

BUILDING A WORLD OF DIFFERENCE

IMPLEMENTING A WASTEWATER TREATMENT FACILITY UPGRADE/ EXPANSION USING IFAS AT WEST HAVEN, CT

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28 January 2015



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AGENDA

- **Design Basis**
- **Project Challenges**
- **Construction Sequences and Restrictions**
- **Environmental Restrictions/Reviews**
- **Screening and Influent Pumping**
- **Primary Settling Tanks**
- **Aeration Tanks**

AGENDA (CONT.)

- **Aeration Blowers**
- **Existing Secondary Settling Tanks**
- **New Secondary Settling Tanks**
- **Return Activated Sludge Pumping**
- **How is plant operating now?**

DESIGN BASIS

DESIGN BASIS

	Average Day	Maximum Month
Flow (mgd)	9.7	10.4
BOD (mg/L, ppd)	187 (15,070)	227 (19,750)
TSS (mg/L, ppd)	191 (15,440)	296 (25,790)
TKN (mg/L, ppd)	27 (2,184)	36 (3122)

Total Nitrogen Waste Load Allocation

- August 2014 – 353 ppd



PROJECT CHALLENGES

- Design and implement a robust system
- Keep the plant operating and in compliance during construction
- Small site footprint
- Minimize disturbance to Marine Wetlands

