

I AM IMAGINATION.

Abstract

What is the cost premium to have a LEED certified building? This is one of the great questions that exist in the construction industry today. Owners, architects, and contractors all want to know. There is a rather loose figure floating around the business that LEED certification adds an 8% to 12% premium to the initial construction costs for a building project. There is no feasible way to calculate an absolute value for the LEED premium. However, by compiling the estimated additional costs required for LEED-related design features,

Mascaro Construction and Perkins Eastman offer a case study of the Children's Museum of Pittsburgh project and the initial construction cost premium for LEED certification. For this poster case study presentation, Perkins Eastman highlights some of the LEED and green building-related design and construction features of the Children's Museum and Mascaro Construction puts the 8%-12% premium figure to the test.

INSPIRATION

CHILDREN'S MUSEUM OF PITTSBURGH



Imagining a children's museum... A vivid imprint of actively engaged children, an historic post office with dollhouse details, and a storybook-like empty planetarium triggered the imagination of Design Architect Koning Eizenberg and Executive Architect Perkins Eastman, and resulted in an innovative expansion and renovation to create the new Children's Museum of Pittsburgh.

The Children's Museum of Pittsburgh expansion and renovation continues a commitment to Pittsburgh's north side neighborhood by adaptively utilizing historic structures in an urban setting. The newly expanded facility (completed November 2004) is designed to offer innovative exhibits and programs for all families and children in western Pennsylvania and beyond. The facility is one of the few museums in the country to be housed in three buildings that architecturally span three millennia: the original Children's Museum housed in the old Allegheny Post Office (a registered Historic Landmark), the former Buhl Planetarium building (a nominated structure), and the new connecting structure referred to as the Lantern Building. The Lantern Building establishes a new front door for the museum and joins the two historic structures, while providing much needed additional exhibit space.



In collaboration with environmental artist Ned Kahn, fluttering plexi pixels shade the exterior glass of the new exhibit space addition and highlight the movement of the wind, casting shadows on interior circulation space. The seamless, flexible interior space features a veranda, bookstore, and café; three floors of exhibit space; classrooms, conference rooms, and a theater; as well as administrative space. Children can now tinker under the hood of a MINI Cooper and pound nails in the Garage Workshop, build a boat and set it sailing on a 53-foot waterway in Waterplay,

DESIGN

KONING EIZENBERG ARCHITECTURE PERKINS EASTMAN IBE CONSULTING ENGINEERS TOWER ENGINEERING VORTEX LIGHTING
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BURT HILL KOSAR RITTELMAN ASSOCIATES FIRSCHING MARSTILLER RUSBARSKY AND WOLF ENGINEERING, INC. STEEB SERVICES, INC.

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I CAN SEE WHAT THE EYES CANNOT SEE.

Approach

As stated in our abstract, there is no feasible way to calculate an absolute value for the premium costs due to LEED. Mascaro, along with the trade contractors for the various packages, compiled the estimated additional costs associated with the LEED driven aspects of the design. Through this combined effort, Mascaro calculated a LEED premium for the Children's Museum of Pittsburgh project.

Estimated Premium for LEED			
Work Package	Package Value	Estimated Premium Costs for LEED	% Premium
General Conditions - Recycling & Salvaging Dumpster Service	\$28,875.00	\$6,375.00	28.3%
Bid Package 01 - Site Demolition, Exc. & Conc.	\$1,114,395.00	\$0.00	0.0%
Bid Package 02 & 18 - Structural Steel & Misc. Steel	\$954,517.00	\$0.00	0.0%
Bid Package 03 - Masonry	\$169,739.00	\$0.00	0.0%
Bid Package 04 - Conveying Systems	\$144,404.00	\$0.00	0.0%
Bid Package 05 & 06 - HVAC & Plumbing	\$1,873,943.00	\$186,750.00	11.1%
Bid Package 07 - Fire Protection Systems	\$207,776.00	\$0.00	0.0%
Bid Package 08 - Electrical Systems	\$1,490,192.00	\$18,240.00	1.2%
Bid Package 09 - Food Service Equipment	\$63,913.00	\$0.00	0.0%
Bid Package 10 - Design-Build Screen Wall	\$441,641.00	\$0.00	0.0%
Bid Package 11 - Glass & Glazing	\$311,731.00	\$32,500.00	11.6%
Bid Package 12 - Roofing	\$203,875.00	\$23,646.00	13.1%
Bid Package 13 - Tile Flooring	\$39,716.00	\$0.00	0.0%
Bid Package 14 - Carpet & Resilient Flooring	\$57,789.00	\$2,100.00	4.1%
Bid Package 15 - Painting	\$140,866.00	\$6,000.00	4.4%
Bid Package 16 - General Trades	\$1,497,306.00	\$22,500.00	1.5%
Total		\$298,111.00	3.5%

