Getting the Biggest Bang for Your Buck

$200 million Treatment Plant Upgrade and Expansion

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Mark Eppich, P.E.

Matt Leach, P.E.
Dean Ramsey, P.E.
Presentation Topics

- Project Background
- Project Scope & Budget
- Condition Assessment
- Repurposing
- Construction Phasing
- Current Project Status
PROJECT BACKGROUND
Existing Treatment Plant--Site

- Original Plant -- 1907
- Existing Plant Constructed --mid 1970’s
- No option to obtain additional site
  - Railroad
  - Post Office
  - Major Road plus Scioto River
  - County Engineers Office and Abandoned Landfill
- Department of Public Utilities Office Complex—1980’s
Existing Site Plan
City of Columbus, Dublin Road Water Plant
Existing Treatment Plant--Site

- Multi Purpose Site
  - Treatment Plant
  - DPU Administrative Offices
  - Fleet Maintenance Facilities
  - Support Facilities and Personnel
- Access Required at All Times
- Public Access and Parking—Normal Business Hours
- Maintain Space for Future Treatment Requirements
Existing Treatment Plant

- Scioto River
- Conventional Lime Softening Plant
- 65 MGD Capacity
Plant Treatment Goals

- Total Hardness: 120 mg/L to 125 mg/L as CaCO3
- Alkalinity: >35 mg/L as CaCO3
- Total Organic Carbon (TOC): <2.0 mg/L
- Nitrate: < 10 mg/L as N
- Atrazine: <2.5 ppb (MCL= 3.0 ppb)
- Stage 2 DBP Compliance:
  - Target 80% of Location Running Annual Average (LRAA) and Operational Evaluation Level
- Comply with all primary drinking water regulations
- Taste and Odor
PROJECT SCOPE & BUDGET
BUDGET

- Budget = $200 M
- Established in 2007/2008
- Expansion to 80 mgd
- Budget Included:
  - New Processes for Regulatory Compliance
  - Reliability Upgrades
- Other CIP Items
Approach to Achieving Goals & Budget

- Non-Negotiable Goals – Regulatory Compliance & Safety
- Everything Else on the Table
  - Size of Expansion
  - Treatment Process Selection
- Detailed Condition Assessment
- Re-purposing of Existing Facilities to Maximum Extent
- Phasing of Project
CONDITION ASSESSMENT
Condition Assessment

- All Equipment and Structures Included
- OLD Not Sufficient Reason For Replacement
- Each Item Scored Based Upon Selected Criteria
- Evaluations of O & M Records
- Long Term Availability of Spare Parts
Primary Condition Assessment Factors

- Condition of Asset - \( C_A \)
- Criticality of Asset - \( C_R \)
- Consequence of Failure of Asset - \( C_F \)
- Redundancy of Asset - \( R \)
- Regulatory/Code Compliance of Asset - \( C_c \)
- Health and Safety of Asset – \( C_H \)

\[
\text{Score} = \left( \frac{C_A \times C_R \times C_F}{R} \right) + C_c + C_H
\]
Table 1
Condition Assessment Ratings
Instrumentation & Control System
Dublin Road Water Plant

Score = \([C_A \times C_R \times C_F / R] + C_C + C_H\)

<table>
<thead>
<tr>
<th>CA – Physical Condition of the Asset</th>
<th>CF – Consequence of Failure of the Asset</th>
<th>CH – Criticality of the Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Excellent</td>
<td>1 = Minimal impact to staff or environment (low)</td>
<td>1 = Minimal impact on treatment, control and/or compliance (low)</td>
</tr>
<tr>
<td>2 = Good</td>
<td>3 = Specific training, awareness and/or equipment required (medium)</td>
<td>3 = Alternatives available and/or have time to address problem</td>
</tr>
<tr>
<td>3 = Satisfactory</td>
<td>5 = May trigger an emergency response. Response planning required (high)</td>
<td>5 = No or limited alternatives available &amp; no or limited time to address problem</td>
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<tr>
<td>4 = Marginal</td>
<td></td>
<td></td>
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<tr>
<td>5 = Poor</td>
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<tr>
<td>1 = Poor component has no redundancy</td>
<td>0 = Complies with all code/regulations, or a waiver/exception can be granted</td>
<td>0 = No health/safety issues associated with the asset in its current condition</td>
</tr>
<tr>
<td>2 = Moderate: Component redundancy equals 1 (e.g. standby pump)</td>
<td>30 = Does not comply with current regulations (e.g. OSHA)</td>
<td>10 = Adverse health and safety issue; moderate concern</td>
</tr>
<tr>
<td>4 = Component redundancy is greater than 1</td>
<td></td>
<td>30 = Adverse health and safety issue; high concern</td>
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<table>
<thead>
<tr>
<th>Asset</th>
<th>CA</th>
<th>CR</th>
<th>CF</th>
<th>R</th>
<th>C_F</th>
<th>Score</th>
<th>Bin 1</th>
<th>Bin 2</th>
<th>Bin 3</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCADA Software</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>100</td>
<td>X</td>
<td></td>
<td></td>
<td>• Existing SCADA software cannot be reinstalled on new hardware.</td>
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<td>• Telvent moving to Windows OS.</td>
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<td>• Telvent no longer supporting with security patches.</td>
</tr>
</tbody>
</table>
Evaluation/Path Forward

