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Missouri Botanical Garden Commerce Bank Education Center

LEED: EXISTING BUILDINGS OPERATIONS & MAINTENANCE

Transforming the Built Environment
INTRODUCTIONS

• Who are we?
  – Hope Gribble
    • USGBC-MGC Staff (Membership & Education Coordinator)
    • Bachelor of Arts in Fine Arts & Education
    • SS Team, Credits 2, 3, and 4
  – Kurt Thompson
    • Architect w/10+ yrs Experience in Green Building
    • MBA, Washington University in St. Louis
    • SS Team Captain
- Category Overview | Sustainable Sites
- Credit X Credit Investigation
- Review

Missouri Botanical Garden Commerce Bank Education Center

SUSTAINABLE SITES
CLASS OVERVIEW

Transforming the Built Environment
SUSTAINABLE SITES
CATEGORY OVERVIEW

Transforming the Built Environment
CATEGORY OVERVIEW

IS YOUR BUILDING QUALIFIED?

• Sustainable Sites Prerequisites
  – None!
CATEGOR Y OVERVIEW

IS YOUR BUILDING QUALIFIED?

• Sustainable Sites Credits (SSc)
  ✗ SSc1 LEED Certified Design and Construction
  ✓ SSc2 Building Exterior and Hardscape Management Plan
  ✗ SSc3 Integrated Pest Management, Erosion Control, and Landscape Management Plan
  ✓ SSc4 Alternative Commuting Transportation
  ✓ SSc5 Site Development  {Protect or Restore Open Habitat}
CATEGORY OVERVIEW

IS YOUR BUILDING QUALIFIED?

• Sustainable Sites Credits (SSc)
  × SSc6 Stormwater Management
  × SSc7.1 Heat Island Reduction {Non-Roof}
  × SSc7.2 Heat Island Reduction {Roof}
  × SSc8 Light Pollution Reduction

Transforming the Built Environment
SUSTAINABLE SITES CATEGORY OVERVIEW

Transforming the Built Environment

Resources
- Time
- Money
- Teamwork
- LEED
CATEGORY OVERVIEW

RESOURCES. WHAT DID IT REALLY TAKE?

• Time
  – Thoroughly read, re-read, and understand info about the credit in the LEED Reference Guide
    • Intent, requirements, related credits, referenced standards, implementation, timeline and team, calculations, resources, necessary documentation
  – Research and Review Additional Resources
    • Existing Plans/Policies, LEED User
    • CREDIT INTERPRETATION RULINGS
  – Identify Key Players & Stakeholders

Transforming the Built Environment
CATEGtORY OVERVIEW

RESOURCES. WHAT DID IT REALLY TAKE?

• Time
  – Identify Potential Changes
    • CREATE A STRATEGY
    • Meet with Key Players & Stakeholders
  – Implement Changes
    • Prepare the Documentation
    • Review with Key Players
  – Follow UP & Follow THROUGH
RESOURCES. WHAT DID IT REALLY TAKE?

• Money
  – Incentives for Get Up & Go! Campaign
  – Capital Improvements
  – Site Work = $$$

Transforming the Built Environment
CATEGORY OVERVIEW

RESOURCES. WHAT DID IT REALLY TAKE?

• The Sustainable Sites Team
  Kurt Thompson | Hope Gribble
  Tyler Miller | Rich Pendl | Ralph Wafer

  – Divide & Conquer
  – The Cloud via Dropbox
  – Dark Nights
  – Rainstorms

Transforming the Built Environment
CATEGORY OVERVIEW

RESOURCES. WHAT DID IT REALLY TAKE?

• Key Players & Stakeholders
  – Horticulture Staff
    • VP and Groundskeeper
  – CBEC Occupants
    • Transportation Survey
  – Human Resources
    • Get Up & Go!

– Design Professional/MSD
  • Site Work/Best Practices

Transforming the Built Environment
CATEGORY OVERVIEW

RESOURCES. WHAT DID IT REALLY TAKE?

