CONSIDERATIONS FOR THE DESIGN AND CONSTRUCTION OF A WATER STORAGE TANK
Shippensburg Borough Authority
Look familiar?
Agenda

- QUANTITY
- QUALITY
- TYPE
Today’s Challenge
Old School
How many days of storage?

- 0 Days
- 1 Day
- 2 Days
- 3 Days
Effective Storage

Operational

Equalization

Fire

Emergency

Effective Storage
Concrete D-110 by DN Tanks

3.0 Million Gallons

123’ Inside Diameter

34’ water column
Today’s Challenge
This is quality?
“Perhaps the single greatest water quality problem which affects the daily lives of most American water consumers results from the deterioration of water quality within water distribution systems.”

- Dr. John T. O’Connor
How do we monitor quality?

- Chlorine residual
- Chemical Contaminants
- Biological Contaminants
- Disinfection By-Products
- pH
- ORP (oxygen reduction potential)
- Temperature
- Turbidity
- Color
- Taste
- Odor
Keys to maintain quality

- Chlorine residual
- Chemical Contaminants
- Biological Contaminants
- Disinfection By-Products
- pH
- ORP (oxygen reduction potential)
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- Turbidity
- Color
- Taste
- Odor
Keys to maintain quality

WATER “AGE”
Influence Age & Chlorine Residual

- Turnover (Design)
- Turnover (Operations)
- Baffling

- Separate Inlet/Outlet
- Mechanical Mixing
- Chlorine Boost
Three Fold Strategy

**Turnover**

**Mechanical Mixing**

**Chlorine Boost**
PAX Mixer

Turnover:
2.3 hours
Chlorine Booster
Type of Tank
## Upsize from 2 MG to 3 MG
### Cost Per Gallon

<table>
<thead>
<tr>
<th>Material</th>
<th>Cost Per Gallon for first 2 MG</th>
<th>Cost Per Gallon to Upsize from 2 to 3 MG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete D-115</td>
<td>$0.43</td>
<td>$0.28</td>
</tr>
<tr>
<td>Concrete D-110</td>
<td>$0.49</td>
<td>$0.29</td>
</tr>
<tr>
<td>Steel Welded</td>
<td>$0.48</td>
<td>$0.31</td>
</tr>
<tr>
<td>Steel Bolted</td>
<td>$0.53</td>
<td>$0.40</td>
</tr>
</tbody>
</table>
Capital Budget Cost
3 MG Tank

3 MG Tank Capital Cost in Millions of Dollars

- Concrete D-115: $1.14
- Concrete D-110: $1.27
- Steel Welded: $1.27
- Steel Bolted: $1.45
Life Cycle Cost
40 Year Present Value for 3 MG Tank

- **Concrete D-115**
  - Capital Cost: $1.14
  - 40 Year Present Value Cost: $0.14

- **Concrete D-110**
  - Capital Cost: $1.27
  - 40 Year Present Value Cost: $0.00

- **Steel Welded**
  - Capital Cost: $1.27
  - 40 Year Present Value Cost: $0.67

- **Steel Bolted**
  - Capital Cost: $1.45
  - 40 Year Present Value Cost: $0.34
Summary

3 MG of Storage
DN Tanks Concrete AWWA D110 Tank

Active Mixing with Chlorine Boost

3,200 LF of 16” DICL
6,500 LF of 12” DICL
Questions?