Endicott College

Title: Green Building Standards

Responsible Office: Physical Plant

OVERVIEW

The Endicott College Green Building Standards apply to all capital projects and should be included in all Requests for Proposals issued for new projects and referenced in contracts for architects, design consultants, and construction managers. These Standards have been developed to align with the College's vision focused on creating a healthier, low carbon campus community. These requirements are also a key tool to reduce greenhouse gas emissions associated with campus operations. The Standards identify a minimum level of design and process requirements for all new construction and renovation projects, while providing enough flexibility for individual project teams to meet project goals. The Standards also include recommendations that project teams should attempt to achieve.

The requirements and recommendations are organized within six categories that are aligned with six project tiers as described below:

<table>
<tr><td>Tier 1</td><td colspan="3">Tier 2</td><td>Tier 3</td><td>Tier 4</td></tr>
<tr><td>New Building or Major Renovation</td><td>Tier 2A
Fit-Outs
> $10 million</td><td>Tier 2B
Fit-Outs
$1 - $10 million</td><td>Tier 2C
Fit-Outs
<$1 million</td><td>System Upgrades</td><td>Non-Energy</td></tr>
<tr><td>New Buildings and Building-Wide Full-Gut Renovations</td><td colspan="3">Partial Building Interior Fit-Outs
HVAC, Lighting, and Materials Within the Scope</td><td>Limited Scope Projects with Energy and GHG Impact</td><td>Limited Scope Projects with No or Limited Energy and GHG Impact</td></tr>
</table>

Tier 1: Tier 1 projects include all new buildings and full building renovations with a comprehensive scope that includes room configuration modifications, new HVAC systems, envelope modifications, and new lighting.

Tier 2: Tier 2 projects are partial renovations or fit-outs of existing facilities in which systems within the renovated spaces are largely replaced (e.g. lighting, finishes, plumbing, and/or HVAC), but base building HVAC systems and the building envelope remain unaffected. Tier 2 is further divided into subcategories based on project costs:

- Tier 2A: >$10 million in total costs
- Tier 2B: $1-$10 million in total costs
- Tier 2C: <$1 million in total costs

Tier 3: Tier 3 projects include renovations to systems with an energy impact but are focused only on those systems (e.g. controls upgrades, AHU replacement, lighting replacement, etc.)

Tier 4: Tier 4 projects have no or limited energy and GHG impact, such as a landscape project or a project which only renovates finishes and furnishings.

TIER 1 REQUIREMENTS

Analysis

Prior to the end of the Schematic Design (SD) phase evaluate the feasibility of pursuing LEED certification. If applicable, include the analysis in the project Request for Proposals (RFP). Projects are not required to pursue LEED certification but must demonstrate that it was evaluated:

- Review applicable Green Building Standards with team during conceptual design.
- When setting goals, look at each LEED credit and set goals that align with this Standard, regardless of whether full certification is pursued.
- Viable components should be implemented as appropriate.

Prior to the end of the SD phase, present the feasibility of pursuing net zero energy and determine the renewable energy generation potential of the site. Consider including net zero energy performance in the RFP or Owner's Project Requirements (OPR) as a stretch goal. Projects are not required to pursue net zero energy or on-site renewables, but must demonstrate that they were evaluated:

- Using internal benchmarks, develop an energy use intensity (EUI) target for the project in kBtu per square foot per year.
- Complete an analysis for renewable potential assuming the site and project roof are capable of and compare to the energy target.

Integrated Design

At least three integrated design charrettes are required, the first of which should happen at the time of project kickoff and prior to the end of Schematic Design. Charrettes should include identification and tracking of project goals and analyzing the life cycle cost impacts of potential

design options. Charrettes should include representation of major stakeholders including occupants and operations staff. Additionally, a Materials meeting and a Furniture meeting should be held with the Physical Plant and Office of Sustainability to address healthier building products; this will help support the team in achieving the requirements and minimize or avoid any impacts on cost or schedule.

For laboratory and data center projects, additional charrette requirements are provided in the "Prescriptive Requirements and Certification" section of this document.