• LEED Specific
  – Existing Documents
    • Monsanto Center LEED EB:O&M
  – LEED EB:O&M Reference Guide
  – Credit Interpretation Rulings
  – LEEDUser.com

Transforming the Built Environment
CATEGORY OVERVIEW

RESOURCES. WHAT DID IT REALLY TAKE?

- LEED Online
  - Log In...
    - Familiarize Yourself Ahead of Time
    - Figure Out THE GOAL
      - not always the same as understanding the goal
    - Work Backwards
  - Required Documentation?
  - Performance Period | YES/NO?
    - A specific timeframe allowed for measurement.
  - Who Signs off on the Documents?
LEED ONLINE

Transforming the Built Environment
• The Process | How did we do it?
• Credit Review
HOW DID WE DO IT? WHAT DID WE DO?

• How *did* we do it?
  – Volunteers
  – Teamwork
    • Monthly Meetings
    • Plan Writing & Revising
    • Site Analysis/Calculations
    • Technology
  – MBG Monsanto Center Plans & Programs

*We relied on a lot of existing resources...*

Transforming the Built Environment
How did we do it?

– Meeting the “Intent” of the Credit
– Credit Analysis
  • Policy
  • Program
  • Plan

– Scorecard
<table>
<thead>
<tr>
<th>MBGC/CEC LEED EBOM Certification</th>
<th>Points</th>
<th>P-P-P</th>
<th>Performance Period</th>
<th>LEED Online</th>
<th>Verified</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Plan</td>
<td>Policy</td>
<td>Program</td>
<td>Y/N Date</td>
</tr>
<tr>
<td>25S c1.0</td>
<td>0</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>25S c2.0</td>
<td>1</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>25S c3.0</td>
<td>1</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>25S c4.0</td>
<td>11</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>25S c5.0</td>
<td>1</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>25S c6.0</td>
<td>0</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>25S c7.1</td>
<td>0</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>25S c7.2</td>
<td>0</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>25S c8.0</td>
<td>0</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

**Kurt Thompson:**
- Unfortunately a majority of the runoff drains directly into MSD sewers. There may be limited options for redirecting, but will require a further look at topography. This credit will not apply because there is no intentionally planned capture of stormwater runoff. One idea would be to turn the 5000 ft of gravel into a storage area built with proper detention facilities below grade.

- **Kurt Thompson:**
  - I am skeptical of this credit given the ratio of parking lot (black asphalt) area to vegetated area. We will work to prove my theory, or to disprove it.

- **Kurt Thompson:**
  - N/A, uncoated roof area is greater than 25% of total roof area.

**Total 55 Points** 10

**Kurt Thompson:**
1. I don't think we can comply with the interior lighting requirements (direct line of sight), which negates the credit.

2. Install automatic controls and develop a lighting scheme/program that ensures proper use of lighting system and to adjust lighting levels during all after hours (lights out) periods to remain compliant with credit intent (lights out 50% or more of all annual nighttime hours = 2,190 hours). FYI: This is a larger undertaking than it seems on the surface.

3. **Kurt Thompson:**
   - Maintenance (cleaning/uploads) program consistent with.

4. **Kurt Thompson:**
   - Implement a maintenance program the ensures all SRI surfaces are cleaned at least every two years. Be sure to document and record cleaning efforts in some form of roofing report (I have sample from another project).
HOW DID WE DO IT? WHAT DID WE DO?

• Performance Period
  – What is it?
    • A specific timeframe allowed for measurement.
    • Can vary between Prerequisites & Credits
    • 3 Months to 2 Years, Preceding Certification
  – Implement tracking procedures beforehand
    • What information/procedures need(s) to be tracked
      how it will be tracked.
    • Who needs to be consulted and/or trained in order for
      tracking to be implemented.
HOW DID WE DO IT?  WHAT DID WE DO?

