

***AN UPDATE* ON THE IMPLEMENTATION
OF THE STICKNEY, CALUMET AND
NORTHSIDE WATER RECLAMATION
PLANTS' MASTER PLANS**

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**Metropolitan Water Reclamation District
of Greater Chicago**

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MWRDGC

PRESENTATION OVERVIEW

1. Review of the Objectives of the Master Planning Process
2. Review of the Master Plans Program
3. Current Implementation Progress
4. A Look Ahead

HISTORY OF THE MASTER PLANS

2000: Recognized Need for a Comprehensive Plan to Address Major Plant Shortcomings at Stickney.

40 Year Planning Horizon (2040)

20 Year Improvement Projects (2020)

2003: Initiated First Master Plan Work at Stickney

2004: Completed Stickney Master Plan

2005: Completed Calumet Master Plan

2007: Completed North Side Master Plan

Objectives of the Master Plan Process:

- 1. Assess Future Flows and Pollutant Loadings**
- 2. Maintain the Treatment Capacity of the Plant through the Year 2040 Projected Flows**
- 3. Replace/Upgrade Undersized or Underperforming Unit Processes**
- 4. Review Opportunities with Respect to Process Changes**

Objectives of the Master Plan Process:

- 5. Provide Sustained Treatment Capability for TARP Phase II Reservoir Pumpback (Stickney & Calumet)**
- 6. Prepare to Respond to Changes in Potential Regulations (Nutrient Removal, Disinfection)**
- 7. Standardization of Processes and Equipment Between Plants Where Practical**

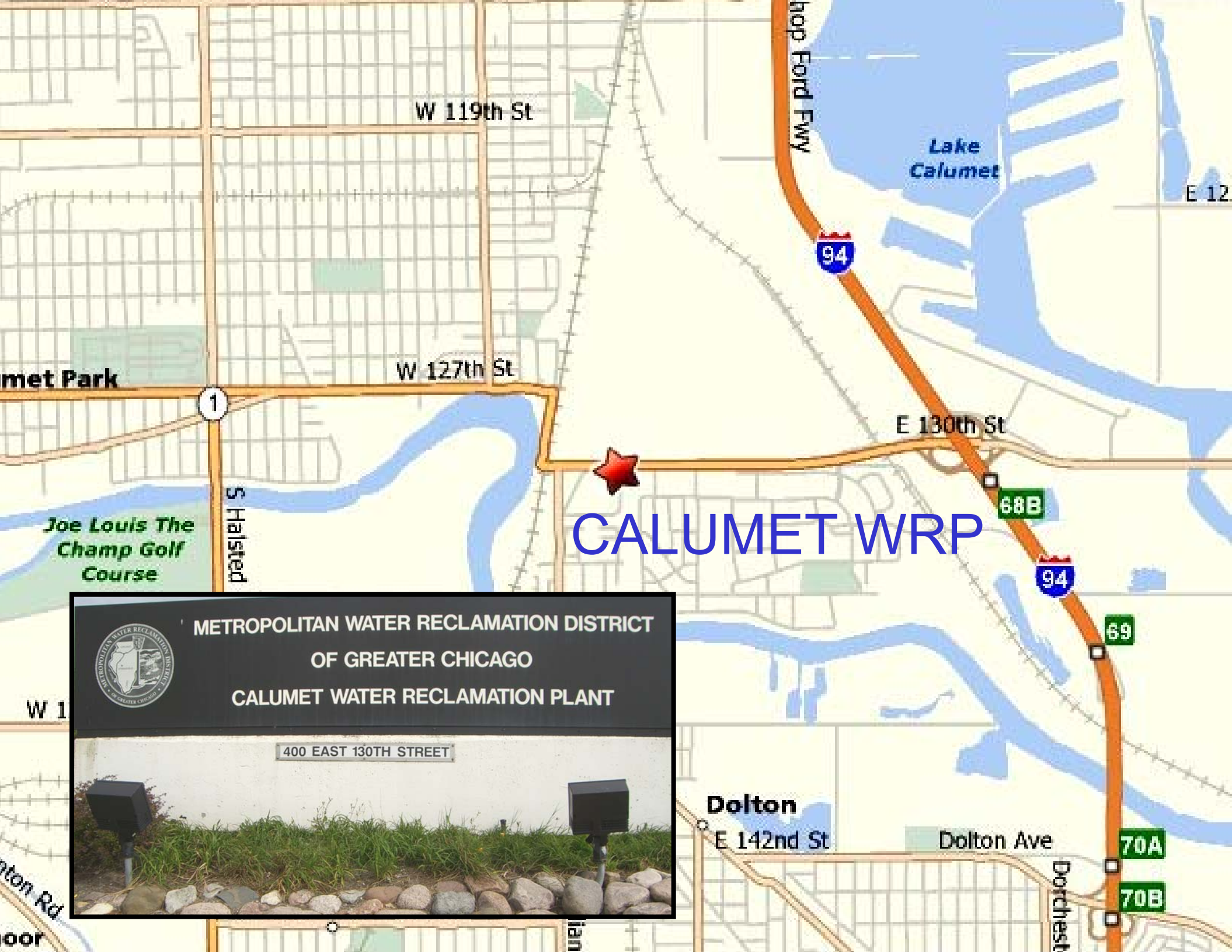
Products:

- 1. Master Plan Prioritizing Capital Improvement Projects Over the Next 20 Years**
- 2. Computer Model of the Plant Processes for Future Analysis**

The Master Planning Process is a “Road Map to the Future”:

Where Do We
Need to be in
40 Years, and
How Do We
Get There?

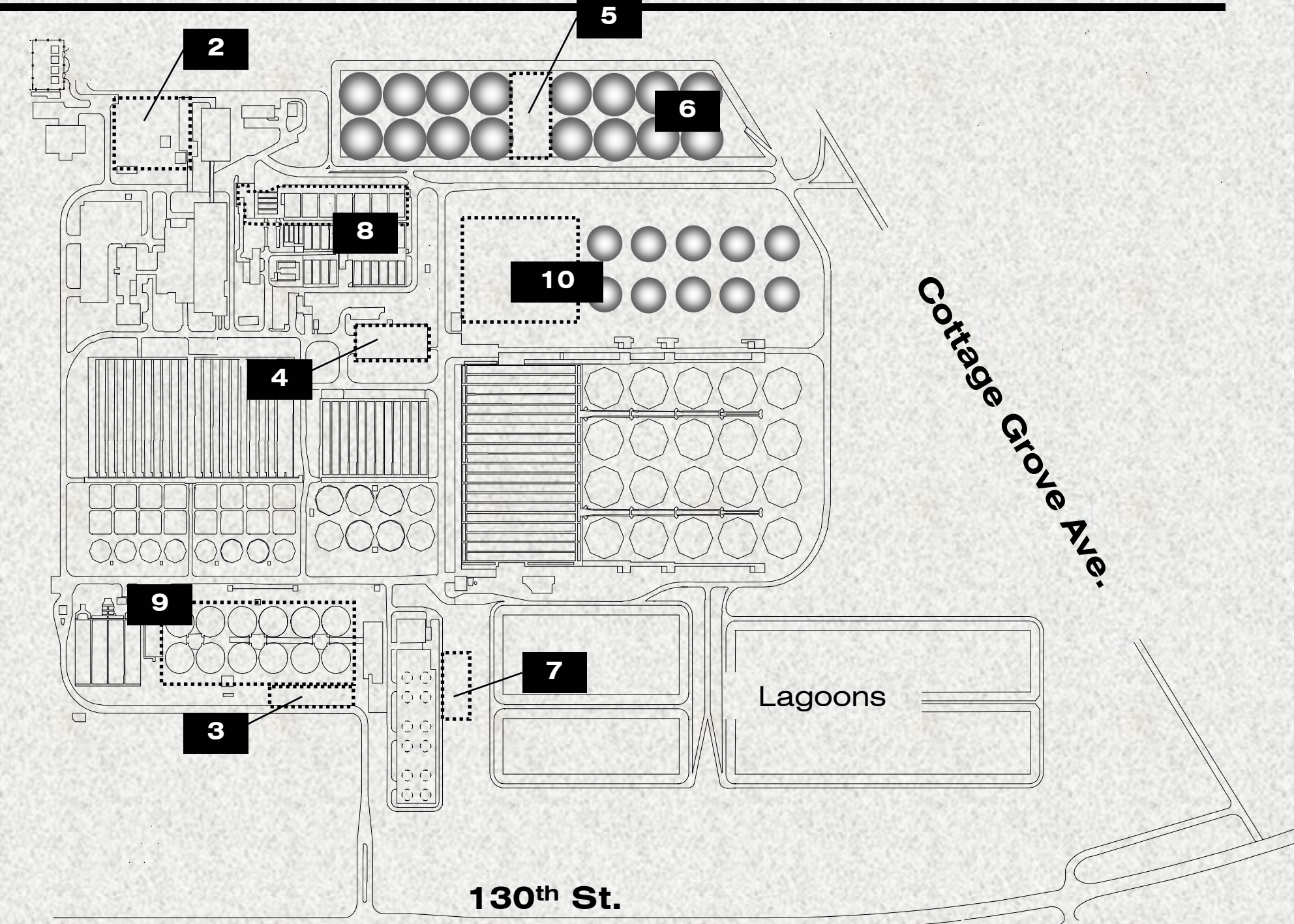




CALUMET WRP



CALUMET WRP MASTER PLAN



SITE PREPARATION CONTRACT - 2004



New Parking Area

SITE PREPARATION CONTRACT 2004



Temporary Trailers and Contract Staging Area

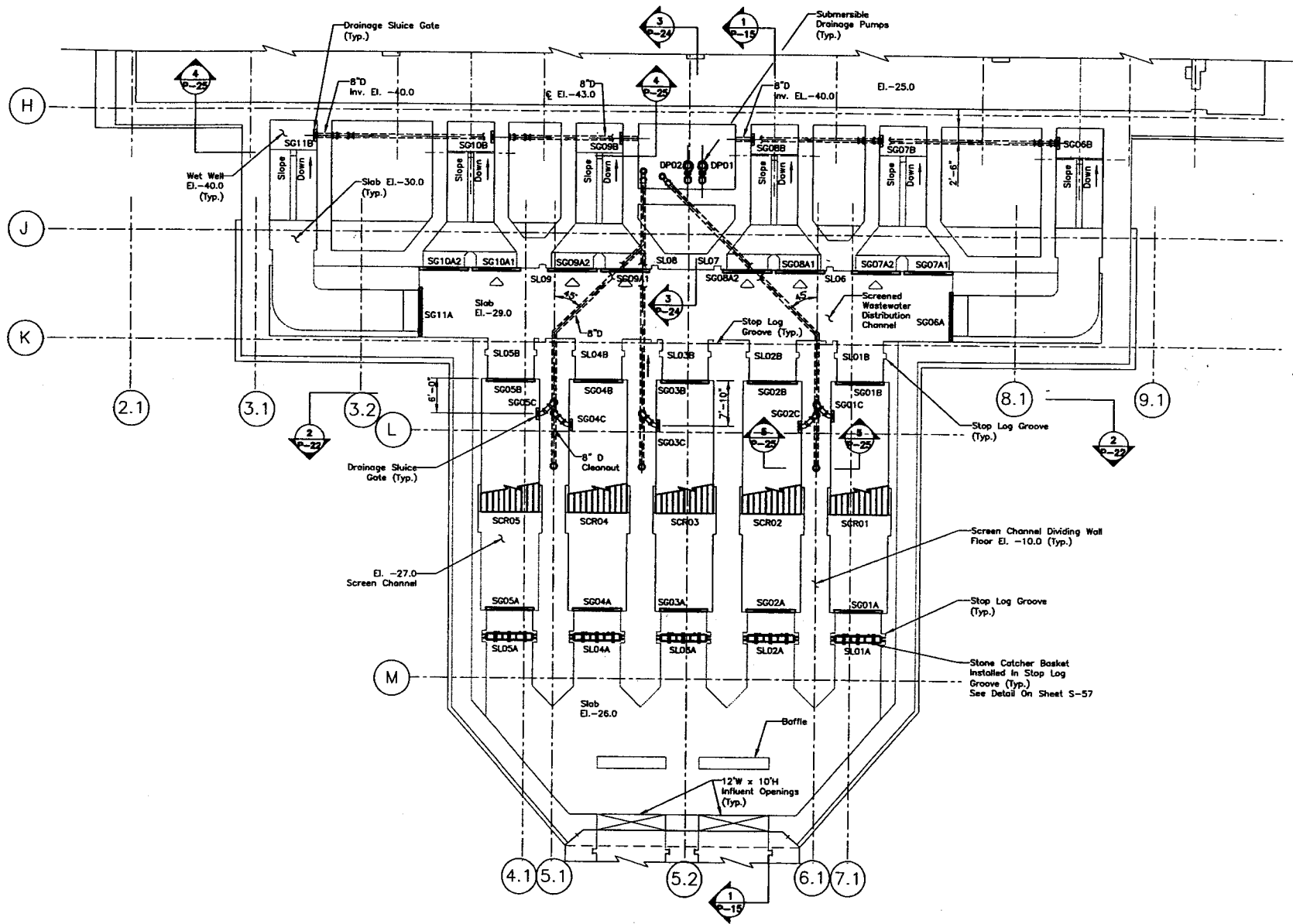
Demolition of Decommissioned Buildings



NEW HIGH LEVEL INFLUENT PUMPING STATION

- 480 MGD Firm Capacity
- 5 Mechanically Cleaned Bar Screens
- Operating Engineer's Room
- Electrical Operator's Room
- Odor Control
- Construction Completion 2010





Screen Building And Wet Wells Plan At Elev. -27.0

Scale: 1/8"=1'-0"

HIGH LEVEL INFLUENT PUMPING STATION

NEW HIGH LEVEL INFLUENT PUMPING STATION



NEW HIGH LEVEL INFLUENT PUMPING STATION



CENTRAL BOILER FACILITY



CENTRAL BOILER FACILITY

- **4 Boilers, 70,000 lbs./hr Capacity Each**
- **100 psi Output**
- **Dual Gas (Natural Gas and Digester Gas)**
- **Simultaneous Co-firing, Maximize Use of Digester Gas**
- **Overhead Steam and Condensate Return Line**

