



# Operations & Maintenance Success Stories: Interceptor Sewer I&I Reduction

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Conference**

2017

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**Sulphur Maintenance Yard**

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**Lemay Pump Station**



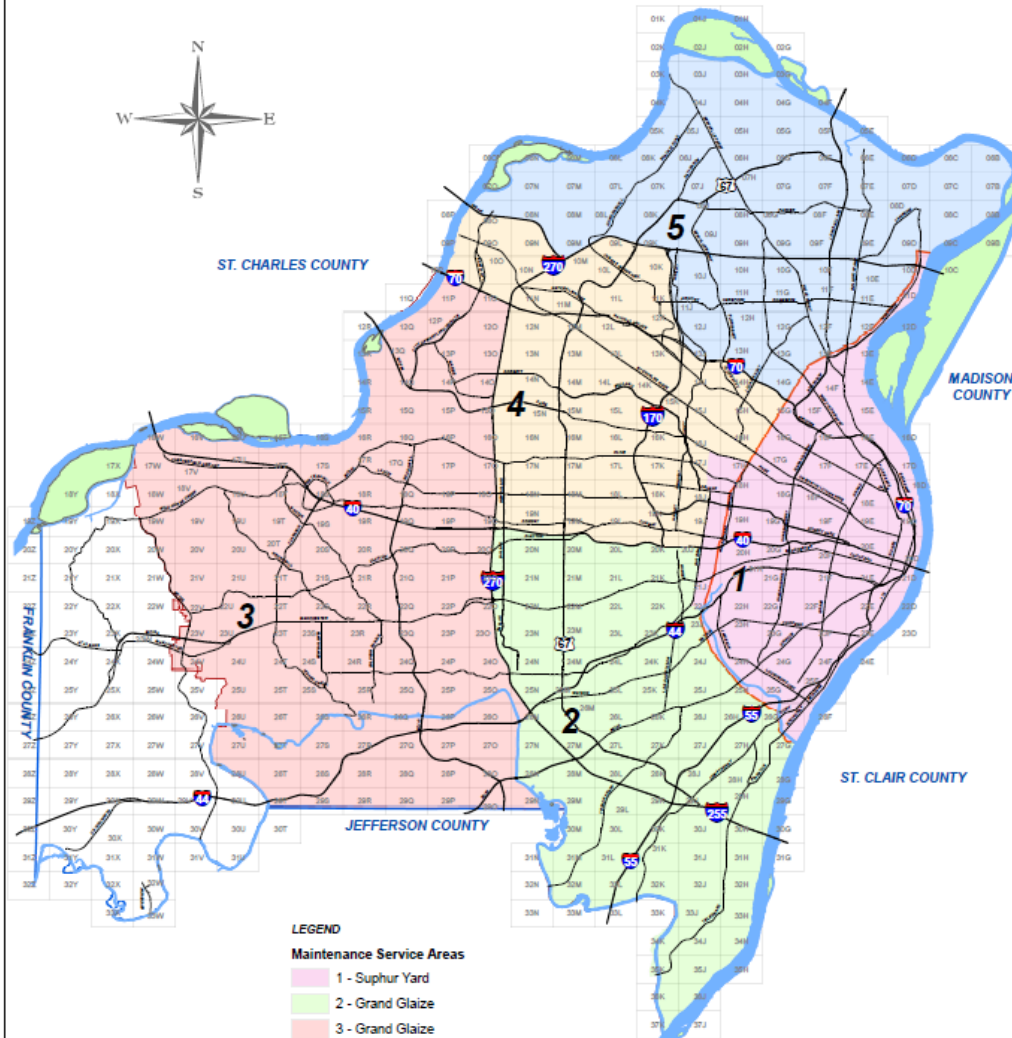
# MSD System Overview & Details

- ② Two utilities: wastewater and stormwater
- ② 525 square mile service area
- ② ~1,300,000 residents served
- ② 88 municipalities served + City of St. Louis & St. Louis County
- ② 7 treatment plants
- ② 350+ million gallons/day wastewater treated
- ② 4,744 miles of sanitary sewers
- ② 1,806 miles of combined sewers
- ② 3,028 miles of stormwater sewers
- ② 4th largest sewer system in US (by miles of sewers that handle wastewater)
- ② 276 pump stations (wastewater, floodwall, overflow regulation & wet weather relief tanks)
- ② 116 miles of force mains