• **SSc1 LEED Certified Design & Construction** {4 pts}
  – Credit Intent & Requirements
    • Reward environmentally sensitive building design and construction, thereby enabling high-performance building operations to be achieved more easily.
  – Why not?
    • The building was not previously certified.
HOW DID WE DO IT? WHAT DID WE DO?

• **SSc2 Exterior & Hardscape Management Plan** {1 pt}
  
  – Credit Intent & Requirements
    
    • Encourage environmentally sensitive building exterior and hardscape management practices that provide a clean, well-maintained and safe building exterior while supporting high-performance building operations.

  – Why?
    
    • Existing MBG Plan ➔ Adaptable

Transforming the Built Environment
• **SSc2 Exterior & Hardscape Management Plan** {1 pt}

  – **Details**

    • *Employ an environmentally sensitive, low-impact building exterior and hardscape management plan that helps preserve surrounding ecological integrity. The plan must employ best management practices that significantly reduce harmful chemical use, energy waste, water waste, air pollution, solid waste and/or chemical runoff (e.g., gasoline, oil, antifreeze, salts) compared with standard practices. The plan must address all of the following operational elements that occur on the building and grounds...*

    – Cleaning of Sidewalks, Pavement, & Other Hardscape
    – Paints & Sealants Used on Building Exterior
    – Cleaning of Building Exterior
    – Maintenance Equipment
    – Snow & Ice Removal

Transforming the Built Environment
INTRODUCTION

GOALS

The goal of this plan is to maintain the exterior of the Commerce Bank Education Center (CBEC) in a way that is consistent with one of the Garden’s core values, “to demonstrate environmental stewardship...and to act in a sustainable way.”

SCOPE

This plan outlines procedures for maintaining the building exterior and hardscape (parking lots, driveways, and sidewalks) of CBEC that reduce the impact on the site and surrounding environment. The scope of this plan includes:

- Maintenance Equipment
- Snow and Ice Removal
- Cleaning of Building Exterior, sidewalks, pavement and other hardscape on the grounds
- Paints and Sealants Used on the Building Exterior

This plan is applicable to the entire CBEC site area.

RESPONSIBLE PARTY

Except when specified below, the Vice President of Horticulture is responsible for the implementation of this plan.

GUIDANCE FOR RESOURCES AND IMPLEMENTATION

MAINTENANCE EQUIPMENT

The CBEC site was developed using mostly native and highly adaptable plants and grasses such as Prairie Dropseed which needs little cultivation, minimal maintenance, and is highly resistant to infestation. Having a low maintenance landscape limits greatly the amount of motorized equipment used to maintain the site. A complete inventory of maintenance equipment is submitted as Exhibit 1. All equipment is hand equipment except for two pieces. The first is a 21” mower for which a Mowing Log is currently being maintained for an accurate accounting of the mowing, and the quantity of gasoline used. The second piece of powered equipment is a back pack blower for blowing grass clippings and plant debris off the walks. The blower also works well to blow light snowfall from the walks and exterior steps to make them safe for pedestrian traffic. On very rare occasions equipment such as cultivators or small excavators...
CREDIT X CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

• **SSc2 Exterior & Hardscape Management Plan** {1 pt}
  
  – **MAINTENANCE EQUIPMENT**
    • Majority of equipment is hand equipment
  
  – **SNOW AND ICE REMOVAL**
    • No salts except for magnesium chloride, and less than 200 pounds of magnesium chloride applied per snow event

Transforming the Built Environment
CREDIT X CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

• **SSc2 Exterior & Hardscape Management Plan** \(1\) pt

**Cleaning of Building Exterior, Sidewalks, Pavement and Other Hardscape**

Cleaning the building exterior of CBEC has been unnecessary up to this point. The only building cleaning done on the exterior is windows. The window cleaning has been contracted out. The Missouri Botanical Garden instructs its third party cleaners to abide by the cleaning product and material guidelines established in the Garden’s Sustainable Purchasing Policy (SPP) submitted under Mrp1. As stated in Section 6 of the SPP, titled **CLEANING EQUIPMENT AND MATERIALS:**

