Georgia Institute of Technology
The Living Building
table of contents

00 Introduction  page 4

01 Day 1  page 6
  Project Goals Setting  page 6
  Brainstorming Session  page 10
  Summary of Work to Date  page 12
  Site Drivers and Solutions  page 18
  Biophilia  page 20
  Petal Breakout Sessions  page 22

02 Day 2  page 30
  Rise and Report  page 30
  Moving Forward  page 42
  Outreach and Engagement  page 43
  Working Together  page 44
  LBC Progress Report  page 45

03 Appendix  page 56
The Living Building at Georgia Tech

The Living Building Challenge (LBC) describes itself as an ambitious philosophy and rigorous certification, begging the question: What does good look like?

As a demonstration of its commitment to be thoughtful stewards of its resources, the Georgia Institute of Technology (from here on referred to as Georgia Tech) has set out to develop the Living Building at Georgia Tech: a new facility that will exhibit the viability of a net positive, urban, and sustainable building in the Southeast. This new facility will support a dynamic educational experience, a robust research platform, and a public forum for community outreach.

The Programming and Process Charrette was the kick-off to the Living Building at Georgia Tech. Over the course of two days, designers, owners, key community and faculty members gathered to discuss where the project stands-to-date; the big questions and big ideas; and immediate action items.

The result, is an unified understanding of the project intent and deliverables.
### Day 1

<table>
<thead>
<tr>
<th>Time</th>
<th>Session/Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30-9:00</td>
<td>Introduction</td>
</tr>
<tr>
<td>9:00-9:30</td>
<td>What Makes It a Georgia Tech Building: Goal Setting</td>
</tr>
<tr>
<td>9:30-10:15</td>
<td>No Stone Unturned: Brain Storming Session</td>
</tr>
<tr>
<td>10:30-11:15</td>
<td>Where Are We After All That</td>
</tr>
<tr>
<td>11:15-12:00</td>
<td>Rings of Our Tree: LBC Review</td>
</tr>
<tr>
<td>12:00-1:00</td>
<td>Biophilia Lunch Presentation</td>
</tr>
<tr>
<td>1:15-1:45</td>
<td>Rings of Our Tree: LBC Review</td>
</tr>
<tr>
<td>1:45-2:30</td>
<td>In and of the Place: Site Drivers and Solutions</td>
</tr>
<tr>
<td>2:30-3:30</td>
<td>Petal Break Out Sessions</td>
</tr>
<tr>
<td></td>
<td>Break Out #1: Net Positive Water</td>
</tr>
<tr>
<td></td>
<td>Break Out #2: Net Positive Energy</td>
</tr>
<tr>
<td></td>
<td>Break Out #3: Materials Discussion</td>
</tr>
<tr>
<td></td>
<td>Break Out #4: Pedagogy</td>
</tr>
<tr>
<td>3:30-4:10</td>
<td>Rise and Report: Break Out Session Reports</td>
</tr>
<tr>
<td>4:10-4:30</td>
<td>Recap of the Day &amp; A Look Forward to Tomorrow</td>
</tr>
<tr>
<td>4:30-10:00</td>
<td>Design Team Work Sessions – at LAS Offices</td>
</tr>
</tbody>
</table>

### Day 2

<table>
<thead>
<tr>
<th>Time</th>
<th>Session/Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30-10:00</td>
<td>Design Team Work Sessions</td>
</tr>
<tr>
<td>10:00-11:30</td>
<td>Pin–Up Discussion of Design Team Work Sessions</td>
</tr>
<tr>
<td>11:30-12:00</td>
<td>Guiding Principles for Moving the Project Forward</td>
</tr>
<tr>
<td>12:00-1:00</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>1:00-2:30</td>
<td>Mapping the Future</td>
</tr>
<tr>
<td>2:30-3:00</td>
<td>Outreach and Engagement</td>
</tr>
<tr>
<td>3:00-3:15</td>
<td>15 minute break</td>
</tr>
<tr>
<td>3:15-3:45</td>
<td>Working Together: Integrated CM and Design Team</td>
</tr>
<tr>
<td>3:45-4:00</td>
<td>Wrap Up Session and Next Steps</td>
</tr>
</tbody>
</table>
Each charrette participant was asked to list what they felt will be the most important outcome of this Living Building project. Given the makeup and varying backgrounds and fields of expertise of the participants, the answers ran the gamut from measured levels of success in building technologies all the way to visions of how the building will be used in the future and by whom.
These goals were then arranged into loose categories that either generally aligned with an LBC petal or some more general themes:

