Collection System Action Plans

FRWA Wastewater Session
Wednesday the 31st of July 2024
Wastewater Track
Tomoka room - 9 am to 10 am

Collection System Action Plans

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OUTLINE

- Introduction
- Requirement of CS Action Plan
- Requirement of Power Outage Contingency Plan
- First Steps – Review and Preparation of a CS System
- System Inspection
- Benefits of the Plan and Putting the Plan into Action
- Annual Reporting Requirement to DEP
- Case Studies

Collection System Action Plan Requirements

- Rules 62-600.405, .705, and .720, F.A.C., were ratified by the legislature and became effective on June 28, 2023 (see House Bill 7027).
- Domestic wastewater facility permittee to develop two new, important plans:
  1. power outage contingency plan for the facility's collection system and a
  2. collection system pipe assessment, repair, and replacement action plan

CS Action Plan is Required

- An applicant for domestic wastewater facility permit is required to submit a power outage contingency plan to DEP with the application for a new permit, permit renewal, or substantial permit revision.

Power Outage Contingency Plan

- The facility's power outage contingency plan must describe the program and protocols to mitigate the impacts of power outages on the facility's collection/transmission system and pump stations. The rule implements the power outage contingency plan requirement.
- Rule 62-604.400(2) FAC – master stations (flow from 1 or more pump stations) and/or 12-inch force mains require in-place emergency generator. But DEP allows in-place or portable engine driven pumping equipment. Connection for emergency portable pumping is required

Power Outage Contingency Plan

- Overview of the plan, its management, and general response procedures for power outages at individual pump stations as well as area-wide power outages.
- Overview of the collection system, including a map, identifying pump stations and critical areas for SSOs.
- Pump station inventory and individual pump station evaluations/assessments related to power outages.
    - As part of an individual pump station assessment, a pre-completed generator request form should be prepared to ensure the correct type and size of portable generator with compatible connections is requested during an emergency (see Appendix B of the Power Resilience: Guide for Water and Wastewater Utilities (epa.gov).

Collection System Action Plan

- The plan must cover at least a 5-year planning horizon for all collection/transmission systems under the utility's control and the plan's detail must reflect the complexity of the system.
- The plan must set goals for evaluating percentages of the collection system each year with a minimum of 25 percent of the collection system evaluated over the five-year planning horizon. Evaluations and assessments may be made using one or more of the following investigative techniques:
  - camera inspections,
  - smoke testing,
  - data analytics,
  - focused electrode leak location,
  - flow isolation,
  - direct observation,
  - sonar imaging,
  - water chemistry,
  - solids analysis, or
  - flow monitoring
- The plan must be based on infiltration and inflow (I&I) studies, leakage surveys, and any follow-up detailed sanitary sewer evaluation surveys.
- The plan must include a map and inventory of the collection system.

Facility > 1 MGD

- Facilities with a permitted capacity over 1 million gallons per day must have a computerized GIS map and electronic inventory. Inventory items include:
  - Detailed information on each section of pipe, manholes, and pump stations including inspection and maintenance information.
  - Climatic, geologic, topographic, and hydrological information including seasonal high water table information and rainfall data.
  - Information on system flows, SSOs, bypasses, odor complaints, corrosion data, and past I&I analyses, as well as population and industries served.

CS Action Plan – continued

- The plan must include an adaptive maintenance and repair plan including protocols for routine maintenance, cleaning activities, and emergency repairs.
- Contact information and recordkeeping procedures.
- The plan shall describe measures, if any, taken for the following:
  - To limit fats, oils, grease, wet wipes, sand, and grit into the collection system, and a root control program.
  - Any local sewer ordinances or programs to minimize I&I from private sanitary sewer laterals/individual service connections.
  - Resiliency for sea-level rise and flood mitigation and stormwater control actions.
- After December 21, 2025, identify all satellite collection systems connected to the facility collection system.

