Dental Science Building Phase I

Gold Certification Documentation
LEED™ for New Construction v2.2
January 18, 2013

Owner: The University of Iowa
Architect: InVision Architecture
MEP Engineer: Design Engineers
Civil Engineer: Shive Hattery
LEED Consultant: C-Wise Design & Consulting LLC
Commissioning: The University of Iowa
General Contractor: Larson Construction

Prepared by: Martha Norbeck, Hannah Papineschi at C-Wise
### Sustainable Sites

<table>
<thead>
<tr>
<th>Prereq 1</th>
<th>Credit 1</th>
<th>Site Selection</th>
<th>Required</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Credit 2</td>
<td>Development Density &amp; Community Connectivity</td>
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<tr>
<td>1</td>
<td>Credit 3</td>
<td>Brownfield Redevelopment</td>
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<td>1</td>
<td>Credit 4.1</td>
<td>Alternative Transportation, Public Transportation Access</td>
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<td>Alternative Transportation, Bicycle Storage &amp; Changing Rooms</td>
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<td>Alternative Transportation, Low-Emitting and Fuel-Efficient Vehicles</td>
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<td>Credit 4.4</td>
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<td>1</td>
<td>Credit 5.1</td>
<td>Site Development, Protect of Restore Habitat</td>
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<td>Credit 5.2</td>
<td>Site Development, Maximize Open Space</td>
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<td>Credit 6.1</td>
<td>Stormwater Design, Quantity Control</td>
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<td>Stormwater Design, Quality Control</td>
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<td>Credit 7.1</td>
<td>Heat Island Effect, Non-Roof</td>
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<td>Heat Island Effect, Roof</td>
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### Water Efficiency

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<thead>
<tr>
<th>Credit 1.1</th>
<th>Water Efficient Landscaping, Reduce by 50%</th>
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<tbody>
<tr>
<td>1</td>
<td>Credit 1.2</td>
<td>Water Efficient Landscaping, No Potable Use or No Irrigation</td>
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<td>1</td>
<td>Credit 2</td>
<td>Innovative Wastewater Technologies</td>
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<td>1</td>
<td>Credit 3.1</td>
<td>Water Use Reduction, 20% Reduction</td>
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<td>Water Use Reduction, 30% Reduction</td>
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### Energy & Atmosphere

<table>
<thead>
<tr>
<th>Prereq 1</th>
<th>Credit 1</th>
<th>Fundamental Commissioning of the Building Energy Systems</th>
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<tr>
<td>1</td>
<td>Credit 2</td>
<td>Minimum Energy Performance</td>
<td>Required</td>
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<tr>
<td>1</td>
<td>Credit 3</td>
<td>Fundamental Refrigerant Management</td>
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<td>7</td>
<td>Credit 1</td>
<td>Optimize Energy Performance</td>
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<tr>
<td>2</td>
<td>Credit 2</td>
<td>On-Site Renewable Energy</td>
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<tr>
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<td>Credit 3</td>
<td>Enhanced Commissioning</td>
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<td>Enhanced Refrigerant Management</td>
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<td>Credit 5</td>
<td>Measurement &amp; Verification</td>
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<td>1</td>
<td>Credit 6</td>
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continued…
### Materials & Resources

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<th>Credit</th>
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<tr>
<td>Y 1</td>
<td><strong>Prereq 1 Storage &amp; Collection of Recyclables</strong></td>
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<tr>
<td>Y 1</td>
<td><strong>Credit 1.1 Building Reuse, Maintain 75% of Existing Walls, Floors &amp; Roof</strong></td>
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<tr>
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<td><strong>Credit 1.2 Building Reuse, Maintain 100% of Existing Walls, Floors &amp; Roof</strong></td>
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<td>Y 1</td>
<td><strong>Credit 1.3 Building Reuse, Maintain 50% of Interior Non-Structural Elements</strong></td>
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<td>Y 1</td>
<td><strong>Credit 2.1 Construction Waste Management, Divert 50% from Disposal</strong></td>
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<tr>
<td>Y 1</td>
<td><strong>Credit 2.2 Construction Waste Management, Divert 75% from Disposal</strong></td>
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<tr>
<td>Y 1</td>
<td><strong>Credit 3.1 Materials Reuse, 5%</strong></td>
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<td>Y 1</td>
<td><strong>Credit 3.2 Materials Reuse, 10%</strong></td>
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<td>Y 1</td>
<td><strong>Credit 4.1 Recycled Content, 10% (post-consumer + ½ pre-consumer)</strong></td>
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<td><strong>Credit 4.2 Recycled Content, 20% (post-consumer + ½ pre-consumer)</strong></td>
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<td><strong>Credit 6 Rapidly Renewable Materials</strong></td>
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<td><strong>Credit 7 Certified Wood</strong></td>
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### Indoor Environmental Quality

