

# Columbus Southerly WWTP New Headworks June 2010

Presented by:  
Chad Dunn, PE  
Malcolm Pirnie, Inc.



**MALCOLM  
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# New Headworks Project Summary

- Replace existing Headworks with all new facility
- \$110 million construction project
- Project design started in 1997
- Began operations in March 2008
- Major components:
  - Collection System Modifications
  - Coarse Screening
  - Raw Sewage Pumping
  - Fine Screening
  - Grit Removal
  - Wet Weather Flow Control
  - Odor Control



# Preliminary Treatment Sequence

*Treatment sequence selected for most reliable O&M with high level of screening*



BAR RACKS  
GRIT

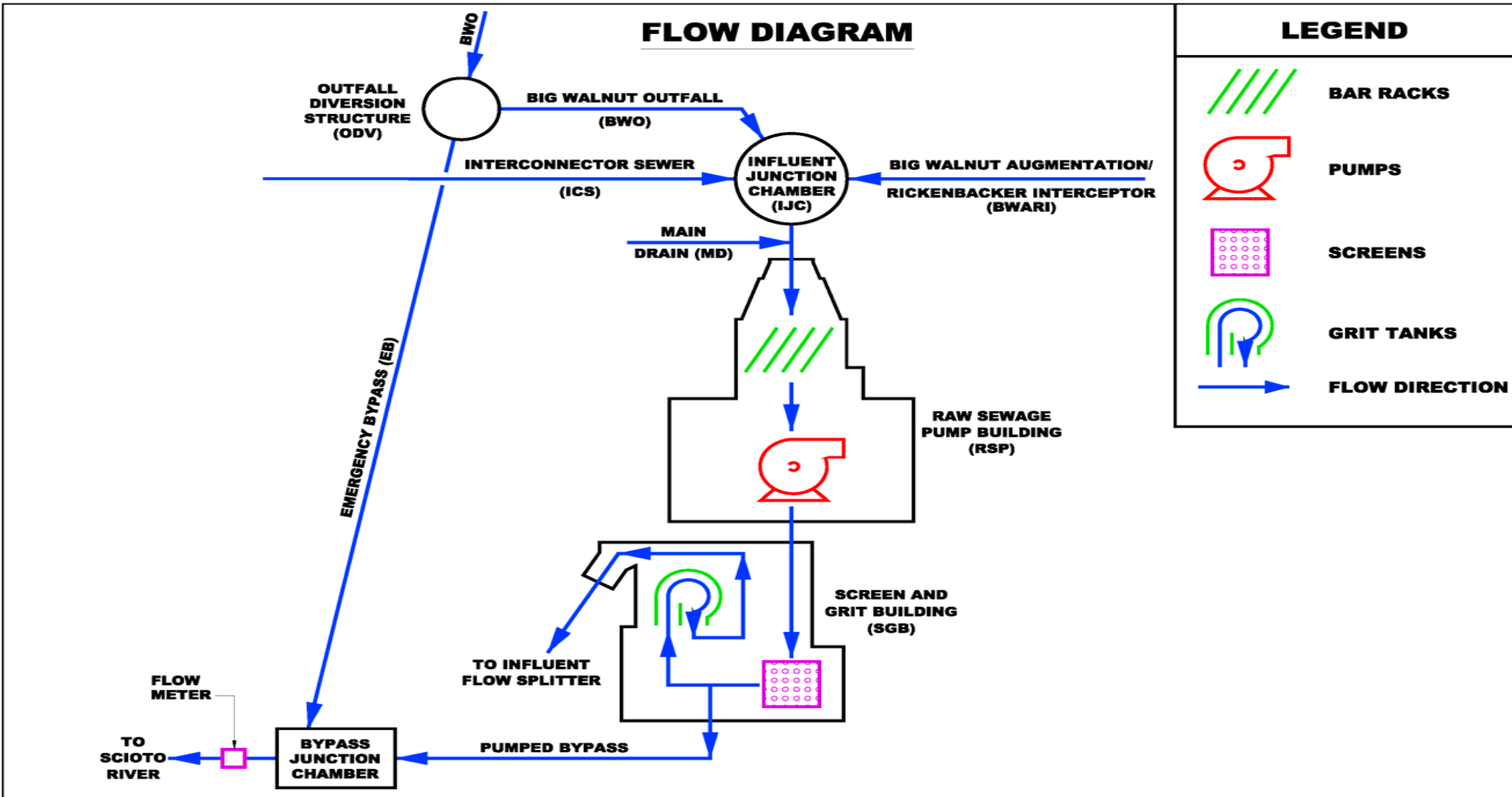
RAW SEWAGE  
PUMPING

FINE  
SCREENING

REMOVAL

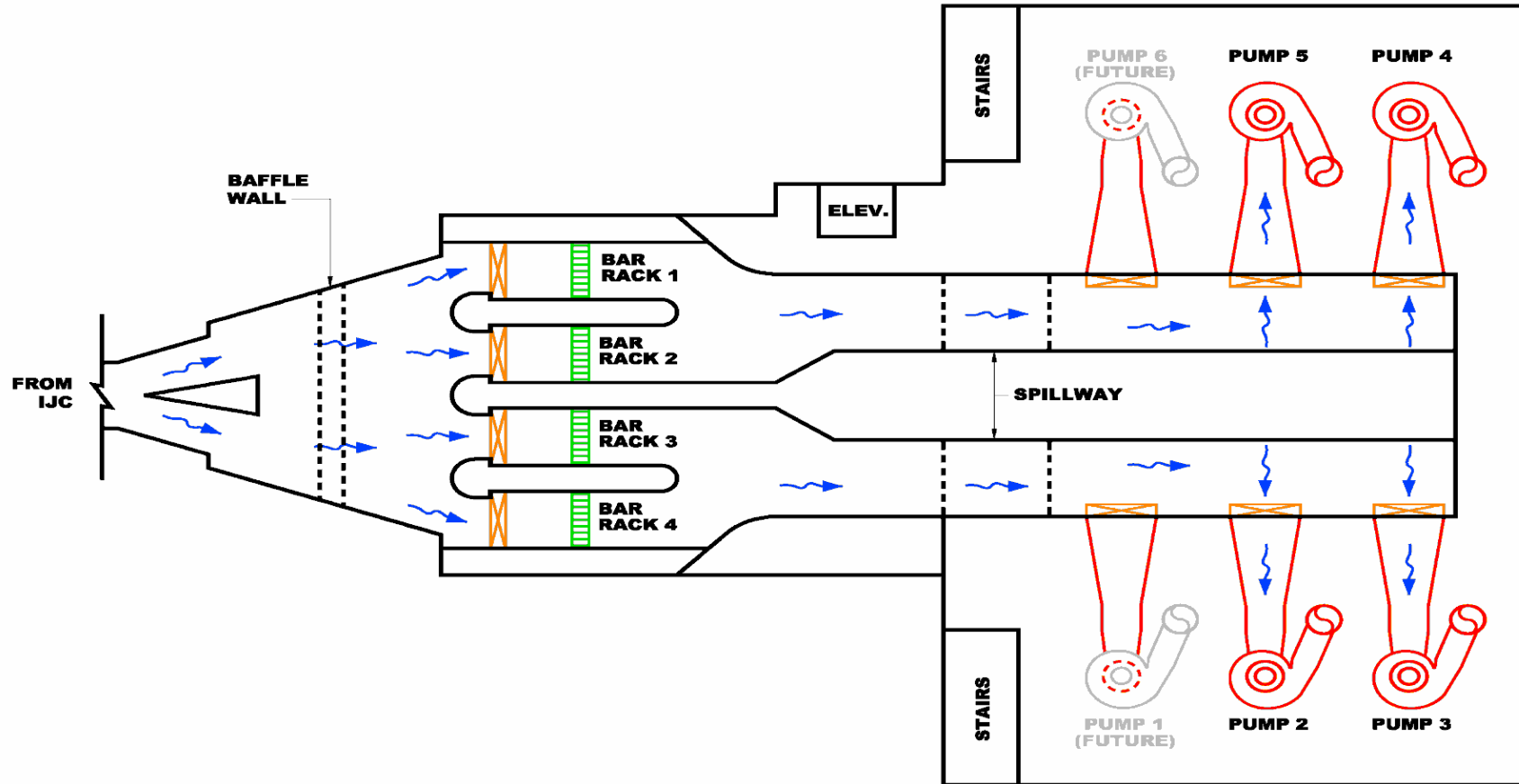


