



## Research Topic – LEED Guide for Trade Contractors

### Introduction

#### *Problem/Opportunity Statement*

Green Building is a hot topic in today's industry. However, the client of Milestone Building #4 had to take away LEED points early during construction because of cost, availability of materials, trades, and knowledge within the construction industry. Even though this was not a topic of discussion at the PACE Round Table, I decided to talk to a few industry members at the career fair and Round Table about this issue. After speaking with them, I found that many other companies, when implementing LEED design into a project for the first time, have experienced similar problems.

#### *Goal*

Over the last few months, the goal of the research was to provide industry members and trade contractors with adequate LEED information prior to design and bidding. In particular, the following LEED points have been found to cause the most difficulty: MR 2: Construction Waste Management, MR 4: Recycled Content and MR 5: Local/Regional Materials. These are the only points studied in this research analysis. An information pamphlet and LEED guidelines will be developed. This will not only inform the industry about sustainable buildings but will also aid in excelling in LEED design and construction.

#### *Research Steps*

1. Educate self on LEED criteria and requirements.
2. Learn LEED classification and rating system.
3. Develop information pamphlet for developers, general contractors and trade contractors.
4. Develop list of experienced industry members and a list of industry members that are interested in implementing LEED.
5. Put together a package to send to industry members
  - a. Develop information pamphlet for developers, general contractors and trade contractors.
  - b. Convincing Argument... "Why is this important to you?"
  - c. Write a survey for industry members to find their opinion on sustainability, material conservation ideas, any interest/hesitation and key success indicators.
  - d. Develop a guide to be used by trade contractors
6. Send package to experienced and inexperienced industry members.
7. Process results and develop a more detailed goal if needed.
8. Make any necessary changes based on feedback from industry members.

*For all documents sent to survey consultants see Appendix E.*



### *Expected Outcomes*

The expected results of this research is to provide trade contractors with information about LEED construction and an easy to use guide that will help them get started on a project. Also, a list of experienced design and construction teams will be available to industry members, so they can prepare a proficient project team early on.

### **LEED Information Pamphlet**

A LEED information pamphlet was created for those who are new to LEEDs. This pamphlet was designed to aid beginners in sustainable building, focusing on LEED applications. This guide was only geared towards the three credits that were part of the research; MR2 Construction Waste Management, MR3 Recycled Content and MR5 Local/Regional Materials. The guide reviews strategies, requirements, calculations, submittal documentations and example templates. The LEED Pamphlet can be found in Appendix E.3.

### **Survey**

The following survey was sent out to industry members to gauge their knowledge of LEED requirements in the construction industry. The survey was sent to building owners, developers, design engineers, architects, contractors, suppliers and manufacturers. The feedback obtained from this survey would also provide a more defined direction for this research.

#### **SECTION 1**

What kind of company do you work for?

- Owner
- Architect
- Construction Manager
- General Contractor
- Trade Contractor
- Supplier
- Manufacturer
- Other: \_\_\_\_\_

Have you participated in the design or construction of a LEED certified building?

- Yes. Please proceed to SECTION 2
- No. Please proceed to SECTION 3

#### **SECTION 2**

How many LEED certified building did you take part in?



Construction Management | Dr. Riley | Germantown, Maryland | April 9, 2008

What were the ratings?

- Certified
- Silver
- Gold
- Platinum

If you are a trade partner, supplier or manufacturer, did you have any problems implementing the needed requirements for the anticipated LEED points: MR 2 (Construction Waste Management), MR 4(Recycled Content), MR 5(Local/Regional Materials)?

- Yes
- No

If yes, please provide explanation.

Was there any trouble obtaining verification information needed for submittals?

- Yes
- No

If yes, please provide explanation.

When fulfilling requirements for MR 2 Construction Waste Management, what method was used?

- third party to separate co-mingled trash
- separate recycling bins on site for different materials

Why did you choose this method?

Where there any complications?

Did you have any trouble finding products with the noted recycled content in MR4 Recycled Content?

- Yes
- No

If yes, please provide explanation.

Was there any trouble finding local materials, suppliers and/or manufacturers for MR 5 Local Materials?

- Yes
- No

If yes, please provide explanation.



Construction Management | Dr. Riley | Germantown, Maryland | April 9, 2008

**SECTION 3**

Would your company be interested in pursuing a LEED project?