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<tr>
<td>Y 1</td>
<td><strong>Prereq 1 Minimum IAQ Performance</strong></td>
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<tr>
<td>Y 1</td>
<td><strong>Prereq 2 Environmental Tobacco Smoke (ETS) Control</strong></td>
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<td>Y 1</td>
<td><strong>Credit 1 Outdoor Air Delivery Monitoring</strong></td>
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<td><strong>Credit 2 Increased Ventilation</strong></td>
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<td><strong>Credit 3.1 Construction IAQ Management Plan, During Construction</strong></td>
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<td><strong>Credit 3.2 Construction IAQ Management Plan, Before Occupancy</strong></td>
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<td><strong>Credit 4.1 Low-Emitting Materials, Adhesives &amp; Sealants</strong></td>
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<td><strong>Credit 4.2 Low-Emitting Materials, Paints &amp; Coatings</strong></td>
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<td><strong>Credit 4.3 Low-Emitting Materials, Carpet Systems</strong></td>
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<td><strong>Credit 4.4 Low-Emitting Materials, Composite Wood &amp; Agrifiber Products</strong></td>
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<td><strong>Credit 5 Indoor Chemical &amp; Pollutant Source Control</strong></td>
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<td><strong>Credit 6.1 Controllability of Systems, Lighting</strong></td>
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<td><strong>Credit 6.2 Controllability of Systems, Thermal Comfort</strong></td>
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<td><strong>Credit 7.2 Thermal Comfort, Verification</strong></td>
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<td><strong>Credit 8.1 Daylight &amp; Views, Daylight 75% of Spaces</strong></td>
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<td><strong>Credit 8.2 Daylight &amp; Views, Views for 90% of Spaces</strong></td>
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### Innovation & Design Process

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<tr>
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<tr>
<td>1</td>
<td><strong>Credit 1.1 Innovation in Design: Low Mercury lamps</strong></td>
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<tr>
<td>1</td>
<td><strong>Credit 1.2 Innovation in Design: Exceptional water efficiency</strong></td>
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<tr>
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<td><strong>Credit 1.3 Innovation in Design: Exceptional Green Power</strong></td>
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<tr>
<td>1</td>
<td><strong>Credit 1.4 Innovation in Design: Building Envelope Commissioning</strong></td>
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<tr>
<td>1</td>
<td><strong>Credit 2 LEED® Accredited Professional</strong></td>
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### Project Totals (pre-certification estimates)

<table>
<thead>
<tr>
<th>Certification</th>
<th>Points</th>
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<tr>
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<td>Gold</td>
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<td>Platinum</td>
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LEED for New Construction

How to Interpret this Report

Purpose
The Leadership in Energy and Environmental Design (LEED) Rating System was designed by the US Green Building Council to encourage and facilitate the development of more sustainable buildings.

Environmental Categories
The report is organized into five environmental categories as defined by LEED including: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environment

LEED Prerequisites
Prerequisites must be achieved. Non-compliant prerequisites must be resolved before a certification can be awarded.

LEED Credits
The environmental categories are subdivided into the established LEED credits, which are based on desired performance goals within each category. An assessment of whether the credit is earned or denied is made and a narrative describes the basis for the assessment.

Achieved
The applicant has provided the mandatory documentation which supports the achievements of the credit requirements, achieving the associated points. Currently the project has scored the adjacent points in this category.

Denied
The applicant has applied for a point in a particular credit, but has misinterpreted the credit intent or cannot substantiate meeting the requirements. Currently the project has the adjacent points in this category.

Rating
This Project has achieved enough points for Gold Rating.

Official Scores
The LEED Submittal Template has been provided stating that the project’s erosion and sedimentation control plan conforms to the 2003 EPA Construction General Permit, which outlines the provisions necessary to comply with Phase I and Phase II of the NPDES program. A narrative describing the implemented erosion and sedimentation control measures and a copy of the project’s erosion and sedimentation control plan have been provided.

Site Selection

Design Application

The LEED Submittal Template has been provided stating that the project site does not meet any of the prohibited criteria.

Development Density and Community Connectivity

Design Application

The LEED Submittal Template has been provided stating that the project site is located within one half mile of a minimum of ten community services and an existing residential district with a minimum density of ten units per acre. Additionally, a listing of the neighborhood services has been provided on the template.

However, two issues are pending:
1. The site map showing these services does not indicate the drawing scale as required.
2. It is unclear whether all of community services are available to the general public because the building is located on a campus. It is the intent of this credit that basic services are available to everyone, and are not restricted to campus occupants and staff.

TECHNICAL ADVICE:
1. Please provide a revised community connectivity drawing indicating the a scale for reference.
2. Provide a revised LEED Submittal Template that confirms that at least ten unique community services (two restaurants may be included) exist within one half mile of the project and are accessible to the public.

For future submittals please note that project site area and building area should be consistent across all LEED credits.

Design Application

The LEED Submittal Template has been revised to address the issues outlined in the Preliminary Review and states that the ten community services are available to the general public. The required site map showing the one half mile radius has also been revised as requested. The documentation demonstrates credit compliance.
Brownfield Redevelopment

Alternative Transportation: Public Transportation Access
Design Application 6/9/2011
The LEED Submittal Template has been provided stating that the project is served by five bus lines within one quarter mile of the project site. A scaled drawing showing the location of the transit stops has been provided.

Alternative Transportation: Bicycle Storage and Changing Rooms
Design Application 6/9/2011
The LEED Submittal Template has been provided stating that the project has provided bicycle storage for 8.2% of FTE and Transient building occupants and shower facilities for 13.2% of the FTE occupants.

For future submittals, please note that the building occupancy should be consistent across all credits. SS4.2 occupant calculations should include peak transient populations while WEc3 should account for the daily average.

Alternative Transportation: Low-Emitting and Fuel Efficient Vehicles

Alternative Transportation: Parking Capacity
Design Application 6/9/2011
The LEED Submittal Template has been provided stating that no new parking has been added to the site.

