



FUSS & O'NEILL

NEWEA

Small Communities Specialty Conference
November 18, 2015

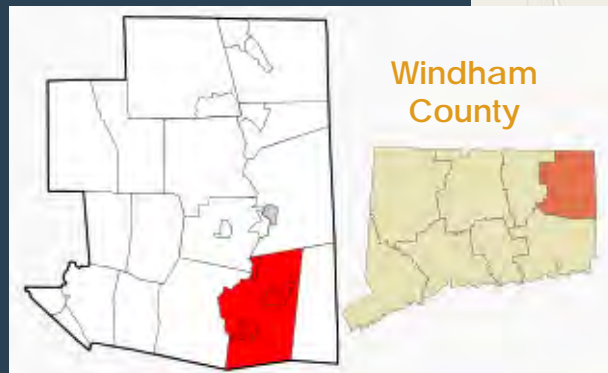
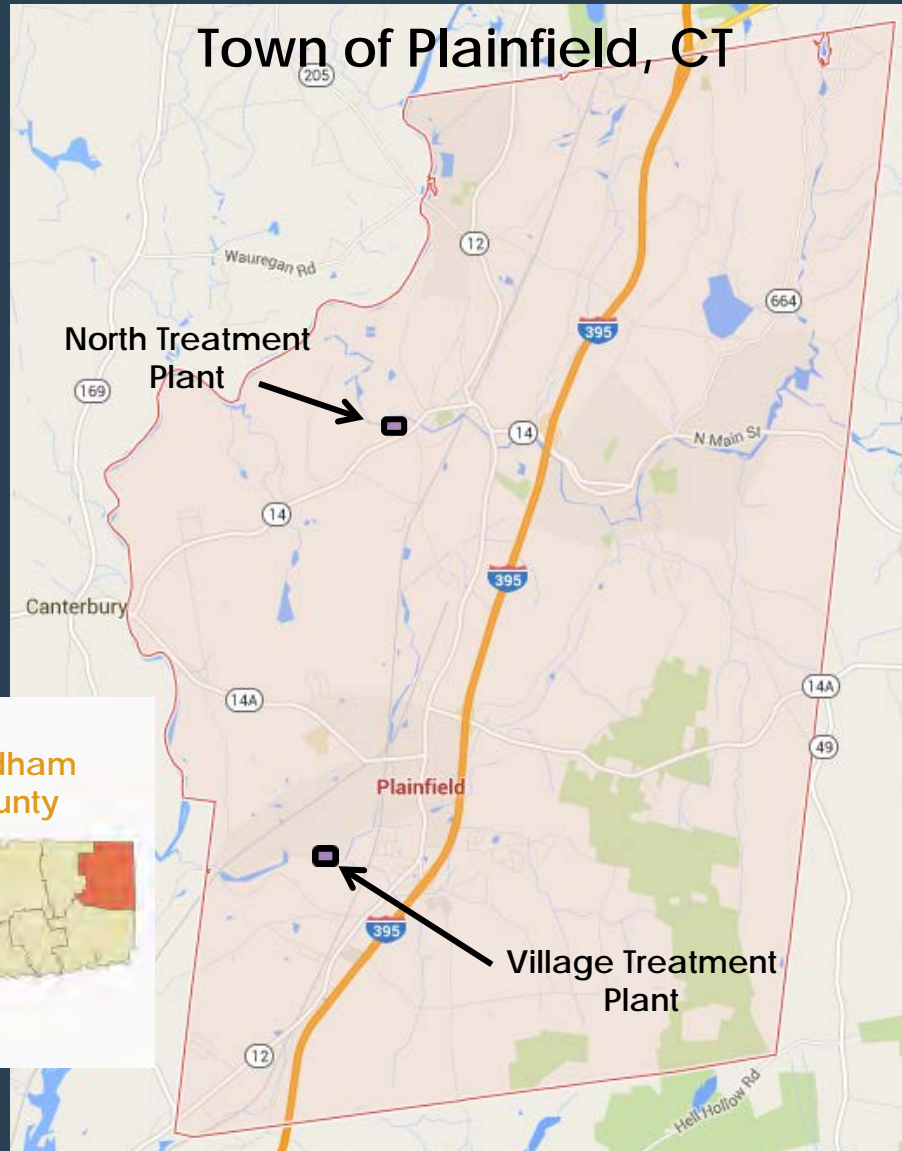
**Improving Nutrient Removal at Existing
Wastewater Facilities Using Cyclical
Aeration and Chemical Addition**

Presentation Outline

- Background
- Compliance Issues
- Alternatives Development
- Implementation



Project Location



Rehabilitation of Wastewater Treatment Facilities



Village Plant 0.707 MGD



North Plant 1.086 MGD

- Two Plants
 - Aging Equipment
 - New CTDEEP regulations regarding Nitrogen, Phosphorus & Metals
- Costly To Replace
- Project Approach
 - Compliance for Phosphorus Limits (0.43 mg/l)
 - Nitrogen goals (6 mg/l)
 - Modernize aging equipment
 - Maintain existing infrastructure
 - \$5.5 vs \$45 Million

Regulatory Issues

Permittee:

Town of Plainfield
Town Hall
8 Community Avenue
Plainfield, Connecticut 06374

Location Address:

Town of Plainfield WPCF
Birch St.
Plainfield, Connecticut 06374

Facility ID: 109-001**Permit ID:** CT0100439**Permit Expires:** August 9, 2017**Receiving Stream:** Mill Brook **Design Flow Rate:** 0.707 MGD**SECTION 9: COMPLIANCE SCHEDULES**

- (C) The permittee shall achieve the final water quality-based effluent limits for phosphorus for DSN 001-1 established in Section 5 of this permit, in accordance with the following:
- (3) Unless another deadline is specified in writing by the Commissioner, on or before 210 days after approval of the engineering report, the permittee shall (1) submit for the Commissioner's review and written approval, contract plans and specifications for the approved remedial actions, a revised list of all permits and approvals required for such actions and a revised schedule for applying for and obtaining such permits and approvals; and (2) submit applications for all permits and approvals required under Sections 22a-430 and 22a-416 of the CGS. The permittee shall obtain all required permits and approvals.