WEST HAVEN WPCF

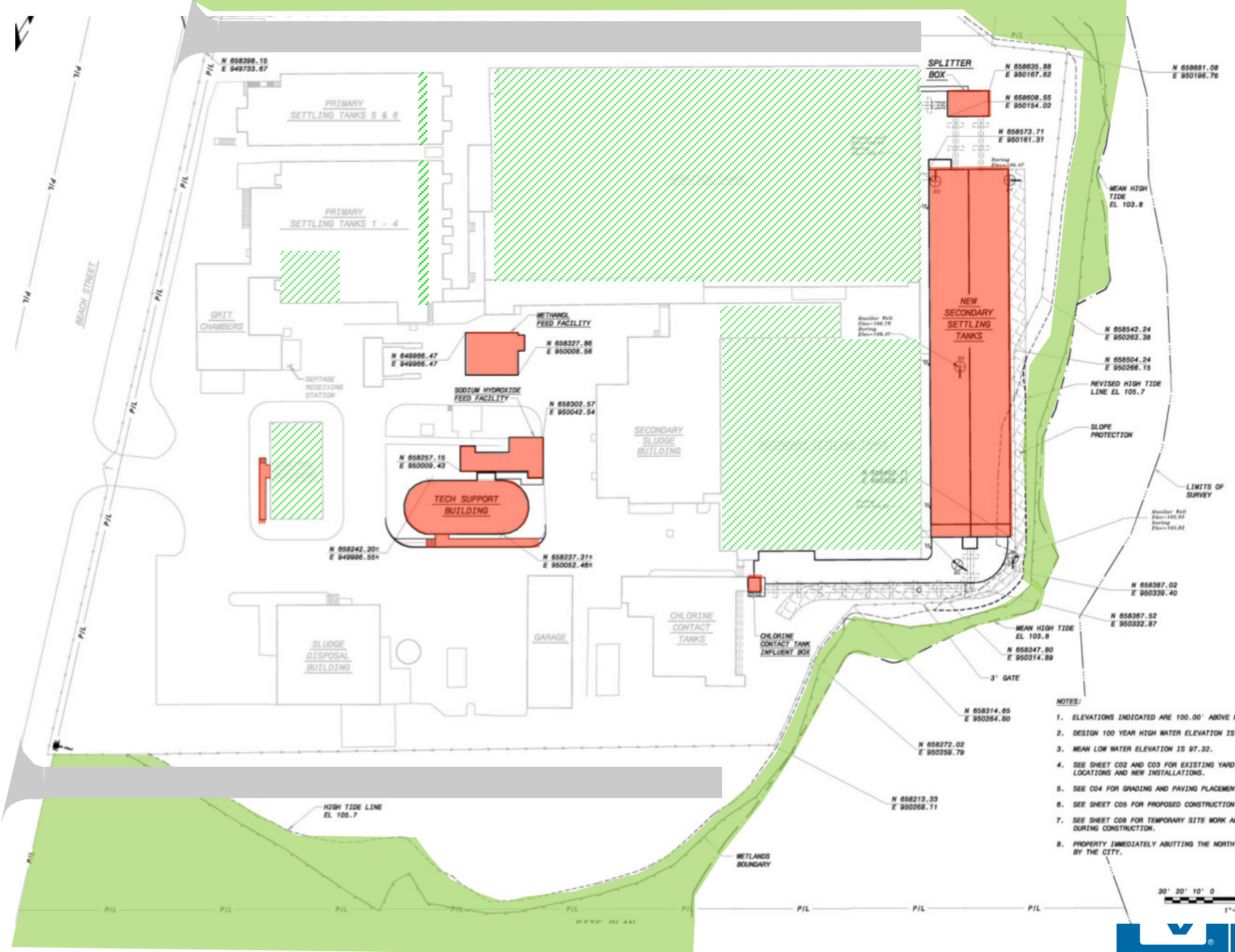


BEFORE

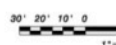


AFTER

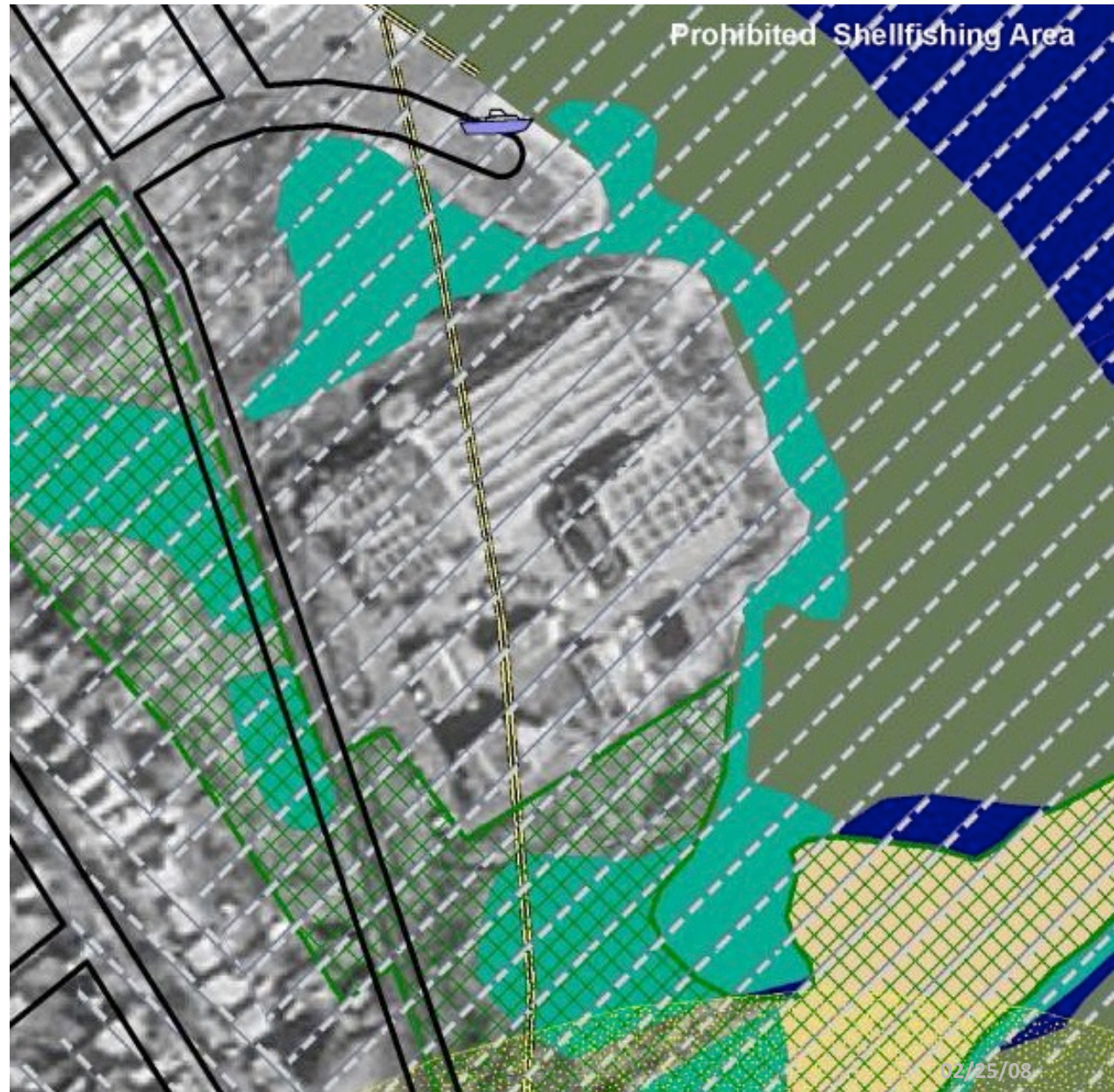
SITE PLAN



- NOTES:**
1. ELEVATIONS INDICATED ARE 100.00' ABOVE I
 2. DESIGN 100 YEAR HIGH WATER ELEVATION IS
 3. MEAN LOW WATER ELEVATION IS 97.32.
 4. SEE SHEET C02 AND C03 FOR EXISTING YARD LOCATIONS AND NEW INSTALLATIONS.
 5. SEE C04 FOR GRADING AND PAVING PLACEMENT
 6. SEE SHEET C05 FOR PROPOSED CONSTRUCTION
 7. SEE SHEET C08 FOR TEMPORARY SITE WORK A DURING CONSTRUCTION.
 8. PROPERTY IMMEDIATELY ABUTTING THE NORTH BY THE CITY.



