

City of Miamisburg WRF

Worth the Wait

**2021 OWEA Plant Operations and Lab
Conference
David Reinker, City of Miamisburg**



Proposed Agenda

- **Brief History**
- **Current Design**
- **Construction**
- **Questions**



MIAMISBURG NEWS

ESTABLISHED APRIL 1st, 1880

THURSDAY, JULY 8, 1954

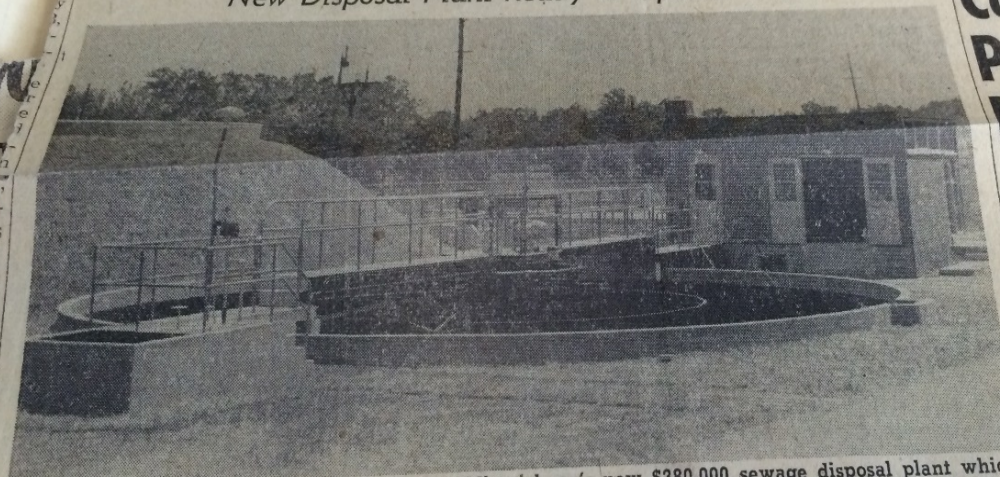
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EIGHTEEN PAGES

Over 16,000 Living in This Area Read THE NEWS Weekly \$2.50 A YEAR

New Disposal Plant to Begin Operation Monday

New Disposal Plant Ready to Operate Here



A general view is pictured above of Miamisburg's new \$380,000 sewage disposal plant which will be ready for partial operation Monday of next week. In the center is the aerator-clarifier into which sewage is first pumped and purified to a degree by air forced through the sewage. On the left is the large digester tank into which sludge is pumped and further reduced by chemical action and bacteria. The building at the right is the control station where most equipment is located and tests conducted. In the rear of the station are the large sludge or "drying" beds. (Photo by Jim Ransdell)

