



BuildBetter by CARDINAL SYSTEMS



LEED® POINTS REFERENCE GUIDE

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THE USGBC LEED® PROGRAM
SUSTAINABLE BUILDING PRODUCTS
BuildBetter by CARDINAL SYSTEMS

What is LEED®?

Members of the United States Green Building Council (USGBC) developed the Leadership in Energy and Environmental Design (LEED®) Green Building Rating System to establish practices for designing, constructing, and certifying sustainable buildings. The LEED® rating system has become a recognized benchmark for sustainable building practices.

The latest version of the LEED® Green Building Rating System, LEED® 2009, is divided into seven key practice categories. These include:

- Sustainable Sites (SS)
- Water Efficiency (WE)
- Energy and Atmosphere (EA)
- Materials and Resources (MR)
- Indoor Environmental Quality (IEQ)
- Innovation in Design (ID)
- Regional Priority (RP)

Under the LEED® system points are awarded when requirements of various credits are met. The applicant for LEED® recognition is responsible for documenting compliance. The LEED® rating system does not recognize or certify individual products, but information on product characteristics is often required for an applicant to submit the appropriate documentation for certification of the overall construction project.

There are three levels of LEED® Certification:

- Certified (40-49 points)
- Silver (50-59 points)
- Gold (60-79 points)
- Platinum (80 points and above)

The LEED® program includes projects related to new construction (NC), schools (SCHOOLS), Core and Shell Projects (CS), and existing building renovations. More extensive information on the LEED® program can be found at www.usgbc.org.

Cardinal Systems' BuildBetter construction panel product line may provide LEED® points for construction projects. This guide outlines those potential credit areas.



SECTION 1

EA CREDIT 1

Optimize Energy Performance

EA CREDIT 1 – OPTIMIZE ENERGY PERFORMANCE

	NC	SCHOOLS	CS
Credit	EA Credit 1	EA Credit 1	EA Credit 1
Points	1-19 points	1-19 points	3-21 points

Intent

To achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

Requirements – NC, SCHOOLS, & CS

Select 1 of the 3 compliance path options described below. Project teams documenting achievement using any of the 3 options are assumed to be in compliance with EA Prerequisite 2: Minimum Energy Performance.

OPTION 1 – WHOLE BUILDING ENERGY SIMULATION
(POINTS: 1-19 for NC and SCHOOLS, 3-21 for CS)

Demonstrate a percentage improvement in the proposed building performance rating compared with the baseline performance rating. Calculate the baseline building performance according to ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda) using a computer simulation model for the whole building project. The minimum energy cost savings percentage for each point threshold is as follows:

New Building	Existing Building Renovations	Points (NC& Schools)	Points (CS)
12%	8%	1	3
14%	10%	2	4
16%	12%	3	5
18%	14%	4	6
20%	16%	5	7
22%	18%	6	8
24%	20%	7	9

26%	22%	8	10
28%	24%	9	11
30%	26%	10	12
32%	28%	11	13
34%	30%	12	14
36%	32%	13	15
38%	34%	14	16
40%	36%	15	17
42%	38%	16	18
44%	40%	17	19
46%	42%	18	20
48%	44%	19	21

The ANSI/ASHRAE/IESNA Standard 90.1-2007 requires that the energy analysis done for the building performance rating method include all the energy costs associated with the building project. To achieve points under this credit, the proposed design must meet the following criteria:

- Compliance with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4, 10.4) in Standard 90.1-2007 (with errata but without addenda).
- Inclusion of all energy costs within and associated with the building project.
- Comparison against a baseline building that complies with ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda). The default process energy cost is 25% of the total cost for the baseline building. If the building’s process energy cost is less than 25% of the baseline building energy cost, the LEED submittal must include documentation substantiating that process energy inputs are appropriate.

For the purpose of this analysis, process energy is considered to include, but not limited to, office and general miscellaneous equipment, computers, elevators and escalators, kitchen cooking and refrigeration, laundry washing and drying, lighting exempt from the lighting power allowance (e.g. lighting integral to medical equipment) and other (e.g. waterfall pumps).

Regulated (non-process) energy includes lighting (e.g. for the interior, parking garage, surface parking, façade, or building grounds, etc. (except as noted above), heating, ventilating, and air

conditioning (HVAC) (e.g. for space heating, space cooling, fans, pumps, toilet exhaust, parking garage ventilation, kitchen hood exhaust, etc.) and service water heating for domestic or space heating purposes.