Annual Report Requirements

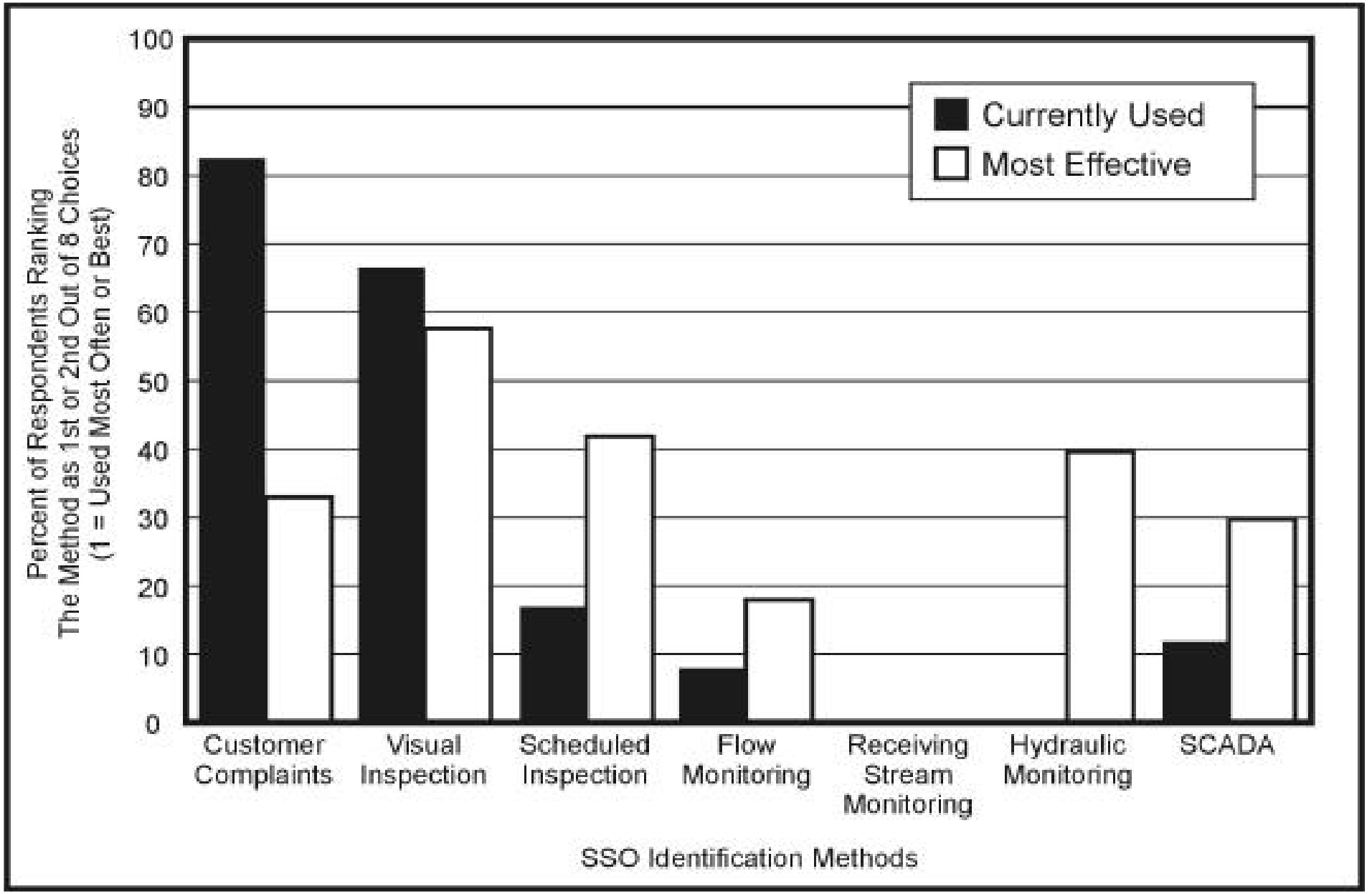
- The facility must submit an annual report summarizing plan by June 30 of the year following the fiscal year covered by the report. The report must include, at a minimum:
  - A summary of assessments conducted, results of the assessments, and the percentage of the collection system assessed.
  - Significant repairs, replacements, maintenance activities, expansions and upgrades conducted during the year and any planned for the upcoming year.
  - After December 21, 2025, identification of new satellite collection systems.
  - Information on annual expenditures for I&I studies, implementing the collection system action plan, repairs, replacements, and measures related to limiting fats, oil, grease, roots, wet wipes, sand, and grit in the collection system.
  - Details of facility revenues and expenditures related to the collection system.
  - Any other activities and information deemed relevant by the permittee.

