

Monroe County Investing in the Future

**NYWEA/NEWEA Joint Spring
Technical Conference & Exhibition**

Session 6.2
Thursday, June 8, 2023



Agenda

- 1** Overview of FEV
- 2** Background to FEV Capital Improvement Program
- 3** Approach to Investing in the Future of FEV
- 4** Aeration System – Operational Improvements and Increased Flexibility
- 5** Secondary Clarifiers – Beyond Replace in Kind
- 6** Electrical System – Resiliency and Reliability
- 7** Lessons Learned and Current Status
- 8** Questions and Acknowledgements

Today's Presenters



Matthew Czora, PE
Program Manager
Arcadis



Corky Kelsey, Grade 4A
Chief WRRO
MCDES

Overview of FEV

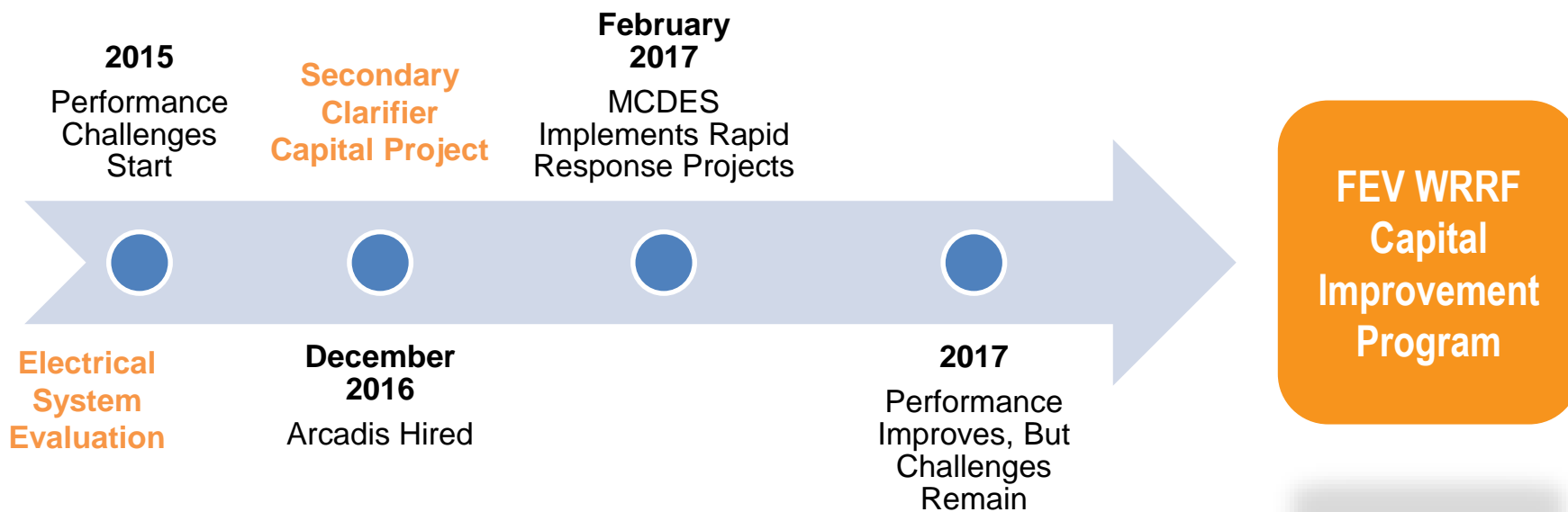


FEV WRRF

- Rochester, NY
- Original construction 1900s, last major upgrade in 1970s
- Combined sewer
- Permitted for 135-mgd
- Peak influent of 600-mgd
- Effluent limits:
 - Phosphorus -1.0 mg/L
 - TSS - 30/45 mg/L; 85% removal
 - SS - 0.3/0.5 ml/L
 - BOD - 30/45 mg/L; 85% removal