# General Arrangement of Headworks

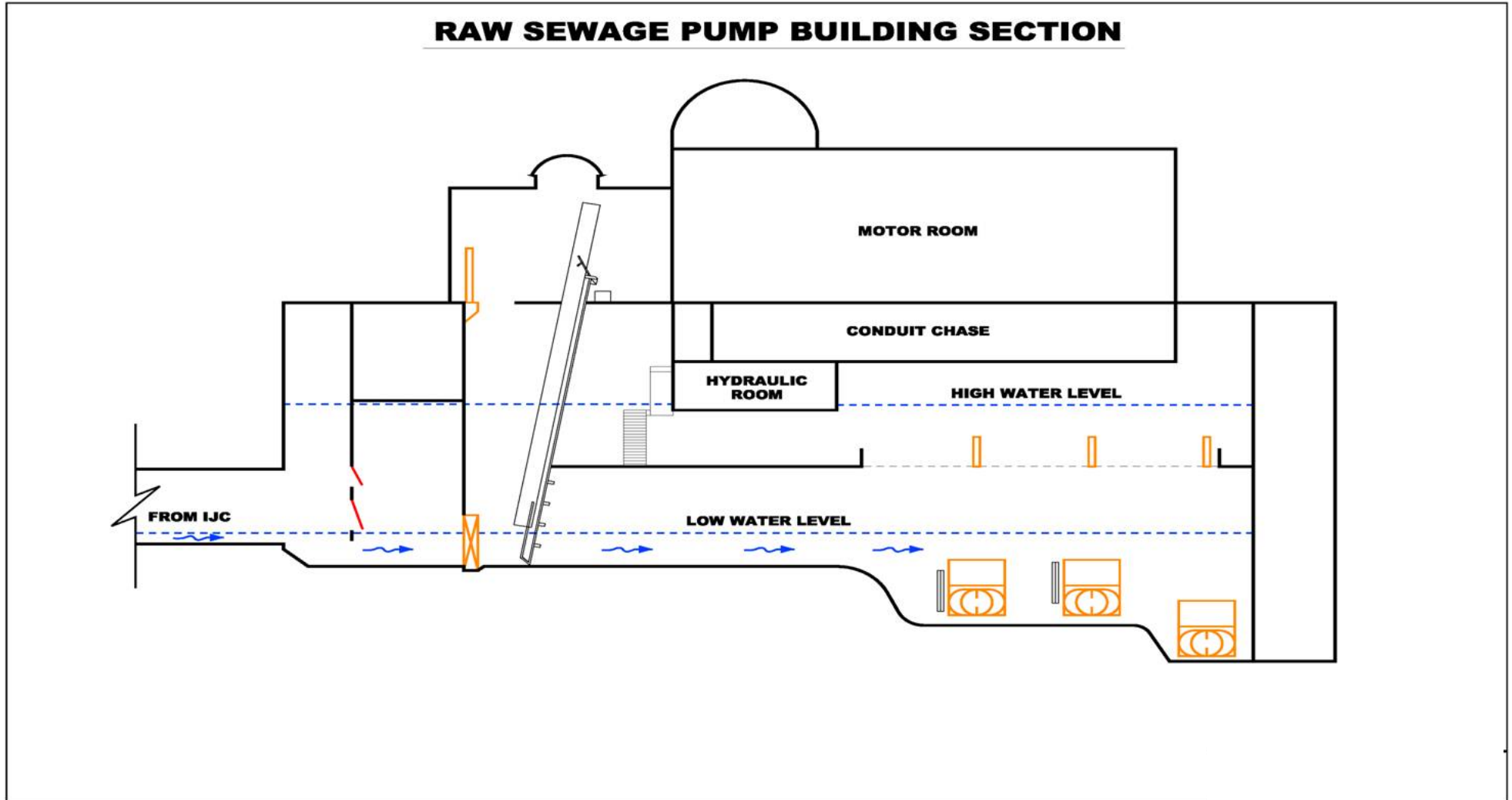


# Raw Sewage Pumping

## RAW SEWAGE PUMP BUILDING LOWER LEVEL



# Raw Sewage Pumping



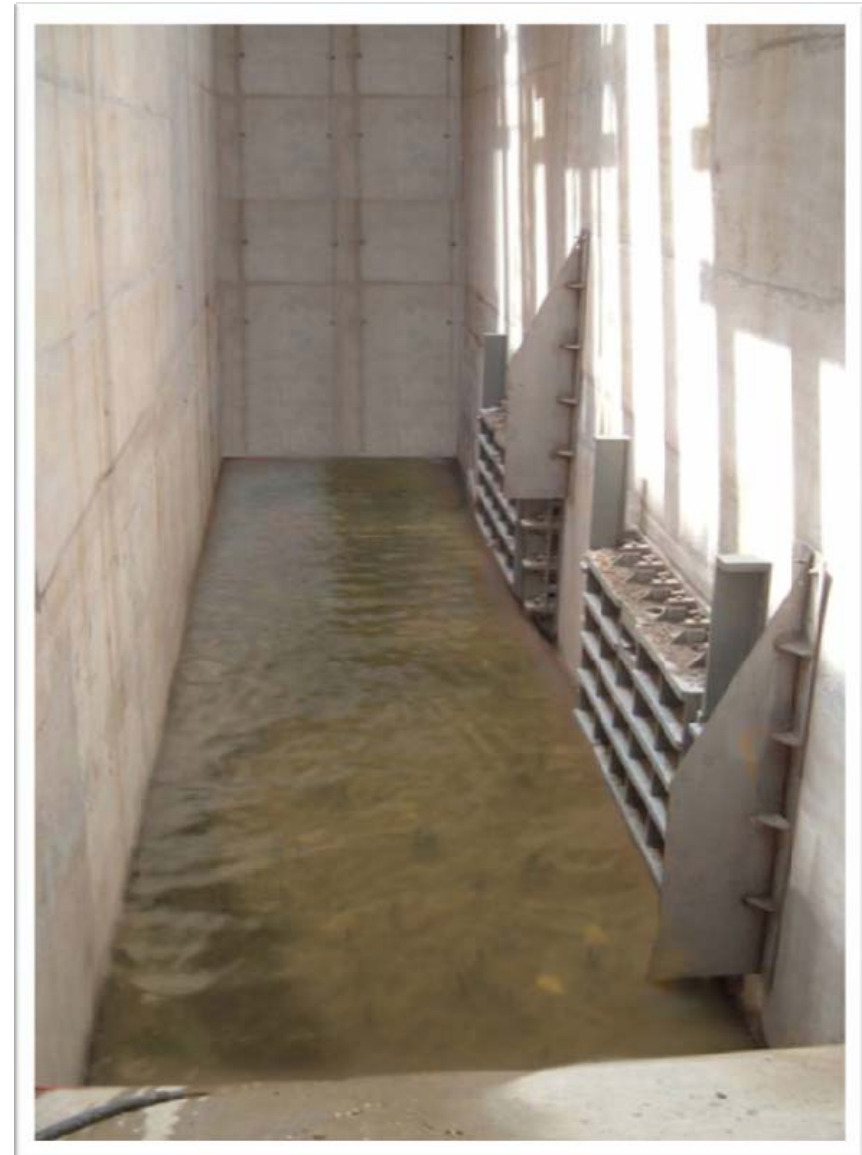
# Bar Racks

- Type - Mechanically-cleaned reciprocating rake
- Channel width - 9 ft
- Clear bar spacing – 3 inches
- Rake speed - Adjustable (~ 20 – 40 ft/min)
- Design flow per bar rack - At least 330 MGD