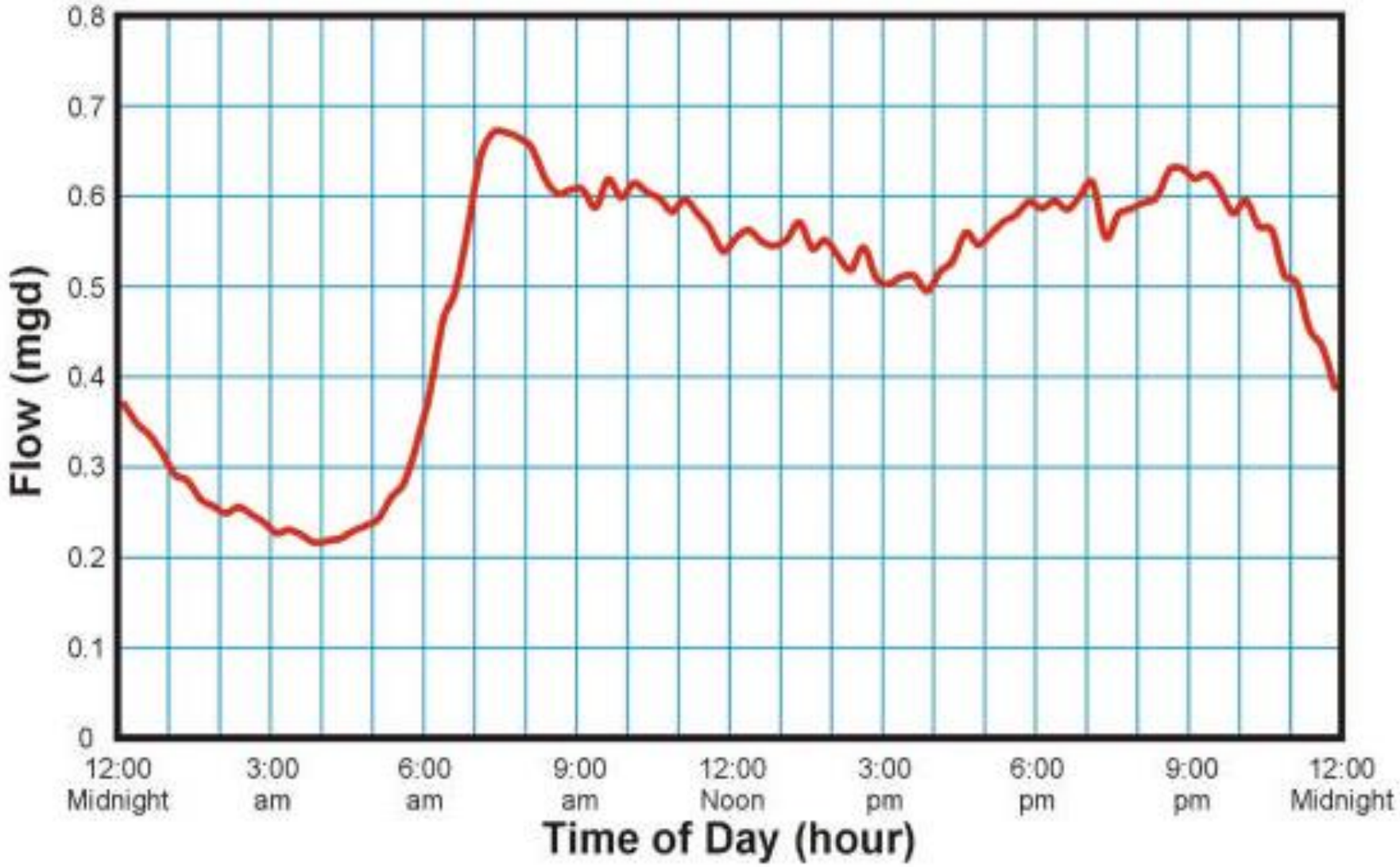
First Steps to Evaluate the CS System

- Identify Flow Patterns and known trouble locations
- Review COC Process: Built According to Plans?
- Review & Document O and M History
- Review & Document SSO History
- Identify Inspection Test Methods (i.e. manhole flow monitoring, lift station run times, cctv, etc.)
- Review Inspection Results

