



# Untangling Complex Collection Systems With a System-Wide Odor Evaluation

FWEA 2017 Air Quality Seminar

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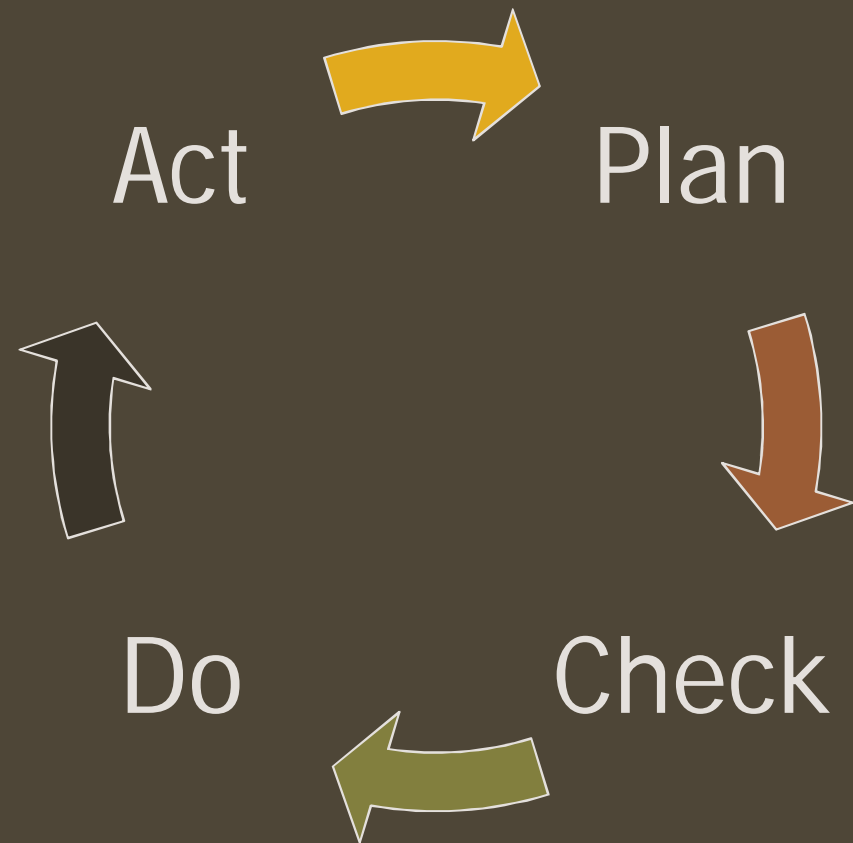
# Collection Systems

- Buried Assets
  - Representative Data
- Reactive O&M
- Odor & Corrosion Data
  - Informs Decision Making
- Comprehensive Odor & Corrosion Strategy
  - Proactive
  - Lowest Life Cycle Cost



# Systematic Approach

- Comprehensive
  - Identify Objectives
  - Minimize Costs
- Prioritization
  - Hot Spot Analysis
- Measurable
  - Monitoring Programs
- Cohesive Strategy
  - Proactive Solutions



