The Challenges of Upgrading/Expanding a 150 Year Old Water Treatment Plant Located in the Flood Plain
Agenda

- History
- Project Goals
- Design Challenges
- Construction Challenges
- Description of Upgraded Facility
History

- Site Originally Used by the Railroad for Water Supply
- Columbia Water Company Incorporated in 1823 and Purchased Site
- CWC Constructed First Building in 1849
- Current Filter Building Constructed in 1905
History

- Complete History of Site Unclear
- Few Drawings Available
- Upgraded Several Times
Filters on Old Sedimentation Basin - 1936
History

- **Current Facility**
  - 3.0 MGD Capacity
  - Old sed basin and new basin with inclined plates installed in 1991
  - 6 circular filters
  - Clearwell under filters
  - Gas chlorine
  - 2 raw water pumps and 2 high service pumps
  - Lagoon for sludge storage/backwash waste settling
Project Goals

- Increase Capacity from 3.0 MGD to 6.0 MGD (ultimate)
- Upgrade All Processes/Systems
- Flood Proof Facility
- Provide Improved Screening
- Minimize Additional Land Requirements
- Minimize Process Wastewater
Design Challenges

- Entire Site in Flood Plain
- 100 Year Flood Elev. 245.5 ft
- Ground Level 236 ft
Flood During Design Phase

Challenge
Plant to be operable through 100 year flood

Historic Flood
Flood Proofing

- All Electrical/Mechanical Equipment on 2nd Floor
- Tanks Raised to Above Flood Elev.
- Clearwells and Wetwells are Watertight
- Elevated Walkways
- Removable Flood Walls for Bulk Chemical Tanks
- First Floor Designed for Easy Hosed-Down
Flood Proofing
**SITE CONSTRAINTS**

- **Entire Site in Flood**
- **100 Year Flood Elev. 245.2**
- **FF Elev. 238.5**

**Challenge:** Design plant to be operable through a 100-year flood.

- **Historic Canoe Club Lagoon**
- **Walnut Street**
- **PUBLIC ROAD**

**Challenge Limit Land Requirements**
SITE CONSTRAINTS

- Entire Site in Flood
- 100 Year Flood Elev. 245.2
- FF Elev. 238.5

Challenge: Design plant to be operable through 100 year flood

Conversion:
- 2nd Floor Chem Feed Area
- Demo for Site Access
- Convert to Bulk Chem Storage
- Two New Filters in Addition
- Demo Old Sed Basin
- Convert to Traveling Screen Bldg
- Convert to Backwash Settling Tank
- New Floc/Sed Basins
- Demo Old Sed Basin
- New Floc/Sed Basins
Space Saving Design

- Convert Existing Offsite Tanks to Clearwell
- Convert Existing Sed Basin to Backwash Settling Tank
- Construct New Filters in Existing Filter Bldg & Addition
- Selective Demo to Provide Access
- Acquire Limited Land to South
Lagoon Capacity

- Convert Existing Sed Basin to Backwash Settling Tank
- Recycle Backwash Wastewater and Filter-to-Waste
- Lagoon Reserved for Sludge Settling/Storage

Challenge: Reduce Process Wastewater

Undersized for Plant Expansion
Backwash Wastewater Recovery

Floating Inclined Plates in Existing Sed Basin
Historic Structures

- Site Located in the Historic District
- Oldest Building Anchors Site
- No Drawings
- Historic Construction Methods
- Limited Ceiling Height

Challenge:
Retain historic buildings and enhance site with new buildings
Enhance Historic Appearance

- Re-used/Upgraded Historic Buildings
- 1823 Structure Converted to Bulk Chemical Storage Facility
- Ice Wall with Brick Façade
- Walkways with Wrought-Iron Appearance
- Decorative Arch with Metal Signage
Enhance Historic Appearance

- New Filters Constructed within Filter Building
- New Brick Buildings with Matching Facades
- Composite Slate Roofs & Copper Gutters
Ice Wall

- Structural Wall Required
- Brick Veneer to Match Historic Buildings
- Incorporate Wall into New Building
- Provides Security for the Site

Challenge Architecturally Appealing Wall
Construction Challenges

**Challenge:** Major Phasing Required

- **Construct**
  - New Floc/Sed Basin
  - Remaining New Filters

- **Demo**
  - Old Sed Basin
  - 4 Old Filters

- **Construct**
  - Filter Bldg Addition/Two New Filters
  - Operate 2 New & 2 Old Filters, New HSP

- **Install New Electrical Service**
  - Maintain Old Electrical Service

- **Demo**
  - Remaining Raw Water PS & Construct New Travelling Screen Bldg

**Project Complete!**
Construction

- Limited Ceiling Heights
- Space Constraints
- Unforeseen Conditions

Challenge
Historic Site and Structures
Construction
Construction

Challenge:
Soil Conditions
High Groundwater
Upgraded Facilities

- 4.0 MGD Capacity with Expansion to 6.0 MGD
- New Traveling Screen Facility with Grit Removal System
- New Raw Water PS
- New Bulk Chem Tanks & Chem Feed Systems
- New Flocculation and Sedimentation Basin with Inclined Plates & Telescoping Sludge Collection
Upgraded Facilities

- New Filters with Support Gravel & Air Scour
- New High Service Pumps
- More than Adequate Clearwell Capacity in Offsite Tanks
- New Backwash Settling Tank with Floating Inclined Plates & Telescoping Sludge Collection
- New Control Room, Laboratory, Conference Room, & Offices
THANK YOU