Background to FEV Capital Improvement Program

History



Program Goals

Program Components



Program Goals

Improve Permit
Compliance

Maintain Permit
Compliance

Increase
Operational
Flexibility

Expand
Capabilities for
Staff

Improve
Resiliency and
Reliability

Maximize
ROI

Program Components

Program Goals

Improve Permit Compliance

Maintain Permit Compliance

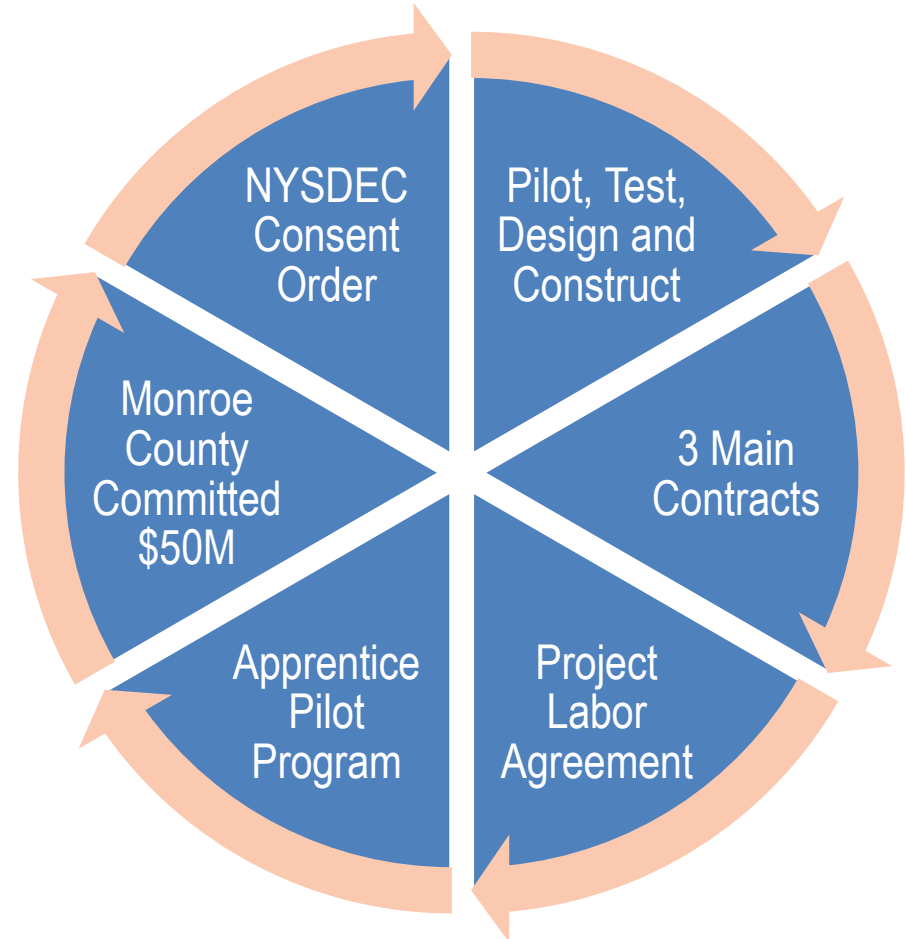
Increase Operational Flexibility

Expand Capabilities for Staff

Improve Resiliency and Reliability

Maximize ROI

Program Components



Approach to Investing in the Future of FEV

Beyond Replace in Kind

By piloting and testing improvements in a phased approach with field validation testing between the alterations prior to full-scale construction/implementation, **the incremental benefit of each improvement could be measured, and a cost benefit analysis could be completed to determine the full-scale design.**

This approach – design, pilot, test, modify, test, implement at full scale – allowed MCDES to maximize return on investment and improve operational capabilities for the staff.



