URS Corporation

Concrete Restoration at the Columbus Southerly WWTP

June 16, 2010

Presented by:
Bill Johngrass, P.E. – Project Manager
URS Corporation

Concrete Restoration at the Southerly WWTP

Presentation Agenda

- Introduction
- Project Background
- Structure Evaluation Approach
- Estimating Approach
- Bidding Approach
- Construction Overview
- Summary
- Questions

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Concrete Restoration at the Southerly WWTP

Introductions

- Design Team
  - Lead: URS Corporation
  - Subconsultants: Chester Engineers, Prime Engineering, Lee Testing, CTL Engineering, 360 Water
- Construction Management Team
  - Owner: City of Columbus Treatment Engineering
  - Program Manager (PPM): Malcolm Pirnie, Stantec
  - Construction Manager: HR Gray, Dynotec
- Contractors
  - General: Kenmore Construction
  - Restoration Specialty Subcontractor: Technical Construction Specialties (TCS), Inc.

Concrete Restoration at the Southerly WWTP

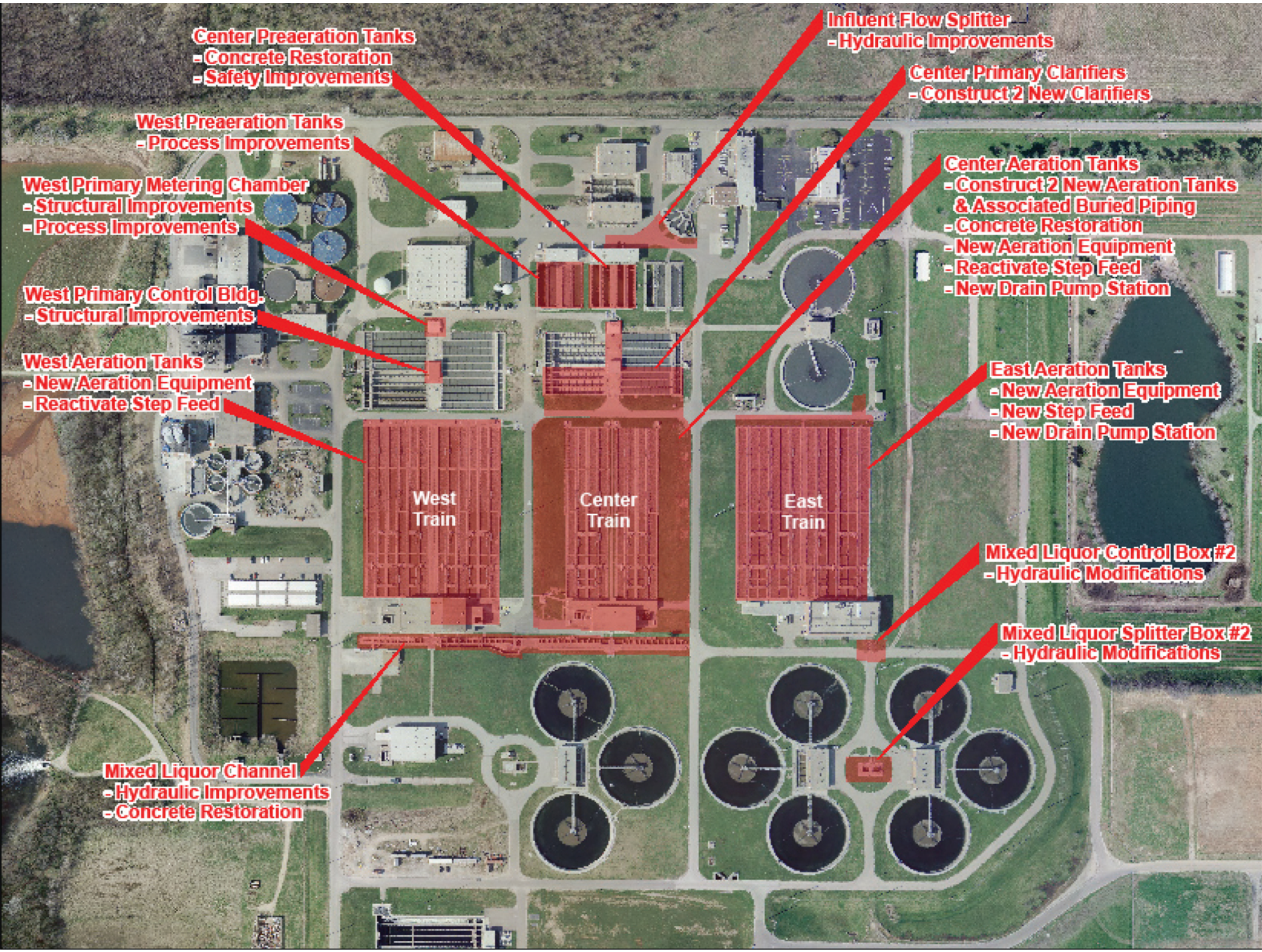
Project Background

- Objectives:
  - Expand the Primary Clarifier and Aeration Capacity from 200 MGD to 330 MGD by June 2010 (Consent Order Deadline)
  - Rehabilitate the Center Train (Primary and Aeration)
- Construction Cost:
  - $53 Million Total
  - $2.7 Million in Concrete Restoration Work

Concrete Restoration at the Southerly WWTP

Project Background

- Restoration Scope:
  - West and Center Pre-aeration Tanks
  - West Primary Metering Chamber
  - Center Primary Clarifiers
  - West Primary Control Building
  - Center (and Eventually West . . .) Aeration Tanks
  - Mixed Liquor Channel

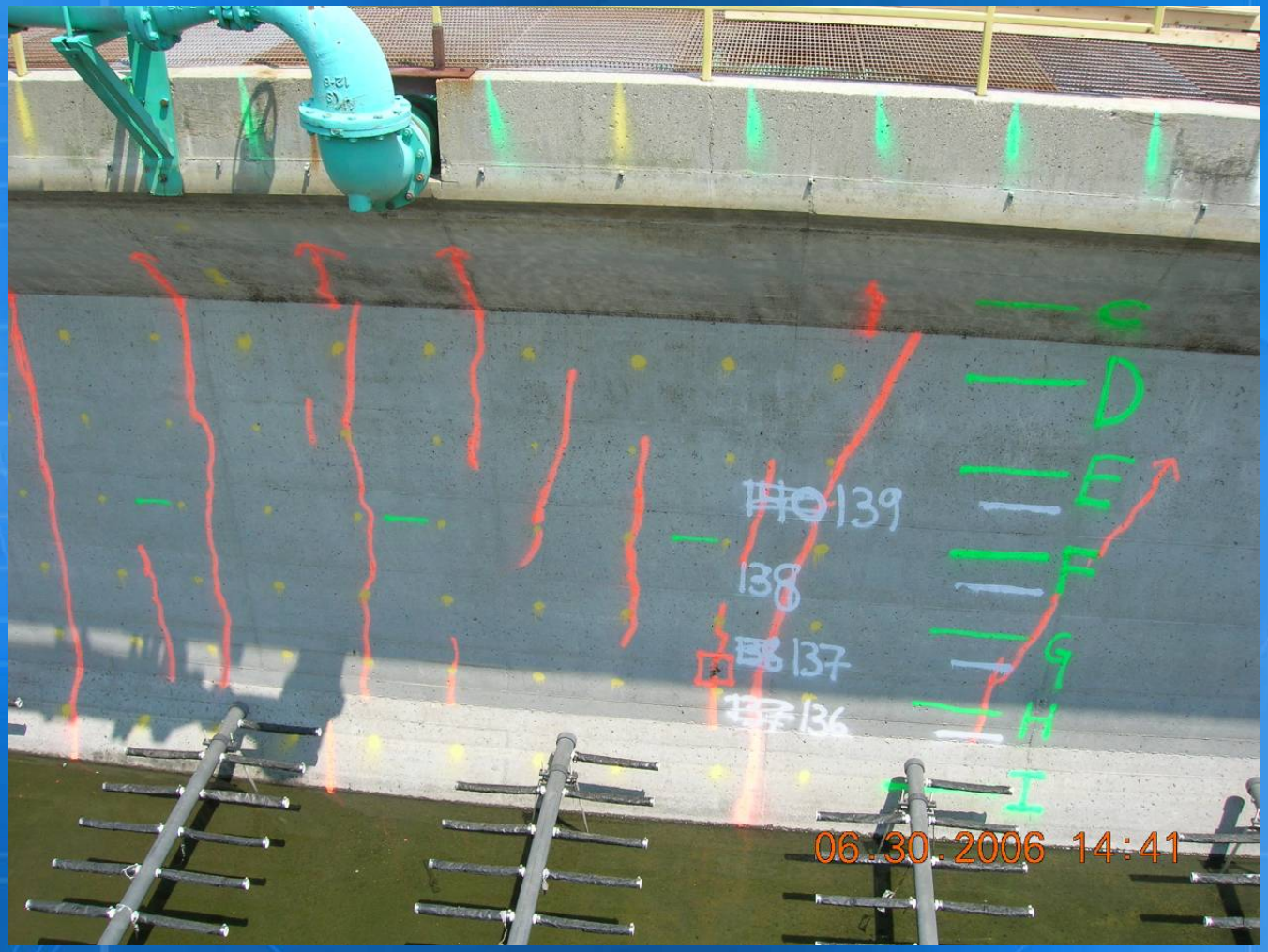

Center Preaeration Tanks
- Concrete Restoration
- Safety Improvements
Influent Flow Splitter
- Hydraulic Improvements
Center Primary Clarifiers
- Construct 2 New Clarifiers
West Preaeration Tanks
- Process Improvements
West Primary Metering Chamber
- Structural Improvements
- Process Improvements
Center Aeration Tanks
- Construct 2 New Aeration Tanks
& Associated Buried Piping
- Concrete Restoration
- New Aeration Equipment
- Reactivate Step Feed
- New Drain Pump Station
West Primary Control Bldg.
- Structural Improvements
West Aeration Tanks
- New Aeration Equipment
- Reactivate Step Feed
East Aeration Tanks
- New Aeration Equipment
- New Step Feed
- New Drain Pump Station
West Train
Center Train
East Train
Mixed Liquor Control Box #2
- Hydraulic Modifications
Mixed Liquor Splitter Box #2
- Hydraulic Modifications
Mixed Liquor Channel
- Hydraulic Improvements
- Concrete Restoration