Adhere to the requirements of LEED IP Credit 1: Integrative Process (based on ANSI Consensus National Guide 2.0 for Design and Construction of Sustainable Buildings and Communities – February 2, 2012) to formalize the integrated design process, which focus on energy and water analysis. See the LEEDv4 Reference Guide for full details.

Life Cycle Costing

Life Cycle Costing (LCC) will be performed to quantify the 20 year impacts on GHG, energy costs, maintenance costs, etc. The scope of LCC will vary depending on project, but will typically include envelope, HVAC, electrical, and many other building systems. Requirements by design phase include:

- Download and follow the Harvard University Life Cycle Calculator or another Endicott approved tool
- Planning/Conceptual Design: Initial Harvard LCC calculator presenting options for optional design elements with major budget implications
- Schematic Design: Harvard LCC calculator presenting options for major energy-consuming systems
- Value Engineering (Any Phase)
- Harvard LCC calculator presenting impacts beyond initial capital outlay

Energy Modeling

Utilize eQuest, Energy Plus, or compatible plug-ins for Revit or other BIM platforms to model proposed building designs, assist with life cycle costing, estimate greenhouse gas (GHG) emissions, and facilitate future measurement and verification.

At a minimum, the following deliverables or reports summarizing these deliverables are required:

- *Schematic Design:* Initial model results of massing, orientation, and/or major HVAC

systems with sensitivity analysis.

- *Design Development:* Multiple parametric runs comparing options of systems and strategies as determined in the initial and/or subsequent integrated design charrettes.
- *Construction Documents:* Complete design and base case models used for LEED and/or code compliance verification.
- *Building Turnover:* As-built energy model & electronic files.

Certification

All projects must meet requirements to achieve at least **LEED version 4 Gold** certification, unless Living Building Challenge (LBC) certification is being pursued.

Prescriptive Performance Metrics

Projects shall meet all the requirements below regardless of whether the project pursues LEED certification. For LEED credits, refer to the LEED v4 Reference Guide for detailed requirements.

Energy:

On a project-by-project basis, establish maximum Energy Use Intensity (kBtu/square foot and kBtu/person) goals.

Demonstrate, via energy modeling, the following savings below ASHRAE 90.1-2010 baselines based on energy reductions:

- 30% - Full building new construction for any non-laboratory use
- 19.5%- Full building new construction of a laboratory
- 18% - Full building renovations of existing buildings of any type

Commissioning:

Meet the requirements of LEED-NCv4 Enhanced Commissioning: Option 1, Path 1, Enhanced Systems Commissioning credit.

If the project scope includes the development of new or substantially renovated facades, the team must also pursue the LEED-NCv4 Enhanced Commissioning: Option 2, Envelope Commissioning credit.

Indoor Potable Water Use:

Meet the requirements of LEED-NCv4 Indoor Water Use Reduction credit, including reducing indoor potable water use by a minimum of 35%.

Outdoor Potable Water:

Use sub-meter irrigation separately from other potable water use.

Comply with the LEED-NCv4 Outdoor Water Use Reduction credit, including a reduction of water use by at least 50% using the EPA's WaterSense Water Budget tool or provide no irrigation from potable sources.

Materials:

Address specific chemical classes of concern in furniture, carpet, wall base, and non-blackout window shades and comply with requirements of Healthier Hospitals Initiative Safer Chemicals Challenge: Healthy Interiors ("HHI-Healthy Interiors") if possible. The Massachusetts and Boston fire codes were updated in 2015 and 2016, respectively. Any furniture procured as part of this project must be free of chemical flame retardants, unless required by code. Chemical flame retardants should not be required in sprinklered spaces, but always consult a code specialist.

Meet the requirements of the following and track using the *LEED Building Product Disclosure and Optimization Calculator*:

- *LEED-NCv4 Building Product Disclosure and Optimization – Environmental Product Declarations: Option 1 – Environmental Product Declaration (EPD)*
- *LEED-NCv4 Building Product Disclosure and Optimization – Sourcing of Raw Materials: Option 1 – Raw Material Source and Extraction Reporting*
- *LEED-NCv4 Building Product Disclosure and Optimization – Material Ingredients: Option 1 – Material Ingredient Reporting*

Teams are not required to achieve the following credits, but they are to pursue documentation of them within LEED Online in an effort to further understand the feasibility of such requirements applying to all projects:

- *LEED-NCv4 Building Product Disclosure and Optimization – Environmental Product Declarations: Option 2 – Multi- Attribute Optimization*
- *LEED-NCv4 Building Product Disclosure and Optimization – Sourcing of Raw Materials: Option 2 – Leadership Extraction Practices*
- *LEED-NCv4 Building Product Disclosure and Optimization – Material Ingredients: Option 2 – Material Ingredient Optimization*
- *LEED-NCv4 Building Product Disclosure and Optimization – Material Ingredients: Option 3 – Product Manufacturer Supply Chain Optimization*

Waste management regulations no longer permit the use of alternative daily cover to be considered as 'diverted' waste. Waste management requirements have been adjusted as a result. Teams must:

- If site separation is possible, teams must divert a minimum of 90% of the construction debris from landfill as calculated under *LEED-NCv4 Construction and Demolition Waste Management*.
- If site separation is not possible, teams must divert a minimum of 75% of the construction debris from landfill as calculated under *LEED-NCv4 Construction and Demolition Waste Management*.

Labs:

High Energy Equipment Isolation: Examine options for co-locating equipment with high heat generation (e.g. -80 freezers) in a distinct space that permit the use of hydronic cooling loops or other means of high-efficiency heat rejection.

Meet the requirements of the credits in the *Labs21 Environmental Performance Criteria version 3.0 (07.11.2010)*:

- *WE EPC Prerequisite 1: Laboratory Equipment Water Use* Do not use once-through water for process cooling.

Recommendation: Teams are not required to achieve the following requirement, but are encouraged to do so as scope and budget allow:

- **Re-commission the lab one year post-occupancy, at a minimum. Monitoring-based commissioning applications can be utilized in lieu of a traditional re-commissioning process.**

Data Centers:

EU Code of Conduct on Data Centres – 2014 Best Practices v5.1.1: As part of at least one design charrette, the project team should consider the applicability of the best practices suggested in the referenced document.

BSR/ASHRAE 90.4* – Energy Standard for Data Centers and Telecommunications Buildings: Project teams are to calculate the anticipated energy use with respect to the following PUE metrics and compare to the design minimums suggested in each section, though compliance with the standard is not required at this time:

- Mechanical Design PUE (Section 6.4.1.1)
- Annualized Mechanical Energy PUE (Section 6.4.1.2)

**ASHRAE 90.4 is currently in draft form, and has not been fully approved by the relevant ASHRAE committees. Pending adoption of the official standard, design teams are directed to reference ASHRAE 90.4P, which is the Proposed standard language.*

Metering and Ongoing Verification of Performance

Separately meter all utilities coming into the building. When appropriate to project scope, separately sub-meter significant use types within the building including. At a minimum, separately meter:

- Parking Garages
- Large Kitchens
- Commercial Spaces
- Data Centers or Large Data Closets

LEED Compliance:

Meet the requirements of either LEED-NCv4 Advanced Energy Metering or LEED- NCv4 Enhanced Commissioning, Option 1, Path 2, Enhanced and Monitoring-Based Commissioning. These credits provide infrastructure for ensuring comprehensive information about the performance of major building systems is available.

Incentives

Projects are required to analyze what utility or other incentives are available to the project team and pursue incentives as appropriate to the scope of the project. The project must disclose the incentives received as part of the Deliverables Checklist requirements. Should the project team have questions or need help with this process, contact the Office of Sustainability at sustainability@endicott.edu.

Close-Out Documentation/O&M Readiness

Projects must collect and turn over documentation that will assist with efficient and cost effective operations of the space or will be beneficial to the performance of future College projects. This process should be done in a consistent and thorough process and includes the following requirements:

1. Prepare and turn over to the Facilities Department a Systems Manual following the requirements of ASHRAE Guideline 4-2008. This is frequently delivered as part of the project's commissioning (Cx) efforts.
2. Official acceptance of O&M documentation must be approved by the facilities director (or designated appointee).