# The Metropolitan St. Louis Sewer District

## MAINTENANCE SERVICE AREAS



- LEGEND**
- Maintenance Service Areas**
- 1 - Suphur Yard
  - 2 - Grand Glaize
  - 3 - Grand Glaize
  - 4 - Mintert
  - 5 - Mintert
  - St. Louis City
  - St. Louis County
  - MSD Boundary

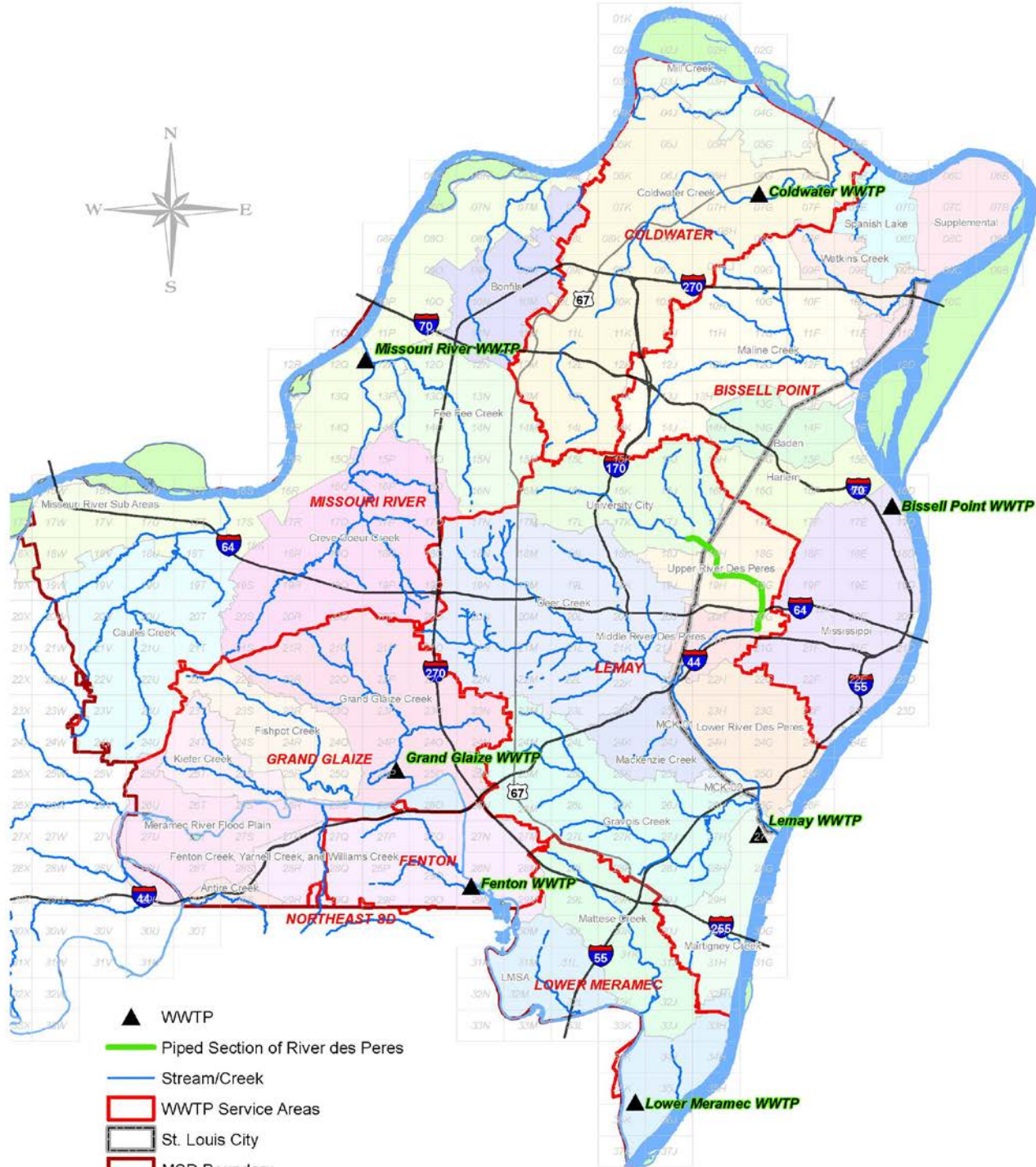
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# River Des Peres (RDP)

