



Breadth Study I Construction

Cost and Schedule

Engineering an alternate structural system will have economic effects from the structural material and labor of construction. One goal of thesis research was to see how the cost of the redesigned structure would compare to the existing as well as how the schedule would change.

The cost of the original concrete system, obtained from HITT Contracting Inc., was \$5.7 million. Since this cost includes the footings, SOG, and foundations walls, a cost estimate was made of the remaining structure which totaled to \$5.13 million. Costs were obtained from R.S. Means 2007 Construction Cost Data. A factor of 0.93 was multiplied to the estimate for a location factor of Baltimore, Md.

The cost estimate for the steel structure came in \$5.19 million. Prices used in the estimate were obtained from distributors, contractors, and R.S. Means 2007. Items including in the take-off were steel beams, columns, lateral braces and girder-slab members. As well as composite decking, pre-cast planks, and spray on fireproofing of the steel members. Labor, equipment, and overhead and profit were considered as well as a factor of 0.93 for a location factor for Baltimore, Md. The steel system costs roughly \$66,000 more than the existing concrete system. A comparison of the two systems is summarized in Table 5 seen below.

System	Component	S.F. Cost	Total Cost Including O&P
Steel	Composite Beam	\$22.55	\$5,192,391.73
	Girder Slab	\$17.11	
	Braced Frames	\$3.89	
CIP Concrete	Drop Panels	\$21.23	\$5,126,712.35
	Post tension	\$21.52	
	Shear Walls	\$1.80	

Table 5: System Cost Comparison

A schedule of each system was made to compare erection times. Schedules were produced using quantities from R.S. Means 2007 Construction Cost Data as well as durations provided by contractors and case studies of the Girder-Slab system. Using Microsoft Project a Gantt bar schedule was created which can be seen in the Appendix. Using the start date of April 25, 2005 provided by the contractor, the CIP concrete system

finished up October 31, 2005, while the steel system was completed by September 16, 2005. The year of 2005 was used just to reference the original project, all cost estimates were made for the present time. The steel system allowed for a decrease in erection time by 45 days.

Schedule Impact

Allowing for an earlier opening date for the hotel would enable the 'BWI Hilton' to start generating revenue earlier. Contacting the 'BWI Hilton Hotel' it was determined that an average of 180 rooms is sold per night. Prices range from \$148 to \$275 depending on demand of rooms. The steel system was projected to be completed 45 days sooner than the existing C.I.P system. At an average selling price of \$211.50 per room with an average quantity of 180 rooms sold, the owners of the 'BWI Hilton Hotel' would generate \$1,713,150.00 in revenue from the earlier opening date.



Breadth Study II
LEED Hotels

LEED Certified Hotel

As more and more concern for sustainability and environmental friendly buildings is brought to the forefront, the question of why are not more hotels moving in this direction was considered. Would the consumer prefer their hotel to be more environmentally conscious? How could gaining certification as Leadership in Energy and Environmental Design (LEED) building appeal to the consumer. These ideas became a basis of a breadth study for thesis research.

A survey was conducted to see what the consumers' preferences would be between a LEED certified hotel compared to a non-LEED certified hotel. The nature of the survey was exploratory, which was not intended to produce statistics that could be generalized, but to gain a feeling of interest or opinion of what people want in their hotel stay.

To gain ideas for a survey and how hotels could become LEED rated, research was completed on the first LEED rated Hilton hotel in the United States. The Vancouver Hilton Hotel in Vancouver, Washington is the first LEED rated Hilton hotel in the U.S. and 1 out of 4 hotels considered green in the world. The primary LEED strategies were buying locally to reduce fuel consumption of delivery, dimmable fluorescents, CO₂ monitoring, recycle construction waste, and landscaping areas to reduce paved areas which in turn reduces heat island effects. The Vancouver Hilton tries to emphasize items that get the public's interest. For instance CO₂ monitors in large gathering spaces, windows in all meeting rooms, and that this hotel has not lost its luxury, yet is more sustainable than the next. The words "High tech and High touch" were used to describe the hotel. Hotel is marketed by placing official LEED logo on hotel brochures and information packets are sent to organizations holding conventions at the hotel, which explain the hotel's LEED efforts. Vancouver Hilton is well received in publications by the U.S. Green Building Council and other various other media publications.

Survey Results

The survey consisted of 8 questions that were asked to people of varying age and race. A copy of the survey may be found in the Appendix. Most people were not familiar with the LEED rating system for buildings and were from there educated. Once

subjects were familiarized with LEED, the consensus was that most people said they would stay at a LEED rated hotel over a non-LEED rated hotel if the following criteria were kept the same: hotel was in a desired location or side by side to a non-LEED rated, and if price was kept within reason. When the question of how much more a subject was willing to pay for a LEED-rated hotel room was asked, there were few who said they would not pay more but the majority said that they thought \$10 more was fitting. Table 6 below displays answers to part of question 7 of the survey, which asks, “What type of information would you want to learn from LEED hotel advertising?”

Information/Ideas how Hotel should advertise
General information about LEED rating and offered literature on LEED
Made aware of how many hotels are LEED rated
What benefits the hotel offers
Advertise online as a amenity not as a main attraction
Display multiple items the hotel has accomplished to help environment
Display Symbol with a description
Communicate the steps they have taken to be LEED rated
Want to know specific features

Table 6: Information from survey

These answers could be beneficial to hotels trying to gain ideas for ways to market their hotel if LEED rating became a realization. Another question asked in the survey was: “Are you aware of any hotels that use CO₂ monitoring systems?” Only one subject replied that they knew of a hotel that utilizes CO₂ monitors. This item was said to gain interest of the public and is an item that could be applied to hotels striving to reach a LEED certification.

Stay at our LEED Certified Hotel

Researching this notion of LEED certified hotels and consumer wants has lead to a few simple guidelines for hotels. Keeping the same basic criteria, while engineering ways to make the hotel more sustainable, is the winning formula. With all the points available to earn, hotels should work towards a LEED goal. The survey cannot be generalized for the entire public, but from the subjects surveyed, all would have chose the LEED rated hotel if location was same and price was constant or within reason.

Explaining the LEED rating, illustrating what steps have been taken to obtain it, and displaying the symbol are the hotel's best tools for attracting a consumers' interest on this topic. The following is an idea for signage.



“Doing Our Part to be Environmentally Conscious”

This hotel received a LEED certification for sustainable practices. To learn more about these accomplishments inquire at the front desk.