- **Education** – using this project to further education across multiple platforms
- **Replicable** – applying innovations from this project to future projects
- **Beauty** – creating design that imparts a sense of happiness to its users
- **Catalyst & Innovation** – using this project to help continue the paradigm shift in the building industry
- **Net Positive Water** – redefining how people view water in its various forms
- **Net Positive Energy** – relying completely on renewable forms of energy
- **Occupants** – keeping the occupants health and well-being in mind
- **Systems** – thinking outside of the box to make regulations work for the project

Participants were then asked to select their top three goals. These are tallied and categorized to the right with the goals receiving the most votes at the top. “Change the industry to instead of saying “why” to say “why not”” received the most votes.
Transform the building energy in the Southeast

Change the industry to instead of saying “why” to say “why not”

Optimize passive design

Happy occupants actively contribute to successful LBC certification

Net ZERO ENERGY

Energy systems that serve as an example to net positive design in similar climate zones

Net ZERO WATER

Energy systems that prove hot humid net zero energy

Net positive water and zero connections to municipal water/ sewer

Net zero energy — energy storage integration

Net POSITIVE WATER

Leverage strategies that will inform design for all future projects & will eliminate the use of potable water for vegetation on campus

Develop strategies that will inform design for all future projects & will eliminate the use of potable water for vegetation on campus

Net POSITIVE ENERGY

Solve the conditioning of hot humid air with replicable systems

Stop the Last Child in the Woods Trend

Implement a creative strategy to keep building occupants safe and think outside of prescriptive code

Safe as possible meeting the intent of the Fire and Building Code

Occupant engagement

Building contributes positively to site & user comfort

 Occupyants

CATALYST & INNOVATION

Make Georgia Tech and the LBC @ Georgia Tech a local point for all things sustainable in the Southeast

Embarrass Portland enough to build an LBC building

To push technology & sustainability to the next level

To learn how to do an LBC 3.0 Certified Building with a local, regional, and national impact

‘Planted on the best site to thrive and grow’ Be an outstanding example of how small buildings stand alone & highlight future planning and design projects

Change the design and construction process in the Southeast to be a truly integrated process

‘Part of the best site to thrive and grow’ Be an outstanding example of how small buildings stand alone & highlight future planning and design projects

Programming & Process Charrette Wrap-Up p. 9
Participants were then asked to get into small groups and delve deeper than they had previously into ideas that perhaps hadn’t been touched on to-date. They were also encouraged to refer to case studies of similar “deep green” buildings and LBC buildings to generate ideas.

Each group reported back on their top three to five ideas. In general these ideas fell into three categories of Pedagogy, Site, and Systems.

**PEDAGOGY**

- Building as a resource center/library
- Create a culture around community values – urban agriculture and art
  - Rotating art exhibits
  - Community education: life skills
  - Community assets/partnerships – take it to the neighborhood
- How can the LBC influence Georgia Tech, and the Yellow Book? Vice versa?
- Building as a learning lab
  - Teach about the building through a virtual scavenger hunt / interaction
  - Incorporate portable education strategies
  - Allow experimentation: learn about the building through trial and error
- Biophilic design: the building operates as a body.

**SITE**

- Urban agriculture
  - grow hops for a local brewery
  - what are the opportunities for food sharing?
  - regional fruit trees – bringing back peach trees to Peachtree
  - regional farmer’s market
- Goats on the roof/lawn
- Return to nature on campus
- Create a dynamic changing landscape –
  - Use plants for filtration, ex. Spanish moss and other regenerative materials
- Recognize and respect the history of the site
- Create a connection to the Atlanta Greenway Network
- Bridge the gap between technology and deep green( e.g., games and apps).
SYSTEMS

- What can we learn from similar climate zones around the world?
- Use of a water misting system
- Vampire switch – kills power to all the plug loads
- Ways to demonstrate multiple solutions (DC power, greywater, living wall, etc.)
- Observable systems – how does the building respond?
- Water as a teaching tool
  - Commercial potable use cisterns
  - Visibility through the sense of water
- How does the building react to new and evolving habitats as a product of climate change?
- Introduce alternate energy systems (walking desk, windmills, water wheels, etc.)

- Disinfect water using UV light
- Evaluating/modifying thermal comfort
- 100% wood building – built to last
- Make ‘gross’ systems cool (e.g., composting toilets, etc.)
- Use materials that are new and unconventional for Georgia Tech.
- Passive HVAC solutions
- Launch megawatt incentives and a rating structure – virtual meter
- Optimize building to grid (solar, power purchase, etc.)

1. Plan for success
2. Operations and maintenance matters, &/or Consider both low and peak attendance in systems calculation
3. Materials matter
4. Net positive water and energy are critical
Lessons Learned from Other Projects

Skanska was invited to share invaluable lessons learned from previous LBC and deep green projects. Replicability is one of the Kendeda’s prime objectives, so it is through these partnerships and sharing of knowledge that each successive project will more easily overcome certain pitfalls and be able to plan ahead for even greater success.