Concrete Restoration at the Southerly WWTP

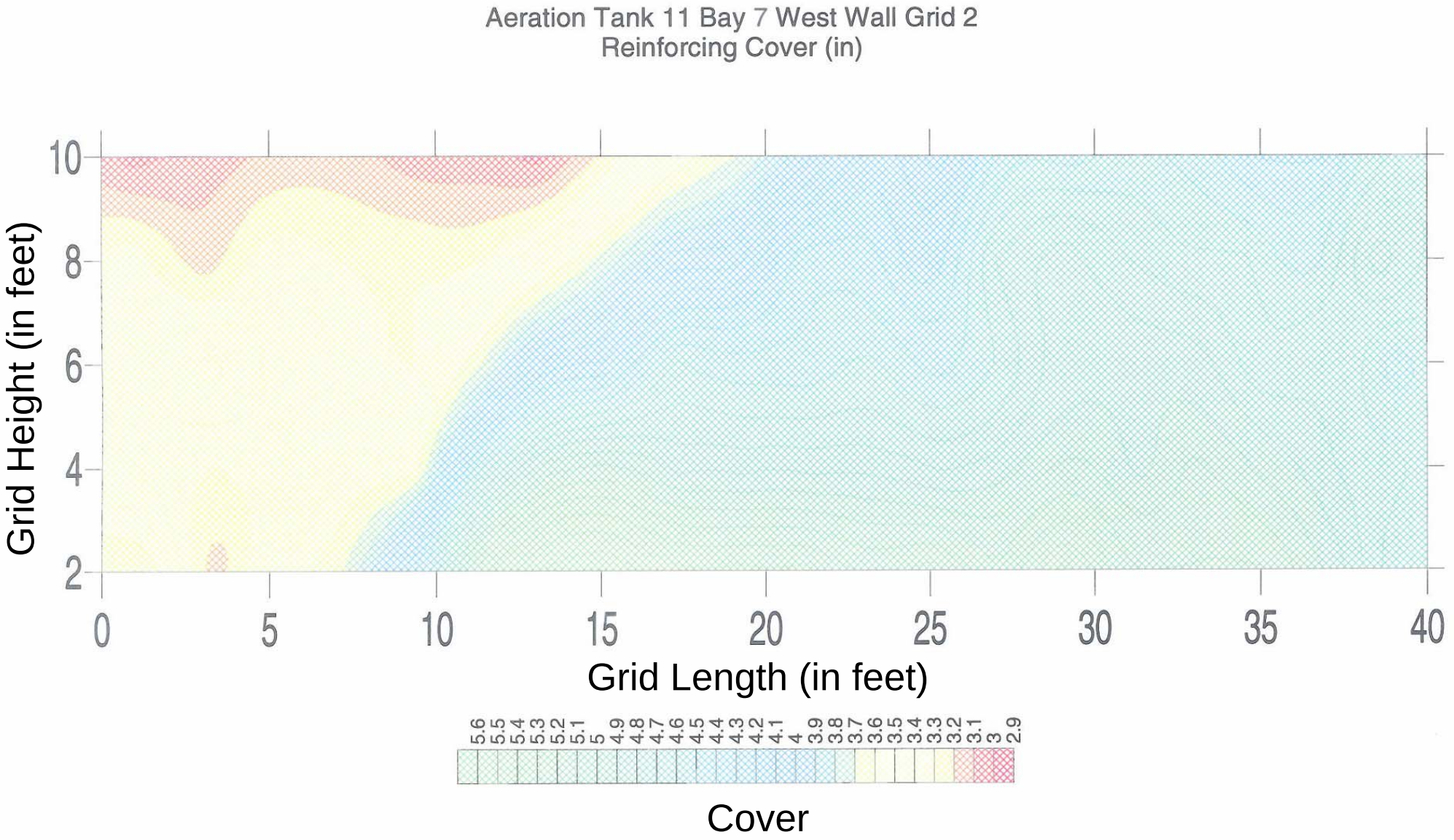
Structure Evaluation Approach

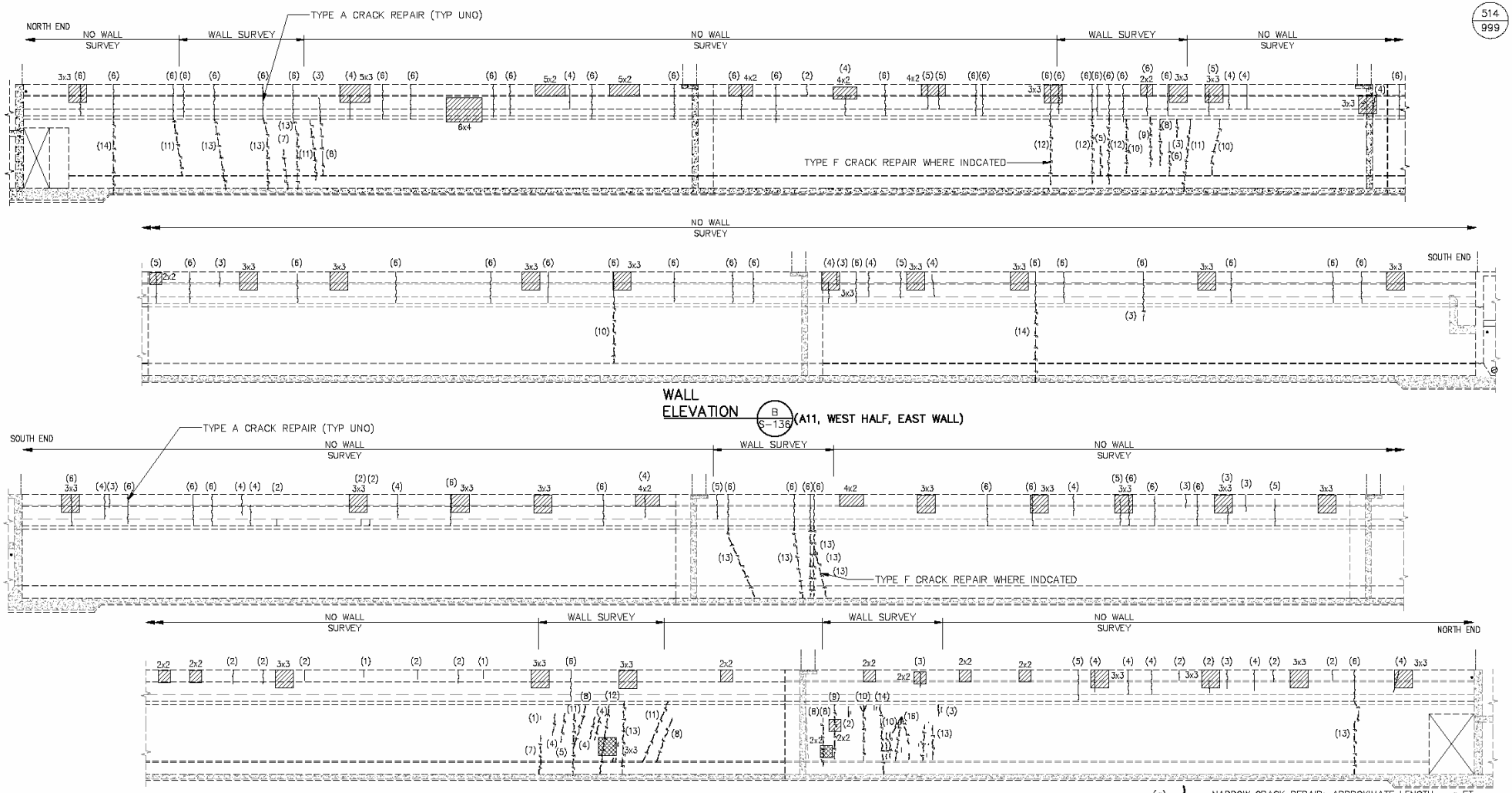
- Original Plan: Perform a “Thorough” Assessment of a Sampling of Tanks (2 of 4 Aeration Tanks)
- CTL Engineering Performed the Following Services in 2006 (20% of Surfaces Evaluated)
  - Interior Floors and Walls Sounded
  - Crack and Defect Mapping
  - Non-Destructive Testing
    - Ground Penetrating Radar to Verify Depth and Location of Reinforcing
    - Impact-Echo Testing to Locate Deep Internal Flaws
    - Half-Cell Potential Testing to Determine the Corrosion Potential of the Reinforcing
    - Core Samples and Testing (Strength, Petrographs)