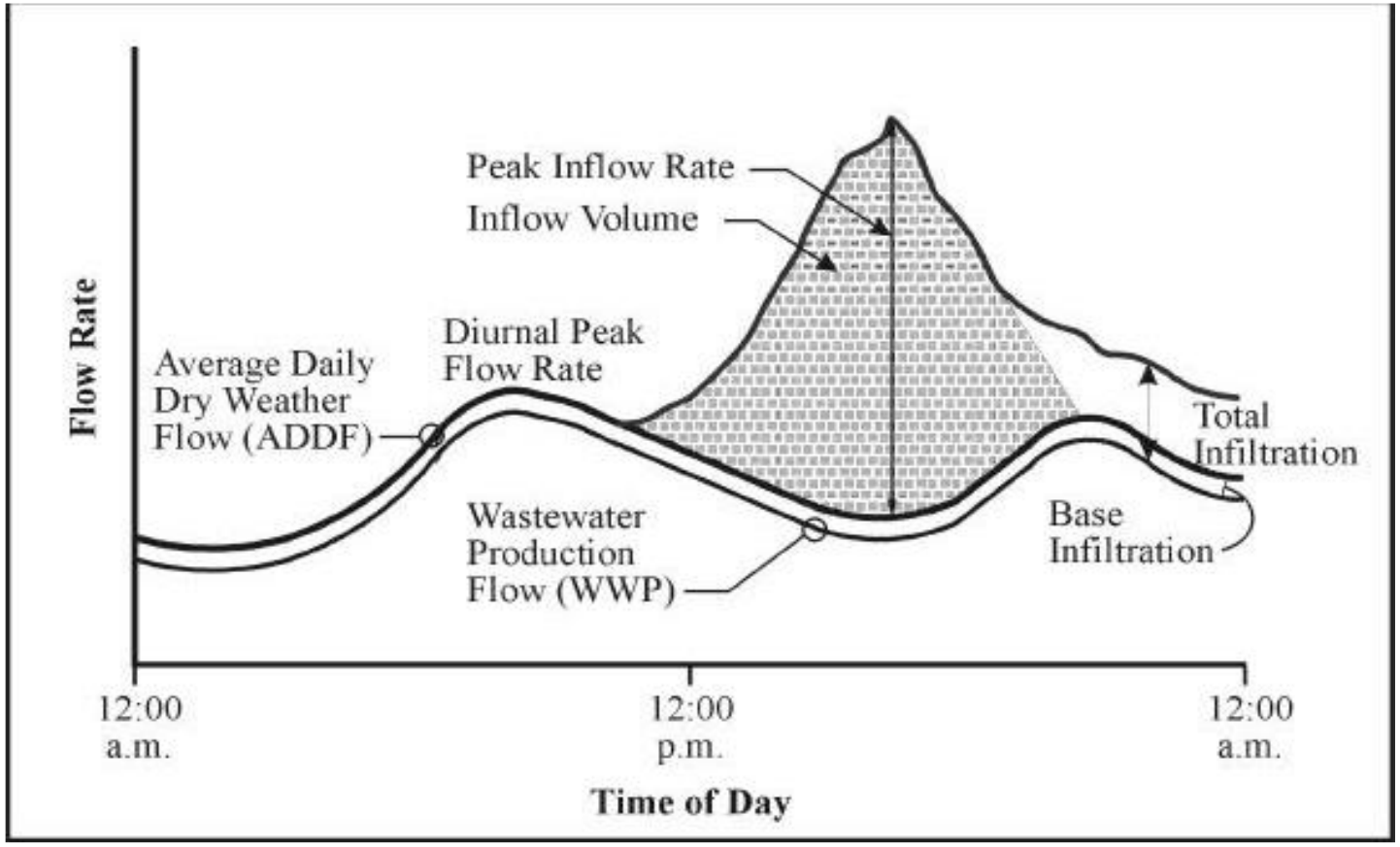
According To Plans – project complete!

SSOs – Storms, FOG, I & I Problems


Percent of Respondents Ranking
The Method as 1st or 2nd Out of 8 Choices
(1 = Used Most Often or Best)
100
90
80
70
60
50
40
30
20
10
0
Currently Used
Most Effective
Customer Complaints
Visual Inspection
Scheduled Inspection
Flow Monitoring
Receiving Stream Monitoring
Hydraulic Monitoring
SCADA
SSO Identification Methods


0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Flow (mgd)
12:00 Midnight
3:00 am
6:00 am
9:00 am
12:00 Noon
3:00 pm
6:00 pm
9:00 pm
12:00 Midnight
Time of Day (hour)

Influence of Rainfall Induced I & I



Inspections
The purpose of conducting inspections is to:

- Identify what is in the system (inventory).
- Identify the location of the system's components
- Determine the condition of the components (assessment).
- Prevent problems from developing.