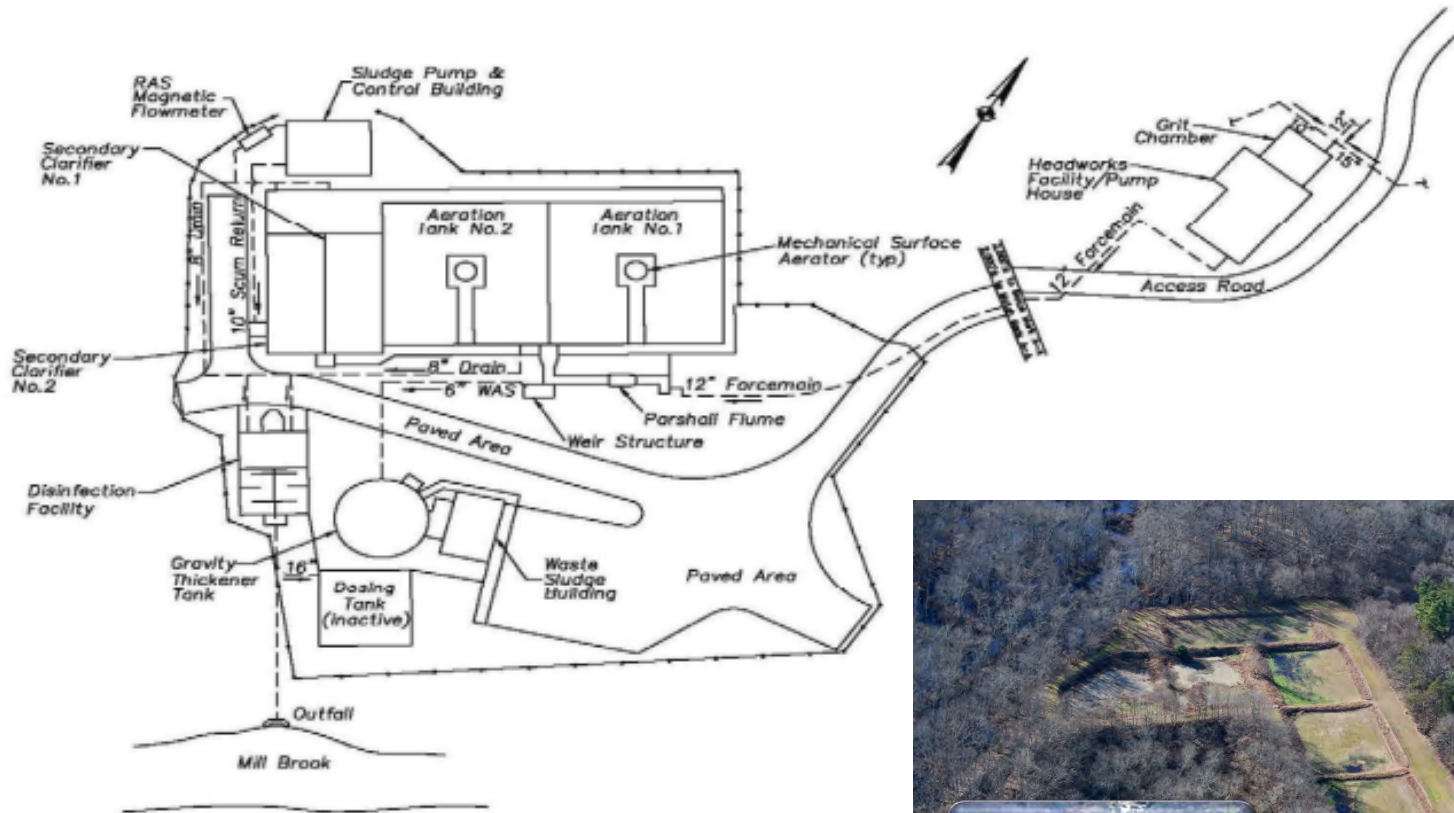
Approval Letter dated **March 4, 2014**

Submittal Deadline is Friday, **September 30, 2014**

Defining Problems and Needs

- Failing equipment
 - Maintaining plant operation during construction
- Maximizing the re-use of existing infrastructure
- Meet new phosphorus limits
 - Phosphorus accumulation in older sand filter beds
- Incorporate low level nitrogen removal
- Need for Influent Fine Screening

Village Site Plan



Development of Alternatives - Early Studies

Modeling of Cyclic Aeration Process for Optimizing Nitrogen

Removal in Wastewater Treatment Plants

Grishma Patel, Master's of Engineering

The University of Hartford, 2007

SUPERVISOR: David Pines, Ph.D.