For this credit, process loads must be identical for both the baseline building performance rating and the proposed building performance rating. However, project teams may follow the exceptional calculation method (ANSI/ASHRAE/IENSA Standard 90.1-2007 G2.5) to document measures that reduce process loads. Documentation of process load energy savings must include a list of the assumptions made for both the base and proposed design, and theoretical or empirical information supporting these assumptions.

Projects in California may use Title 24-2005, Part 6 in place of ANSI/ASHRAE/IENSA Standard 90.1-2007 for Option 1.

OPTION 2: PRESCRIPTIVE COMPLIANCE PATH: ASHRAE ADVANCED ENERGY DESIGN GUIDE
(Points: 1 for NC&CS)

Comply with the prescriptive measures of the ASHRAE Advanced Energy Design Guide appropriate to the project scope, outlined below. Project teams must comply with all applicable criteria as established in the Advanced Energy Design Guide for the climate zone in which the building is located.

PATH 1. ASHRAE Advanced Energy Design Guide for Small Office Buildings 2004

The building must meet the following requirements:

- Less than 20,000 square feet.
- Office occupancy.

PATH 2. ASHRAE Advanced Energy Design Guide for Small Retail Buildings 2006

The building must meet the following requirements:

- Less than 20,000 square feet.
- Retail occupancy.

PATH 3. ASHRAE advanced Energy Design Guide for Small Warehouses and Self Storage Buildings 2008

The building must meet the following requirements:

- Less than 50,000 square feet.
- Warehouse or self-storage occupancy.

OPTION 2: PRESCRIPTIVE COMPLIANCE PATH: ASHRAE ADVANCED ENERGY DESIGN GUIDE**(K-12 Schools)****(Points: 1 for Schools)**

Comply with all the prescriptive measures identified in the Advanced Energy Design Guide for K-12 School buildings.

- Projects must be less than 200,000 square feet.

OPTION 3 – PRESCRIPTIVE COMPLIANCE PATH: ADVANCED BUILDINGS™ CORE PERFORMANCE GUIDE (NC, SCHOOLS, & CS)**(POINTS: 1-3 Points NC, Schools, & CS)**

Comply with the prescriptive measures identified in the Advanced Buildings™ Core Performance™ Guide developed by the New Buildings Institute. The building must meet the following requirements:

- Less than 100,000 square feet.
- Comply with Section 1: Design Process Strategies, and Section 2: Core Performance Requirements.
- Health care, warehouse, or laboratory projects are ineligible for this path (for NC & CS Projects)

Points achieved under Option 3 (1 point)

- 1 point is available for all projects (office, school, public assembly, and retail projects) less than 100,000 square feet that comply with Sections 1 and 2 of the Core Performance Guide.
- Up to 2 additional points are available to projects that implement performance strategies listed in Section 3: Enhanced Performance. For every 3 strategies implemented from this section, 1 point is available.
- The following strategies are addressed by other aspects of LEED and are not eligible for additional points under EA Credit 1:
 - 3.1 – Cool Roofs
 - 3.8 – Night Venting
 - 3.13 Additional Commissioning



HOW CAN BUILD BETTER™ CONSTRUCTION PANELS BY CARDINAL HELP ACHIEVE THESE CREDITS?

The BuildBetter by Cardinal construction panels are an efficient and thermally advantageous solution to above or below grade construction needs.

The footprint of the BuildBetter system is similar to traditional building methods however the insulative value is nearly 2-times that of these traditional systems. The BuildBetter panels can achieve an R-48 value in the same footprint as a traditional panel system providing R-0 for concrete up to R-16 for typical fiberglass-batting insulation systems.

The BuildBetter system is extremely flexible and can be designed for any footprint geometry. Additionally, out of the box R values of the construction panels is R-14 but can be filled up to R-48 post installation without increasing the panel depths or footprint.

The BuildBetter design is air tight greatly reducing the energy loss due to drafts. The BuildBetter systems have been pressure tested by an independent third party and the results are available upon request.

This significant improvement in thermal efficiency will ensure that any project utilizing the BuildBetter construction panels can take full advantage of the LEED® points available under EA Credit 1.

Insulation, pressure, and energy data is available for the BuildBetter systems.



