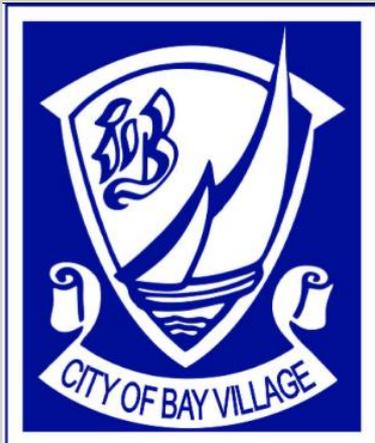


# Rocky River WWTP Capital Improvement Plan



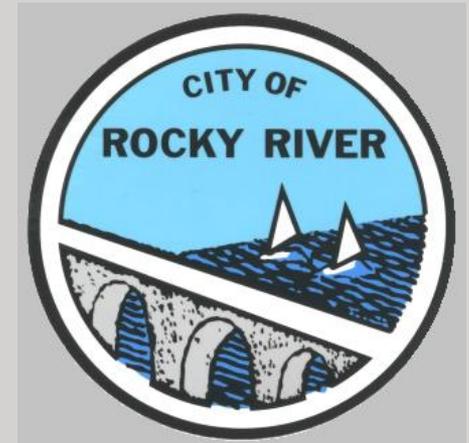
FAIRVIEW PARK CITY COUNCIL  
PRESENTATION



CITY OF  
**FAIRVIEW PARK**

*A Great Place to Grow*

The City of *Westlake* Ohio





# Rocky River Wastewater Treatment Plant

- ❑ Located at 22303 Lake Road in Rocky River
- ❑ Receives wastewater from, and is owned by the cities of Westlake, Rocky River, Fairview Park, and Bay Village
- ❑ Is designed to treat an average daily flow of 25 million gallons and a peak daily flow of 45 million gallons
- ❑ Originally owned and operated by Cuyahoga County





## 1970 Agreement

- ❑ Agreement between Cuyahoga County Board of Commissioners and the cities of Bay Village, Fairview Park, Rocky River and Westlake
- ❑ First agreement to include Westlake
- ❑ Lists all previous agreements and amendments (1937, 1957, 1958, 1959, 1969)
- ❑ Authorizes and apportions cost for the construction of a 10.6 MGD secondary treatment plant. This process was a carbon filtration system that ultimately failed.





## 1982 Agreement

- Authorized construction of new secondary treatment process: Fixed Film Reactors, which are inservice today.
- Provided for reimbursement to Rocky River for the purchase of land for the new process.
- States that Legal Title to the facility shall be held jointly between the four cities.
- States that the costs for maintaining and operating the WWTP will be paid to the City of Rocky River from each of the cities.
- Creates the requirement for the sewer flow and strength testing as the method for determining financial obligation for each city.
- Requires each city to enact ordinances required to satisfy conditions imposed by any regulatory agency having jurisdiction over the WWTP.
- Sets the capacity of the WWTP in Population Equivalent, and allocates population capacity to each city.
- Creates the Management Committee
- States that personnel at the plant are City of Rocky River Employees



# High Priority Issues



- Regulatory Requirements to Eliminate Bypasses
- Aging Infrastructure
- Aging Workforce
- Possible changes in NPDES discharge requirements

# Regulatory Requirements to Eliminate Bypass



- All Wastewater must be treated to Secondary Treatment Standards
- Flows to plant during storm events range from 60 to 170 MGD
- No Feasible Alternatives Analysis Required originally as part of the 2011 NPDES Permit
- Delayed through permit modification
- Submittal Required 1/1/2019
- Hazen and Sawyer Engineers performed the Study