# Wet Well Arrangement

- Dual wet wells with no interconnections
- Space for three pumps per wet well ( 2 installed initially)
- Self-cleaning trench type wet wells. Largest known in US.
- Hydraulically-driven sluice gates to isolate pump suctions





# Self-Cleaning Trench-Type Wet Well

- Introduced in 1998 by HI/ANSI for Pump Intake Design for solids bearing liquids
- First Standard to Distinguish Between Clear Liquids and Dirty Liquids
- Minimizes Accumulation of Solids in the Wet Well
- Organic Solids Accumulations May Become Septic Causing:
  - Odors
  - Corrosion
  - Hazardous Gases



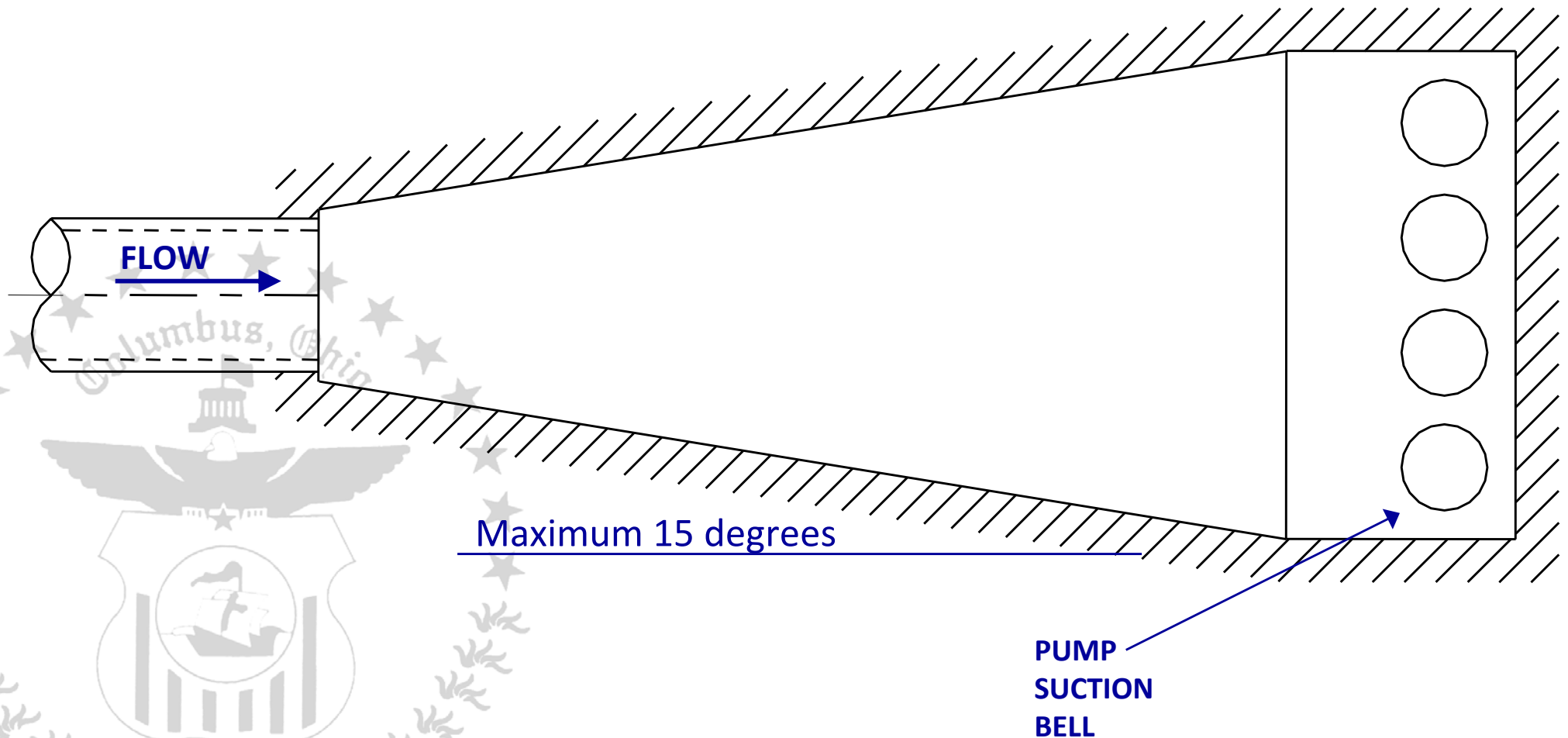
# Self-Cleaning Trench Type Wet Well Principles