Yes

No

If yes, are you looking to start a LEED project?

If no, please provide explanation.

Do you feel that you have adequate knowledge of the LEED design and construction?

Yes

No

Please provide explanation.

What factors do you feel that have preventing your company from taking part in a LEED project?

**SECTION 4**

Was the LEED implementation process successful?

Yes

No

Please provide explanation.

For trade contractors, was this your first LEED project?

Yes

No

If yes, did you find that when implementing the LEED process for the first time, that you had trouble with any of the requirements?

Do you feel that a LEED guide made for trade contractors would be beneficial when implementing LEED into a construction project?

Yes

No

Do you have any suggestions for what can make this process smoother?

As a trade contractor, do you have your own thoughts about recycling materials that is not mentioned in the LEED guidelines?



Construction Management | Dr. Riley | Germantown, Maryland | April 9, 2008

What benefits have you seen in the LEED projects? Are you happy with your decision in taking part of a LEED project?

Please feel free to add any additional comments.

## LEED Guide Examples

Before a LEED guide could be developed, the industry needs to know the importance of sustainable building in today's construction industry. The following introduction was sent in the package along with LEED Guides for Trade Contractors, LEED Pamphlet and a survey:

"...LEED design is a hot topic in today's industry and you can't go a day without hearing about green, sustainability or energy efficient. After graduation, I will be working with construction teams in and around the nation's capital. The city's master plan calls for all new construction to be LEED certified. With this in mind, I developed my research topic. To achieve this goal, trade contractors must be prepared to implement LEED changes into their projects. Once proficient with LEED concepts, contractors will benefit by being called back for future jobs..."

Three LEED guides were developed for trade contractor for credits MR2 Construction Waste Management, MR3 Recycled Content and MR5 Local/Regional Materials. The guides were divided into requirements for submittals, design and construction waste management.

The guides are made in Microsoft Excel and come in both a matrix and list format. The matrix has specification sections across the top and the respective requirements across the left side. An "X" is placed in some boxes where I felt this could be a commonplace. This guide is meant to be project specific. Therefore, more specification sections and requirements can be added or deleted and the X's can be changed. With that said, this matrix can become very large and hard to read.

The list format provides a list of where the X's are located. This is broken down into two lists; by specification section or by requirement (submittal, design and construction waste management). This format is cleaner and easier to understand.



*Submittals*

This document shows some of the requirements needed to complete the documentation process for the submittals.

<b>Construction Submittals</b>		S.1	S.2	S.3	S.4	S.5	S.6
		01 7419	03 2000	03 3000	03 4500	04 0510	04 2000
		Construction Waste Management and Disposal	Concrete Reinforcing	CIP Concrete	Precast Architectural Concrete	Masonry Mortaring and Grouting	Unit Masonry
CS.1	LEED letter template for Credit MR 2.1 and Credit MR 2.2, signed by contractor, tabulating total waste material, quantities diverted and means by which it is diverted and statement that requirements for the credit have been met.	X					
CS.2	Submit certification/letter from material supplier(s) indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content for Credit MR 4		X	X	X	X	X
CS.3	Provide documentation identifying manufacturer and extraction, harvest, and/or recover location of materials provided under this section for Credit MR 5		X	X	X	X	X

The full matrix and list formats of the Submittal Requirements can be found in Appendix E.5.



*Design Requirements*

In the LEED Reference Guides, design requirements are geared toward the design team. However they can be helpful for trade contractors as well, while they are compiling their needed documentation.

Design Requirements		S.1	S.2	S.3	S.4	S.5	S.6	S.7	S.8	S.9	S.10	S.11	S.12
		03 3000	03 4500	04 0510	04 2000	04 2000	04 7313	05 1200	05 3100	05 4000	05 5000	05 5100	05 5200
		CIP Concrete	Precast Architectural Concrete	Masonry Mortaring and Grouting	Unit Masonry - Brick	Unit Masonry - CMU	Calcium Silicate Building Stone	Structural Steel Framing	Steel Decking	Cold-Formed Metal Framing	Metal Fabrications	Metal Stairs	Metal Railings
DR.1	Materials shall be manufactured and of raw materials extracted within 500 miles of project site.	X	X	X	X	X	X	X	X	X	X	X	X
DR.2	Provide products from manufacturers with program for reclaiming construction scrap, waste materials, and packaging.									X		X	
DR.3	Provide materials with recycled content such that sum of post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 10% to 20%.			X									
DR.4	Provide materials with recycled content such that sum of post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 10% to 25%.	X											

The full matrix and list formats of the Design Requirements can be found in Appendix E.6.



