Scattergraphs Used to Reduce Scattered Results

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Overview

- What is a Scattergraph in Relation to Flow Monitoring Data
- How to Use a Scattergraph in QA/QC
- Extra Benefits of Using Scattergraphs in Wet Weather Analysis

Why Do We Flow Monitor

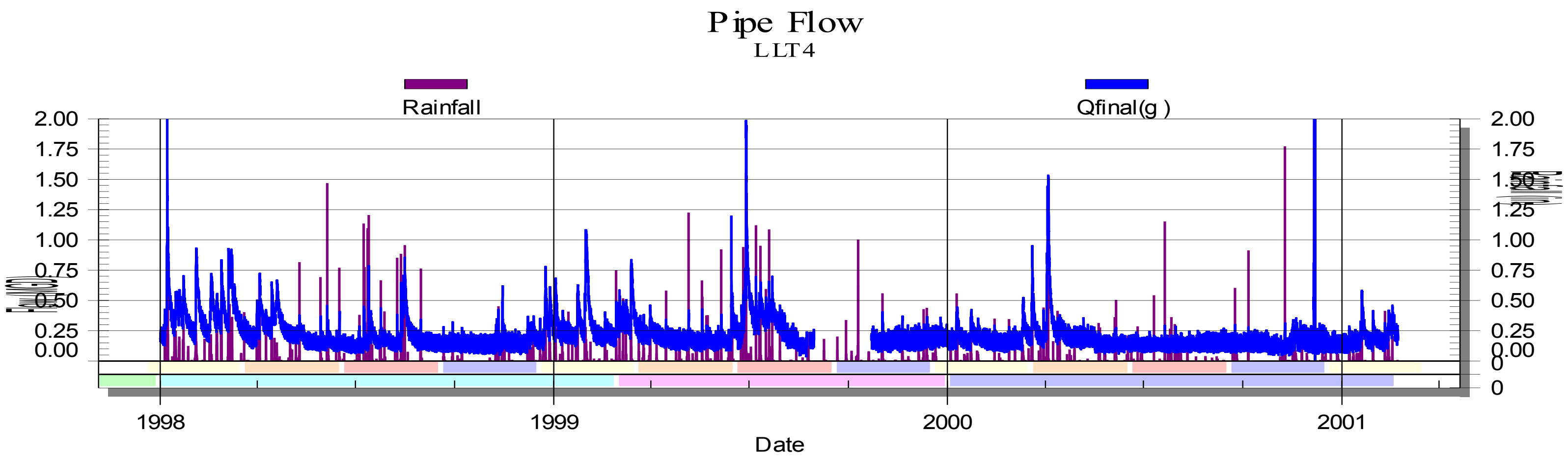
Capacity Analysis

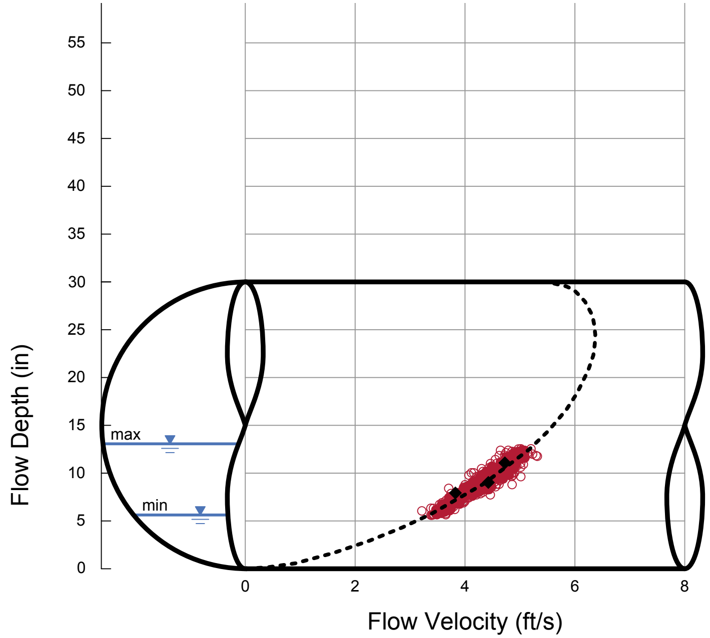
Inflow and Infiltration

Model Calibration

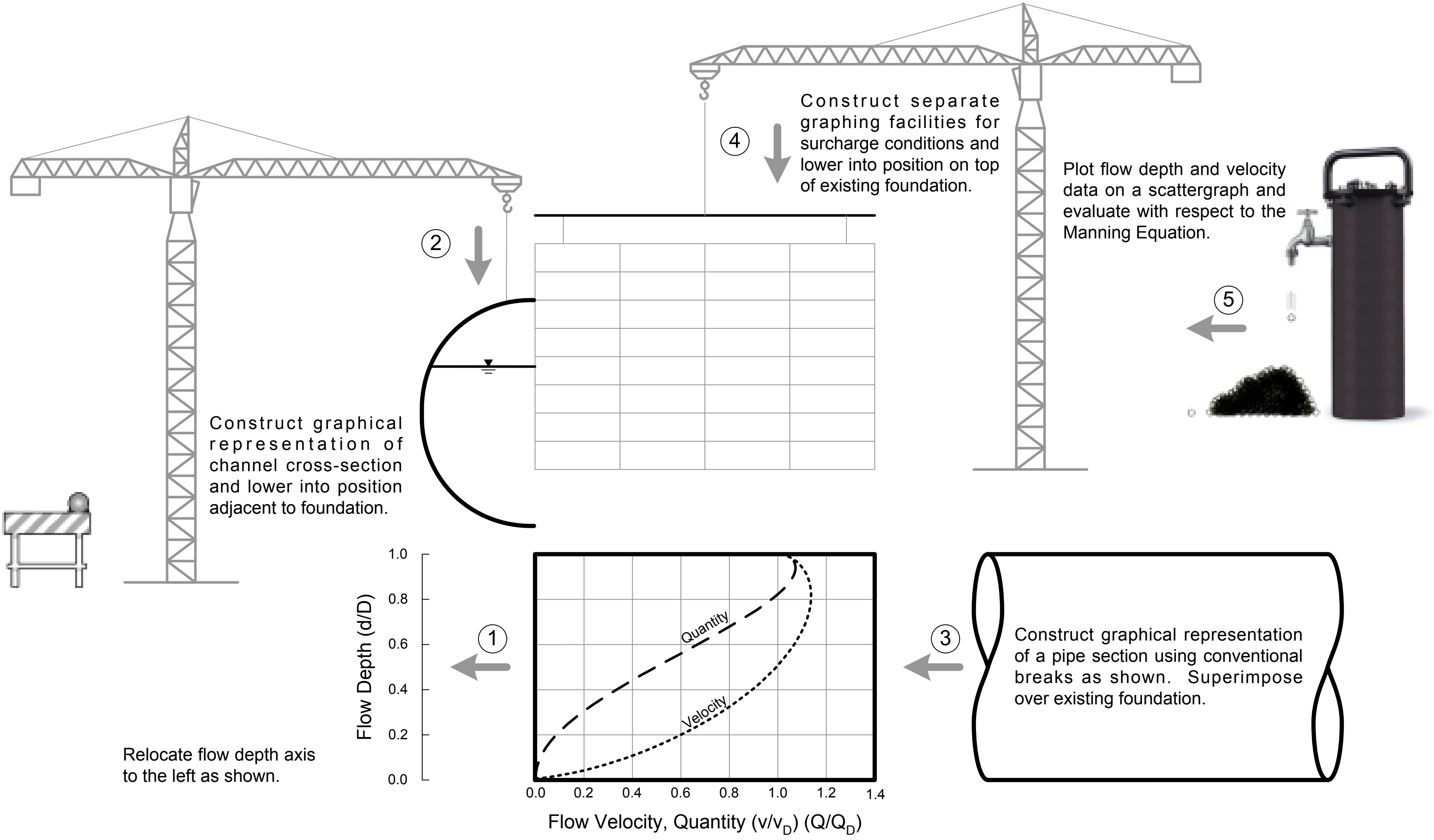
Billing

What to Do with Flow Monitoring Data

