Summary of System

- 424 miles of pipe
- Ranging in size from 1 inch to 48 inches
- Ranging in age from new to 120 years old
<table>
<thead>
<tr>
<th>Decade</th>
<th>Age</th>
<th>Length of Pipe (Miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1880-1889</td>
<td>121-130</td>
<td>25.38</td>
</tr>
<tr>
<td>1890-1899</td>
<td>111-120</td>
<td>26.46</td>
</tr>
<tr>
<td>1900-1909</td>
<td>101-110</td>
<td>39.08</td>
</tr>
<tr>
<td>1910-1919</td>
<td>91-100</td>
<td>74.84</td>
</tr>
<tr>
<td>1920-1929</td>
<td>81-90</td>
<td>44.42</td>
</tr>
<tr>
<td>1930-1939</td>
<td>71-80</td>
<td>20.97</td>
</tr>
<tr>
<td>1940-1949</td>
<td>61-70</td>
<td>23.95</td>
</tr>
<tr>
<td>1950-1959</td>
<td>51-60</td>
<td>34.36</td>
</tr>
<tr>
<td>1960-1969</td>
<td>41-50</td>
<td>26.10</td>
</tr>
<tr>
<td>1970-1979</td>
<td>31-40</td>
<td>26.81</td>
</tr>
<tr>
<td>1990-1999</td>
<td>11-20</td>
<td>24.58</td>
</tr>
<tr>
<td>2000-2009</td>
<td>1-10</td>
<td>43.62</td>
</tr>
</tbody>
</table>
Age of Water Mains

• Over 50% of the system is greater than 80 years old

• 50 miles of pipe were installed before 1900
Water Main Breaks

• 51 breaks in 1971
• 163 breaks in 2007 (highest year)
• 140 breaks per year average (last 5 years)
• Average cost per break of $7,200
• Total current annual cost $140 \times$ $7200 = $1,008,000
# Water Main Breaks

## Average Water Main Breaks per Year per Decade

<table>
<thead>
<tr>
<th>Decade</th>
<th>Breaks per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930's</td>
<td>4</td>
</tr>
<tr>
<td>1940's</td>
<td>6</td>
</tr>
<tr>
<td>1950's</td>
<td>11</td>
</tr>
<tr>
<td>1960's</td>
<td>30</td>
</tr>
<tr>
<td>1970's</td>
<td>50</td>
</tr>
<tr>
<td>1980's</td>
<td>55</td>
</tr>
<tr>
<td>1990's</td>
<td>55</td>
</tr>
<tr>
<td>2000's</td>
<td>141</td>
</tr>
</tbody>
</table>
Water Main Breaks

Year

Breaks per Year
Water Main Leaks

• Water leaks within the City are also excessive

• Over the last 5 years we averaged 180 leaks

• Typical water loss exceeds 14%

• This costs $345,000 a year
Water Main Leaks

• 180 water leaks on average per year

• Total current annual cost 180 x $7200 = $1,296,000
Water Main Repairs
Future Costs

• Breaks are expected to reach 300 per year in 10 years

• Leaks repairs will be over 200

• Total annual cost 500 x $7200 = $3,600,000
Pumping Stations

• 12 Pumping Stations are required to move water throughout the City.

• A breakdown at a major station could put 1000’s of homeowners out of water

• 2 stations in poor condition
Pumping Stations

• Woodland Pumping Station
Woodland Pumping Station
- Pumps and controls over 50 years old
- Replacement parts not available
Pumping Stations

• Middle Pumping Station
• One pump over 60 years old
Storage Facilities

• West Duluth Reservoir needs new roof

• Estimated Cost of $5 million
Lakewood Water Treatment Facility

• Original pump station built in 1898 still used
• Original filtration plant built in 1975
• Much of the equipment is original and needs replacement
Lakewood Water Treatment Facility

- Sedimentation Pond Cleaning
- Estimated cost of $2 million
- Partial cleaning required immediately at cost of $420,000
Lakewood Water Treatment Facility

- Lift Pump switchgear
  - Estimated cost $280,000

- Filter control panels
  - Estimated cost $140,000

- Pump Station electric service
  - Estimated cost $75,000
Lakewood Water Treatment Facility

- Backwash motor control center
- Estimated cost $610,000
Lakewood Water Treatment Facility

• Other electrical upgrades
• Estimated cost $1,600,000
Lakewood Water Treatment Facility

- Pump Station roof
- Estimated cost $650,000
Lakewood Water Treatment Facility

• Other improvements/replacements over next 15 years - $20 million
• Water main breaks must be reduced or repair costs will be excessive

• 500 repairs per year X $7,200 per repair = $3,600,000 per year in repairs

• Maintenance projects can not be delayed indefinitely

• Failure at the plant or a pump station could shut off water service for days or weeks