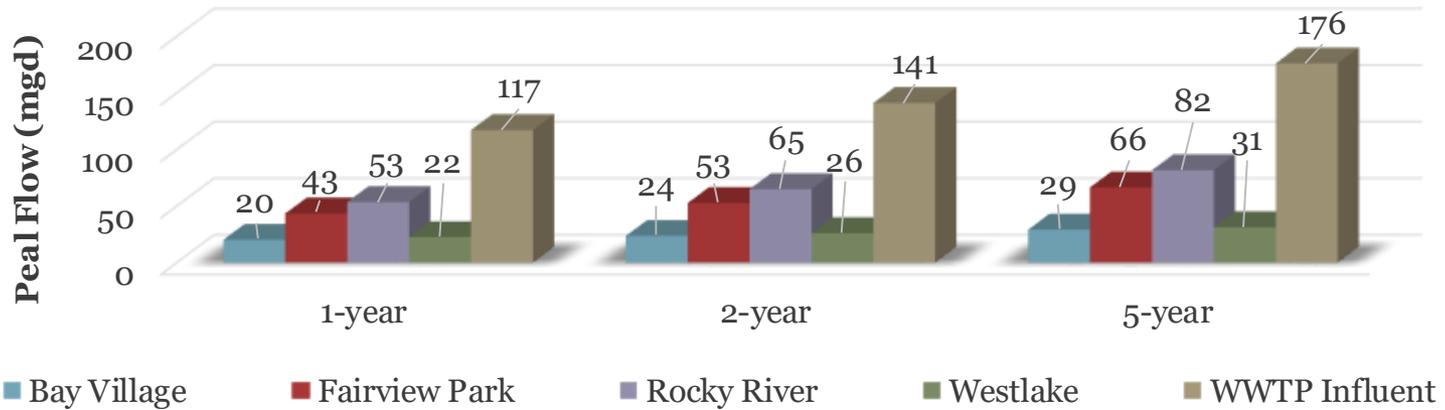
# Process Steps



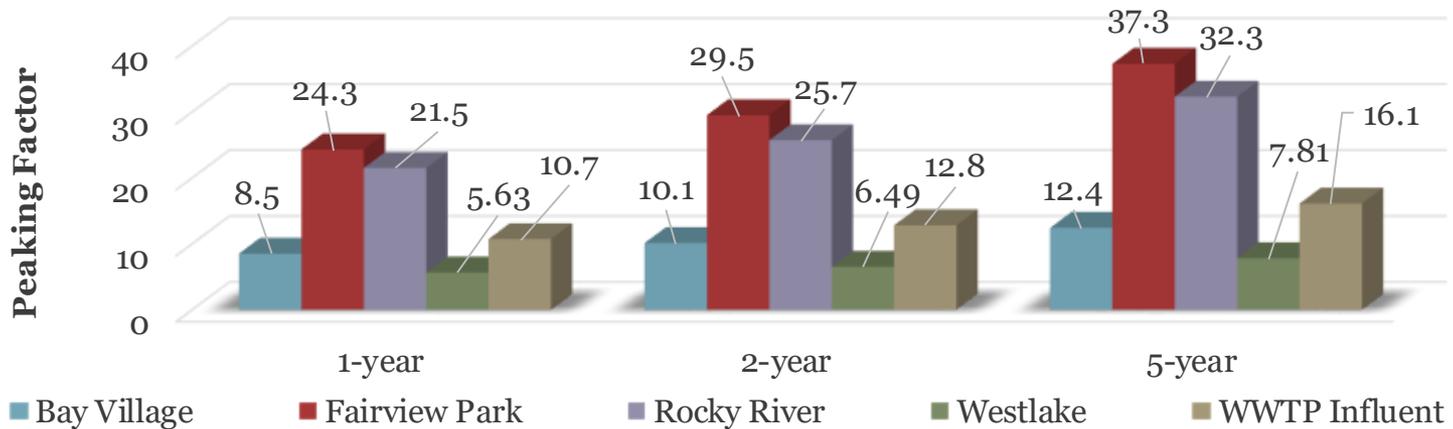
- 2017 Sewer Flow and Strength Study included data capture intended to assist in determining collection system issues
- Interviews with each city regarding work performed and planned in each collection system 2017-2018
- Interviews with Finance Directors 2018
- Approval by Management Committee December 2018
- Submission of Draft Report to Ohio EPA 12/31/2018
- Meeting with OEPA January 2019
- Response Received September 2019