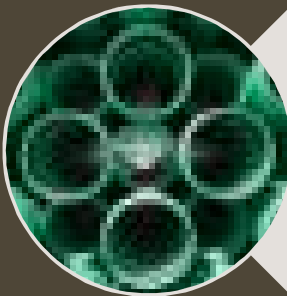
# Control Strategies



Liquid Phase



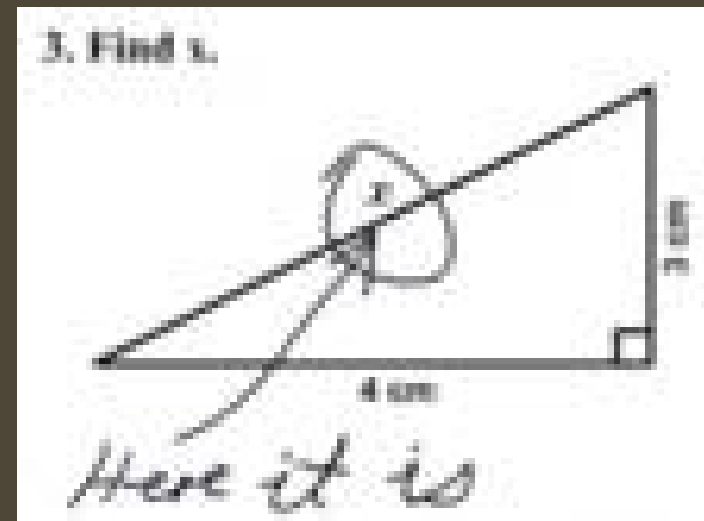
Vapor Phase



Corrosion  
Protection

# Comprehensive Strategy

- Identify Source & Cause
  - Sulfide Generation
  - H<sub>2</sub>S Release
- Establish Control Points & Objectives
  - Odor vs. Corrosion
- Hotspot Analysis
  - Data Driven
  - Prioritized List of Odor & Corrosion Issues



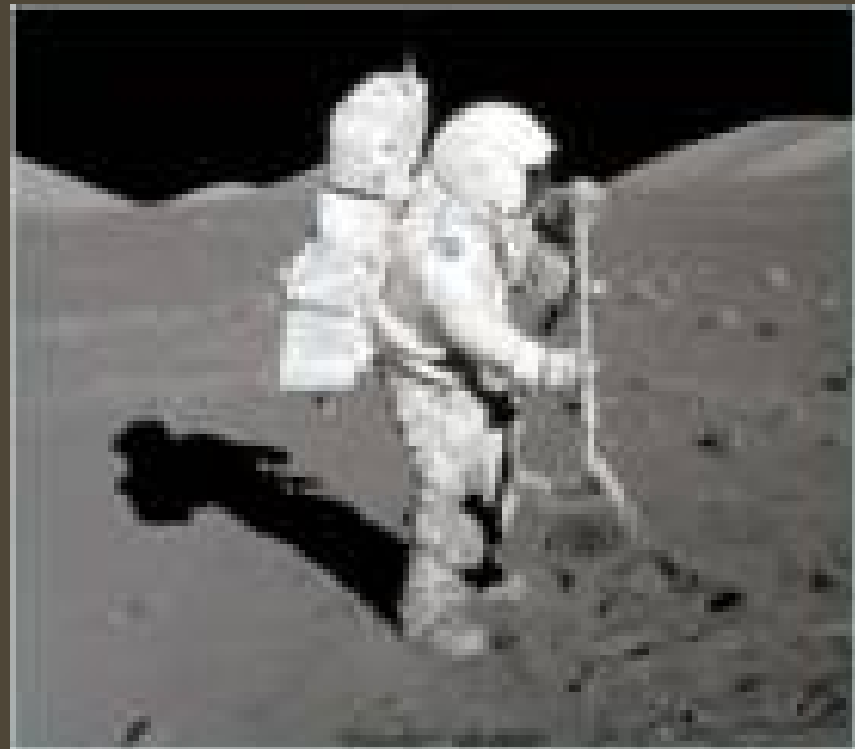
# Hot Spot Analysis

- Definable Locations
  - Sulfide Production
  - Sulfide Release
  - Headspace Pressurization
- Prioritized List of Odor & Corrosion Issues
- Data Refinement
  - Asset Inventory
  - Modeling



# Monitoring Program

- Establish Objectives
  - Parameters
  - Locations
- Characterize Hot Spots
  - Dissolved Sulfide
  - Hydrogen Sulfide
  - Differential Pressure
  - Condition Assessment
- Screening Level
  - Establish Trends





# Macomb County Interceptor

- Multi-agency odor and corrosion study
- Large diameter interceptors (3- to 4-foot) and tunnels (9- to 12-foot)
- Conveys 40 MGD of flow to the Northeast Pump Station