Site Development: Protect or Restore Habitat

Site Development: Maximize Open Space
Design Application 6/9/2011
The LEED Submittal Template has been provided stating that the project has been developed in an area with no minimum local zoning code requirements for open space. The template further states that 54,282 square feet of dedicated open space, compared to 10,826 square feet of the building footprint has been provided adjacent to the building. Site drawings have been provided in support of this credit. Additionally, a narrative has been provided stating that the area around the project will be developed in three phases, all of which will seek LEED certification. The open space surrounding all three phases of the area will be designated as such in perpetuity so that the open space equals or exceeds the total footprint of all three phases.
Although not affecting credit compliance, please note for future submittals that the site boundary provided on the site drawings must be consistent with the LEED Project Boundary in the Documents section of LEED Online.

**Stormwater Management: Quantity Control**

Credit 6.1-Version 2.2

**Stormwater Management: Quality Control**

Credit 6.2-Version 2.2

**Heat Island Effect: Non-Roof**

Credit 7.1-Version 2.2

Construction Application

9/2/2012

The LEED Submittal Template has been provided stating that 76.9% of the site hardscape have been paved with highly reflective materials. The calculations provided in the template indicate that of the 40,765 square feet of total site hardscape, 31,349 square feet (76.9%) have been paved with non-colored concrete. A site plan showing the paved areas, has been provided.

However, two issues are pending:
1. It is unclear what material is used for the main circular drive.
2. The square foot area of each hardscape material has not been provided on the site plan as indicated

TECHNICAL ADVICE:
1. Please provide a site plan identifying each type of paving material.
2. Provide a site plan showing the extents of the paved areas. The site plan should include calculations showing the specific areas of these surfaces.

Construction Application

1/4/2013

The LEED Submittal Template has been revised and a revised site plan has been provided to address the issues outlined in the Preliminary Review comments and state that of the 40,765 square feet of total site hardscape, 25,337 square feet, (58.9%), have been paved with non-colored concrete. The documentation demonstrates credit compliance

**Heat Island Effect: Roof**

Credit 7.2-Version 2.2

Design Application

6/9/2011

The LEED Submittal Template has been provided stating that the 100% of the roofing materials used on the project meet the SRI requirements of the credit.

For future submittals, as stated on page 100 of the LEED-NC v2.2 Reference Guide, Third Edition, please note that it is permissible to deduct roof areas covered by equipment and appurtenances for this calculation.

**Light Pollution Reduction**

Credit 8-Version 2.2
**Water Efficiency**

### Water Efficient Landscaping

**Credit 1.1-1.2-Version 2.2**

**Design Application**  
6/9/2011

The LEED Submittal Template has been provided stating that no permanent irrigation system has been installed. A narrative has also been included describing the landscaping design strategies installed on the site.

**Innovative Wastewater Technologies**

**Credit 2-Version 2.2**

**Water Use Reduction**

### Water Use Reduction

**Credit 3.1-3.2-Version 2.2**

**Design Application**  
6/9/2011

The LEED Submittal Template has been provided stating that the project has reduced potable water use by 50.4% from a calculated baseline design through the installation of dual-flush toilets, water efficient urinals and faucet aerators.

For future submittals, please note that the building occupancy should be consistent across all credits. SSC4.2 occupant calculations should include peak transient populations while WEC3 should account for the daily average.

**Energy and Atmosphere**

### Fundamental Commissioning of the Building Energy Systems

**Prerequisite 1-Version 2.2**

**Construction Application**  
9/2/2012

The LEED Submittal Template has been provided stating that the fundamental commissioning requirements have been completed. In addition, a narrative describing the commissioned systems, as well as the results of the commissioning process, has been provided.

**Minimum Energy Performance**

**Prerequisite 2-Version 2.2**

**Design Application**  
6/9/2011

The LEED Submittal Template has been provided stating that the project complies with the mandatory
provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) of ASHRAE 90.1-2004, and has used a computer simulation model to document improved building energy performance under EA Credit 1. However, insufficient information has been provided to verify confirmation of at least two points achieved under EA Credit 1. Since the project was registered after 06/27/2007, it is required to achieve a minimum of 2 points to qualify for LEED certification based on the following document (http://www.usgbc.org/ShowFile.aspx?DocumentID=2303).

TECHNICAL ADVICE:
Please address the comments raised under EA Credit 1 to document a minimum of two points achieved under EA Credit 1.

Design Application
9/22/2011

Additional documentation has been provided for EAc1 Optimize Energy Performance. The clarifications provided are sufficient to verify achievement of at least two points under EAc1. The documentation demonstrates prerequisite compliance.

Fundamental Refrigerant Management
Prerequisite 3-Version 2.2

Design Application
6/9/2011

The LEED Submittal Template has been provided stating that base building HVAC systems do not use any CFC-based refrigerants. The Template also states that a portion of the buildings energy is provided by the University of Iowa (IU) district chilled water system which uses CFC based refrigerants. The project is seeking an alternate approach to show compliance with the phase out requirements. The project team has submitted a third party report showing that the CFC-based system replacement or conversion is not economically feasible at this time and an alternate phase out plan is proposed to meet the minimum requirements. The report also concludes that the annual refrigerant leakage has been reduced to 5% or less as per the EPA Clean Air Act, Title VI Rule 608 procedures and that the total Refrigerant Leakage for the remaining life of the units will be maintained at less than 30% of the total Refrigerant Charge.

Optimize Energy Performance
Credit 1-Version 2.2

Design Application
6/9/2011

The LEED Submittal Template and supporting documentation have been provided stating that the project has achieved an energy cost savings of 41.0% using the ASHRAE 90.1-2004 Appendix G methodology, CHP Calculation Methodology for LEED NCv2.2, and Required Treatment of District Thermal Energy in LEED NCv2.2 methodology. Energy efficiency measures include an improved thermal envelope, high efficiency glazing, reduced interior lighting power density, occupancy sensors, energy recovery, and a University CHP plant. However, the following 5 review comments requiring a project team response (marked as "Mandatory") must be addressed for the final review. For the remaining review comments (marked as "Optional"), a project team response is optional.

