required.

Pipeline Inspection / Testing Methods

The objectives of sewer inspection and testing are to identify existing or potential problems in the collection system, pinpoint the location of the problems, evaluate the seriousness of the problems, correct the problem and provide accurate and meaningful reports regarding the problems.

1. Surface Inspection

The inspection program is primarily a visual one made from street level. The inspection crews look for flooded or sunken areas, surface cracks on the ground along the sewer line route, signs of vandalism, damage to special structures and manholes, manhole covers higher or lower than the pavement level in the streets, and evidence of flooding or seepage from sewers.

2. Closed Circuit Television Inspection (CCTV)

Closed circuit television inspection provides the most positive and reliable information on the internal condition of a sewer line. Permanent records of the inspection can be made by photographing the TV screen or by using video tape. CCTV inspection capability extends to pipes of all sizes, down to 4-inch diameter pipes. Knowledge of the TV equipment and its capabilities, as well as the operator's skill in interpreting the recorded information, are very important.

3. Smoke Testing

Smoke testing consists of blowing smoke through a section of pipelines isolated from the rest of the system by plugging the pipes at both ends of three successive maintenance holes. Smoke testing is best applicable when the groundwater is low, so that any crack will leak smoke. Smoke testing is used in wastewater collection system to determine:

- a. Points of entry of surface inflow to the collection system;
- b. Location of illegal connections (e.g., down-spouts, drains, industrial drains, etc.) to the wastewater collections system; and
- c. Location of broken sewers due to settling of foundations, manholes and other structures.

Smoke testing of a sewer line could adversely affect the occupants of buildings connected to the sewer line being tested. There are a number of ways smoke could enter the building. These include defects in the building sewer system, dry taps, defective wax ring under the commodes, vents terminating in an attic, or missing clean-out plugs from the building sewer system. To avoid panic or undue alarm, the residents of the area to be smoke-tested should be notified of the scheduled testing a minimum of five (5) days in advance of the testing. The local Fire and Police departments should also be notified at that time and on at the start of each day of the scheduled testing.

4. Dye Testing

Dye testing consists of applying dye to a sewer line and tracing its movement as it flows through the sewer system. Typical applications of the dye testing include the following:

- a. Buildings that may not show smoke at vents during the smoke test due to dips or traps in the service connection pipes;
- b. Where a yard drain or storm drain is suspected of being tied to the building sewer or a lateral sewer;
- c. Any suspected surface inflow to the wastewater collection system; d. Testing for infiltration and exfiltration; and

5. Lamping

Pipeline lamping consists of looking directly through a section of the sewer line or by the aid of a mirror and light source. The purpose is to determine whether or not the section of the sewer line being lamped is straight and open. It also allows an inspector to visually examine the condition of the pipe within viewing distance of the manhole. Lamping, while providing only limited information, has considerable value in collection system maintenance. It is an economical and fast method of determining if a line is straight and clear; otherwise, it will expose imperfections in the line. Lamping is fast and cheap, if it can be used. However, lamping should never be used for any purpose other than for alignment. The existence of cracks, infiltration or other pipe problems are difficult to detect by this method.

Pipeline Maintenance

The most frequently received complaints about sewers are blockages. A blockage is confined principally to small diameter sewers not accessible for a maintenance worker to enter. Blockages or obstructions can be caused by sand

and gravel deposits, garbage from garbage grinders, disposable diapers, personal hygiene products, grease build-up, heavy settled debris, debris held by a line break, a slipped joint, illegal taps that protrude into the sewer pipe, or any other condition that reduces or restricts the flow. The recommended methods for cleaning blockages or obstructions depend on the nature and causes of the problems.

Pipeline cleaning and maintenance methods depend on the wastewater characteristics, fluctuations in flows, sewer alignment and grade, pipe material, condition of the sewer, the type of area being served, and most importantly, past history of sanitary sewer performance. An effective preventive maintenance program can only be achieved with a complete set of records. The records should indicate the causes of all blockages, size of the sewer, history of past blockages and corresponding preventive maintenance, including the type of maintenance equipment used to perform the maintenance work. Blockages can be cleared or prevented and sewers cleaned by either hydraulic or mechanical methods. Chemicals are also a tool used to help control root growth in sewer lines. Hydraulic methods consist of cleaning sewers with water under pressure that produces high water velocities. These velocities are usually high enough to break up the blockage and flush most grit, grease, and debris. Mechanical methods consist of using equipment that scrapes, cuts, pulls or pushes the material out of the pipeline. The following briefly describes the most commonly used cleaning methods, including their applicability and limitations.

1. Rodding

The equipment may either be a power rodding machine (may be truck or trailer-mounted) or hand rods. Power rodding involves applying a torque to a steel rod as it is pushed through the line, rotating the cleaning device attached to the lead end of the rod. This method can be used for routine preventive maintenance, such as breaking up of grease deposits, cutting roots, loosening debris, threading cable for bucket machines or TV inspection equipment, and for emergency removal of blockages. The method is fairly efficient in lines up to twelve (12) inches in diameter but is less useful in larger lines. The method is ineffective for removing sand and grit accumulations, but may loosen the material so it can be flushed out of the sewer. The rod tends to coil and bend when used in large diameter sewers. Electrically-powered power rodding machine is also available and can be used in smaller lines.

2. Flushing

This is an inefficient hydraulic method that can be used at the upstream location of a collection system where low or sluggish flow results in deposition of solids. It is now rarely used since the introduction of the high-pressure water jet cleaners. A fire hydrant, water meter, and approved backflow prevention assembly is normally used for this procedure. However, if a fire hydrant is not accessible, the equipment may consist of a water

tank, pumping mechanism, and piping. The method is effective in removing floatables and some sand and grit. It is useful in combination with mechanical operations such as rodding. The method is not very effective in removing heavy debris and grit. It is not recommended for use in locations with steep-grade hilly areas because of possible flooding of connected buildings.

