“Building Green – Keep Green”

By: Michael Knaack / Jim Hansen
Learning Objectives

At the end of this program, participants will be able to:

• Understand details used for schools in Bethel, WA.
• Evaluate the energy benefits that wood framing provides.
• Discuss cost saving techniques used in the Bethel School District for new school construction.
• Investigate the decision making process as it relates to selection of building materials and systems.
Presentation

- Bethel School District
- Design Approach
  - Wood / Insulation
  - HVAC / Electrical
- Carbon Emission (Sequestration)
- History of RCM Program
- How the RCM Program Works
- RCM Program
- Lessons Learned
- Questions
Bethel School District

- 215 SQ Miles Unincorporated Pierce County
- 1/3 – In Urban Growth Area
- 18,500 Students
- 17 Elementary Schools
- 6 Middle Schools
- 3 High Schools
- 1 Alternative School
- Pierce County Skills Center
Bethel School District
Design Approach

- Function – Aesthetics – Economics

- 2006 Bond Issue
  - Educational Specifications (Administrative Team)
  - Construction Standards
  - Operational Cost
  - 30-35 Year Remodel Cycle

- Design Team
  - Collaborative Design with Team Members
  - Familiar with Local Codes & Design Standards
    - 4 Community Plans, 3 Power Companies, 5 Water Purveyors
Speed of Construction / Framing
## Net Carbon Emissions

<table>
<thead>
<tr>
<th>Material</th>
<th>Net Carbon Emissions (kg C/metric ton)</th>
<th>Net Carbon Emissions Including Carbon Storage Within Material (kg C/metric ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framing lumber</td>
<td>50</td>
<td>-457</td>
</tr>
<tr>
<td>Medium density fiberboard (virgin fiber)</td>
<td>100</td>
<td>-382</td>
</tr>
<tr>
<td>Brick</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Glass</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Recycled steel (100% from scrap)</td>
<td>210</td>
<td>210</td>
</tr>
<tr>
<td>Concrete</td>
<td>240</td>
<td>240</td>
</tr>
<tr>
<td>Concrete block</td>
<td>264</td>
<td>264</td>
</tr>
<tr>
<td>Recycled aluminum (100% recycled content)</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Steel (virgin)</td>
<td>660</td>
<td>660</td>
</tr>
<tr>
<td>Plastic</td>
<td>580</td>
<td>237</td>
</tr>
<tr>
<td>Aluminum (virgin)</td>
<td>4,260</td>
<td>4,260</td>
</tr>
</tbody>
</table>

1. Values are based on life cycle assessment and include gathering and processing of raw materials, primary and secondary processing, and transportation.
3. A carbon content of 49% is assumed for wood.
HVAC/Electrical

- Ridge Conduit (EMT) vs MC Cabling
- Lighting Fixtures
- Ground Couple vs Air Induction Systems
- Copper vs Pex Piping
- Cast Iron vs ABS
- No Sole Source
  - Controls
  - HVAC Equipment
Ground Couple vs Air Induction Systems
Air Induction Systems
RCM Program=M.E.A.T.

• How to Build a Program:
  – Measure
  – Educate
  – Audit
  – Talk

• HVAC is the biggest user of energy, the most difference is made there (Schedule Time = Money)

• Long term Solutions – Retrofits, Grants, Waste Mgt
RCM Program Results

- Since 2005, $7.5 million in costs avoided
- Kilowatt reduction equal to two years of usage for all district buildings (2 million SF)
  - 2004/05  21 million KW $1.1 Million - 26 Sites
  - 2012/13  19 million KW $1.3 Million - 31 sites
- Nationwide Recognition
  - Overall portfolio average of 92 (out of 100)
  - 2013 ENERGY STAR LEADER
  - 2013 Leadership in Reducing Greenhouse Gases
  - 2016 Dept. of Education Green Ribbon District
Bethel Wins Green Award on Earth Day!

Today, the U.S. Secretary of Education named the Bethel School District a U.S. Department of Education Green Ribbon School District Sustainability Awardee!

Bethel was one of only 15 school districts in the country to receive the award. All were honored for their innovative efforts to reduce environmental impact and utility costs, improve health and wellness, and ensure effective sustainability education. 47 schools and 11 postsecondary institutions were also recognized.

We are excited to share this wonderful news with our staff on Earth Day!
Questions?

This concludes The American Institute of Architects Continuing Education Systems Course.

Michael Knaack
mknaack@Bethelsd.org

Jim Hansen
jim@rjhsolutionsllc.com