Please post the original documentation for this credit (including the original EAc1 template) to LEED online in a zip file (e.g. "Preliminary EAc1 Submittal.zip") for comparison in the next review phase. Please also upload a summary document that includes a narrative response to each preliminary review comment that has been addressed by the project team, and a narrative describing any additional changes made to the energy models.
between the preliminary and final review phase.

Please note that the project was registered after 06/27/2007, and is therefore required to achieve a minimum of 2 points to qualify for LEED certification based on the following document (http://www.usgbc.org/ShowFile.aspx?DocumentID=2303).

**TECHNICAL ADVICE:**

**REVIEW COMMENTS REQUIRING A PROJECT TEAM RESPONSE (Mandatory):**

It appears from the descriptions in the 'IDS_LEED supporting documentation' report that a district energy source is used for the Proposed building heating and cooling and that the project is using the "Required Treatment of District Thermal Energy in LEED NCv2.2" version 1.0 (dated May 28, 2008) guidance for showing energy savings. The project team has uploaded supporting documentation for Step 1 and Step 2 of the guidance to show compliance. However, the uploaded documentation does not meet all the requirements of Step 1 and Step 2 methodology. Please address comments 1 to 4 below to ensure that the Proposed Case and the Baseline case models are in accordance with requirements of the guidance.

1. According to the uploaded Submittal template for Step 1 and the supporting documentation, exceptional calculation methodology is used to take credit for the electricity and thermal energy provided from the CHP plant. This approach is inconsistent with the guidance for modeling Step 1 - The Building Stand-alone scenario. As per the guidance "In Step 1 the energy model’s scope accounts for only the downstream equipment" and "The energy source is modeled as purchased energy in both the Proposed and the Baseline buildings in order to hold the DES cost neutral in the model". Please remove any exceptional calculation methodology for taking credit for the CHP from Step 1 submittal template and use the energy rates as described in Step 1 (Building Stand-Alone Scenario) on page 8 of the guidance document to calculate energy cost savings and upload the revised template. Please note that Step 1 should verify that the 2-point minimum is met without the effects of DES (Step-1 Building stand-alone scenario).

2. Table 1.4 of Step 1 template indicates that two secondary variable volume heating water pumps with a pump head of 70ft and total flow of 106 GPM were modeled for the Baseline Case, and that the Baseline Case pumps were modeled differently than the Proposed Case pumps (2 pumps @ 35 ft and 103 gpm). Step 1 template also indicates that 2 variable flow secondary chilled water pumps @ 86 ft, and 188 gpm total flow were modeled for the Baseline Case, and that the Baseline Case pumps were modeled differently than the Proposed Case pumps (2 VFD pumps @ 45 ft and 175 gpm). Since this is Step 1 of a district energy system, the heating water loop and chilled water loop modeling requirements from Appendix G do not apply (since only the downstream components are documented in the Proposed Case energy model, leading to an unfair comparison in the Baseline Case if the entire upstream + downstream pump power allowance is modeled in the Baseline Case). Please update the Baseline Case model so that the pump head, heating water temperature rise, heating water temperature differential, pump quantity, chilled water temperature differential, pump quantity, variable speed pump controls, and pump minimum turndown ratio are modeled identically in the Baseline and Proposed Case based on Proposed Case values. Additionally, make sure that all pumps have been modeled (including snow melt system pumps) and that the Proposed case model pump parameters are as per the design documents and match the values in the mechanical schedule, and that only downstream equipment is included in Step 1. Update Table 1.4, 1.8.1 and 1.8.2 for Step 1 for the Baseline Case and Proposed case with the revised information.

3. Table 1.4 of Step 2 of the template indicates that chilled water and hot water pumps have been modeled identically between the Proposed Case and the Baseline. Please revise the Baseline model in accordance to Appendix G modeling methodology for chilled water and hot water pump and loop parameters following sections G3.1.3.2 to G3.1.3.13 as necessary. Additionally, update the proposed case chilled water and hot water pump and loop parameters in accordance to the upstream and downstream equipment.
4. It is unclear from the supporting documentation on hourly energy consumptions data how the "Consumed kWh after CHP" has been derived and how the 82,300 kWh of electrical savings as indicated in Section 1.7 has been calculated. As per the description in exceptional calculation methodology, 70% electricity is consumed after benefits from CHP. As per the submitted tabular data this is inconsistent with the stated calculation methodology. Please fix any inconsistencies in the calculations, provide an additional narrative clarifying the calculations and resubmit the updated calculations for the exceptional methodology.

5. The energy savings reported for the cooling and heating between Step 1 and Step 2 do not appear to be substantiated based on the energy inputs reported in Table 1.4. Please review the Baseline and Proposed inputs for both the Step 1 and the Step 2 models to confirm that they conform to 'Required Treatment of District Thermal Energy in LEED NCv2.2' methodology and ASHRAE 90.1 Appendix G modeling protocol where applicable, and provide sufficient information regarding the energy inputs in Table 1.4 and an accompanying narrative to justify the reported energy savings between Step 1 and Step 2. Please also provide additional input summary reports for the Step 1 and Step 2 Baseline and Proposed Cases to justify that the energy inputs correctly reflect ASHRAE 90.1 Appendix G modeling protocol.