# RDII Peak Flows and Peaking Factors

## Design Storm Peak Flows



## Design Storms Peaking Factors



**OPCC for Alternatives to Increase Wet Weather Treatment Capacity at Rocky River WWTP**

Treatment Technology	Option	Level of Service (mgd)	Total WWTP Improvement Cost (\$M)	Remote EQ Cost (\$M)	Total Capital Cost (\$M)
1 Trickling Filter	A	1-year <sup>1</sup>	\$77.6	-	\$77.6
	B	2-year <sup>1</sup>	\$90.4	-	\$90.4
	C	5-year <sup>1</sup>	\$157.4	-	\$157.4
	D	10-year <sup>1</sup>	\$190.9	-	\$190.9
	E	1-year <sup>1</sup>	\$28.6	\$41.8	\$70.4
	F	2-year <sup>1</sup>	\$81.0	\$40.4	\$121.4
	G	5-year <sup>1</sup>	\$134.4	\$45.6	\$180.0
	H	10-year <sup>1</sup>	\$174.8	\$50.9	\$225.7
2 Activated Sludge	A	1-year <sup>1</sup>	\$89.9	-	\$89.9
	B	2-year <sup>1</sup>	\$103.3	-	\$103.3
	C	5-year <sup>1</sup>	\$132.4	-	\$132.4
	D	10-year <sup>1</sup>	\$149.2	-	\$149.2
	E	1-year <sup>1</sup>	\$28.6	\$41.8	\$70.4
	F	2-year <sup>1</sup>	\$88.0	\$40.4	\$128.4
	G	5-year <sup>1</sup>	\$106.2	\$45.6	\$151.8
	H	10-year <sup>1</sup>	\$130.7	\$50.9	\$181.6
3 Trickling Filter Solids Contact	A	1-year <sup>1</sup>	\$77.9	-	\$77.9
	B	2-year <sup>1</sup>	\$87.0	-	\$87.0
	C	5-year <sup>1</sup>	\$117.2	-	\$117.2
	D	10-year <sup>1</sup>	\$152.1	-	\$152.1
	E	1-year <sup>1</sup>	\$28.6	\$41.8	\$70.4
	F	2-year <sup>1</sup>	\$73.5	\$40.4	\$113.9
	G	5-year <sup>1</sup>	\$93.1	\$45.6	\$138.7
	H	10-year <sup>1</sup>	\$129.5	\$50.9	\$180.4
4 Chemically Enhanced Primary Treatment	A	1-year <sup>2</sup>	\$10.2	-	\$10.2
	B	2-year <sup>2</sup>	\$10.6	-	\$10.6
	C	5-year	NF	-	NF
	D	1-year <sup>3</sup>	\$37.9	-	\$37.9
	E	2-year <sup>3</sup>	\$40.4	-	\$40.4
	F	5-year <sup>3</sup>	\$45.2	-	\$45.2
	G	1-year <sup>4</sup>	\$55.1	-	\$55.1
	H	2-year <sup>4</sup>	\$62.6	-	\$62.6
	I	5-year <sup>4</sup>	\$86.5	-	\$86.5
	J	1-year <sup>4</sup>	\$8.9	\$41.8	\$50.7
	K	2-year <sup>4</sup>	\$55.3	\$40.4	\$95.7
	L	5-year <sup>4</sup>	\$75.6	\$45.6	\$121.2
	M	1-year <sup>2</sup>	\$8.9	\$41.8	\$50.7
	N	2-year <sup>2</sup>	\$9.1	\$40.4	\$49.5
	O	5-year <sup>2</sup>	\$10.3	\$45.6	\$55.9

<sup>1</sup> Biological treatment expansion and equalization at WWTP

<sup>2</sup> CEPT only at WWTP

<sup>3</sup> CEPT and equalization at WWTP

<sup>4</sup> CEPT and biological treatment expansion at WWTP

NF - Option not feasible due to hydraulic limitations of 72-inch EFC influent and effluent pipe

**Note:** Localized collection system improvements are not included in the total capital costs



# Financial Capability Analysis (FCA)

- Snapshot for each city
- EPA standard and modified metrics
- Two assessments:
  - Economic impact on residential ratepayers
  - Impact on financial strength of utility
- Traditional affordability – 2% of median household income, but now additional factors

## *Additional Factors For Affordability*

- **Lower level quintiles**
- **Socioeconomics**
- **Community debt**
- **Bond rating**
- **Unemployment rate**
- **Property tax collection rate**
- **Poverty rate**
- **Welfare rate**
- **Water / storm water rates**
- **Other charges to users**

# Conclusions / Recommendations

- 1 Full system flow monitoring / modeling to optimize improvements for peak flow / EQ
- 2 CEPT can be implemented quickly and would improve WWTP water quality for EFC flows at the lowest High Burden impact
- 3 EQ at plant or in collection system in conjunction with other community improvements required to address untreated bypass at headworks
- 4 Rocky River and Fairview Park impacted by affordability
- 5 Phased integrated plan approach
  - Optimize total cost of improvements
  - Schedule most feasible for all communities

Hazen



# Project Phasing and Implementation Schedule

Collection System Model to Optimize System Improvements.