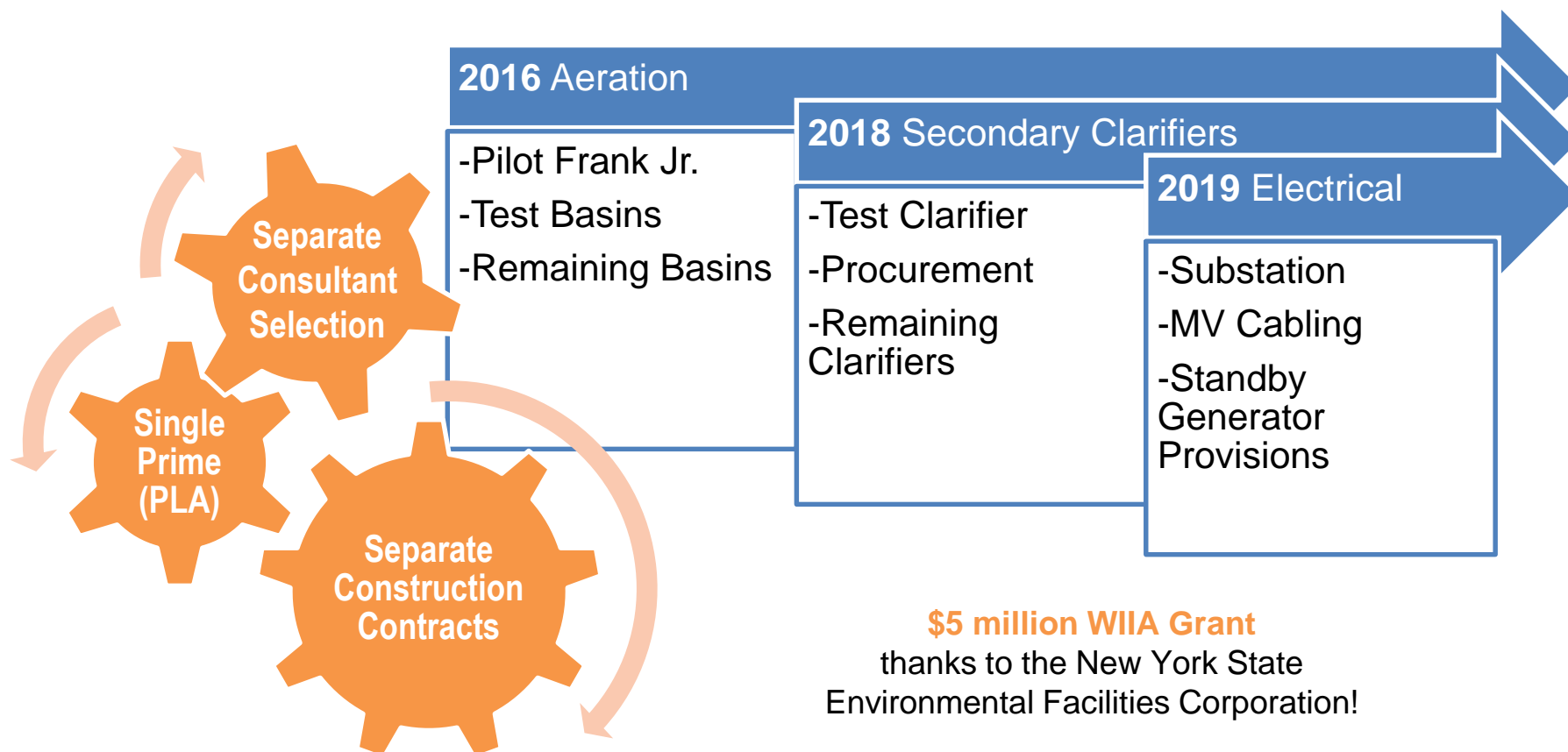
```
graph TD; A[Desktop Analysis] --> B[Full Scale Pilot]; B --> C[Field Verification];
```

Desktop Analysis

Full Scale Pilot

Field Verification

Contract Organization





NEWEA
WORKING FOR WATER QUALITY

Aeration System – Operational Improvements and Increased Flexibility





NEWEA
WORKING FOR WATER QUALITY

Aeration System – Existing Conditions

- 20 Aeration Basins
- 4 Quadrants
- 10 Centrifugal Turbo Blowers
- 900 to 1200 SCFM per Basin
- 3.0 mg/L Dissolved Oxygen
- Non-aerated Selector
- Plug Flow



Frank E. Vanlare
Water Treatment Plant...