REVIEW COMMENTS THAT DO NOT REQUIRE A PROJECT TEAM RESPONSE FOR THIS PROJECT, BUT SHOULD BE CONSIDERED AS EDUCATIONAL NOTES FOR FUTURE PROJECTS (Optional):

6. It appears from the Step 1 template that different fuel types for Domestic Hot water are used which is inconsistent with the model output reports for the Baseline and Proposed case. For future submissions please make sure that all the information between the output results and templates is consistent.

Design Application 9/22/2011

Revised documentation has been provided including a narrative response to Preliminary Review comments, updated simulation input and output summary files, and an updated LEED Submittal Template claiming a performance improvement of 43.8% using the ASHRAE 90.1-2004 Appendix G methodology and DES v1.0 guidance. Energy efficiency measures incorporated into the building design include an improved thermal envelope, high efficiency glazing, reduced interior lighting power density, occupancy sensors, energy recovery, and a University CHP plant. Sufficient information has been provided to address the issues raised in the Preliminary Review.

However, as per DES v1.0 guidance document 'The total number of EAc1 points achievable in Step 2 is limited to 4 points above the number determined in Step 1, up to a maximum of 10 total points for the project.' The Step 1 of the project is claiming 3 points, therefore the total number of points that can be achieved for this credit is 7.

For future submittals please note that in Step 1 the chilled water temperature delta listed as 77.6F to meet the pump flow rate listed in the construction documents seems incorrect. It is highly unlikely that the return chilled water temperature will be 112.6 F as listed in the supporting documentation. Although this discrepancy in Step 1 does not affect the achievement of this credit as pump power seems reasonable and no credit is being taken for the pumping energy in the proposed case. For future reference, the Step 1 stand-alone scenario building loads should closely match the construction documents including the chilled water loop flow, chilled water temperature differential, pump power, etc.
Construction Application 9/2/2012

The LEED Submittal Template and a narrative have been provided stating that 4.6% of the project’s energy cost is being offset by renewable site generated energy.

However, it is not clear that the renewable energy sources listed are compliant with the credit standards. Additionally, the LEED template has not been completed reflecting the percentage of the project’s energy cost that is being offset by the renewable site generated energy.

TECHNICAL ADVICE:
Please refer to “Required Treatment of District Thermal Energy in LEED-NC version 2.2 and LEED for Schools’ (DES v1.0) guidance and LEED Interpretation 2226 for an updated list of eligible versus ineligible renewable energy systems and provide additional documentation verifying that the biomass energy falls under the eligible renewable energy sources.

Additionally, update calculations for the percentage of the project’s energy cost that is being offset by the renewable site generated energy as per the DES v1.0 guidance. The guidance states that "The fraction of renewable energy contributed by the DES depends in turn on how much energy the DES delivers to the building, how much of the building's load the DES supplies, and how much of the DES energy source is renewable. Calculate the overall performance by multiplying together the following three factors: 1. The fraction of the estimated or actual DES total energy use provided by qualifying renewable sources 2. The fraction of the estimated or actual DES total delivered energy that is supplied to the project building 3. The fraction of the project building's annual energy cost that is supplied by the DES, i.e., (DES energy supplied to building * unit energy (fuel or electricity) cost of the DES) / total building energy cost over all fuel types."

Confirm that the total energy consumption and cost for each energy type match the energy and cost reported in EAc1 Step 2 template. Revise the LEED submittal template as necessary.

Construction Application 1/4/2013

Revised LEED Submittal Template, a response narrative and additional calculations have been provided stating that 4.2% of the project’s energy cost is being offset by renewable energy generated on-site and that the project has used a computer model simulation to document improved building energy performance under EAc1 Optimize Energy Performance. The project has verified that the oat hulls, procured as waste from an industrial process are an eligible renewable energy source.

The documentation demonstrates credit compliance.

Construction Application 1/4/2013

Enhanced Commissioning Credit 3-Version 2.2
The LEED Submittal Template has been provided stating that the enhanced commissioning requirements have been completed. In addition, a narrative describing the enhanced commissioning processes that were employed on the project has been provided.

Enhanced Refrigerant Management
Credit 4-Version 2.2

Measurement and Verification
Credit 5-Version 2.2

Green Power
Credit 6-Version 2.2

The LEED Submittal Template has been provided stating the project has purchased Green-e accredited Tradable Renewable Certificates (RECs) equal to 140% of the predicted annual electrical consumption over a two year period. The submitted documentation states that Renewable Choice will provide RECs equal to 140% of the building’s total annual electric energy usage and includes the term of the contract and a narrative.

The documentation demonstrates credit compliance.

Materials and Resources
Possible Points 13

Storage and Collection of Recyclables
Prerequisite 1-Version 2.2

The LEED Submittal Template has been provided stating that the project has provided appropriately sized dedicated areas for the collection and storage of recycling materials, including cardboard, paper, plastic, glass, and metals.

Building Reuse
Credit 1.1-1.2-Version 2.2

Building Reuse, Non-Structural
Credit 1.3-Version 2.2

Construction Waste Management
Credit 2-Version 2.2
The LEED Submittal Template has been provided stating that the project has diverted 966.3 tons (86.4%) of on-site generated construction waste from landfill. Calculations have been provided to document the waste types and receiving agencies for recycled materials. A narrative has been provided describing the project's Construction Waste Management Plan.

**Resource Reuse**  
Credit 3-Version 2.2

**Recycled Content**  
Credit 4-Version 2.2

The LEED Submittal Template has been provided stating that 14.8% of the total building materials content, by value, have been manufactured using recycled materials.