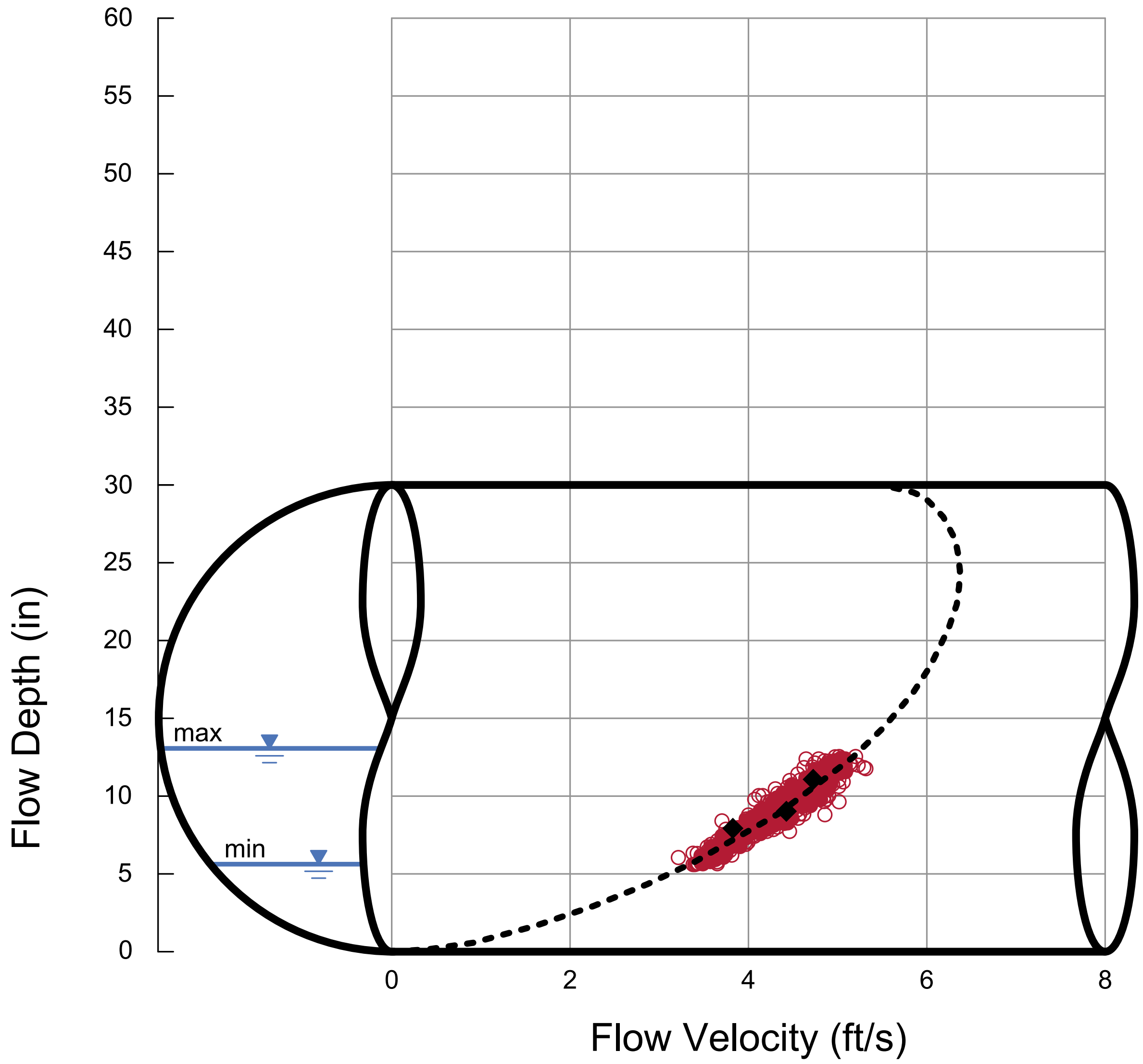




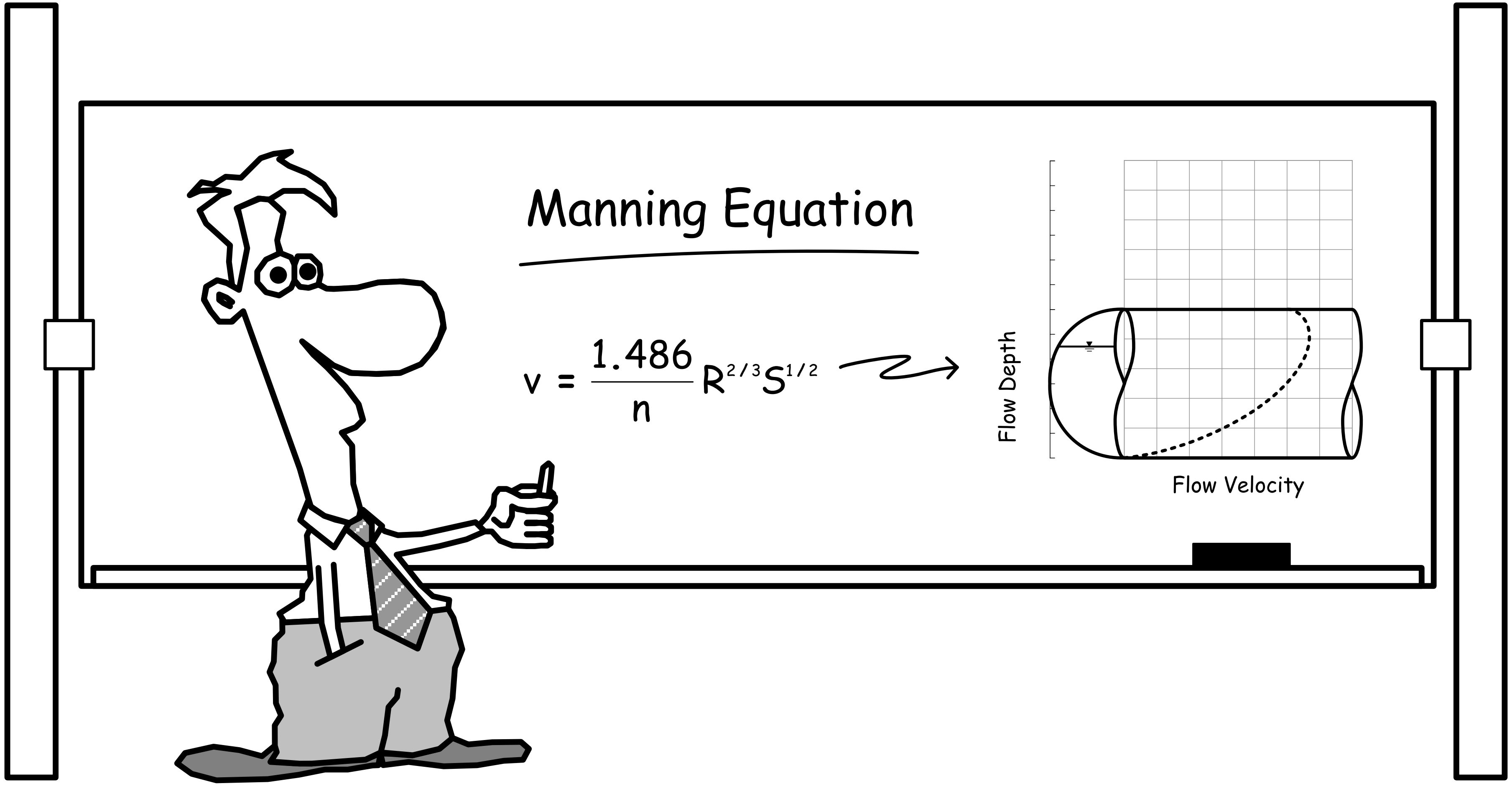
Formula for Constructing a Scattergraph



The Scattergraph in all of Its Glory!



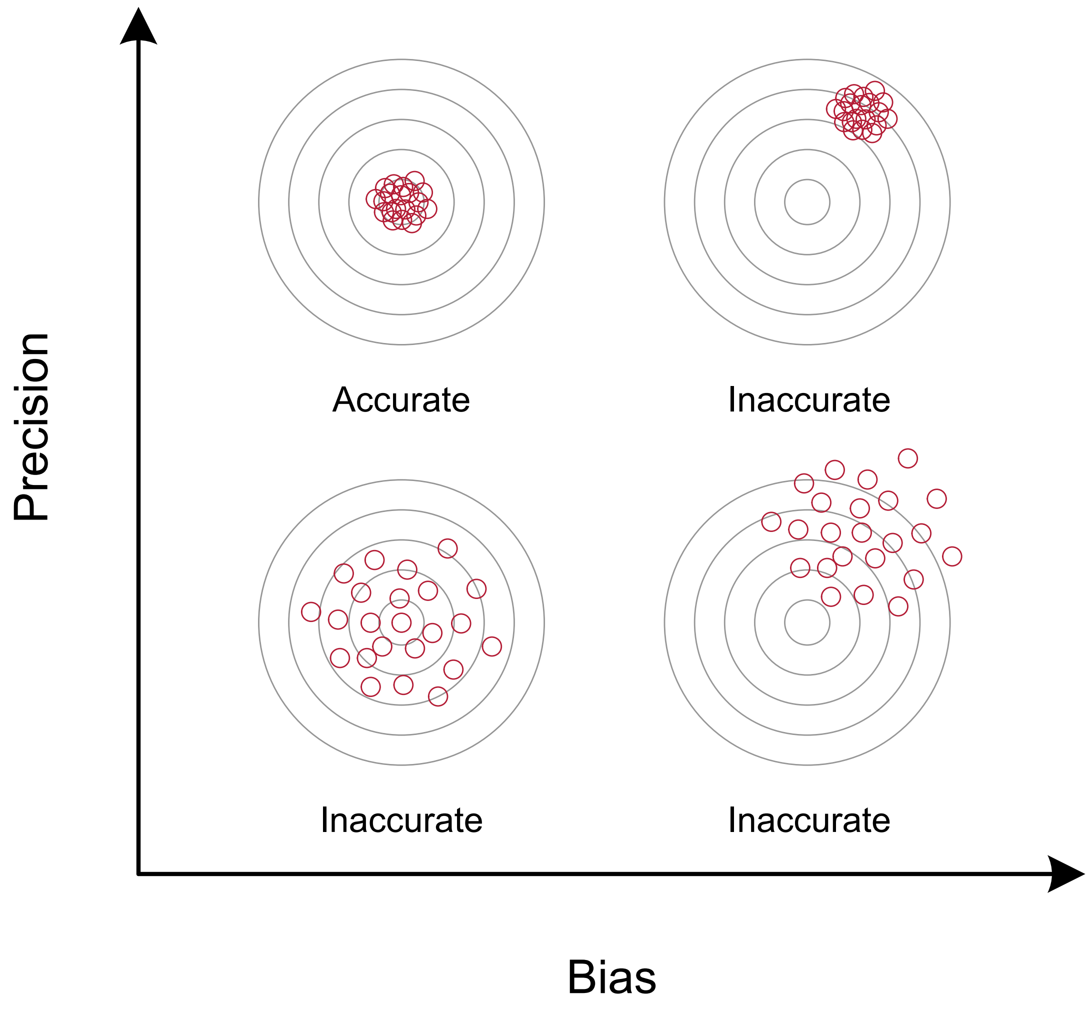
Design Curves Provide Scientific Approach to Evaluate Flow Behavior

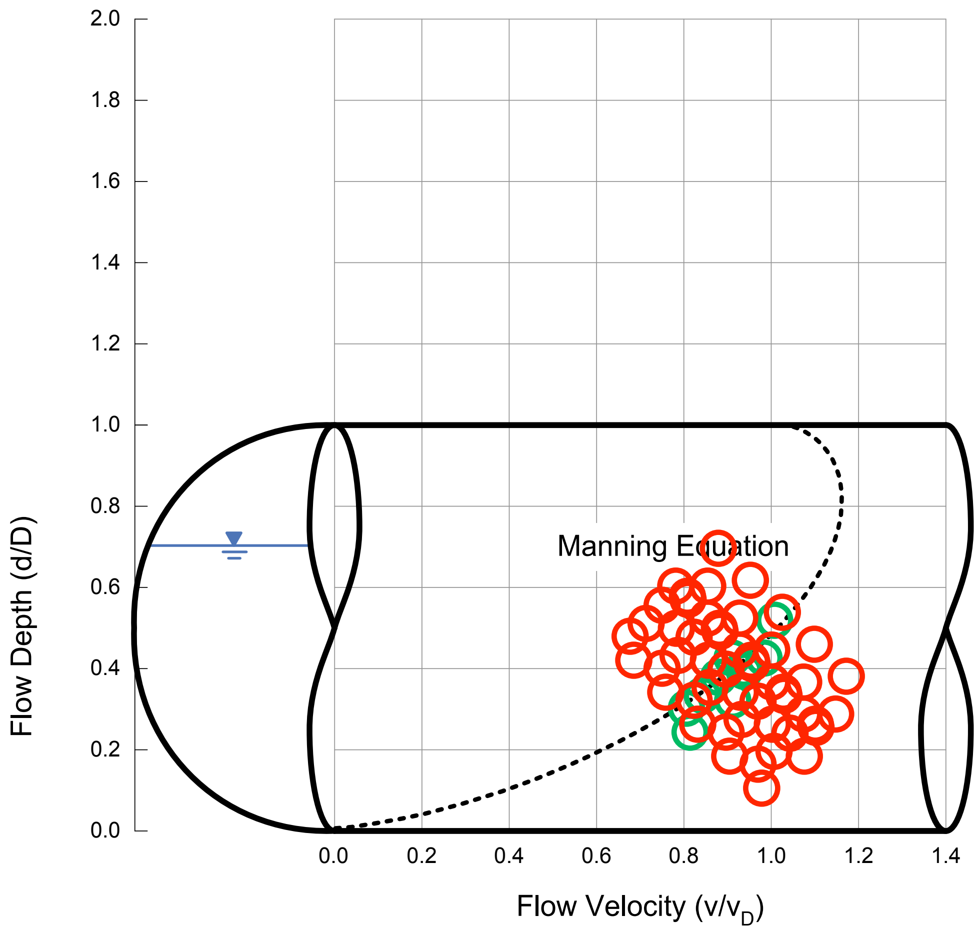


The **Manning Equation** is an empirical formula that describes a relationship between depth and velocity under ideal conditions and is commonly used to design sewer systems.