ENVIRONMENTAL RESTRICTIONS/REVIEW



- Section 404 CWA, ACOE
- Coastal Zone Management Act

CONSTRUCTION SEQUENCING AND RESTRICTIONS

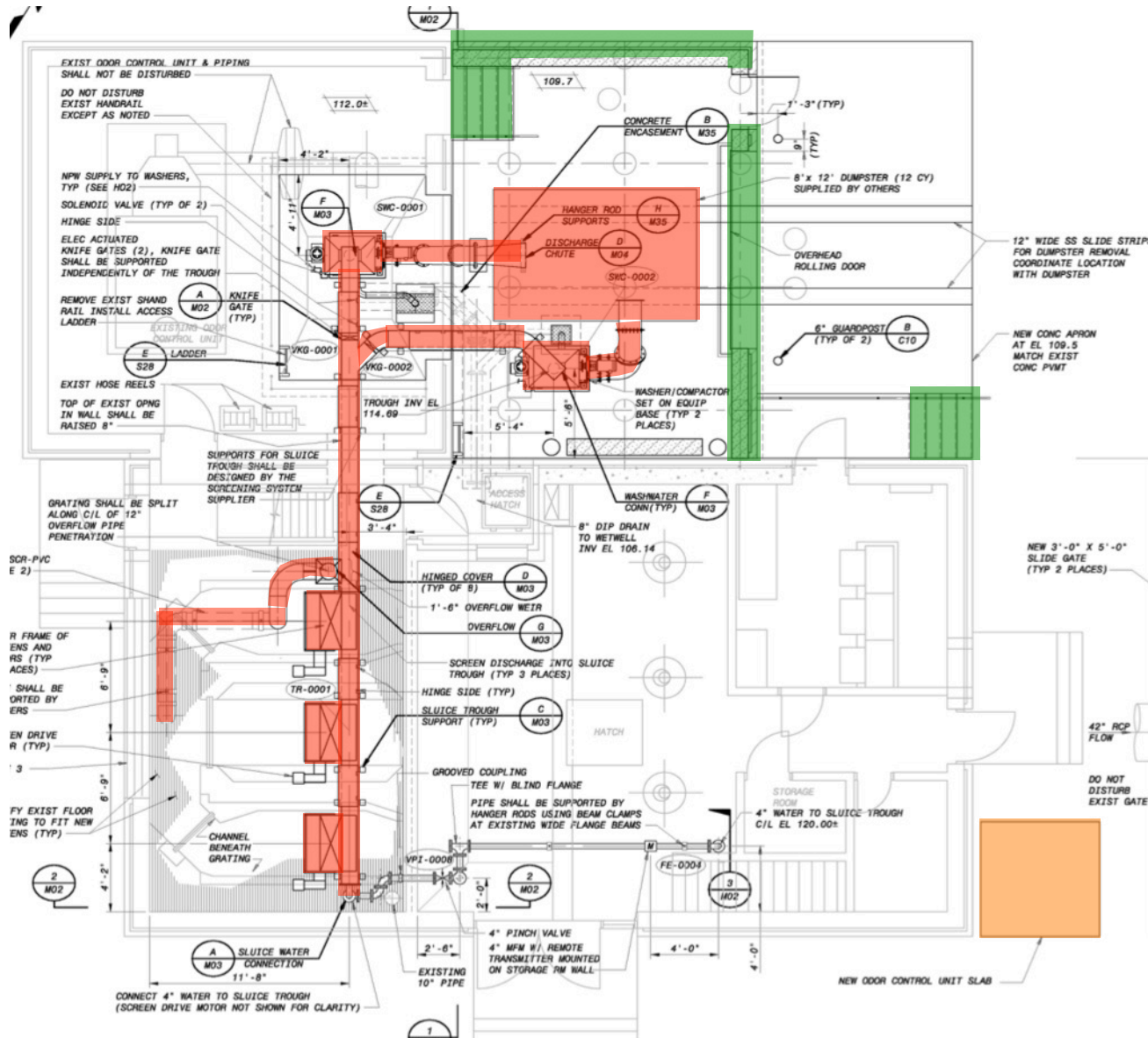
- WPCF –continuous operation
- One unit out of service at a time
- No work on existing primary clarifiers until PC 1 work is complete
- No work on aeration until all PC work completed and new SCs in service
- No work on existing SCs until new SCs on line



SCREENING AND INFLUENT PUMPING

- Fine screens required for IFAS
- Unmanned facility requires simple and reliable screenings handling systems
- Required bypass pumping for construction

MAIN PUMPING STATION UPPER LEVEL



GENERAL NOTES:

MAIN PUMP STATION NEW MECHANICAL SCREENS



01/04/2011

SLUICE TROUGH & GRINDER WASHER COMPACTOR



PRIMARY SETTLING TANKS

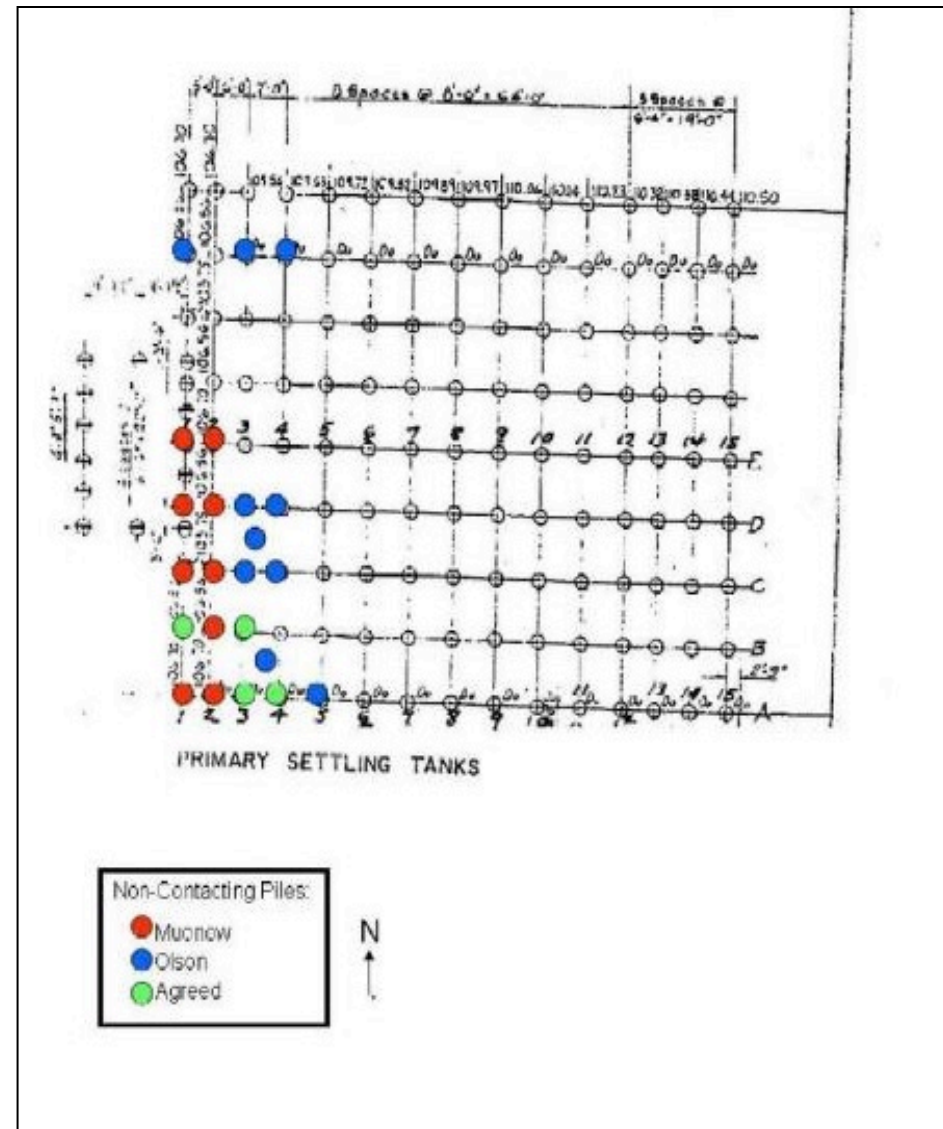
- Foundation required bolstering
- Repair cracked Tank No. 1

PRIMARY SETTLING TANKS – BEFORE CONSTRUCTION



PRIMARY CLARIFIER REPAIR

- Tank 1 out of service since August 1994
- Non-destructive testing
 - Pulse echo testing, 1995
 - Ground penetrating radar, 2006
- Not complete agreement between two testing methods
- Sludge trough was not completely clean