Concrete Restoration at the Southerly WWTP



Typical Grid


Aeration Tank 11 Bay 7 West Wall Grid 2
Reinforcing Cover (in)
Grid Height (in feet)
10
8
6
4
2
0
5
10
15
20
25
30
35
40
Grid Length (in feet)
5.6
5.5
5.4
5.3
5.2
5.1
5
4.9
4.8
4.7
4.6
4.5
4.4
4.3
4.2
4.1
4
3.9
3.8
3.7
3.6
3.5
3.4
3.3
3.2
3.1
3
2.9
Cover



WALL ELEVATION B S-136 (A11, WEST HALF, EAST WALL)

WALL ELEVATION A S-136 (A11, EAST HALF, WEST WALL)

NOTE:

SEE SHEET S-132 FOR CONCRETE REHABILITATION NOTES AND FIELD SURVEY IDENTIFICATION. INDIVIDUAL DEFECTS AND REPAIRS MAY BE DESCRIBED ON PLANS AND ELEVATIONS, OR ESTIMATED QUANTITIES FOR SIMILAR DEFECTS ARE TABULATED. SEE SUMMARY QUANTITIES FOR THIS STRUCTURE ON SHEET S-132.

CONCRETE REHABILITATION GRAPHIC SYMBOLS :

SEE SHEETS S-288 AND S-289 FOR CONCRETE RESTORATION DETAILS TO BE APPLIED AS INDICATED ON PLANS AND ELEVATIONS. SEE FIELD SURVEY REPORT, BY CTL ENGINEERING INC. IN ATTACHED APPENDIX, FOR COMPLETE MAPPING OF SURFACE DEFECTS IDENTIFIED AT TIME OF SURVEY.

(a) – NARROW CRACK REPAIR: APPROXIMATE LENGTH – a FT
SEE REPAIR TYPE A/S-288.(WHERE INDICATED, THIS SHEET.)

(a) – WIDE CEMETITOUS CRACK REPAIR: APPROXIMATE LENGTH – a FT
SEE REPAIR TYPE F/S-288. (WHERE INDICATED, THIS SHEET.)

(a x b) – SHALLOW SURFACE REPAIR: APPROXIMATE AREA – a X b FT
SEE REPAIR TYPE C/S-288.

(a x b) – DEEP SURFACE REPAIR: APPROXIMATE AREA – a X b FT
SEE REPAIR TYPE D/S-288.

NO.	BY Int	DATE Mo./Dy./Yr.	REVISIONS Remarks

PROJECT PERSONNEL Initial	DATE Mo./Dy./Yr.
DES. SH/CLK	09/12/07
DWN. JDB	09/12/07
CKD. SH	09/19/07

URS

CITY OF COLUMBUS, OHIO
DEPARTMENT OF PUBLIC UTILITIES
DIVISION OF SEWERAGE AND DRAINAGE

SOUTHERLY WASTEWATER TREATMENT PLANTS
CONTRACT S74
PRIMARY CLARIFIERS AND AERATION TANKS IMPROVEMENTS

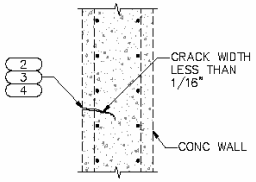
SCALE
0 2 4 8
FEET

STRUCTURAL
A11 REHABILITATION WALL ELEVATIONS

ISSUED STATUS: RCC
(See Users Guide for Explanation)

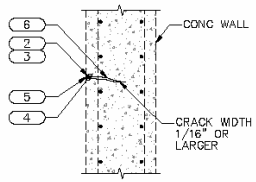
SHEET S-147

DATE ISSUED: 5/1/09
Mo./Dy./Yr.



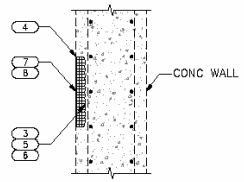
REPAIR TYPE A – HORIZONTAL

1. "NARROW CRACK" REFERS TO A CRACK IN THE CONCRETE THAT IS LESS THAN 1/16" WIDE, YET GREATER THAN 0.016". CRACKS EXTENDING BENEATH AREAS RECEIVING REPAIR TYPES C, D AND E SHALL REMAIN "NARROW CRACKS", REGARDLESS OF MEASURED WIDTH.
2. CLEAN SURFACE OF CONCRETE WITH SAND BLASTING AND BLOW OUT CRACKS WITH OIL-FREE COMPRESSED AIR PER ASTM D4258.
3. GRAVITY FEED CRACKS BY POURING SIKADUR 55 SLV ONTO CRACKED AREA AND SPREADING PER MANUFACTURER'S INSTRUCTIONS. PRESSURE INJECTION FOR CRACKS MAY BE PROPOSED, WITH PROVISIONS FOR MONITORING EFFECTIVE FEED BY OBSERVATION PORTS.
4. EXCESS MATERIAL MUST BE REMOVED FROM THE SURFACE BEFORE THE CRACK FILLING MATERIAL CURES.



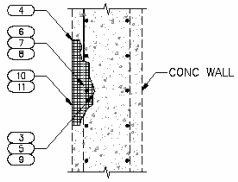
REPAIR TYPE B

1. "WIDE CRACK" REFERS TO A CRACK IN THE CONCRETE THAT IS WIDER THAN OR EQUAL TO 1/16".
2. CRACK SHOULD BE ROUTED TO A MINIMUM OF 3/8" WIDE x 1" DEEP.
3. CLEAN ROUTED CUT BY SAND BLASTING AND BLOW OUT CRACKS WITH OIL FREE COMPRESSED AIR PER ASTM D4258.
4. BOND BREAKER TAPE OR 1/4" FINE SILICIA SAND TO CLOSE BASE OF JOINT MUST BE USED TO PREVENT BOND.
5. USE SIKAFLEX-2c NS TO FILL CRACK IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTION.
6. IN AREAS WHERE CRACK EXTENDS BENEATH EXISTING REINFORCING STEEL, SEE "REPAIR TYPE D" FOR DEEP SURFACE REPAIR PROCEDURES.



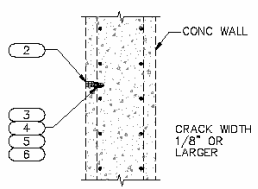
REPAIR TYPE C

1. "SHALLOW SURFACE REPAIR" REFERS TO SURFACE REPAIRS WHERE THE EXISTING REINFORCING STEEL IS NOT EXPOSED.
2. LOCATE THE EXTENT OF THE DAMAGED AREA BY TAPPING THE CONCRETE SURFACE WITH A HAMMER OR USING A CHAIN DRAG AND LISTENING FOR HOLLOW SOUNDS INDICATING CONCRETE DETERIORATION. THE PERIMETER OF THE AREA TO BE REPAIRED SHALL BE DEFINED BY STRAIGHT LINES. "SQUARE UP" DETERIORATED AREAS AS SHOWN IN TYPICAL DETAIL ON THIS SHEET. UNDER NO CIRCUMSTANCES SHALL THE SIZE OF THE REPAIR BE LESS THAN 6"x6".
3. REMOVE DAMAGED AND LOOSE CONCRETE TO A SOUND AND SOLID SUBSTRATE BY USING A SMALL HAND HELD JACKHAMMER (20 LBS MAXIMUM).
4. SAW CUT ALONG PERIMETER OF THE DAMAGED AREA TO MINIMUM 1/2" DEPTH. "FEATHERED EDGE" IS NOT PERMITTED. DO NOT CUT REINFORCING STEEL.
5. REMOVE ALL LAITANCE AND CONTAMINANTS FROM THE SURFACE OF THE REMAINING SOUND CONCRETE BY WATER BLASTING AT 8,000 PSI. BLAST CLEANED SUBSTRATE SURFACES SHALL BE ROUGHENED TO A MINIMUM PROFILE OF 1/8"± AND SHALL BE SATURATED SURFACE DRY WITH NO STANDING WATER.
6. SCRUB THE SIKA ARMATEC 110 EPOCEM BONDING COMPOUND SLURRY ONTO ALL SURFACES OF CONCRETE THAT HAVE BEEN PREPARED TO BE PATCHED. SCRUB THE BONDING COMPOUND SLURRY INTO THE SUBSTRATE BY USING A STIFF-BRISTLE BRUSH TO ENSURE A COMPLETE COVERAGE OF ALL SURFACE IRREGULARITIES, WITH A MINIMUM THICKNESS OF 20 MILS (80 SQ/FT MAXIMUM PER GALLON). APPLY FRESHLY MIXED PATCHING COMPOUND WET ON WET BONDING COMPOUND.
7. FILL SURFACE REPAIR USING SIKATOP 123 PLUS (OR APPROVED EQUAL) APPLIED IN ACCORDANCE WITH MANUFACTURE'S INSTRUCTIONS. REPAIR AREAS ARE SHOWN ON THE PLANS. NOTE THAT NOT ALL REPAIR AREAS ARE GRAPHICALLY DEFINED ON PLANS AND ELEVATIONS. CONTRACTOR SHALL BID FOR REPAIR AREA QUANTITIES IDENTIFIED WITHIN TABLE FOR EACH STRUCTURE.
8. WET-CURE THE REPAIR AS REQUIRED BY THE SPECIFICATIONS.