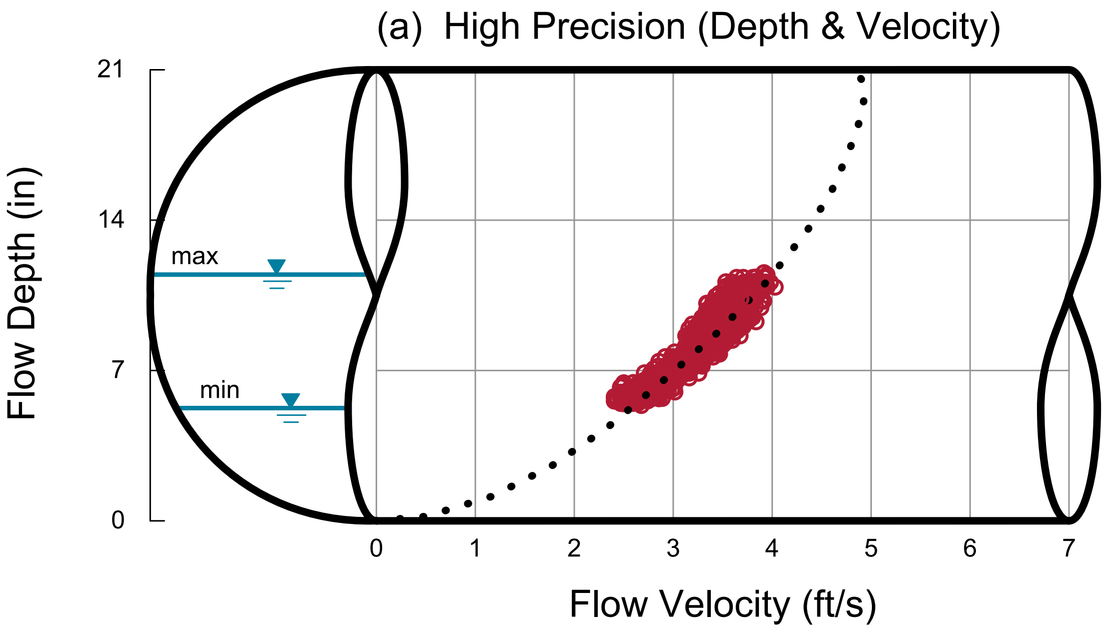
In order for the **Manning Equation** to apply, the sewer must be in free flow/ gravity flow conditions.

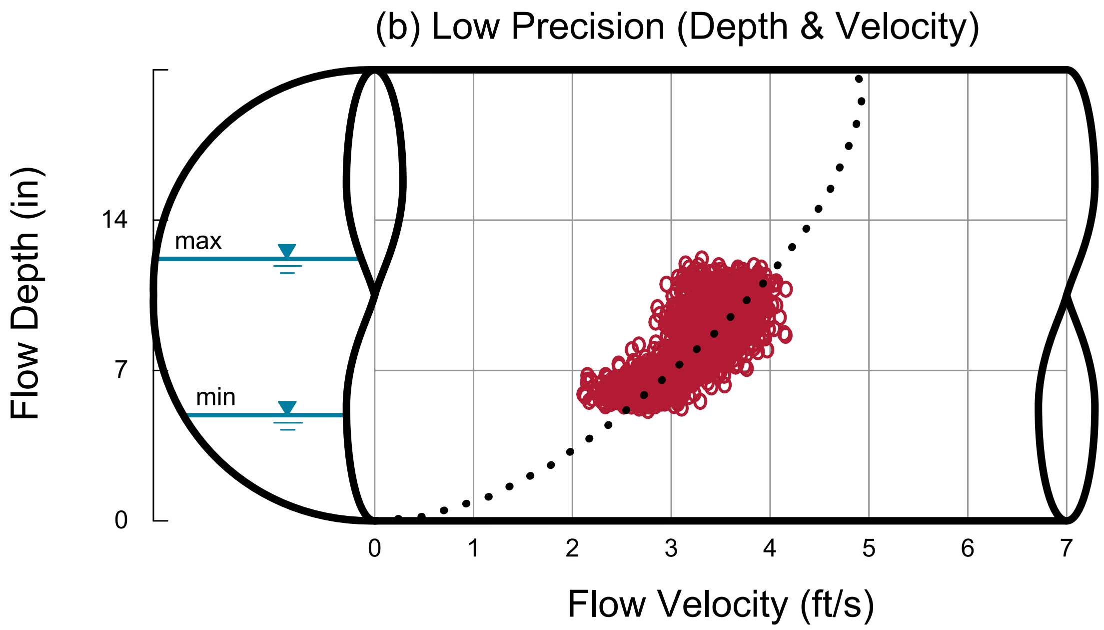
Precision and Accuracy Applied to Flow Data