PRIMARY SETTLING TANKS 1 & 2 – MICROPILE INSTALLATION



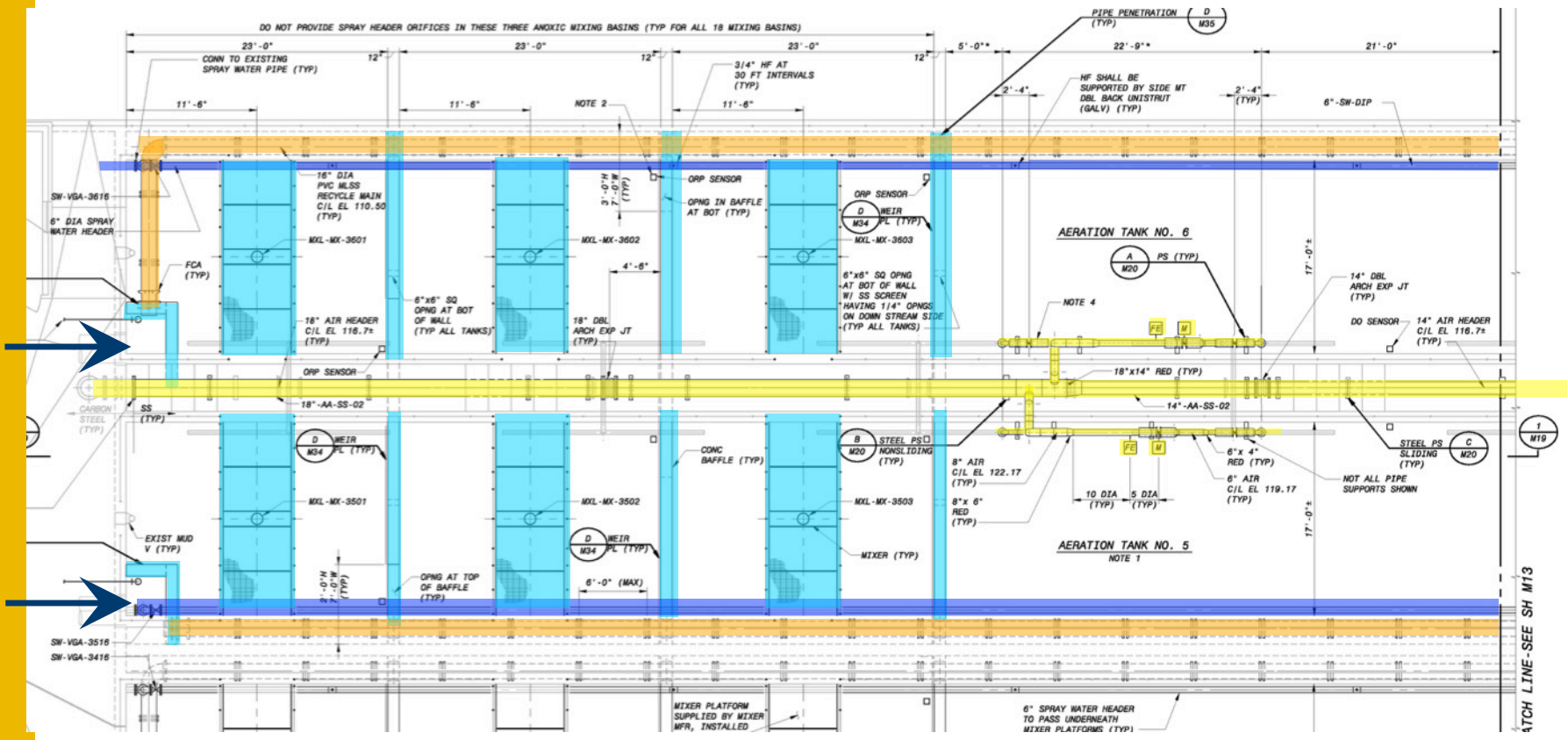
AERATION TANKS

- **No room for new tanks, required a small footprint design**
- **Reliable and robust system required**
- **Readily implemented at this plant**
- **IFAS chosen**

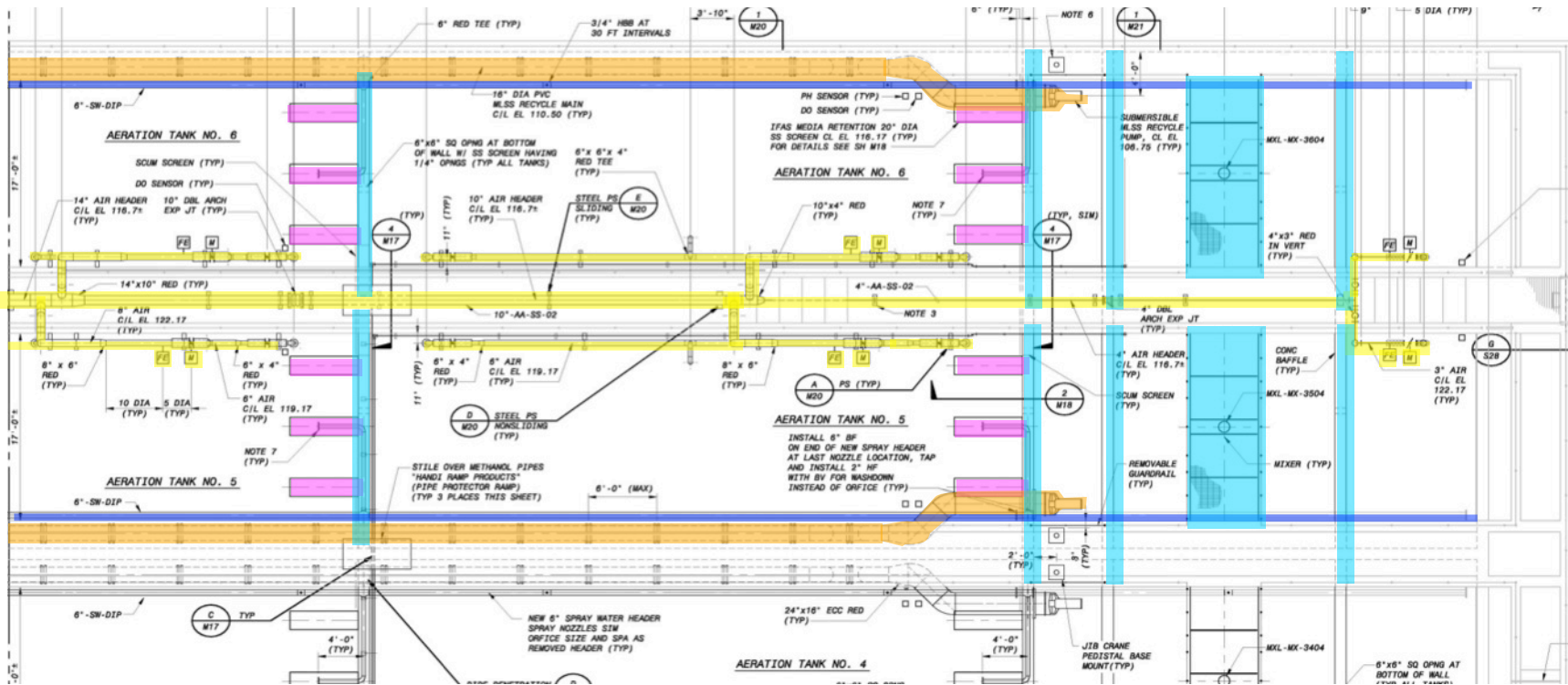
AERATION TANK – BEFORE CONSTRUCTION



IFAS BASINS



IFAS BASIN (CONT.)