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Physical inspections are performed to accomplish the following goals:

- Identify defects in the system that can contribute to or cause backups, overflows, and bypasses.
- Identify chronic problem areas so maintenance can be planned and scheduled.
- Identify defects that if not fixed will result in a future failure.
- Determine the system needs for long-term replacement and rehabilitation.
- Develop a baseline for future comparison to determine rates of deterioration.
- Assist in setting and justifying realistic user charges.

The primary methods of inspection and testing include the following

- Air testing
- Vacuum testing
- Mandrel testing
- Smoke testing
- Dye water testing
- Closed-circuit television (CCTV)
- Visual (including lamping)
- Tape measurements
- Sonic Testing

Inspection ?

Man unclogging sewer overflow, Chennai, India

A typical weekly pump station inspection should include observations of the following:

- The components comprising the alarm system, i.e., the wet well controller and electrical system. Note how the pumps are sequenced
- The pumps: bearings, packing, seals, suction and discharge gauge pressures.
- The pump motors: temperature, amperage and voltage, coupling and alignment, vibration and noise.
- Valves: check and pressure relief.
- Oil levels and lubrication.
- Belt wear and tightness.
- Emergency generator (exercise under load—if present).

Alternative Collection Systems

- Alternative wastewater collection systems are often implemented in situations where conventional wastewater collection systems are not feasible. Alternative collection systems include vacuum systems, small diameter gravity sewers, and pressure systems, which include septic tank effluent pump (STEP) systems and grinder pump (GP) systems.
- A common need of all alternative collection systems is proper administration and management. Since the needs of these technologies are different from conventional collection systems, operation and maintenance staff members must be properly trained in the particular needs of the type of system employed.

Spare Parts and Equipment

- The collection system authority must maintain an adequate inventory of spare parts, equipment, and supplies
- The inventory should contain information from the equipment manufacturer’s recommendations, supplemented by historical experience with maintenance and equipment problems.

Choosing the Best Option

- Costs and Cost Factors
- Pumps, Motors and Efficiencies
- Example Case Studies

Cost Considerations

- Sewer rehabilitation by both trenchless and traditional dig-and-replace methods can reduce treatment and O&M costs at the receiving treatment plant. In addition to treatment cost savings, energy costs for transporting flows to the treatment plant could also be reduced due to the reduced flow volume.

Cost Factors

- The diameter of the pipe.
- The amount of pipe to be rehabilitated
- Specific defects in the pipe, such as offset joints, root intrusions, severe cracking or other defects.
- The depth of the pipe to be replaced and changes in grade over the pipe length.
- The locations of access manholes.
- The number of additional access points that need to be excavated.
- The location of other utilities and structures that have to be avoided during construction.
- Provisions for flow by-pass.
- The number of service connections that need to be reinstated.
- The number of directional changes at access manholes.
- The soil's characteristics.

Pumps, Motors, and Efficiency

- Minimizing operating costs is a "systems approach" that uses proper component sizing and effective maintenance practices to avoid unnecessary energy consumption
- Pump speed adjustments provide the most efficient means of controlling pump flow. Adjustable speed drives—specifically, variable frequency drives (VFDs)—allow pump speed adjustments over a continuous range
- Improving Pumping System Performance: A Sourcebook for Industry, Hydraulic Institute, 2nd Edition 2006. Available for download at: improving-pumping-system-performance-sourcebook-industry-second-edition (energy.gov)
- Pump Manufacturers: ShinMaywa, Liberty, Flygt,

Benefits of the CS Action Plan

- Reduction of SSOs
- Help to Eliminate Sewage Discharges to the Environment
- Plan and Schedule O and M for the CS System –Be Proactive
- Plan and Seek Funding for the CS System
- Reduce and Mitigate DEP SSO Penalties
- Put Your Plan Into Action

Local Sewer Ordinances and SOPs

- Ordinance Approval By Local Government with Guidelines, Preferred Haulers & Contractors, Compliance and Penalties
- STANDARD OPERATING PROCEDURE (SOP) for Sanitary Sewer Overflows and Spill Incidents
- Fat, Oil & Grease (FOG) BMP
- FRWA Documents: SSO Response Plan, Manhole Inspection Form; I & I Information for Systems, Smoke Testing Information,

Satellite Systems

- All satellite collection systems connected to the City's collection system must be identified:
- Name of each satellite collection system,
- The ownership type of each identified satellite collection system,
- A unique identifier number for each satellite collection system,
- Whether the satellite collection system is under the control of the facility, and
- Population served by the satellite collection system.

