

RESIDENCE INN

BY MARRIOTT

2345 MILL RD, ALEXANDRIA, VA

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CONSTRUCTION MANAGEMENT



Critical Industry Research: “Greening” of Hotels - Depth

Background

There is an unfortunate misconception in this industry that adding green value or achieving LEED points simply costs too much no matter what the benefits could be. The city of Alexandria, VA is trying to help this cause in new construction by requiring all new buildings to have at least 20 LEED points. While budgeting for this project it was initially determined to include what would qualify for only the required 20 points.

Marriott firmly believes in adding green or LEED credits to many of their new hotels and resorts. Marriott shows that they are one of the leaders in green technologies and are willing to try new energy and mechanical systems. Since Marriott is one of the leading hotel chains their ideas and practices will filter to all other hotel chains.

Goal

The goal of this research is to investigate the sustainability or “Greening” of hotels by incorporating green design into the project and analyzing the corresponding cost. This research will compare typical building materials and systems to their green alternative. The analysis includes comparing upfront cost, installation cost, and life cost to determine which is most economical. This research will compare:

- Painted Gypsum Board to Colored Clay Plaster
- Fiberglass Batting Insulation to Blown Cellulose Insulation
- Ceramic Tile Flooring to Polished Concrete
- Continuously powered A/C units to Programmed Networked A/C units
- Typical Sanitary System to Constructed Wetlands Greywater System

The owner’s and architect will be surveyed to gain an initial opinion regarding these green technologies. Once the research is complete a concluding survey will be sent with an overview of the results, to determine if the research was effective.

Resources

- Project staff and consultants
- R.S. Means Interior Cost Data, and Square Foot Costs
- Material manufacturer’s websites
 - www.greenbuildingpages.com
 - www.buildinggreen.com

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Industry Analysis

Please refer to Appendix G for surveys, results, and R.S. Means cut sheets.

❖ *Step 1: Product / System Overview*

- Painted Gypsum Board vs. Colored Clay Plaster
 - Drywall is a very common material used in the Residence Inn Marriott. It is used for wall coverings as well as acoustical use. There are multiple layers of drywall on every wall between each guestroom and the exterior walls on the north, west, and south faces of the building which greatly escalates the material cost. These multiple layers of drywall are intended to help with the sound attenuation from outside the façade and from room to room.
 - Clay plaster is an excellent alternative to drywall. It is a very flexible and workable material that can be stained or painted and can easily be repaired. The plaster has many similar characteristics to drywall; it is fire rated, can be painted, and absorbs sound in the same way. It is also mold, moisture, and pest resistant. Although the plaster can be painted, it is easier to use the color packages and add a stain to it, so once the plaster is installed there is no need to come back and paint. This will reduce the labor cost and eliminate painting. The plaster can also be sprayed on, increasing construction efficiency. The plaster also out performs the drywall in terms of mold and moisture absorption, and is pest resistant. The clay used in the plaster is extracted from soils in the United States; clay is renewable resource which adds green value to the product.



*Figure 32: Stained Plaster (Left), Painted Plaster (Right)
Courtesy of American Clay Plaster*

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- Fiberglass Batting Insulation vs. Blown Cellulose Insulation
 - The current insulation is typical 6” fiberglass batting insulation. It has an R-value of 19 which is most common and sufficient for use in a hotel. The insulation like the drywall is being used in almost every wall throughout the hotel to block sound. The insulation is located on all exterior walls to provide thermal comfort and in each wall separating guestrooms to provide sound attenuation. However, this typical insulation is truly meant for thermal comfort more so than sound attenuation.
 - Blown cementitious foam insulation, called cellulose, is an excellent alternative to the fiberglass batting. The cellulose fills many air gaps that exist with batting, and decreases air infiltration. The cellulose also has a Class A fire rating which aids in the stability of the wall and façade allowing more time for evacuation if the building were to be compromised.
 - More stable R-value throughout the year and no fluffing required.
 - *“All loose-fill insulation settles after installation. Cellulose insulation is always specified and sold at settled density, so compensation for settling is built into the bag count and material weight columns of cellulose coverage charts.”*
 - *“Research shows cellulose to be up to 40% better than fiber glass at controlling air infiltration. – makes air barriers not necessary”*
 - Absorbs moisture that might get into the wall cavity
 - Class A fire rating vs. Noncombustible