AERATION TANK – MODIFICATION WORK



05/17/2011

AERATION TANK – INTERIOR WORK



06/17/2011

AERATION TANK – IFAS INSTALLATION



AERATION TANK – IFAS



AERATION BLOWERS

- Average air requirement increased from approx. 8,000 to 11,800 SCFM
- Increased efficiency
- Limited building footprint

BLOWER ROOM – BEFORE CONSTRUCTION



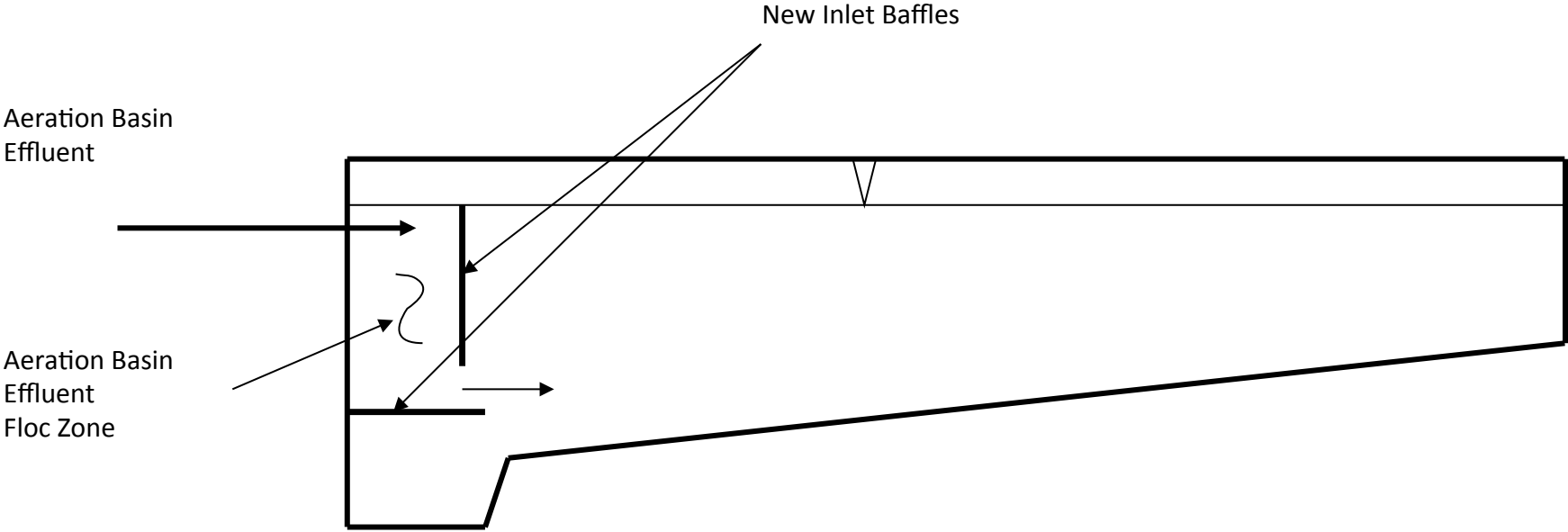
BLOWER ROOM – POST CONSTRUCTION



EXISTING SECONDARY SETTLING TANKS

- Solids pass-through due to shallow depth
- Poor inlet design

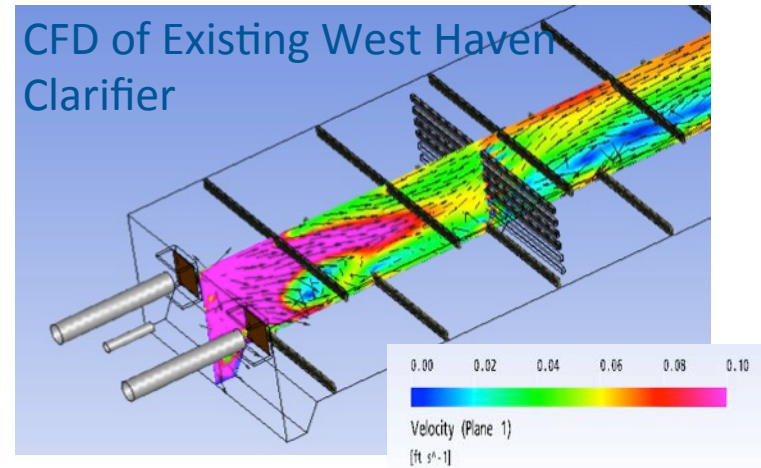
EXISTING SECONDARY CLARIFIERS MODIFICATIONS PER FACILITIES PLAN



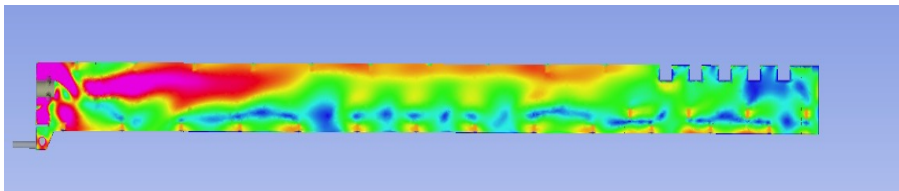
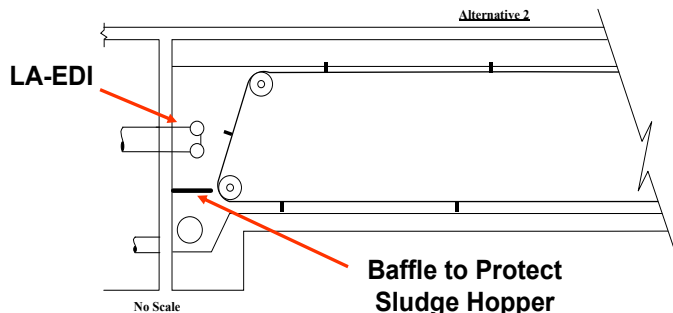
Performed CFD Modeling to Optimize