**Regional Materials**  
Credit 5-Version 2.2

The LEED Submittal Template has been provided stating that 36.3% of the total building materials value includes building materials and/or products that have been extracted, harvested or recovered, as well as manufactured within 500 miles of the project site.

**Rapidly Renewable Materials**  
Credit 6-Version 2.2

**Certified Wood**  
Credit 7-Version 2.2

The LEED Submittal Template has been provided stating that 81% of the total wood-based building materials are harvested from FSC certified forests. A minimum of 50% is required.

However, two issues are pending:
1. It appears the Roseburg Skyblend Melamine has recycled content. Only the portion of the Melamine which is raw wood may be counted towards MRc7
2. For projects registered after 4/7/2008, the vendor invoices for all FSC certified wood products must be provided.

**TECHNICAL ADVICE:**
1. Revise the LEED Submittal Template to include only the raw wood content for FSC Mixed [NN]% materials.

2. Please provide vendor invoices for all certified wood products. Each vendor invoice must conform to the following requirements:
   A. Each wood product must be identified as such on a line-item basis;
   B. FSC products must be identified as such on a line-item basis and must be identified as "FSC Pure," "FSC Mixed Credit," or "FSC Mixed [NN]%"
   C. The dollar value of each line item must be shown
D. The vendor’s chain-of-custody (COC) number must be shown on any invoice that includes FSC products.

Exceptions—In some rare instances, it may not be practical for a vendor to invoice wood products on a line-item basis because the invoice would be dozens of pages long. In such cases, the invoice should indicate the aggregate value of wood products sold by the vendor. If the wood products are FSC certified:
1. The vendor’s COC number must be shown on the invoice;
2. The invoice must be supplemented by a letter from the vendor stating that the products invoiced are FSC certified.
3. The invoice or the letter must state whether the products are “FSC Pure,” “FSC Mixed Credit,” or “FSC Mixed [NN]%”

An optional narrative can be submitted describing any special circumstances or considerations regarding the project’s credit approach. Comprehensive guidelines can be found on the USGBC website at: https://www.usgbc.org/ShowFile.aspx?DocumentID=4027

**Construction Application**

The LEED Submittal Template has been revised and vendor invoices for all certified wood products have been provided to address the issues outlined in the Preliminary Review comments and state that 59.5% of the total wood based building materials are harvested from FSC certified forests. The documentation demonstrates credit compliance.

**Indoor Environmental Quality**

Minimum IAQ Performance

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<th>Possible Points</th>
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</thead>
<tbody>
<tr>
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<td>15</td>
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**Design Application**

The LEED Submittal Template has been provided stating that the project complies with the minimum requirements of ASHRAE Standards 62.1-2004. A narrative, ASHRAE 62.1 VRP calculations, HVAC schedule drawings, and HVAC plan drawings have been provided describing the project’s ventilation system design.

However, the narrative and supporting calculations are not adequate to confirm compliance using the ASHRAE 62.1-2004 modeling methodology.

1. It appears that Vbz values are not consistent with the Minimum Ventilation Rate Procedure guidelines. For example for classroom space W220b, Vbz should be 371 but the reported Vbz is 331.

2. It appears that values for Ra and Rp are incorrectly chosen for some spaces (for eg kitchenette has 0.0 Rp and Ra) from Table 6.1 of the standard.

3. In the uploaded ASHRAE 62.1 VRP calculations, value for Pz (People in zone) for spaces like workrooms has been listed as 0.0. It is highly unlikely that these spaces have 0.0 occupant density.

4. The total peak occupancy of 410 people documented for this credit varies substantially from the peak occupancy of 145 people reported in SSc4.2 Bicycle Storage and Changing Rooms. Note that the peak
occupancy should be reported consistently across all credits

TECHNICAL ADVICE:
1. Please revise the calculations for Vbz as per the Minimum Ventilation Rate procedure guidelines.

2. Update the values for Rp and Ra from Table 6.1 of ASHRAE 62.1-2004 where applicable. If default values are not being used please provide narrative/supporting documentation for not choosing the default values.

3. Note that workrooms are occupied spaces. Provide additional narrative/supporting documentation explaining why occupancy values for these occupied spaces are 0.0 and update the calculations if necessary.

4. Confirm the appropriate peak occupancy for the building, and update the peak occupancy and/or the diversity as necessary so that the peak occupancy is consistent across all credits.

Design Application
9/22/2011
Revised calculations have been provided that show compliance with ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality, using the Ventilation Rate Procedure. Additionally, the peak occupancy has been revised and is consistent with the other credits. The documentation demonstrates prerequisite compliance.

For future submittals, please provide a narrative if one is asked for in the preliminary review comments. Additionally, ensure all the information provided in revised documentation is consistent throughout the credit. For example the LEED online template states a supply air volume of 24,185 CFM, whereas the revised 'EQp1 - OA ventilation rates 08-18-11' lists a total supply air volume of 24,245 CFM.

Environmental Tobacco Smoke (ETS) Control
Prerequisite 2-Version 2.2
Design Application
6/9/2011
The LEED Submittal Template has been provided stating that smoking is prohibited inside buildings within the project and that designated smoking areas have been located at least 25 feet away from building entries, windows, and air intakes. In addition, Chapter 35 of the University's Conditions of Use Operations Manual highlighting the smoke-free campus policy has been provided.