Purchases for cleaning equipment and supplies include all cleaning materials and products, disposable janitorial paper products, and trash bags. This includes all items used by in-house staff or outsourced service providers, and applies to both the building interior and exterior, including the exterior hardscape. Priority should be given to products that meet one or more of the following standards for the appropriate category. Exceptions to these policies may include special circumstances where the specified products are unable to satisfy the critical need. These guidelines follow the sustainability criteria for cleaning product purchases in LEQc3.3 and for cleaning equipment purchases in LEQc3.4.

A backpack blower is used for blowing grass clippings and plant debris off the walks when necessary. The blower also works well to blow light snowfall from the walks and exterior steps to make them safe for pedestrian traffic.

Transforming the Built Environment
HOW DID WE DO IT? WHAT DID WE DO?

• SSsc3 Integrated Pest Management, Erosion Control, and Landscape Management Plan {1 pt}

– Credit Intent & Requirements
  • Preserve ecological integrity, enhance natural diversity and protect wildlife while supporting high-performance building operations and integration into the surrounding landscape.

– Why not?
  • RoundUp – not a least toxic chemical and should only be used if universal notification is issued and in extreme circumstances

Transforming the Built Environment
• **SSc3** Integrated Pest Management, Erosion Control, and Landscape Management Plan {1 pt}

– Details

  • *Have an environmentally sensitive management plan in place for the site’s natural components. The plan must employ best management practices that significantly reduce harmful chemical use, energy waste, water waste, air pollution, solid waste and/or chemical runoff (e.g., gasoline, oil, antifreeze, salts) compared with standard practices. The plan must address all of the following operational elements...*

  – Outdoor Integrated Pest Management
  – Erosion and Sediment Control
  – Diversion of Landscape Waste
  – Minimized use of Chemical Fertilizer

Transforming the Built Environment
CREDIT X CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

• **SSc3** Integrated Pest Management, Erosion Control, and Landscape Management Plan {1 pt}
  – Potential Technologies & Strategies
    • Implement a low-impact site and green building exterior management plan during Performance Period
      – Reducing the use of Power Equipment
      – Fertilize only as Needed
      – Composting Landscape Waste
      – Create a Wildlife Habitat
      – Use a Mulching Mower

Transforming the Built Environment
HOW DID WE DO IT? WHAT DID WE DO?

• **SSc4 Alternative Commuting Transportation** {3-15 pts}
  – Credit Intent & Requirements
    • Reduce pollution and land development impacts from automobile use for commuting. **CARBON!**
  – Why?
    • Urban Location/Mass Transit Proximity
    • Get Up & Go! Promotion
    • “Right-Minded” Staff

SUCCESS = SURPRISE!

Transforming the Built Environment
HOW DID WE DO IT? WHAT DID WE DO?

• *SSc4 Alternative Commuting Transportation* {3-15 pts}
  – Details
    • *Reduce the number of commuting round trips made by regular building occupants using single occupant, conventionally powered and conventionally fueled vehicles. For the purposes of this credit, alternative transportation includes at a minimum, telecommuting; compressed workweeks; mass transit; walking; bicycles or other human-powered conveyances; carpools; vanpools; and low-emitting, fuel-efficient or alternative fuel vehicles.*
    
    – Points are earned for reductions in conventional commuting trips during the performance period relative to the demonstrated percentage reduction in conventional commuting trips.
CREDIT X CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

• **SSc4** Alternative Commuting Transportation {3-15 pts}
  – Potential Technologies & Strategies

Transforming the Built Environment
### CBEC Transportation Survey Results ~ May 7 - 11, 2012