- Minimize Horizontal Surfaces Except for Directly in Front of Pumps
- Use Pumping Equipment to Remove Solids from Wet Well
- Cleaning Cycle Allows for Wet Well Cleaning Using Pumping Equipment

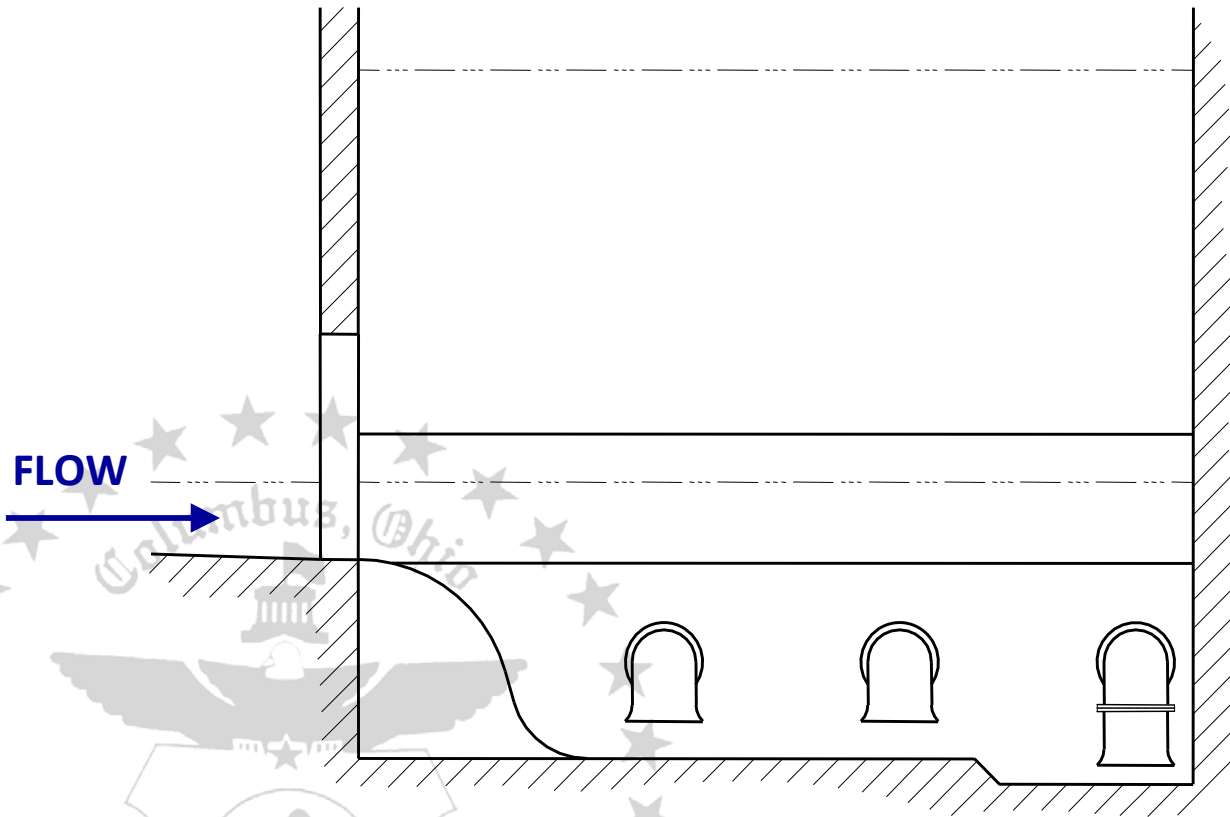


# Conventional Wet Well

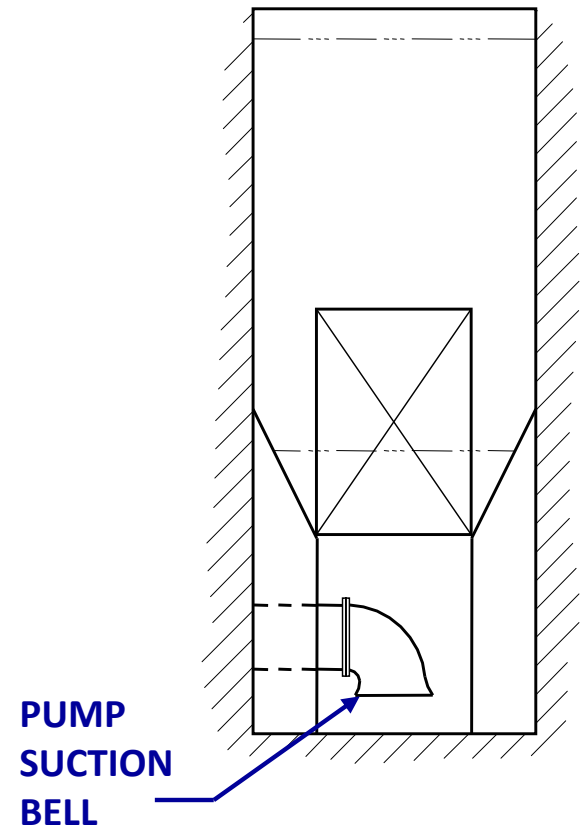
*NOT A SELF-CLEANING WET WELL*



# Self-Cleaning Trench-Type Wet Well



LONGITUDINAL SECTION

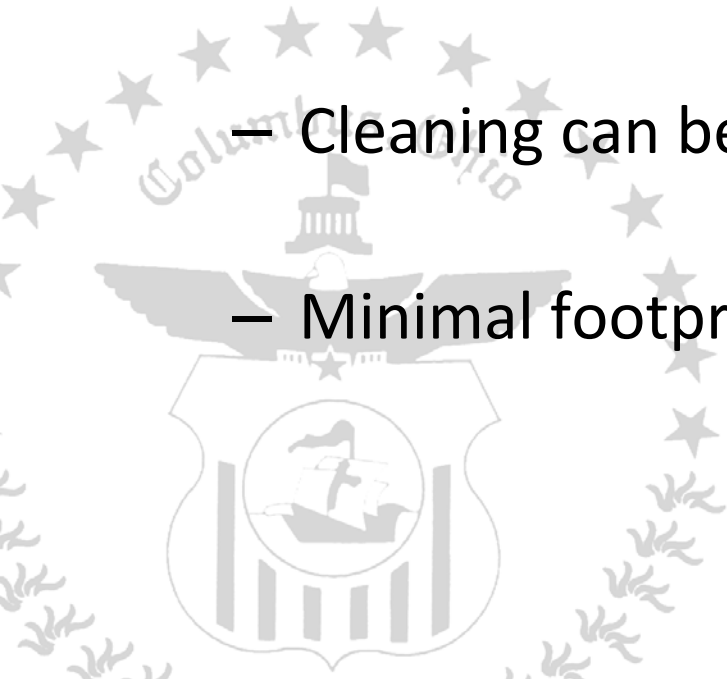


TRANSVERSE SECTION



# Self-Cleaning Trench-Type Wet Well

- Advantages
  - Pump inlets are deep so cross currents are low and water tends to enter suction bells uniformly around periphery
  - Incoming flow is coaxial
  - Cleaning can be accomplished by pumping equipment
  - Minimal footprint



# Raw Sewage Pumps

- Vertical centrifugal pumps
- Extended shafts with intermediate bearing on mid-level
- 1250-horsepower medium voltage motors at grade level
- VFDs in Electrical Room at grade level



# Pumping Capacity

## *At Normal Wet Well Level*

- 92 mgd per pump
- 368 mgd total installed pumping capacity
- 552 mgd total future pumping capacity

## *At High Wet Well Level*

- 110 mgd per pump
- 440 mgd total installed pumping capacity
- 660 mgd total future pumping capacity

Minimum capacity per pump is ~45 mgd



Raw Sewage Pump



# Piping Arrangement

- Each pump is piped separately to screen channels
- Magnetic flow meter on each pump discharge
- No check valves on pump discharge piping
- Anti-siphon valves on each pump discharge at Screen and Grit Building