SECTION 2

MR CREDIT 2

Construction Waste Management



MR CREDIT 2 – CONSTRUCTION WASTE MANAGEMENT

	NC	SCHOOLS	CS
Credit	MR Credit 2	MR Credit 2	MR Credit 2
Points	1-2 points	1-2 points	1-2 points

Intent

To divert construction and demolition debris from disposal in landfills and incineration facilities. Redirect recyclable recovered resources back to the manufacturing process and reusable materials to appropriate sites.

Requirements - NC, SCHOOLS, & CS

Recycle and or salvage nonhazardous construction and demolition debris. Develop and implement a construction waste management plan that, at a minimum, identifies the materials to be diverted from disposal and whether the materials will be sorted on-site or comingled. Excavated soil and land-clearing debris do not contribute to this credit. Calculations can be done by weight or volume, but must be consistent throughout. The minimum percentage debris to be recycled or salvaged for each point threshold is as follows:

Recycled or Salvaged	Points
50%	1
75%	2

HOW CAN BUILD BETTER™ CONSTRUCTION PANELS BY CARDINAL HELP ACHIEVE THESE CREDITS?

The BuildBetter by Cardinal construction panels are designed specifically for a construction footprint, leaving very little if any debris left after construction.

Additionally the BuildBetter systems are completely recyclable and reusable. Any leftover panels can be recycled, returned to Cardinal, or reused at other construction sites.

This efficiency in design and pollution reduction engineering will ensure that any project utilizing the BuildBetter construction panels can take full advantage of the LEED® points available under MR Credit 2.

Complete design and materials of construction data is available for the BuildBetter systems.



SECTION 3

MR CREDIT 3 Materials Reuse

MR CREDIT 3 – MATERIALS REUSE

	NC	SCHOOLS	CS
Credit	MR Credit 3	MR Credit 3	MR Credit 3
Points	1-2 points	1-2 points	1 point

Intent

To reuse building materials and products to reduce the demand for virgin materials and reduce waste, thereby lessening impacts associated with the extraction and process of virgin resources.

Requirements – NC & SCHOOLS

Use salvaged, refurbished, or reused materials, the sum of which constitutes at least 5% or 10%, based on cost, of the total value of materials on the project. The minimum percentage materials reused for each point threshold is as follows:

Reused Material	Points
5%	1
10%	2

Requirements – CS

Use salvaged, refurbished, or reused materials, the sum of which constitutes at least 5%, based on cost, of the total value of materials on the project.

NOTE – NC, SCHOOLS, & CS

Mechanical, electrical, and plumbing components and specialty items such as elevators and equipment cannot be included in this calculation. Include only materials permanently installed in the project. Furniture may be included if it is included consistently in MR Credit 3: Materials Reuse through MR Credit 7: Certified Wood (MR Credit 6 in Core & Shell)



HOW CAN BUILD BETTER™ CONSTRUCTION PANELS BY CARDINAL HELP ACHIEVE THESE CREDITS?

The BuildBetter by Cardinal construction panels are designed with reuse in mind. The panel systems are fastened together for easy assembly and disassembly. This segmented construction design makes them reusable. The life expectancy of the BuildBetter panels exceeds 100 years and can be reused throughout the entire lifespan of the product without loss of performance.

Additionally the BuildBetter systems are completely recyclable and reusable. Any leftover panels can be recycled, returned to Cardinal, or reused at other construction sites.

Also, the BuildBetter panels are manufactured almost exclusively with recycled materials reducing the demand for virgin resources.

This efficiency in design, constructability, and life cycle awareness will ensure that any project utilizing the BuildBetter construction panels can take full advantage of the LEED® points available under MR Credit 3.

Complete design and materials of construction data is available for the BuildBetter systems.



SECTION 4

MR CREDIT 4 Recycled Content

MR CREDIT 4 – RECYCLED CONTENT

	NC	SCHOOLS	CS
Credit	MR Credit 4	MR Credit 4	MR Credit 4
Points	1-2 points	1-2 points	1-2 points

Intent

To increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.