<table>
<thead>
<tr>
<th>On Monday, May 7th, how did you get to work?</th>
<th>Response Count</th>
<th>Response Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>I did not work (vacation or sick leave)</td>
<td>3</td>
<td>7.32%</td>
</tr>
<tr>
<td>Walked</td>
<td>2</td>
<td>4.68%</td>
</tr>
<tr>
<td>Carpoled with one or more additional passengers for more than 50% of my commuting trip</td>
<td>1</td>
<td>2.44%</td>
</tr>
<tr>
<td>Drove alone (single passenger) in a low-emissions vehicle</td>
<td>11</td>
<td>28.83%</td>
</tr>
<tr>
<td>Drove alone (single passenger) in a NON-low emissions vehicle</td>
<td>17</td>
<td>41.48%</td>
</tr>
<tr>
<td>Rode my bike</td>
<td>5</td>
<td>12.20%</td>
</tr>
<tr>
<td>Took the bus, metro or other form of public transportation</td>
<td>2</td>
<td>4.68%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>41</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>On Tuesday, May 8th, how did you get to work?</th>
<th>Response Count</th>
<th>Response Percentage</th>
</tr>
</thead>
</table>

### Week Totals

<table>
<thead>
<tr>
<th>Response Count</th>
<th>Response Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>I did not work (vacation or sick leave)</td>
<td>17</td>
</tr>
<tr>
<td>Walked</td>
<td>10</td>
</tr>
<tr>
<td>Carpoled with one or more additional passengers for more than 50% of my commuting trip</td>
<td>5</td>
</tr>
<tr>
<td>Drove alone (single passenger) in a low-emissions vehicle</td>
<td>58</td>
</tr>
<tr>
<td>Drove alone (single passenger) in a NON-low emissions vehicle</td>
<td>88</td>
</tr>
<tr>
<td>Rode my bike</td>
<td>22</td>
</tr>
<tr>
<td>Took the bus, metro or other form of public transportation</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>205</strong></td>
</tr>
</tbody>
</table>

### Summary

<table>
<thead>
<tr>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-Time Employees (Regular occupants)</td>
<td>51</td>
</tr>
<tr>
<td>Occupants responded</td>
<td>41</td>
</tr>
<tr>
<td>Non-respondents</td>
<td>10</td>
</tr>
</tbody>
</table>

### Respondents’ Conventional vs. Alternative Transportation Trip Totals (80.04% of Regular Occupants)

| Total Commuting Trips (Two trips per day per respondent [205 x 2 = 410] minus Vacation/Sick Leave [17 x 2 = 34]) | 376          |
| Conventional Transportation Trips (Single passenger NON low-emissions vehicle, Carpooling counted as 0.5 conventional transportation each way) | 181          | 48.14%         |
| Alternative Transportation Trips (Bicycle, Walking, Public Transit, Low-emissions vehicle achieving a minimum green score of 40 on the ACEEE annual vehicle-rating guide, Carpooling counted as 0.5 alternative transportation each way) | 195          | 51.86%         |
| **RCCT**                                    |              |                 |
Transforming the Built Environment
CREDIT X CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

• **SSc5** Site Development
  {Protect or Restore Open Habitat} {1 pt}

  – Credit Intent & Requirements
    • Conserve existing natural site areas and restore damaged site areas to provide habitat and promote biodiversity.

  – Why?
    • Availability of Information
    • Recent re-plantings/High % Native & Adapted
    • Synergy w. Water Efficiency

Transforming the Built Environment
CREDIT X CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

• SSc5 Site Development
  {Protect or Restore Open Habitat} {1 pt}

– Details
  • During the performance period, have in place native or adapted vegetation covering a minimum of 25% of the total site area (excluding the building footprint) or 5% of the total site area (including the building footprint), whichever is greater. Improve and/or maintain off-site areas with native or adapted plants can contribute toward earning this credit provided the improvement and maintenance are documented in a contract with the owner of the off-site area. Every 2 square feet off-site can be counted as 1 square foot on-site.
    – Water bodies
    – Exposed Rock
    – Unvegetated Ground
    – Features that Provide Habitat Value