System Resiliency

- The Collection System Action Plan must describe the resiliency of the collection/transmission systems that considers sea-level rise and the planned or completed flood mitigation and stormwater control actions

FRWA Wastewater Services

- **Collection System Assistance:**
- Lift station pumping rate calibration, floats and operations
- Evaluate, diagnose, and trouble shoot control systems
- Corrosion, H_2S formation, odor problems, and reduction in collection systems
- Locating line blockages and leakage – utilize sewer camera and other devices to determine the location and/or cause of the blockage(s)
- Use Vac Trailer to clean manholes and lift stations
- Provide low-cost suggestions to help the system correct blockages
- Air release valve maintenance – provide assistance and training

FRWA Wastewater Services

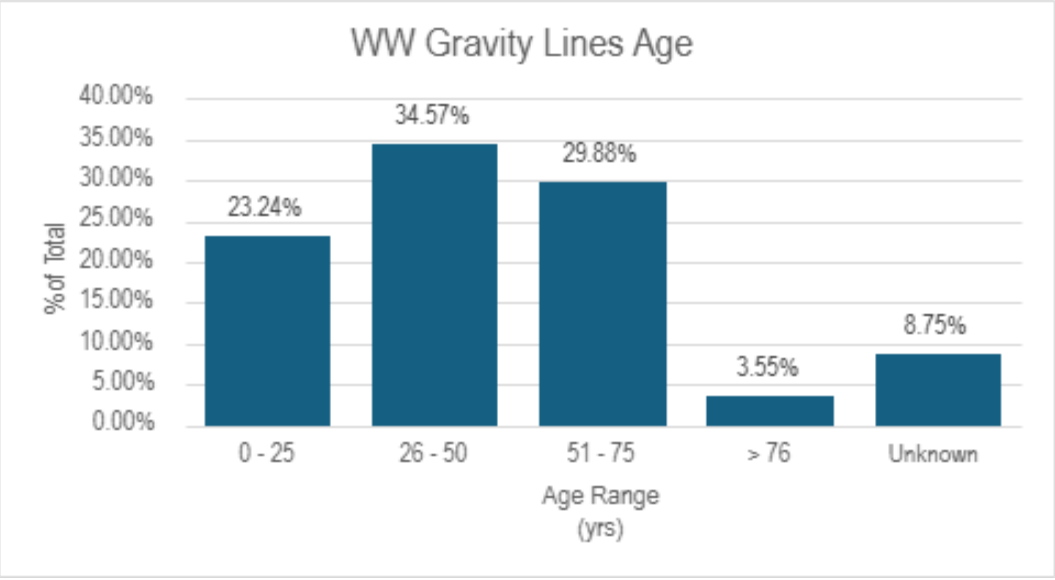
- Inflow and Infiltration (I&I) Studies
- Asset Management Program
- Critical Asset Evaluation and Management (Fiscal Sustainability)
- Drones - FRWA has invested in both an above ground and underwater drone
- Mapping - Diamond Maps
- Safety Issues