Task / Upgrade

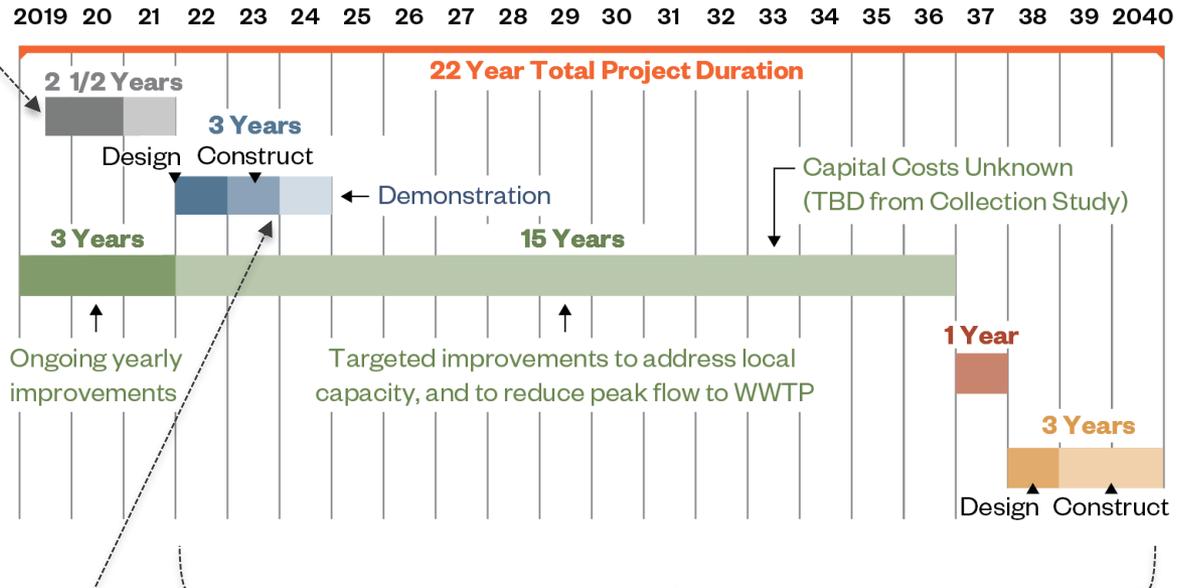
Collection System Modeling / Refined Community Prioritization

Phase 1 WWTP Improvements

Individual Member Community Collection System Improvements

Evaluate WWTP Peak Flows / Need for Phase 2 WWTP Improvements

Phase 2 WWTP Improvements (If Necessary)



CEPT Improvements to Improve WWTP Water Quality on EFC

Improvements to Reduce/Attenuate Peak Flows



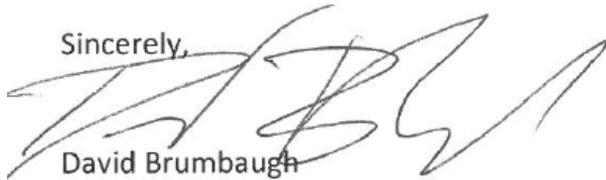
Additionally, the trickling filters are aging and other components of the facility are even older. By the end of the proposed implementation schedule (2040), much of the WWTP will have passed its expected useful life and require repair or replacement.

Given the hydraulic limitations and age of Rocky River WWTP, Ohio EPA recommends that Phase 2 of the WWTP improvements include an expansion of secondary treatment to at least 66.5 MGD. Ohio EPA understands that this represents a significant expense for the member communities and is therefore willing to accept an extended schedule similar to that included in the NFA

4. Please update the schedule to include dates-certain for the submission of plans and reports, as well as the initiation and completion of construction projects.

If you have questions or concerns regarding this letter, I can be reached by telephone at (614) 644-2138 or e-mail at [david.brumbaugh@epa.ohio.gov](mailto:david.brumbaugh@epa.ohio.gov).