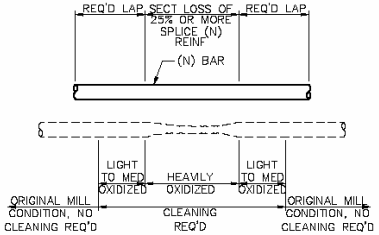
REPAIR TYPE D

1. "DEEP SURFACE REPAIR" REFERS TO SURFACE REPAIRS WHERE THE EXISTING REINFORCING STEEL IS EXPOSED.
2. LOCATE THE EXTENT OF THE DAMAGED AREA BY TAPPING THE CONCRETE SURFACE WITH A HAMMER OR USING A CHAIN DRAG AND LISTENING FOR HOLLOW SOUNDS INDICATING CONCRETE DETERIORATION. THE PERIMETER OF THE AREA TO BE REPAIRED SHALL BE DEFINED BY STRAIGHT LINES AND SHALL EXTEND A MINIMUM OF 2 BAR DIAMETERS AND 3" BEYOND THE END OF ANY EXPOSED REINFORCING. "SQUARE UP" DETERIORATED AREAS AS SHOWN IN TYPICAL DETAIL. UNDER NO CIRCUMSTANCES SHALL THE SIZE OF THE REPAIR BE LESS THAN 6"x6".
3. REMOVE ALL DETERIORATED AND LOOSE CONCRETE WHERE EMBEDDED REINFORCING STEEL BARS ARE CORRODED. REMOVED DAMAGED AND LOOSE CONCRETE TO A SOUND AND SOLID SUBSTRATE. CAREFULLY REMOVE ALL CONCRETE MATERIAL AROUND CORRODED STEEL BARS BY USING A SMALL HAND HELD JACKHAMMER. JACKHAMMER AND REMOVE CONCRETE TO COMPLETELY EXPOSE THE SURFACE AREA AROUND CORRODED BAR SECTIONS. REMOVE CONCRETE MATERIAL BEHIND STEEL BARS SUCH THAT ALL FINGERS CAN FREELY AND COMPLETELY BE WRAPPED AROUND A BAR (WHEN HELD) WITH A MINIMUM CLEARANCE OF 3/4" BETWEEN THE BAR AND THE REMAINING SUBSTRATE.
4. SAW CUT ALONG PERIMETER OF THE DAMAGED AREA TO MINIMUM 1/2" DEPTH. DO NOT CUT REINFORCING STEEL.
5. REMOVE ALL LAITANCE AND CONTAMINANTS FROM THE SURFACE OF THE REMAINING SOUND CONCRETE BY WATER BLASTING AT 8,000 PSI. BLAST CLEANED SUBSTRATE SURFACES SHALL BE ROUGHENED TO A MINIMUM PROFILE OF 1/8"± AND SHALL BE SATURATED SURFACE DRY WITH NO STANDING WATER.
6. REMOVE ALL RUST FROM THE SURFACE OF ALL BARS THAT HAVE BEEN EXPOSED BY THE REMOVAL OPERATION. WATER BLAST OR WIRE BRUSH CLEAN UNTIL ONLY TIGHTLY BONDED, LIGHT RUST REMAINS.
7. STEEL SURFACES SHALL BE HIGH-PRESSURE (8,000 PSI) WASHED WITH CLEAN, CLORIDE FREE WATER. WHERE MORE THAN 25% OF THE CROSS SECTIONAL AREA OF STEEL BAR IS LOST TO CORROSION, SPLICE NEW STEEL BAR SECTIONS TO THE RUST FREE STEEL BAR SECTIONS BY LAPPING OR USING APPROVED MECHANICAL COUPLERS. SEE TYPICAL DETAIL ON THIS SHEET.
8. APPLY TWO (2) COATS OF SIKA ARMATEC 110 EPOCEM CORROSION PROTECTION AND BONDING COMPOUND ON ALL PREPARED OLD AND NEW (SPLICED SECTION) SURFACES OF THE REINFORCING STEEL BARS BY USING STIFF-BRISTLE BRUSH OR SPRAY AND BRUSH. EACH COAT SHALL BE A MINIMUM THICKNESS OF 20 MILS (COVERAGE OF 80 SQ/FT MAXIMUM PER GALLON) WITH AN OVERALL MINIMUM THICKNESS OF 40 MILS. ALLOW A MINIMUM DRYING TIME OF 2 TO 3 HOURS AT 73° FAHRENHEIT AND 4 TO 6 HOURS AT 40° FAHRENHEIT BETWEEN COATS. ALLOW THE SAME AMOUNT OF DRYING TIME AFTER FINAL COAT ON THE STEEL BEFORE APPLYING THE COMPOUND ON THE SURFACES OF CONCRETE (AROUND THE STEEL BARS) THAT HAVE BEEN PREPARED TO RECEIVE THE PATCHING COMPOUND.
9. SCRUB THE SIKA ARMATEC 110 EPOCEM BONDING COMPOUND SLURRY INTO ALL SURFACES OF CONCRETE THAT HAVE BEEN PREPARED TO BE PATCHED. SCRUB THE BONDING COMPOUND SLURRY INTO THE SUBSTRATE BY USING A STIFF-BRISTLE BRUSH TO ENSURE A COMPLETE COVERAGE OF ALL SURFACE IRREGULARITIES, WITH A MINIMUM THICKNESS OF 20 MILS (80 SQ/FT MAXIMUM PER GALLON). APPLY FRESHLY MIXED PATCHING COMPOUND WET ON WET BONDING COMPOUND.
10. FILL SURFACE REPAIR USING SIKATOP 123 PLUS APPLIED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. REPAIR AREAS ARE SHOWN ON THE PLANS. NOTE THAT NOT ALL REPAIR AREAS ARE GRAPHICALLY DEFINED ON PLANS AND ELEVATIONS. CONTRACTOR SHALL BID FOR REPAIR AREA QUANTITIES IDENTIFIED WITHIN TABLE FOR EACH STRUCTURE.
11. WET-CURE THE REPAIR AS REQUIRED BY THE SPECIFICATIONS.



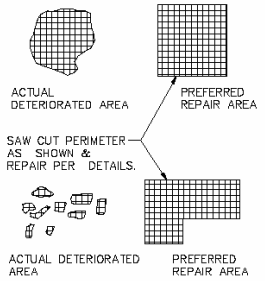
REPAIR TYPE F

1. "WIDE CEMENTITOUS CRACK REPAIR" REFERS TO A CRACK IN THE CONCRETE THAT IS WIDER THAN OR EQUAL TO 1/8".
2. CRACK SHOULD BE ROUTED TO A MINIMUM OF 3/4" WIDE x 1/2" DEEP. CRACK ROUTING SHALL EXTEND TO "ROOT" OF CRACK. "FEATHERED EDGE" TRANSITION AT EDGES AND TERMINATION OF CRACK IS NOT PERMITTED. DO NOT CUT REINFORCING STEEL.
3. REMOVE ALL LAITANCE AND CONTAMINANTS FROM THE SURFACE OF THE REMAINING SOUND CONCRETE BY WATER BLASTING AT 8,000 PSI. BLAST CLEANED SUBSTRATE SURFACES SHALL BE ROUGHENED TO A MINIMUM PROFILE OF 1/8"± AND SHALL BE SATURATED SURFACE DRY WITH NO STANDING WATER.
4. SCRUB THE SIKA ARMATEC 110 EPOCEM BONDING COMPOUND SLURRY ONTO ALL SURFACES OF CONCRETE THAT HAVE BEEN PREPARED TO BE PATCHED. SCRUB THE BONDING COMPOUND SLURRY INTO THE SUBSTRATE BY USING A STIFF-BRISTLE BRUSH TO ENSURE A COMPLETE COVERAGE OF ALL SURFACE IRREGULARITIES, WITH A MINIMUM THICKNESS OF 20 MILS (80 SQ/FT MAXIMUM PER GALLON). APPLY FRESHLY MIXED PATCHING COMPOUND WET ON WET BONDING COMPOUND.
5. FILL SURFACE REPAIR USING SIKATOP 123 PLUS (OR APPROVED EQUAL) APPLIED IN ACCORDANCE WITH MANUFACTURE'S INSTRUCTIONS. REPAIR AREAS ARE SHOWN ON THE PLANS. NOTE THAT NOT ALL REPAIR AREAS ARE GRAPHICALLY DEFINED ON PLANS AND ELEVATIONS. CONTRACTOR SHALL BID FOR REPAIR AREA QUANTITIES IDENTIFIED WITHIN TABLE FOR EACH STRUCTURE.
6. WET-CURE THE REPAIR AS REQUIRED BY THE SPECIFICATIONS.