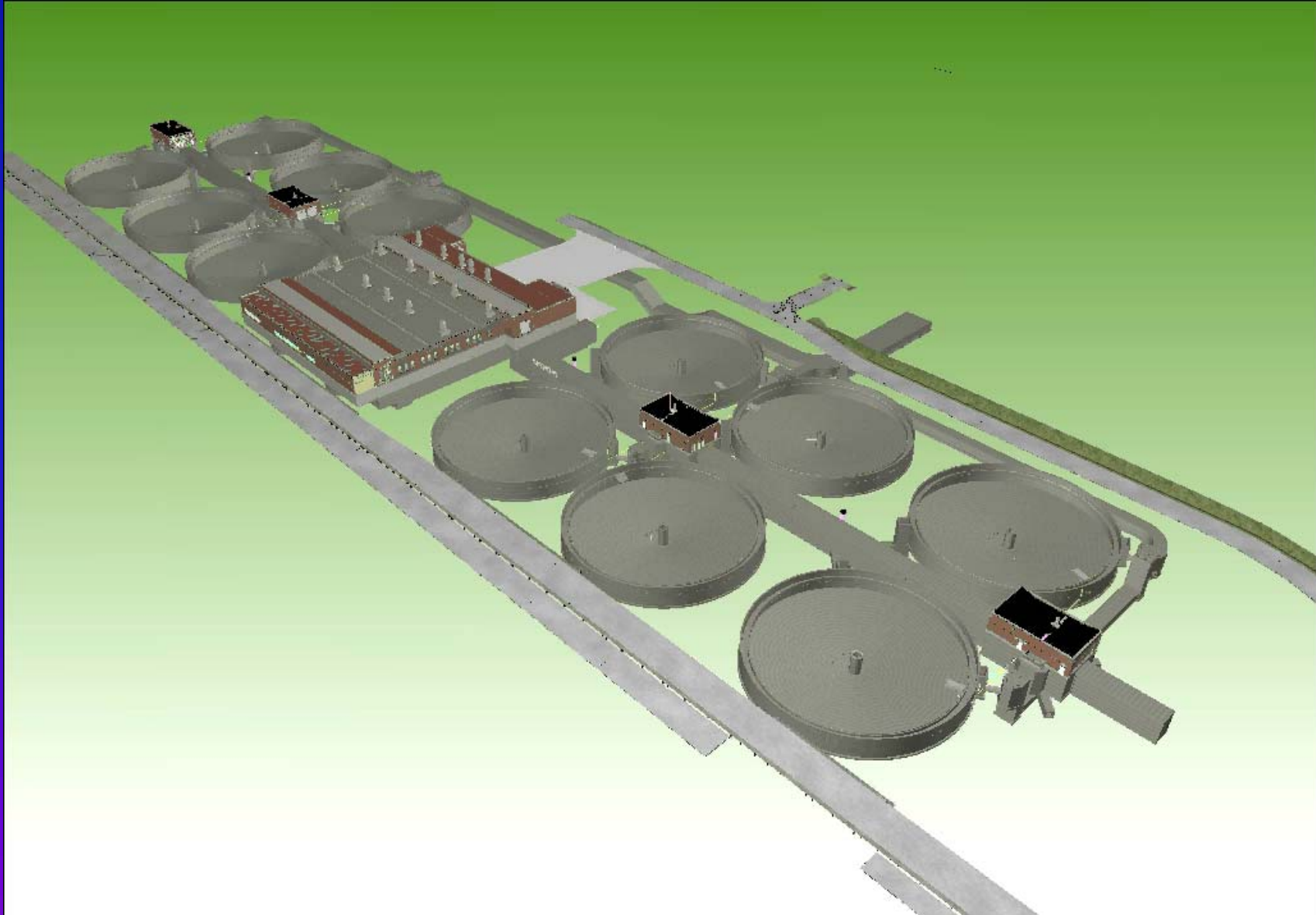
CENTRAL BOILER FACILITY



Construction Completion 2008

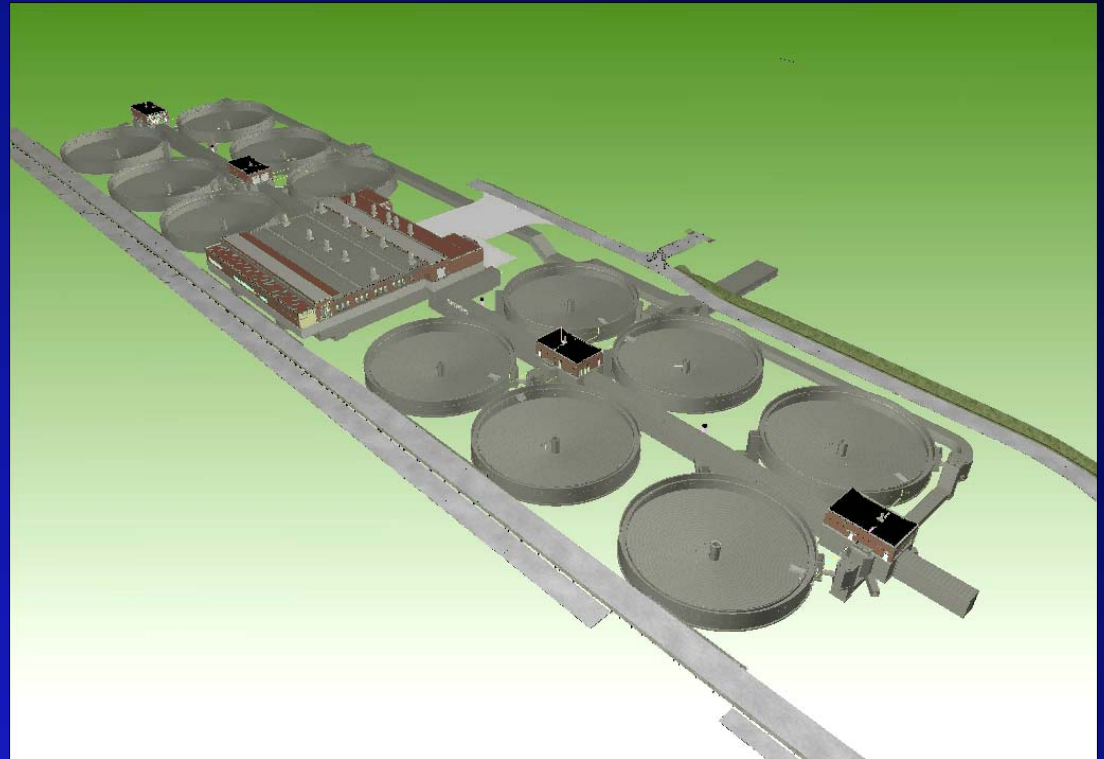
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PRIMARY SETTLING TANKS AND GRIT REMOVAL FACILITY



GRIT REMOVAL FACILITY

- 8 25' X 135' Aerated Grit Tanks
- Traveling Bridge Grit Removal System
- Grit Dewatering
- Tanks Covered for Odor Control

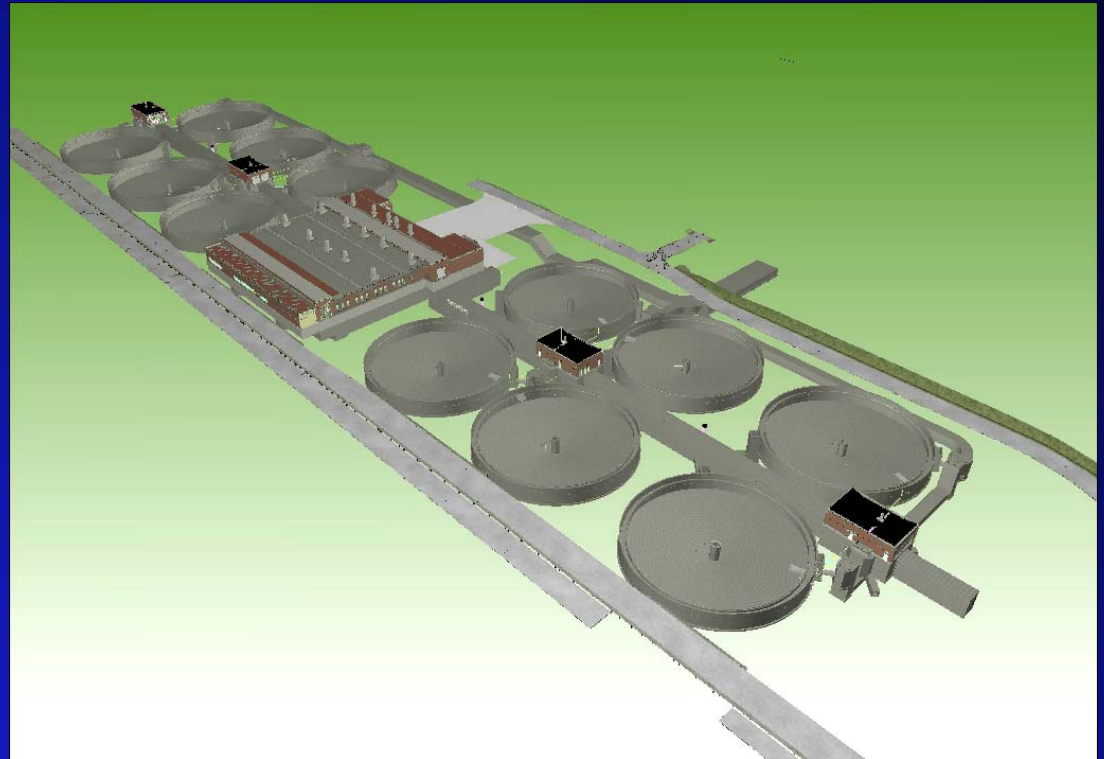


TRAVELING BRIDGE GRIT REMOVAL MECHANISM

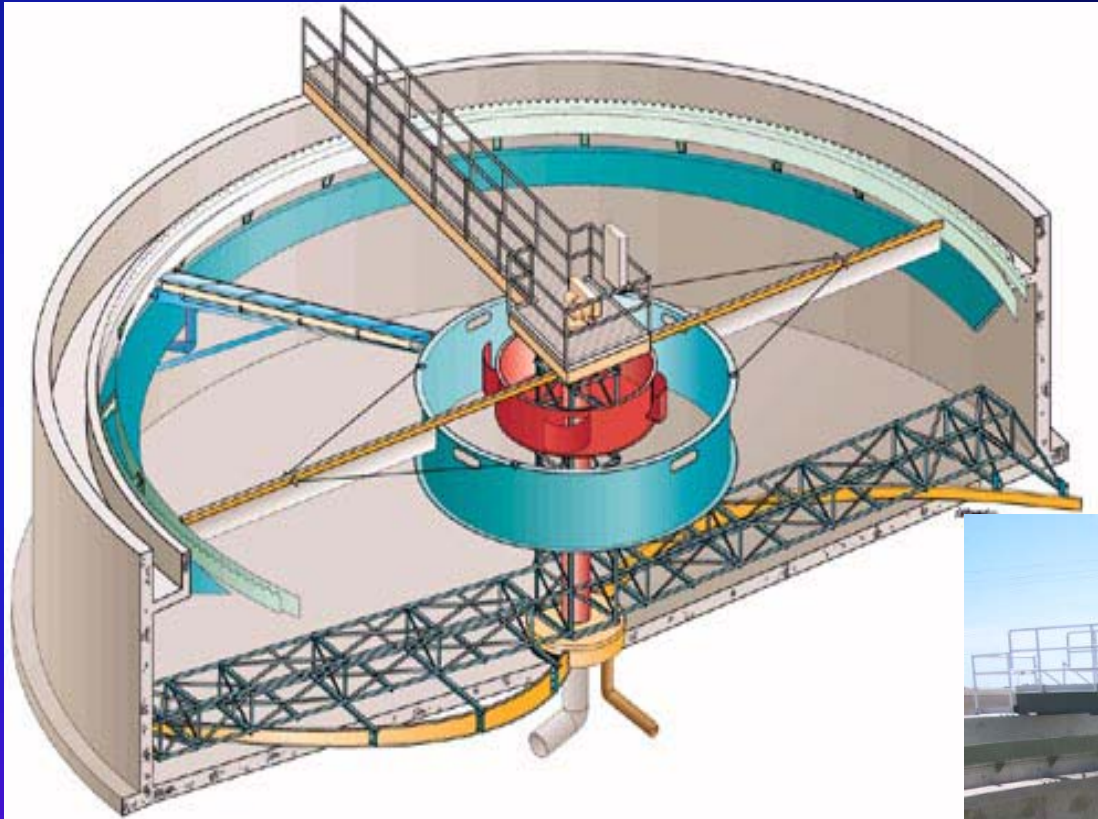


PRIMARY SETTLING TANKS

- 12 155 ft. dia. Circular Primary Settling Tanks
- 4 Primary Sludge and Scum Pumping Stations
- Piping Gallery