Sincerely,



David Brumbaugh  
Environmental Specialist 2,  
NPDES Permitting  
Ohio EPA, Division of Surface Water, Central Office

# Aging Infrastructure



# Long Term Capital Improvement Plan

- Critical Needs Assessment Performed in 2018
- Long Term CIP Developed in 2019

# Draft Prioritized Project Table



		POF	COF		
#	Project	Score	Score	Total Score	Rank
J-3	Filter Building/Thickening Rehab Project	4.4	3.0	13.2	1
C-1	Auxiliary Clarifier Upgrade Project	4.7	2.5	11.5	2.5
G-1	Final Clarifier Upgrade Project	4.7	2.5	11.5	2.5
K-5	Building Roof Repairs	4.7	2.3	10.8	4
J-1	Sludge Digester Critical Ugrades	4.0	2.7	10.8	5
A-2	Screen/Grit Building Upgrade Project	4.0	2.6	10.2	6
F-2	Trickling Filter Top Floor HVAC Upgrade	4.0	2.0	8.0	7
I-1	Chemical Feed Systems Rehab Project	3.4	2.3	7.7	8
A-1	Headworks Upgrade/Repair Project	3.0	2.6	7.7	9
D-1	Excess Flow Clarifier Structural Settlement Repair	3.7	2.0	7.4	10
B-1	Primary Clarifier Mechanism Replacement Project	3.3	2.2	7.1	11
K-1	Boiler Building / Standby Power Upgrade Project	3.0	2.4	7.1	12
C-2	Auxiliary Clarifiers Pump Gallery Rehab Project	3.4	2.0	6.8	13
E-1	Settled Sewage Pump Station HVAC/Electrical Upgrade	3.0	2.2	6.5	14
J-2	Sludge Digester Rehab Project	2.7	2.3	6.2	15
F-1	Trickling Filter Rehab/Replacement Project	3.0	2.0	6.0	16
K-2	Site Power Distribution Upgrades	2.3	2.5	5.6	17
H-1	Chlorine Contact Mixer/Electrical Upgrades	2.7	2.0	5.4	19
D-2	Excess Flow Clarifiers Pipe Gallery/Electrical Project	2.7	2.0	5.4	19
K-3	Admin Building Electrical Upgrades	2.7	2.0	5.4	19
K-4	Lake Road Pump Station Upgrade	2.0	2.0	4.0	21



The final clarifiers for the Rocky River Wastewater Treatment Plant were designed and installed as part of the 1982 Secondary Treatment process addition. They receive flows from the trickling filters, which are the biological treatment process for the plant. They are designed to maintain RRWWTP NPDES permit limits for TSS. And can handle plant flows up to a maximum of 45 MGD. The clarifiers include a settling zone, an effluent launderer and weir, and solids removal mechanisms.