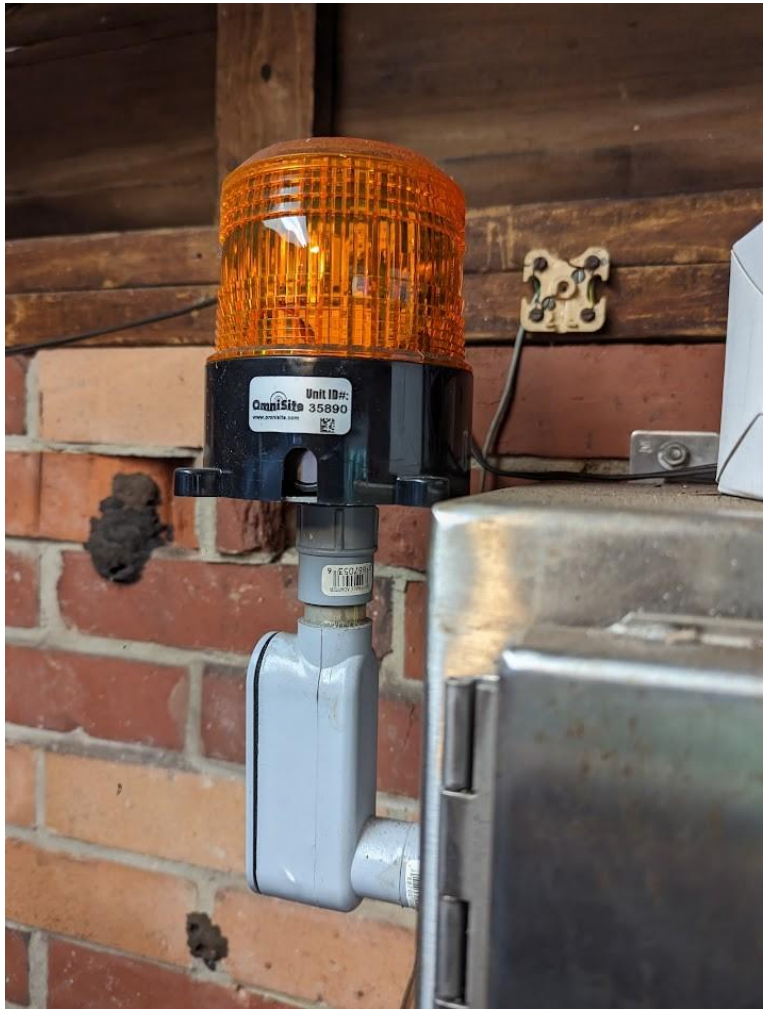
Examples: USN NAS Jax, Atlantic Beach, Neptune Beach