3. Turn-over documentation, including as-built energy model with summary of inputs and outputs and electronic model file.
4. Engage the Office of Sustainability to complete a project profile for sharing with campus community.
5. Provide access to LEED-Online to sustainability@endicott.edu for college-wide metric tracking purposes.
6. Provide a final copy of the project's Deliverables Checklist and any associated documentation to sustainability@endicott.edu.

TIER 2 REQUIREMENTS

Scope Overview

This tier is designed to cover projects in which only a part of an existing building is being renovated, but most or all major systems serving the space (e.g. lighting, HVAC, furniture, fixtures and finishes) are within the scope of the project. Typical examples include renovating an office space to the extent that occupants must be removed during construction and renovating a space to enable a new use or shift in programing. Projects that are only addressing one or a few systems serving the space are more likely to fall under Tier 3 or Tier 4 of the Green Building Standards.

LEED certification is encouraged, but not required, for Tier 2 projects. Please note that the prescriptive requirements below, which include some LEED credits, are required regardless of whether LEED certification is being pursued.

Integrated Design

Tier 2A and 2B:

Host a sustainability goal-setting meeting for the project that includes the design, project management, and operations team at the beginning of the design phase, ideally shortly after program needs and scope are determined but before design activities commence. Provide a copy of the meeting minutes, agenda, or slides as part of the Deliverables Checklist requirements. Additionally, a Materials meeting and a Furniture meeting should each be held with the Office of Sustainability or Physical Plant to address healthier building products; this will help support the team in achieving the requirements and minimize or avoid any impacts on cost or schedule.

Tier 2C:

No formal requirements, though project teams are encouraged to pursue integrated design

practices to the extent that it is feasible.

Recommendation:

Projects are encouraged, but not required, to adhere to the requirements of LEED IP credit 1: Integrative Process (based on ANSI Consensus National Guide 2.0 for Design and Construction of Sustainable Buildings and Communities – February 2, 2012) to formalize the integrated design process, which focuses on energy and water analysis.

Health and Wellness Initiatives

Healthier Materials:

- **All Tier 2 Projects - 2A, 2B, and 2C**:
  - Any furniture procured as part of this project must address specific chemical classes of concern and comply with requirements of Healthier Hospitals Initiative Safer Chemicals Challenge: Healthy Interiors ("HHI-Healthy Interiors") if possible. Note: The Massachusetts and Boston fire codes were updated in2015 and 2016, respectively. Any furniture procured as part of this project must be free of chemical flame retardants, unless required by code. Chemical flame retardants should not be required in sprinklered spaces, but always consult a code specialist.
- **Tiers 2A and 2B**:
  - Any carpet, wall base, and non-blackout window shades procured as part of this project must address specific chemical classes of concern.
  - Must meet the requirements of the following and track using the LEED Building Product Disclosure and Optimization Calculator:
    - LEED-CIv4 Building Product Disclosure and Optimization – Environmental Product Declarations: Option 1 – Environmental Product Declaration (EPD)
    - LEED-CIv4 Building Product Disclosure and Optimization – Sourcing of Raw Materials: Option 1 – Raw Material Source and Extraction Reporting
    - LEED-CIv4 Building Product Disclosure and Optimization – Material Ingredients: Option 1 – Material Ingredient Reporting
    - LEED-CIv4 Construction and Demolition Waste Management: Divert at minimum of 50% of construction waste from landfills
- **Tiers 2A and 2B** must perform the following analysis: Teams are not required to achieve the following credits, but they are to pursue documentation of them within LEED Online in an effort to further understand the feasibility of such requirements applying to all projects:

- LEED-CIv4 Building Product Disclosure and Optimization – Environmental Product Declarations: Option 2 – Multi-Attribute Optimization
- LEED-CIv4 Building Product Disclosure and Optimization – Sourcing of Raw Materials: Option 2 – Leadership Extraction Practices
- LEED-CIv4 Building Product Disclosure and Optimization – Material Ingredients: Option 2 – Material Ingredient Optimization
- LEED-CIv4 Building Product Disclosure and Optimization – Material Ingredients: Option 3 – Product Manufacturer Supply Chain Optimization

Ventilation

- **Tiers 2A, 2B and 2C:** Teams must meet the minimum requirements of ASHRAE 62.1-2010 and complete the LEED-CIv4 Ventilation Calculator if adjustments to the ventilation system serving the space are within the project scope.