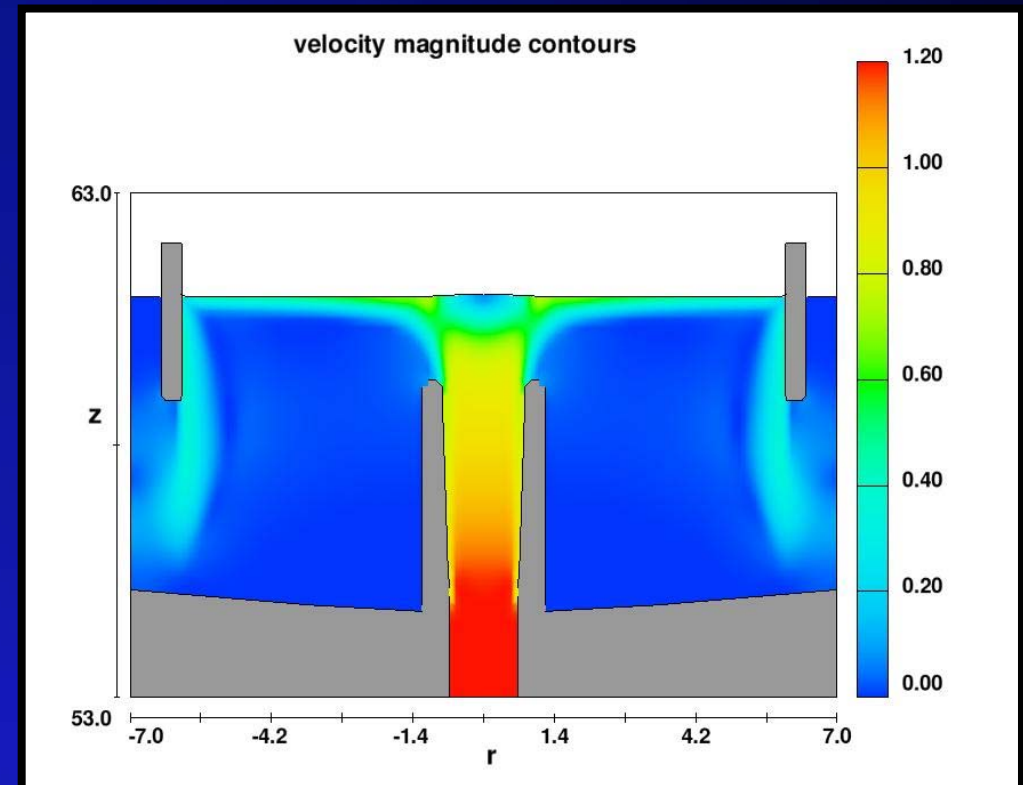
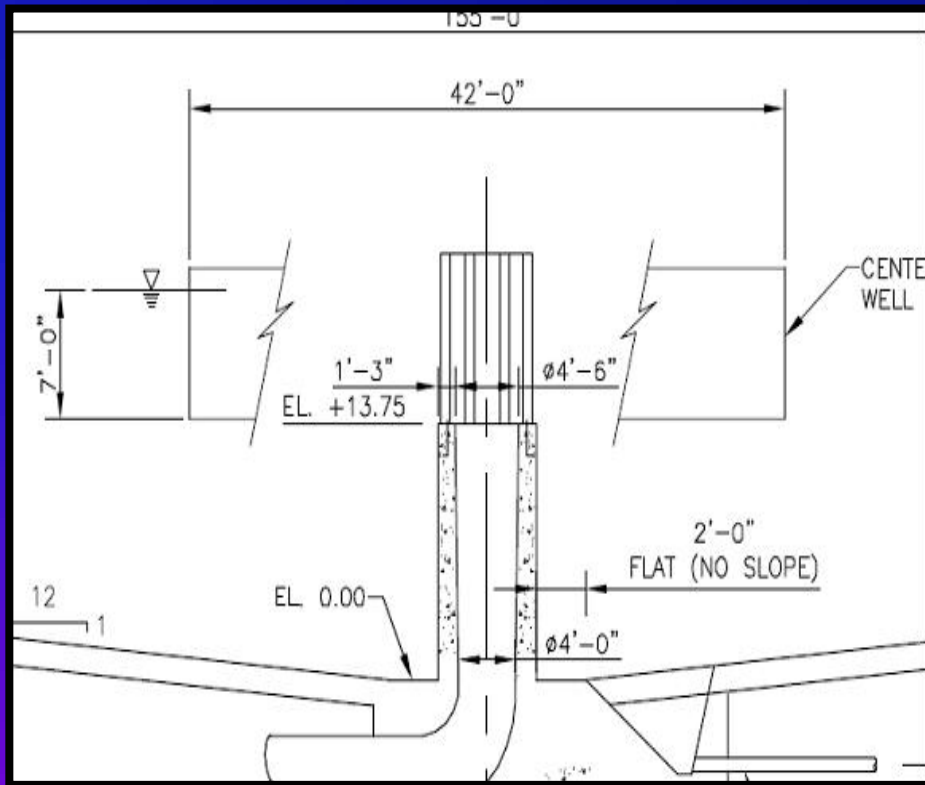


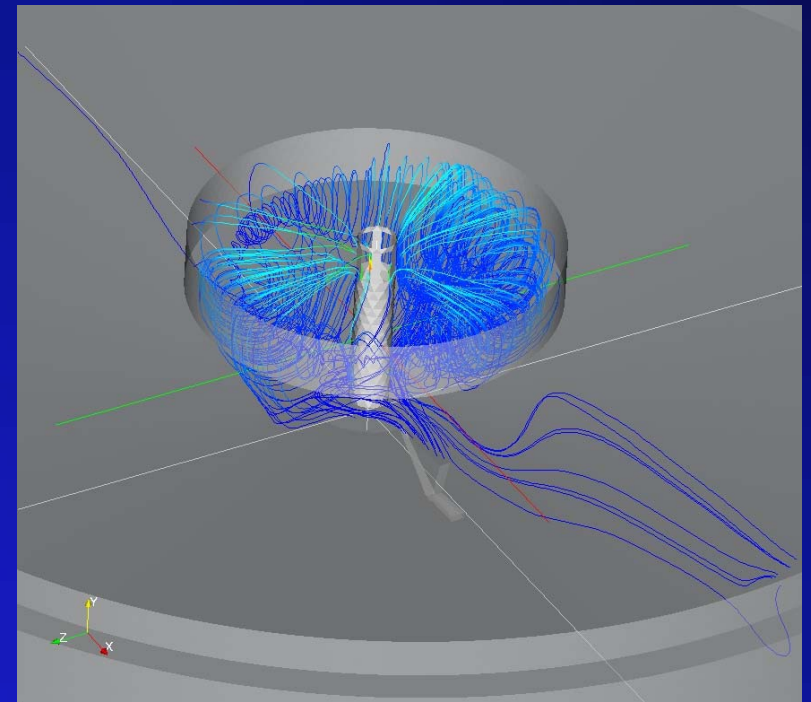
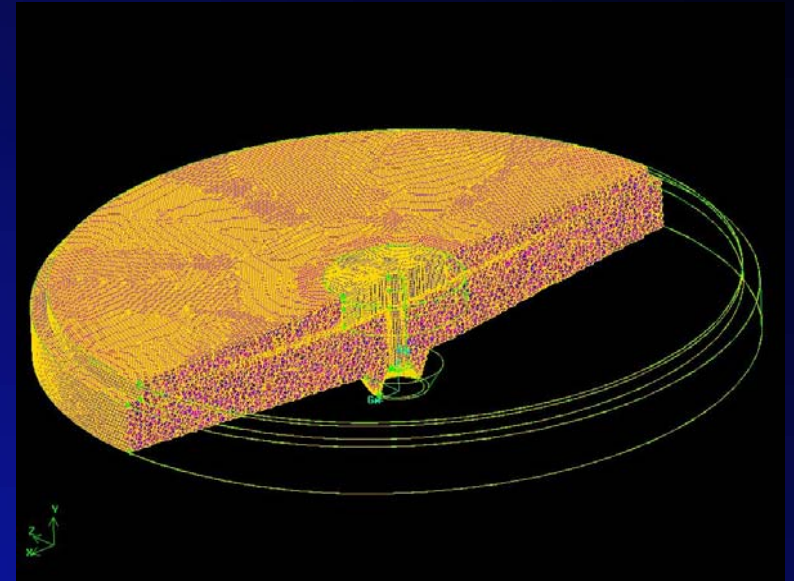
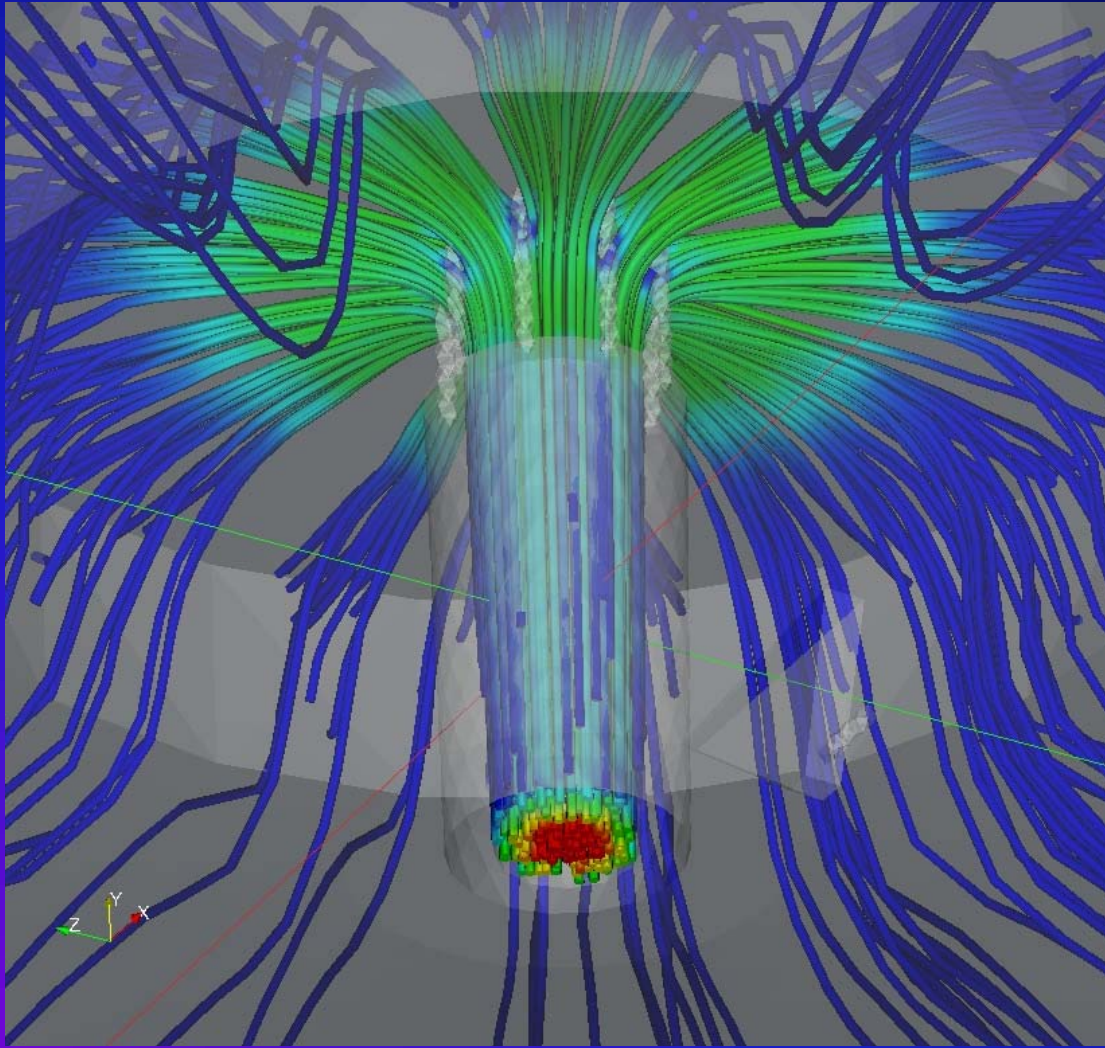
PRIMARY SETTLING TANKS



Construction 2008-2011

COMPUTATIONAL FLUID DYNAMICS MODELING





CFD Model Results

INTERMEDIATE BLOWERS

- 2 75,000 scfm Blowers
- Reduce Energy Consumption at Below Peak Demand
- Looped Air Main to Improve Air Pressure to Battery A
- Construction 2008--2010