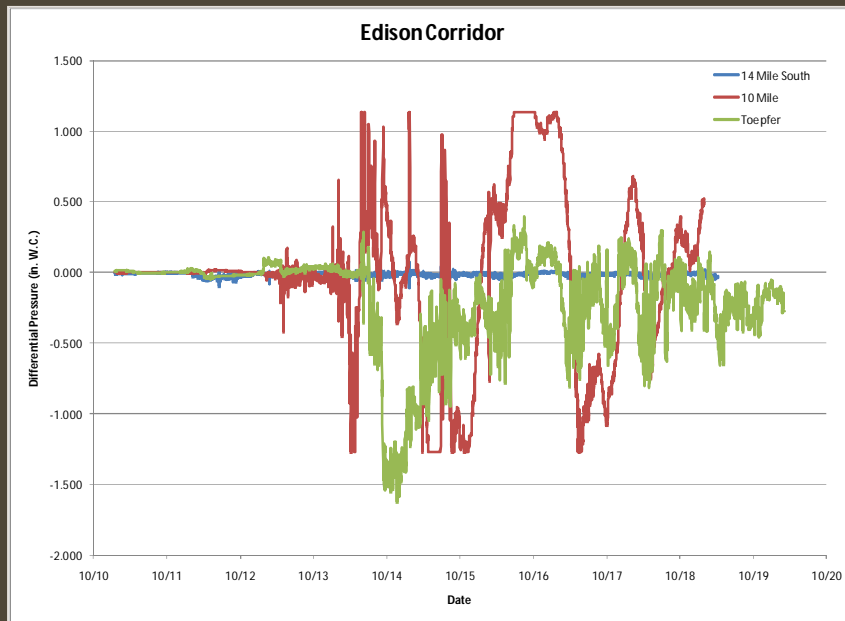
# Sampling and Monitoring Program

- Preliminary screening of dissolved sulfide and headspace  $H_2S$  to identify likely problem areas
- Continuous  $H_2S$  monitoring
- Continuous monitoring of headspace air pressure