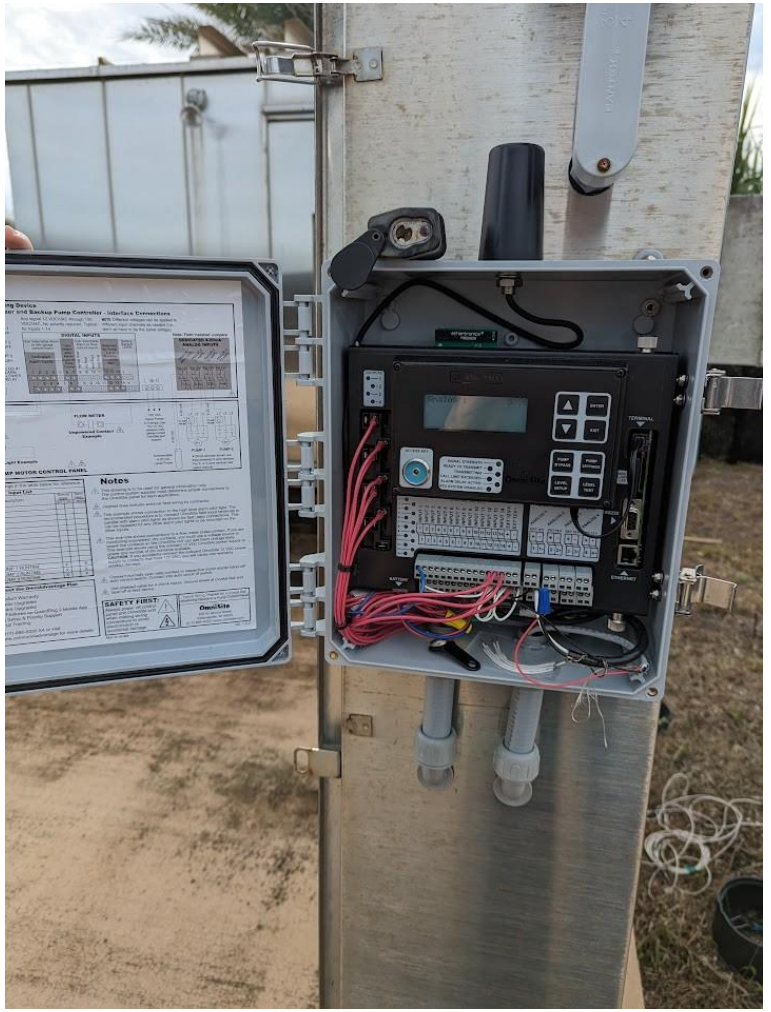
Table of Contents

City Of Neptune Beach Florida

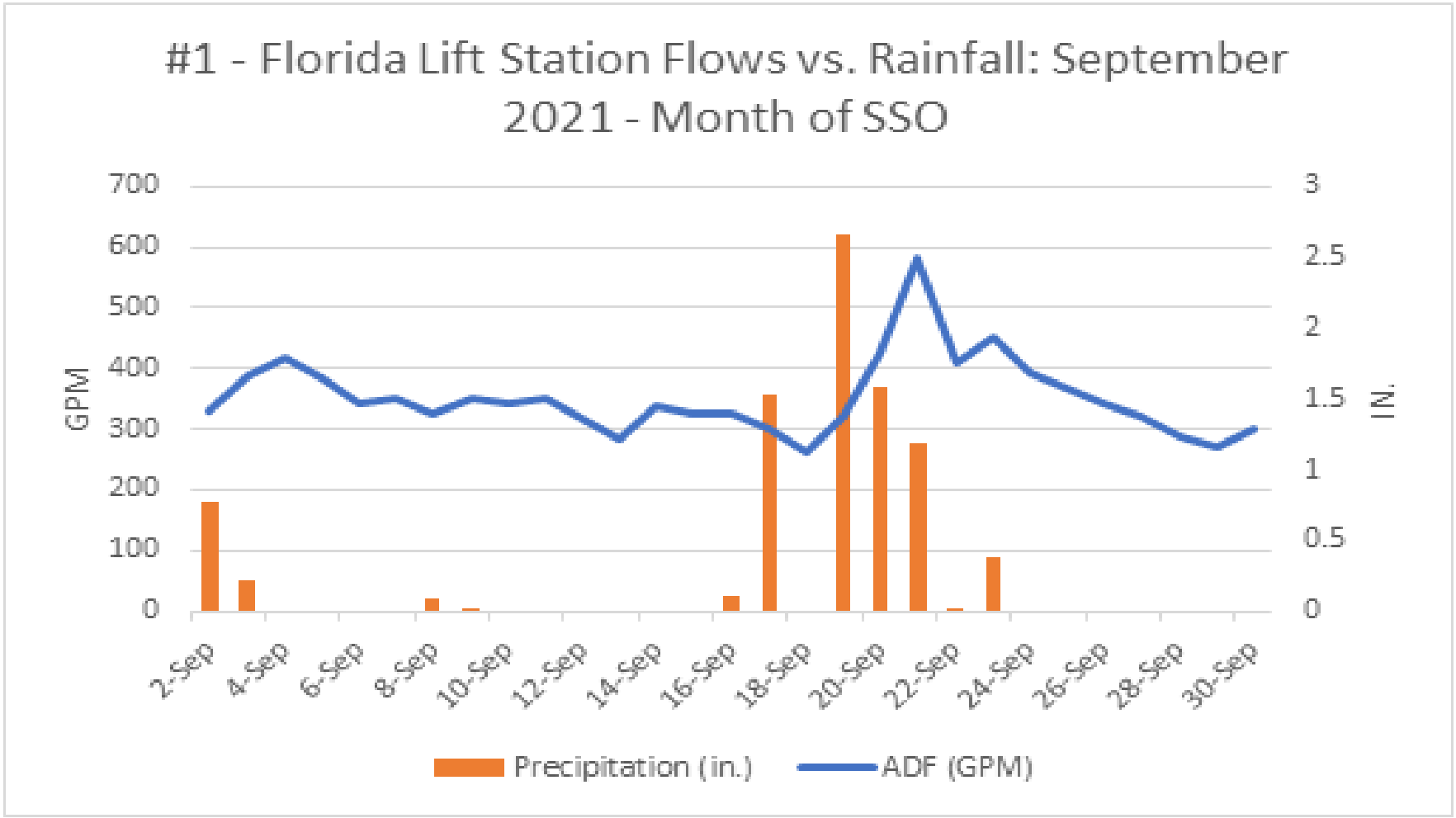
- Capacity, Management, Operations and Maintenance and Asset Management Program (CMOM and AM Program)
- 162,100 linear feet of gravity sewer main, 548 manholes and 14 lift stations and approximately 14,200 linear feet of force mains.







SCADA System for Monitoring - **Spare Parts and Equipment Inventory Available**


#1 - Florida Lift Station Flows vs. Rainfall: September 2021 - Month of SSO
GPM
IN.
700
600
500
400
300
200
100
0
3
2.5
2
1.5
1
0.5
0
2-Sep
4-Sep
6-Sep
8-Sep
10-Sep
12-Sep
14-Sep
16-Sep
18-Sep
20-Sep
22-Sep
24-Sep
26-Sep
28-Sep
30-Sep
Precipitation (in.)
ADF (GPM)

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Thank you

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