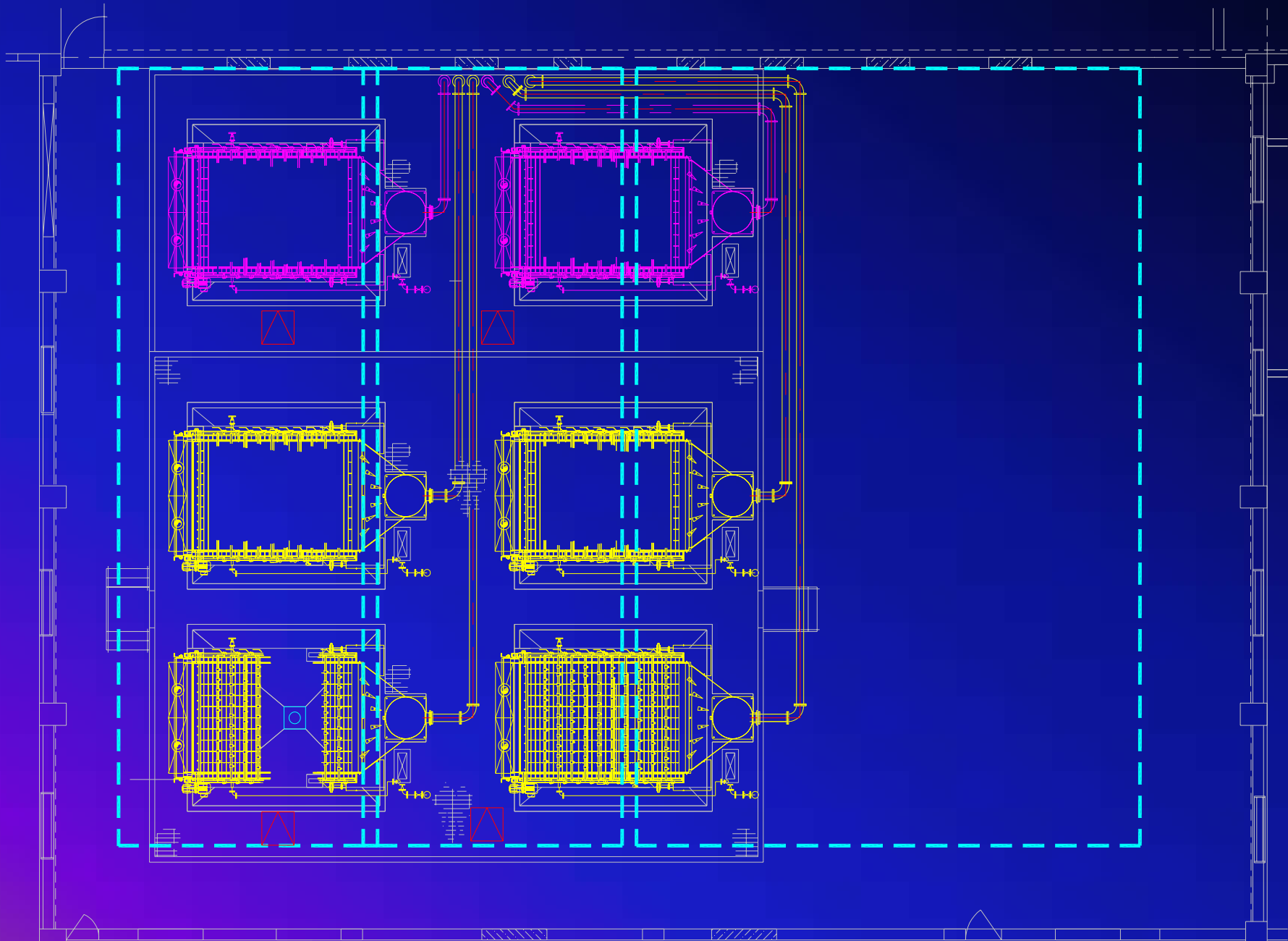


SLUDGE THICKENING FACILITIES

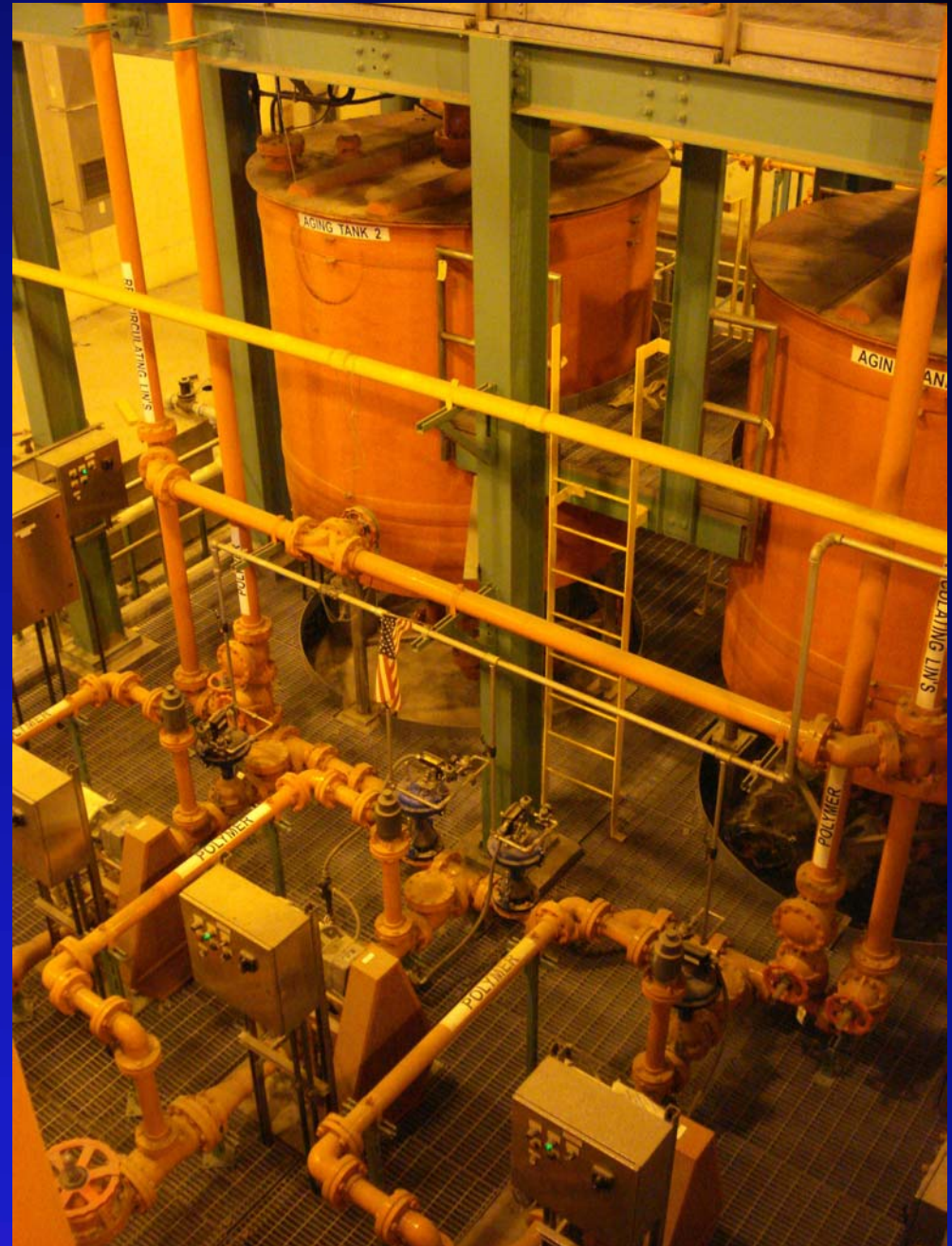
- Separation of Primary Sludge from WAS
- Primary Sludge Only to Existing 12 Gravity Concentration Tanks
- Replace Primary Sludge Screens



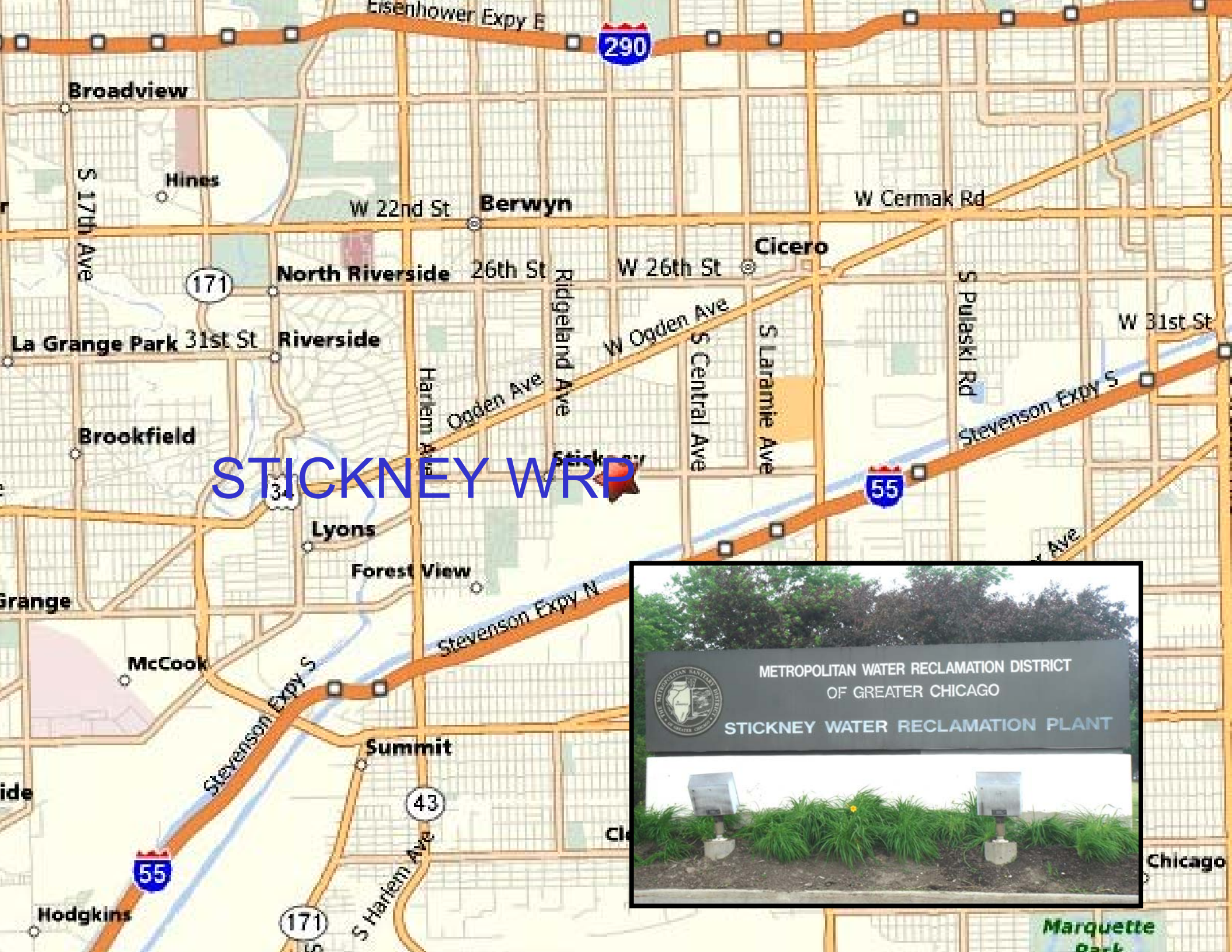
WAS TO 6 NEW 2.5m GRAVITY BELT THICKENERS



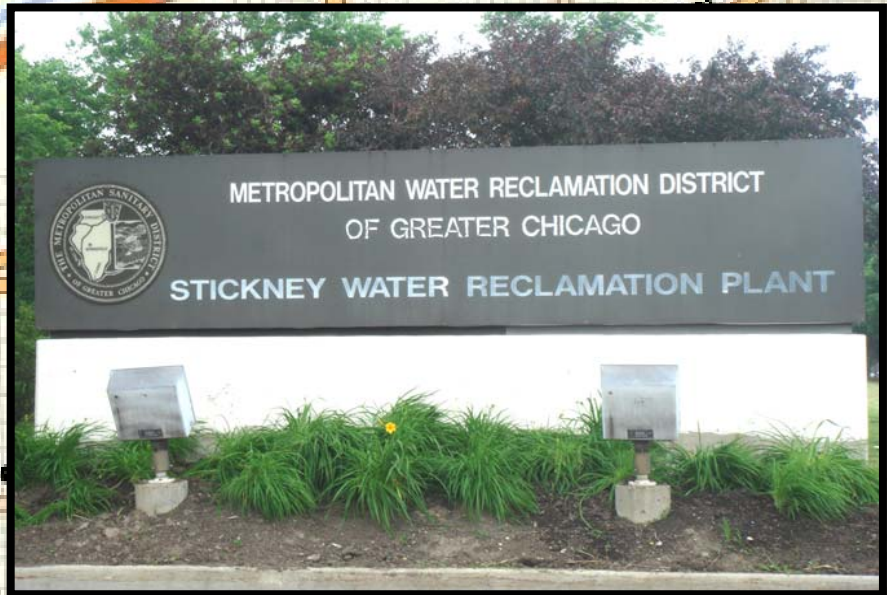
- Expand Polymer Feed System
- Construction 2008-2011







