Fort Valley State University: Miller Hall

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Mid-20th Century Buildings Workshop

Facility Officers Conference/ Columbus, Ga./ 26 October 2011
Consider the Mid-Century Building

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Campus Map

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Site Plan

Ohio Hall

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Main Floor Plan

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Miller Hall Energy Study
Fort Valley State University

Submitted by:
Board of Regents of the University System of Georgia
In conjunction with:
Georgia Environmental Facilities Authority

Prepared by:
Surber Barber Choate & Hertlein Architects, P.C.
with:
Essex Engineering Corporation
SL King and Associates, Inc.
Costing Services Group
Light Studio

June 23, 2010

This study was funded by the American Recovery and Reinvestment Act through the US Department of Energy’s State Energy Program. These funds were coordinated and administered in cooperation with the Georgia Environmental Facilities Authority.

Miller Hall Energy Study

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### Table 1. Comparison of Current Building, Proposed building and Further Energy Conservation Opportunities.

<table>
<thead>
<tr>
<th>Project Run</th>
<th>ECO Description</th>
<th>Electricity</th>
<th>Natural Gas</th>
<th>Total Energy</th>
<th>Total Yearly Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Usage (x1,000) kWh</td>
<td>Savings</td>
<td>Usage (x1,000,000) Btu</td>
<td>Savings</td>
</tr>
<tr>
<td>Current Building</td>
<td></td>
<td>515.3</td>
<td>648.1</td>
<td>2406.8</td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>renovation baseline</td>
<td>401.9</td>
<td>926.46</td>
<td>2300.1</td>
<td>4.4%</td>
</tr>
<tr>
<td>Reduced Lighting</td>
<td>F28T8 vs F32T8</td>
<td>385.5</td>
<td>933.5</td>
<td>2249.2</td>
<td>2.2%</td>
</tr>
<tr>
<td>R30 Roof</td>
<td>R30 roof insulation</td>
<td>402.7</td>
<td>925.09</td>
<td>2297.4</td>
<td>0.1%</td>
</tr>
<tr>
<td>PVC Roof</td>
<td>PVC membrane on 2-inch floor</td>
<td>399.36</td>
<td>966.66</td>
<td>2330</td>
<td>1.3%</td>
</tr>
<tr>
<td>Operable Windows</td>
<td>Keep operable windows</td>
<td>400.61</td>
<td>971.83</td>
<td>2339.1</td>
<td>1.7%</td>
</tr>
<tr>
<td>Insulating Glass</td>
<td>Insulating glass in current</td>
<td>402.18</td>
<td>891.41</td>
<td>2270</td>
<td>1.3%</td>
</tr>
<tr>
<td></td>
<td>window frame</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum Frame</td>
<td>New aluminum frame window</td>
<td>401.5</td>
<td>886.99</td>
<td>2257</td>
<td>1.9%</td>
</tr>
<tr>
<td>Vinyl Frame</td>
<td>New vinyl frame window</td>
<td>401.52</td>
<td>882.99</td>
<td>2253.4</td>
<td>2.0%</td>
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<tr>
<td>Daylighting</td>
<td>Daylighting Controls</td>
<td>385.69</td>
<td>932.66</td>
<td>2249</td>
<td>2.2%</td>
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<tr>
<td>VAV</td>
<td>VAV HVAC System</td>
<td>526.04</td>
<td>68.77</td>
<td>1864.1</td>
<td>19.0%</td>
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<td>DCV*</td>
<td>DCV estimate</td>
<td></td>
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</tr>
<tr>
<td>VRFZ*</td>
<td>Estimate of VRFZ system instead of 4-pipe HVAC system</td>
<td>2019.12</td>
<td>12.2%</td>
<td>2.5%</td>
<td></td>
</tr>
</tbody>
</table>
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Table 2. Payback and Energy Saved per Investment for each Energy Conservation Opportunity

<table>
<thead>
<tr>
<th>Project Run</th>
<th>ECO Description</th>
<th>Total Energy</th>
<th>Total Yearly Cost</th>
<th>Installation Cost</th>
<th>Payback (years)</th>
<th>Energy Saved per Investment (MBtu/1,000 dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Usage (x1,000,000) Btu</td>
<td>Savings</td>
<td>Cost ($)</td>
<td>Savings</td>
<td></td>
</tr>
<tr>
<td>Current Building</td>
<td></td>
<td>2406.8</td>
<td>$66,781</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>renovation baseline</td>
<td>2300.1</td>
<td>4.4%</td>
<td>$54,210</td>
<td>18.8%</td>
<td></td>
</tr>
<tr>
<td>Reduced Lighting</td>
<td>F2RT8 vs F3RT8</td>
<td>2249.2</td>
<td>2.2%</td>
<td>$52,233</td>
<td>3.6%</td>
<td>$20,499</td>
</tr>
<tr>
<td>R30 Roof</td>
<td>R30 roof insulation</td>
<td>2297.4</td>
<td>0.1%</td>
<td>$54,222</td>
<td>0.0%</td>
<td>$31,706</td>
</tr>
<tr>
<td>PVC Roof</td>
<td>PVC membrane on 2-inch R410 concrete</td>
<td>2330</td>
<td>-1.3%</td>
<td>$54,014</td>
<td>0.4%</td>
<td>Not Price</td>
</tr>
<tr>
<td>Operable Windows</td>
<td>Keep operable windows</td>
<td>2338.1</td>
<td>-1.7%</td>
<td>$54,183</td>
<td>0.0%</td>
<td>$0</td>
</tr>
<tr>
<td>Insulating Glass</td>
<td>insul glass in current window frame</td>
<td>2270</td>
<td>1.3%</td>
<td>$54,154</td>
<td>0.1%</td>
<td>$131,381</td>
</tr>
<tr>
<td>Aluminum Frame</td>
<td>New alu frame window</td>
<td>2257</td>
<td>1.9%</td>
<td>$54,042</td>
<td>0.3%</td>
<td>$164,226</td>
</tr>
<tr>
<td>Vinyl Frame</td>
<td>New vinyl frame window</td>
<td>2253.4</td>
<td>2.0%</td>
<td>$54,033</td>
<td>0.3%</td>
<td>$65,690</td>
</tr>
<tr>
<td>Daylighting</td>
<td>Daylighting Controls</td>
<td>2249</td>
<td>2.2%</td>
<td>$52,253</td>
<td>3.6%</td>
<td>$40,998</td>
</tr>
<tr>
<td>VAV</td>
<td>VAV HVAC System</td>
<td>1864.1</td>
<td>19.0%</td>
<td>$66,708</td>
<td>-23.1%</td>
<td>$25,184</td>
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<tr>
<td>DCV*</td>
<td>DCV estimate*</td>
<td>2242.6</td>
<td>2.5%</td>
<td></td>
<td></td>
<td>$12,885</td>
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<tr>
<td>VRFZ*</td>
<td>Estimate of VRFZ system instead of 4-pipe HVAC system.</td>
<td>2019.12</td>
<td>12.2%</td>
<td>$126,748</td>
<td>2.2</td>
<td></td>
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</tbody>
</table>

* Savings for these ECO are estimates only, as they could not be accurately modeled in eQUEST

## Payback and Energy Saved

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Miller Hall: Programmatic Issues
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Main Floor

Upper Floor

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Classrooms

Offices

Public Spaces

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Miller Hall: Technical Challenges

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Steel Structure with CMU Shear Walls; Low ceiling heights

Systems shared with adjacent buildings

Window and masonry rehabilitation

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Implementation

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The Bottom Line

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Miller Hall $150/square foot (estimated)

vs.

New Construction @ $180-$240/square foot
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