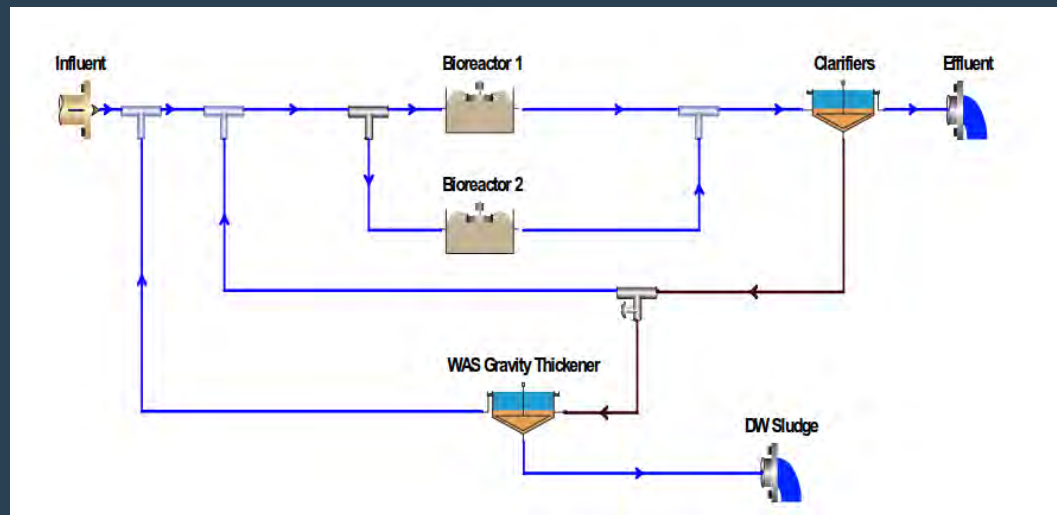


WWTP Plainfield, CT

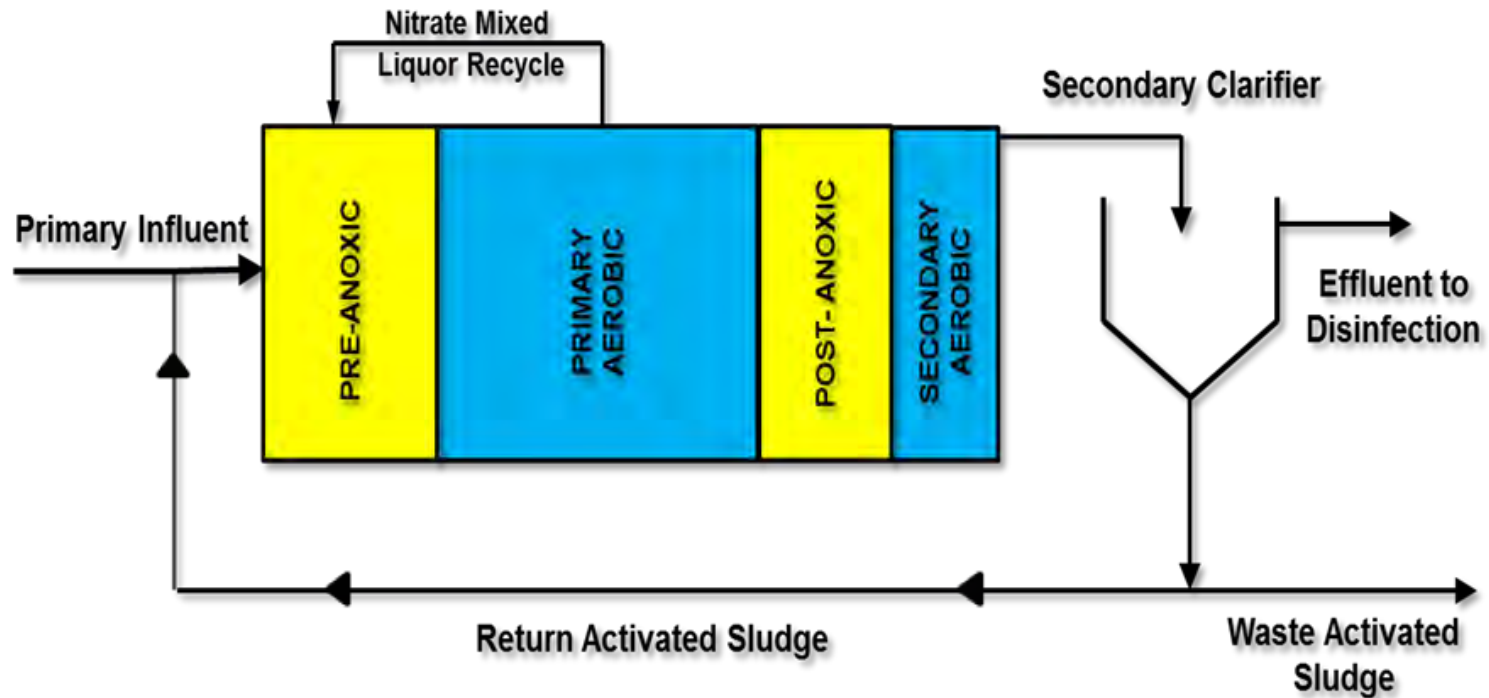
**Fuss & O'Neill Engineers
Manchester, CT**

**INVENT Environmental Technologies Inc.
HYPERCLASSIC® -Mixing and Aeration System**

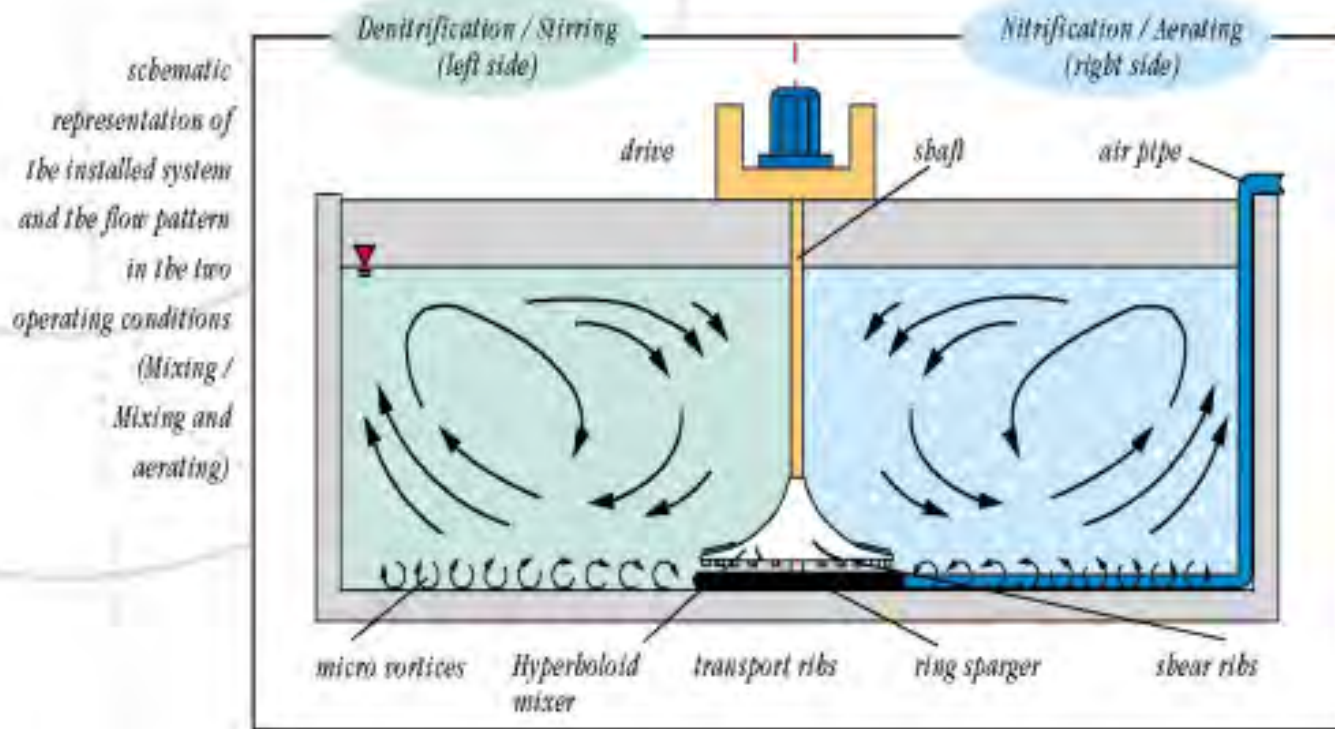
**Biowin® Study in
Sequential Denitrification**