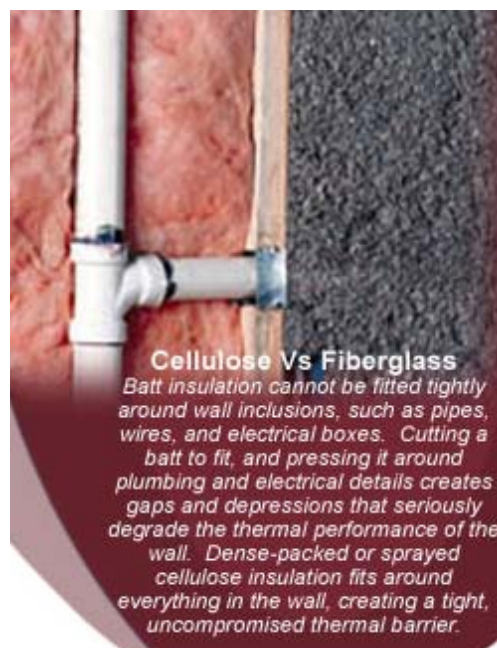


Figure 33: Cellulose Insulation
Courtesy of Cellulose website

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- Ceramic Tile Flooring vs. Polished Concrete
 - Ceramic tile is currently being used in the lobby area of the Residence Inn by Marriott. The lobby is a very high traffic area which means an alternative must be very durable.
 - Polished concrete is an excellent alternative to ceramic tile flooring. The structural floor system being used in the hotel currently is a post-tensioned concrete floor system. This alternative is an ideal technology because there is no longer a need to add cost to the project by specifying a material finish and hiring highly skilled labor to install. The polished concrete floor finishing eliminates the extra cost for materials and extra laborers. The finished product looks like a high gloss expensive coating, tile, or linoleum and colors and patterns can be added increase the aesthetics of the flooring.
 - A polished concrete floor will outlast a ceramic tile floor in high traffic areas because the concrete is sealed after be polished to resist fading, staining, and damages. Ceramic tile colors fade and the floor system cannot be sealed as effectively.



*Figure 34: Polished Concrete Flooring
Courtesy of Retroplate website*

- Continuously Powered A/C Units vs. Programmed Networked A/C Units
 - The fan coil unit (FCU) mechanical system is designed to condition the guest rooms and other spaces in addition to masking the noise from the metro tracks that impede the site. The original mechanical fan coil units were intended to run 24 hours a day to condition the space. The primary purpose was to create a white noise background to prevent guests from being disturbed during their stay at the Residence Inn.
 - The programmable thermostat was selected as an alternative for this system because it can be networked with the other thermostats in the building and controlled by a single computer. This means that the building's fan coil units can be controlled from one place and that the guest can be locked out of the system.

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- This thermostat network has the capabilities of the nightly “over-ride” mode and occupant control during the day.



*Figure 35: Delta DNT-103 Programmable Thermostat
Courtesy of Delta Controls*

- Typical Sanitary System vs. Constructed Wetlands Greywater System
 - Hotels generate a large amount of greywater from showers, sinks, and laundry. Currently this water is being expelled through the storm water and sanitary systems out to the city sewer system; none of it is being recycled.
 - A constructed wetlands greywater system is an excellent alternative to the current system. This system will save water, help the environment, and add aesthetic appeal.
 - A constructed wetlands greywater system cleans the greywater biologically. This means the “constructed wetland system (CWS) pre-treats wastewater by filtration, settling, and bacterial decomposition” as defined by the University of Minnesota.
 - This system is intended to mimic the system currently in use at Penn State’s Center for Sustainability. “[This is a] natural wastewater treatment facility that mimics nature’s own processes found in wetlands and marshes to remediate contaminated water. Micro-organisms break down and digest the waste, as they do in our outdoor ecosystems, found in closed aerobic and anaerobic tanks. Inside the biofilter’s greenhouse, tropical plants, flowers and a fish flourish in open aerobic tanks, continuing this filtering process. Since the plants are doing most of the work, the Ecological Systems Lab offers a low impact, less costly and less energy intensive alternative to chemical waste water treatment.”