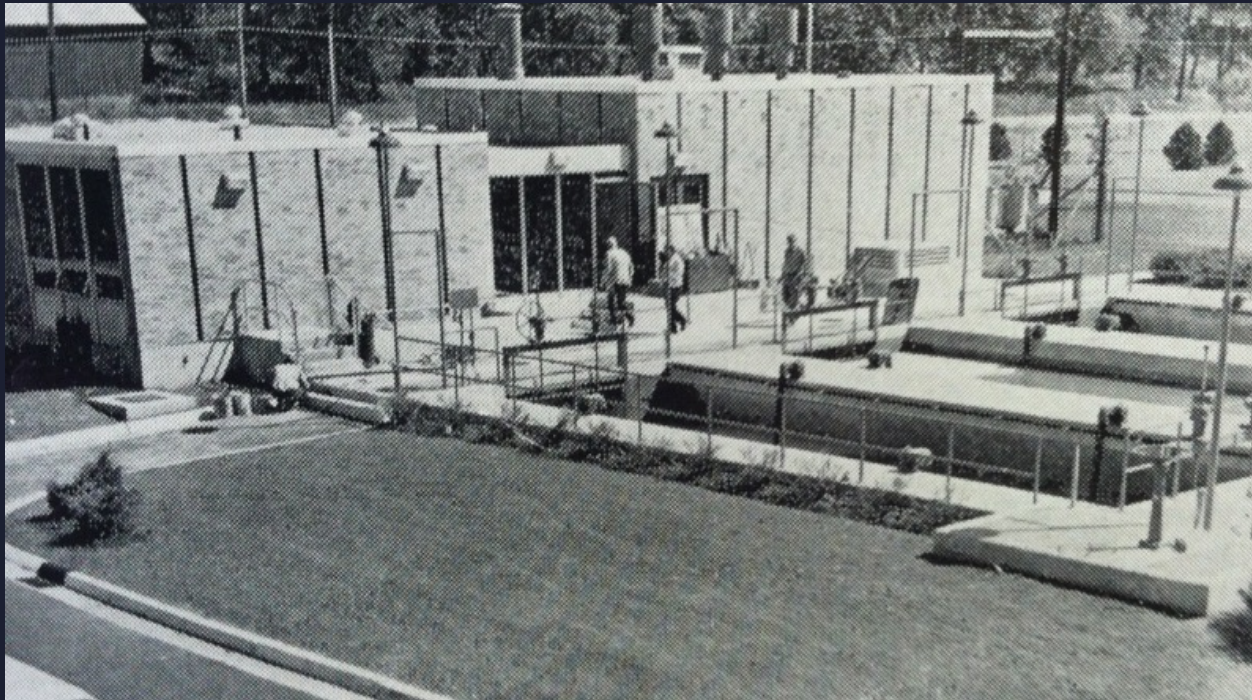
Complete Project In 1 Year

Miamisburg's new \$380,000 sewage disposal plant, located at the south end of Riverview avenue southwest of Miamisburg, is expected to be ready for partial operation by next Monday, July 12, it was learned this week.

City officials and Alfred Feber and Associates, design engineers, said today that construction work on the new plant is completed and the partial treatment plant is ready to run with full operation later next week.

They said the plant has been designed to handle and dispose of 2,500,000 gallons of untreated waste per day. Full operation beginning next Monday the plant will probably be called upon to dispose of more than one million gallons per day "for

Brief History



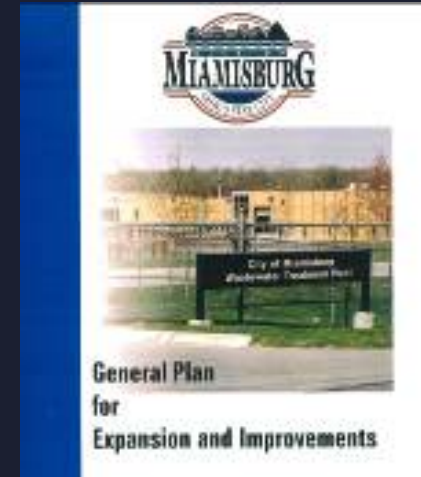
Early Miamisburg WRF History

- **1954 Original 1.0 MGD WRF into operation**
 - Primary treatment
- **1967 New 2.2 MGD WRF plant**
 - Secondary treatment and disinfection
- **1980s WRF expansions**
 - 3 phases to meet additional flows
 - 1985, 1986, and 1988