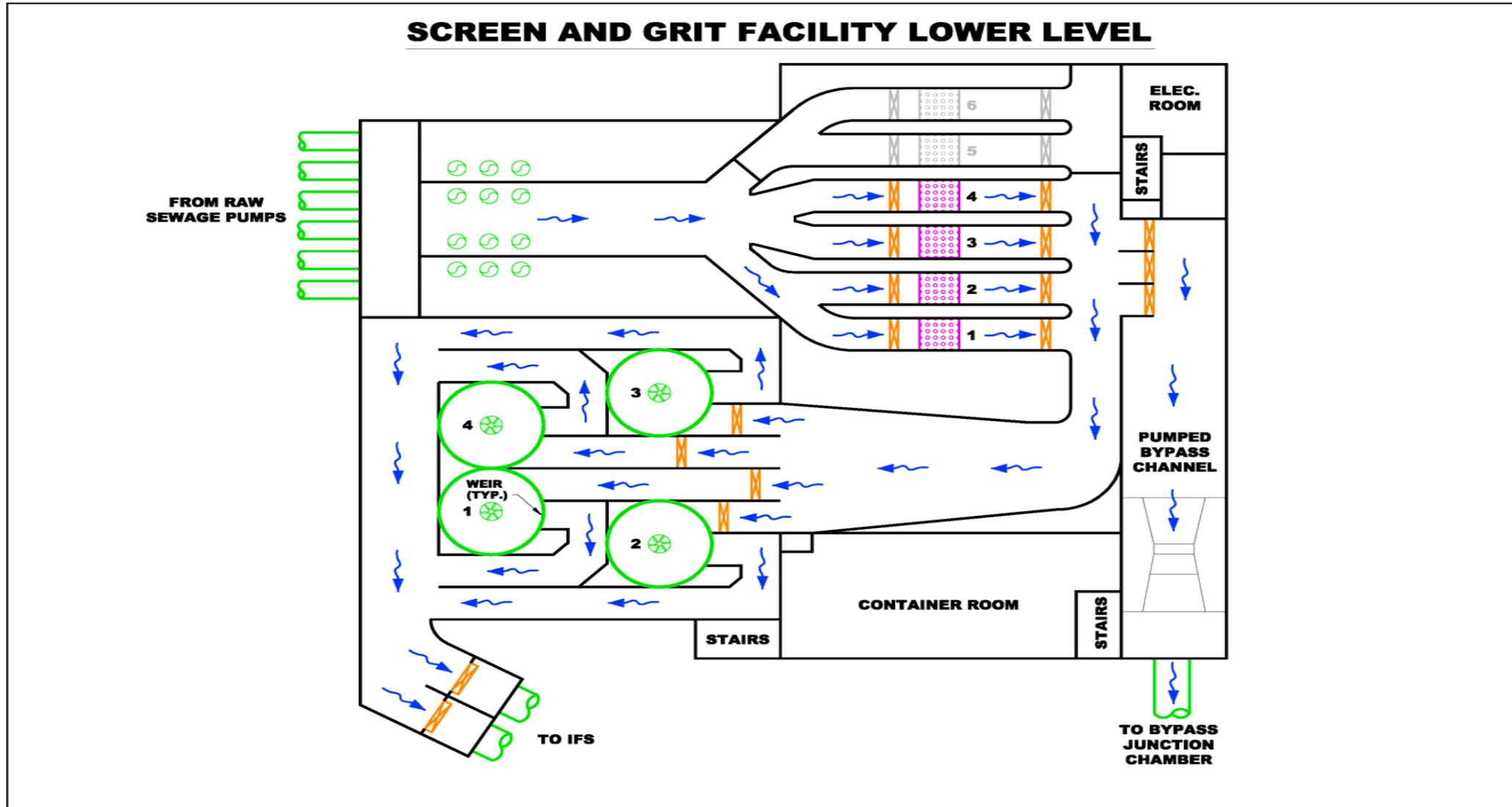


Pump Discharge Piping





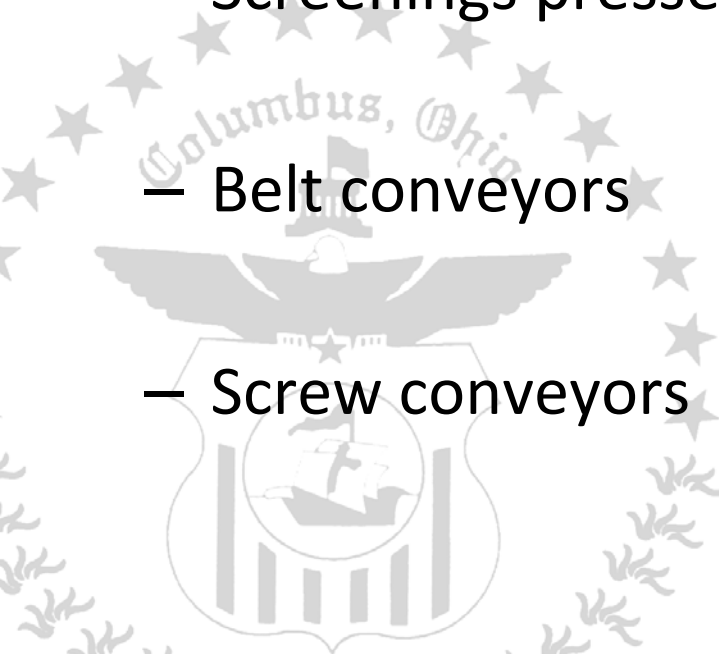
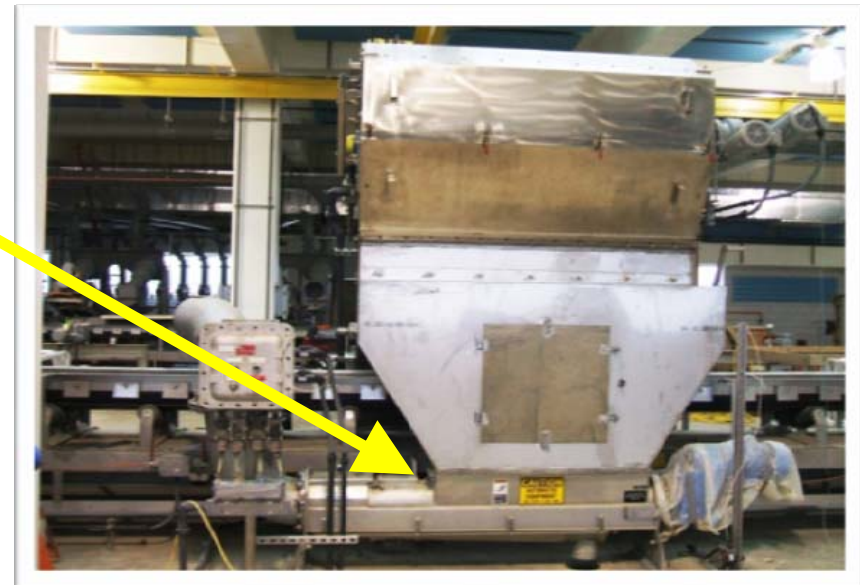
# Screening and Grit Removal