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*Figure 36: Constructed Wetlands Greywater System
Created in Google SketchUp*

❖ Step 2: Initial Survey

Please refer to Appendix G for surveys.

- The survey was designed to learn the opinions of the owner, owner's representative, two architects, and an estimator regarding green technologies usefulness and cost. These participants were chosen because they have the greatest influence over the design of the project and can decide what technologies should be implemented.
 - Marriott was contacted to participate in the survey, but was unable to do so. Their efforts are clearly in favor of green technologies and are outlined later.
- A series of questions were asked to gain an understanding of the familiarity to LEED and green technologies each person has, as well as their experience with each.
- At the end of the survey was a chart with each set of materials and systems listed. Participants were asked to check which they thought was greater between each set, the upfront cost, payback period, and life cycle cost.
- The survey also asked which they thought was the most cost effective project: a LEED project, a green project, or a project which implements neither.
 - The results show that on average from a scale of 1 to 10 the participants showed a 7.6 familiarity with LEED and 4.6 with green technologies.
 - On average, participants have worked on 1 to 5 projects that implemented LEED, and 5 to 10 projects that implemented green technologies.
 - Each showed an average of 5 to 10% cost increase. Most participants cited "compliance" as the reason the increased cost made the project worthwhile.
 - The results for the chart varied widely. There was no definitive way to tabulate a result. Most participants responded with "it depends" as to whether the upfront cost, payback period, and life cycle cost were greater between the technologies in each set.
 - Almost all participants site that the most cost effective project implements green technologies.

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- The results of the initial survey show that overall there is a greater understanding the LEED system than there is of green technologies. This is very interesting because LEED aims to push green technologies in building design.
- The results also show that the cost effectiveness of each green technology and system compared do depend on the application. But there is also no consistency between the participants as to which is better.

❖ *Step 3: Research*

- Contractor quotes and R.S. Means were used to determine the material and labor costs.
- Manufacturer data was used to determine product life.
- For each set of materials the product costs were broken down per square foot. This was then used to derive the life cost; this is not a true life cycle cost. This is the annual cost of the product over the useful life of the product.
- The A/C units were compared by thermostat unit cost, labor, and installed cost. They were not able to be compared for the life cost due to the unknown nature of the thermostat life. Thus, the units were compared by total price per unit.
- The sanitary systems were not able to be compared in this manner. The total average cost of a greywater system was applied, and the water savings was highlighted.

❖ *Step 4: Concluding Survey*

Please refer to Appendix G for surveys.

- The concluding survey was very brief. The participants were presented with a chart of the same sets of materials and technologies, showing the material upfront cost, labor cost, total cost, life cost, and product life. They were asked to choose one from each set that they would use on a project and briefing explain why.
 - All participants chose painted gypsum board over colored clay plaster. Most cited the ease of installation, maintenance and repair as the deciding factors. Some also noted that it is more applicable in buildings that are renovated frequently, such as hotels.
 - There was a tie between the blown cellulose insulation and the fiberglass batting insulation. Some noted that the fiberglass batting is easy to install because it comes in appropriate widths for stud cavities. Others reasoned that since the cellulose has almost the identical life cost per year and higher thermal protection qualities that it should be implemented.
 - Most chose the polished concrete flooring over the ceramic tile. This was interesting because one participant chose it after learning about it through this survey. They found it to have “good savings and a durable solution”. Another noted that it would aid in renovation by eliminating the need for demolition of the existing flooring. However, this product cannot be used in all projects because the architectural design

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- may not allow for it. This is because a polished concrete flooring system, if not stained, can produce an industrial look with the space.
- All participants chose the programmed networked A/C units based on the energy and cost savings. They felt the higher upfront cost was justified by the savings produced.
 - Almost all participants chose the greywater system over the typical sanitary system. Most noted that the water savings was the reason to implement this system, but also weighed it with ability to design, install, and maintain it properly. Jurisdictional issues could also cause problems with a greywater system.
 - These results were very encouraging. In most cases the green alternative technology was chosen over its more common counterpart. This was intriguing because when asked which technology was more costly, longer payback, or higher life cycle cost, the answers varied widely. This means that most participants did not have a clear understanding of what costs are associated with each product. However, when shown hard numbers and savings data, their choices were clear. The higher upfront cost was justified by the savings and the environmentally friendly technologies.