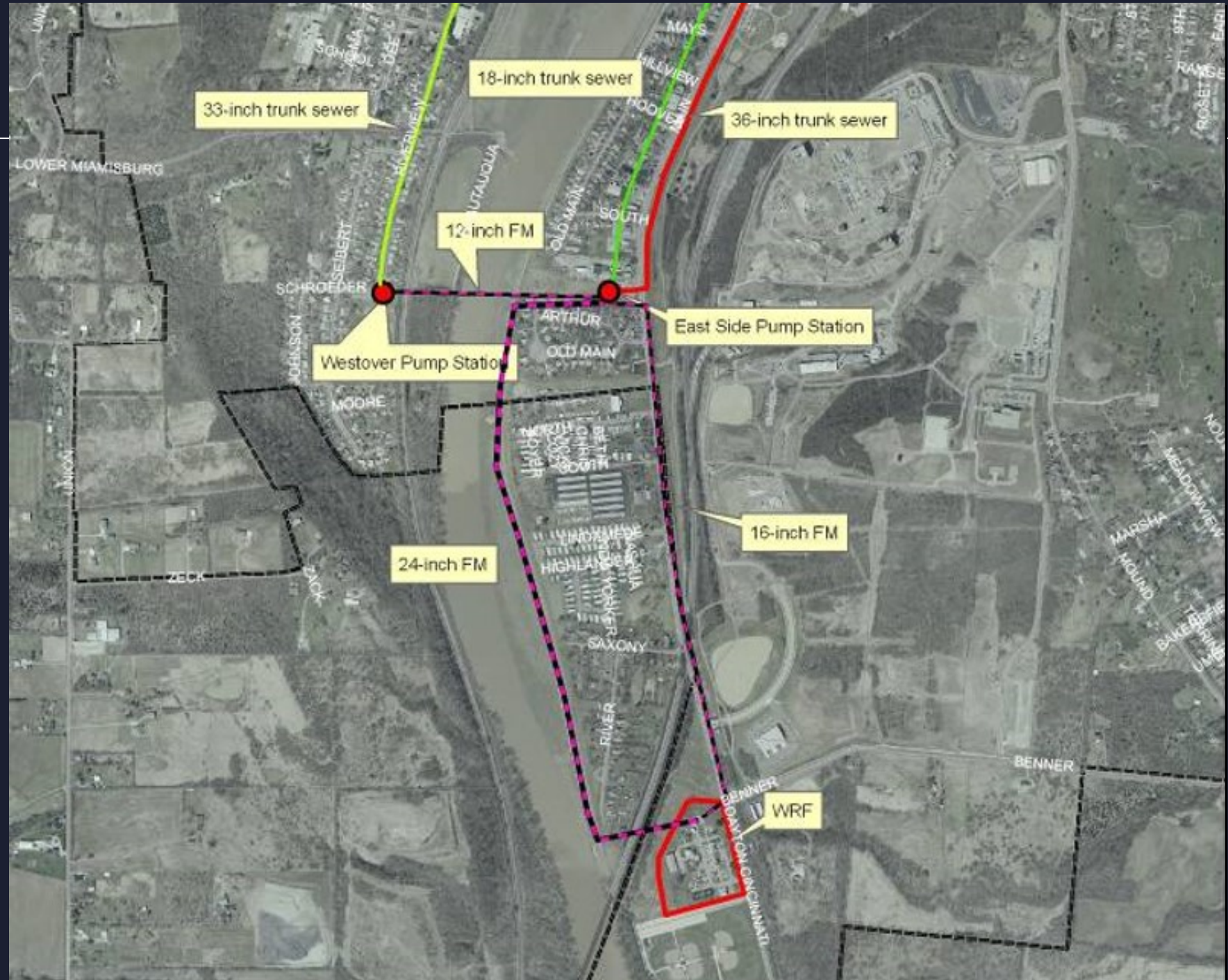
2001 WRF Improvements

- **1999 General Plan**
 - Outlined 3 phases of improvements to WRF
- **2001 Improvements Phase A**
 - 4 MGD capacity improvements
 - 8 MGD peak day
 - Modified secondary treatment
 - Remodeled admin and lab
 - SCADA and PLC additions
- **Other phases delayed**
 - Economic downturn



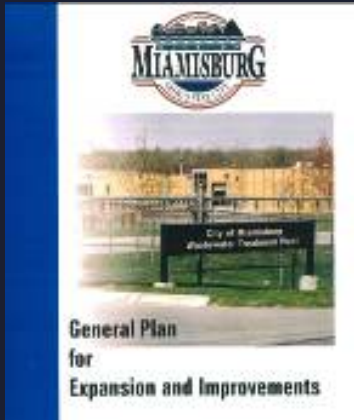
2016 through 2018







2009 General Plan



**Update to
Old General
Plan**



**Aging
Facilities and
Infrastructure**



**System
Releases and
Back-ups**

Objectives

1. Incorporate input from Miamisburg staff
2. Develop 'roadmap' for improvements with phased approach
3. Address collection system, pump station and WRF needs, focused on initially addressing highest priority issues