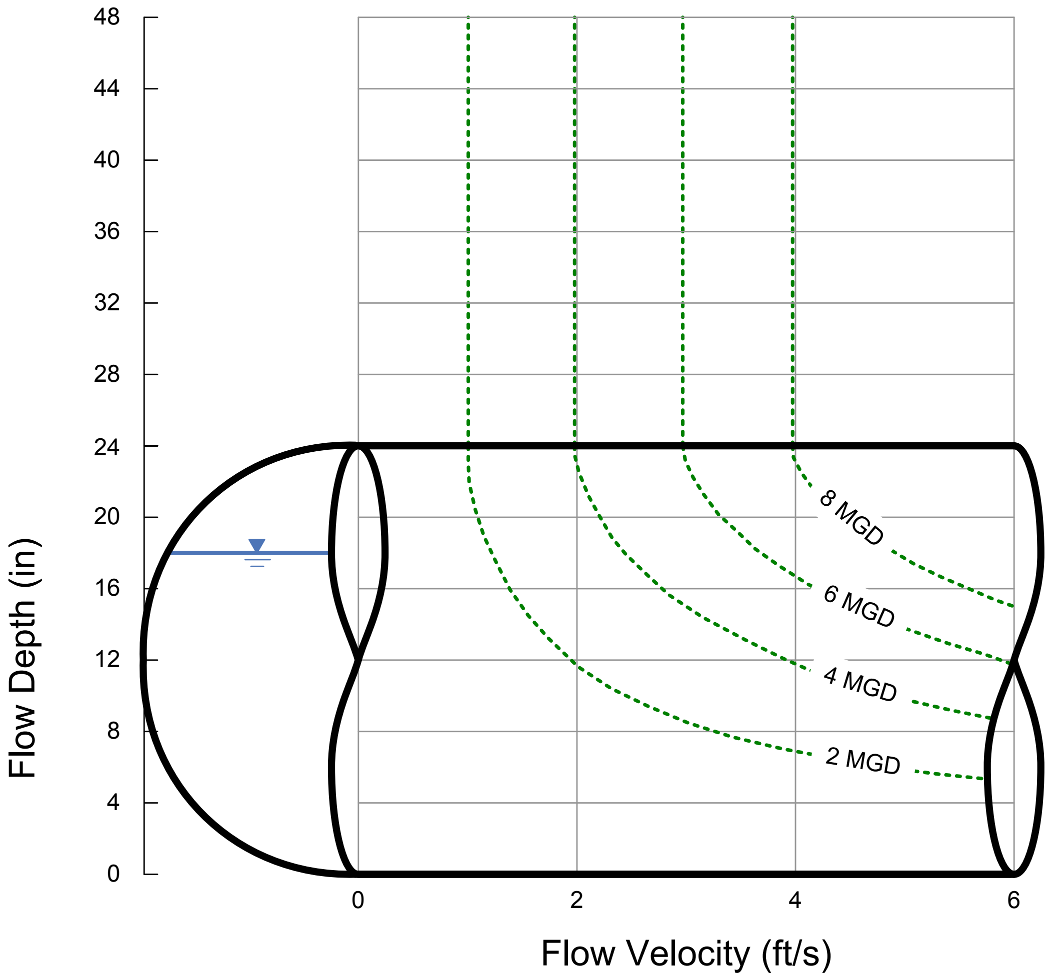


Precision and Accuracy Applied to Flow Data

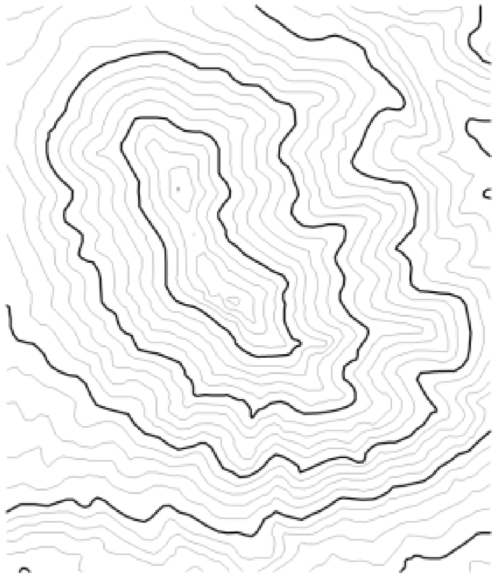




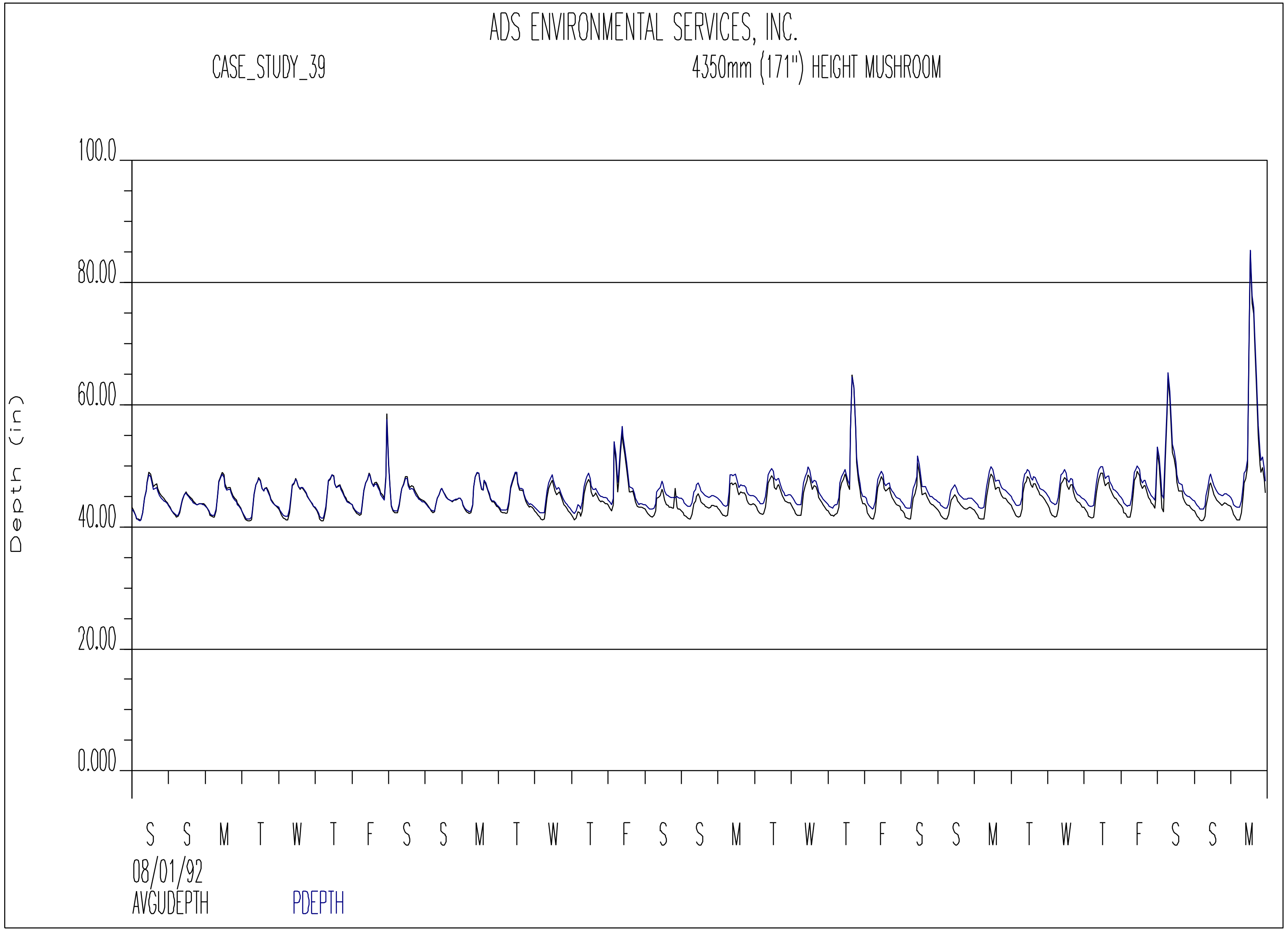
Adding Even More Value to Your Scattergraph – ISO Q Lines

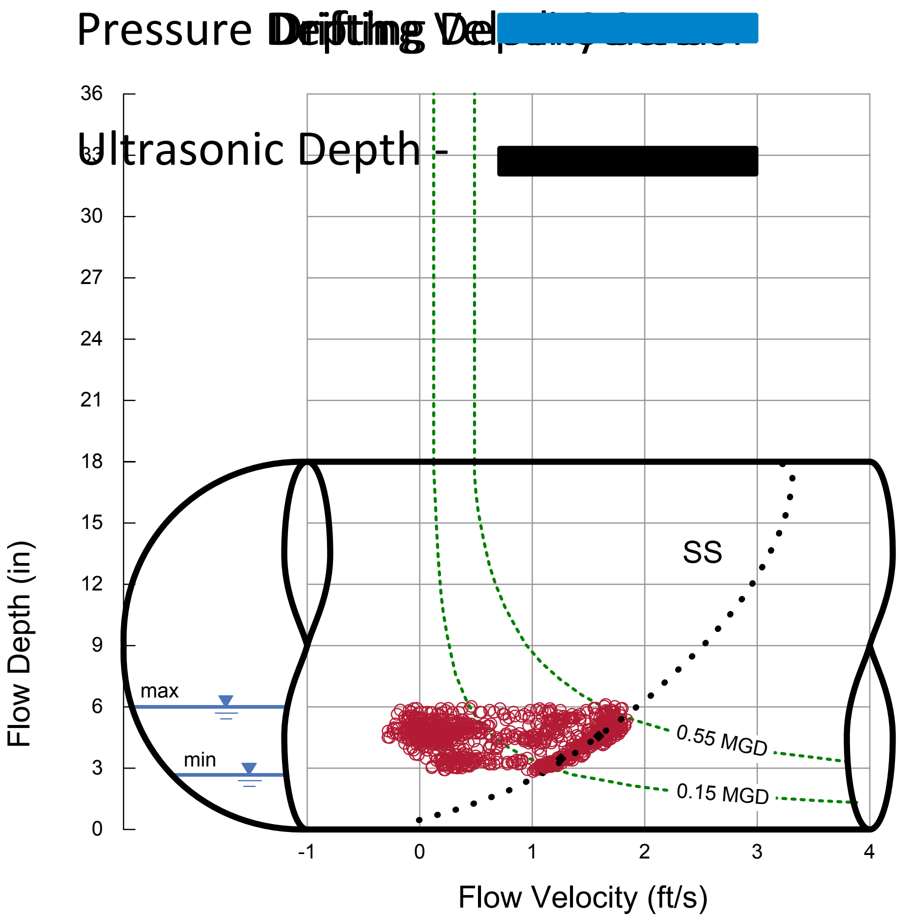


- Iso-Q lines are analogous to contour lines on a topographic map.
- When you cross contour Lines, you go up or down in elevation.
- When you cross Iso-Q lines, you go up or down in flow rate.



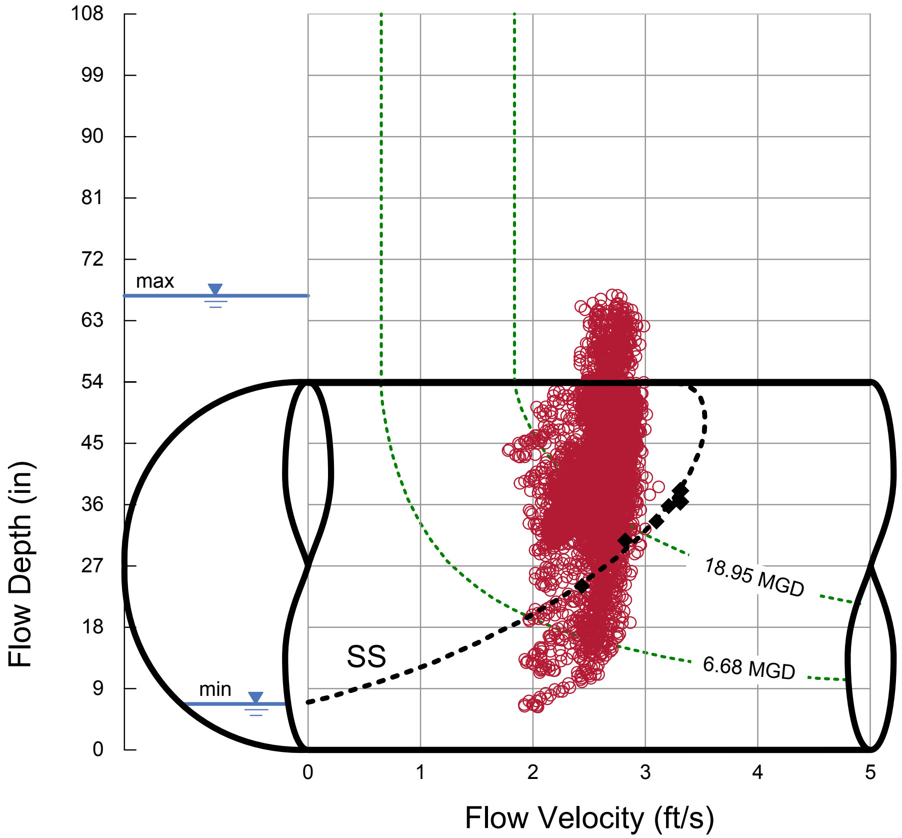
Scattergraphs in QA/QC Procedures





Scattergraphs in QA/QC Procedures

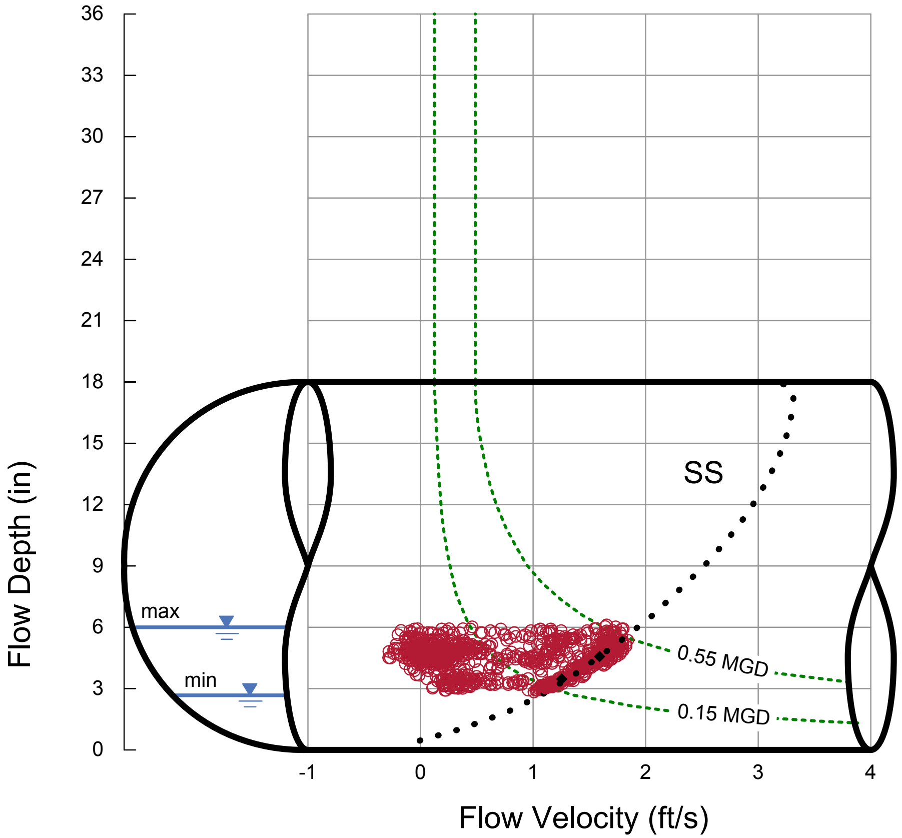
Drifting Depth Sensor



Remember

According to a design curve all changes in one either depth or velocity should warrant a change in its counterpart.

