Integrating Design & Construction
Ann Arbor Wastewater Treatment Plant Facilities Renovations Project

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The Seven Ps

• The Benefits of Integrating Design and Construction for a Complex Project

OR………..

• Prior Proper Planning Prevents Piss Poor Performance
City of Ann Arbor WWTP

- Permitted capacity - 29.5 MGD
- Average daily flow – 16.6 MGD
- Maximum hydraulic flow – 48 MGD
City of Ann Arbor WWTP Treatment Processes

- **Liquid Treatment**
  - Primary
    - Physical
  - Secondary
    - Biological
    - Chemical
    - Physical
  - Tertiary
    - Physical
  - Disinfection
    - Ultra-violet (UV)

- **Solids Removal**
  - Screenings
  - Grit
  - Fats, oils & grease (FOG)
  - Biosolids
    - Lime stabilization and subsurface land application
    - Centrifuge dewatering and landfill disposal
Plant Layout

Newer East Plant – 20 mgd
1977

Old West Plant – 9.5 mgd
1936 – 1964
City of Ann Arbor WWTP
Facilities Renovations Project

• Construction Schedule
  – Notice to Proceed: June 2012
  – West Plant Start-up: October 2015
  – Project Completion: September 2017

• Construction Budget
  – Approximately $96 million (currently)
Project Features

- Two new treatment passes including primary settling tanks, aeration tanks and secondary settling tanks
- Flow splitter improvements
- New plant wide electrical distribution system
- New stand-by electrical generators
- New Administration Building
- Replace East Plant blowers
- Miscellaneous East Plant improvements
WWTP Site Limitations

- Norfolk Southern RR
- Access Road
- Huron River
- Fleming Creek
Project Challenges

- Emphasis during design and construction is the Maintenance Of Plant Operations (MOPO)
- Integration of Design and Construction
Project Challenges

Maintenance Of Plant Operations
- Construction Sequencing & Staging
- FEMA
  - Flood Plain Issues
- Geotechnical
  - Geotechnical Instrumentation
  - Artesian Dewatering
  - Deep Excavations Near Existing Operating Plant Facilities
- Electrical
  - Complete Replacement of Electrical Distribution System
Construction Sequencing During Design
Stage 1 - Construction Sequence During Design
Stage 3 - Construction Sequence During Design
Stage 4 - Construction Sequence During Design
Stage 5 - Construction Sequence During Design
FEMA Impacts to Project Schedule

- Embankment History
- Embankment Improvements before FRP could proceed
- Site Embankment Improvements
- FEMA CLOMR / LOMR Process
1980 FIRM Before Embankment Improvements

FEMA Identified 500-year Floodplain

FEMA Identified 100-year Floodplain

FEMA Identified Floodway
2014 FIRM After Embankment Improvements

Modeled 500-year Floodplain

Modeled 100-year Floodplain

Modeled Floodway
Geotechnical Challenges

- Geotechnical Instrumentation to Monitor Existing Structures During Construction
- Site-wide Artesian Conditions and Depressurization Before Construction
- Excavation & Construction Near Existing Operational Structures
Geotechnical Instrumentation

• Instruments
  – Inclinometers
  – Monitoring Points and Ground Surface Markers
  – Telltales
  – Monitoring Wells
  – Piezometers
Artesian Dewatering
Artesian Dewatering
Artesian Dewatering
Earth Retention Adjacent to Operating Facilities
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Electrical Sequencing

- Replacement of the entire electrical distribution system
- Maintain a primary and redundant power source throughout construction and startup
- Significant electrical sequencing specified in the contract documents and executed during construction
Central Electrical Building (CEB)
CEB Primary Switch Gear Room
CEB Generator Room
Drone View of West Plant Construction
Preparation for Startup

- Training
- Commissioning
- Wet Test
- Seeding Plan
- Demonstration Test
- Go
Questions & Discussion