## Secondary Treatment Process 1982



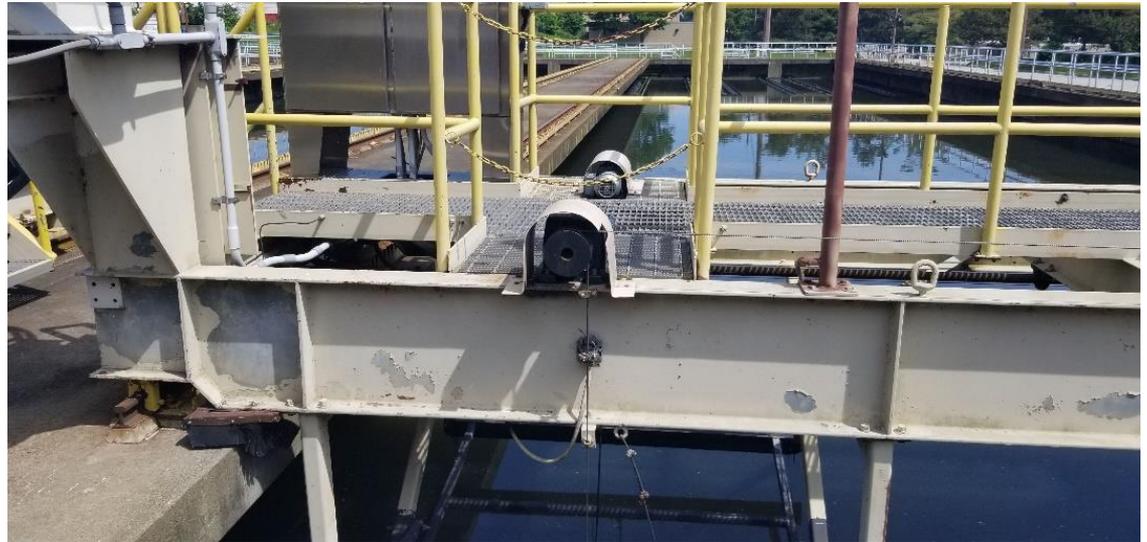
## Final Clarifier Tanks

The solids removal process takes place through the use of a traveling bridge mechanism. Each of the four clarifiers has its own mechanism. This equipment travels from the inlet side of the tank, down to the effluent end of the tank. At that point, a number of scrapers and skimmers drop into the tank. The scrapers pull the solids material back to the inlet end of the clarifier, and the skimmers pull the floating debris and grease to channels at the inlet end as well.



# Final Clarifier Upgrade Project

- Replacement of traveling bridge mechanisms, tracks
- Repair areas in pump gallery with leaks from groundwater and/or overhead channel
- Improve grease removal system



# Final Clarifier Upgrade Project



- Replacement of traveling bridge mechanisms, tracks
- Repair areas in pump gallery with leaks from groundwater and/or overhead channel
- Improve grease removal system

Probability of Failure		Consequence of Failure				Total
Physical	Performance	Safety	Level of Service	Regulatory	O&M Impacts	PoF * CoF
5	4	2	3	2	3	<b>11.5</b>

# Filter Building/Thickening Rehabilitation Project



Probability of Failure		Consequence of Failure				Total
Physical	Performance	Safety	Level of Service	Regulatory	O&M Impacts	PoF * CoF
5	3	3	3	3	3	<b>13.2</b>

# Filter Building/Thickening Rehabilitation Project



- Replace belt presses
- Replace sump pumps
- Recoat sludge loadout beams, conveyors
- Repair distressed concrete areas and corroded reinforcement
- Determine source of leak repair brick wall in belt press room
- Recoat roof framing system

# Filter Building/Thickening Rehabilitation Project



- Build electrical room to separate electrical equipment from filter presses
- Replace all electrical equipment, materials and wiring
- Replace make-up air unit and exhaust fans
- Replace Roof of Filter Building and Digester Building
- Gravity Thickener upgrades
  - Structural investigation and recoating
  - Mechanism replacement

# Auxiliary Primary Clarifier Upgrade Project



- Traveling bridge/track replacement
- Repair stairs and structural cracks in gallery



# Sludge Digester Critical Upgrades Project

- Replace digester mixers, Sludge pumps 8 and 9
- Boiler Room HVAC Upgrades
  - Add a combustion air intake within 12” of the floor.
  - Add a supply fan to this room.



Probability of Failure		Consequence of Failure				Total
Physical	Performance	Safety	Level of Service	Regulatory	O&M Impacts	PoF * CoF
4	4	2	3	3	3	<b>10.8</b>

# Auxiliary Primary Clarifier Upgrade Project



- NFPA evaluation
- Relocate door
- Airlock or additional ventilation to declassify pump gallery
- E-0600MCC replacement