**Construction Waste Management**

The Construction Waste Management guide was developed to aid trade contractors onsite when recycling waste. The document shows what can be recycled or reused for each specification section. This helps mostly when there is recycling bins on site instead of using a third party recycler.

<b>Waste Management</b>		S.16	05 7313	Tempered Glass Railings																	
		S.17	06 1053	Misc. Rough Carpentry																	
		S.18	06 16435	Gypsum Sheathing																	
		S.19	06 6400	Architectural Woodwork																	
		S.20	07 1616	Building Insulation																	
		S.21	07 1616	Cementitious Waterproofing																	
		S.22	07 2100	Thermal Insulation																	
		S.23	07 4220	Metal Panels																	
		S.24	07 5400	Thermoplastic Membrane Roofing																	
		S.25	07 8116	Cementitious Fireproofing																	
		S.26	07 8400	Firestopping																	
WS.59	Separate and recycle waste materials in compliance with Waste Management Plan	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
WS.60	a. Place materials defined as hazardous or toxic waste in designated containers.								X										X	X	
WS.61	b. Use trigger operated spray nozzles for water hoses														X				X	X	X
WS.62	c. Fold up metal banded, flatten, and place in designated area.			X															X		
WS.63	d. Collect wood packing shims and pallets and place in designated area	X																	X		
WS.64	e. Separate corrugated cardboard in compliance with Waste Management Plan and place in designated areas for recycling.	X																	X	X	

The full matrix and list formats of the Construction Waste Management Requirements can be found in Appendix E.7.





### Survey

Upon reviewing the LEED Guidelines for Trade Contractor Documents, the industry members were asked to complete the following survey.

Was this guide easy to understand?

Yes

No

Please provide explanation.

Was it user friendly?

Yes

No

Please provide explanation.

Did you find it helpful?

Yes

No

Please provide explanation.

Do you have any suggestion as to how this guide can be improved?

### Survey Results and Findings

For all feedback regarding the opinion and LEED Guide surveys, please see Appendices E.8 and E.9 respectively.

#### *Opinion Survey*

The results of the survey verified that there are still kinks in the LEED design, construction and documentation process. Some of the findings that caught my eye are summarized below.

Was there any trouble obtaining verification information needed for submittals?

The process obtaining the information wasn't hard, but each project seemed to have a different documentation and reporting process. There are also some trades that are slightly behind the LEED learning curve which makes it difficult to obtain documents required for submittals.

When fulfilling requirements for MR 2 Construction Waste Management, what method was used?

The results of this question were split equally; hired a third party to separate co-mingled trash and provided recycling bins on site for different materials. The preferred method seems to be



Construction Management | Dr. Riley | Germantown, Maryland | April 9, 2008

allowing a third party to separate trash, even though this method is more expensive. This seems to be for the following reasons; not enough recycling bins were on site, so other recyclables were sent to the landfill and multiple chutes will be needed on a high-rise building, one for each recycling bin.

#### Did you have any trouble finding products with the noted recycled content in MR4 Recycled Content?

The results of this question indicated varying degrees of difficulty locating products. The most common reason identified for this seemed to indicate that some trades were behind the curve and weren't prepared to obtain the proper documents.

#### Were there any troubles finding local materials, suppliers and/or manufacturers for MR 5 Local Materials?

The results of this question implied that there seems to be difficulty finding products that are extracted, harvested and manufactured within the 500 mile radius set by United State Green Building Council as a LEED requirement. Many of these products are custom made and had to be sent to a different plant. Another complication is due to the fact that the products selected by the architect aren't manufactured locally. For example, Venetian rugs and European light fixtures.

#### Do you feel that you have adequate knowledge of LEED design and construction?

The feedback received regarding this question was most astounding. All industry members felt they do not have adequate knowledge of LEED. This is causing them not to pursue LEED projects or to learn as they go. For industry members that have been involved with multiple LEED projects, many find that there is a different method and strategy with each job and have to "reinvent the wheel" each time. A comment that reappears throughout the surveys is that there is no central source for LEED guidelines, it seems to be done on a job-by-job basis and the methods need to be more standardized.

