Importance of Flow Monitoring

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SEWAGE IS MY BREAD AND BUTTER
• Definitions
• Why Flow Monitor?
• Flow Monitoring Applications
• Site Selection
• Lessons Learned
• DWF – Typical daily flow from the system
• DWI – groundwater entering the sanitary sewer system through indirect paths like at pipe joints and lateral connections
•WWF – sewer flows in addition to DWF that occur during a precipitation event
• RDII – stormwater entering the sanitary sewer system through direct and indirect connections like catch basins, down spouts, and pipe joints
• Measure discharge for billing purposes
• Establish dry weather flow patterns
• Quantify and isolate wet weather flow
Why Flow Monitor?

Credit: Alan Cressler
• Sewage overflows
• Basements back ups
• Capacity assurance/MDEQ compliance
• Transport and treatment costs
- I/I problem?
  - MORs/WWTP data and lift station data

Who Needs to Flow Monitor?
• I/I study
  o Flow monitoring
  o Modeling
  o Sewer System evaluation study (SSES)
• Flow monitoring – a decision-making tool
  o Collect data used to model collection system
  o Establish DWF patterns
  o Identifying areas with high WWF
• Establish diurnal or seasonal flow patterns
Dry Weather Flow Patterns – Casino
Dry Weather Flow Patterns – Industrial
DWF Patterns – Seasonal Variations

Dry Weather Infiltration

Flow (gpm)

Rainfall (inches)

Base Infiltration
Min Flow
Avg DWF
Avg Spring DWF
Spring Increase
Min Spring Flow

2/26/12 2/27/12 2/28/12 2/29/12 3/1/12 3/2/12 3/3/12 3/4/12 3/5/12

Flow
Rainfall
Wet Weather Flow Patterns
• Flow monitoring process
• Installation
• Things to consider
• Ideal site
• Area Velocity Measurements

\[ Q = A \times V \]

ISCO 2150

Sigma 910

ISCO LaserFlow

Marsh-McBirney Flo Dar
• Monitoring program development
  o Site selection and installation
  o Data collection and handling
  o Data analysis
• Confined space certified personnel needed for installation
• Proper installation provides for accurate measurements and can prevent malfunctions and data loss
• Program objectives
• Physical criteria
• Accessibility
• Security
• Budget
Less Ideal Site
• Where to install flow monitors?
  ○ Monitor all areas contributing to the WWTP or pump station
  ○ Monitor areas of suspected high I/I
• Straight through manhole
• No other incoming sewers or laterals
• Adequate depth and velocity
• Not within the influence of a lift station
• No surcharging
• Easily accessible
• Free of excess grease or debris
Site Selection Lessons Learned
• Site hydraulics
• Lift station
• Site access
• Grease/debris
Ideal Site?
Low Depth Sensor

0.00 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

0 50 100 150 200 250 300 350 400 450 500


Rainfall (inches)

Flow (gpm)

Meter 4 - Flow Chart

Raw Data  Rainfall

Low Depth
Lift Station Influence
Meter 4 - 4/15 Event

Flow (gpm) vs. Rainfall (inches) for the period 4/14/12 to 4/21/12.

- **Flow (gpm)**: The blue line represents the wet weather flow.
- **Rainfall (inches)**: The green line indicates the rainfall.

*Lift Station Influence*
Silt Covering Sensor

Meter 11 - Flow Chart

Flow (gpm)

Rainfall (inches)

- Raw Data
- Rainfall

12/7/12 12/12/12 12/17/12 12/22/12 12/27/12 1/1/13 1/6/13

0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

0 500 1,000 1,500 2,000 2,500
Silt and Seasonal Variation
Ideal Site?
• Know the objectives of your flow monitoring program
• Allow enough budget and time to collect necessary data
• Work closely with field staff when picking sites
• Flow vary greatly between systems and seasons
• Careful site selection can save time and money
Thank You

Questions?

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