Requirements – NC, SCHOOLS, & CS

Use materials with recycled content such that the sum of post-consumer recycled content plus ½ of the pre-consumer content constitutes at least 10% or 20%, based on cost, of the total value of materials in the project. The minimum percentage materials recycled for each point threshold is as follows:

Recycled Content	Points
10%	1
20%	2

The recycled content value of a material assembly is determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

NOTE – NC, SCHOOLS, & CS

Mechanical, electrical, and plumbing components and specialty items such as elevators and equipment cannot be included in this calculation. Include only materials permanently installed in the project. Furniture may be included if it is included consistently in MR Credit 3: Materials Reuse through MR Credit 7: Certified Wood (MR Credit 6 in Core & Shell)



HOW CAN BUILD BETTER™ CONSTRUCTION PANELS BY CARDINAL HELP ACHIEVE THESE CREDITS?

The BuildBetter by Cardinal construction panels are manufactured almost exclusively with recycled materials. Upward of 70%+ of the product is made from post consumer recycled content. These construction materials greatly reduce the demand for virgin resources.

The recycled content of the BuildBetter construction panels is as follows:

Material used in Construction	Total Recycled Content	Post Consumer Recycled Content (by weight)	Pre Consumer Recycled Content	% weight of total construction
Steel	77%	70%	7%	77%
Nailing Strips (composite)	100%	100%	0%	1.5%
Insulation	0%	0%	0%	0.5%

The significant amount of recycled materials used in the construction of the BuildBetter construction panels will ensure that any project utilizing the BuildBetter construction panels can take full advantage of the LEED® points available under MR Credit 4.



SECTION 5

MR CREDIT 5

Regional Materials

MR CREDIT 5 – REGIONAL MATERIALS

	NC	SCHOOLS	CS
Credit	MR Credit 5	MR Credit 5	MR Credit 5
Points	1-2 points	1-2 points	1-2 points

Intent

To increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.

Requirements – NC, SCHOOLS, & CS

Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10% or 20%, based on cost, of the total materials value. If only a fraction of a product or material is extracted, harvested or recovered, and manufactured locally, then only that percentage (by weight) must contribute to the regional value. The minimum percentage regional material for each point threshold is as follows:

Regional Materials	Points
10%	1
20%	2

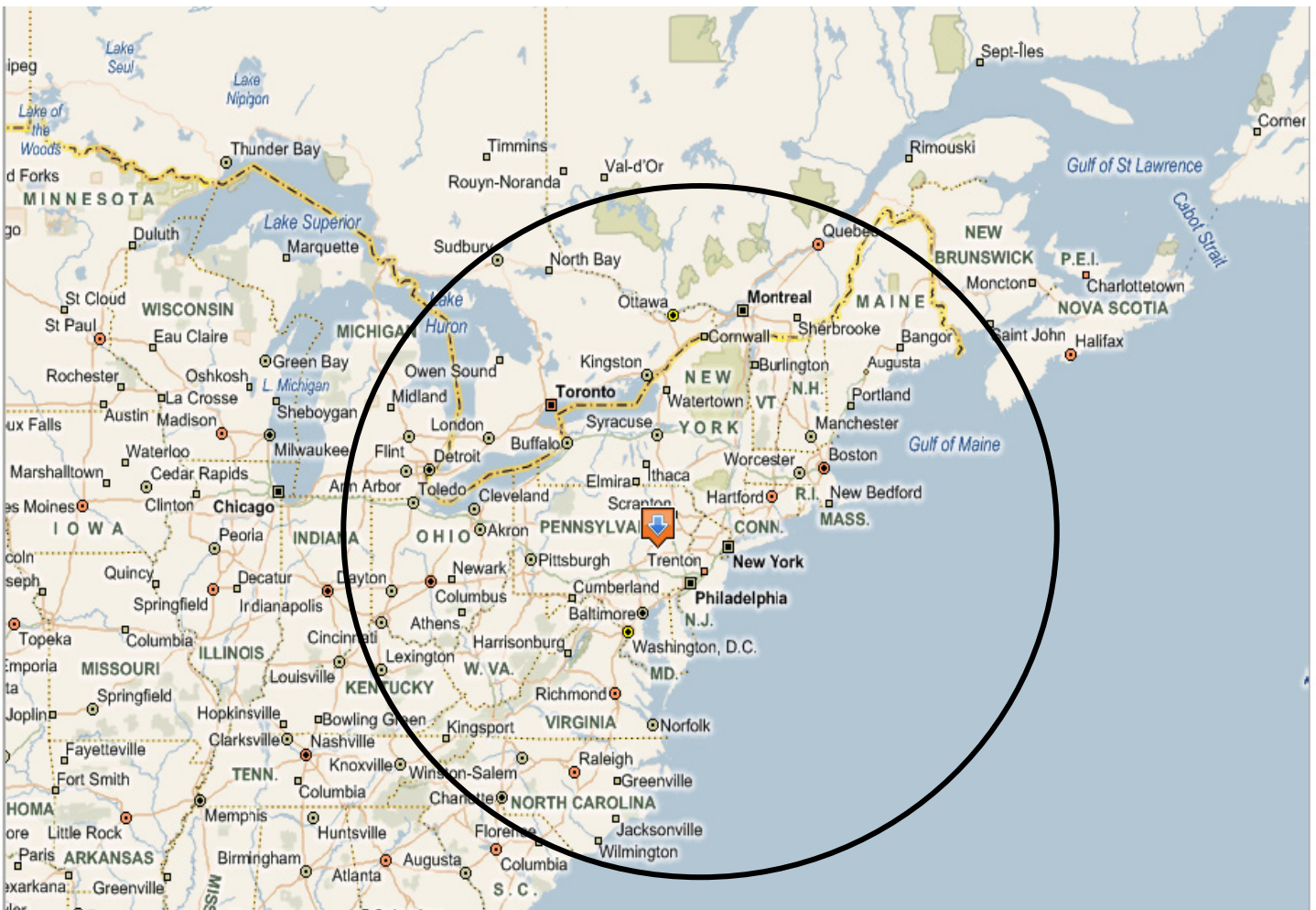
Mechanical, electrical, and plumbing components and specialty items such as elevators and equipment cannot be included in this calculation. Include only materials permanently installed in the project. Furniture may be included if it is included consistently in MR Credit 3: Materials Reuse through MR Credit 7: Certified Wood (MR Credit 6 in Core & Shell)