Transforming the Built Environment
SSc5

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Site Area</td>
<td>172,643.00</td>
</tr>
<tr>
<td>Bldg Footprint</td>
<td>42,670.00</td>
</tr>
<tr>
<td>Site less Bldg</td>
<td>129,973.00</td>
</tr>
<tr>
<td>5% of Site</td>
<td>8,632.15</td>
</tr>
<tr>
<td>25% of Site less Bldg</td>
<td>32,493.25</td>
</tr>
<tr>
<td>Total Landscaped Area (from WE takeoff)</td>
<td>37,143.25</td>
</tr>
<tr>
<td>% Native Species</td>
<td>94.8%</td>
</tr>
<tr>
<td>Contributing Area</td>
<td>35,222.23</td>
</tr>
</tbody>
</table>

**Notes:**
- The Total Site Area is 172,643.00 square feet.
- The Bldg Footprint is 42,670.00 square feet.
- The Site less Bldg is 129,973.00 square feet.
- 5% of the Site is 8,632.15 square feet.
- 25% of the Site less Bldg is 32,493.25 square feet.
- The Total Landscaped Area is 37,143.25 square feet.
- The % Native Species is 94.8%.
- The Contributing Area is 35,222.23 square feet.
HOW DID WE DO IT? WHAT DID WE DO?

- **SSc5** Site Development
  {Protect or Restore Open Habitat} {1 pt}
  – Potential Technologies & Strategies

Transforming the Built Environment
HOW DID WE DO IT? WHAT DID WE DO?

• **SSc6 Stormwater Management** {1 pt}
  - Credit Intent & Requirements
    • Limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from storm water runoff and eliminating contaminants.
  - Why not?
    • Design of Existing Facilities
    • Almost 100% of Runoff ➔ MSD Sewer
    • Grading & Topography
    • Amount of Impervious Surface *{Asphalt}*
HOW DID WE DO IT? WHAT DID WE DO?

• **SSc6 Stormwater Management** {1 pt}
  
  – Details
  
  • *During the performance period, implement a stormwater management plan that infiltrates, collects, and reuses runoff or evapotranspirates runoff from at least 15% of the precipitation falling on the whole project site both for an average weather year and for the 2-Year, 24-Hour Design Storm.*

  • *Implement an annual inspection program of all stormwater facilities to confirm continued performance. Maintain documentation of inspections and perform all necessary repairs within 60 days of inspection.*

  – Clearing Tree Limbs
  – Easier if Draining to Daylight
  – Maintain a Logbook w. Detail
CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

• **SSc6** Stormwater Management
  – Potential Technologies & Strategies

Transforming the Built Environment
• **SSc7.1 Heat Island Reduction {Non-Roof} {1 pt}**
  – Credit Intent & Requirements
    • Reduce heat islands to minimize impacts on microclimates and human and wildlife habitats.
  – Why not?
    • Cost vs. Payback
      – Build Shade Structures in Parking Lot
      – Plant Additional MATURE Trees
      – Replace Existing Pavement
    • Existing Conditions
CREDIT

HOW DID WE DO IT?  WHAT DID WE DO?

• SSc7.1 Heat Island Reduction {Non-Roof} {1 pt}
  – Option 1
    • Use any combination of the following for 50% of site hardscape areas:
      1. Provide shade from existing tree canopy; 2. Provide shade from structures covered in solar panels; 3. Provide shade from architectural devices with SRI of at least 29 & ensure these surfaces are maintained; 4. Use hardscape materials with SRI of at least 29 & ensure these surfaces are maintained; 5. Use an open-grid pavement system – at least 50% pervious.
  – Option 2
    • Place a minimum of 50% of parking spaces under cover {underground, under deck, under roof, under building}. Any roof used to shade parking must have an SRI of at least 29, be vegetated, or be covered by solar panels. SRI surfaces must be maintained regularly and the top parking level of a multi-story parking structure is included in the total parking space calculation but is not considered a roof and is exempt from being an SRI surface.
Howard did we do it? What did we do?

