



2018 ONE WATER CONFERENCE

SOFTER WATER FOR YELLOW SPRINGS



Presentation Overview

- Project Framework and Timeline
- Water Treatment Options
- Design-Build Team Procurement
- Design and Permitting
- GMP Preparation
- Construction
- Startup and Operation
- Project Summary



Project Framework

- Progressive Design-Build Format
 - Criteria Engineer Preliminary Work
 - Facility Options
 - Treatment Options
 - Design-Build Team Selection
 - Guaranteed Maximum Price (GMP)
- Design, Permitting, Construction, and Startup Progressed Conventionally



Project Timeline

- Criteria Engineer Selection
December 2014
- Preliminary Design Tasks
 - New WTP Features
 - Softening Process
 - RFQ/RFP Documents
- Design-Build Team Selection
December 2015
- Design-Permitting-GMP Finalized
March-August 2016
- Construction
September 2016
- Commissioning and Startup
January 2018



Groundwater Treatment Options

- Maintain Familiar Processes
 - Aeration
 - Deep Bed Filtration
 - Disinfection
- Manganese Removal
- Storage and Pumping
- Softening
 - Average hardness of 450 mg/L
 - Minimal water additives.
 - Minimal waste produced.
 - Cost-efficient from capital and operating standpoints



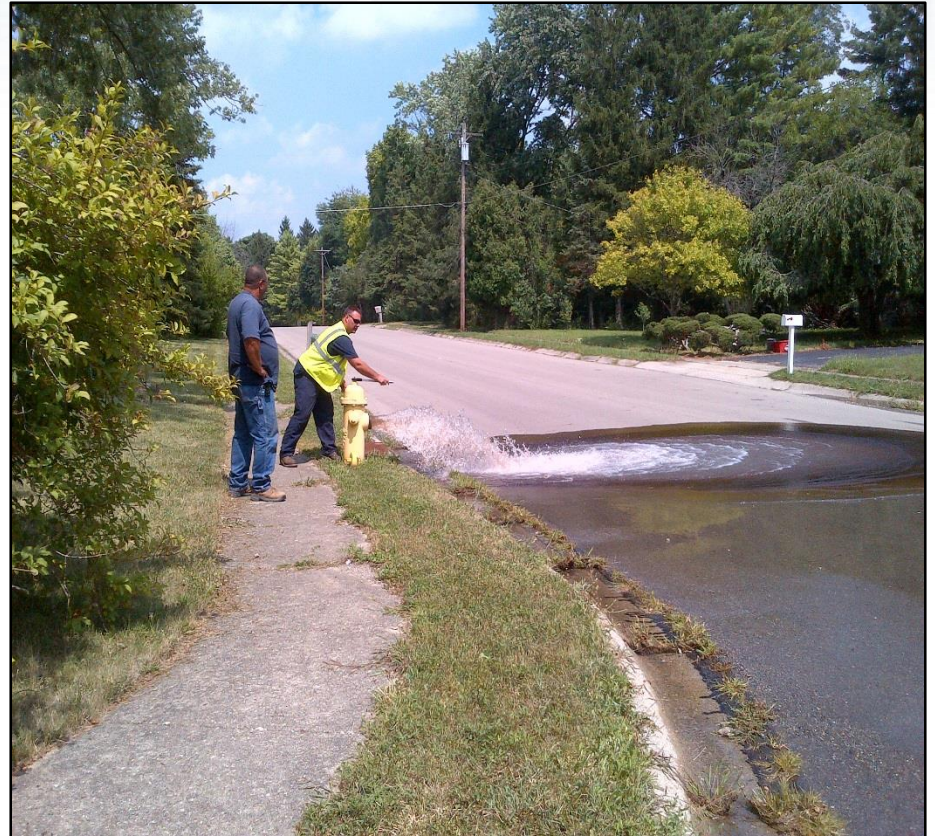
Pellet Softening

- Hardness (as CaCO_3)
 - Range of 275-553 mg/L
 - Calcium (300 mg/L)
 - Magnesium (150 mg/L)
- pH Adjustment to 9.2 with Sodium Hydroxide
- Upflow of water through expanded silica sand bed
- pH Adjustment to 8.0 with Carbon Dioxide
- *Softer* potable water retaining about half of ambient hardness (product water ranging between 180 and 240 mg/L)