Outdoor Air Delivery Monitoring
Credit 1-Version 2.2

Increased Ventilation
Credit 2-Version 2.2

Construction IAQ Management Plan: During Construction
Credit 3.1-Version 2.2
Construction Application
9/2/2012
The LEED Submittal Template has been provided stating that the project developed and implemented a construction IAQ Management Plan that followed the referenced SMACNA Guidelines, and that permanently installed air handling equipment was not operated during construction. A copy of the project's IAQ Management Plan and photos highlighting the implemented IAQ measures have been provided.
**Construction IAQ Management Plan: Before Occupancy**

Credit 3.2-Version 2.2

Construction Application 9/2/2012

The LEED Submittal Template has been provided stating that the project is performing a flush-out prior to occupancy by supplying a total air volume of 14,000 cubic feet of outdoor air per square foot of floor area while maintaining an internal temperature of 64.8 degrees F and relative humidity of 59.8%. A narrative describing the project's pre-occupancy flush-out process has been provided as required. The narrative includes data regarding the temperature, air flow, and duration of the flush-out.

**Low-Emitting Materials: Adhesives and Sealants**

Credit 4.1-Version 2.2

Construction Application 9/2/2012

The LEED Submittal Template has been provided stating that all indoor adhesive and sealant products comply with the VOC limits of the referenced standards for this credit. The template includes a list of the required product details.

**Low-Emitting Materials: Paints and Coatings**

Credit 4.2-Version 2.2

Construction Application 9/2/2012

The LEED Submittal Template has been provided stating that all indoor paint and coating products comply with the VOC limits of the referenced standards for this credit.

However, the required product details for all interior paints and coatings have not been provided. The model/type of Minwax Sanding Sealer, Woodstain, Polyurethane Gloss and Polyurethane Satin have not been included on the LEED Submittal Template.

TECHNICAL ADVICE:
Please provide a list of the required product details for all indoor paint and coating products. The list should include the product manufacturer's name, product name and type/model, specific VOC data (g/L), the corresponding allowable VOC content, and the source of VOC data for each product.

Construction Application 1/4/2013

The LEED Submittal Template has been revised/annotated and manufacturer's product cut sheets have been provided to address the issues outlined in the Preliminary Review comments and state that all indoor paint and coating products comply with the VOC limits of the referenced standards for this credit. The documentation demonstrates credit compliance.

**Low-Emitting Materials: Carpet Systems**

Credit 4.3-Version 2.2

Construction Application 9/2/2012

The LEED Submittal Template has been provided stating that the installed carpet complies with the testing and product requirements of the CRI Green Label Plus Program, there are no installed carpet cushions and all carpet adhesives comply with the requirements of EQc4.1 Low-Emitting Materials-Adhesives and Sealants. The template includes a list of the required product details.
Low-Emitting Materials: Composite Wood and Agrifiber

**Construction Application**

The LEED Submittal Template has been provided stating that all composite wood, agrifiber products, and laminate adhesives used in the building contain no added urea-formaldehyde resins. A product summary has been provided.

However, the information provided is inconsistent with the LEED Submittal Template for MRc7, Certified Wood. The Luray Veneer wood panels, FSC Skyblend Melamine by Roseburg, and the GPD EC Structural Composite Lumber Core Doors are not included on the template for EQc4.4

**TECHNICAL ADVICE:**

Please provide information for the Luray Veneer wood panels, the FSC Skyblend Melamine by Roseburg and the GPD EC Structural Composite Lumber Core Doors and any other composite wood or agrifiber products within the scope of work that may not be listed and/or a narrative explaining why these items were not used. To support the information, provide documentation confirming that the products contain no added urea-formaldehyde resins.

**Construction Application**

The LEED Submittal Template has been revised and manufacturer's product cut sheets have been provided to address the issues outlined in the Preliminary Review comments and state that all composite wood, agrifiber products, and laminate adhesives used in the building contain no added urea-formaldehyde resins. The documentation demonstrates credit compliance.

Indoor Chemical and Pollutant Source Control

**Controllability of Systems: Lighting**

**Design Application**

The LEED Submittal Template has been provided stating that lighting controls are provided to enable 95.4% of occupants to make adjustments to suit individual task needs and preferences, and to permit transient groups to share lighting controls in all shared multi-occupant spaces. A narrative has also been provided describing the project's lighting control strategy with a description of the type and location of the lighting controls.

However, it appears that Group Study Rooms W201, W203 and W215 have a single wall switch. While it is acceptable to provide a single on and off switch in small multi-occupant spaces not intended for making presentations, it is unclear as to whether a single switch in these spaces provides sufficient control adequate for the intended function of the space.

**TECHNICAL ADVICE:**

Please provide a narrative demonstrating how the controls in Group Study Rooms W201, W203 and W215 meet group needs and preferences. The narrative should clarify if the function of the spaces includes activities other than studying.

**Design Application**

The LEED Submittal Template has been revised to address the issues outlined in the Preliminary Review and
states that the lighting controls in Group Study Rooms W201, W203 and W215 can be adjusted to meet group needs and preferences. The documentation demonstrates credit compliance.

**Controllability of Systems: Thermal Comfort**
Credit 6.2-Version 2.2

**Thermal Comfort: Design**
Credit 7.1-Version 2.2

**Design Application**
6/9/2011

The LEED Submittal Template has been provided stating that the HVAC systems and building envelope have been designed to meet the requirements of ASHRAE Standard 55-2004. The project team has provided a narrative describing the method used to establish thermal comfort criteria for the project. Data have also been provided regarding the specific seasonal temperature and humidity design criteria. However, the documentation/narrative provided does not cover details about radiant temperature asymmetry and air speed. For future submissions please ensure that the information provided shows compliance with ASHRAE Standard 55-2004 section 6.1.1 in its entirety including radiant temperature asymmetry, and air speed.