# Fine Screening

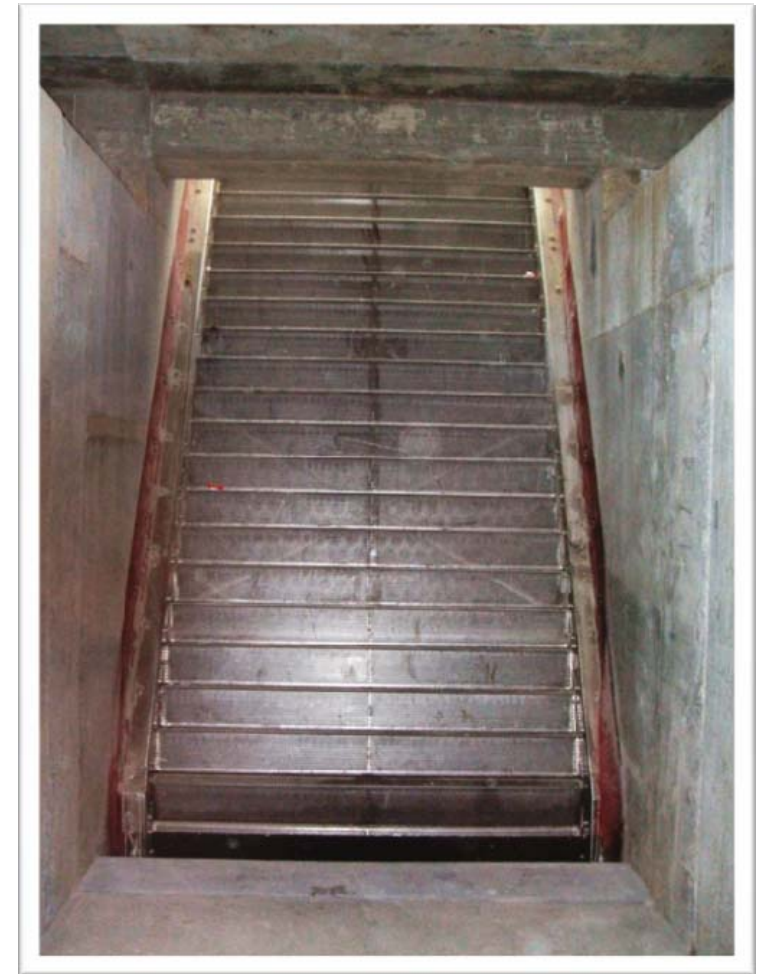
## *Components*

- Screens
- Screenings presses
- Belt conveyors
- Screw conveyors



# Screens

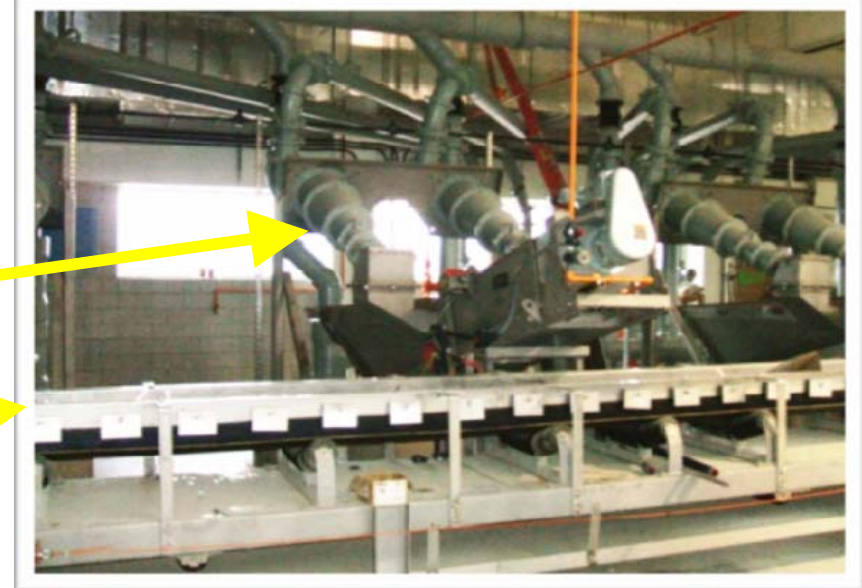
- 4 screens installed – space for 2 more
- Perforated (punched) plate screen on continuous traveling belt
- Screen opening size: 0.25 in (6 mm)
- Channel width – 7 ft
- Channel depth – 13 ft
- Screen Capacity – 110 mgd each
- Peak Headloss – 39 inches



# Grit Removal

## *Components*

- Vortex-type grit tanks
  - 24-foot diameter
  - Capacity
    - Manufacturer - 70 mgd
    - Design – 55 mgd
- Grit pumps
- Grit cyclones & classifiers
- Belt conveyors



# Odor Control System

## Summary

- Completely biological odor control system
  - 10 Bio-trickling Filters (Bioway System)
- Synthetic media with attached biological growth
- No chemicals added
- Capacity
  - Odor Control Only - 100,000 cfm
  - With WW Vent Fans – 150,000 cfm
- H<sub>2</sub>S removal efficiency: 99% or 0.1 ppm whichever is greater



# Questions?

**Chad Dunn, PE**

Associate

Malcolm Pirnie, Inc.

1900 Polaris Parkway, Suite 200  
Columbus, Ohio 43240

614.430.2617

Cdunn@pirnie.com