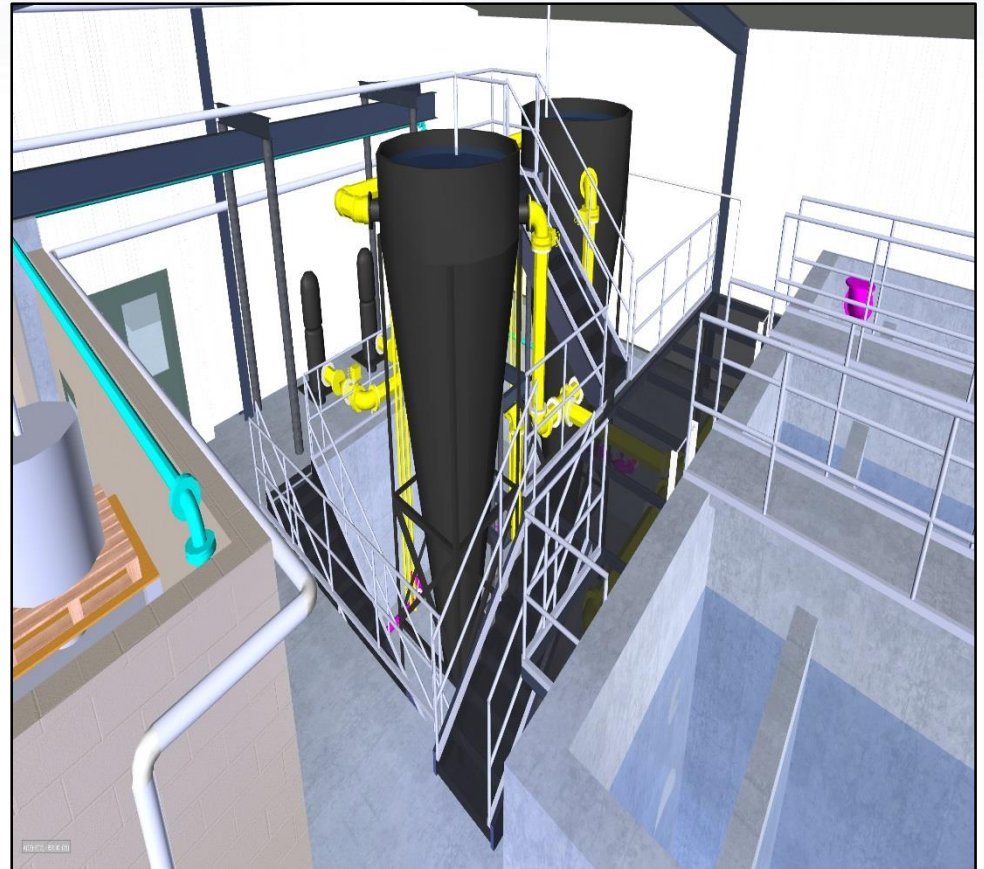
Design-Build Team Procurement

- Two-Step Process
- 12 RFQ Respondents
- 4 Teams Shortlisted
- Two Proposals Submitted
- Committee of 6 Reviewers
- Evaluations Independently Produced
- Selection Value-Based
 - 60% Approach
 - 40% Cost
 - Interview



Design Documents

- Conventional design documents (drawings and specifications)
- Start with 30% complete package (schematic design)
- Progress to 60%, 90%, and construction documents
- Value-engineering throughout design
- 3D model



