Boise School District: School Lead Risk Mitigation & Water Conservation Project
SRF Loan #WW1902
$500,000

Green Project Reserve Technical Memorandum

Categorical GPR Documentation

REPLACES LEAD SERVICE LINES, AND FIXTURES IN SCHOOLS (Water Efficiency). Business Case GPR per the criteria requirements of 2.1 …*use of improved technologies and practices to deliver equal or better services with less water*; also, per 2.2-1 Installing or retrofitting water efficient devices such as plumbing fixtures...; also per 2.2-1a... plumbing devices; 2.2-1c WaterSense labeled products; also 2.4-1 Water efficiency can be accomplished through water saving elements or reducing water consumption.¹ ($500,000)

State of Idaho SRF Loan Program
January 2019

**GAC Filters & Replacement Fixtures**

**Summary**
The Boise School District has detected lead in the drinking water of some schools constructed prior to 1986 and has undertaken a rigorous program to address the issue. In addition to removing the old fixtures and installing lead-free, water-efficient fixtures, the program includes installing GAC filters at select locations to create water efficiencies by eliminating line and fixture flushing.

- Estimated funding amount = $500,000
- Estimated energy efficient (green) portion of funding = $500,000 (100%)

**Background**
- The Boise School District has a program to replace water faucets/fixtures and fountains/bubblers for 27 schools constructed prior to 1986. At three schools where water lines currently dead-end at the school, the program includes installing GAC filters to eliminate daily flushing of lines and fixtures. Both of these initiatives provide a significant water efficiency benefit to the public water system.
- The program also includes taking test samples at each of the 27 schools identified for potential lead in the school’s drinking water, and having the samples analyzed by the Idaho State Test Lab.

**GPR Eligibility**
The Boise School District project is SRF-eligible and GPR-eligible as it results in a considerable water conservation benefit to the public water system through (1) flow reduction by installing new water-efficient fixtures, and by (2) eliminating the daily flushing of school lines and fixtures required to reduce lead exposure.

1. **NEW WATER-EFFICIENT FIXTURES: WATER CONSERVED**

   **LAVATORY FAUCETS**
   - i. Replacement Faucets = 1.2 gpm²
   - ii. Old Faucets = 3.5 gpm³

   The Moen replacement lavatory faucets qualify as GPR-eligible as they result in a **65% reduction in the flow rate** compared to the old American Standard faucets.

   ![New MOEN-Bition Centerset Bathroom Faucet](image)

   ![New Elkay Cooler Fountains LZS8LF/LZ88WSLK](image)

   **HALLWAY FOUNTAINS**
   - i. Replacement Fountains = .25 gpm⁴
   - ii. Old Fountains = .75 gpm⁵

   The replacement Elkay hallway fountains qualify as GPR-eligible as they result in a **66% reduction in the flow rate** compared to the old Elkay fountains.

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² Moen specification for series 8800 commercial lavatory 2-handle faucet; Watersense certified
³ American Standard Faucets pre-1990; Per Vanessa McDowell, Lixil Water Technology Americas, Technical Customer Care Representative; 11-14-2018
⁴ Ed Locke, Product Manager, Elkay Manufacturing Co.; Elkay Hallway Fountain Model LZS8WSLK; 11-6-18
⁵ BSD maintenance staff test results at 58 psi; manufacturer data unavailable.
(con’t) GAC Filters & Replacement Fixtures

**CLASSROOM BUBBLERS**

i. Replacement Bubblers = .50 gpm

ii. Old Bubblers = 1.25 gpm

The replacement Chicago Faucets classroom bubblers qualify as GPR-eligible as they result in a 60% reduction in flow rate compared to the old Chicago Faucets bubblers.

**KITCHEN FAUCETS**

i. Replacement Faucets = 1.5 gpm

ii. Old Kitchen Faucets = 4.5 gpm

The replacement Moen Chateau kitchen model 7425 faucets qualify as GPR-eligible as they result in at least a 66% reduction in flow rate compared to the old kitchen faucets.

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**TABLE 1. SUMMARY OF WATER SAVINGS FROM REPLACEMENT FAUCETS**

<table>
<thead>
<tr>
<th>Fixture</th>
<th>Type/ Manufacturer of Replacement Faucet</th>
<th>Efficiency Rating or Flow (gpm) of New Faucet</th>
<th>Old Faucet* to be Replaced by New Model</th>
<th>Number of Each type to be Replaced</th>
<th>Flow (gpm) of Old Faucet</th>
<th>Water Savings (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lavatory</td>
<td>Moen-Bition</td>
<td>1.20</td>
<td>American Standard</td>
<td>489</td>
<td>3.50</td>
<td>2.30</td>
</tr>
<tr>
<td>Fountain</td>
<td>Elkay Cooler</td>
<td>0.25</td>
<td>Elkay</td>
<td>168</td>
<td>0.75</td>
<td>0.50</td>
</tr>
<tr>
<td>Bubbler</td>
<td>Chicago Faucets</td>
<td>0.50</td>
<td>Chicago Faucets</td>
<td>309</td>
<td>1.25</td>
<td>0.75</td>
</tr>
<tr>
<td>Kitchen</td>
<td>Moen Chateau</td>
<td>1.50</td>
<td>American Standard</td>
<td>631</td>
<td>4.50</td>
<td>3.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>1,597</strong></td>
<td></td>
</tr>
</tbody>
</table>

* Fixtures are all pre-1984 (the schools in the leaded fixture replacement program were constructed from 1903 through 1984)

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6 BSD maintenance staff tested Model 748-665ABCP at 58 psi. Matt Gilbert, Product Manager, Woodruff, reported 0.74 gpm.