- SSc7.1 Heat Island Reduction {Non-Roof} {1 pt}
  - Potential Technologies & Strategies
How did we do it? What did we do?

- **SSc7.2** Heat Island Reduction {Roof} {1 pt}
  
  - Credit Intent & Requirements
    - Reduce heat islands to minimize impacts on microclimates and human and wildlife habitats.
  
  - Why not?
    - Cost vs. Payback
      - Coat 50% of Roof
    - No Structure to Support Vegetated Surface
    - Existing Conditions

Transforming the Built Environment
HOW DID WE DO IT? WHAT DID WE DO?

• SSc7.2 Heat Island Reduction {Roof} {1 pt}

  – Option 1
    • Use roofing materials with SRI equal to or greater than those listed below for 75% of the roof area and ensure surfaces are maintained regularly.
      – Low Sloped Roof ≤ 2:12 {SRI 78}
      – Steep Sloped Roof > 2:12 {SRI 29}

  – Option 2
    • Install & maintain a *vegetated* roof surface for at least 50% of the roof area.

  – Option 3
    • Install high albedo & vegetated roof surfaces that meet the minimums of Option 1 and following criteria:

\[
\text{Area Roof Meeting Min. SRI} \quad 0.75 + \text{Area Vegetated Roof} \quad 0.5 \geq \text{Total Roof Area}
\]

Transforming the Built Environment
HOW DID WE DO IT? WHAT DID WE DO?

• **SSc7.2** Heat Island Reduction {Roof} – Potential Technologies & Strategies
HOW DID WE DO IT? WHAT DID WE DO?

• **SSc8 Light Pollution Reduction** {1 pt}
  
  – Credit Intent & Requirements
  
  • Minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction and reduce development impact from lighting on nocturnal environments.

  – Why not?
  
  • Interior Lights Visible Outside
  • Interior Lights not Automatically Controlled
    – *Must be through Building Automation System*
CREDIT

HOW DID WE DO IT? WHAT DID WE DO?

• **SSc8 Light Pollution Reduction** {1 pt}
  
  – **Interior Requirement**
    • Project teams **MUST** comply with the *Interior Lighting Requirement*.
    – *All non-emergency built-in luminaires with a direct line of sight to any opening in the building envelope must be automatically controlled to turn off after hours. Total duration of all programmed after hours periods must be ≥ 2,190 hours per year.*

  – **Exterior Requirements**
    • Project teams **MUST** comply with 1 of 3 *Exterior Options.*
      – *Option 1* If the building is certified, show evidence that SSc8 was achieved.
      – *Option 2* Partially or fully shield ALL exterior fixtures over 50 watts so they do not directly emit light to the night sky.
      – *Option 3* Measure nighttime illumination around the perimeter of the property, with interior lights ON and OFF. The illumination level measured with the lights on must not be 20% above the measured level when lights are off. *Averaging of points is NOT allowed.*

Transforming the Built Environment
HOW DID WE DO IT? WHAT DID WE DO?

- **SSc8** Light Pollution Reduction
  - Potential Technologies & Strategies

Transforming the Built Environment
Transforming the Built Environment
HOW DID WE DO IT? WHAT DID WE DO?

- Certification Process

Transforming the Built Environment
• Lessons Learned
• Recommendations

• What about next time?

Missouri Botanical Garden Commerce Bank Education Center

SUSTAINABLE SITES
CLASS REVIEW

Transforming the Built Environment
LESSONS LEARNED

IS YOUR BUILDING QUALIFIED?

• Performance Period ≠ Deadline
• Plan Ahead ➔ Capital Expenditures
• Keep Track/Journal If/Then Scenarios

What would it take?
RECOMMENDATIONS

IS YOUR BUILDING QUALIFIED?

Transforming the Built Environment
WHAT ABOUT NEXT TIME?

IS YOUR BUILDING QUALIFIED?

Transforming the Built Environment