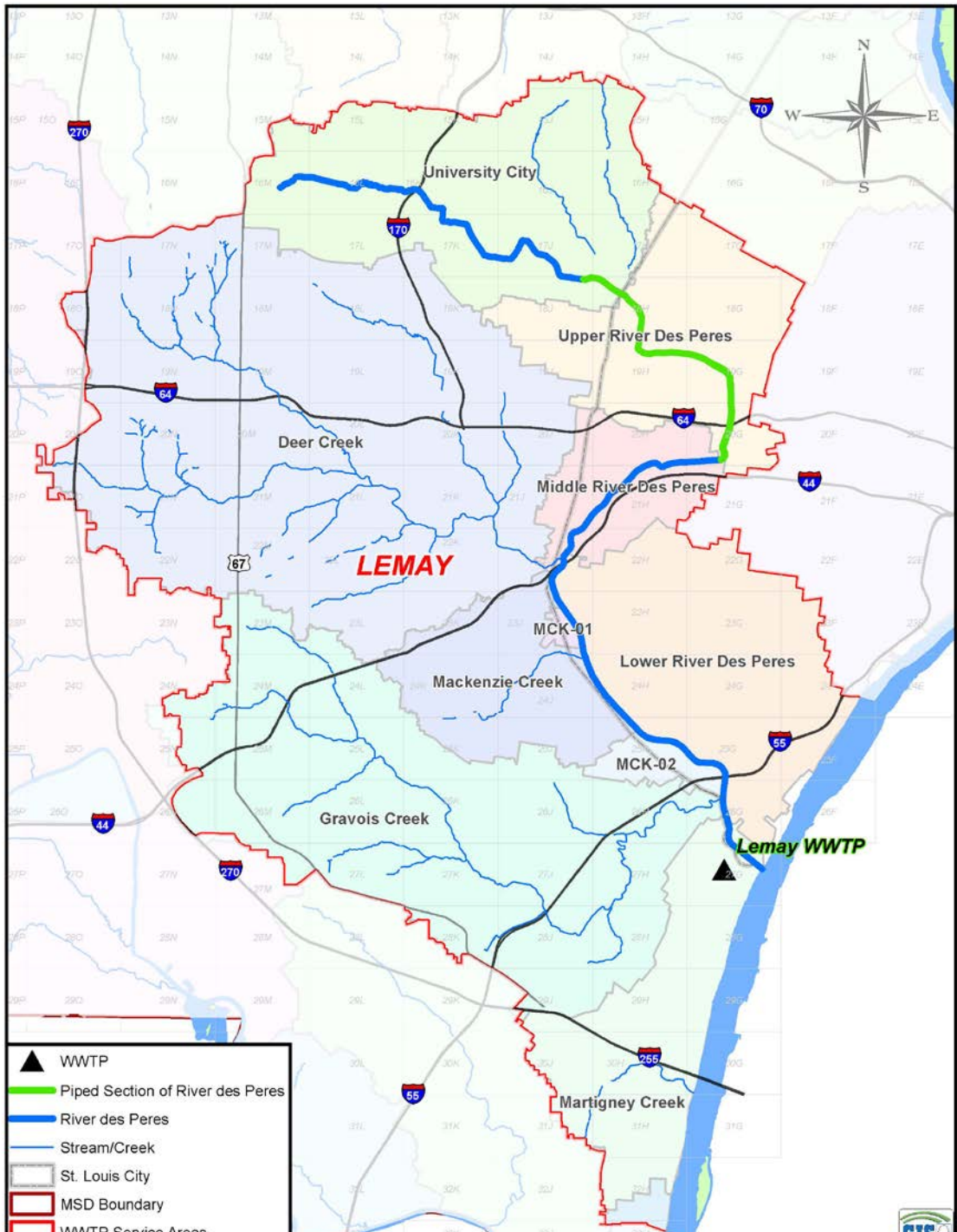
- 💧 **21 miles long**
  - 15 miles open – concrete/rip rap
  - 6 miles enclosed – 29' double arches
- 💧 **Drains 115 square miles**
- 💧 **1920 – 30's – straightened & channelized**
- 💧 **Two sanitary interceptors – 5' to 9' dia.**
- 💧 **I&I Challenges – hundreds of manholes in channel and contributing streams**