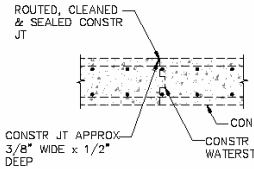
NOTES:
1. LAP #5 BARS 30" & #6 BARS 40".
2. IN LIEU OF LAP, BARS MAY BE MECHANICALLY COUPLED.

REPAIR OF REINFORCING STEEL
NOT TO SCALE
1

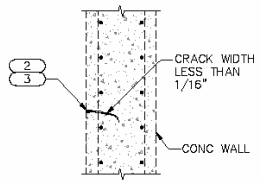


NOTE:
1. DEPTH AND EXTENT OF REPAIR AREA MAY REQUIRE TEMPORARY SHORING. ALL REPAIRS SHALL BE PERFORMED UNDER THE SUPERVISION AND DIRECTION OF A REGISTERED PROFESSIONAL ENGINEER RETAINED BY CONTRACTOR.

CONCRETE REPAIR AREA LAYOUT
NOT TO SCALE
2



EXISTING CONSTRUCTION JOINT REPAIR DETAIL
NOT TO SCALE
3



REPAIR TYPE A1 – VERTICAL/OVERHEAD

1. "NARROW CRACK" REFERS TO A CRACK IN THE CONCRETE THAT IS LESS THAN 1/16" WIDE, YET GREATER THAN 0.016". CRACKS EXTENDING BENEATH AREAS RECEIVING REPAIR TYPES C, D AND E SHALL REMAIN "NARROW CRACKS", REGARDLESS OF MEASURED WIDTH.
2. CLEAN SURFACE OF CONCRETE WITH HYDRO BLASTING. ROUTE CRACKS WITH "V-NOTCH". GRINDING WHEEL TO MINIMUM DEPTH OF 1/4". BLOW OUT CRACKS WITH OIL-FREE COMPRESSED AIR PER ASTM D4258.
3. APPLY NEAT MIX OF SIKADUR 31 HI-MOD GEL INTO PREPARED SUBSTRATE, WORKING INTO SUBSTRATE FOR POSITIVE ADHESION PER MANUFACTURER'S INSTRUCTIONS.

NO.	BY Int	DATE Mo./Dy./Yr.	REVISIONS Remarks
1	SH	5/26/08	SUBMITTAL 03930-D-0011-01

PROJECT PERSONNEL Initial		DATE Mo./Dy./Yr.
DES.	SH	10/11/07
DWN.	JDB	10/11/07
CKD.	SH	10/17/07

URS

CITY OF COLUMBUS, OHIO
DEPARTMENT OF PUBLIC UTILITIES
DIVISION OF SEWERAGE AND DRAINAGE

SOUTHERLY
WASTEWATER TREATMENT PLANTS
CONTRACT S74
PRIMARY CLARIFIERS AND
AERATION TANKS IMPROVEMENTS

SCALE
NOT TO SCALE

STRUCTURAL
TYPICAL CONCRETE REHABILITATION DETAILS

ISSUED STATUS: RCC
(See Users Guide for Explanation)
SHEET S-288
DATE ISSUED: 5/1/09
Mo./Dy./Yr.

Concrete Restoration at the Southerly WWTP

Structure Evaluation Approach

- Design Conclusions
  - Demo the West and Center Preaeration Tanks
  - Demo and Rebuild the West Primary Metering Chamber (Above Grade Structure Only)
  - Aeration Tank Defects are Primarily Due to Freeze-Thaw Damage on the Walkways. The Tank Walls and Floor Slabs are in Good Condition.
  - Cap the Mixed Liquor Channel

Concrete Restoration at the Southerly WWTP

Estimating Approach

- Three Simple Steps
  1. Take Your Best “Guess” and Double It
  2. Go Get a Cup of Coffee
  3. Double It Again
- Typical Repair Types and Quantities Developed Based on Evaluation
- Added 40% to Our Best “Guess”

Concrete Restoration at the Southerly WWTP

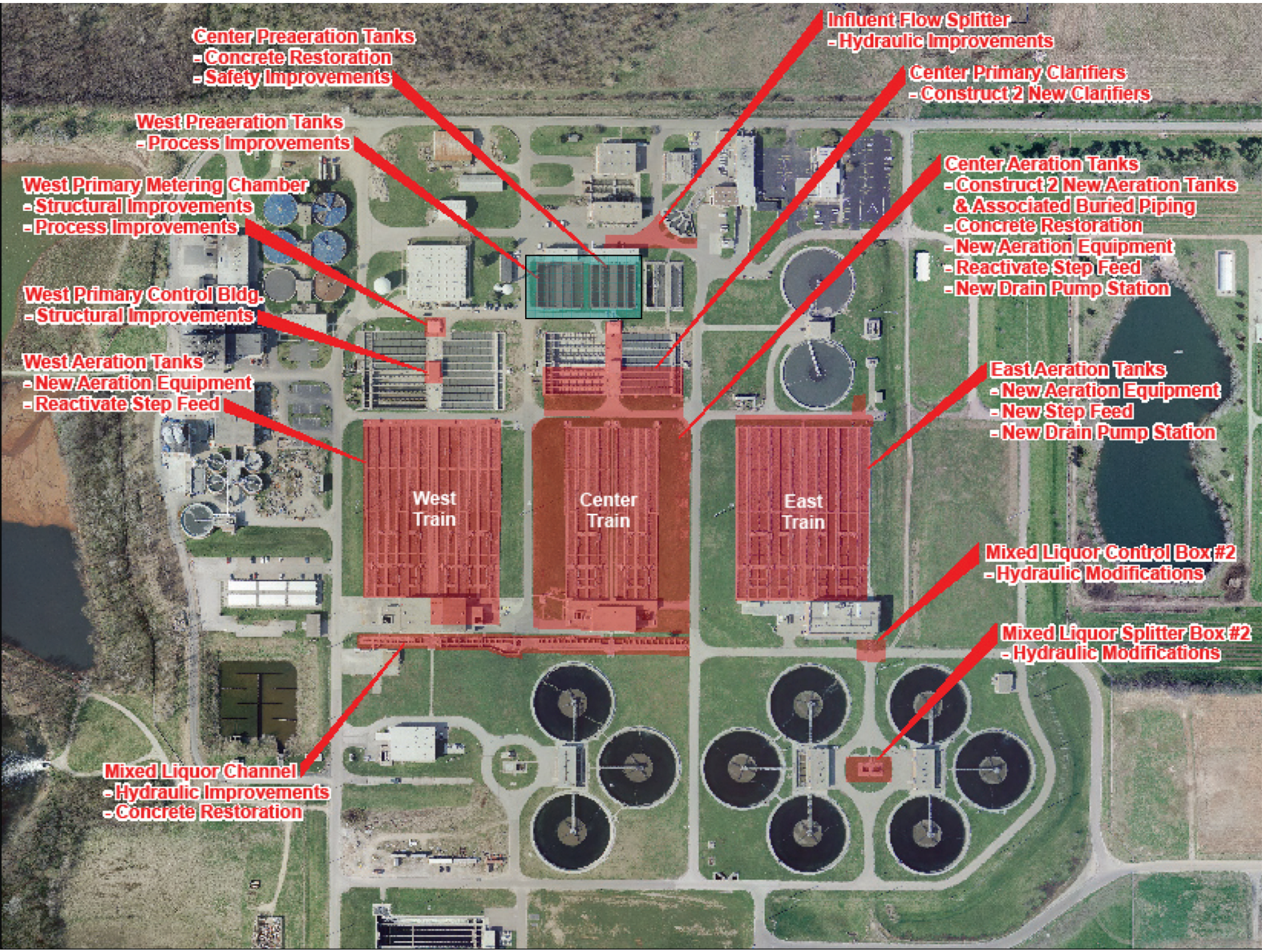
Estimating Approach

		Quantity	
Repair Type	Unit	Mapped	Unmapped
Narrow / Wide Crack Repair	LF	7,473	64,913
Shallow Surface Repair	SF	8,378	9,189
Deep Surface Repair	SF	1,915	1,948