Aeration System – Challenges

No Basin Mode
Flexibility

No Tools to
Respond to Wet
Weather Events

Reduced
Resources for
Moving Gates

Complex
Programming
Logic

Insufficient
Blower Capacity

Aeration System – The Solution

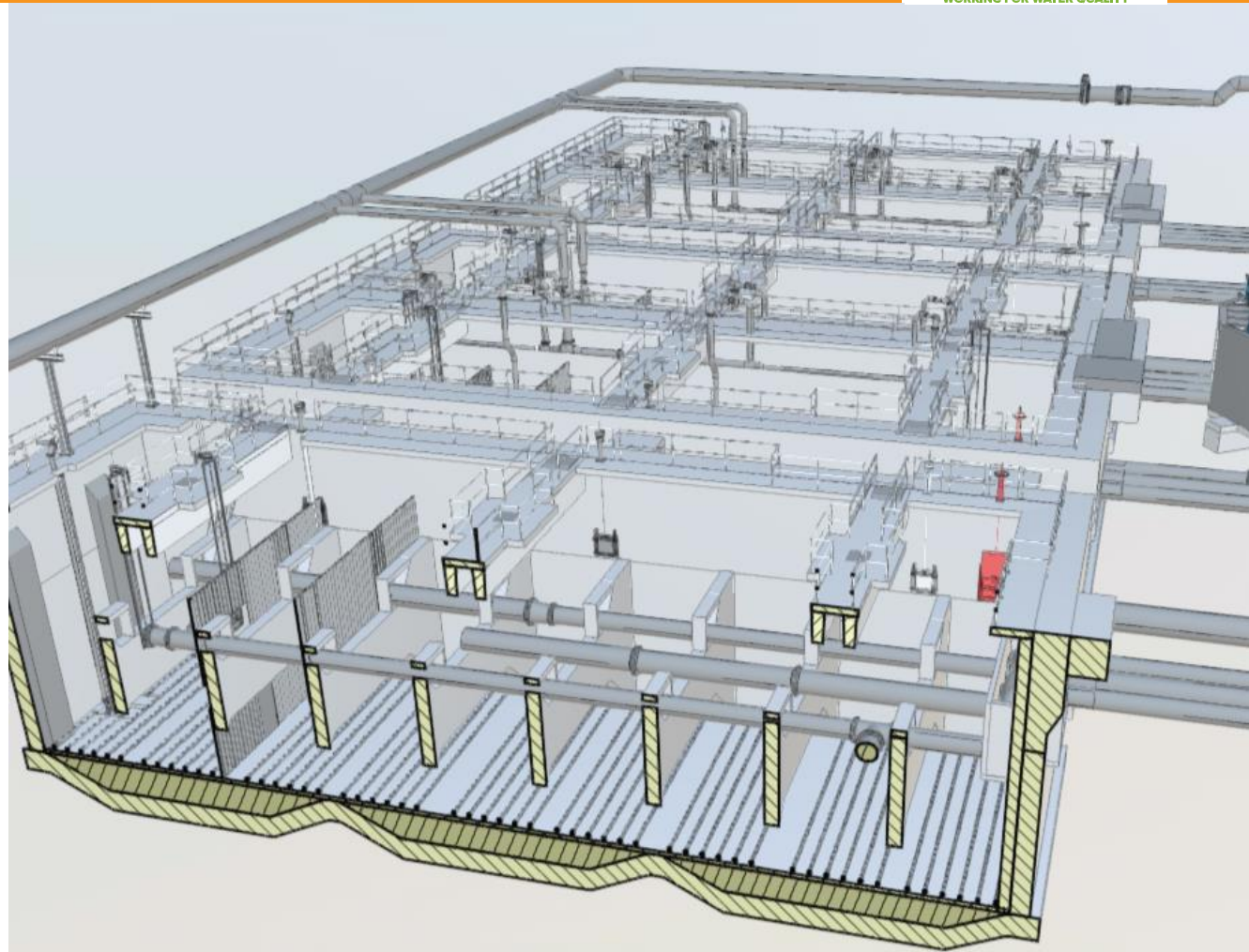




NEWEA
WORKING FOR WATER QUALITY

Aeration System – The Solution

- Complete Mix, Full Air – 8 Basins
- 2 Additional Blowers
- Automation of Influent Gates
- New Programming Implemented for Blower and DO Control





NEWEA
WORKING FOR WATER QUALITY

Secondary Clarifiers – Beyond Replace in Kind



Secondary Clarifiers – Existing Conditions

- **Existing Secondary Clarifiers:**
 - Six 145-foot diameter squircles
 - Installed in 1970s - beyond useful life
 - Circular collector mechanism
 - No corner sweeps – corner infills in 1990s
 - 14.5-foot side water depth
 - Cone bottom with slope of 1 to 12-feet
 - Center feed
 - Peripheral effluent
 - Scrappers with draft tubes
 - WAS hopper at center



Secondary Clarifiers - Challenges

Meeting permit at 135 mgd

Performance highly dependent on aeration

Performance challenges at higher flow rates

- poorly functioning sludge removal mechanisms
- high sludge blankets
- internal density currents (**temperature changes!**)
- rapid flow changes
- uneven flow resulting from the hybrid square/circle shape



ALL CONTRIBUTING TO LOSS
OF SOLIDS OVER THE WEIRS

Secondary Clarifiers - The Solution

1. CFD Model Various Improvements
2. Test Clarifier
3. Field Verification
4. Modifications to Test Clarifier
5. Final Design of Remaining Clarifiers



**Maximize Wet Weather
Flow**



**Increase Underflow
Concentrations**



Improve Solids Removal



NEWEA
WORKING FOR WATER QUALITY

Electrical System – Resiliency and Reliability





NEWEA
WORKING FOR WATER QUALITY

Electrical System – Existing Conditions

- Original installation in the 1980s
- Two incoming 34.5kV RG&E circuits (same source)
- Oil circuit breakers and air switches located in outdoor overhead structures
- 4 outdoor 7500kVA transformers - 34.5kV service to 4160V
- 5kV MV distribution switchgear located inside metal enclosure
- MV cabling throughout facility to stepdown transformers