Greenhouse Gas Reduction Initiatives

Energy Reduction:

- **Tier 2A, 2B, and 2C**: Track and document Energy Conservation Measure details performed on this project for annual reporting.
- **Tier 2A and 2B**: Projects must document compliance with 50% of the "available" points under LEED ID+Cv4 credit EAc2, Optimize Energy Performance. The Project teams may pursue prescriptive or energy model-based compliance paths.
  - e.g. If project does not have building envelope or base building systems within the scope, then the maximum points available under the prescriptive compliance path is 10, so the project must earn 5 points to comply with the Green Building Standards. If glazing and insulation are added to the scope, the maximum available points under the prescriptive compliance path is 14, so the project must earn 7 points to comply.

Life Cycle Costing:

- **Tiers 2A, 2B, and 2C**: Life Cycle Costing is required for any and all energy saving systems that are being considered for removal from a project as part of any value engineering processes. Teams must enter first costs, estimated energy savings, and potential incentives (if applicable) into the latest version of the Harvard University Life Cycle Costing Calculator or another Endicott approved tool.

- ***Recommendation: Projects are encouraged, but not required, to perform Life Cycle Costing exercises for "stretch" energy goals that may not be in the current scope of the Project but could contribute to greater emissions and cost savings.***

Commissioning:

- **Tier 2A:** The project's mechanical, electrical, plumbing and associated controls systems must be commissioned in accordance with the LEED-CIv4 Enhanced Commissioning: Option 1, Enhanced Systems Commissioning credit.
- **Tier 2B and 2C:** The project's mechanical, electrical, plumbing and associated controls systems must be commissioned by a person or firm that is independent of the design, construction, or controls companies used on the project. The commissioning services should include any systems that are part of the scope of the project, but are not required to include base-building systems that are not part of the scope of the renovation. Teams are encouraged, but not required, to meet LEED credits related to commissioning in Tier 2B and 2C.

Additional Sustainability Strategies:

- **All Tier 2 Projects - 2A, 2B, and 2C:**
  - **Indoor Potable Water Use Tiers 2A, 2B, and 2C:** Meet the requirements of LEED- CIv4 Indoor Water Use Reduction including reducing indoor potable water use by a minimum of 35%.
  - **Outdoor Potable Water Use (if in scope):** Sub-meter irrigation separately from other potable water use.
- ***Recommendation:*** *Rainwater Management – LEED NCv4 SS credit 4: Incorporate green infrastructure and low impact development strategies into the site design in order to manage on- site 100% of the total volume of runoff calculated for the 95th percentile rainfall event for the site.*
- ***Recommendation:*** *Heat Island Reduction – LEED NCv4 SS credit 5: Non-roof and roof heat island reduction required for new buildings, optional for existing buildings.*
- ***Recommendation:*** *Light Pollution Reduction – LEED NCv4 SS credit 6: Meet the requirements of LEED-NC v4 SS credit 6.*
- ***Recommendation:*** *Sustainable Sites Initiative - If project is a primarily a landscape project, adhere to Sustainable Sites Initiative requirements.*

Incentives:

- **Tier 2A, 2B and 2C:** Projects are required to analyze what utility or other incentives are available to the project team and pursue incentives as appropriate to the scope of the project. The project must disclose the incentives received as part of the Deliverables Checklist requirements. Should the project team have questions or need help with this process, contact Office of Sustainability at sustainability@endicott.edu.

Close-Out Documentation

Projects must collect and turn over documentation that will assist with efficient operations of the space or will be beneficial to the performance of future College projects. This process should be done in a consistent and thorough process and includes the following requirements:

1. Prepare and turn over to the Physical Plant a Systems Manual following the requirements of ASHRAE Guideline 4-2008. This is frequently delivered as part of the project's commissioning (Cx) efforts.
2. Official acceptance of O&M documentation must be approved by the facilities director (or designated appointee).
3. Turn-over documentation, including as-built energy model with summary of inputs and outputs and electronic model file.
4. Engage the Office of Sustainability to complete a Project Profile for sharing with campus community.
5. Provide access to LEED-Online to sustainability@endicott.edufor college-wide metric tracking purposes.
6. Provide a final copy of the project's Deliverables Checklist and any associated documentation to sustainability@endicott.edu.