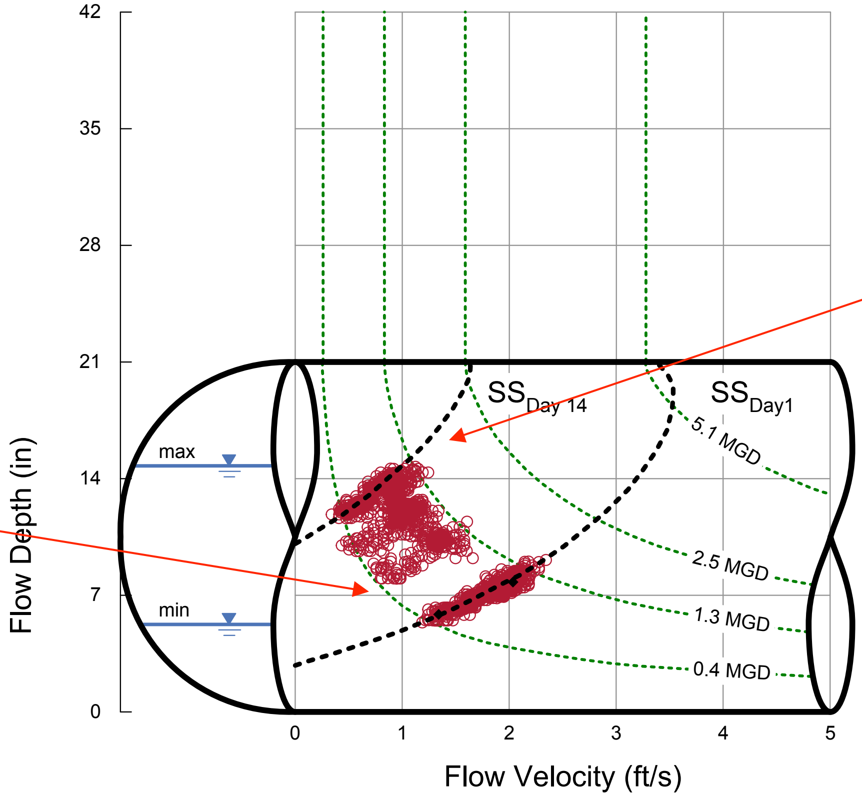
Drifting Velocity Sensor



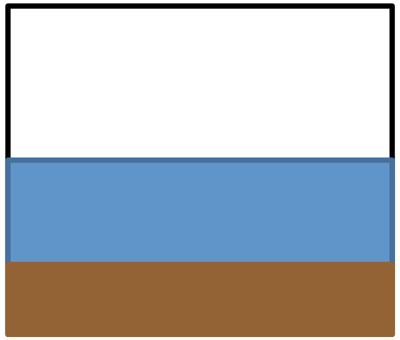
ADS

Debris Accumulation

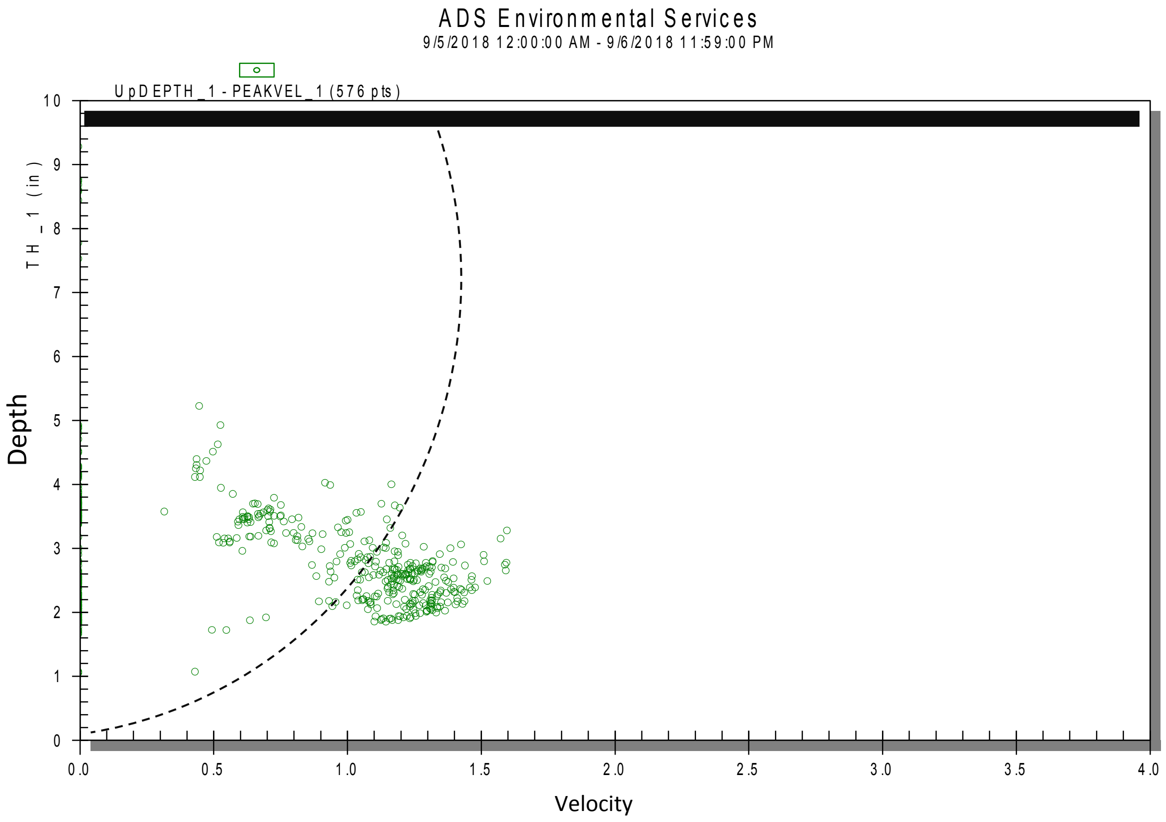
Pipe Day 1
No Sediment or Debris



Pipe Day 14
Sediment or Debris Present



Debris on Sensor



Wet Weather Applications

Questions When Dealing with Wet Weather

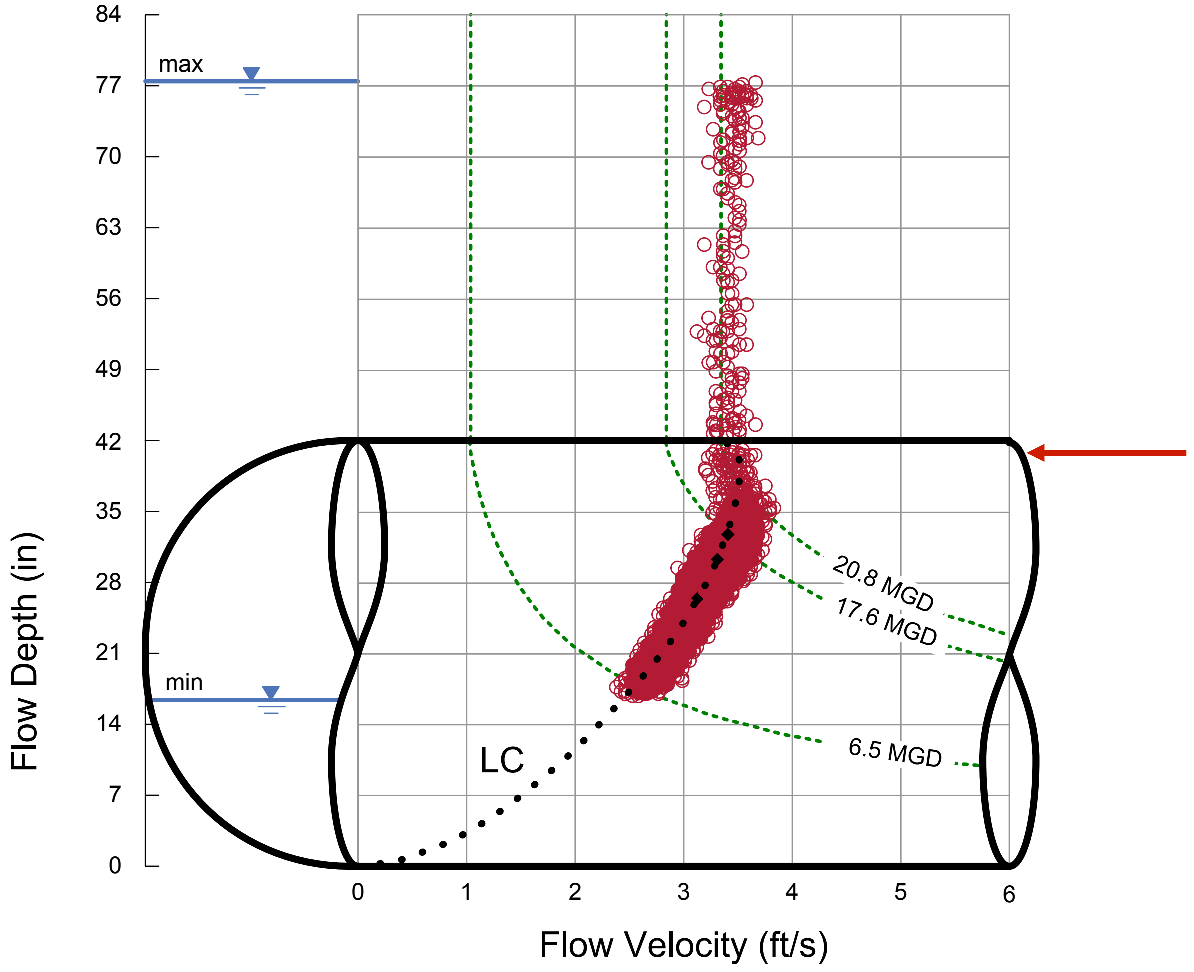
How much flow is being conveyed in my system?

Do I have I/I?