Concrete Restoration at the Southerly WWTP

Bidding Approach

- Bid Repairs as Unit Price Work and Bid Remainder of Contract Lump Sum
- Included a Bid Escrow Requirement for the Rehabilitation Scope
- Rehabilitation Technical Specification Required the Following:
  - Subcontractor Qualifications (Min. 5 years and 5 Projects of Similar Size and Scope)
  - Cold Weather Protection!!! The Work (at Bid Time) Was Proposed to be Completed in January-March 2010.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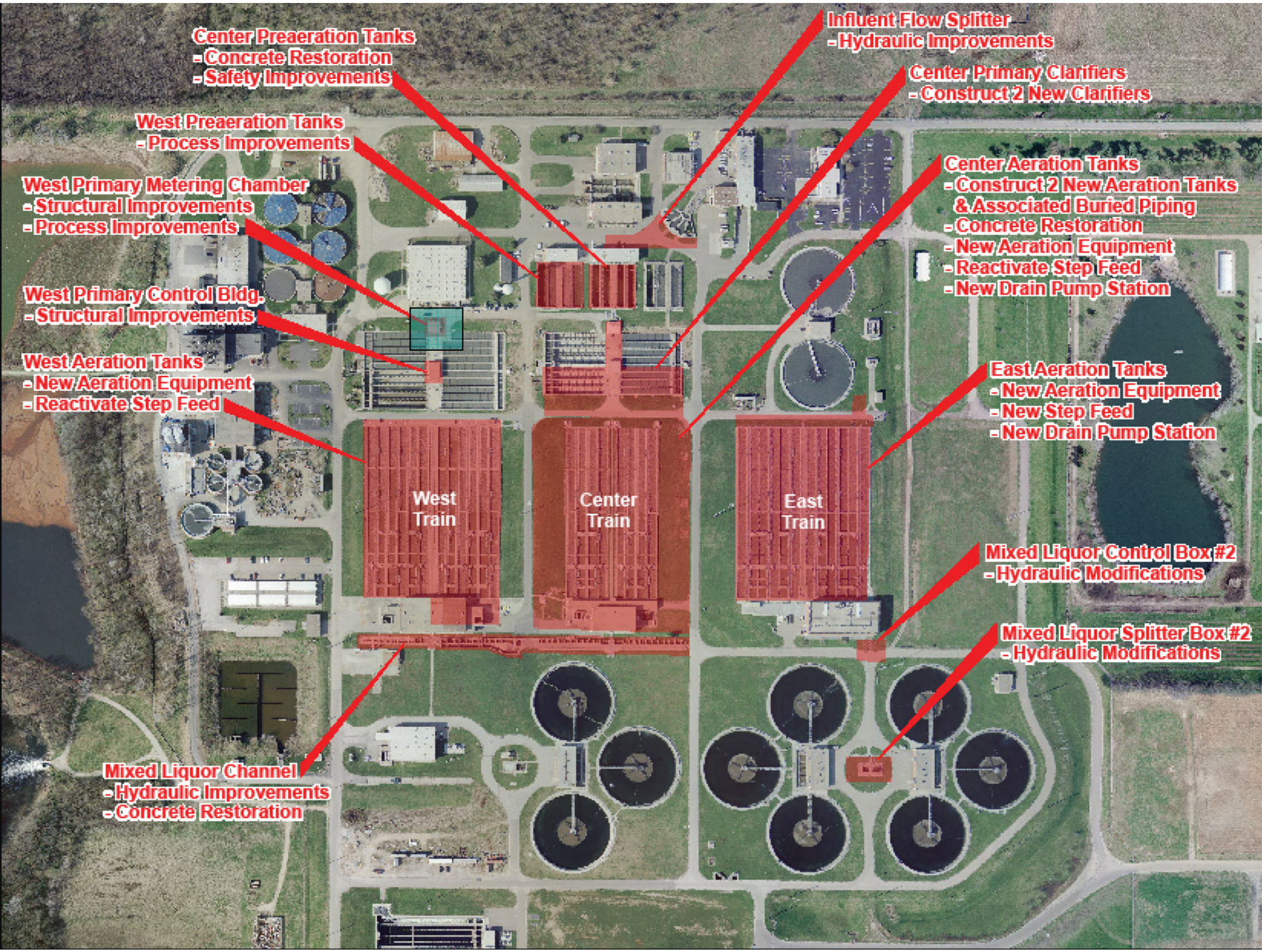
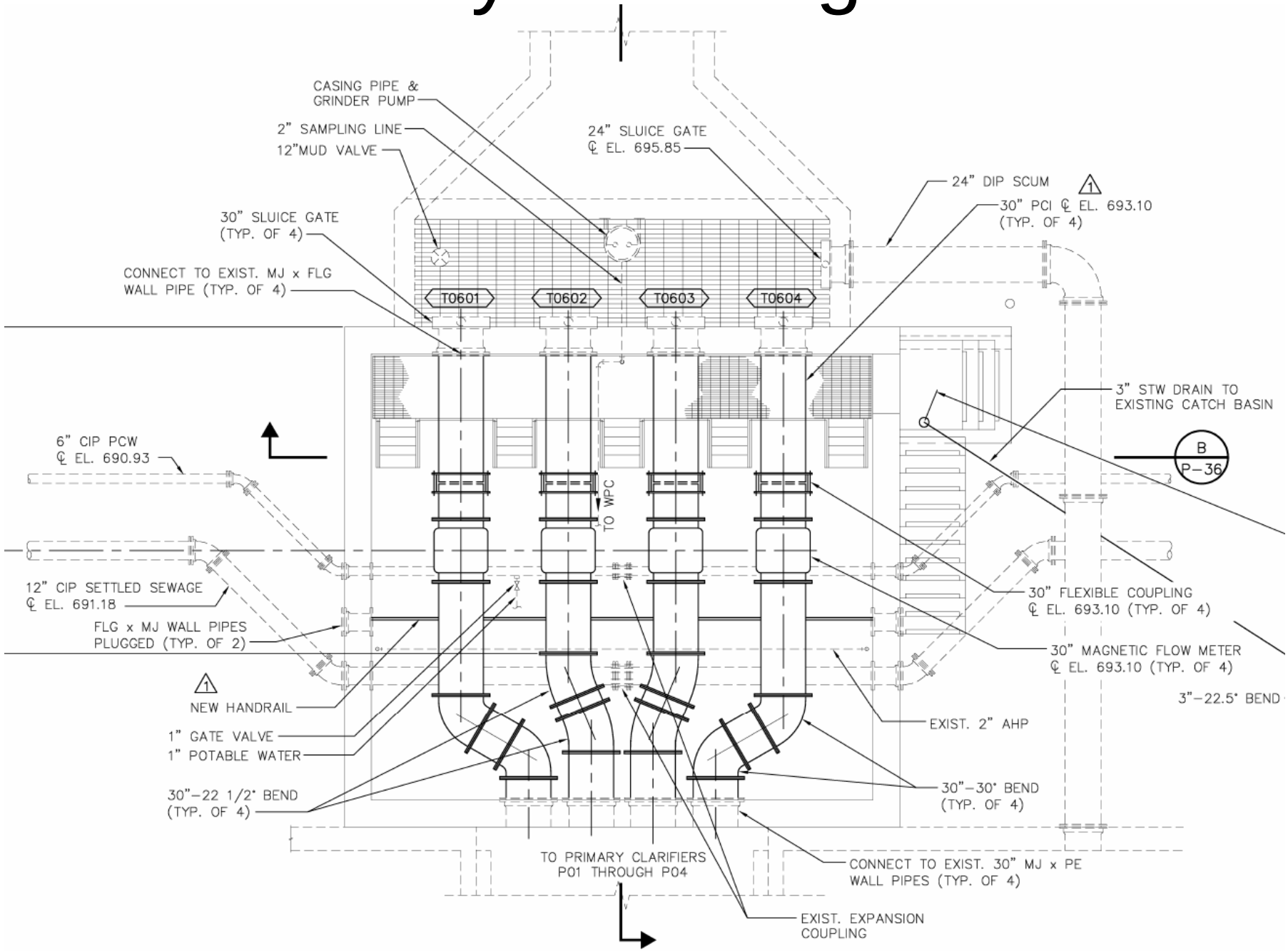
Concrete Restoration at the Southerly WWTP

Pre-Aeration Tanks

- Tanks no Longer in Use
- Safety Concerns Due to Handrail and Concrete Deterioration
- Cost to Rehab ($250,000+) Versus Cost to Remove ($450,000)
- Decision Made to Demolish the Tanks


Center Preaeration Tanks
- Concrete Restoration
- Safety Improvements
Influent Flow Splitter
- Hydraulic Improvements
Center Primary Clarifiers
- Construct 2 New Clarifiers
West Preaeration Tanks
- Process Improvements
West Primary Metering Chamber
- Structural Improvements
- Process Improvements
Center Aeration Tanks
- Construct 2 New Aeration Tanks
& Associated Buried Piping
- Concrete Restoration
- New Aeration Equipment
- Reactivate Step Feed
- New Drain Pump Station
West Primary Control Bldg.
- Structural Improvements
West Aeration Tanks
- New Aeration Equipment
- Reactivate Step Feed
East Aeration Tanks
- New Aeration Equipment
- New Step Feed
- New Drain Pump Station
West Train
Center Train
East Train
Mixed Liquor Control Box #2
- Hydraulic Modifications
Mixed Liquor Splitter Box #2
- Hydraulic Modifications
Mixed Liquor Channel
- Hydraulic Improvements
- Concrete Restoration