The complete presentation, including project specific examples and anecdotes can be found in the Appendix, section 3.02. The following represents the key takeaways of this session.

**Process**

1. Transparency and full team collaboration from the onset is a must.
   - All team members must be committed to sharing information and working on documentation collaboratively.
   - Collaboration includes subcontractors, as well as facilities manager and users.

2. Engage local jurisdictions early and make them part of the team.
   - The earlier the team understand jurisdictional barriers, the better. If jurisdictions are part of the solution, they should be bought in – reduces risk of delay.
   - Be prepared for long conversations / educating reviewers.
   - Need to identify the correct people, and engage early.

**Materials**

3. Material research must start as early as possible.
   - There should be dedicated members from the A/E and GC teams focused on materials research and vetting.

4. Materials research must be collaborative and easy to track
   - Shared responsibility means shared information.
   - Utilize file sharing platforms (Google Docs, Dropbox, Newforma, etc).
   - Start early!

5. Contact the material manufacturer directly, not the subcontractor or supplier, for vetting.
   - Going directly to the manufacturer when researching and vetting eliminates a step and allows for a streamlined process, which can be owned by the A/E and Contractor.
   - Be persistent.

6. Construction Waste Plan must be vetted and in place ahead of construction start.
   - There are unique requirements for tracking waste per material that will not fit into the standard construction waste management “LEED” practices and tracking.

The complete presentation, including project specific examples and anecdotes can be found in the Appendix, section 3.02. The following represents the key takeaways of this session.
Cost

7. Prioritize material selection strategy based on procurement timeline and relative cost to the project.
   • Materials decisions should be prioritized and begun quickly to allow the time necessary to comply with LBC materials requirements.

8. Attempt to find more than one compliant material and/or equipment supplier for competitive pricing.

9. Plan for risk associated with not only construction, but performance as well.

Operations

10. Be realistic in terms of estimated building hours and program. Don’t skimp on what’s necessary.
   • Expect an additional influx of visitors, tour groups, etc. upon opening.

11. Identify and engage the facilities manager assigned to the building early, during design.
### Programming

#### What We Know:

Over July 7 and 8, the design team and Georgia Tech engaged in its first round of programming meetings.

#### Discussion:

The design team started space planning with the original program provided during the Ideas Competition. As a result of the first programming meeting, that program was updated to include some redefined and flexible spaces, reflecting the pedagogy of the project.

The complete presentation can be found in the Appendix, section 3.03

---

<table>
<thead>
<tr>
<th>Classroom Learning component</th>
<th>QTY</th>
<th>Avg/SF</th>
<th>Total NSF</th>
<th>Net Assign</th>
<th>Total GSF</th>
<th>ZONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classrooms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Auditorium (seats 160-180)</td>
<td>1</td>
<td>3,750</td>
<td>3,750</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classroom (50 people)</td>
<td>2</td>
<td>1,500</td>
<td>3,000</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar Room (16 people)</td>
<td>2</td>
<td>600</td>
<td>1,200</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breakout/Group Study Rooms (6 people)</td>
<td>2</td>
<td>360</td>
<td>720</td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classroom Support</td>
<td>1</td>
<td>240</td>
<td>240</td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classrooms Subtotal</td>
<td></td>
<td></td>
<td>8,910</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Community Learning Component</th>
<th>Class</th>
<th>Total NSF</th>
<th>B/C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student/Community Center</td>
<td></td>
<td>4,180</td>
<td></td>
</tr>
<tr>
<td>Center</td>
<td></td>
<td>1,500</td>
<td>B/C</td>
</tr>
<tr>
<td>* Center support areas (storage, catering kitchen, etc.)</td>
<td>1</td>
<td>750</td>
<td>A</td>
</tr>
<tr>
<td>Quiet study areas</td>
<td></td>
<td>600</td>
<td>B</td>
</tr>
<tr>
<td>Collaboration/Innovation Learning Area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Student/Community Center Subtotal</td>
<td></td>
<td>4,180</td>
<td></td>
</tr>
<tr>
<td>Multi-purpose/Exhibit Space/Event Support</td>
<td>1</td>
<td>1,800</td>
<td>A</td>
</tr>
<tr>
<td>* Shower (SF to be adjusted when need defined)</td>
<td>1</td>
<td>280</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lab and Lab Support (Teaching and Research)</th>
<th>6,600</th>
<th>11,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research - Faculty (FC x 4; flex lab class lab)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Laboratory (Flex Use Class Lab 16 Students)</td>
<td>2</td>
<td>900</td>
</tr>
<tr>
<td>Lab Support</td>
<td>2</td>
<td>300</td>
</tr>
<tr>
<td>* Lab Staff</td>
<td>1</td>
<td>200</td>
</tr>
<tr>
<td>* Faculty Office (need to confirm)</td>
<td>0</td>
<td>140</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>2,600</td>
</tr>
<tr>
<td>Class Laboratory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ClassLab (24 Students)</td>
<td>2</td>
<td>1,200</td>
</tr>
<tr>
<td>ClassLab Support</td>
<td>1</td>
<td>300</td>
</tr>
<tr>
<td>ClassLab Staff</td>
<td>1</td>
<td>200</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>2,900</td>
</tr>
<tr>
<td>Design Studio Instructional Space</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maker Space/ClassLab (16 Students)/Research</td>
<td>1</td>
<td>900</td>
</tr>
<tr>
<td>* ClassLab Staff and Support</td>
<td>1</td>
<td>200</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>1,100</td>
</tr>
</tbody>
</table>
Auditorium