Alternative Biological Processes



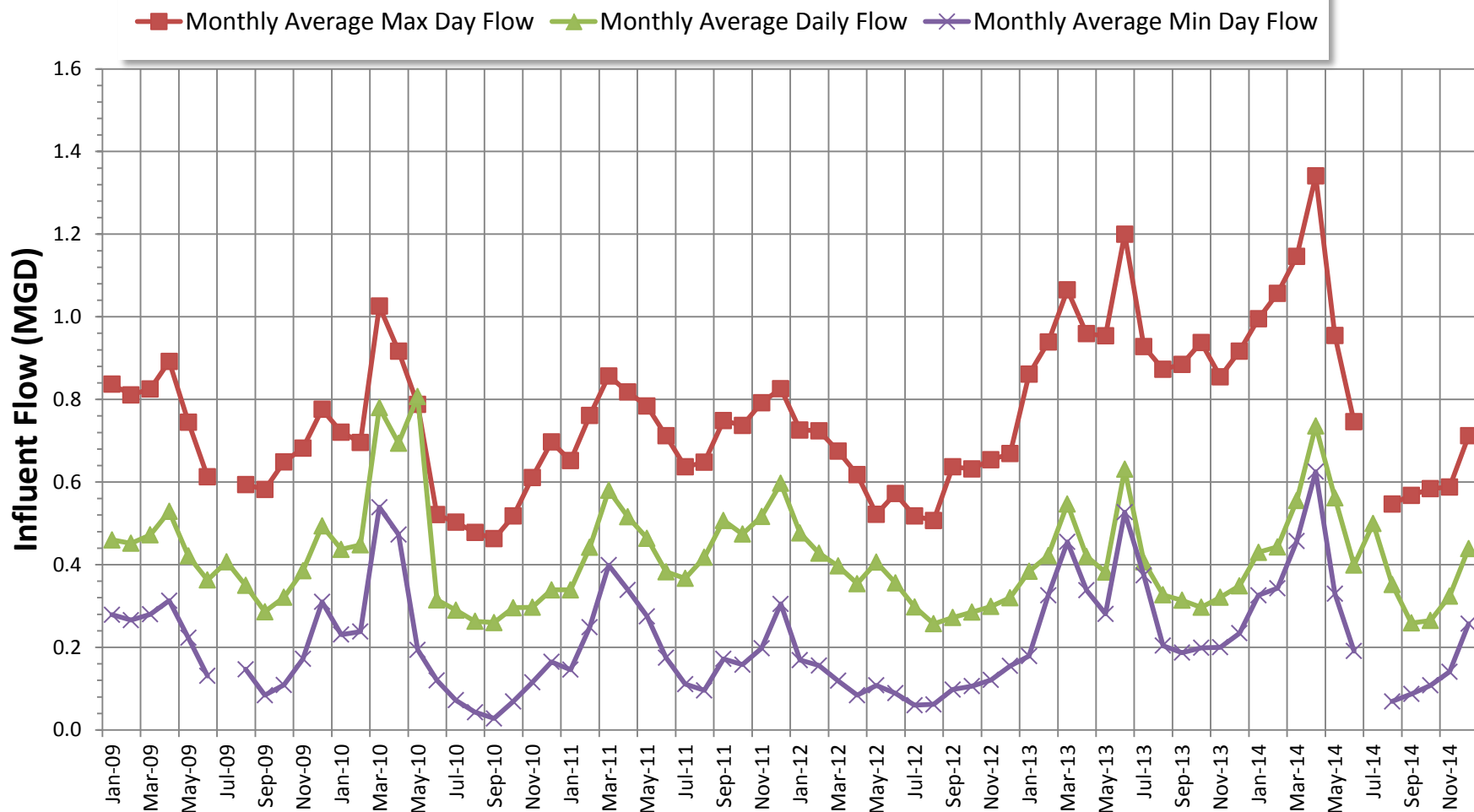
Selected Cyclical Aeration



Typical Average Flows



Flow Chart - Plainfield Village WPCF

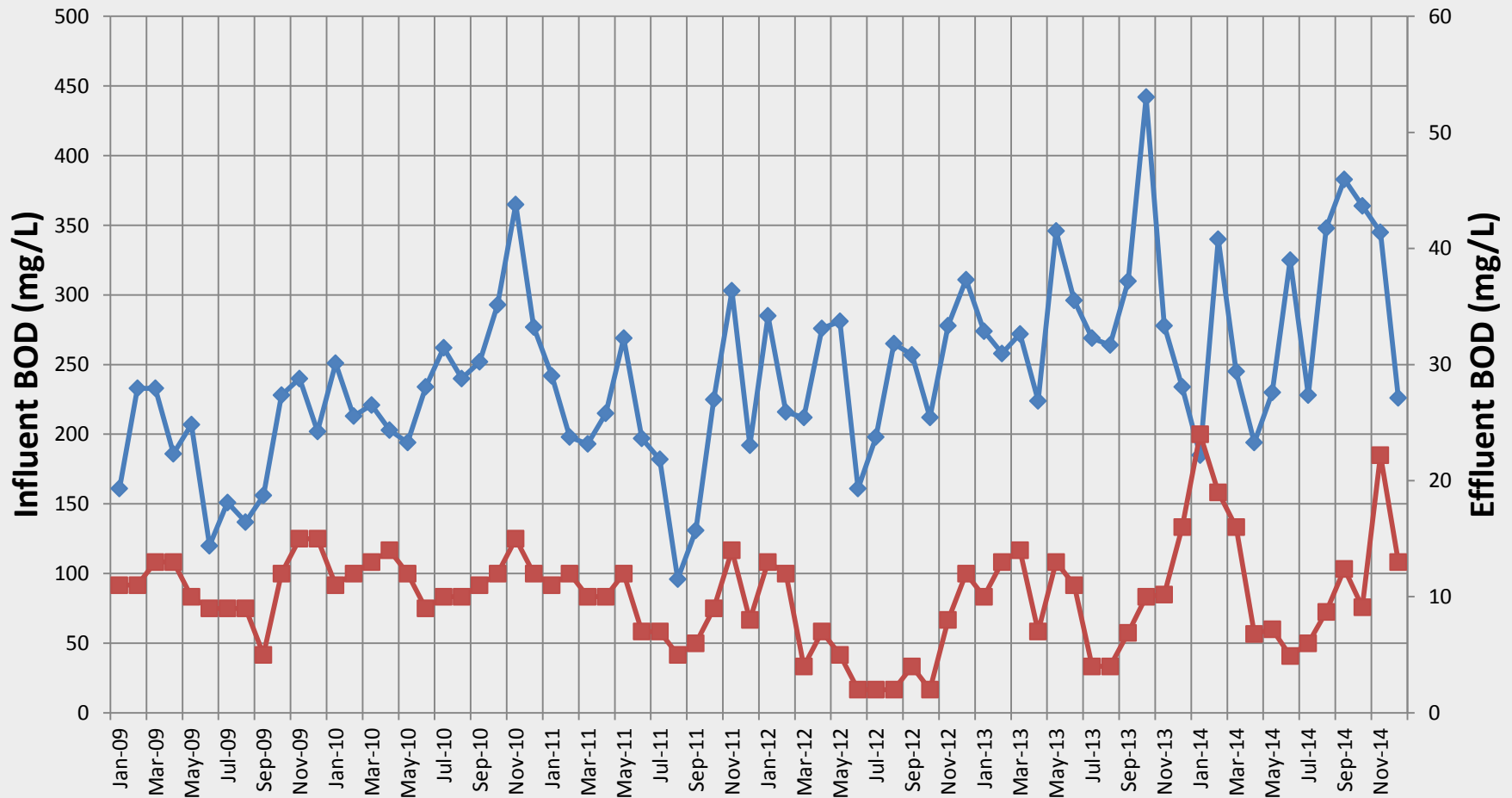


Typical BOD Removal



BOD - Plainfield Village Plant

—◆— Influent BOD —■— Effluent BOD

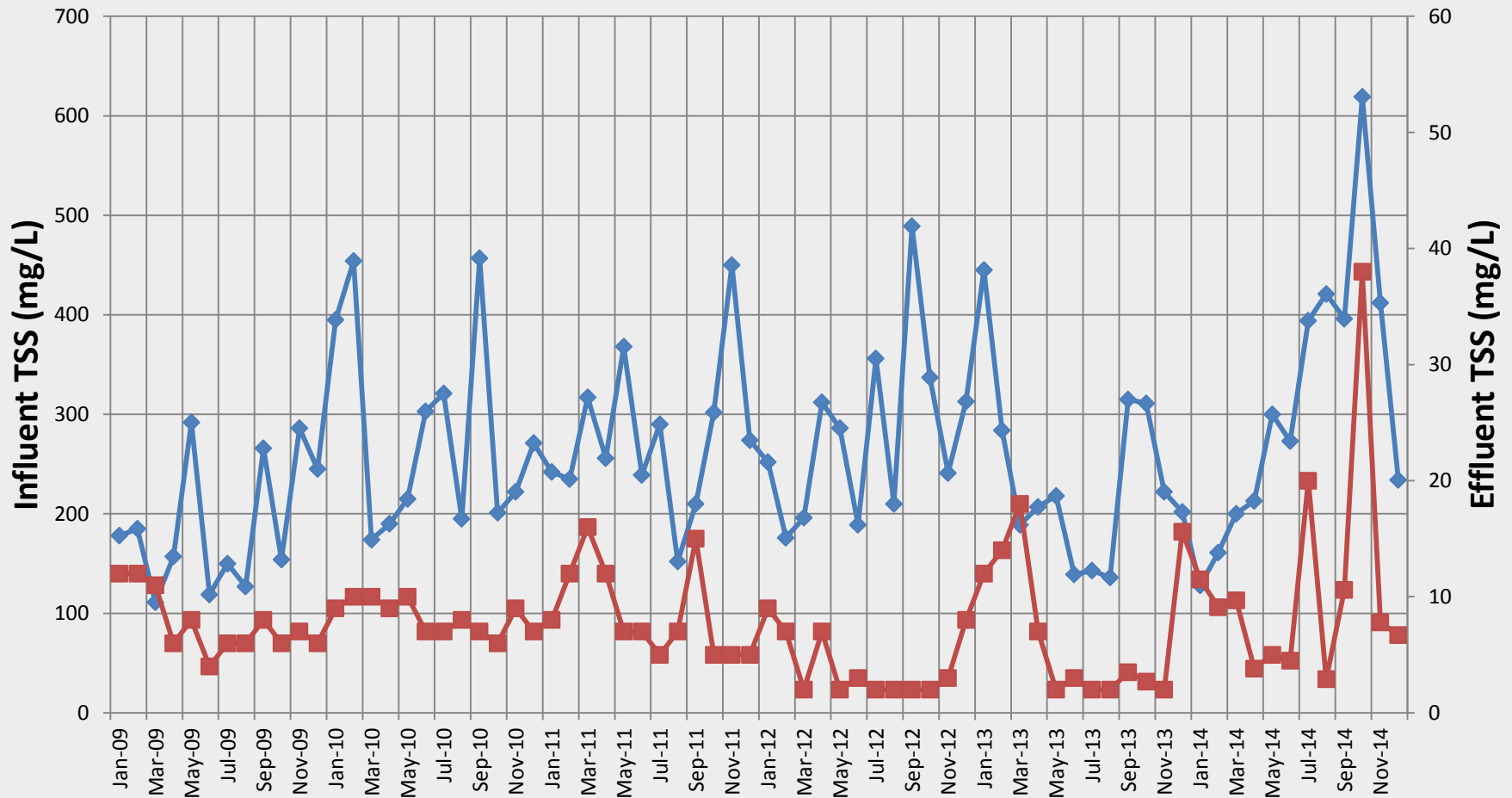