**Thermal Comfort: Verification**
Credit 7.2-Version 2.2

**Daylighting and Views: Daylight 75% of Spaces**
Credit 8.1-Version 2.2

**Daylighting and Views: Views for 90% of Spaces**
Credit 8.2-Version 2.2

**Innovation and Design Process**
Possible Points 5

**Innovation in Design**
Credit 1.1-Version 2.2

**Design Application**
6/9/2011

The LEED Submittal Template has been provided stating that the project team has developed and implemented an ID credit proposal to reduce the amount of toxic material brought onto the building site by specifying low mercury lamps. The IDc1.1 Credit Template, Low Mercury Calculator and Lamp Fixture cut sheets have been provided.

However, four issues are pending:
1. LEED-EB v2 MRc6, Additional Toxic Material Reduction, Reduced Mercury in Light Bulbs sets the standard for this strategy. This credit requires that the project maintain mercury content of all mercury-containing light bulbs below 80 picograms per lumen hour.
2. A LEED-EB v2 MRc6 Submittal Template must also be provided.
3. A quick calculation of the average picograms per lumen hour results in 69.2, not 8.65 as listed in the Calculator.
4. The documentation provided does not appear to include all indoor, outdoor, hard-wired, and portable fixtures and it is unclear if there are any lamps with no mercury content used in the project.

TECHNICAL ADVICE:
1. Please demonstrate that the mercury content of all mercury-containing light bulbs is below 80 picograms per lumen hour.
2. Provide a completed LEED-EB v2 Submittal Template for credit MRc6.
3. Revise the Low Mercury Calculator to list the average mercury content of all mercury-containing lamps.
4. Provide a lighting schedule or other documentation that includes all lamps for indoor, outdoor, hard-wired, and portable fixtures. Alternatively, provide a narrative to demonstrate that the documentation provided includes all of the aforementioned fixtures. If applicable, provide documentation from product manufacturers or suppliers verifying that non-mercury containing lamps are at least as energy efficient (in lumens per watt) as their mercury-containing counterparts.

Design Application
9/22/2011
The LEED-EB v2 MRp2 Submittal Template and mercury calculator have been revised to address the issues outlined in the Preliminary Review and state that the average mercury content of all mercury-containing bulbs is 62.81 picograms per lumen hour. A LEED-EB v2 MRc6 Submittal Template has been provided as requested. In addition, a lighting schedule, lighting plans, product manufacturer documentation, and a narrative have been provided that describe all lighting fixtures used in the project. The documentation demonstrates credit compliance.

Innovation in Design
Credit 1.2-Version 2.2
Design Application
6/9/2011
The LEED Submittal Template has been provided stating that the project achieves exemplary performance for WEc3, Water Use Reduction as specified in the LEED-NC v2.2 Reference Guide. The guideline for exemplary performance in WEc3 is 40%.

For future submittals, please note that the building occupancy should be consistent across all credits. SS4.2 occupant calculations should include peak transient populations while WEc3 should account for the daily average.

Innovation in Design
Credit 1.3-Version 2.2
Construction Application
9/2/2012
The LEED Submittal Template has been provided stating that the project achieves exemplary performance for MRc5, Regional Materials, as specified in the LEED Reference Guide for New Construction v2.2, Third Edition. The requirement for exemplary performance in MRc5 is 40%.

However, as documented, the project does not meet the exemplary performance standard.

TECHNICAL ADVICE:
Please provide revised base credit documentation to confirm that the project achieves the exemplary performance standard specified in the Reference Guide.
Alternatively, the project may apply for an alternative Innovation in Design credit for the Final Review.

**Construction Application**  
1/4/2013

The project is attempting a new Innovation in Design credit based on the preliminary review comments. A revised LEED Submittal Template has been provided stating that the project achieves exemplary performance for EAc6 - Green Power. The requirement for exemplary performance in EAc6 is met by doubling the requirements, either by the amount of electricity or the length of contract. The project team has provided documentation demonstrating that the project has purchased Green-e accredited Tradable Renewable Certificates (RECs) equal to 140% of the predicted annual electrical consumption over a two year period.

The documentation demonstrates credit compliance.

**Innovation in Design**  
Credit 1.4-Version 2.2

**Construction Application**  
9/2/2012

The LEED Submittal Template has been provided stating that the project has demonstrated compliance with Building Envelope Commissioning based on LEED Interpretation 2302.

However, the documentation provided does not meet the requirements of LEED Interpretation 2302 (please refer to the complete ruling). Documentation indicating the development of a systems manual for each building system enclosure and training for the maintenance of the exterior enclosures have not been provided. Additionally, the results of the commissioning process have not been provided.

**TECHNICAL ADVICE:**  
Please provide documentation of the development of a systems manual for each building system enclosure and training for the maintenance of the exterior enclosures. Additionally, provide the results of the commissioning process.

**Construction Application**  
1/4/2013

Additional documentation of the Building Envelope Commissioning Process and the results and a clarification narrative describing why a systems and training manual is not required have been provided to address the issues outlined in the Preliminary Review comments. The documentation demonstrates credit compliance.

**LEED Accredited Professional**  
Credit 2-Version 2.2

**Construction Application**  
9/2/2012

The LEED Submittal Template has been provided stating that a LEED AP has been a participant on the project development team. A copy of the LEED AP award certification for Martha Norbeck has been included as required.