- Equipment Placed in “Bins” based upon Score
  - Score > 30 = ‘Bin 1’
  - Score = 9-30 = ‘Bin 2’
  - Score < 9 = ‘Bin 3’
- Workshops with DOW and Plant Staff
- Preliminary Costs Developed
- Preliminary Project Definition Finalized
- Continue to Re-Assess
Major Items Not Included

- Additional Flocculation Basins
  - Primary Cold Water Concern
    - *Added Filter Aid Polymer*
    - *Added Coagulant Aid Polymer*
- Residuals Thickening
  - Added Sludge Density Meters Instead
- Backwash Treatment
  - Equalization Only
  - Historical Performance
- Chemical Feed Building/Facilities
  - *Repurpose/Upgrades*
Major Repurposing

- Existing Recarb Basin → Sedimentation Basin
REPURPOSING

- Existing Backwash Pumps ➔ IX Pump Station
Other Repurposing

- Portion of Existing Clearwell Used for New Mixing Chamber
  - Potential Future Use for UV

- Ex. PAC Storage Tanks Converted to Chemical Containment
PROJECT PHASING
CONSTRUCTION CONTRACTS
Phasing Criteria

- Prioritize Contract Sequence
  - Risk/Critical Upgrades
  - Project Size and Type of Work
  - Coordination with Construction at Other WTP

- Multiple Construction Contracts
  - Five Contracts
  - Maximize Bidders/Competition
  - Site Usage/Maintain Plant Operations
“Existing” DRWP
DRWP Construction Contracts

CONTRACTOR ENTRANCE

TEMPORARY PUBLIC/EMPLOYEE ENTRANCE

TWIN RIVERS DRIVE

OGB OCB RCB CO2

BHB

IEB

CONTRACT 4

CONTRACT 3

WCB

FB S&I

CONTRACT 4

TEMPORARY PUBLIC/EMPLOYEE ENTRANCE

DUBLIN ROAD

TWIN RIVERS DRIVE

POND

PARKING

PARKING

PARK
CURRENT PROGRAM STATUS
Status of Projects

- 4 of 5 Major Projects Bid to Date
- Final Project – Currently in Bid Phase
- Facilities Projects have included 4 – 6 Bidders
- Total Bids to Date: $99.5 M
- Estimate for Final Contract: $90 M
Contract 1

- Site Improvements
- New Sludge PS
- New Electrical Substation
Contract 1

910 Building Parking Area and Sidewalks

Pervious Pavement Parking Lot
Contract 1
Contract 2

- SCADA Backbone
- Filter Rebuild
Contract 2

Filter Troughs

Air Scour Blower
Contract 2

Filter Underdrains
Contract 3

- Basin #4 Modifications
- Recarbonation
- Ozonation
Contract 3

Recarbonation Basin and Channel

Ozone Facility
Contract 3

Ozone Facility and Recarbonation Basin
Contract 4

- Ion Exchange
- Backwash Equalization
- High Service Pumps
- Chemical System Upgrades
- Electrical System Upgrades
Contract 4- Ion Exchange & Plant Reliability Upgrades

- IX Nitrate Removal System – Nitrate Selective Resin

- Plant Reliability Upgrades
  - High Service Pumps
  - Electrical System - MCC’s
  - Chemical Feed & Storage
    - Alum Tanks; Lime Slakers; etc.

- Current Status – Receive Bids September 17, 2014
Contract 5

- McKinley Quarry Sludge Pipeline
Acknowledgements

- City of Columbus – Division of Water
  - Rick Reinhold, PE – Project Manager
  - Matt Steele – Water Supply and Treatment Coordinator
  - Tony Kohler – DRWP Superintendent
  - Scott Lockhart – DRWP Operations Manager
  - Dan Davis – DRWP Maintenance Manager
  - Dave Opferman, PE – (CDM Smith PM for Design)

- CDM Smith
- Stantec
- Chester Engineers
- Prime AE Group
Questions?
Thank You