TIER 3 REQUIREMENTS

Scope Overview

This tier focuses on projects that may have an energy impact, but otherwise do not involve the renovation of a space in its entirety. Typical examples include the replacement of an air handling unit, boiler, or elevator. LEED certification is generally not possible for Tier 3 projects as there is not enough scope to earn a sufficient amount of points to meet LEED requirements.

Project teams should review the Green Building Standards when each project begins.

Greenhouse Gas Reduction Initiatives

Energy Reduction:

- Track and document Energy Conservation Measure details performed on project for annual reporting.

Life Cycle Costing:

- Before an energy system can be "replaced-in-kind", teams must research more efficient alternates, estimate potential savings, costs, and available incentives, and enter into the latest version of the Harvard University Life Cycle Costing Calculator or another Endicott approved tool.

Commissioning:

- The project's mechanical, electrical, plumbing and associated controls systems must be commissioned by a person or firm that is independent of the design, construction, or controls companies used on the project. The commissioning services should include any systems that are part of the scope of the project, but are not required to include base-building systems that are not part of the scope of the renovation.
- ***Recommendation: Teams are encouraged, but not required, to meet LEED credits related to commissioning.***

Incentives:

- Projects are required to analyze what utility or other incentives are available to the project team and pursue incentives as appropriate to the scope of the project. Should the project team have questions or need help with this process, contact the Office of Sustainability at sustainability@endicott.edu.

Health and Wellness Initiatives

Healthier Materials:

- ***Recommendation:*** *Projects are encouraged to address specific chemicals of concern in equipment and building materials. Comply with requirements of Healthier Hospitals Initiative Safer Chemicals Challenge: Healthy Interiors ("HHI-Healthy Interiors") when possible.*

Close-Out Documentation

Projects must collect and turn over documentation that will assist with efficient operations of the space or will be beneficial to the performance of future College projects. This process should be done in a consistent and thorough process and includes the following requirements:

1. Prepare and turn over to the Physical Plant a Systems Manual following the requirements of ASHRAE Guideline 4-2008. This is frequently delivered as part of the project's commissioning (Cx) efforts.
2. Official acceptance of O&M documentation must be approved by the facilities director (or designated appointee).
3. Turn-over documentation, including as-built energy model with summary of inputs and outputs and electronic model file.

TIER 4 REQUIREMENTS

Scope Overview

This tier focuses on projects that have a negligible energy impact and do not involve the renovation of a space in its entirety. Typical examples include the replacement of carpeting, re-painting a space, or replacing a roof. LEED certification is generally not possible for Tier 4 projects as there is not enough scope to earn a sufficient amount of points to meet LEED requirements. Despite the small scope of these projects, they can still make meaningful contributions to Endicott's healthier materials objectives.

Project teams should review the Green Building Standards when each project begins.

Health and Wellness Initiatives

- Any furniture procured as part of this project must address specific chemical classes of concern and comply with requirements of Healthier Hospitals Initiative Safer Chemicals Challenge: Healthy Interiors ("HHI-Healthy Interiors") when possible. Note: The Massachusetts and Boston fire codes were updated in 2015 and 2016, respectively. Any furniture procured as part of this project must be free of chemical flame retardants, unless required by code. Chemical flame retardants should not be required in sprinklered spaces, but always consult a code specialist.

Sustainable Site Strategies

- ***Recommendation:*** *Rainwater Management – LEED NCv4 SS credit 4: Incorporate green infrastructure and low impact development strategies into the site design in order to manage on- site 100% of the total volume of runoff calculated for the 95th percentile rainfall event for the site.*
- ***Recommendation:*** *Heat Island Reduction – LEED NCv4 SS credit 5: Non-roof and roof heat island reduction required for new buildings, optional for existing buildings.*
- ***Recommendation:*** *Light Pollution Reduction – LEED NCv4 SS credit 6: Meet the requirements of LEED-NC v4 SS credit 6.*
- ***Recommendation:*** *Sustainable Sites Initiative - If project is a primarily a landscape project, adhere to Sustainable Sites Initiative requirements.*