Preliminary and Primary Treatment

Effects of poor screening



No grit removal

Primary equipment deteriorating



WRF Solids Handling Improvements

- **Anaerobic Digestion**
 - Digester cover covered
 - Digesters contain grit
 - Existing roof poor condition
 - Code updates required
 - Gas flare

- **Dewatering**
 - Belt press to be replaced
 - Increase O&M



Needed to address aging equipment (high O&M) and meet code and regulatory requirements



2009 General Plan Recommendations

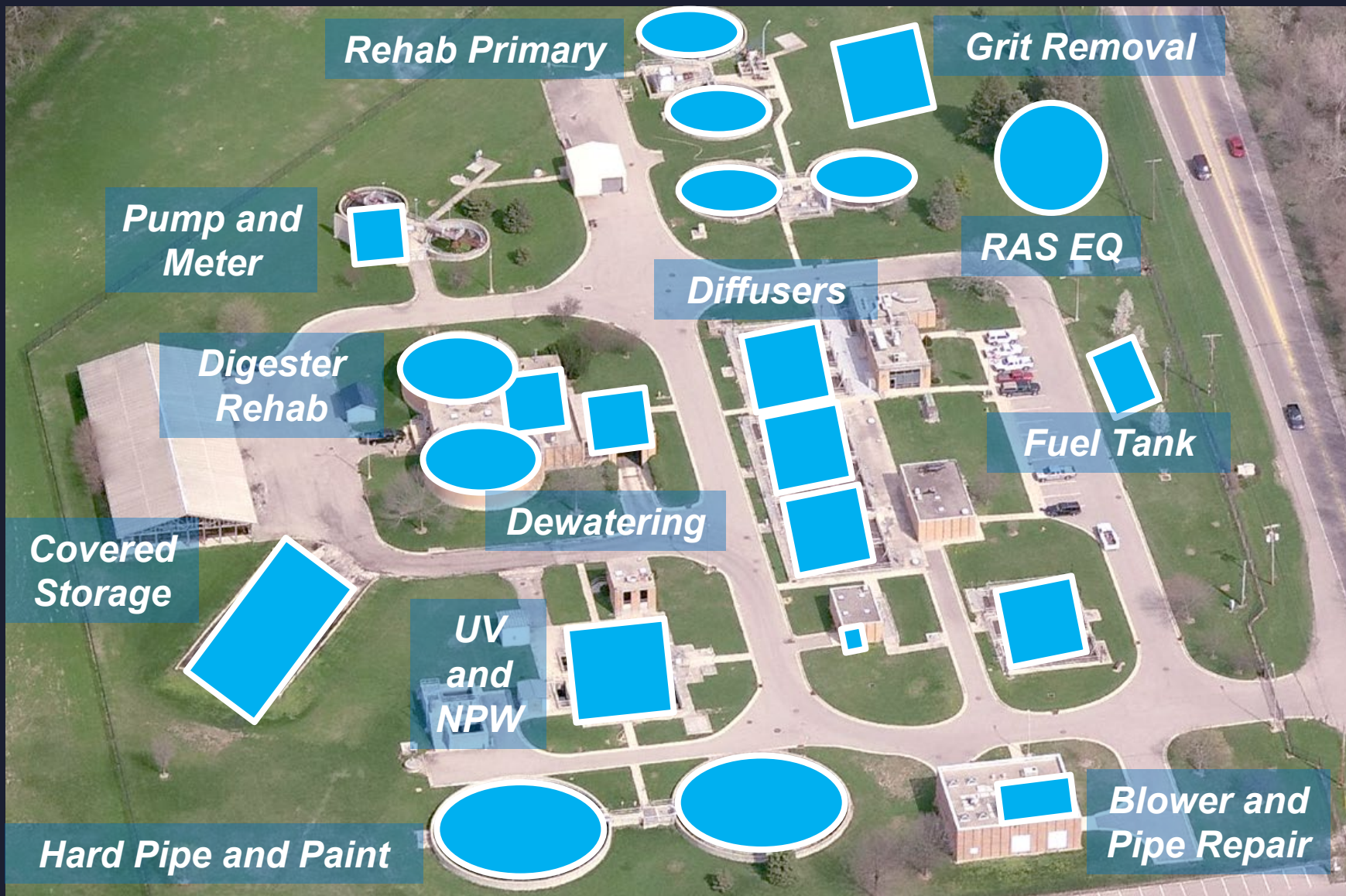
- **Wet weather capacity highest priority**
- **Collection system upgrades**
 - Collection system evaluation and testing
 - Misc I/I repair and rehab
 - New East Side PS with screening
 - New equalization storage at East Side PS
- **WRF improvements**
 - Add grit removal, replace PC equipment
 - Replace aeration diffusers, blower, add UV
 - Rehab digestion, replace dewatering
- **Potential for phased improvements, but put on hold due to inability to fund**