Electrical System – Challenges

Equipment >50 Years Old
Failures and Cable Faults

Lack of Redundancy from
Power Utility

Difficult to Procure Spare
Parts for Equipment

Increased Likelihood of
Failure and Safety Risk

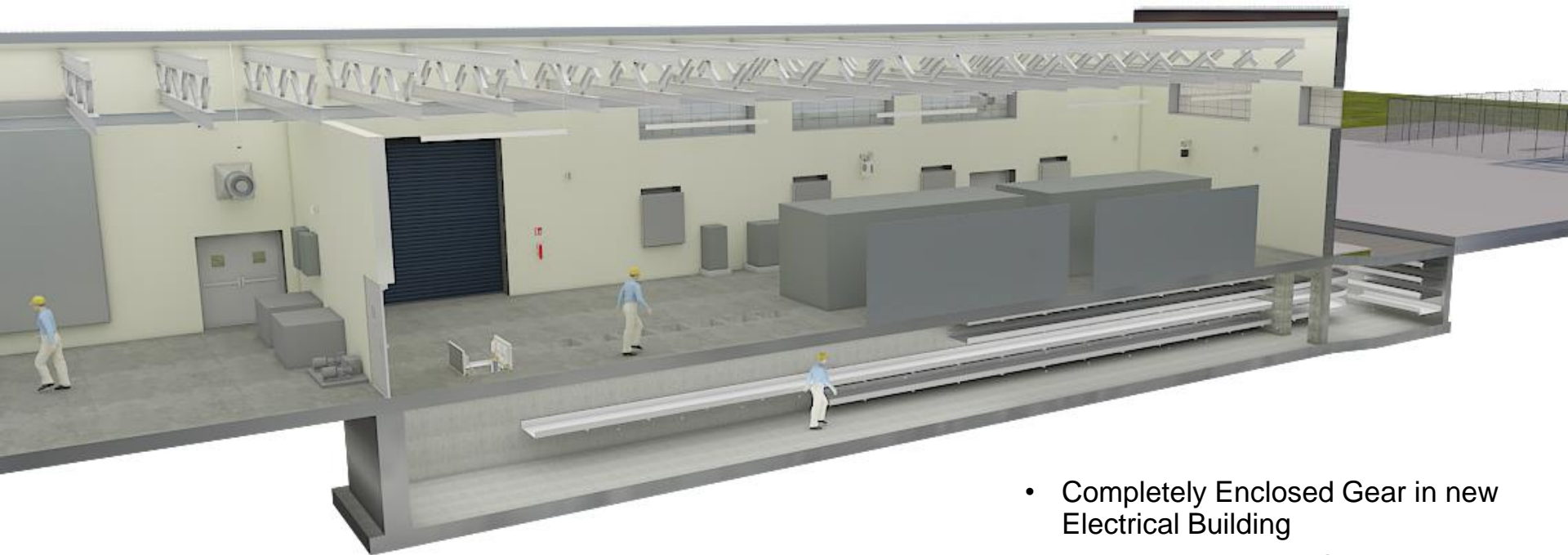
Electrical System – Existing Conditions



Electrical System – The Solution



Electrical System – The Solution



- Completely Enclosed Gear in new Electrical Building
- New 38kV and 5kV Gear
- 2 New 7500kVA Transformers
- Provisions for Future Standby Power

Lessons Learned and Current Status

Lessons Learned

- Benefit of Investing Time in Testing & Phasing
- Consistent Coordination & Communication
- Continuity Across Program Projects
- Equipment Procurement Saves More Than Time & Money

Current Status

Aeration

- Phase A - Complete
- Phase B - Complete

Clarifiers

- Test Clarifier – Complete 2021
- Phase 2 – Ongoing, 2025 Completion

Electrical

- Ongoing – Fall/Winter 2023 Completion

Questions and Acknowledgements

Acknowledgements

- **Andy Fraser, PE**
Engineering Manager, Assistant
- **Kevin Quinn**
Project Manager, MCDES
- **Kenneth Kelsey**
Chief Water Resource Recovery Operator, MCPW
- **Wayne C. LaVair**
Assistant Chief Water Resource Recovery Operator, MCPW
- **Alan E. Oates**
Assistant Chief Waster Resource Recovery Operator, MCPW
- **Taylor Listowski**
Senior Water Resource Recovery Operator, MCPW
- **Gary B. Brown**
Technical Director Monroe County Environmental Lab, MCDES
- **Pradeep Jangbari**
NYSDEC
- **Michele Vincent**
NYSDEC

The FEV Capital Improvement Program would not have been a success without the contributions of these key contractors:



Schuler-Haas
Electric Corp.



Blue Heron
CONSTRUCTION

Contact Us



Matthew Czora, PE
Program Manager
Arcadis
Direct: 585.662.4055
matt.czora@arcadis.com



Corky Kelsey, Grade 4A
Chief WRRO
MCDES

Thank you

9 June 2023

35