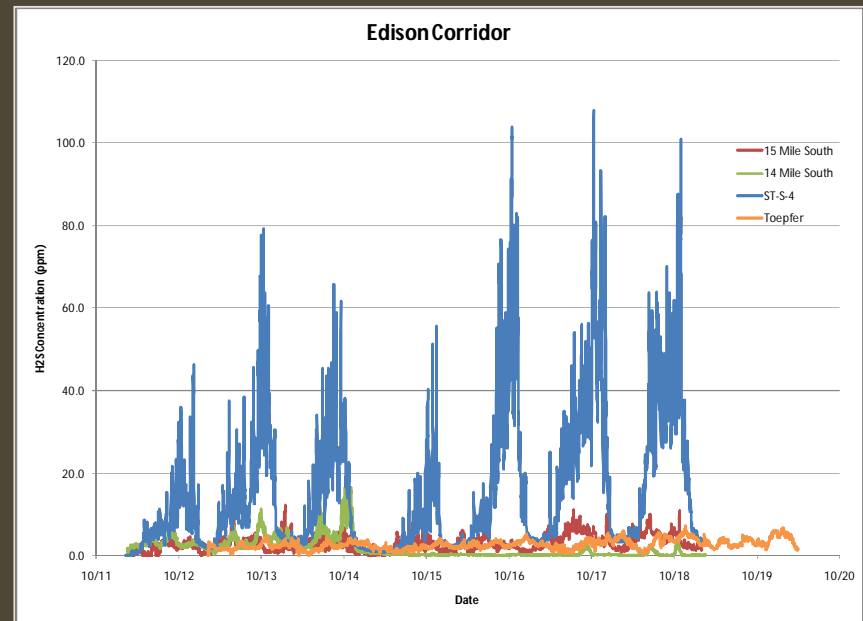


# Continuous Monitoring

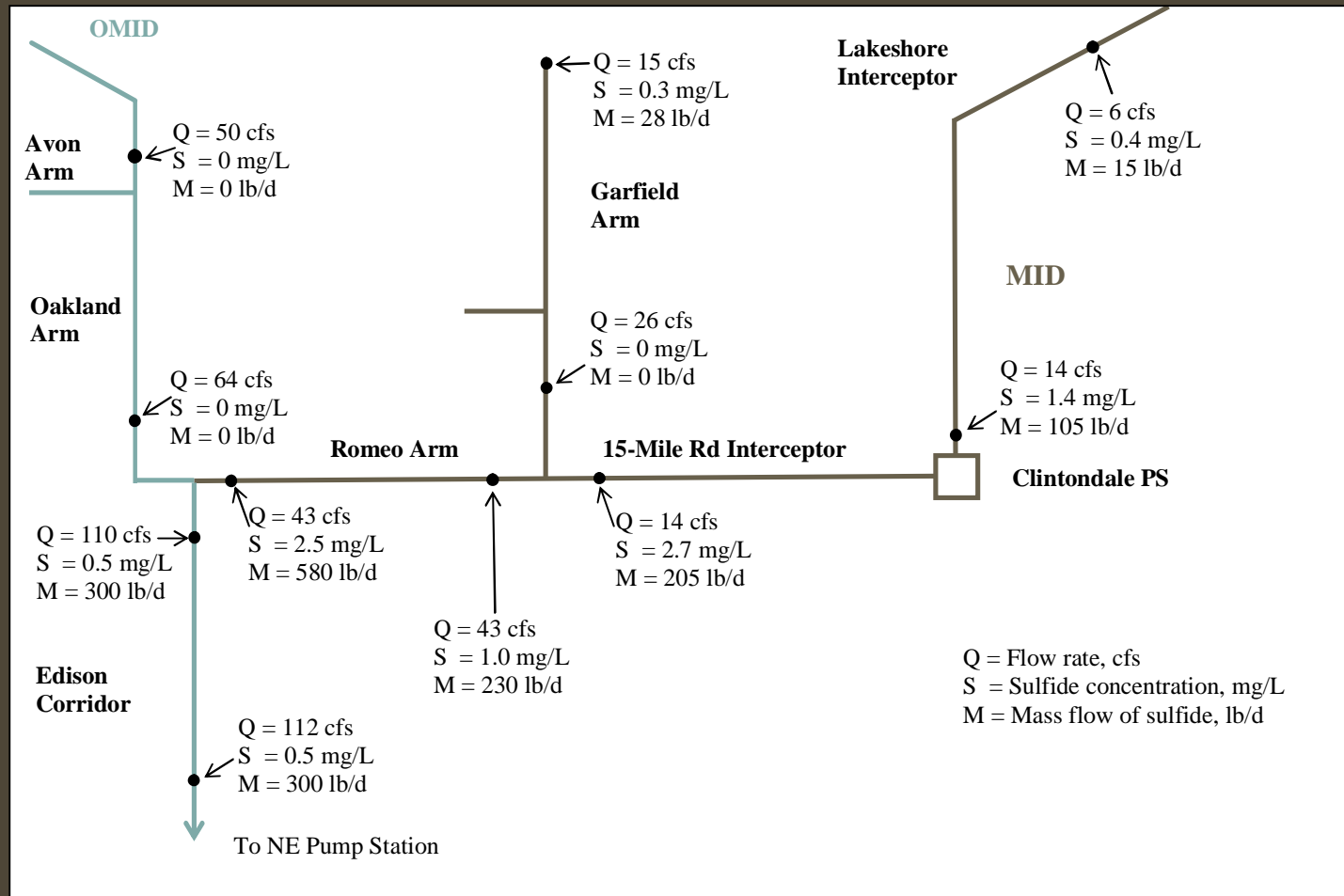
## Differential Pressure



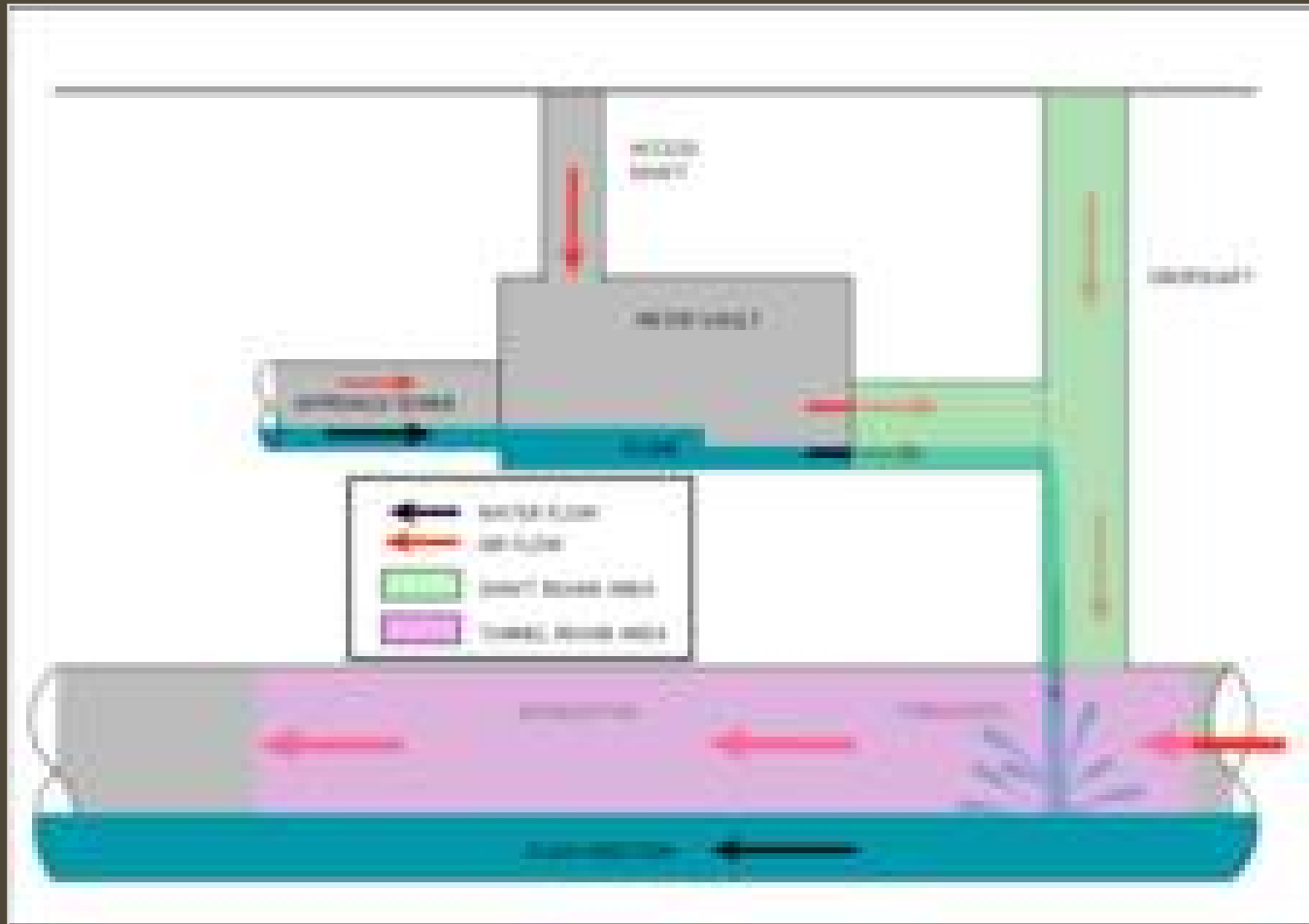
## Hydrogen Sulfide



# Mass Balance of Sulfide



# Ventilation Analysis



# Recommendations

RECOMMENDATION	LOCATION	INTERCEPTOR SYSTEM	UNIT COST	CAPITAL COST	ANNUAL O&M COST
<b>PHASE 1</b>					
Chemical Addition (Ferrous Chloride)	Lakeshore Interceptor	MID	---	\$125,000	\$80,600
Magnesium Hydroxide (Corrosion Protection)	Meter Chambers	OMID-MID	\$0.75/ft <sup>2</sup>	---	---
5,000 cfm In-Ground Organic Media Biofilter	Lakeshore Interceptor	MID	---	\$340,800	\$17,500
5,000 cfm In-Ground Organic Media Biofilter	Garfield Arm	MID	---	\$340,800	\$17,500
8,000 cfm In-Ground Organic Media Biofilter	Oakland Arm	OMID	---	\$529,800	\$22,760
5,000 cfm In-Ground Organic Media Biofilter	Garfield @ 15 Mile	MID	---	\$340,800	\$17,500
15,000 cfm In-Ground Organic Media Biofilter	Edison Corridor	OMID	---	\$964,800	\$36,400
<b>PHASE 2</b>					
CIPP Rehab	Meter Chamber Dropshafts	OMID-MID	\$30/ft <sup>2</sup>	---	---
<b>PHASE 3</b>					
Spiral Wound Lining Rehab	Main Interceptors	OMID-MID	\$35/ft <sup>2</sup>	---	---