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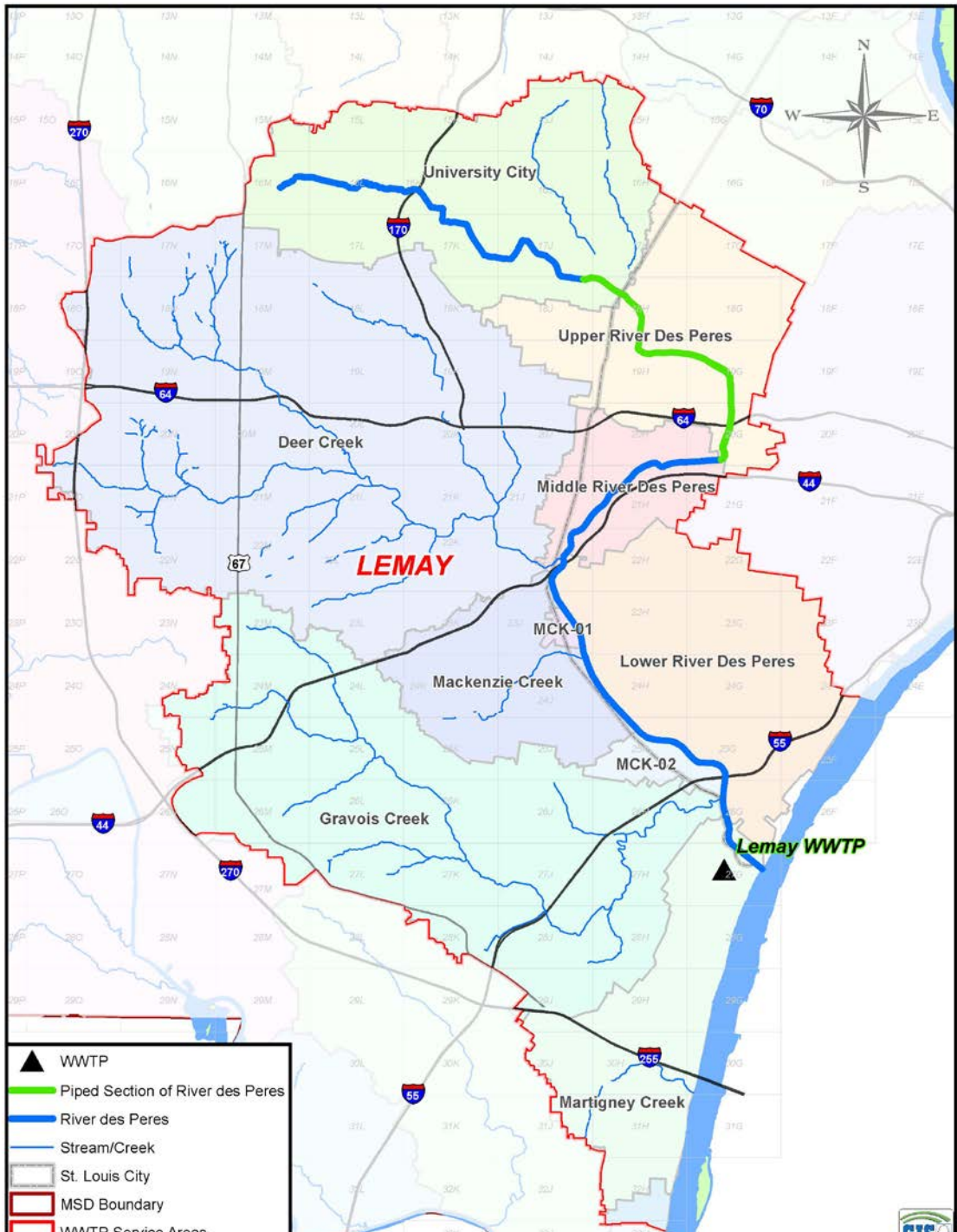