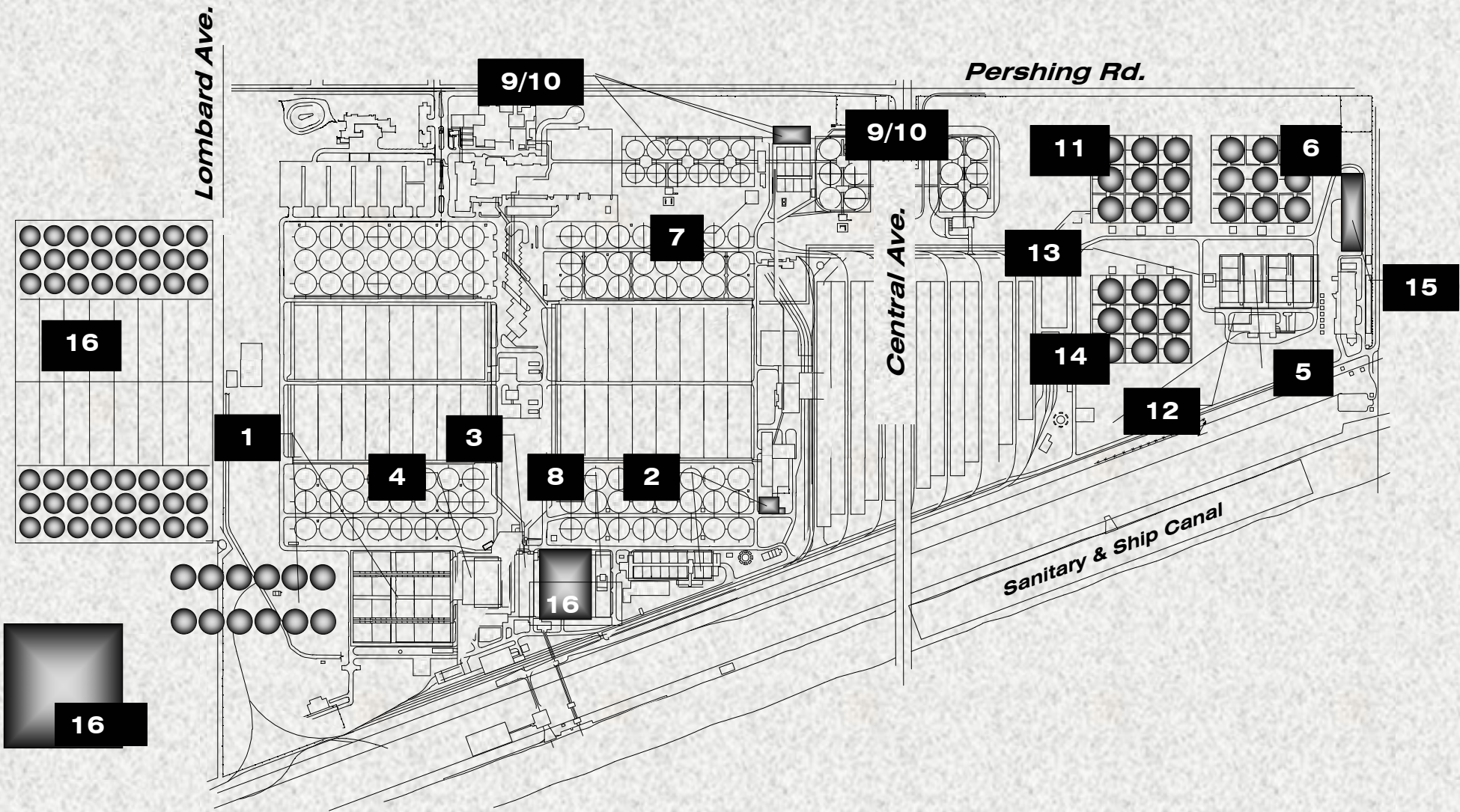
STICKNEY WRP



Chicago

Marquette Park

STICKNEY WRP MASTER PLAN



NEW INTERMEDIATE BLOWER



NEW INTERMEDIATE BLOWER

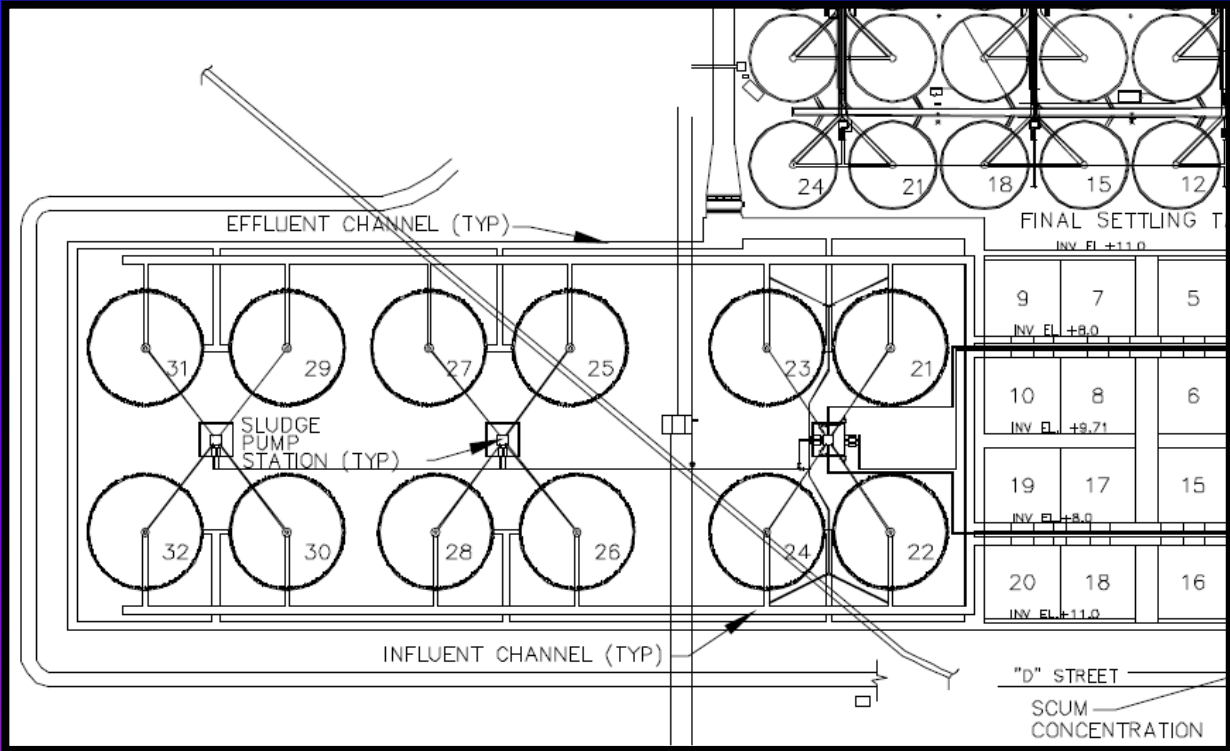
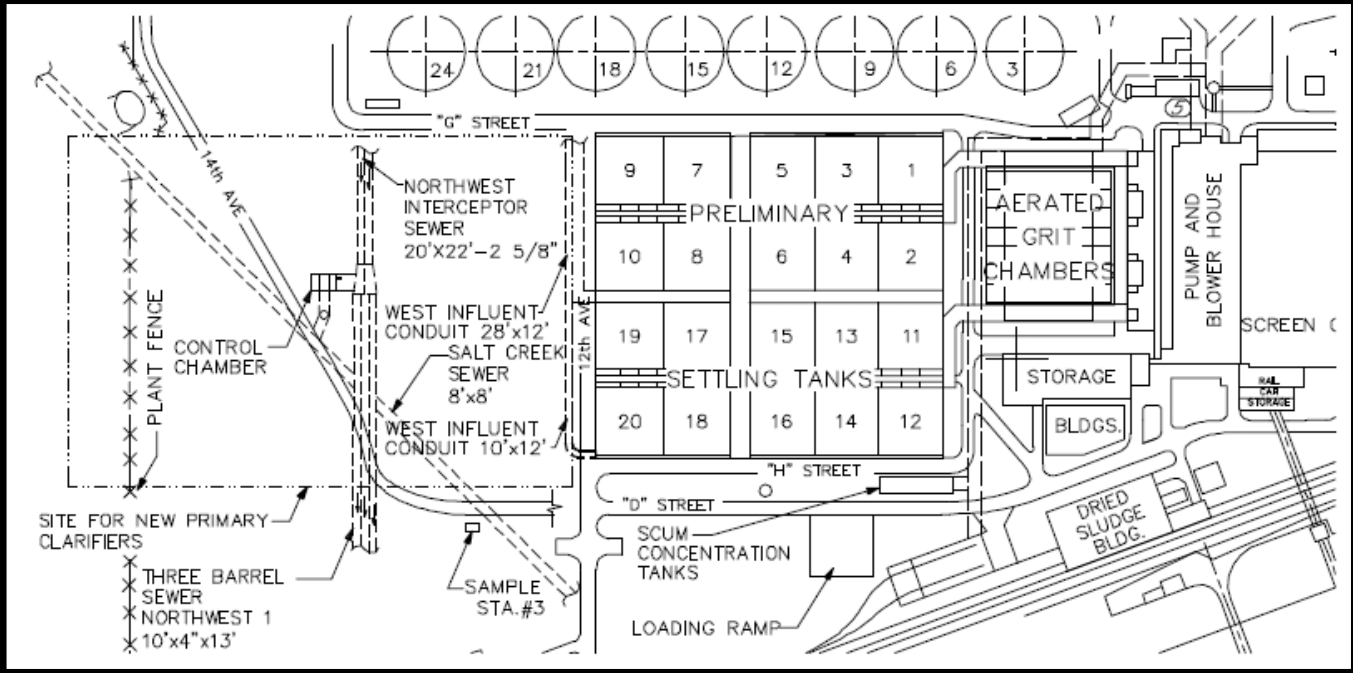
- **New Blower # 2 in SW P&BH**
- **155,000 Scfm**
- **Adjustable Inlet Guide Vanes to Better Tailor Air Production to Air Demand**
- **Will Be Connected to Plant Wide DCS So New DO Probes in Aeration Tanks Can Control Blower Output**
- **Construction Completion 2008**

SOUTHWEST PRIMARY SETTLING TANKS

Master Plan Recommendations:

- **Increase Primary Treatment Capacity at the Southwest Plant by Adding 12 New 160' Circular Clarifiers**
- **Two Dedicated New Circular Primary Clarifiers for Thickening**
- **Modify the Existing Sludge Pumping System to Accommodate In-tank Thickening to 4-5% Solids**

Existing Site



Proposed Layout



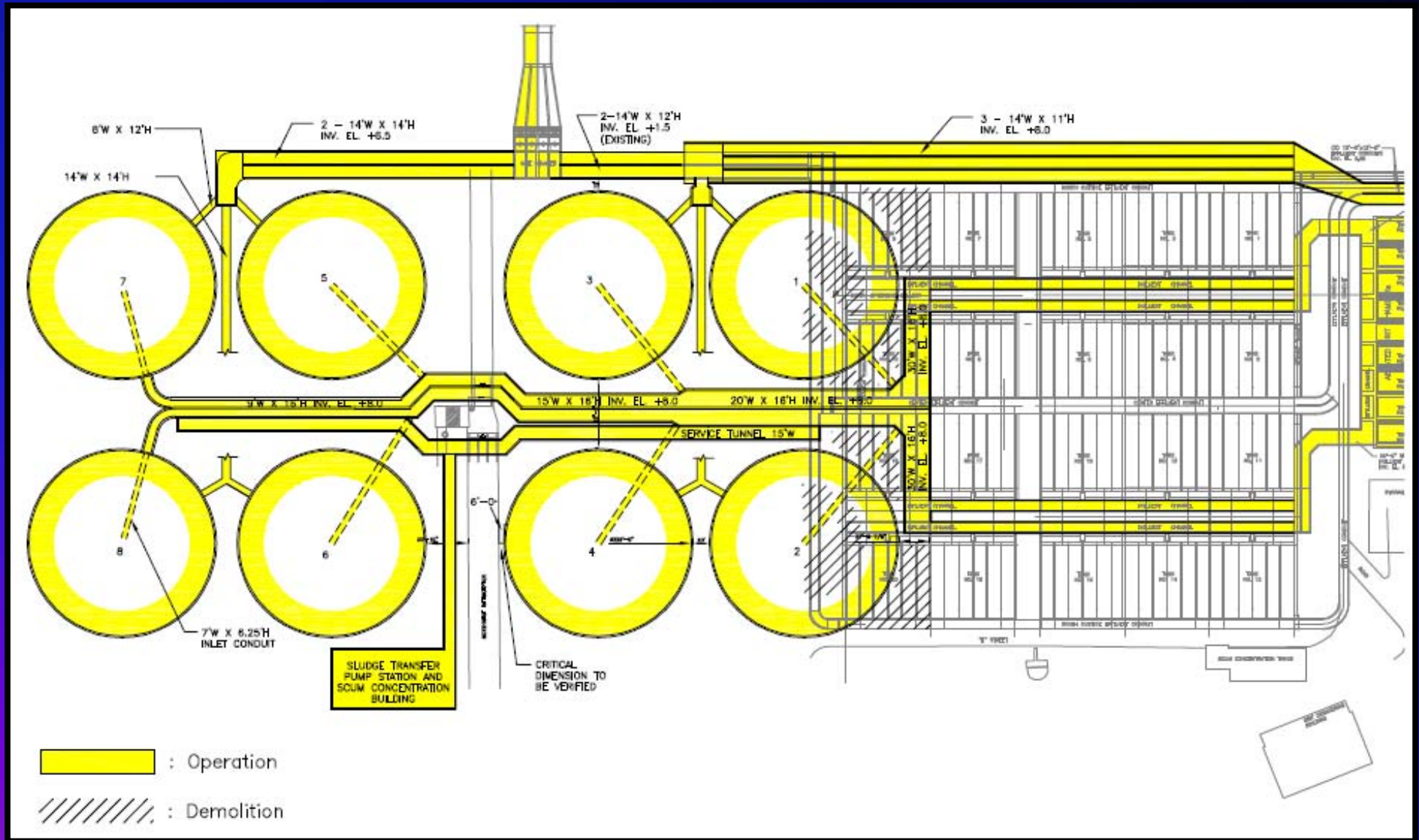
Problems:

- **Hydraulic Analysis Revealed Very Uneven Flow Split Between New and Existing PSTs. Less than 5% to Circular / More than 95% to Rectangular**
- **Water Level in Existing Inlet Channels Must Be Raised 2.5 Ft to Push the Desired Flow Rate to the New PSTs**
- **Increase of Required 2.5-ft of Pumps TDH Results in About 100-mgd Reduced Capacity**
- **Flow to Existing PSTs Must Be Regulated by Valves or Gates Based on Pumped Flow**
- **Thickening in primary settling tanks not desirable**

REVISED APPROACH TO SOUTHWEST PRIMARY SETTLING TANKS

- 8 225 Ft. dia. Circular Tanks
- Existing Rectangular Tanks Demolished
- Capacity Reduced to 700 MGD Due to Hydraulic Restrictions
- Need to Raise Wall Height of Grit Tanks 18”

SW CIRCULAR PRIMARY TANKS



IMHOFF TANK REPLACEMENT

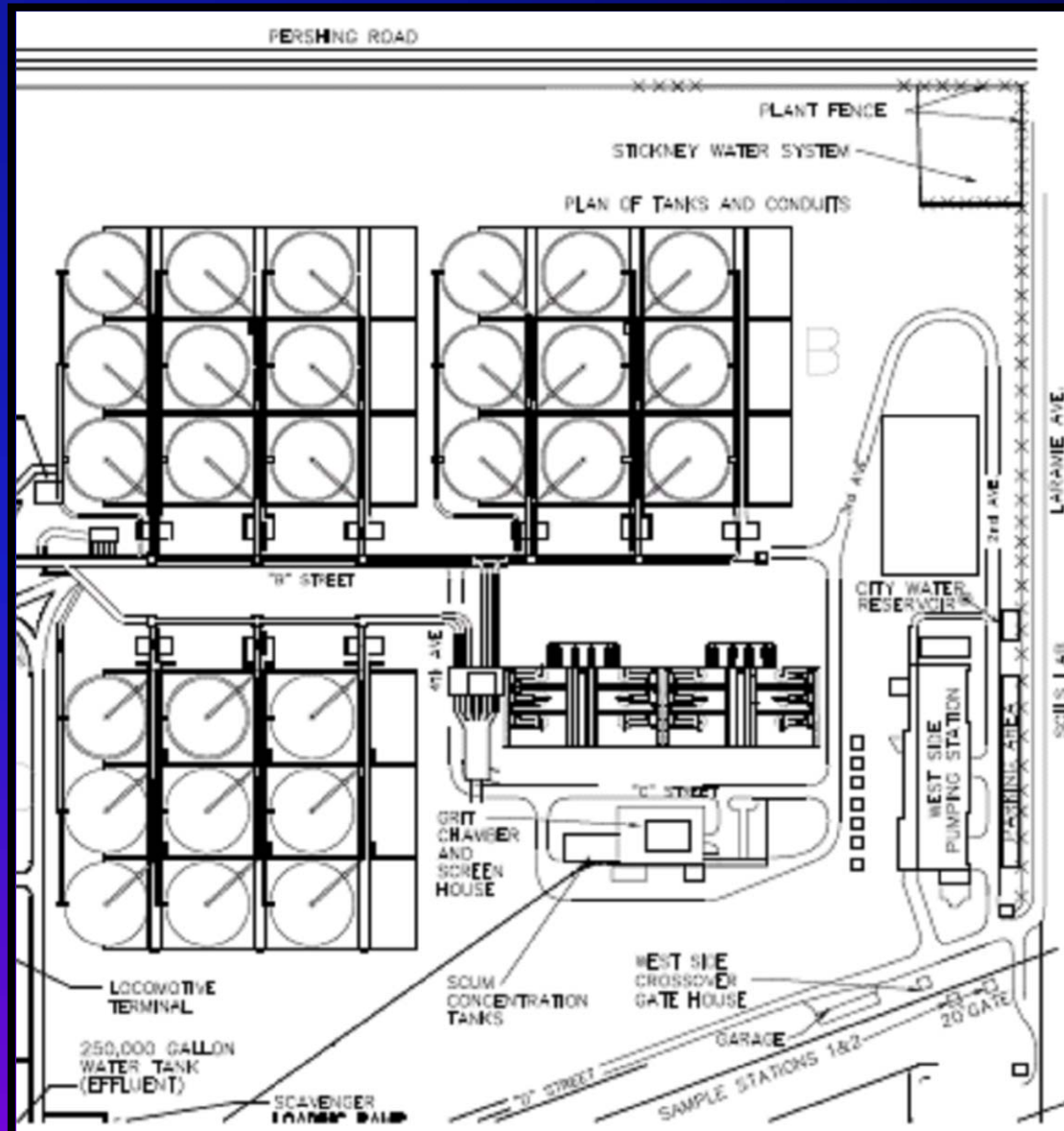


WESTSIDE IMHOFF TANKS

Master Plan Recommendations:

- **Nine 150 ft. dia. Circular Primary Settling Tanks Per Battery Constructed Within the Imhoff Tanks Influent/Effluent Channels**
- **Total 27 New Circular Primary Settling Tanks**
- **One Dedicated Circular Primary Clarifier for Thickening per Battery**
- **Replace Skimming Tanks with Pista Grit Vortex Grit Removal**

WESTSIDE PRIMARY SETTLING TANKS PROPOSED MASTER PLAN LAYOUT





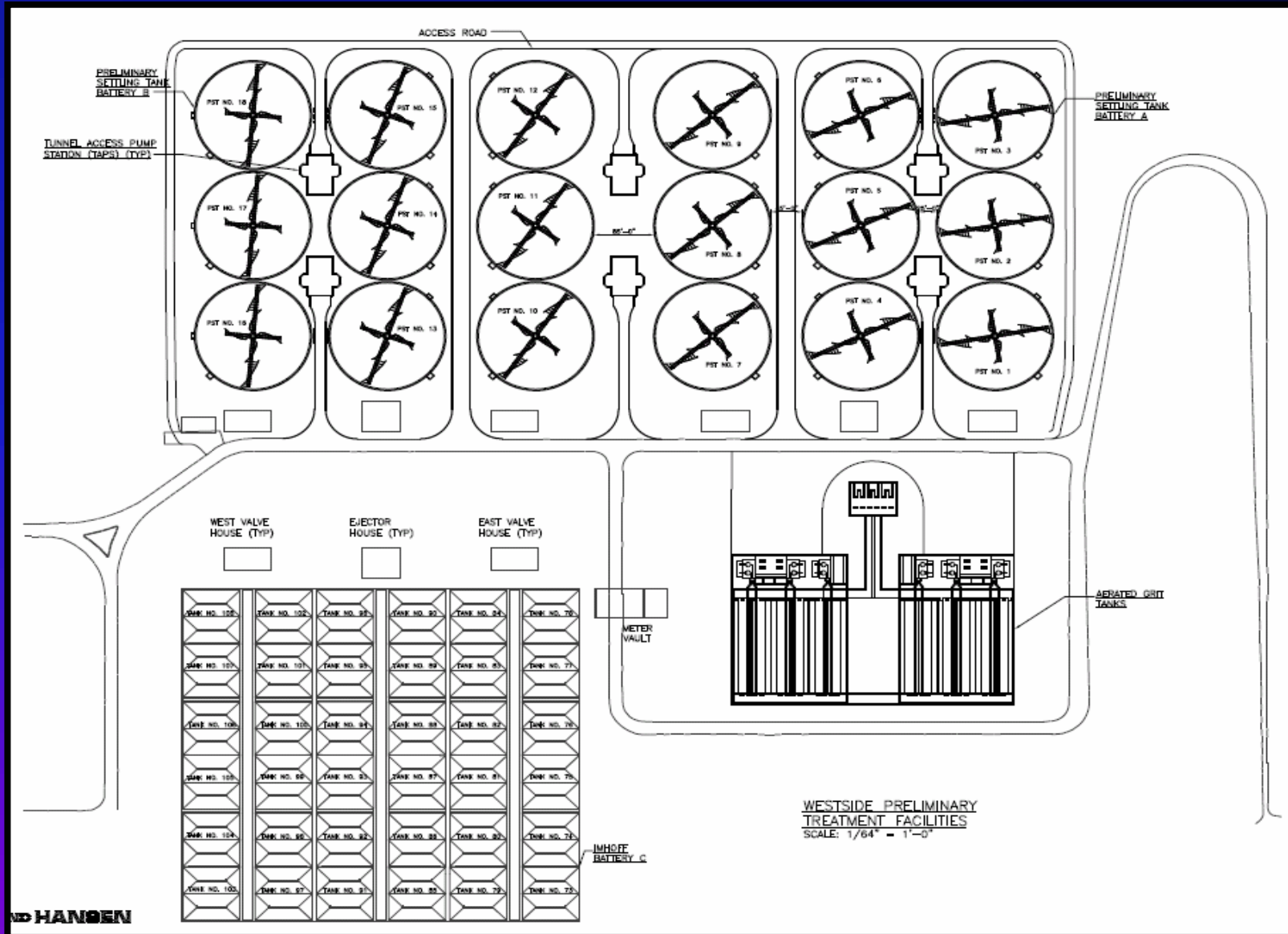
Problems

- **Proposed Arrangement of Nine Tanks per Battery Leaves Center Tank Without Access**
- **Surgical Cutting of Concrete Walls of Imhoff Tanks Very Expensive**
- **Thickening in Primary Tanks Not Desirable**
- **Lacks Sludge Screening**
- **Vortex Grit System Undersized and Prone to Clogging After First Flush**

REVISED APPROACH TO WESTSIDE PRIMARY SETTLING TANKS

- **Replace 3 Batteries of 108 Imhoff Tanks with 3 Batteries of 18 Circular Primary Settling Tanks**
- **Imhoff Battery C Abandoned**
- **Primary Sludge to New Gravity Concentration Tanks**
- **Replace Skimming Tanks with Aerated Grit Tanks**
- **Utilize CFD Modeling Work Performed Under Calumet Project for Sizing New Primary Settling and Grit Tanks**
- **Construction 2010-2015**

NEW WESTSIDE PSTs AND GRIT

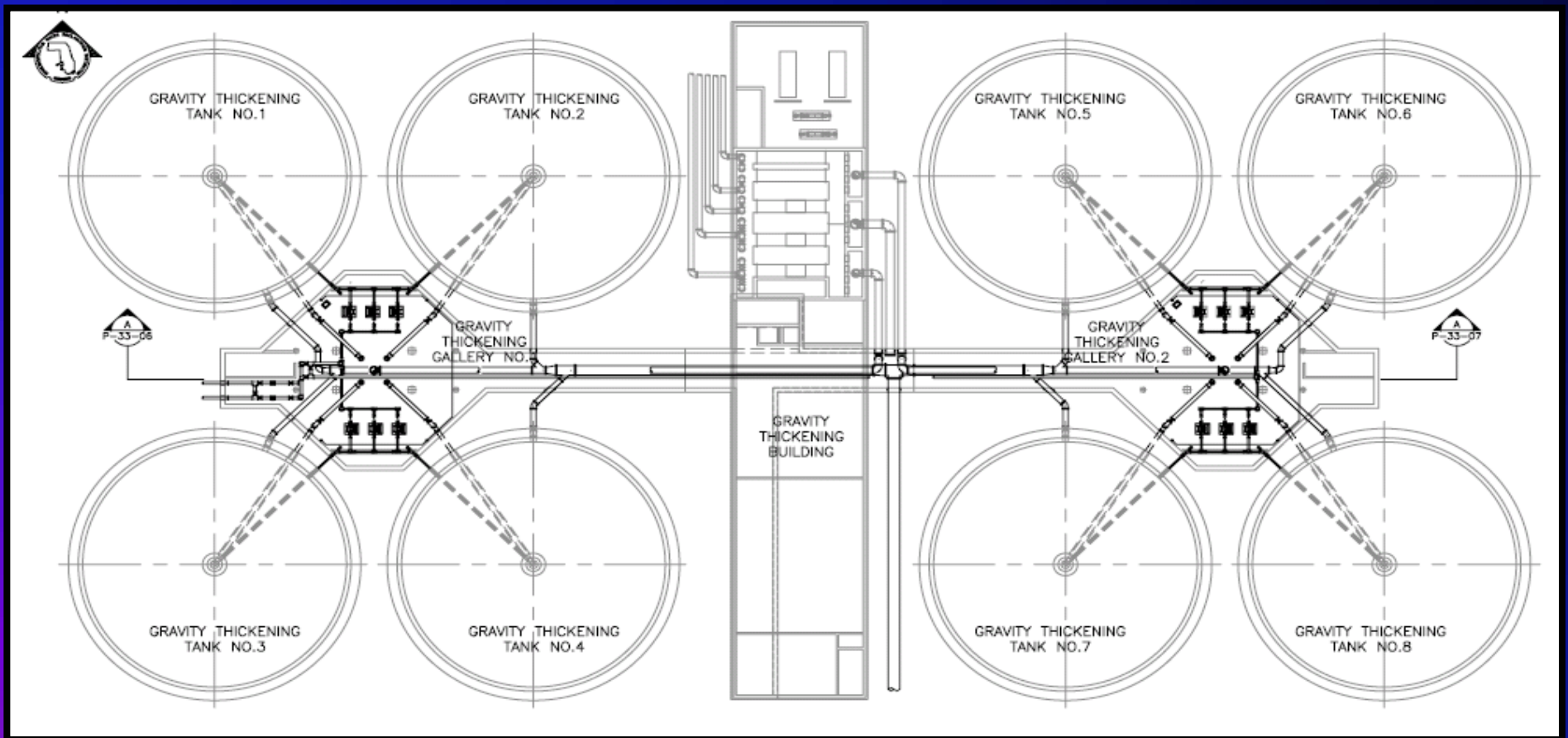


NEW SLUDGE THICKENING PROCESSES

- **Separate Primary Sludge Stream from WAS**
- **Existing Concentration Tanks to be Decommissioned**



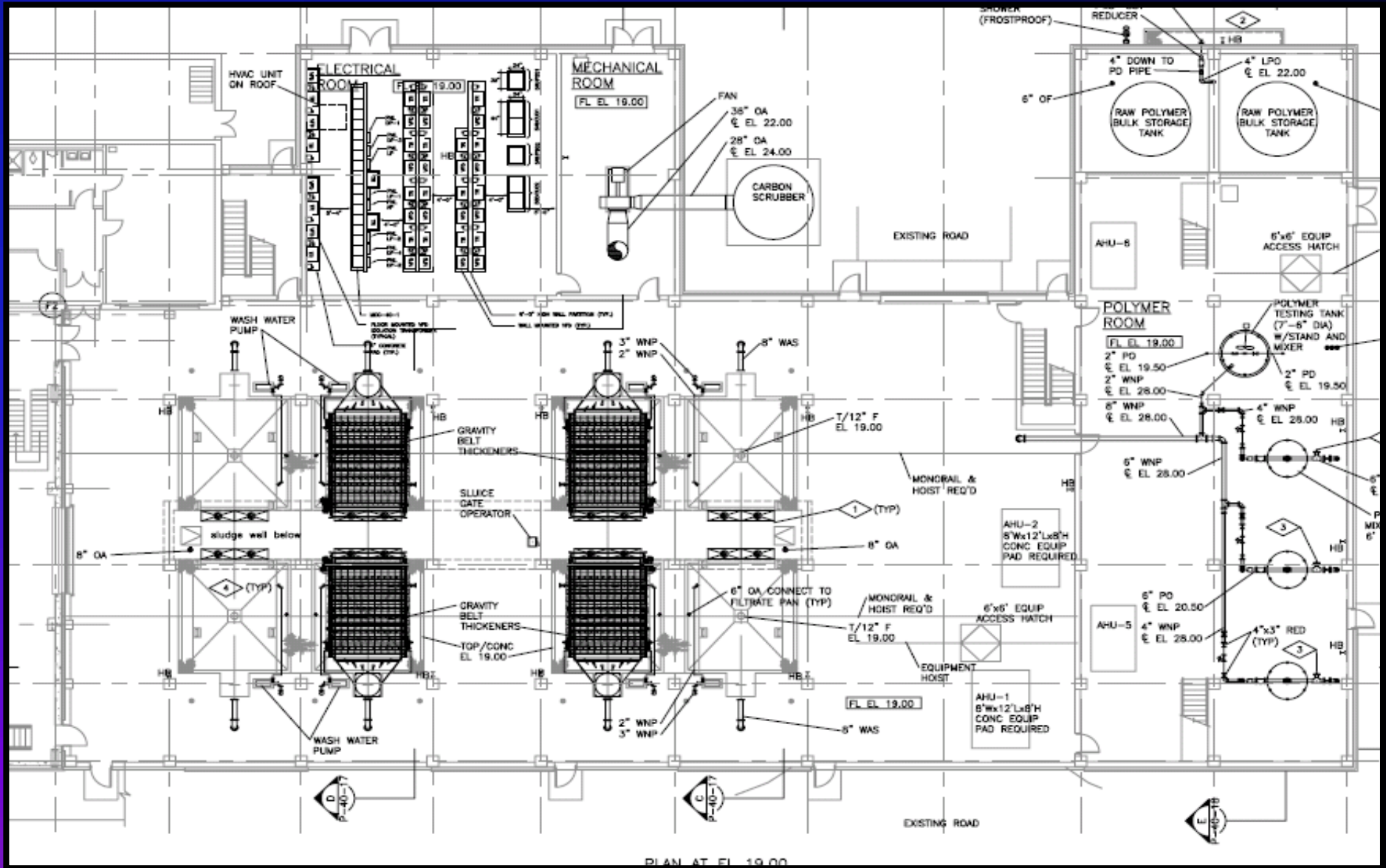
- **SW Primary Sludge, and Future WS Sludge to be Thickened in New Round Gravity Concentration Tanks**
- **Eight 80-ft Diameter Tanks**