West Primary Metering Chamber



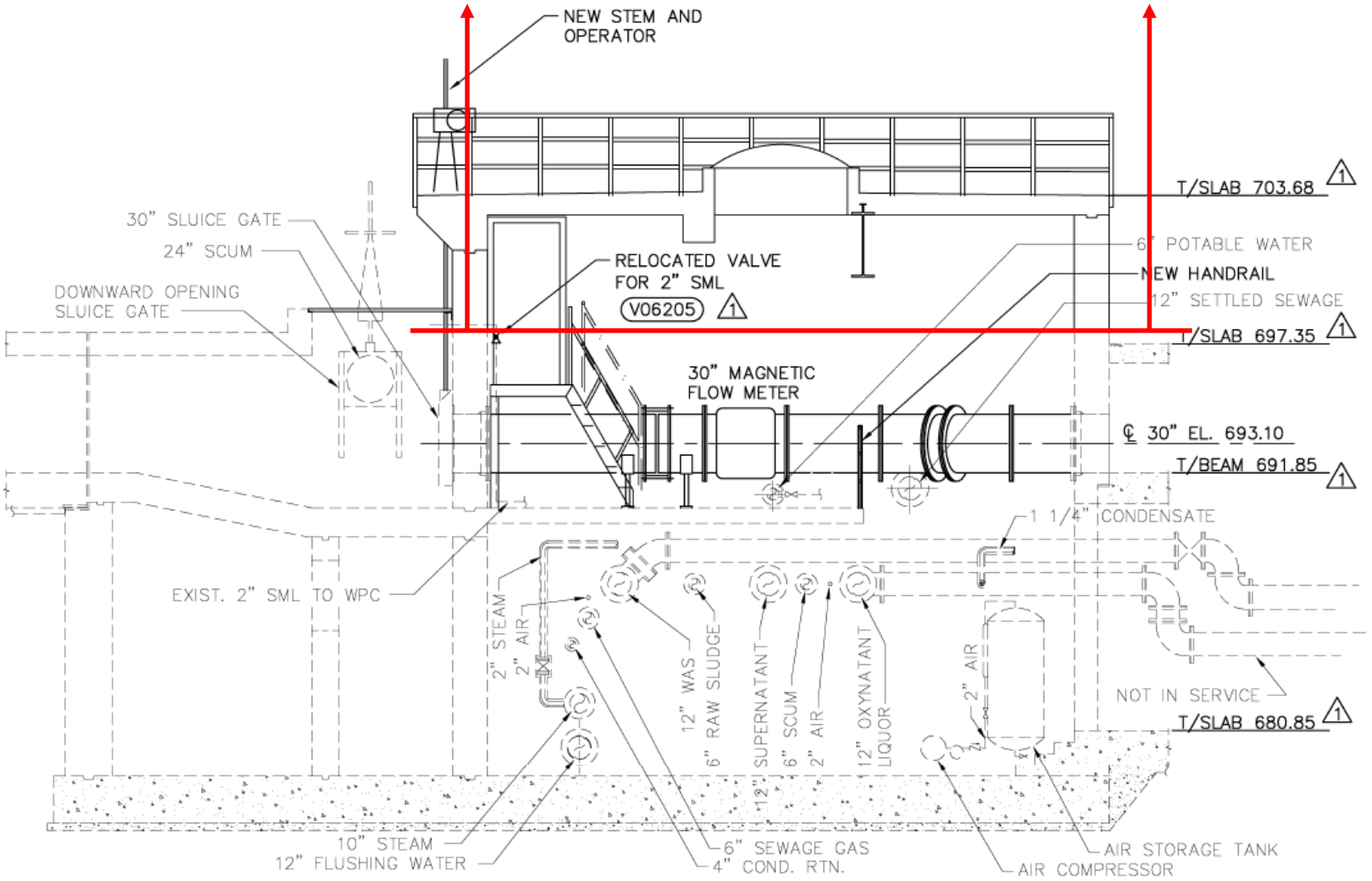
Concrete Restoration at the Southerly WWTP

West Primary Metering Chamber Condition

- Concrete Walls and Roof in Poor Condition
- Below Grade Walls (Part of Tunnel System) in Good Condition
- Recommendation to Rebuild Structure
- Due to Construction Sequencing, the Piping (Supported from the Ceiling) Had to Remain in Service During the Structure Replacement