Typical TSS Removal

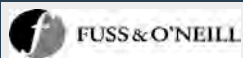


TSS - Plainfield Village Plant

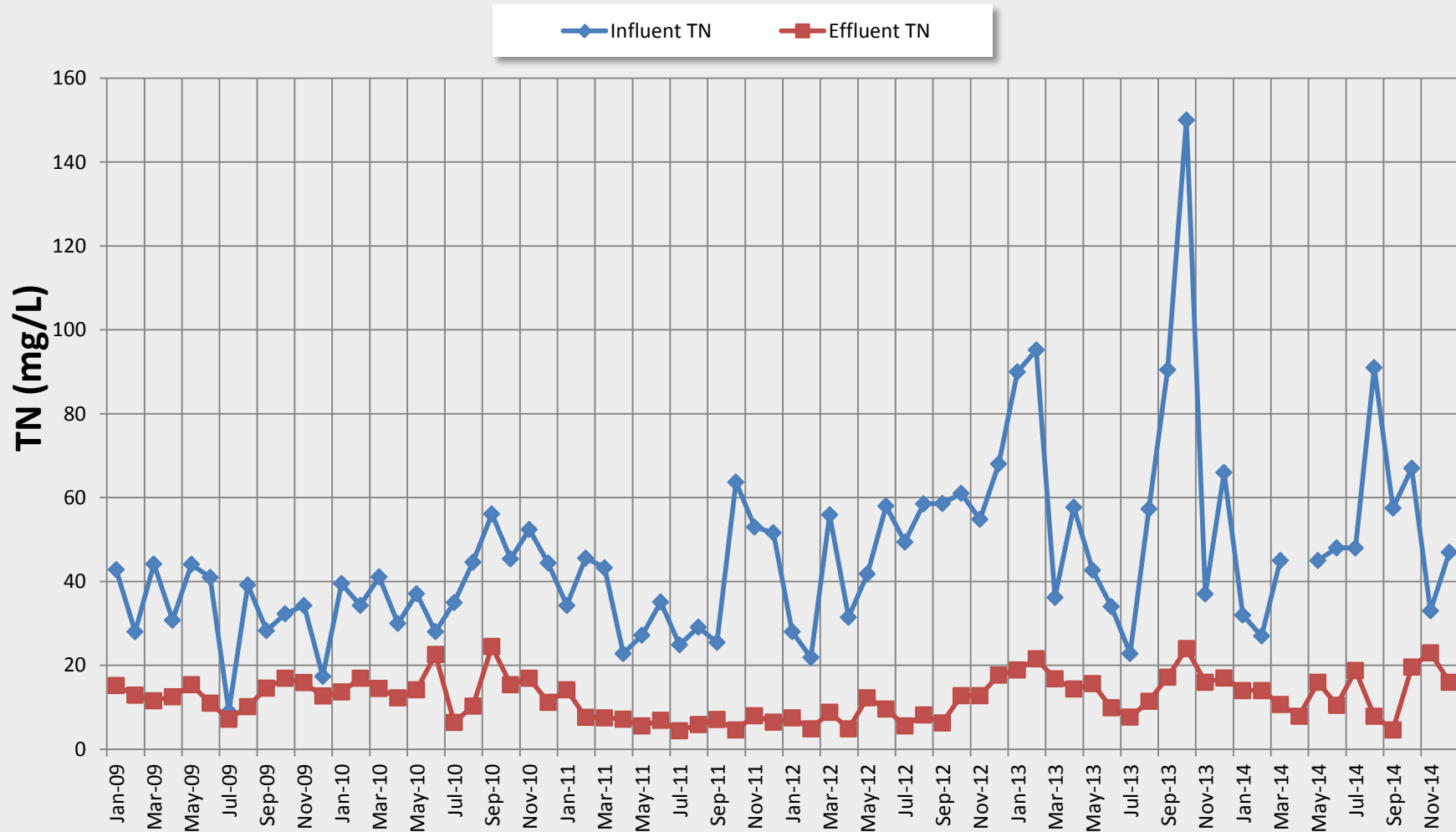
—●— Influent TSS —■— Effluent TSS



Typical Nitrogen Removal

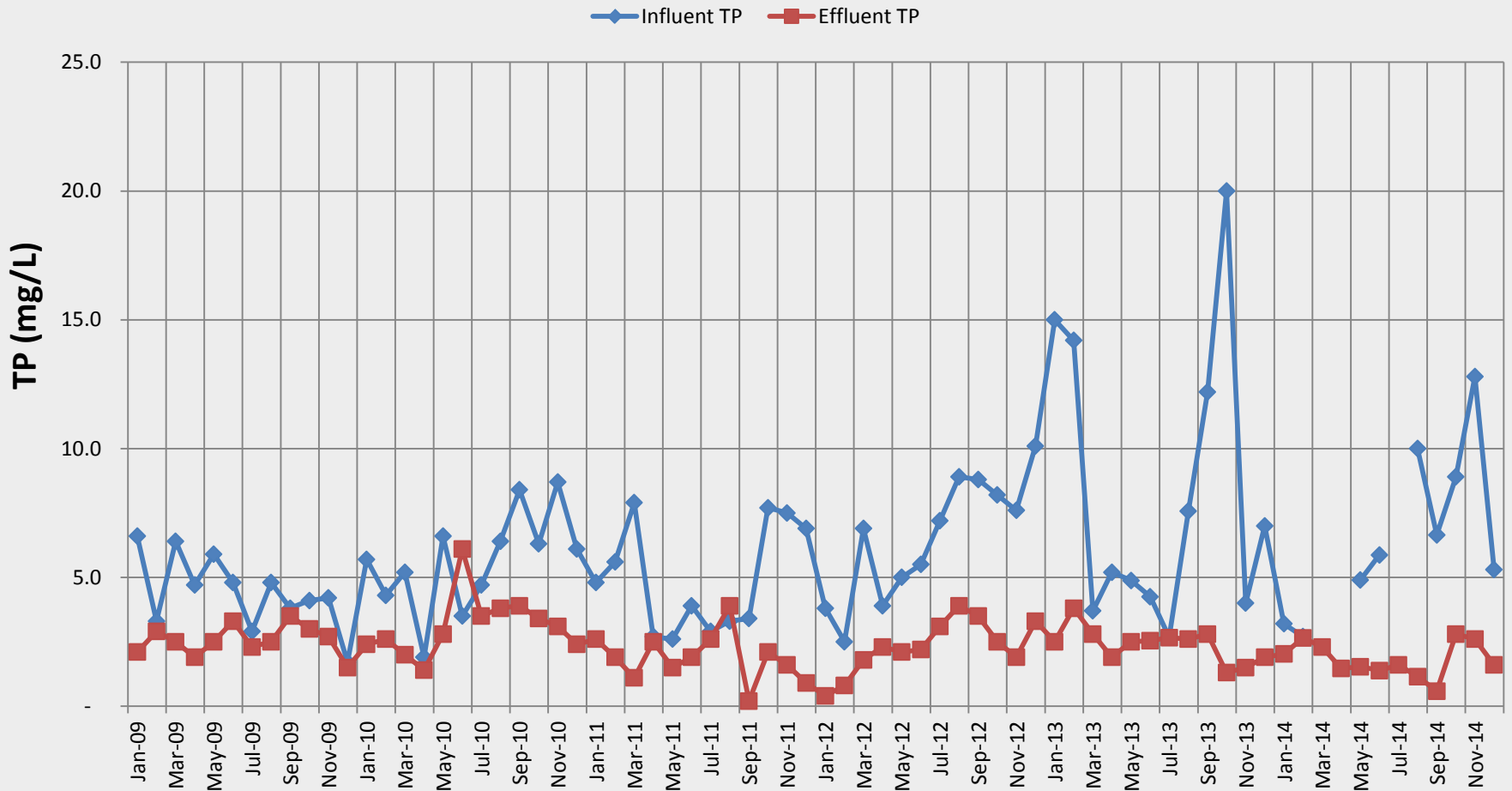


Nitrogen Profile - Plainfield Village WPCF

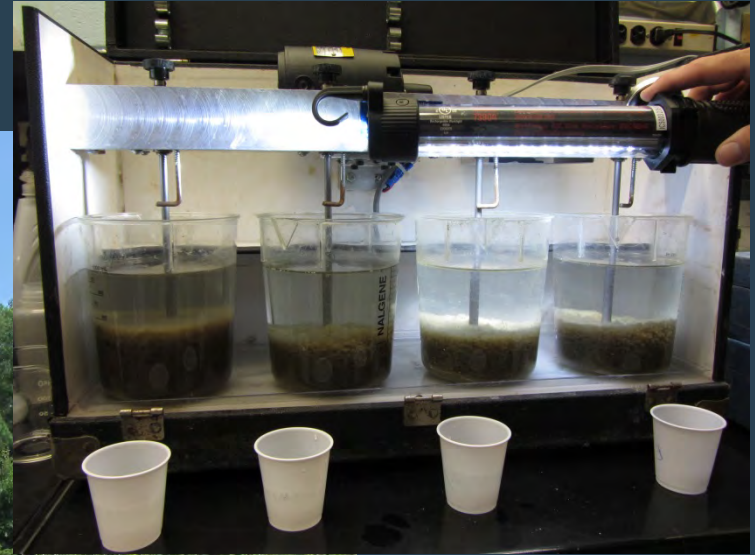