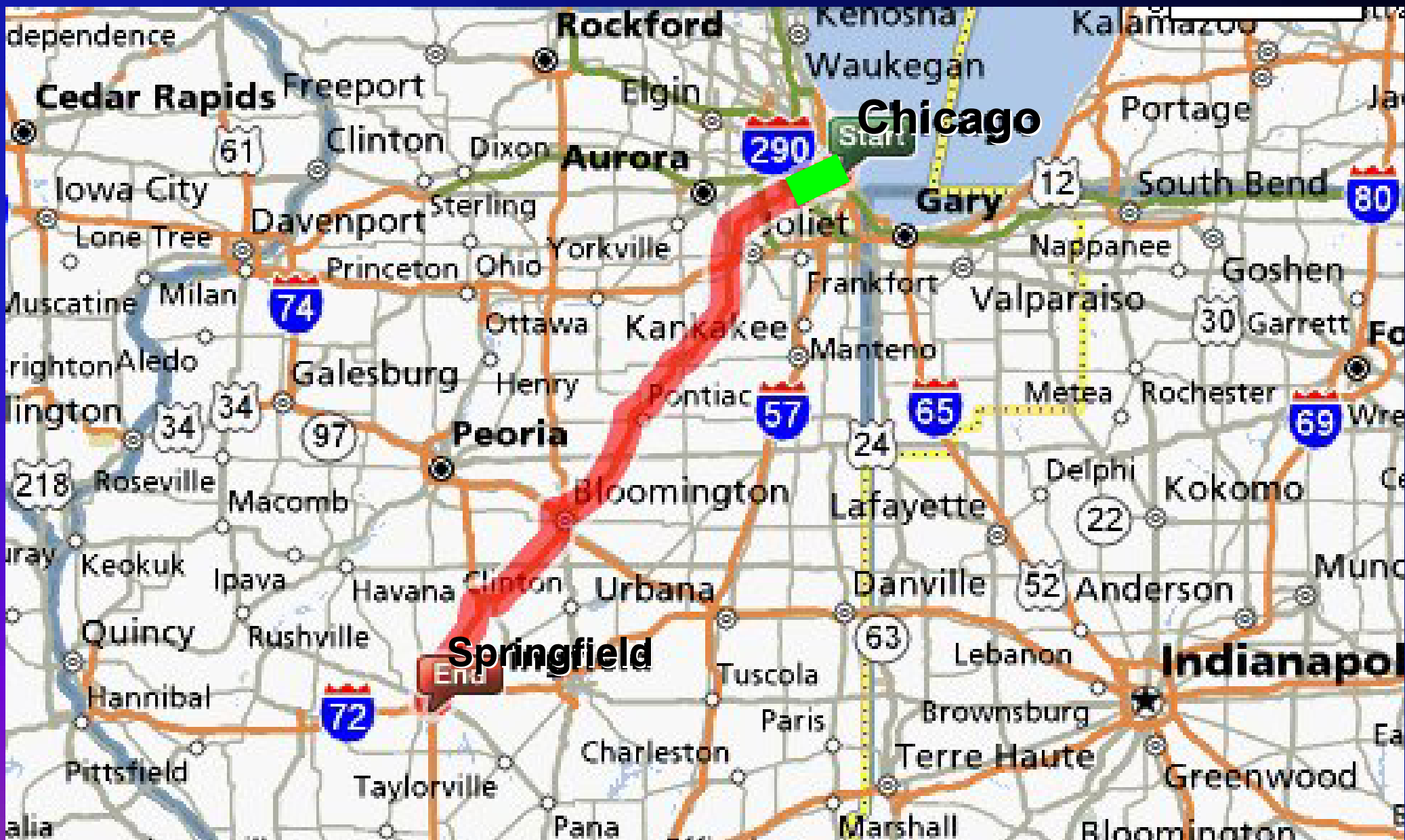


- **North Side Sludge to be Thickened in Existing Centrifuges**
- **WAS to be Thickened by New 3-Meter GBTs**
- **Construction 2009-2012**