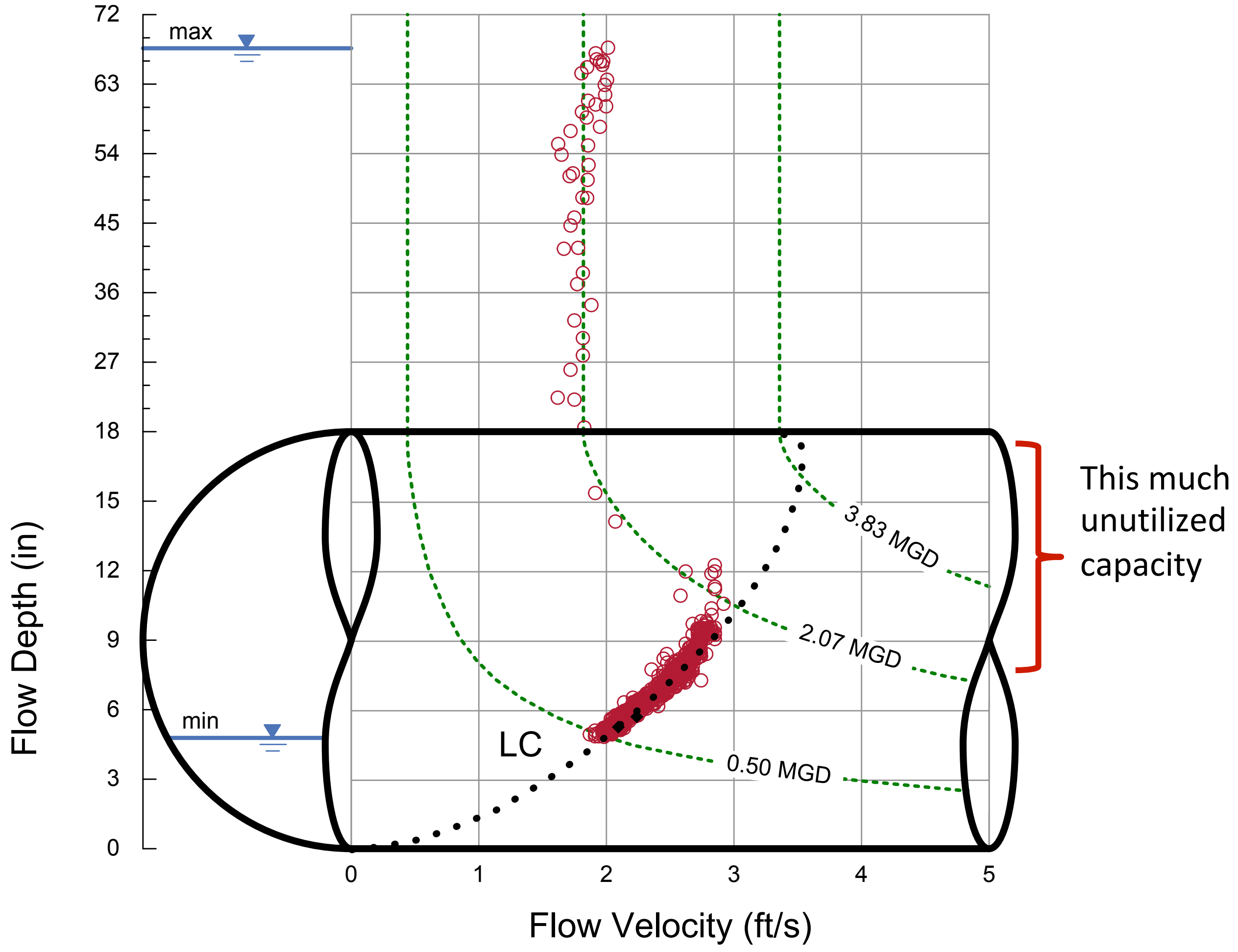
How severe are my surcharge events?

Am I experiencing overflows (CSO/SSO)?