7 BSD maintenance staff test results, measured at 58 psi.

8 Moen specifications for model 7425 and 7423 single handle faucets; meets CalGreen and Georgia SB370 requirements.

9 Flow of old fixtures measured in situ at 58 psi by the District with the exception of Kitchen faucets, whose estimated flow was per Water Efficiency Management Guide Residential Kitchen and Laundry, EPA 832-F-016b, November 2017, page 1: pre-1992 kitchen faucet flow range from 3 to 7 gpm.
2. **Elimination of Flushing: Water Conservation**

Flushing lines and fixtures is a primary management strategy to reduce lead exposure in drinking water systems with detectable levels of lead. Table 2 outlines the 3Ts Flushing Instructions Best Practices published by the EPA\(^{10}\).

**Table 2. 3Ts Flushing Instructions Best Practices**

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Locate the faucet furthest away from the service line on each wing and floor of the building, open the faucets wide, and let the water run for 10 minutes. For best results, calculate the volume of the plumbing and the flow rate at the tap and adjust the flushing time accordingly. This 10-minute time frame is considered adequate for most buildings.</td>
</tr>
<tr>
<td>2.</td>
<td>Open valves at all drinking water fountains without refrigeration units and let the water run for roughly 30 seconds to one minute, or until cold.</td>
</tr>
<tr>
<td>3.</td>
<td>Let the water run on all refrigerated water fountains for 15 minutes. Because of the long time period required, routinely flushing refrigerated fountains may not be feasible. It may therefore be necessary, and more economical, to replace these outlets with lead-free, NSF-approved devices.</td>
</tr>
<tr>
<td>4.</td>
<td>Open all kitchen faucets (and other faucets where water will be used for drinking and/or cooking) and let the water run for 30 seconds to one minute, or until cold.</td>
</tr>
</tbody>
</table>

**Water Conserved Through GAC Filtration**

- The District will install GAC filtering systems at 3 schools where the water line dead-ends at the school. This will eliminate the need for daily flushing of water lines.
- Eliminating flushing each day through a faucet on all 3 floors = 3.5 gpm x 20 min x 3 floors x 176 days x 3 schools = **111,000 gallons/year** conserved for the public water system.

**Water Conserved by Eliminating Fixture Flushing by Installing New Fixtures**

- With new drinking water fixtures, the District will no long need daily flushing of individual fixtures.
- Water conserved by eliminating flushing is reported in Table 3, and is based on flushing through the old fixtures for 1 minute twice a day for 176 instructional days in a typical school year.

**Table 3. Water Conserved by Eliminating Daily Fixture Flushing**

<table>
<thead>
<tr>
<th>Type of Fixture</th>
<th>Kitchen Faucets</th>
<th>Lavatory Faucets</th>
<th>Drinking Fountains</th>
<th>Classroom Bubblers</th>
<th>Total Conserved (gal/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of each type</td>
<td>631</td>
<td>489</td>
<td>168</td>
<td>309</td>
<td></td>
</tr>
<tr>
<td>Discharge Rate of Old Fixture</td>
<td>4.50 gpm</td>
<td>3.50 gpm</td>
<td>0.75 gpm</td>
<td>1.25 gpm</td>
<td></td>
</tr>
<tr>
<td>Water Conserved/year</td>
<td>1,000,000 gal</td>
<td>600,000 gal</td>
<td>40,000 gal</td>
<td>135,000 gal</td>
<td><strong>1,775,000</strong></td>
</tr>
</tbody>
</table>

Installing new fixtures saves the public water system - just through eliminating flushing alone - approximately **1,775,000 gallons every year**.

Summary

New water fixtures use 60% to 66% less water than the old water fixtures they replaced in the Boise School District Schools, resulting in considerable water conservation for the public water system. In addition, the new water fixtures - along with GAC units - save an additional approximate 1.8 million gallons of water every year by eliminating daily fixture and water line flushing.

Conclusion

- GAC filters and faucet upgrades conserve water and remove the risk of lead particles in soldered fountains and fixtures in the District’s older schools.
- The Boise School District’s installation of GAC filtration systems and replacement of leaded drinking water fixtures are eligible for SRF funding and Green Project Reserve status as they provide a water efficiency benefit to the public water system.
- GPR Costs: Leaded lines, fixtures, and appurtenance replacement = $500,000
- GPR Justification: Installation of GAC filters and replacement of leaded drinking water fixtures are Categorically GPR-eligible (Water Efficiency) per the criteria requirements of 2.1 use of improved technologies and practices to deliver equal or better services with less water; also, per 2.2-1 Installing or retrofitting water efficient devices such as plumbing fixtures...; also per 2.2-1a... plumbing devices; 2.2-1c WaterSense labeled products; also 2.4-1 Water efficiency can be accomplished through water saving elements or reducing water consumption11.

Below: old inefficient fixtures (left to right): (1) hallway fountain, (2)classroom bubbler, (3) lavatory faucet.

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