HOW CAN BUILD BETTER™ CONSTRUCTION PANELS BY CARDINAL HELP ACHIEVE THESE CREDITS?

The BuildBetter by Cardinal construction panels would be eligible to contribute to obtaining LEED points in an area roughly bound by: The Canadian Border, Bangor, ME, Lansing, MI, Cincinnati, OH, and Charlotte, NC.

See Circle on Map below.

500 MILE RADIUS FROM SCHUYLKILL HAVEN, PA





Cardinal manufactures the BuildBetter Construction panels in Schuylkill Haven, Pennsylvania. The majority of the raw materials are sourced within 500 miles of the manufacturing site. A schedule of the production locations for the primary components is shown below:

Material	Primary Production Location	% by weight Harvested/Extracted/Recovered	Information Source
Steel	Butler, Indiana	70%	Vendor Letter
Plastic	Lancaster, PA	100%	Vendor Letter
Insulation	North Carolina	100%	Vendor Letter



SECTION 6

ID CREDIT 1

Innovation in Design

ID CREDIT 1 – INNOVATION IN DESIGN

	NC	SCHOOLS	CS
Credit	ID Credit 1	ID Credit 1	ID Credit 1
Points	1-5 points	1-4 points	1-5 points

Intent

TO provide design teams and projects the opportunity to achieve exceptional performance above the requirements set by the LEED® Green Building Rating system and/or innovative performance in Green Building categories not specifically addressed by the LEED® Green Building Rating System.

Requirements – NC, SCHOOLS, & CS

Credit can be achieved through any combination of the paths below:

***PATH 1. INNOVATION IN DESIGN
(POINTS: 1-5 for NC and CS, 1-4 for SCHOOLS)***

In the LEED® 2009 for New Construction and Major Renovations, LEED® 2009 for Core and Shell Development, or LEED® 2009 for Schools Rating Systems one point is awarded for each innovation achieved. No more than 5 points (for NC and CS) and 4 points (for Schools) under ID Credit 1 may be earned through Path 1 – Innovation in Design.

Identify the following in writing:

- The intent of the proposed innovation credit.
- The proposed requirement for compliance.
- The proposed submittals to demonstrate compliance.
- The design approach (strategies) used to meet the requirements.

***PATH 2. EXEMPLARY PERFORMANCE
(Points: 1-3 Points)***

Achieve exemplary performance in an existing LEED® 2009 for Schools prerequisite or credit that allows exemplary performance as specified in the LEED® Reference Guide for Green Building Design & Construction, 2009 Edition. An exemplary performance point may be earned for achieving double the credit requirements and/or achieving the next incremental percentage threshold of an existing credit in LEED®.