#### Would your company be interested in pursuing a LEED project? What factors do you feel that have preventing your company from taking part in a LEED project?

All but one response indicated they are interested in pursuing a LEED project. However the setbacks lie in the financial aspects and lack of knowledge. These reasons stem from each other. The lack of knowledge about LEED find many companies spending more time designing, bidding, constructing, and documenting the process. In some instances one member of the staff is taken away from the construction team and place as a full time LEED consultant.



Do you feel that a LEED guide made for trade contractors would be beneficial when implementing LEED into a construction project?

All survey consultants agree that a LEED guide for trade contractors would be beneficial, but it needs to be specific. I was impressed to see that there wasn't anything out there that is standardized and could aid in implementing the LEED construction requirements. The guide completed as part of this project works for the rookies but not the veterans.

Do you have any suggestions for what can make this process smoother?

The results to this question were overwhelming. The feedback was great and there seems to be a lot of ideas that can help make the requirements and documentation process smoother. Overall, any guide must be able to be project specific, trade specific and updatable. Two suggestions were to use a computer program or internet site.

#### *LEED Guide Survey*

The results for this survey were unanimous. Out of five responses, all survey consultants agreed that the LEED Guide was easy to understand, user friendly and helpful, thereby meeting the goals identified earlier. However there was a lot of feedback on how the LEED Guidelines for Trade Contractors can be improved.

One opinion said that although it was nice to see specification sections, it was not detailed enough. They wanted to know more about electrical, formaldehyde free substrate or water based adhesives. Another commented that "I think that you are on the right track to try and standardize this package. It is very much needed in the industry. If I may borrow a thing in the tax world that many have adopted to do their taxes is "Turbo Tax". We need a "Turbo LEED" program that is easy to use and applicable to the certification process." This is interpreted as meaning a computer program would be nice where specific questions were asked and general yes or no answers can be given to be directed down the correct path. Lastly, a few industry members mentioned that it might be easier if it was broken down by requirement for each trade and not just by specification sections.

#### **LEED Guide Revisions**

A few revisions were completed to the LEED guide. The goal was to make it user friendly, easy to use and helpful. These goals were accomplished. Feedback from the survey consultants was



Construction Management | Dr. Riley | Germantown, Maryland | April 9, 2008

to make the LEED guide more specific to products and broken down by trades. I have added more specific specification sections that are geared toward specific specialty products.

If time permitted, I would like to have broken this down by trade. This is a difficult and time consuming task but would be useful to all trades. Another change is to go further with the LEED guide that I have already completed and turn it into a computer program. This program would act as a flow chart, asking specific yes or no questions until an answer has been reached. An internet site could do the same thing and would be helpful because it is accessible from anywhere.

## Conclusion

After research has been conducted, it is clear that LEED projects are our future and there are still companies that are unfamiliar with all the aspects involved in a LEED project. Trades need to feel comfortable with the design, construction and documentation of LEED to achieve a profitable project. With this, many trades feel it would be beneficial to have a watered down version of the LEED Reference Guide (provided by the United State Green Building Council) and another guide geared towards trade contractors for the LEED requirements.

Upon completing the LEED Guide for Trade Contractors and receiving feedback, I strongly feel that I have achieved my goal. I intended to create this guide and information pamphlet for companies who will implement LEED requirements into construction for the first time. This is a great starting point. There is still a lot of work that can be done to better this guide. This would be to make it more specific to each trade.

Upon completing the research, I found that a sustainability consultant for general contractors would be beneficial. GreenShape is a sustainability consultant located in Washington, DC. GreenShape helps “building developers, architects, engineers and construction teams identify and implement achievable strategies for improved building performance” (GreenShape). GreenShape served as the sustainability consultant on Milestone Building #4 and have been extremely helpful and knowledgeable when it came to design requirements. During design phase, GreenShape reviewed all documents and strategies to make sure they fulfill the design requirement to achieve each anticipated LEED credit. I feel that a similar consultant would be beneficial for the trade contractors. This consultant would serve as the collector of information and assure nothing is left out.