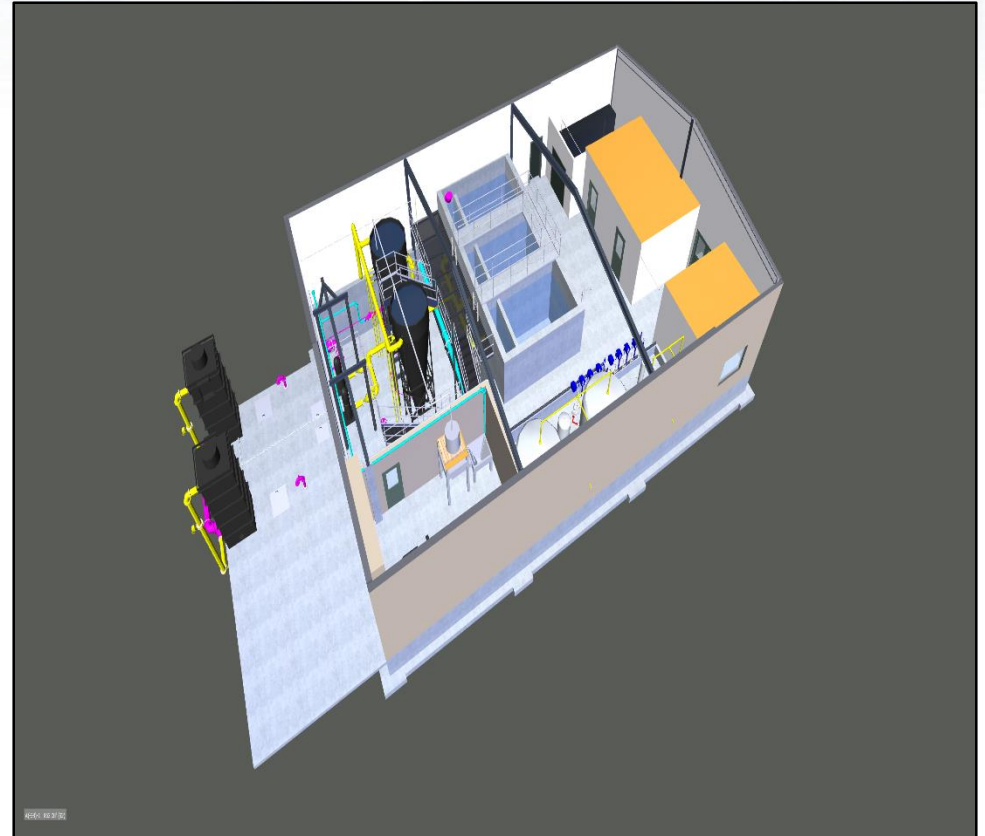
Design Features

- Redundancy
- Metering
- Instrumentation
- SCADA
- Laboratory
- Control Room/Office
- Sand Handling Room



Design Facilities

- Aeration, Chemical Conditioning, Retention Basin
- Softener Feed Pumps
- Softeners
- Deep Bed Filters
- Existing Clearwell, Finished Water Pumps, Backwash Pump
- Sodium Hydroxide, Sodium Hypochlorite, Carbon Dioxide



Permitting

- Conventional Ohio EPA PTI process and local building permits
- NPDES permit
- Septic tank and evapotranspiration field
- Project additions for arsenic removal (permanganate) and manganese (green sand)



GMP Preparation

- Detailed estimates and review at schematic (30%), detailed (60%), and contract document stages
- Allowances for lab equipment, forklift, raw water wells, permanganate system
- Contingency for DB's use with shared savings
- Fee for design and construction services



Construction Approach

- Guaranteed Maximum Price tabulation used as Schedule of Values
- Construction task schedule integrated with 3D model
- Submittal schedule
- Monthly progress meetings



Construction Sequence

- Clear laydown and staging area
- Remove existing spent backwash water retention basin
- Excavate and install new building foundations
- Excavate lagoons
- Install equipment and erect new building
- Install new raw water well and upgrade three existing wells



Construction Challenges

- Access into site
- Proximity of new building to old building
- Maintaining existing plant in operation while commissioning the new water plant
- Phased raw water well reconstruction (four wells, and operating both old and new WTPs simultaneously)



Construction Management

- Prequalified subcontractors and suppliers
- Regulators and permitting
- SCADA and telemetry
- Coordination with Village operations and distribution staff



Operator Involvement

- Full participation in preliminary design and design-build team procurement
- Daily inspection during construction
- Monthly meeting and pay application review
- Regular interaction with mechanical, electrical and instrumentation contractor staff
- Training with equipment manufacturers and engineers (design and criteria)



Operation Transition

- Maintained daily demands through old plant with two wells in operation
- Used other two wells to operate new plant (discharging to backwash lagoons)
- While operating the new plant, practiced multiple laboratory analyses dialing in treatment plant processes
- Optimized sodium hydroxide, carbon dioxide, and sodium hypochlorite feed rates



Treatment Performance

- Operating performance from January-June 2018
- Iron and manganese removal
 - Iron: 0.08 mg/L or BDL
 - Manganese: 0.024 mg/L
- Pellet Softening
 - Adjusted pH of 8.5
 - Final pH of 7.8
 - Total Alkalinity: 312 mg/L
 - Total Hardness: 229 mg/L



Project Performance

- Finished water production started January 2018
- GMP of \$7.2M
- Construction cost of \$5.6M
- Contingency of 3.7% (GMP)
- Final cost to Village of \$6.9M
- Two deductive change orders
- Shared savings (60% Village, 40% Design-Builder)
- Overall project cost of \$7.3M



Questions and Comments



BURGESS & NIPLE