One point is awarded for each exemplary performance achieved. No more than 3 points under ID Credit 1 may be earned through PATH 2 – Exemplary Performance.

HOW CAN BUILD BETTER™ CONSTRUCTION PANELS BY CARDINAL HELP ACHIEVE THESE CREDITS?

The design, manufacture, and constructability of the BuildBetter construction panel systems by Cardinal would be eligible to contribute to obtaining LEED® points in Innovative Design as follows:

- The high insulation (R) value may allow for overall project performance beyond the standard requirements of EA Credit 1.
- The materials of construction (70%+ recycled content) may help a project exceed the standard requirements under MR Credit 4.
- Most of the materials are regionally sources and harvested that may help a project exceed the standard requirement under MR Credit 5.
- The constructability of the panel systems is such that it greatly reduces the carbon footprinting for the project by considering the following:
 - Elimination of concrete usage for foundations (if applicable)
 - Fuel and operating costs for cranes – this building system can be installed without heavy equipment.
 - Labor requirements to install the systems are less than traditional systems.
 - Excavation for below grade applications is minimized – reducing the need for heavy equipment.

All of the above may help any project utilizing the BuildBetter construction panels take full advantage of the LEED® points available under ID Credit 1.



SECTION 7

RP CREDIT 1

Regional Priority

RP CREDIT 1 – REGIONAL PRIORITY

	NC	SCHOOLS	CS
Credit	RP Credit 1	RP Credit 1	RP Credit 1
Points	1-4 points	1-4 points	1-4 points

Intent

To provide an incentive for the achievement of credits that address geographically specific environmental priorities.

Requirements – NC, SCHOOLS, & CS

Earn 1-4 of the 6 regional priority credits identified by the USGBC regional councils and chapters having environmental importance for a project’s region. A database of Regional Priority credits and their geographical applicability is available on the USGBC website www.usgbc.org.

One point is awarded for each Regional Priority credit achieved; no more than 4 credits identified as Regional Priority credits may be earned. Projects outside of the US are not eligible for Regional Priority credits.



SECTION 8

Summary



SUMMARY

The BuildBetter Construction panel systems by Cardinal may contribute significantly to the achievement of LEED® certification for your building project.

A summary of possible points as shown in the tables below:

Credit	NC		Schools		CS	
	Min	Max	Min	Max	Min	Max
EA Credit 1	1	19	1	19	1	19
MR Credit 2	1	2	1	2	1	2
MR Credit 3	1	2	1	2	1	1
MR Credit 4	1	2	1	2	1	2
MR Credit 5	1	2	1	2	1	2
ID Credit 1	1	5	1	4	1	5
RP Credit 1	<u>1</u>	<u>4</u>	<u>1</u>	<u>4</u>	<u>1</u>	<u>4</u>
Total	7	36	7	35	7	35

EXHIBIT A

Sample Construction



The table below shows the LEED points that may be available for construction of a 1000 sq ft basement/foundation system.

The first chart below compares the energy loss of structure. This table compares a basement/foundation system constructed with the BuildBetter by Cardinal system and one with a traditional foundation system.

The systems included in the table are:

- (1) - The BuildBetter system right out of the box.
- (2) - The BuildBetter system finished with maximum insulation space available.
- (3) - Traditional poured concrete foundation system.
- (4) - Traditional poured concrete foundation with an insulated interior wall system with an equivalent insulation value equal to R-12.

The footprint and depth of wall systems are assumed to be equivalent for this analysis and the temperature differential is assumed to be 30 degrees Fahrenheit.

System	R Value	Energy Loss (BTU's/ft ²)	Energy Saving % (versus 3)	Energy Saving % (versus 4)
BuildBetter (1)	14	2.14	98%	12%
BuildBetter (2)	48	0.63	99%	74%
Traditional (3)	0.3	100.0	-	-
Traditional (4)	12.3	2.43	-	-



Possible LEED® points for above system versus poured concrete foundation:

Credit	BuildBetter System	
	R-14	R-48
EA Credit 1	19	19
MR Credit 2	2	2
MR Credit 3	2	2
MR Credit 4	2	2
MR Credit 5	2	2
ID Credit 1	5	5
RP Credit 1	<u>1</u>	<u>1</u>
Total	33	33