# Foul Water Interceptor Sewers

- 💧 Several Consent Decree (CD) projects rely on the RDP Foul Water Interceptors to convey normal combined flow and future stored overflows to the Lemay Pump Station and ultimately to Lemay Treatment Plant
- 💧 48 hours to dewater SSO and CSO storage
- 💧 Interceptor sewers must be free from excessive I&I to maximize needed capacity
- 💧 **HOWEVER..... “We Have a Problem”**





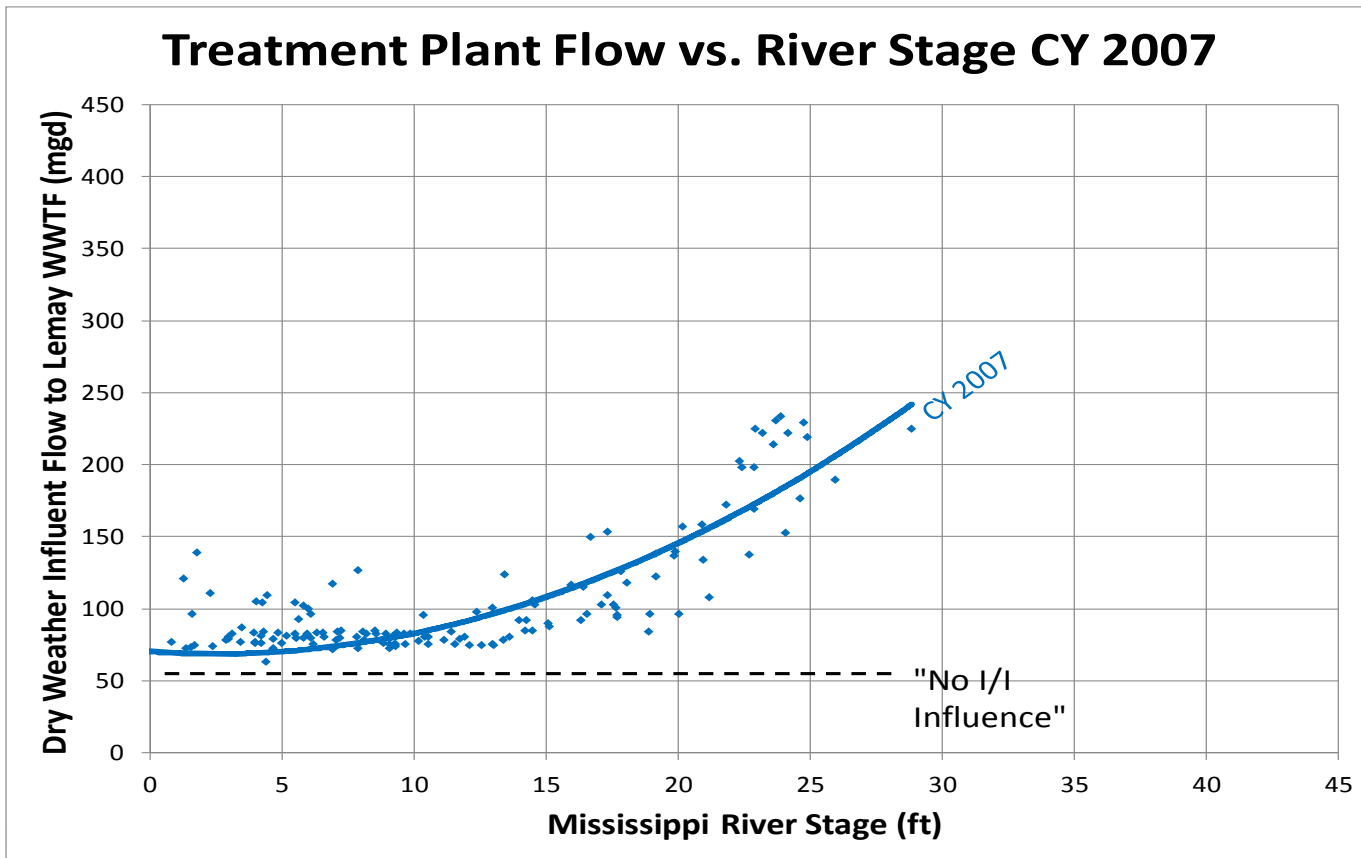


# The Problem During High River Stages

- ⦿ Running more pumps than usual for dry weather average daily flow
- ⦿ 1250 HP 40,000 gpm pumps
- ⦿ Increased utility costs
- ⦿ Increased flows and solids to the treatment plant inflating plant operating costs

# Year 2007

Plot provided by Jacobs Engineering



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# One Problem Identified

- Field investigations of I/O structures were conducted to look for leaking river gates
- Crews began reporting swirls forming in the RDP

Does this look familiar?