Goals:

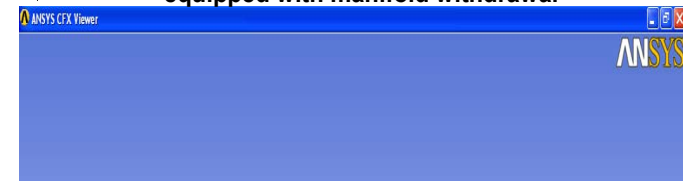
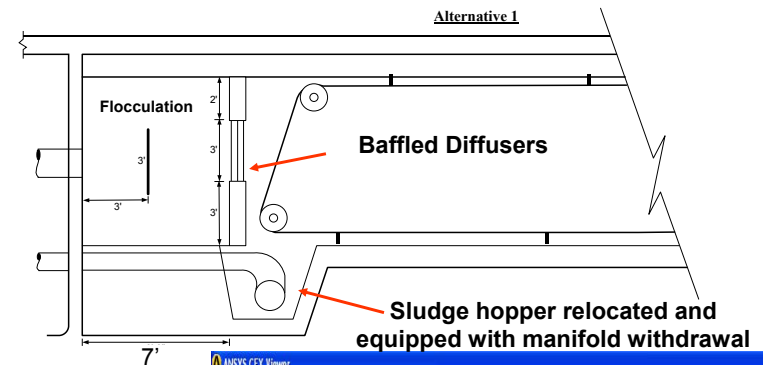
- De-bottleneck clarifiers
- Provide Good Inlet flocculation, and
- Diffusion into tank with energy dissipation