Marriott's "Green" Efforts

“Marriott International, Inc. is a leading lodging company. Its heritage can be traced to a root beer stand opened in Washington, D.C., in 1927 by J. Willard and Alice S. Marriott. Today, Marriott International has about 3,000 lodging properties located in the United States and 67 other countries and territories.”

At the Residence Inn by Marriott the company prides themselves in inviting guests for long term stays in a place that is as close to “home” as you can get. They want to make the guest feel as comfortable as possible. They do this by implementing:

- Residential atmosphere with spacious accommodations
- Complimentary hot breakfast
- Evening hospitality hour
- Swimming pool
- Sport Court®
- Personalized grocery shopping
- Daily housekeeping
- Guest suites with separate living and sleeping areas
- Fully equipped kitchen
- Work space with data ports and voicemail

Marriott also prides itself in the “greening” of their hotels. They have received numerous awards and recognitions for energy conservation, coral reef restorations, recycling construction waste, planting trees, to name only a few. Marriott has a “commitment to sustainable environmental

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practices” demonstrated by their sponsorships and corporate programs: Clean Up the World Sponsor and the Environmentally Conscious Hotel Operations (ECHO) program. Pictures of some of their most recognized hotels and efforts can be seen below. For more information please visit www.marriott.com.

Los Suenos Marriott Builds a Home for the Endangered Scarlet Macaw



Grand Cayman Marriott Leads Successful Beach and Reef Restoration Effort



Miami Hotels Recycle 300 Tons of Materials During Renovation



JW Marriott Bangkok Associates Plant 400 Trees, Help Reforest Fragile Coastline



Figure 37: Pictures of Marriott's Green Efforts

A few of their most recent prestigious awards include:

- “It is ranked as the lodging industry’s most admired company and one of the best places to work for by FORTUNE®.”
- “The company is also a 2006 U.S. Environmental Protection Agency (EPA) ENERGY STAR® Partner.”
- “Marriott has been recognized by the U.S. Environmental Protection Agency (EPA) with the 2007 Sustained Excellence Award and Partner of the Year since 2004.”

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When designing and building a green hotel, there are four key areas that Marriott focuses on.

1. Use of environment-friendly building materials – Materials that are renewable resources are targeted. Wood is certified, and wood stains are water based to minimize VOC emissions. Paints and wallpaper glue are also low VOC materials.
2. Recycling – Materials that contain recycled content are used in construction, as well as recycling construction waste. Energy recovery units are used where applicable.
3. Water Conservation – Low flow fixtures are installed where applicable. Guests are encouraged to reuse bath towels and bed linens rather than having newly washed sets every day.
4. Smoke-Free Environment – All Marriott properties are smoke free spaces.

By focusing on these main areas of conservation, energy is reduced and helps reduce greenhouse gas production. This helps create a healthier living environment for guests. In conjunction with Travelocity a poll was conducted, the survey showed that 38% of the respondents “were interested in taking a vacation where they can give back and make a difference during their stay”. From this a grant was formed to give to people who demonstrate a strong commitment to improving the environment. For more information please visit Travelocity’s website at www.travelocity.com/travelforgood.

Conclusion & Recommendation

This research shows that green technologies are favored among industry members, and are regarded as cost effective. It is also apparent for green technologies the upfront cost, payback period, and life cycle cost are not widely known in comparison with their common counterparts. Based on these results the constructed wetlands greywater treatment system would be recommended for this project. The project participants showed they feel the upfront cost is worth the green value, aesthetic appeal, and water savings.

From these results it shows this research was effective since the green alternative technology was favored. An initial opinion was attained and in some cases participants were educated about new green technologies. Overall, it shows that when presented with hard numbers in terms of cost and savings, the decision makers chose the environmentally friendly alternative.