The Ronald V. Dellums Federal building is a 1.2 million sq. ft. government office building in Oakland, California. The building features two 20-story towers connected by an atrium and houses 4,000 occupants. The building’s owner, the U.S. General Services Administration (GSA), hired a commissioning provider to install new software for the controls system as a way to improve the building’s energy performance. In the initial assessment, the provider found that before installing the controls software, there were many retrocommissioning opportunities that could reduce the building’s energy use.

To start, the commissioning provider, Facility Dynamics Engineering, identified several low-cost and relatively simple operational improvements with dramatic savings potential. The air handlers were operating inefficiently, running at higher design loads than actually experienced. The VAV boxes were reprogrammed to close fully when the building was unoccupied and to function using less air flow during occupied hours. In the central chiller plant, poor programming was causing building operators to run the system manually. The commissioning provider identified new control sequences for optimizing plant operations and recommended the installation of variable frequency drives. By right-sizing the load on the air handler and the chillers, the provider was able to dramatically reduce the equipment’s operating time without the use of additional hardware.

Then, through a project supported by the Oakland Energy Partnership’s Large Commercial Building Tune-Up Program, funded under the California Public Utilities Commission, the commissioning provider identified several opportunities for improvements to the air distribution system.

This case study was funded by FEMP, the U.S. Department of Energy’s Federal Energy Management Program.
Functional testing showed that, with fairly minimal hardware replacement and some adjustment of the controls, the air handler’s efficiency could be dramatically improved. Analysis provided by the Lawrence Berkeley National Laboratory estimated that the set of measures, which included relocating sensors, optimizing the static pressure setpoint and repairing the economizer dampers, were to save $66,981 annually and pay for themselves in less than a year (see graph). Further, the Oakland Energy Partnership offered incentives for implementing many of the building’s improvements.

The retrocommissioning project brought to light some simple adjustments to sensors and controls – many of which had never been installed properly. These relatively easy fixes can lead to large energy benefits. “Retrocommissioning made the building a lot easier to operate and lot of things were able to be turned off,” said commissioning provider Larry Lister. After the retrocommissioning project, the building operators spent significantly less time manually operating the building. “It made their lives a lot easier,” said Lister. “It allowed them to maintain the building instead of manually operating it.”

After completing work on the building, the commissioning provider compiled a Mechanical Systems Operation Manual that detailed operations and maintenance for the improved building systems. This documentation helps to assure that the building will continue to be maintained optimally. And, with the systems working at maximum efficiency, the building was an ideal candidate for installing the new controls system software, allowing it to be commissioned on an ongoing basis.

“Retrocommissioning made the building a lot easier to operate and lot of things were able to be turned off.”

- Larry Lister, Facility Dynamics Engineering Commissioning Provider

Recommended retrocommissioning measures and their associated cost savings.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Electrical Savings</th>
<th>Gas Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inaccurate Sensor Locations - SA Sensors</td>
<td>$30,000</td>
<td>$15,000</td>
</tr>
<tr>
<td>Excessive Static Setpoint - Optimize</td>
<td>$25,000</td>
<td>$10,000</td>
</tr>
<tr>
<td>Economizer Damper Repair</td>
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<td>$5,000</td>
</tr>
<tr>
<td>Relief Dampers - Reverse Flow</td>
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</tr>
<tr>
<td>Hot Deck Reverse Flow</td>
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</tr>
<tr>
<td>Inaccurate Sensor Locations - MA Sensors</td>
<td>$5,000</td>
<td>$0</td>
</tr>
</tbody>
</table>

>> Project Partners

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**FOR MORE INFORMATION**
California Commissioning Collaborative
www.cacx.org
A resource for commissioning providers and owners featuring sample commissioning documents, case studies, tools, and the latest industry news.