Typical Phosphorus Removal

Phosphorus Profile - PLAINFIELD Village WPCF



Full Scale Piloting



07/02/2014

New Influent Fine Screening



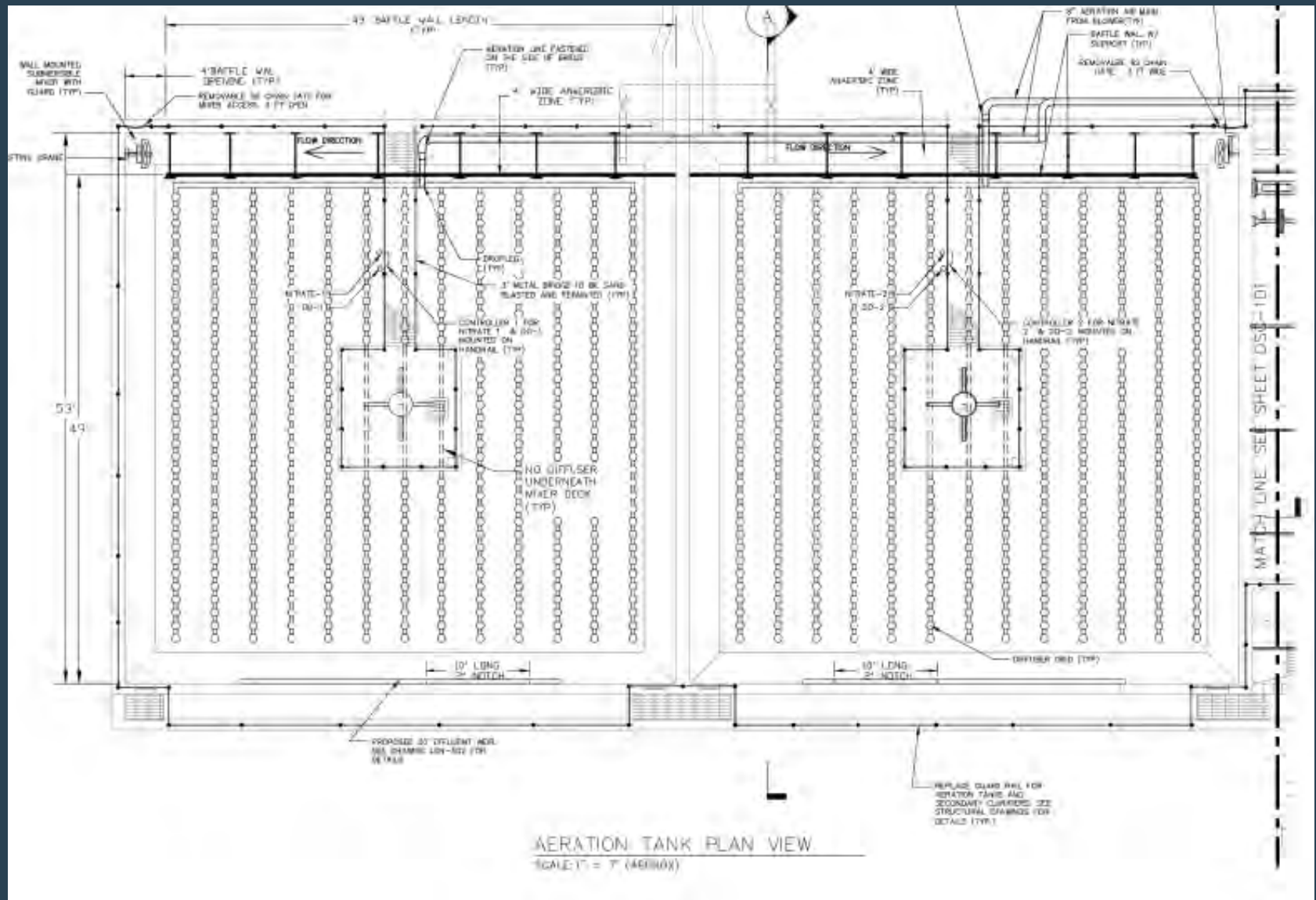
Existing Mechanical Aeration



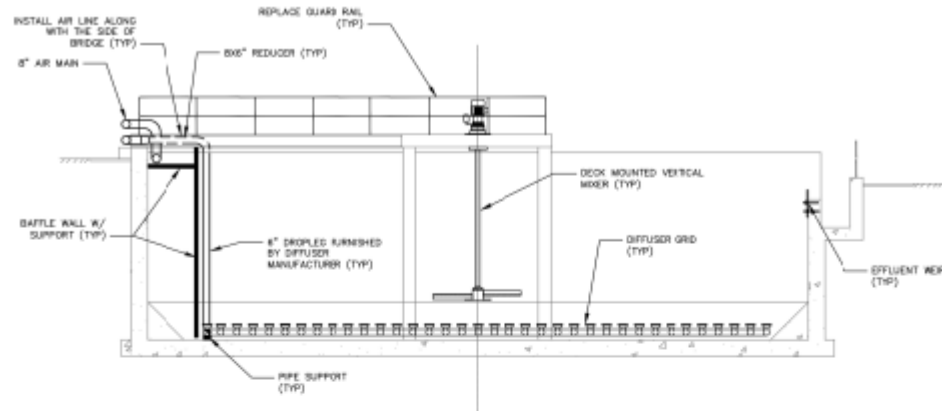
Aeration Cleaning and Demolition



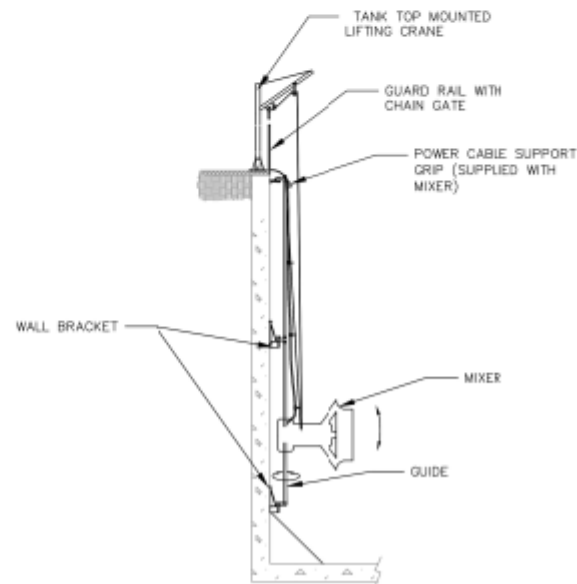