3. Jetting

This is a hydraulic method of cleaning sewers which directs high velocity streams of water against the pipe walls at various angles. The equipment consists of a truck-mounted high velocity water machine, manhole hose guide, debris traps, vacuum trailer / truck. The method is very effective in cleaning flat, slow flowing sewers. It is very efficient in removing grease, sand, gravel, and debris deposits in small sewers. It is also effective in breaking up solids in manholes, and in washing structures. The effectiveness in removing debris, however, decreases as the size of the pipe increases.

4. Pigging

This method utilizes the pressure of water to create high-velocity water flow around the pig. It is very effective in removing heavy concentrations of sand, grit, rock, and grease from the sewers. Pigs are available in sizes from six (6) to Forty-eight (48) inches. Poly pigs are used for very large sanitary sewers and is not restrained by a line, but moves through the pipe segment with the water pressure built up behind it. Poly pigs are frequently used for cleaning force mains. The devices are very effective in moving accumulations of decayed debris and grease downstream. They are also capable of washing ahead of it a full pipe of deposits, including roots. Caution must be used in locations with steep-grade hill areas because of potential flooding of connected buildings.

Wastewater Pumping Stations

The main function of a pump station, sometimes called lift station, is to raise wastewater from a lower elevation to a higher elevation. A pump station discharges into a pressurized wastewater main (force main) where it can either pump directly into a system that will transmit flow to the water reclamation facility or it may discharge into a preceding downstream gravity sewer.

Equipment manufacturers will provide maintenance and repair recommendations for each piece of equipment they install in a pump station. Information includes frequency of oil changes (if applicable), lubrication of bearings, types of lubricants, operating temperature ranges, pressures, flow rates, and disassembly, repair and assembly procedures for specific equipment maintenance or parts replacement. During the warranty period of new equipment, the manufacturer's recommendation must be strictly followed to maintain equipment warranties.

Each individual pump station has its own requirements. These differences result from the design and location of the station. Thus, certain maintenance tasks may have to be modified to meet the needs of a particular pump station. A variety of equipment, ranging from the simplest mechanical, electrical, to the most complex instrumentation and control, are present in a pump station installation. This equipment requires regular preventive maintenance to keep it in optimum operating condition.

1. Operating Mode

This consists of the activation and deactivation of a series of pumps depending on the wastewater level in the wet well. Primary controls, such as floats, probes or pressure sensitive devices, measure the level of water in the wet well. Secondary controls convert the measurement from the primary controls into a signal for a pump to start, stop, or change speed.

2. Routine Inspections

Depending on the type, size, and capacity of a pump station, the facility may be inspected more frequently than others. In general, most of the pump stations are visited monthly for operational needs or as notifications are received from SCADA/Customers of alarms. During such visit, the Pump Operator performs all operational checks, including recording of elapsed time meters, recording electrical consumption, ensuring that all the pumps are operational, and the emergency generator (if applicable) is operational.

3. Wet Well

Wet wells require periodic cleaning and maintenance to include the removal of grit, grease and other materials. Grit has the ability to result in reduced flow to the pump as well as reduced wet well capacity. Grease has the ability to build up causing odors and impairing the operation of the controls. One of the most effective methods of removing grease and associated material is by the use of a truck or trailer-mounted vacuum unit which is conducted based upon each specific pump station's needs. In addition to routine cleaning, inspections will be conducted on all interior coatings of the wet well to ensure structure degradation is not occurring.

4. Pumps

It is common for a pump impeller to become clogged with rags, stringy material, and/or large solids of various sizes and shapes. All pump stations are designed to be easily removable for inspection or service, requiring no bolts, nuts or fastenings to be removed for this purpose, and no need for personnel to enter the wet well. Each pump shall be fitted with a one-fourth inch Type 316, stainless steel cable, air craft rating, between the cable holder or lifting bracket on the pump in order to provide a lifting point.

5. Valve Vaults

Failures in plug and check valves occur due to lack of proper maintenance or corrosion, they become blocked or cannot be closed to provide the needed isolation of the line. To facilitate servicing, check valves shall be equipped with an exterior arm and a lever or weight and access cover to allow for routine cleaning and maintenance.

6. Emergency By-Pass Pump Operation

All pump stations shall be provided with approved coupling device and valving connected to the discharge pipe after the check valves in order to utilize portable pumps and appurtenances during pump or control failures. The pump out connection shall be provided with a cap that includes a one-fourth (1/4) inch stainless steel nipple and stainless-steel ball valve for the purpose of relieving pressure build up in the cap.

7. Common Electrical Failures

In general, electrical failures may be caused by any or a combination of the following:

- a. Loss of electrical power to the pump station itself;
- b. Failure of the motor driving the pump; and/or
- c. Failure of the control system that activates the pumping system.

All pump station designs require a redundant auxiliary power source (standby or portable) with a minimum of 72 hours of operation without refueling. A second type of failure may also occur when the motor itself fails. To ensure continued operation all pump stations are designed to provide a reliable pumping capacity of the design loading with its largest pump out of service. The most common causes of electrical failure of the motor are an extraneous surge of power to the station, single phasing of a three-phase motor, or a short that develops within the motor itself. All stations are equipped with line side surge suppression, grounding systems, and phase monitoring equipment to reduce damages caused by these events.

SOURCE DOCUMENT FROM MCU-VIEWED AND VETTED FOR SWT WEBSITE: A. ORTIZ