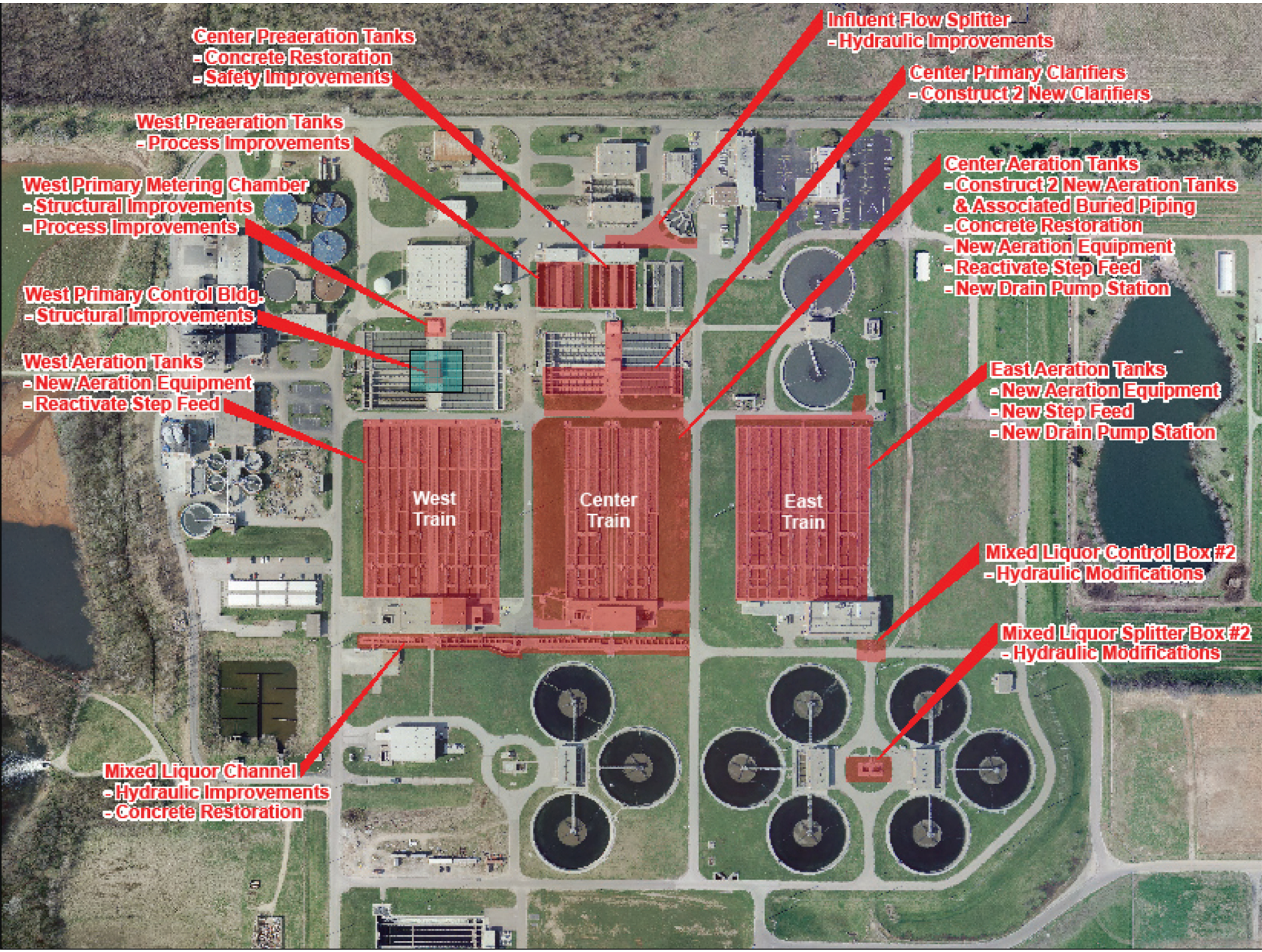

NO SMOKING
20
28

West Primary Metering Chamber




DIGESTER 4
CAUTION
ZINC
CHLORIDE


WEST
PRIMARY
CONTROL
BUILDING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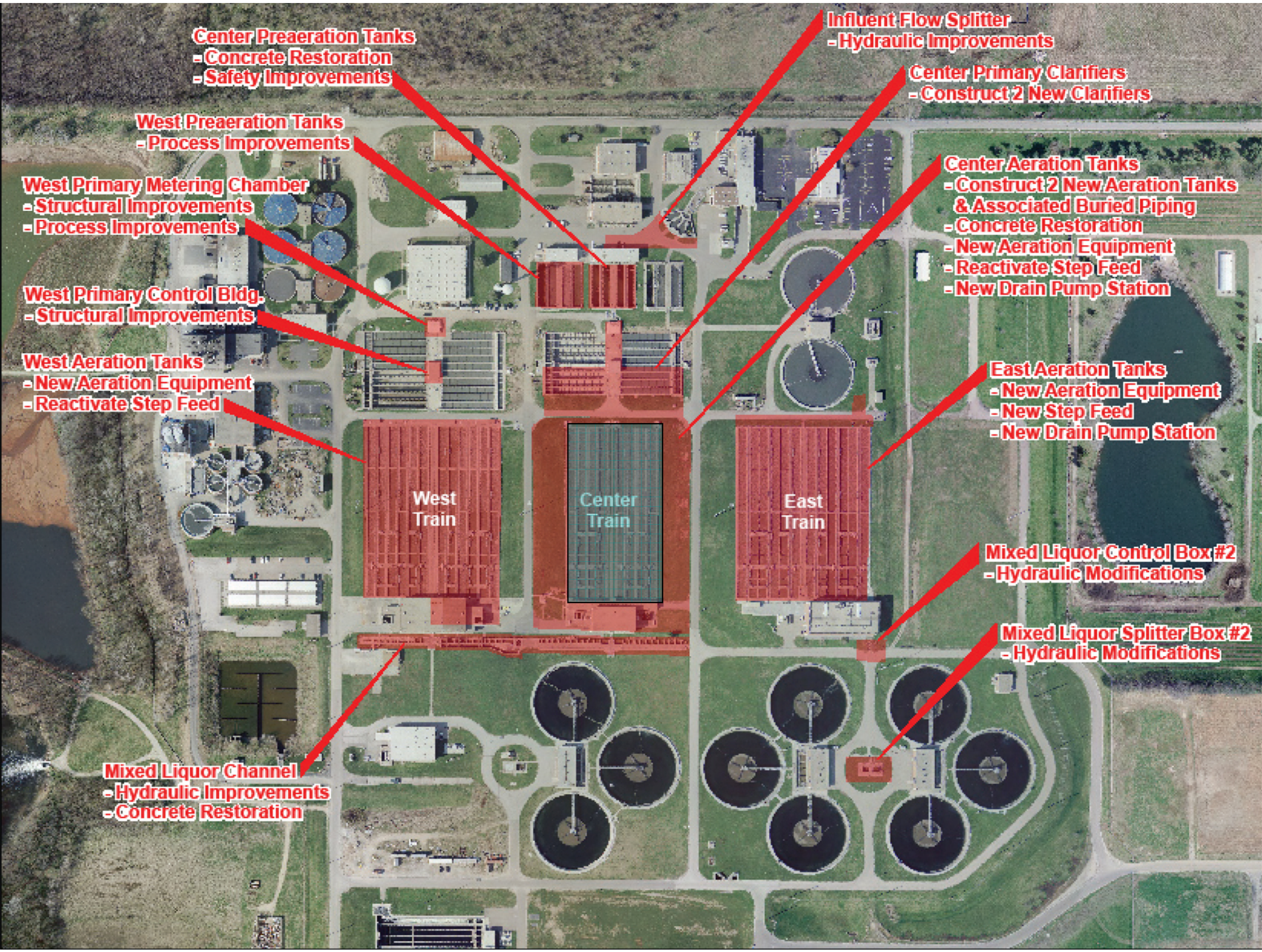
Concrete Restoration at the Southerly WWTP

West Primary Control Building

- Significant Concrete Deterioration on the Exterior Beams and Columns


WACO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- Concrete Restoration

Concrete Restoration at the Southerly WWTP

- Aeration Tank Rehabilitation
  - Center Train (Circa 1968) Had Significant Freeze-Thaw Damage Above the Water Line
  - Repairs Included the Following:
    - Replacement of Steel Handrail with Aluminum
    - Replacement of Galvanized Grating
    - Repair Expansion Joints
    - Crack/Spall Repairs and Slab Replacement


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05/27/2009


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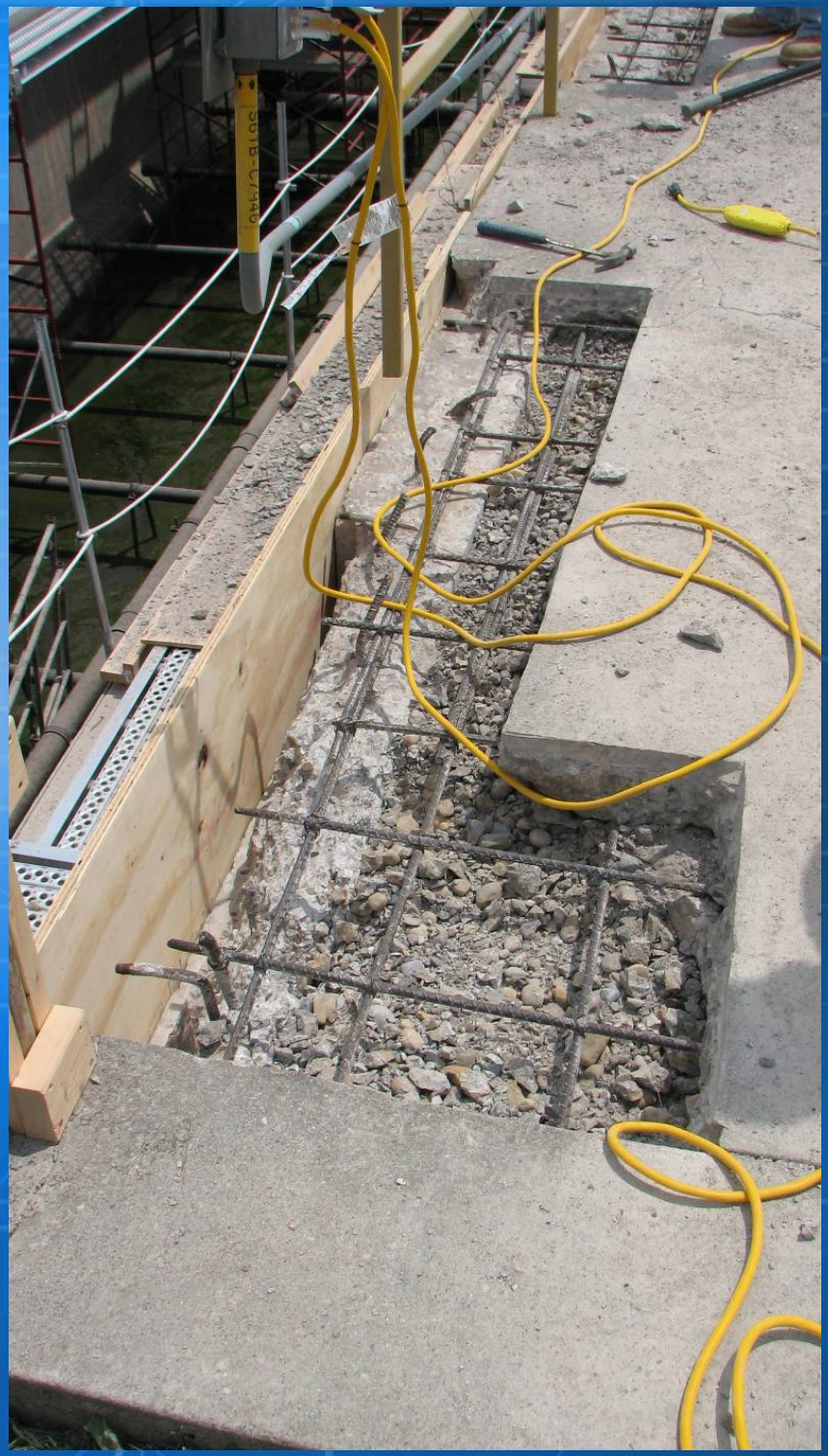
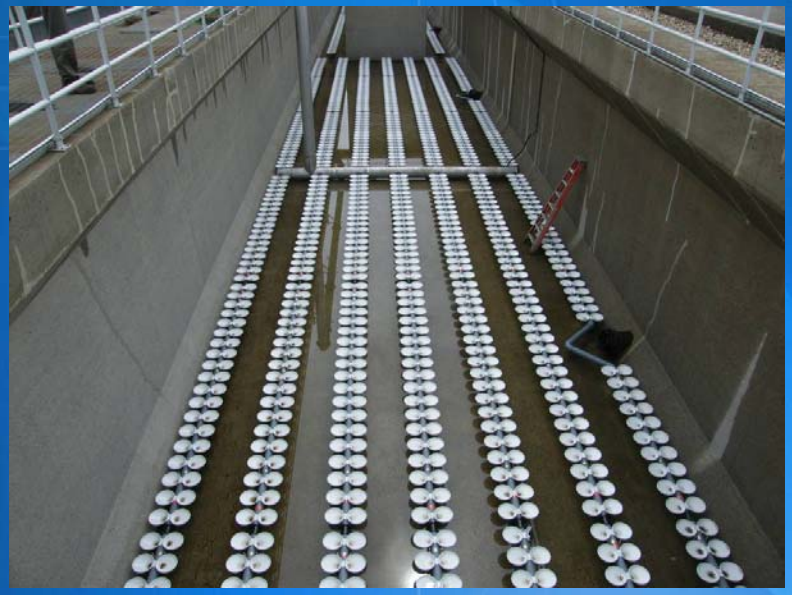


Concrete Restoration at the Southerly WWTP

Project Highlights

- Project Completed On Time and Under Budget
- A Portion of the Surplus Quantities Were Used by the City to Perform All the Concrete Repair Work in West Train During the Diffuser Installation in 2008



Lessons Learned

- Always Take the Tanks Out of Service and Conduct, at a Minimum, a Visual Inspection with the Owner.
- When in Doubt About Repairing versus Replacement, Replace it!
- Set up Bid Items for the Contractor's Fixed Costs to Avoid Disputes

Questions?

Bill Johngrass, P.E.
URS Corporation