New Aeration System Design



New Anaerobic Selector



A AERATION TANK SECTION VIEW
SCALE: 1" = 7' (APPROX)



Anoxic Mixer



New Diffused Aeration



New Biological System On Line



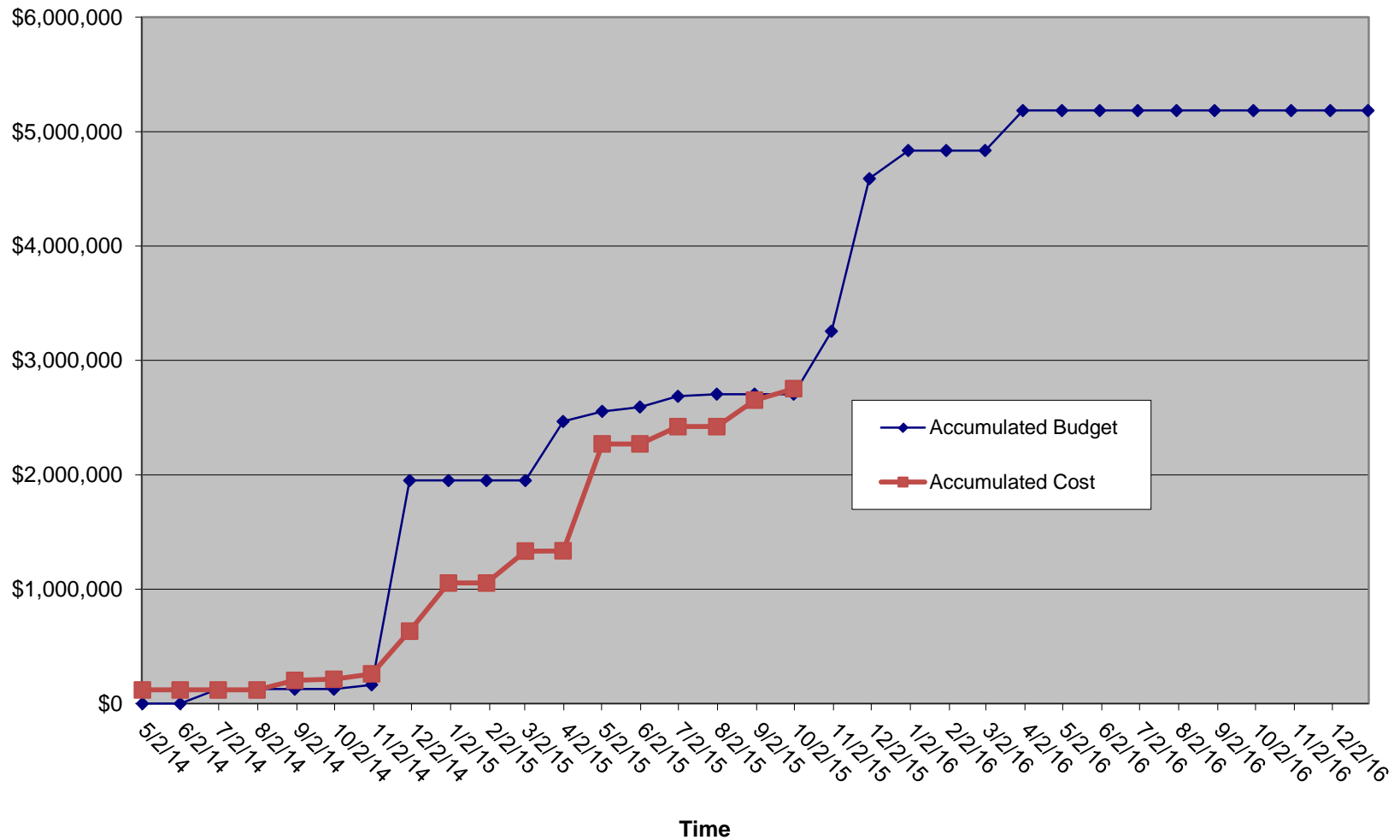
Demolition and Repair of 2nd Reactor



New Blowers for Aeration System



Capital Improvement Plan



Constructed Improvements

- New Influent Fine Screen
- New Anaerobic Selector
- New Anoxic Mixers
- New Diffused Aeration
- New Tri-lobe Blowers
- New DO and Nitrate Sensors
- New Computerized Aeration Monitoring and Control System

Credits/Questions

Presenter

Jeffrey M. McDonald, PE (JMcDonald@fando.com)

Special Thanks To

Town of Plainfield