Surcharge and Capacity Concerns

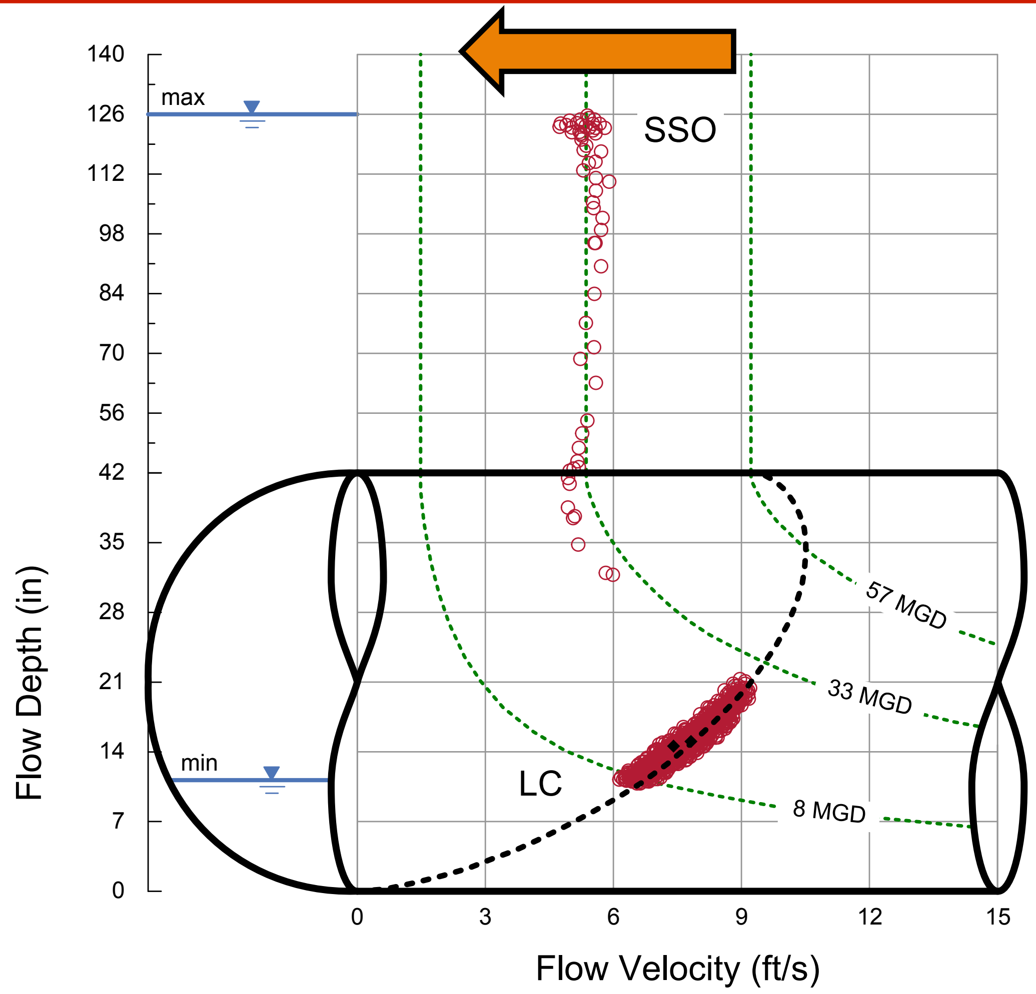


Pipe Operating at Full Capacity

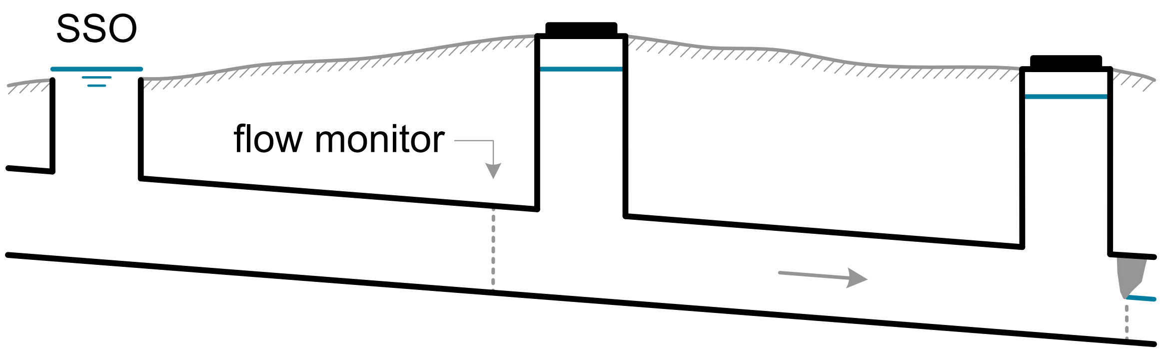


Pipe Operating at Limited Capacity

A Closer Look at Surcharge Events

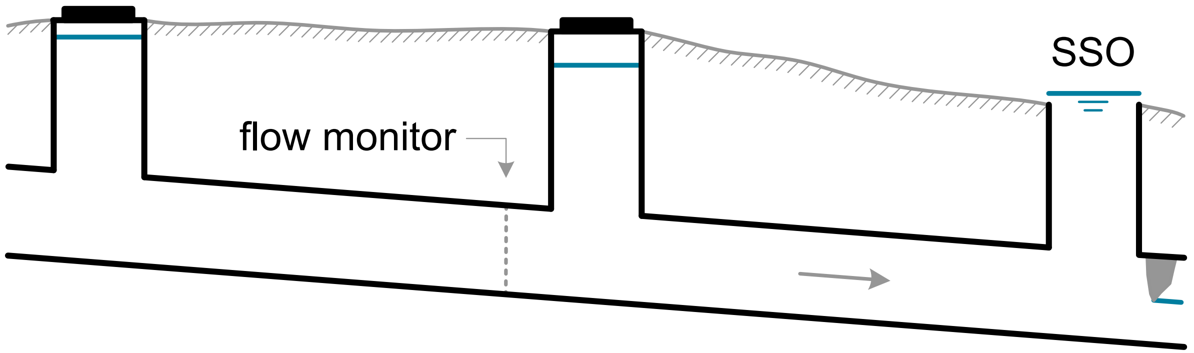


Upstream Overflow

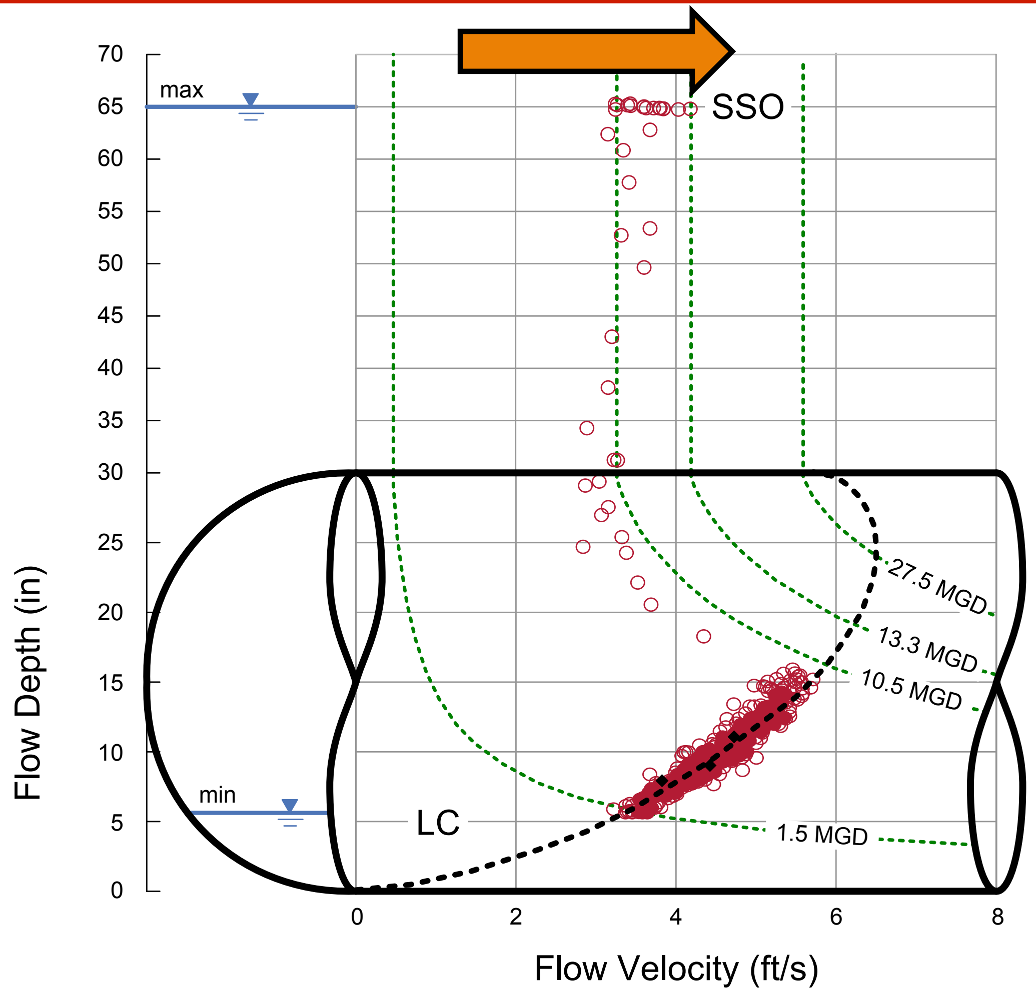


Relief Upstream causes less flow to be observed at the monitoring location

A Closer Look at Surcharge Events

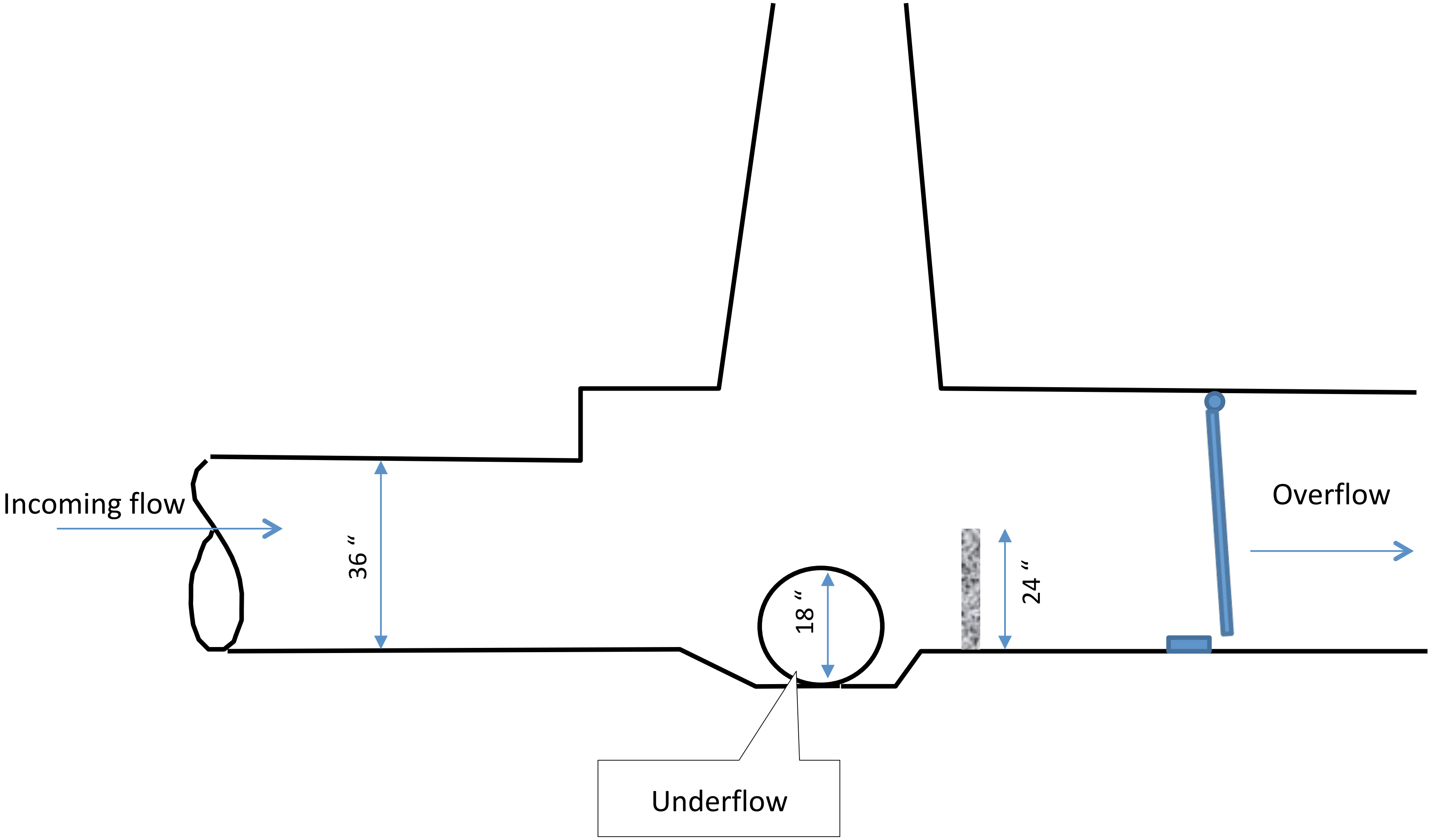


