## Colgate - Chapel House Renovation

### Heating Energy - Summary

With Actual Blower Door

<table>
<thead>
<tr>
<th></th>
<th>Stone Wall</th>
<th>Window</th>
<th>Slab Edge (below grade)</th>
<th>Roof</th>
<th>Door</th>
<th>Glass Door</th>
<th>Infiltration (cfm50)</th>
<th>Internal Gains (kwh)</th>
<th>Ventilation (cfm cont.)</th>
<th>Heat Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DORMITORY</strong></td>
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</tr>
<tr>
<td>Existing Conditions</td>
<td>5.00</td>
<td>1.75</td>
<td>2.00</td>
<td>1.25</td>
<td>0.20</td>
<td>15.00</td>
<td>2688</td>
<td>2000</td>
<td>600</td>
<td>0%</td>
</tr>
<tr>
<td>Base Case</td>
<td>5.00</td>
<td>5.00</td>
<td>20.00</td>
<td>20.00</td>
<td>0.20</td>
<td>50.00</td>
<td>1000</td>
<td>1000</td>
<td>1300</td>
<td>65%</td>
</tr>
<tr>
<td>All The Way</td>
<td>20.00</td>
<td>6.00</td>
<td>30.00</td>
<td>30.00</td>
<td>10.00</td>
<td>60.00</td>
<td>550</td>
<td>1000</td>
<td>1300</td>
<td>80%</td>
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<tr>
<td><strong>CHAPEL</strong></td>
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</tr>
<tr>
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<td>1.75</td>
<td>0.20</td>
<td>15.00</td>
<td>3.00</td>
<td>2.00</td>
<td>2500</td>
<td>4000</td>
<td>1200</td>
<td>0%</td>
</tr>
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<td>500</td>
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<td>5.00</td>
<td>200</td>
<td>2000</td>
<td>1200</td>
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<tr>
<td><strong>WHOLE BUILDING</strong></td>
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</tbody>
</table>

### Net Annual Load (MMBTU)

- **Existing Conditions**
  - DORMITORY: 383
  - CHAPEL: 289
  - WHOLE BUILDING: 992

- **Base Case**
  - DORMITORY: 171
  - CHAPEL: 65
  - WHOLE BUILDING: 75

- **All The Way**
  - DORMITORY: 63
  - CHAPEL: 22
  - WHOLE BUILDING: 27

### Load Reduction (Envelope)

- **Existing Conditions**
  - DORMITORY: 70%
  - CHAPEL: 65%
  - WHOLE BUILDING: 65%

- **Base Case**
  - DORMITORY: 55%
  - CHAPEL: 78%
  - WHOLE BUILDING: 70%

- **All The Way**
  - DORMITORY: 84%
  - CHAPEL: 92%
  - WHOLE BUILDING: 85%

### Heating System

- **Existing Conditions**
  - DORMITORY: 70%
  - CHAPEL: 65%
  - WHOLE BUILDING: 65%

- **Base Case**
  - DORMITORY: 55%
  - CHAPEL: 78%
  - WHOLE BUILDING: 70%

- **All The Way**
  - DORMITORY: 84%
  - CHAPEL: 92%
  - WHOLE BUILDING: 85%

### Input (MMBTU)

- **Existing Conditions**
  - DORMITORY: 547
  - CHAPEL: 445
  - WHOLE BUILDING: 492

- **Base Case**
  - DORMITORY: 53
  - CHAPEL: 22
  - WHOLE BUILDING: 75

- **All The Way**
  - DORMITORY: 20
  - CHAPEL: 7
  - WHOLE BUILDING: 27

### Savings (BTU)

- **Existing Conditions**
  - DORMITORY: -
  - CHAPEL: -
  - WHOLE BUILDING: -

- **Base Case**
  - DORMITORY: 65%
  - CHAPEL: 78%
  - WHOLE BUILDING: 70%

- **All The Way**
  - DORMITORY: 84%
  - CHAPEL: 92%
  - WHOLE BUILDING: 85%

---

Excludes Entry/Connector

Includes Entry/Connector

50% Reduction of existing electric consumption also assumed - based on conversion to LED fixtures.

NOTE: Building will incur additional energy CONSUMPTION due to addition of Cooling capacity.

No calculations made in reference to the added cooling load.

Chapel House- Design Process- Envelope and Energy savings
Chapel House- Design Process- Amber Glass

Colgate University Chapel House
Schematic Design
24 September 2015

c&h architects

CHAPEL GLAZING WALL SECTIONS

EXISTING WALL SECTION @ CHAPEL GLAZING

PROPOSED WALL SECTION @ CHAPEL GLAZING

Building Energy 2017
Transforming Institutional buildings for the next 100 years

NEW AAC BLOCK
NEW CURTAIN WALL FIXED GLAZING
NEW RIGID INSULATION BETWEEN STEEL BEAMS
NEW INSULATED ROOF ASSEMBLY ON EXISTING STEEL DECK
EXISTING STEEL COLUMN
EXISTING STEEL ROOF STRUCTURE
EXISTING CONCRETE SLAB & CONCRETE FOOTINGS
EXISTING ROOF DECK
NEW LIGHTING TO ILLUMINATE GLAZING AND/OR SHADES
NEW SHADE
NEW CURTAIN WALL SPANDREL PANEL
NEW WOOD GRILLE COVERS
EXISTING DUCT
EXISTING SLOPED CEILING
EXISTING GLAZED WALLS
EMPTY CAVITY
EXISTING GLAZED WALLS
EXISTING GLAZED WALLS
EXISTING GLAZED WALLS
Chapel House- Design Process – New curtain wall outside structure
Community Feedback (beyond the Design Committee):

- Plan changes and elevator addition were embraced
- Envelope proposal for new curtain wall at west wall embraced
- Proposal to change the aesthetic of the Amber Glass rejected despite recommendation from the Design Committee

- What to do?
Chapel House- Underground ductwork
The graph below shows the existing loads with the 4,000 cfm exhaust:

Chapel House- Design Process – Analysis - Do Nothing
The next graph shows the revised loads with the new ventilation system, roof being replaced, and no change to the Amber Glazing at all. This represents a 65-70% reduction in the heating load.

Leave Chapel Glazing As Is (R-1.75 Glazing):

![Design Heat Loss by Component Graph](image-url)