Major Planned Improvements

- **Preliminary:** New grit removal and flow measurement
- **Primary:** New primary splitter box, replace clarifier equipment in tank, primary sludge pumps, sludge flow meters, new MCCs, replace sumps, new skimmings pumps, rehab concrete, replace handrail, and update lighting
- **Aeration:** New smaller, more efficient aeration blower, repair aeration header outside building, caulk joints inside building, replace air diffusers and PVC piping
- **RAS:** New RAS holding tank, mixing and RAS pumps
- **Secondary:** Hard pipe clarifier inlet, paint bridge, center well, skimmer box and scum arm
- **Disinfection:** Replace chlorine with UV

Planned Improvements in Perspective





WRF Improvements

Primary Treatment



South Primary Clarifier



Stand Pipe broke





Higher Flow Considerations

- **Eastside PS**
 - 17 MGD screening and pumping capacity
 - Excess above WRF flows to 2 MG EQ

- **WRF**
 - NFA/SECAP recommended 9 MGD design capacity
 - Higher than 9 MGD limitations?
 - Aeration basin organic loadings, 5.3 MGD
 - Secondary clarifiers flow, 10.6 MGD
 - Chlorine contact time, 9.8 MGD
 - Staff has seen hydraulic capacity above 15 MGD through plant...can we reduce bottlenecks in flow?

Hydraulic challenges





WRF Process Design Capacities

Process Unit	Firm Capacity	Total Installed Capacity	Limitation
Primary Clarifiers	9.5 MGD	12.7 MGD	10-State Standard Peak Flow SOR
Aeration Basins	4 MGD	5.3 MGD	10-State Standard AA Organic Loadings
Mixed Liquor Pump Station	14.4 MGD	21.6 MGD	Pump Capacity
Secondary Clarifiers	5.3 MGD	10.6 MGD	10-State Standard Peak Flow SOR
Chlorine Contact Tanks	4.9 MGD	9.8 MGD	10-State Standard Minimum 15 minutes contact time at peak flow

- **Analysis recommended 9 MGD, but what if >9 MGD, what are operational constraints?**



Evaluation of Wet Weather Strategy

- **Existing WRF Wet Weather Design**
 - 8 MGD peak hourly through secondary system
 - >12 MGD hydraulic peak with bypass

- **Recommended Approach**
 - Avoid bypass operations
 - Sustained peak plant flows up to 15 MGD for periods up to days
 - Sustained flows require different operational strategies
 - Mass loading relative to permit is a major consideration
 - Want to preserve biomass and optimize effluent quality