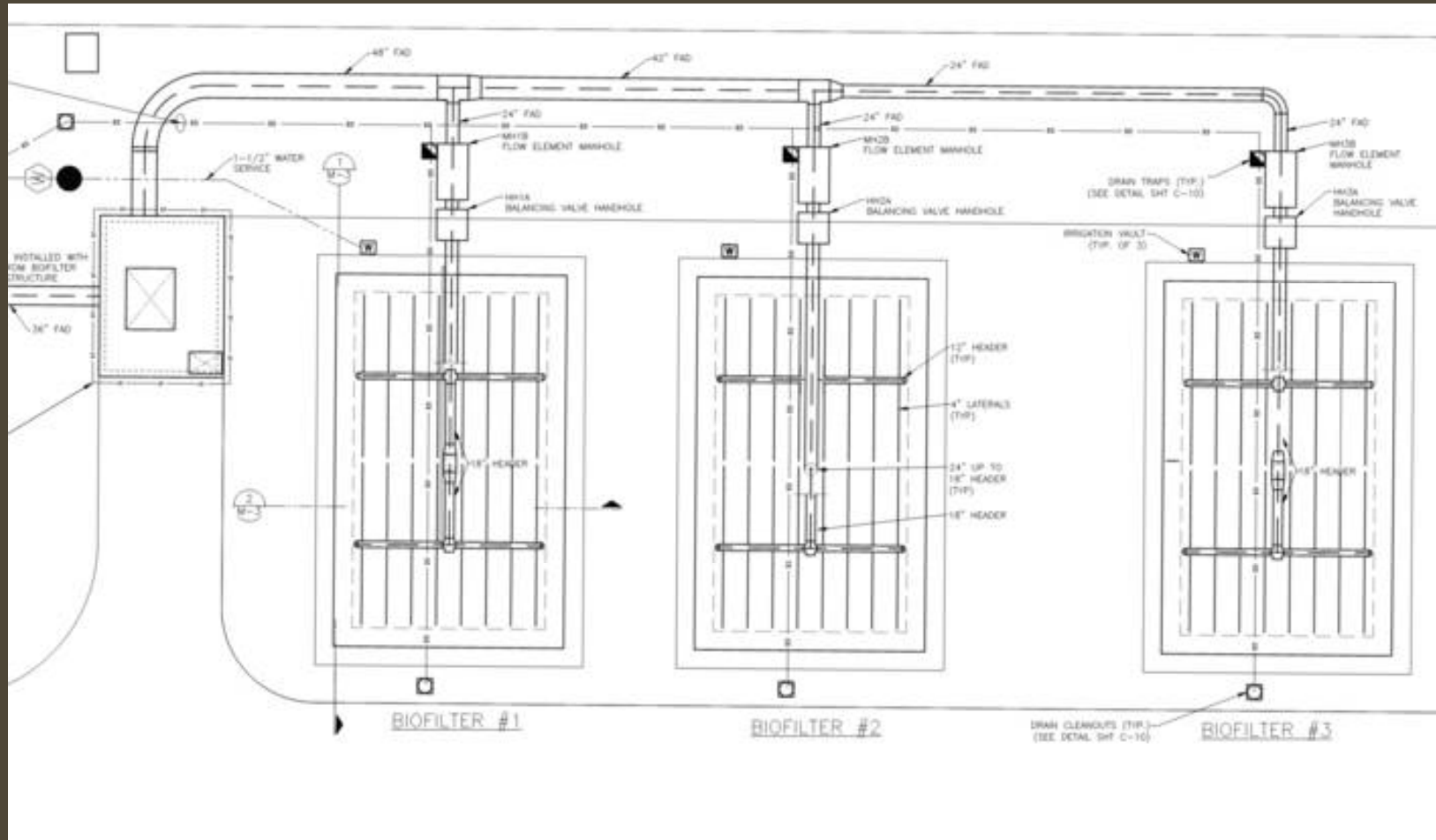
# Fan Test







# 20,000 cfm Biofilter Design



# Biofilter





Questions?  
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