CFD of simple LA-EDI retrofit



Inlet Diffuser and Relocation of Sludge Hopper



NEW SECONDARY SETTLING TANKS

- Designed to match available land area
- Doubled clarifier surface area

SECONDARY SETTLING TANK 7 & 8 – EXISTING CONDITIONS



SECONDARY SETTLING TANK 7 & 8 – TEMPORARY FILL



SECONDARY SETTLING TANK 7 & 8 – SHEET PILING



SECONDARY SETTLING TANK 7 & 8 – EXCAVATION



SECONDARY SETTLING TANK 7 & 8 – INSTALLING PILES



06/29/2010

SECONDARY SETTLING TANK 7 & 8



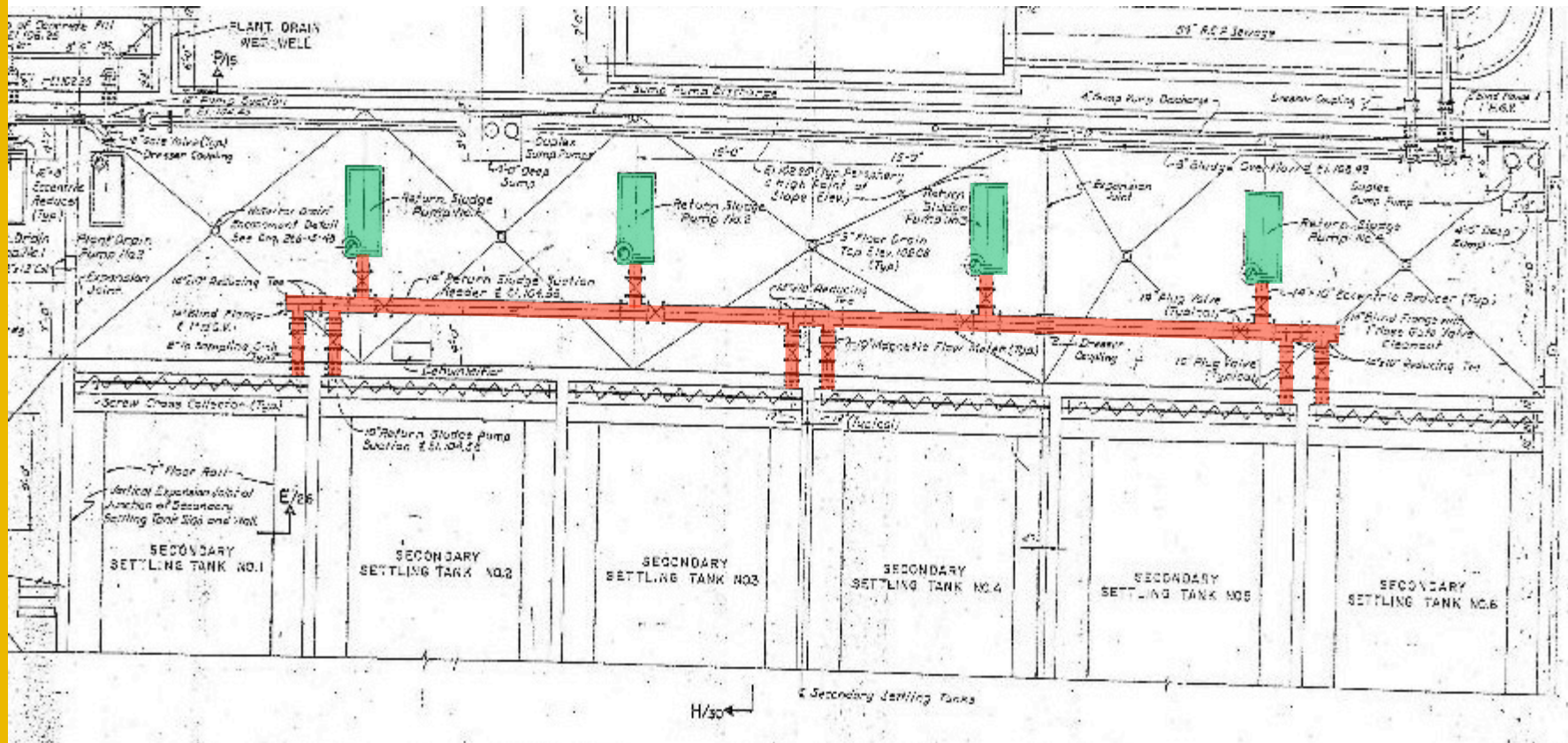
SECONDARY SETTLING TANK 7 & 8



RETURN ACTIVATED SLUDGE PUMPING

- Inaccurate sludge drawoff control
 - Single pump for each pair of tanks
 - Manual throttling of tank suction lines
- Limited pump backup
- Existing sludge cross-collectors inoperable

EXISTING RETURN ACTIVATED SLUDGE PUMPING



RAS PUMP STATION – PRE CONSTRUCTION



RAS PUMP STATION – POST CONSTRUCTION

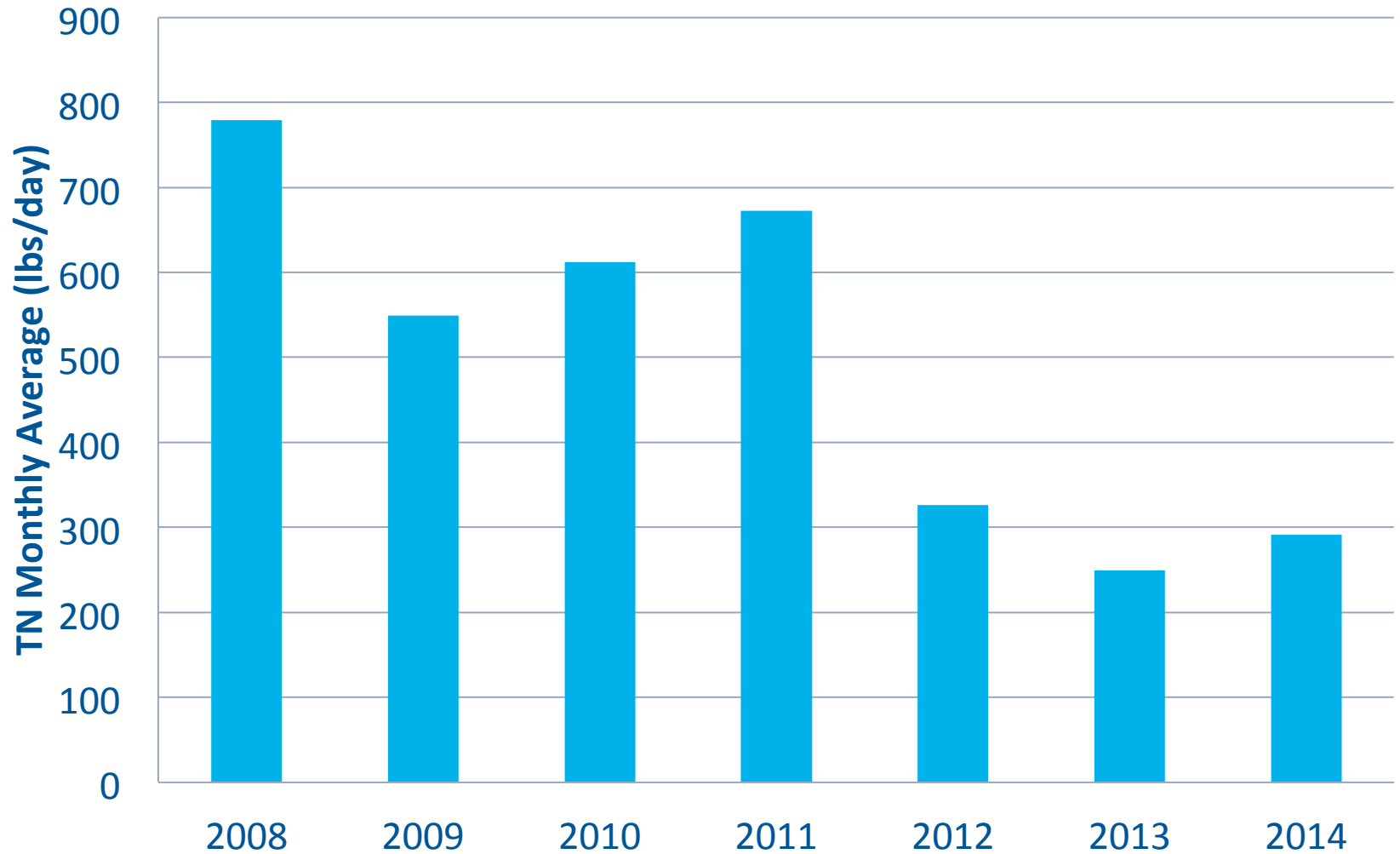


04/04/2012

HOW IS PLANT OPERATING NOW?



West Haven WPCF Effluent Total Nitrogen



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Together



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