PTF Starting Point







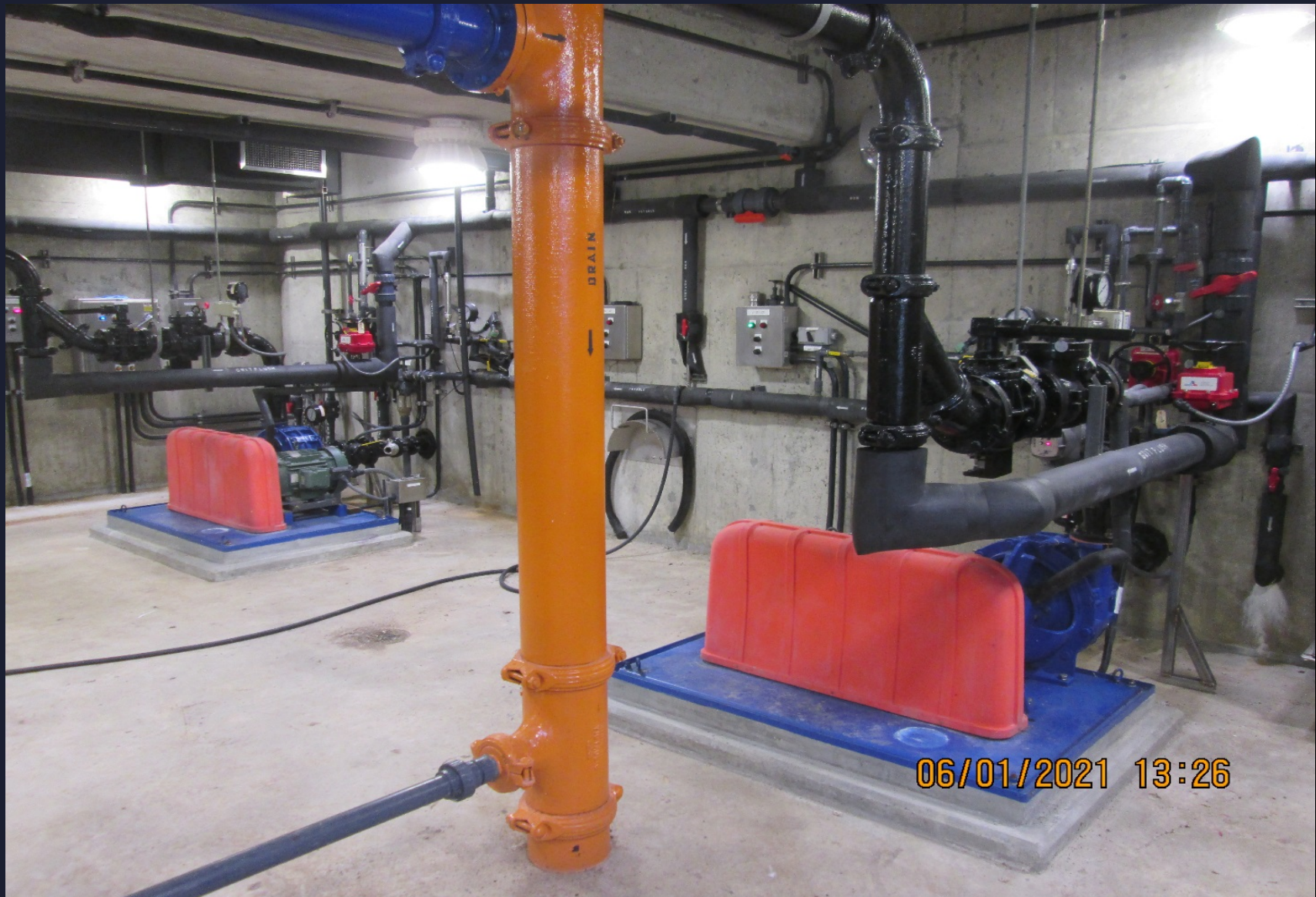


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Headcell Grit Trays









Old RAS mixing box





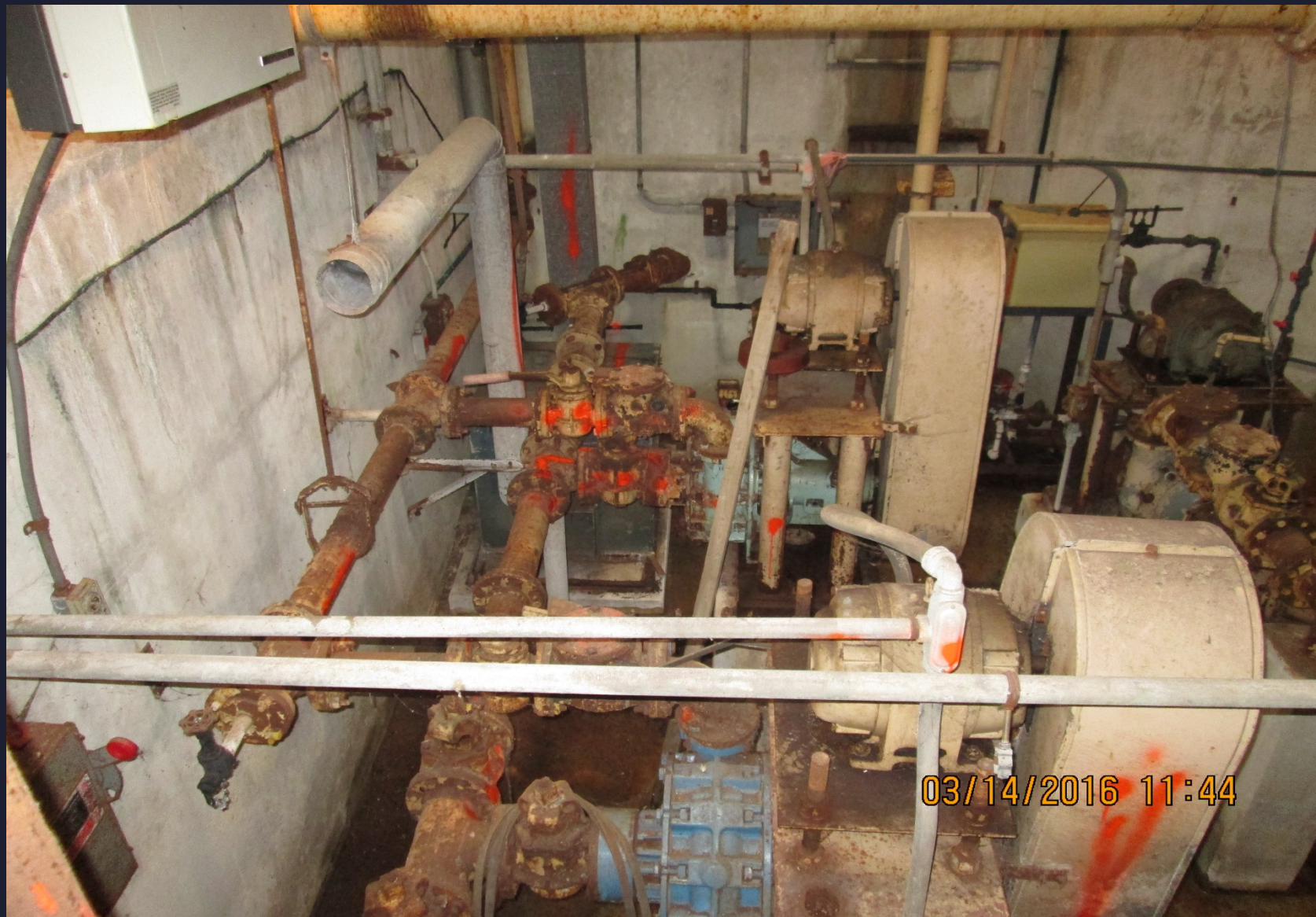
Existing Primary Effluent Splitting Box







Replace Existing Pumps and Piping





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07/25/2016 09:07





Tubes for ?



