Headworks Facilities Evaluation: Operator-Driven Decision Making

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Presentation Outline

• Project Background
• Equipment 101
• Evaluation Process
  • Planning Approach
  • Selection Criteria
  • Visualization
• Take Home Messages
Project Background
Project Background
Village of Grafton WWTF
Project Background
Village of Grafton WWTF
Project Background

Unit Process Overview
Project Background
Facilities Planning

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Historical</th>
<th>Design (2038)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Flow (MGD)</td>
<td>1.47</td>
<td>2.15</td>
</tr>
<tr>
<td>Peak Flow (MGD)</td>
<td>10.89</td>
<td>11.54</td>
</tr>
<tr>
<td>BOD (lb/d)</td>
<td>2,789</td>
<td>4,149</td>
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<tr>
<td>TSS (lb/d)</td>
<td>2,726</td>
<td>4,067</td>
</tr>
<tr>
<td>TKN (lb/d)</td>
<td>436</td>
<td>647</td>
</tr>
<tr>
<td>TP (lb/d)</td>
<td>64</td>
<td>95</td>
</tr>
</tbody>
</table>

Approximately 46% Growth Planned
Project Background

Need for Project

- Equipment failure (Capacity, Condition, Performance)
  - Screening
  - Grit
  - Pumping
- Age/Condition of Building
  - Original to Plant (1950’s)
  - Lack of adequate space
Evaluation Process

Need for Project

Fine Screening

Grit Removal

Influent Pumping
Headworks 101
Mechanical Screening

- Collection
  - Fine Screening (1/4” Opening)
  - Not coarse or micro
- Compaction
  - Washing – removal of organics
  - Compaction – water/volume reduction
- Conveyance
  - Auger & Chute
Headworks 101
Mechanical Screening

Perforated Plate Screen (Band Screen)
Headworks 101
Mechanical Screening

Perforated Plate Screen (Band Screen)
Headworks 101
Mechanical Screening

Step Screen (Stair Screen)
Headworks 101
Mechanical Screening

Spiral Screen
Bar Screen (Chain/Rake)
Grit Removal

- Phases
  - Collection
  - Classification/Washing
  - Conveyance

- Types (Collection)
  - Forced Vortex
  - Multiple-Tray Vortex

- Types (Washing)
  - Classifier
  - Washer
Headworks 101

Grit Removal

Forced Vortex

Multiple-Tray Vortex
Headworks 101
Grit Removal

Classifier

Washer
Evaluation Process

Approach & Criteria
Evaluation Process
Planning Approach

- Communication & Collaboration
- Whose project is this?
- Engineer is the guide
- Meaningful meetings
- Input from all stakeholders
  - Administration
  - Lead Foreman
  - Experienced Staff
  - Mechanic
- Visualization
1. **Application**
   - New vs. Retrofit, Temporary Operations, capacity

2. **Quality of Equipment**
   - Performance, Robustness, References, etc.

3. **O&M Requirements**
   - Regular maintenance, wear parts, power/water use

4. **Quality of Provider**
   - MFR/Rep

5. **Ancillary Equipment**
   - Controls/SCADA
Evaluation Process
Selection Criteria

• Application
  • New or Retrofit – May limit your options (hydraulics)
  • Flow Range – what type is best for my design flow?

• Temporary Operations
  • New vs. Retrofit
  • Staffing

• Price
Evaluation Process
Selection Criteria

Quality of Equipment
- Performance
- UK Water Industry Research Testing (UKWIR) Reports
- Materials of Construction
  - Robustness
  - 304/316SS, HDPE, carbon steel
- References/Experience
  - What do other operators think?
  - How does it hold up?
  - Comparable installations?
- Moving Parts (quality of bearings, chains, etc.)
Evaluation Process
Selection Criteria

- **Operation & Maintenance**
  - How often does it need to be greased? Are they below water?
  - What are the wear parts?
  - How much power does it use?

- **Ancillary Equipment**
  - Do I need to upgrade my water reuse system?
  - How extensive of a SCADA system is needed?
Evaluation Process
Selection Criteria
Evaluation Process

Selection Criteria

• Quality of Providers
  • Is the local representative knowledgeable?
  • Do they claim to be the ‘best’?
  • How knowledgeable are the application engineers?
  • Who is going to service the equipment?
  • Warranty – will they stand behind it?
  • Did you check their references?
  • Do they have single point of responsibility?
  • What is their delivery time?
Evaluation Process
Selection Process

• Reference Check
  • Installation List

• Hit the Road
  • New & Old installations
  • Talk to the operators

• Trade Shows
  • WEFTEC
  • WWOA
  • WRWA
Evaluation Process

Selection Process

• Evaluation Matrix
• Selection Options
  • Pre-Procurement
  • Base Bid Equipment w/ Alternates
  • Open Bid (required multiple designs)
• Funding requirements
Evaluation Process

Selection Process

• What did the Village select?
  • Perforated Plate Screen & Washing Press
    • Huber
  • Mechanical Vortex Grit Collection
    • Smith & Loveless
  • Vortex Grit Washer
    • Huber
  • Dry-Pit Submersible Pumps
    • Flygt

• Base Bid Procurement Method
Visualization

What will it look like?
Visualization
Design Model
Visualization
Design Model
Visualization
Virtual Reality
Take Home Message

What should I remember?
Evaluation Process

Selection Process

- Own the Project
- Take Site Visits
- Be confident in manufacturer & supplier
- Utilize visualization tools