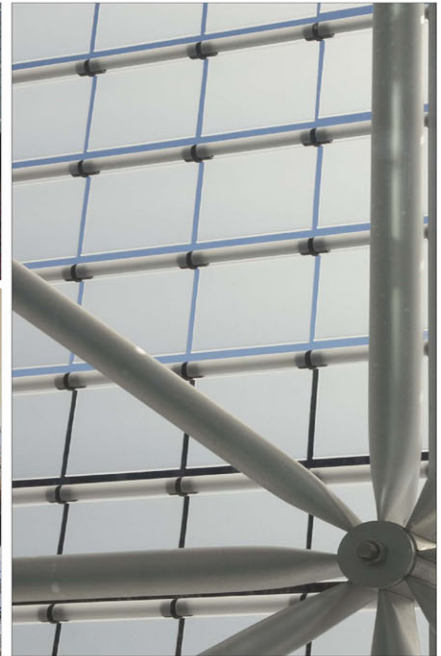
IMAGINATION

CHILDREN'S MUSEUM OF PITTSBURGH



and stage their own performances with costumes and makeup in the Theater. Creative interactive art works are located through the facility in exhibit spaces, public areas and corridors.

The Children's Museum of Pittsburgh desires to be the first LEED@-NC Silver children's museum in the country with the preservation of two important historic buildings along the way.



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I CAN HEAR WHAT THE EARS CANNOT HEAR.

Results

While compiling the data for this case study, and as the table shows, many of the work packages experienced no cost impact due to the LEED design criteria. Some items that did impact the cost of construction are listed below:

- Recycling and salvaging of construction debris
- Rooftop Unit Design
- Make-Up Air Unit Design
- Dehumidifier Design
- Temperature Control Design
- Low VOC Primer and Paints
- Low VOC Adhesive and Products
- Difference between standard tinted glass and low iron "Starphire" glass with "Solarban 60" Low-E
- Upgrade the standard 60 mil EPDM to 60 mil TPO and apply a hypalon coating
- Adding automatic control sensors to lights and plumbing fixtures

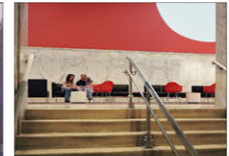
EDUCATION

BEFORE



AFTER

BEFORE



AFTER

BEFORE



AFTER

BEFORE



AFTER

BEFORE



AFTER

BEFORE



AFTER

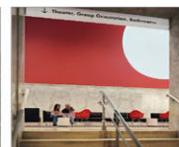
RESTORE
ADAPT
RECYCLE
SUSTAIN
REUSE
REVEAL

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I CAN FEEL WHAT THE HEART CANNOT FEEL. ~PETER NIVIO ZARLENGA

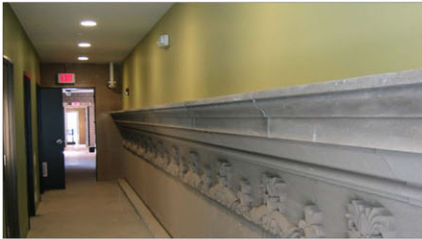
Conclusions

The estimated construction cost premium of LEED certification for the Children's Museum of Pittsburgh was approximately 3.5%.

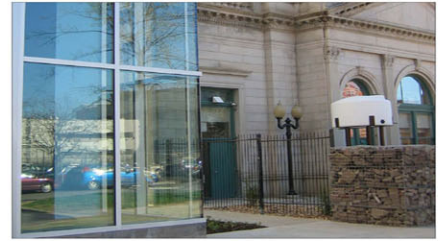
For the work packages that were significantly affected by the LEED design upgrades (HVAC, roofing and glass in the case of the Museum project), the resulting LEED premiums fell in the range of 11% to 13%. However, many of the work packages did not incur any cost impact due to LEED-related design features.

Therefore, our case study results show that an 8% to 12% premium may hold true for work packages that are significantly affected by LEED design upgrades. However, due to the fact that many of the project's work packages were not affected by LEED-related design features, the LEED premium was for this case study, which was 3.5%, was significantly below the industry assumption of 8% to 12%.

EXPLORATION



- Native & Naturalized plantings
- Enhanced indoor/outdoor relationships
- Reflective ENERGY STAR white top roof
- Occupancy light sensors
- Duel Flush Toilets
- "Fuzzy Logic" controlled low flow urinals
- Motion sensor faucets
- Heat recovery wheels
- Heat exchangers
- Additional commissioning
- 3 Kwh photovoltaic system
- Carbon dioxide sensors
- Construction IAQ plan
- Two week fresh air flush out prior to occupancy
- No VOC paints
- Low VOC adhesives & sealants
- Low VOC carpets
- Humidity control
- Recycling of construction waste
- DDC controls
- 100% of existing shell maintained
- 50% of non-shell maintained
- Construction waste management plan
- Reuse of stone & masonry materials
- Highly recycled content
- Rapidly renewable products
- Certified woods & no UREA-Formaldehyde
- Few suspended finish ceilings
- Buhl terra cotta tile (fireproofing) ceilings left exposed
- Exposed steel deck ceilings
- Existing brick/concrete walls exposed
- Existing wood floor resurfaced
- Green Cleaning Practices
- Green power



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