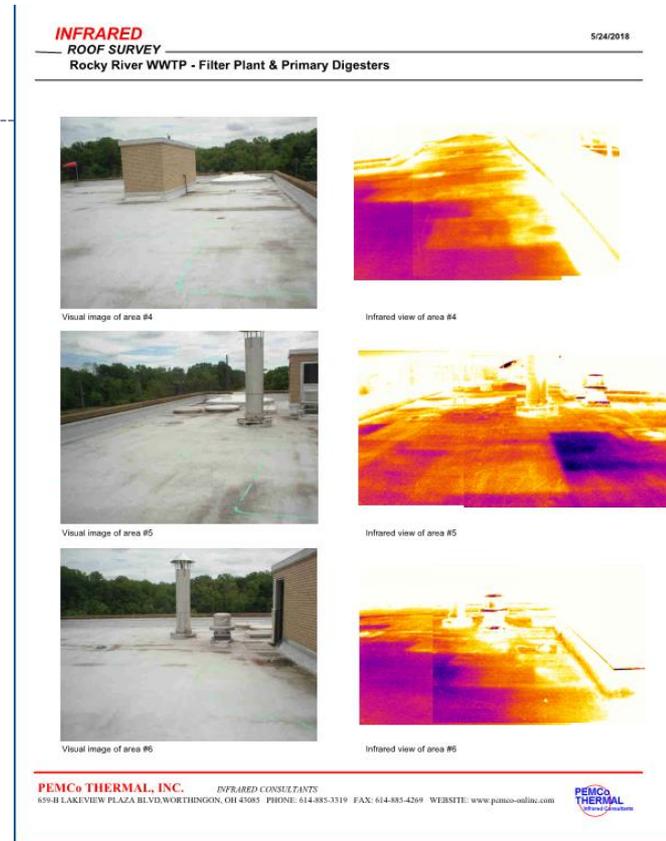
# Auxiliary Clarifier Upgrade Project



Probability of Failure		Consequence of Failure				Total
Physical	Performance	Safety	Level of Service	Regulatory	O&M Impacts	PoF * CoF
5	4	2	3	2	3	<b>11.5</b>

# Building Roof Repairs

- Fixed Film Reactor Building
- Screening and Grit Buildings
- Lake Road Pump Station
- Chemical Storage Building
- Administration Building



Probability of Failure		Consequence of Failure				Total
Physical	Performance	Safety	Level of Service	Regulatory	O&M Impacts	PoF * CoF
5	4	3	2	2	2	<b>10.8</b>

# Near Term Project Costs



Project	Estimated Cost
Flow Monitoring ( <b>Per NFA</b> )	\$340,000
Hydraulic Modeling and Calibration ( <b>Per NFA</b> )	\$275,000
Conversion of Excess Flow Primaries to CEPT ( <b>Per NFA</b> )	\$10,600,000
Final Clarifier Upgrade Project (Rehab Mechanisms)	\$7,600,000
Filter Building/Thickening Rehab Project	\$6,400,000
Auxiliary Clarifier Upgrade Project (Rehab Mechanisms)	\$3,600,000
Building Roof Repairs (ones not included with other high priority projects)	\$1,300,000
Sludge Digester Critical Upgrades	\$2,300,000
<b>Total</b>	<b>\$32,415,000</b>

# Aging Workforce



- Multiple Retirements
- Changes in Operator Certification Requirements
- Multiple Postings Coming Soon

# Changes in NPDES/Regulatory Needs



- Nutrients
- Asset Management
- Contingency Planning

# Thank You!





The clarifiers' age, and the conditions in which they must operate have caused significant mechanical and structural issues that need to be addressed through a Capital Improvement project.



## Track separation and wear

The bridges travel on a set of wheels over a steel track, much like a train. Over time, the track has warped and degraded to such an extent, that multiple times per year, the bridge jumps the track. The gears and wheels that are used for this purpose cannot be relied on to maintain their path because of the unusual wear pattern that occurs.





In November of 2018, this occurred to such an extent that the bridge almost fell into the clarifier. This incident damaged the troughs and weirs at the effluent end of the tank. During cold weather months, we are

forced to limit the amount of time we allow the equipment to run in order to minimize the risk of complete system failure.





In addition to the mechanical issues, there are structural problems that must also be addressed: cracks in the tank walls worsen over time.



Physical, structural, mechanical and electrical assessments have been performed, all concurring with the critical nature of the proposed work.

In June of 2018, the manufacturer was brought in to do a complete evaluation of the equipment.