Ballast



New Dual Fuel Heat Exchanger





05/09/2017 12:05





06/01/2021 13:22







09/22/2016 13:02



10/06/2016 08:10



Halfway Through Construction



RAS Mixing Box





12/04/2017 12:28





RAS to RHT





11/22/2016 14:23

RHT





06/30/2016 07:50







08/22/2016 08:56

Demo



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UV Tank







Effluent Pump Station



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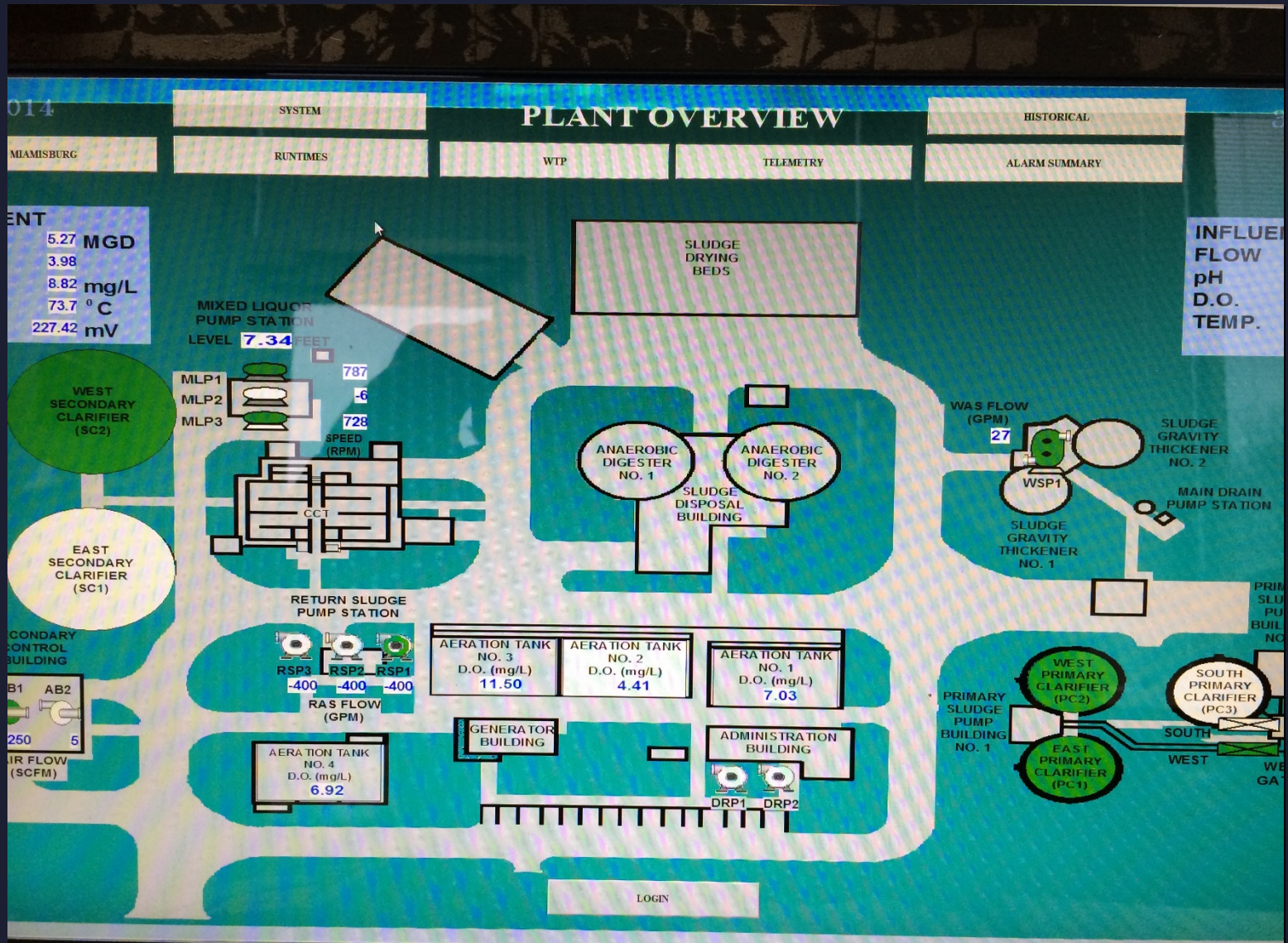






Diesel Tank Removal





Microwave Antenna



November 2018



End of the Pipe



Westover Pump Station















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Questions