# Any Idea How Much Flow?



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# 18,981,655 Million Gallons per Day

- 🔹 Orifice Equation  $Q=CdAo\sqrt{2gH}$
- 🔹 Discharge Coefficient .62
- 🔹 Orifice Area 380.13 sq inches
- 🔹 Gravitational Constant 32.2 ft per second
- 🔹 Centerline Head 5 feet

# Root Cause Investigation

- ④ Combined sewers overcharged during rain events
- ④ Transient pressure
- ④ Faulty structures
- ④ Damaged structures due to channel maintenance





## Solution

- 🔹 **Raised manhole structures out of the channel**
- 🔹 **Installed lock down covers on all manholes in the RDP channel**
- 🔹 **Installed cover restraints to ensure covers weren't dislodged if left unsecure**
- 🔹 **Installed transient air reliefs on the FWI sewers**

# Secured Manhole Cover

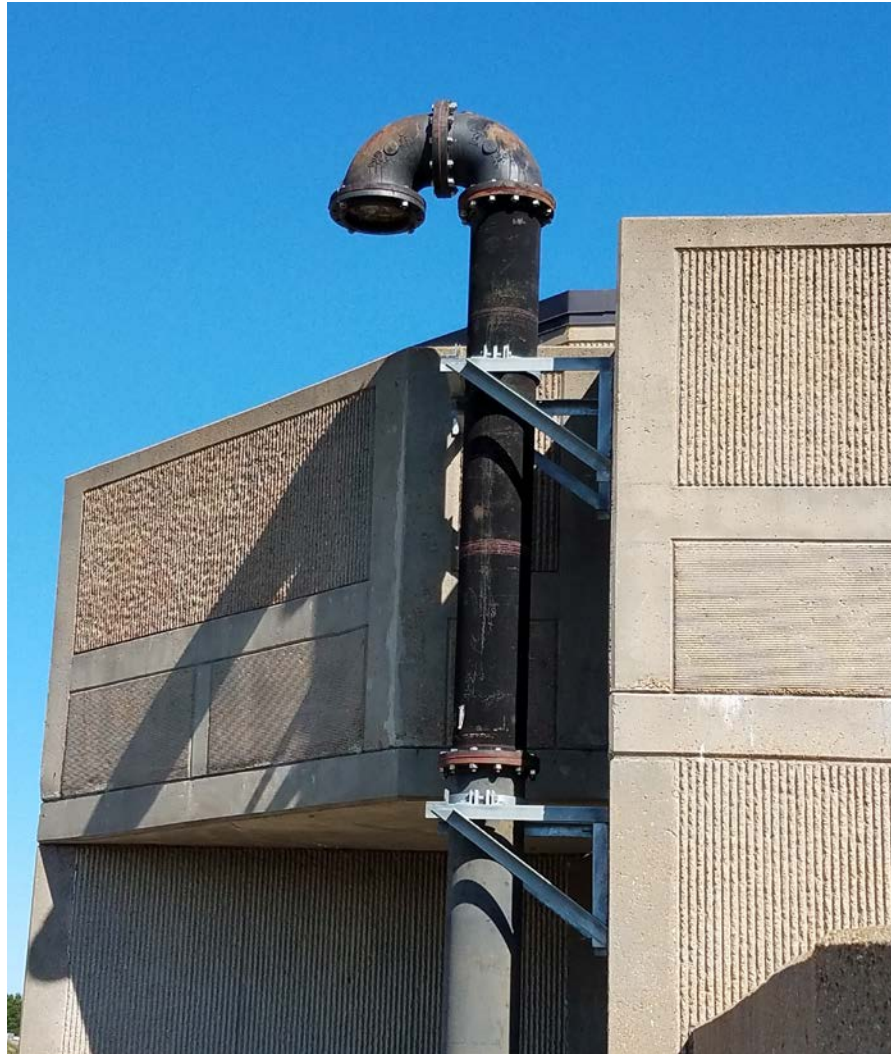


# RDP Pump Station





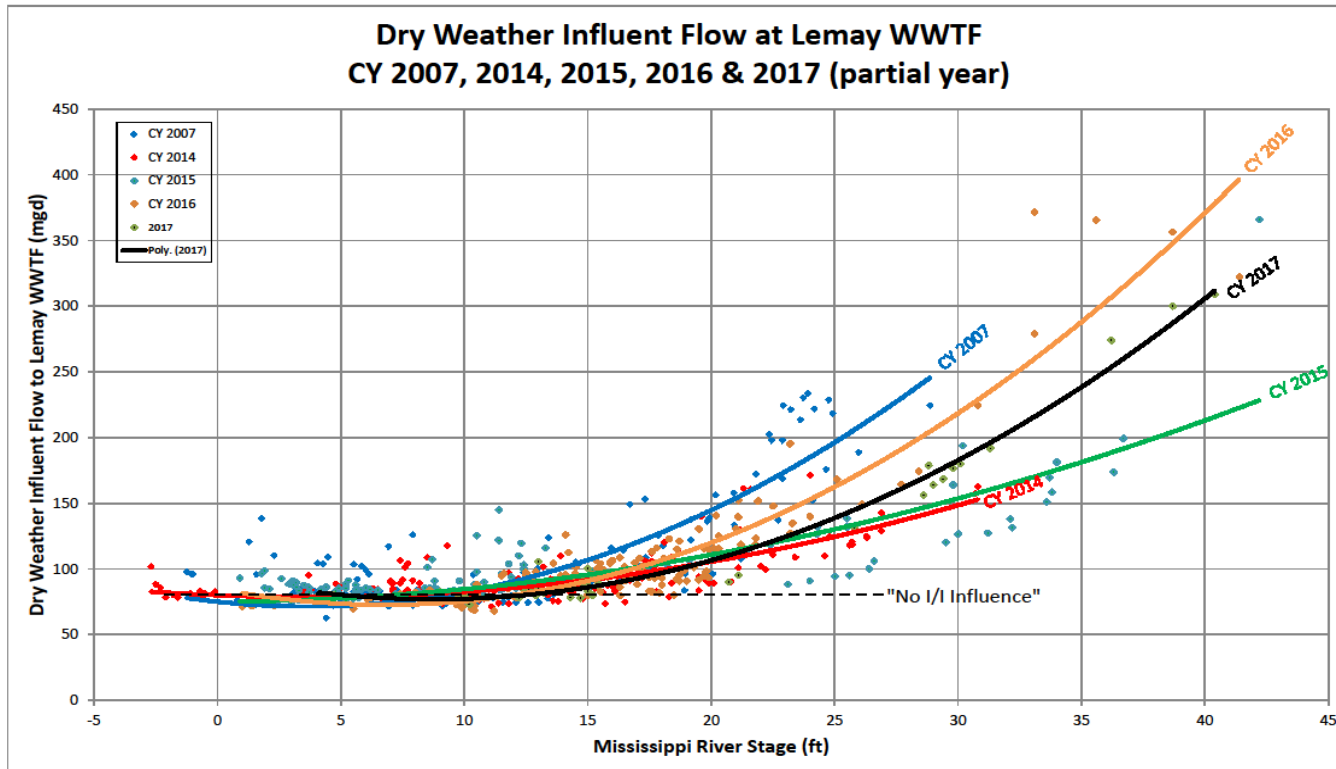
# Vent Pipe Close Up





# The Results

Plot provided by Jacobs Engineering



# We Still Have Work To Do

- 🔹 Removing old grit chambers no longer in use
- 🔹 Continuing to do field investigations to identify and repair faulty structures along area streams and creeks
- 🔹 Repair FWI defects
- 🔹 Routinely inspect and maintain gate structures

# Grit Chamber





# Grit Chamber Issues



# FWI Access Slab Leaks



# Stop Log Structures





# Questions?



# Contact Information

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