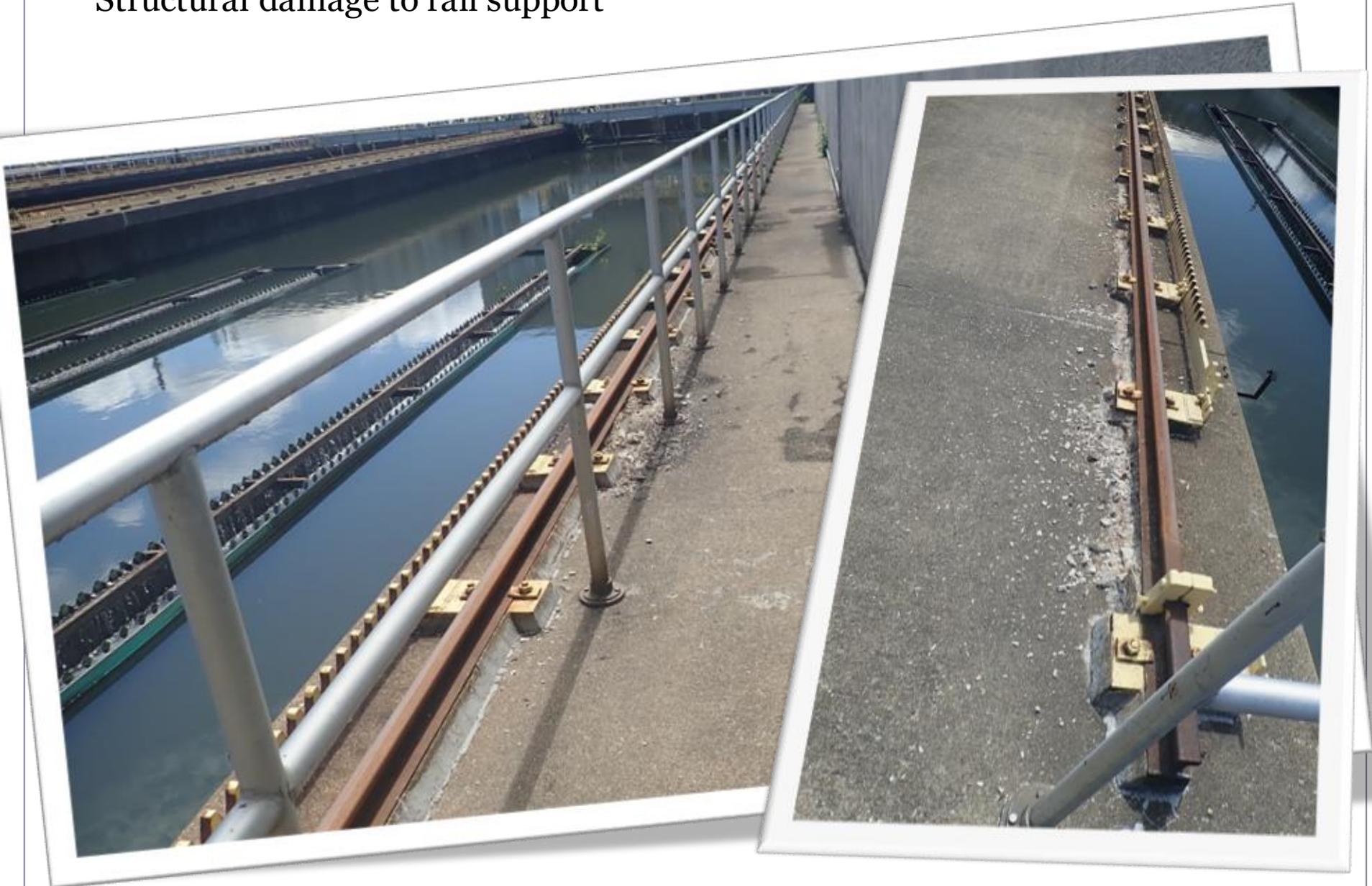


### **Recommendations**

Based on OVIVO's inspection of the bridges we recommend the following:

1. Replacement of the rails, wheels, bearings, cogs, and cog track.
2. Replacement of the complete undercarriage mechanism, skimmers, and brackets. As stated previously, Owner believes the bridges can be reused.
3. Replacement of all supports, brackets, and wipers.
4. Replacement of all fasteners associated with the items above.

# Structural damage to rail support





## 2013-16 Project Completed

- ❑ Replacement of the rotating mechanism and bearings in the four fixed film reactors
- ❑ Replacement of 18 gate actuators
- ❑ Installation of PLC control panel for Chlorine disinfection



**A picture of the interior of a fixed film reactor showing the plastic media, distribution arms, and rotating mechanism.**



## 2014-17 Project

- ❑ Will bring the anaerobic digester building up to NFP code, including replacement of 55 year old electrical equipment with a new electrical room and equipment appropriate to classified spaces.
- ❑ Replacement of the two boiler/heat exchangers
- ❑ Conversion of the Rocky River Pump station to a plans and documents storage building
- ❑ Replacement of the Waste Gas Burner, requires a new air services permit.



**Two new boilers have been started up this past week.**