GBT BUILDING LAYOUT





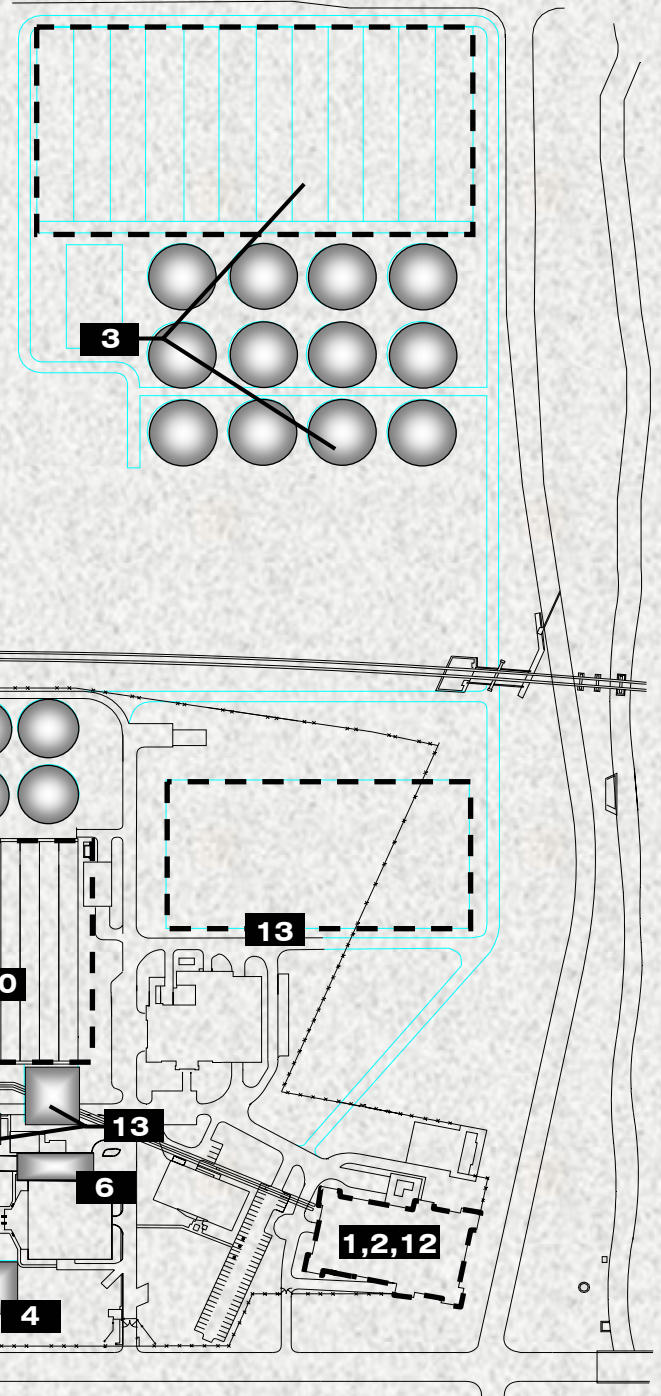


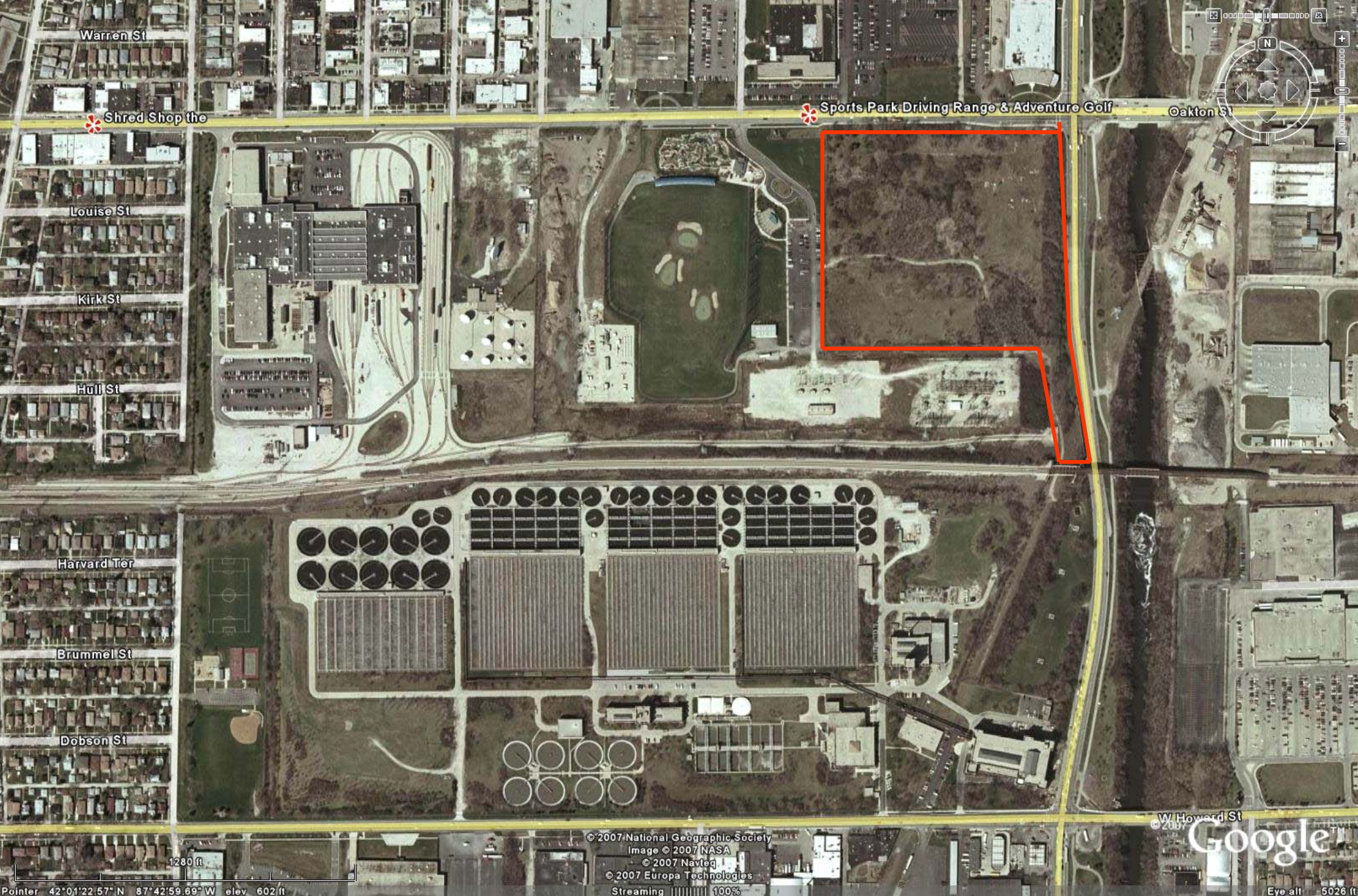
NORTHSIDE WRP



NORTHSIDE WRP

MASTER PLAN





Warren St

Shred Shop the

Sports Park Driving Range & Adventure Golf

Oakton St

Louise St

Kirk St

Hull St

Harvard Ter

Brummel St

Dobson St

1280 ft

Pointer 42°01'22.57" N 87°42'59.69" W elev. 602 ft

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Streaming 100%

W Howard St

Google

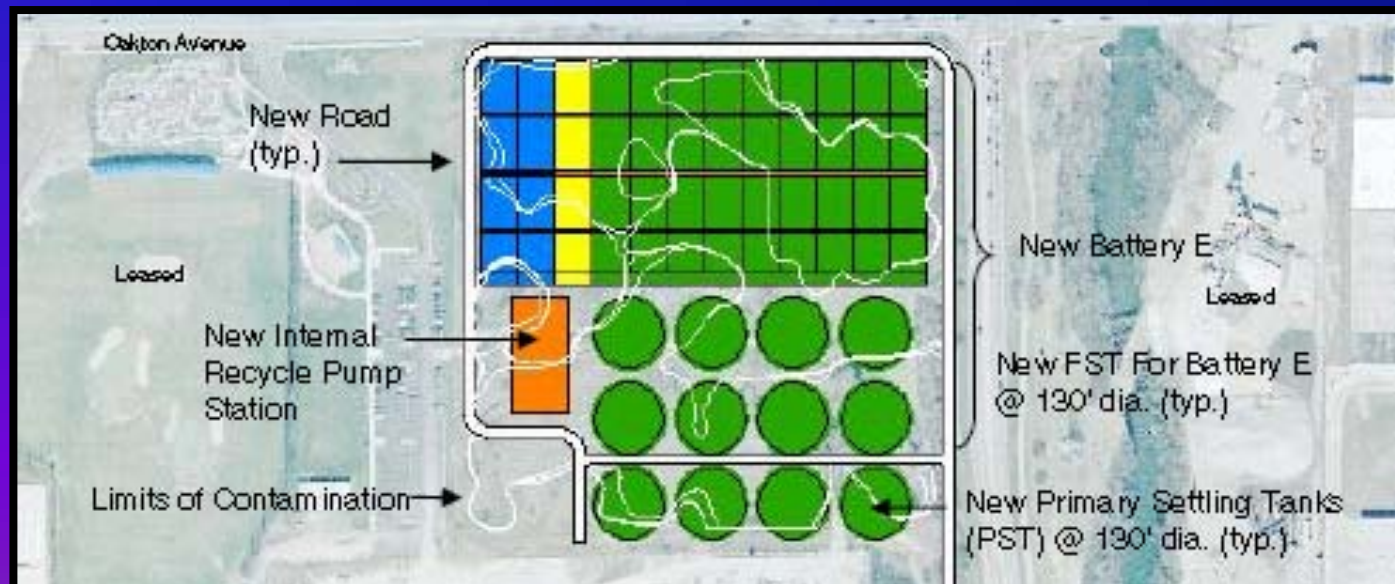
Eye alt 5026 ft

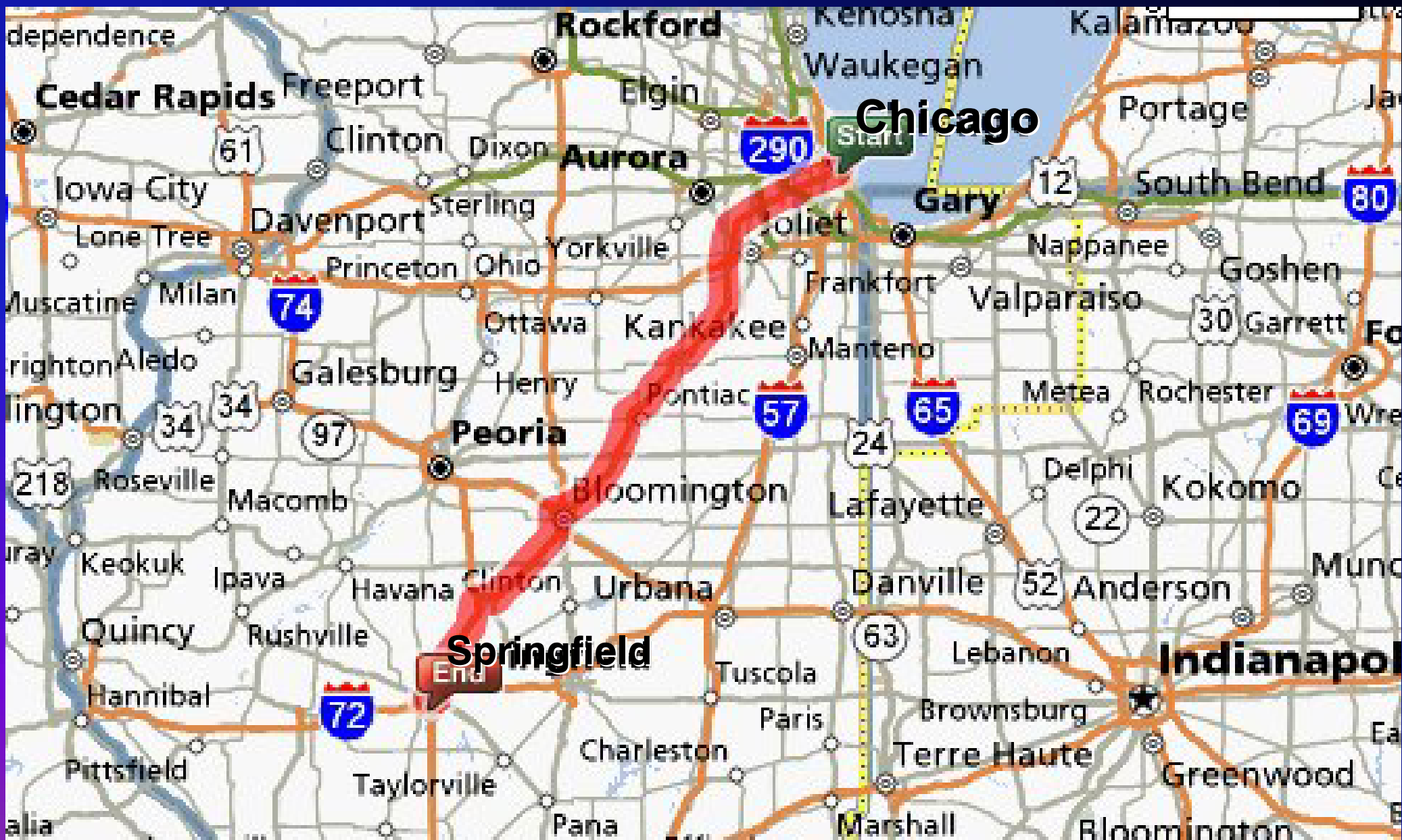
NEW BATTERY E

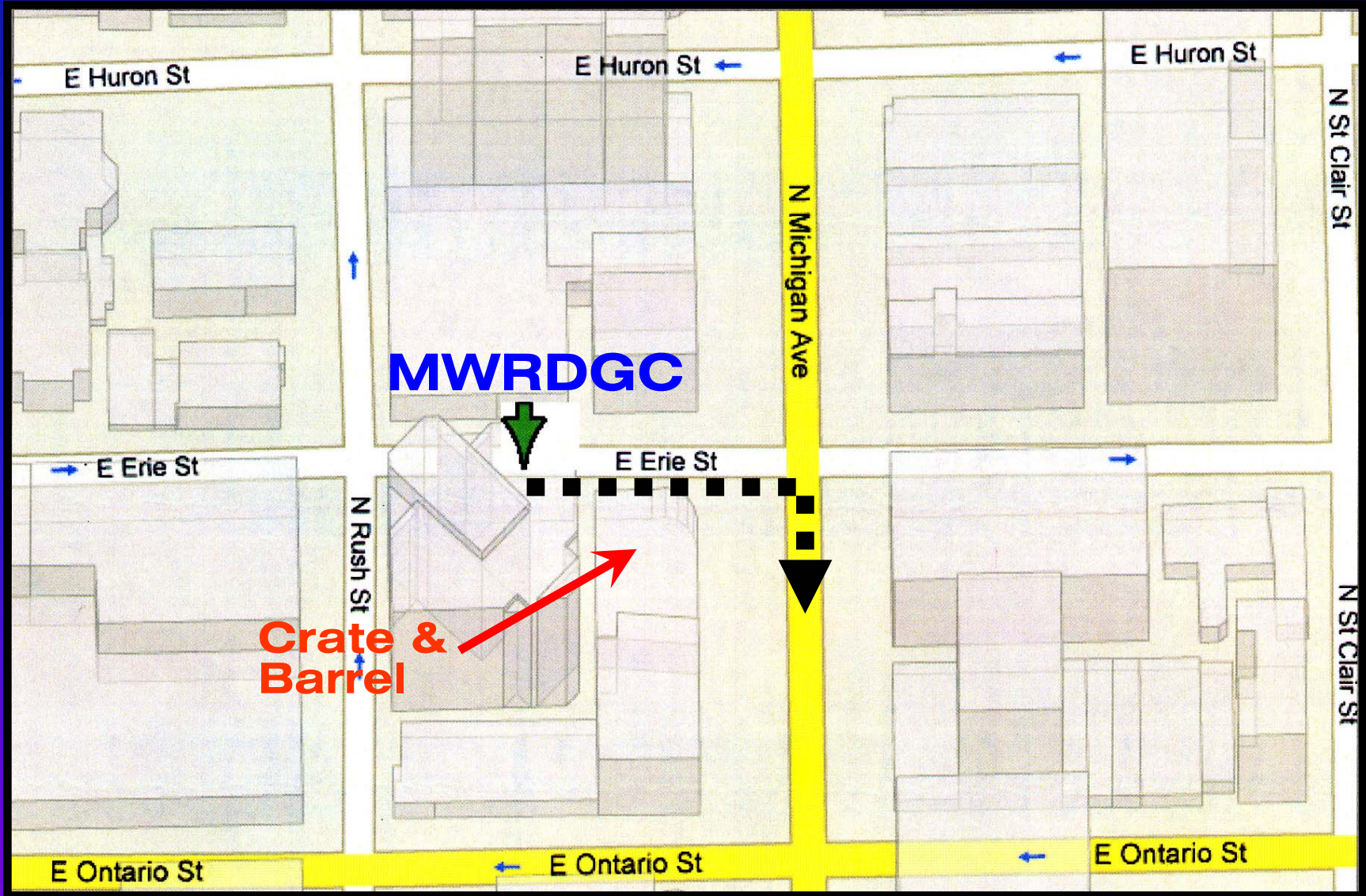
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NSWRP NEW BATTERY 'E'

- Four 130-ft dia. Primary Settling Tanks with 14-ft SWD
- Nine 2-pass Aeration Tanks, 69-ft wide x 325-ft long x 21-ft deep
- Eight 130-ft dia. Final Settling Tanks with 15ft SWD
- Primary Influent and Secondary Effluent Conduits
- Process Air Piping from Existing Site Blowers







PROJECT DESIGN PROCESS

- **Kick-off Meeting with M&O Staff**
- **Priorities and Expectations**
- **Technical Workshops**
- **Technical Memoranda**
- **Preliminary Design Report (30% Complete)**
- **Value Engineering**
- **60% Complete Review**
- **Final Documents**
- **Bidding and Award**
- **Construction Support Services**

DESIGN TEAM

PLANT DESIGN MANAGEMENT SECTION

Ed Brosius, Supervising Civil Engineer

PROCESS DESIGN

Glenn Rohloff, Supervising Civil Engineer

ELECTRICAL DESIGN

Glenn Gottardo, Supervising Electrical Engineer

MECHANICAL DESIGN

Jeff Weber, Supervising Mechanical Engineer

CIVIL, STRUCTURAL, ARCHITECTURAL DESIGN

Jagannath Khanna, Supervising Structural Engineer

MAINTENANCE AND OPERATIONS SUPPORT

Brett Garelli, *Stickney Area*

Tom Conway, *Calumet Area*

Tony Quintanilla, *North Area*

CONSTRUCTION ADMINISTRATION AND SURVEILLANCE

Ken Kits

Ray Lemming

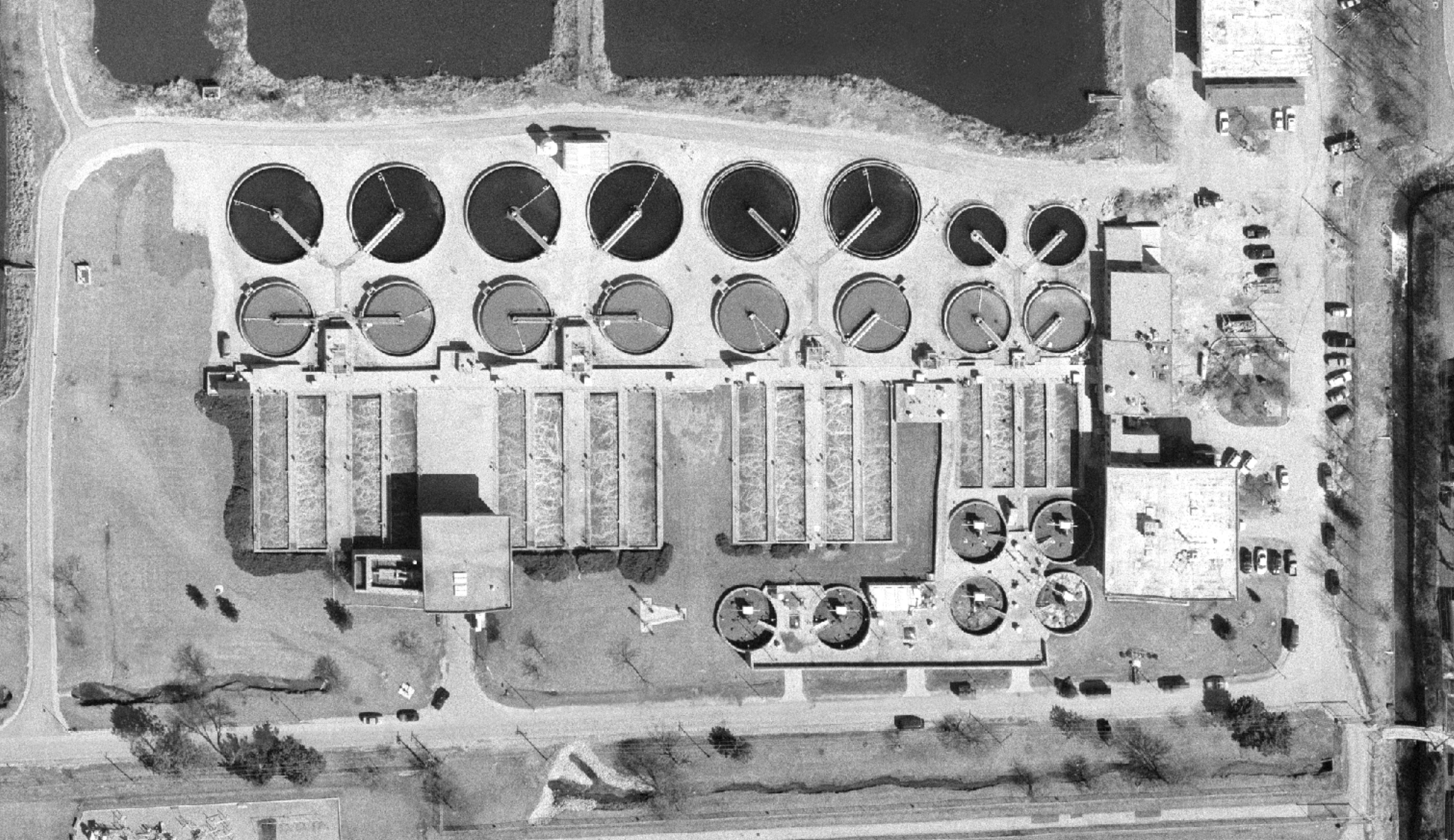
Joe Kennedy

A LOOK AHEAD

- **New Blowers and Upgrade of Raw Sewage Pumps, NSWRP**
- **Expansion of Gravity Concentration Tanks, NSWRP**
- **Grit Dewatering and Sodium Hypochlorite Feed Modifications, NSWRP**
- **MUPP, NSWRP**

A LOOK AHEAD

- **Southwest Screens Handling Equipment Upgrades, SWRP**
- **Low Pressure Digester Gas Storage, SWRP**
- **Class A Biosolids Digestion Process Task Force**



**HANOVER PARK WASTEWATER RECLAMATION PLANT
INFRASTRUCTURE AND PROCESS NEEDS FEASIBILITY STUDY
(MASTER PLAN) RESULTS – END OF 2009**

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What's all this going to cost?

Stickney Master Plan Work:	\$755,000,000
Calumet Master Plan Work:	\$434,000,000
North Side Master Plan Work:	<u>\$1,078,000,000</u>
Total:	\$2,267,000,000

2007 dollars, does not include disinfection or nutrient removal

**All Seven MWRD
Water Reclamation Plants
Costs for Construction Projects
Needed to Start 2007—2012:**

\$1,209,498,000

ACKNOWLEDGEMENTS

Metropolitan Water Reclamation District
of Greater Chicago *MWRDGC*

Questions?



Keep On Truckin'!

MWRDGC