Relief Downstream causes more flow to be observed at the monitoring location



Downstream Overflow

Quantifying CSO Events

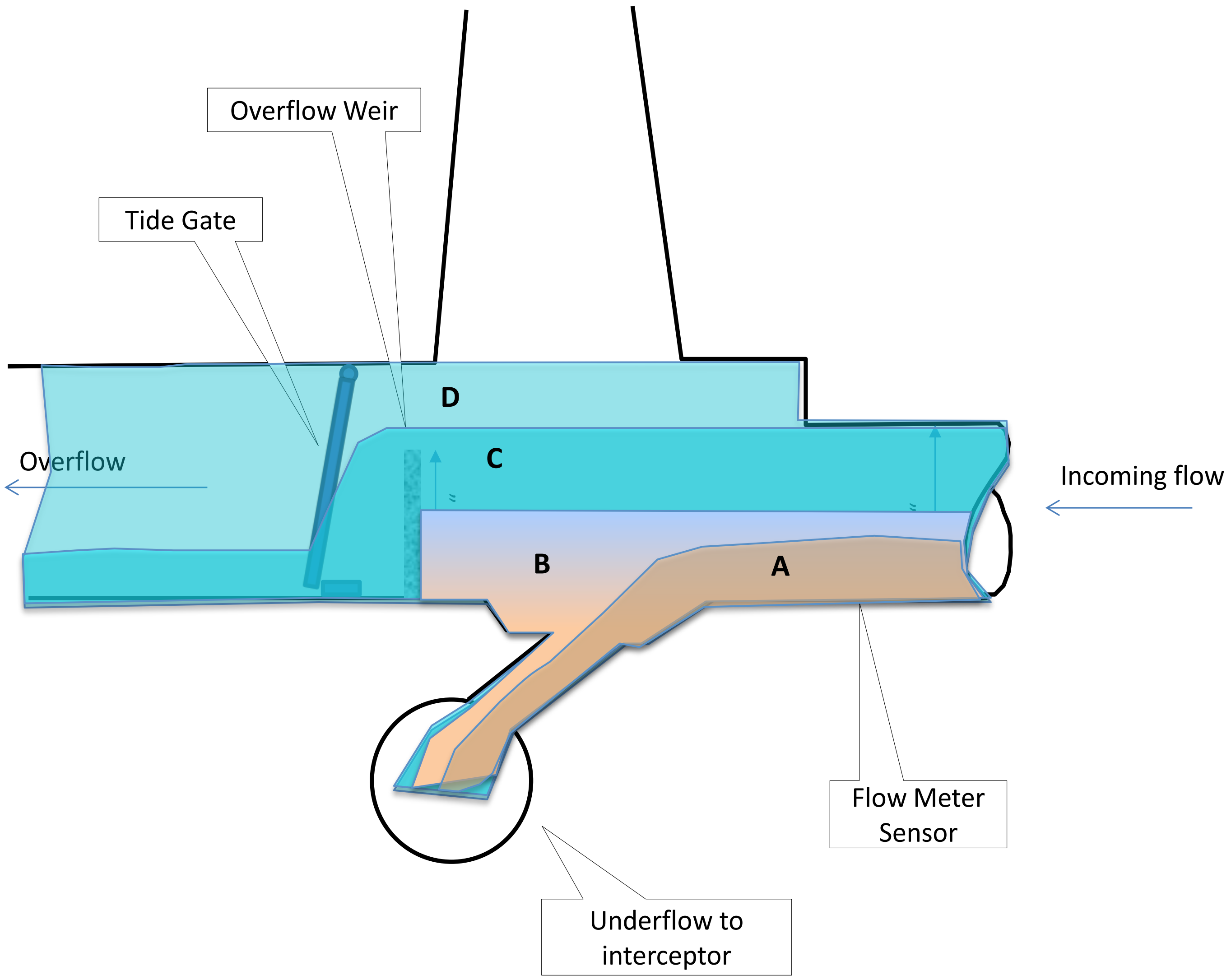


Quantifying CSO Events

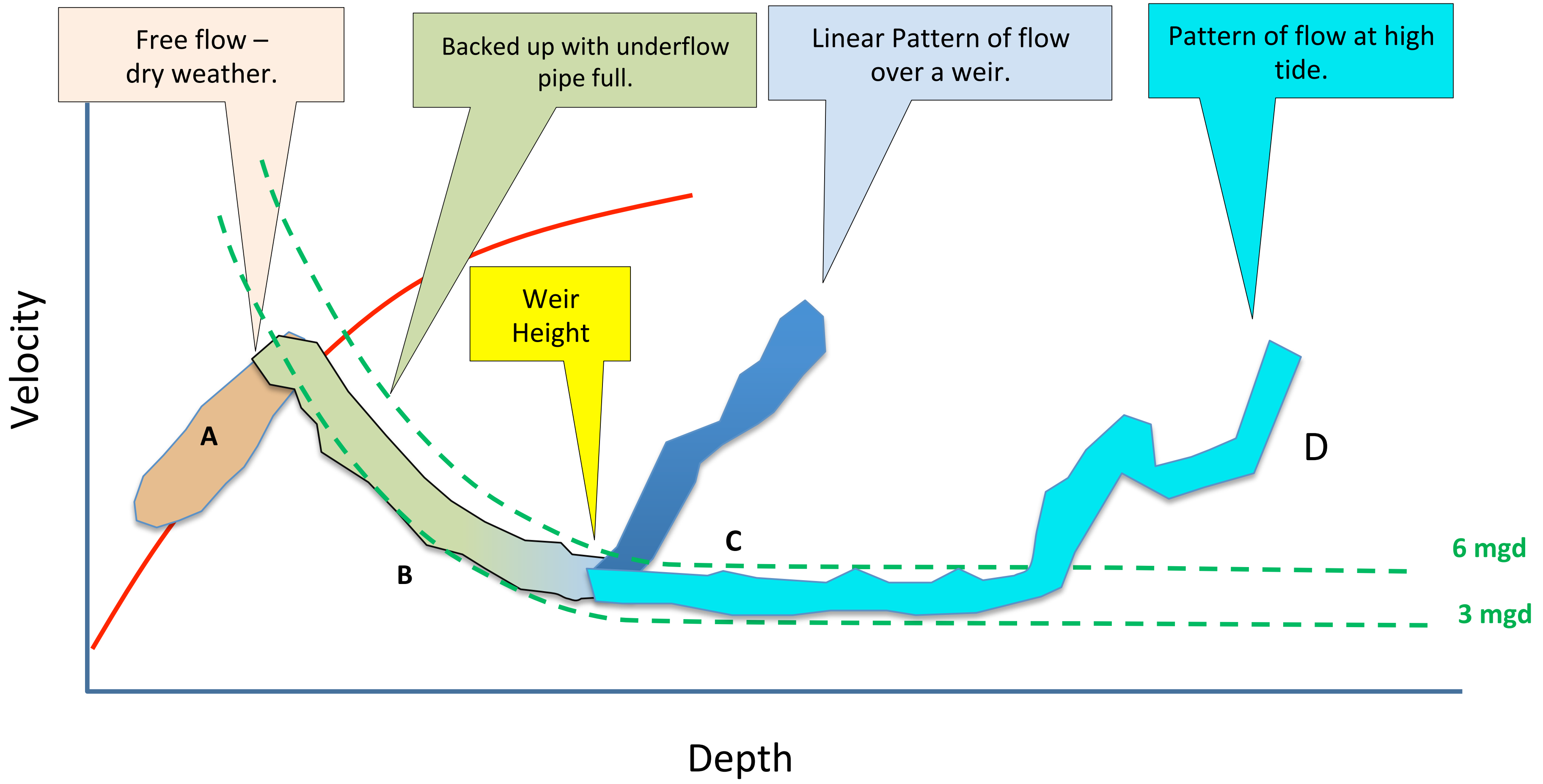
Outgoing Line

Incoming Line

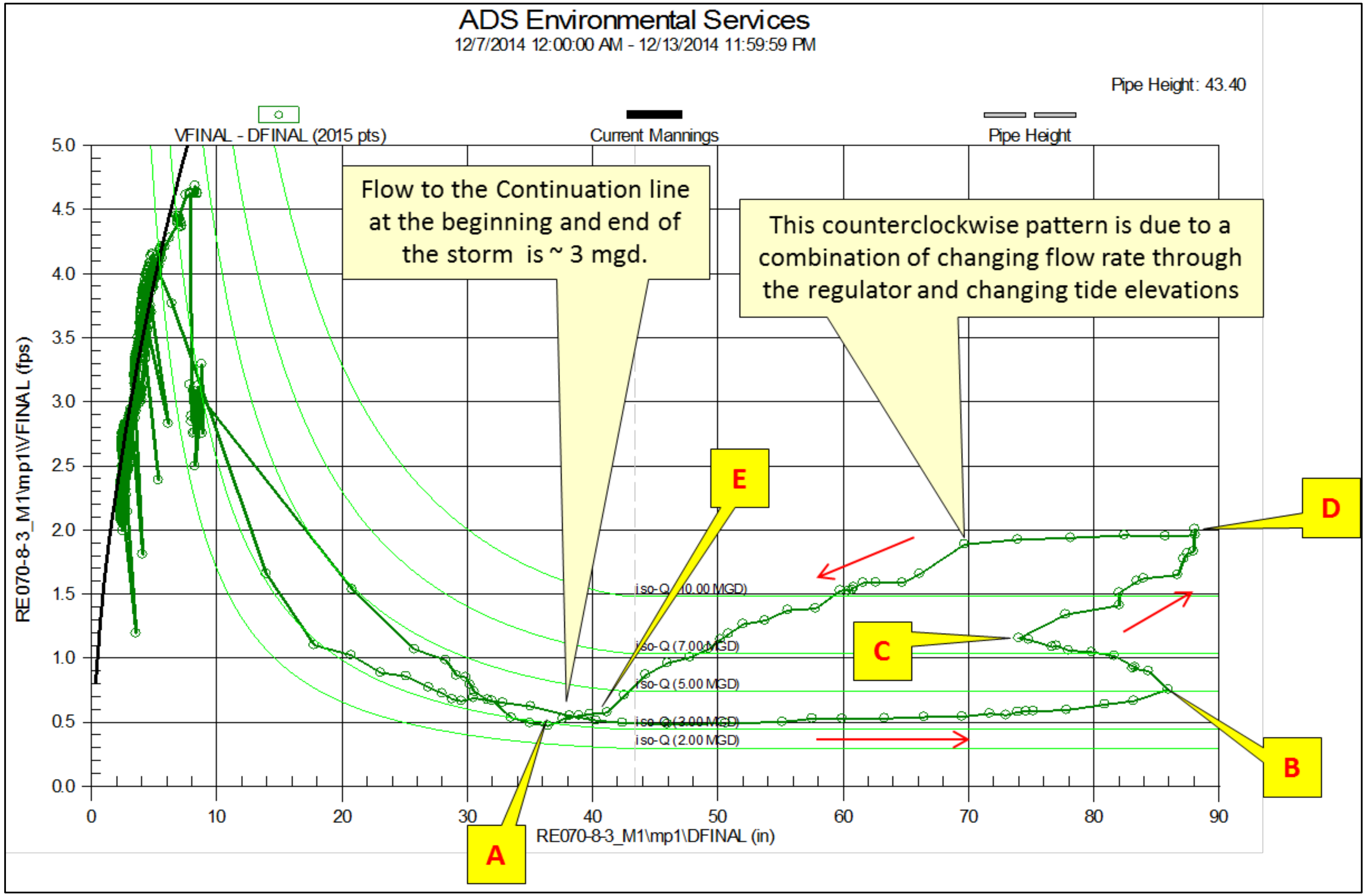
Quantifying CSO Events



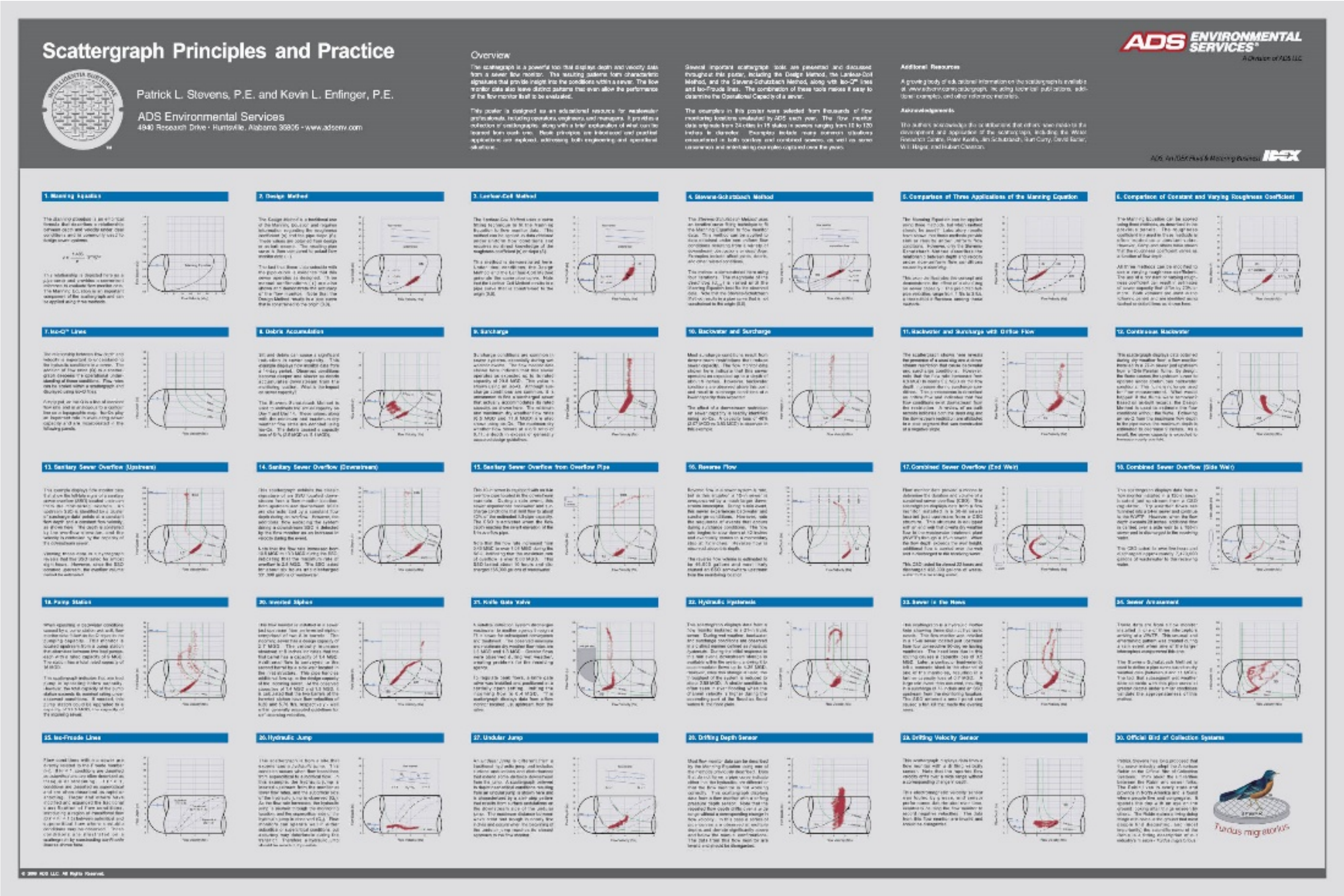
Quantifying CSO Events



Quantifying CSO Events



Even More Useful Ways to Use a Scattergraph



Questions

Thanks for Listening

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