- Occupancy increased from 100 seats to 200 seats, therefore increasing the area by 750 sf.
- Georgia Tech envisions this space to be multi-functional, a variety of programs
- Therefore the auditorium is to have a flat floor, and flexible furniture.
- Potentially, the auditorium could open to the exterior.

Classrooms

The original program called for two classrooms with 50 seats, with an allotted 1500 sf. In reality, only 1376 sf is needed, and the classrooms could shrink if needed.

Classrooms will host lecture based curriculums. It is not necessary to plan for TEAL technology.

Laboratory

- Laboratory design should be flexible enough to house research or class labs.
- As such, the lab staff office can be reduced from 1630 sf to 600 sf in an open shared area. This saved space can be allocated elsewhere (e.g. the larger auditorium, or food service)
- This includes removing faculty offices (as discussed at the space programming meeting)
- Reorganize lab modules in a group together, creating long term flexibility
The Georgia Tech Planning and Design Commission (PDC) approved the building site location and parti for the Porch Scheme at their June 15, 2016 meeting. The PDC appreciated that the proposed site location and plan blurs the lines between architecture + landscape and site + the future Eco Commons.

To receive a final approved conceptual design, the site boundaries need to be established, informing the evolution of the Porch Scheme.
Site opportunities and constraints for selecting the building location:

1. Large enough to support the building programming and support an independent LBC project
2. Preserve ex trees
3. Preserve hydrological systems
4. Preserve steep slopes
5. Prioritize already disturbed land
6. Location adjacent or within areas with high infiltrating soils
7. Fits within the campus fabric and master plan vision
8. Respond to the Pickrick Restaurant location with progress and equity.

The complete presentation can be found in the Appendix, section 3.01
In and of the Place

As confirmed by the PDC, the site location of the Living Building will be at the intersection of Ferst and State Street. The next step is to define the size of the site and its boundaries. To do so, the use and the function of the site needs to be identified.

Discussion:
- Should the team assume a 1-acre or 2-acre site, or somewhere in between? Both have implications and impacts beyond just the site.
- The site should support campus culture: teaching, learning, game-day. How can the site operate as a classroom and as a social space?
- A pathway should be created for species moving north due to climate change.
- The roof should be thought of as a smaller site – what is the relationship?
- How will the site address the slope and achieve appropriate accessibility?
- What is the floor-to-area ratio (FAR)? What implication does the FAR have on the building and site design as well as construction?

Conclusion:
- The project’s Living Transect is L3: Village or Campus Zone.
- Dalney Street: It was identified during the charrette that Dalney Street is a City of Atlanta owned street. This has a significant impact on site boundaries, limiting the possibility of manipulating Dalney Street for this project.

Urban Agriculture

What We Know:
The LBC requires that the project integrates agriculture opportunities. The scale and density of these opportunities are calculated using the Floor-Area-Ratio (FAR) of the project. As the design team determines the site boundary, they must take into consideration which kinds of agriculture are feasible in this environment, the space it will require, and who will maintain it.

Discussion:
- Is there potential to grow crops on the roof, or vertically?
- Could it include flora and fauna?
  - goats for mowing
  - aquaponics
  - Georgia Tech Urban Honey Bee Project
- How much water is needed to support it?
- How much soil needs to be restored?
- What kind of habitat will succeed on the roof?

Conclusion:
Previous efforts in urban agriculture have struggled on campus because student support is lost during the summer, traditionally the peak season for growing and harvesting. To ensure success, Georgia Tech will identify a subcommittee to champion the urban agriculture imperative.
What We Know:
In preparation of a more in-depth study of biophilia, day 01 included a one-hour lunch presentation introducing the group to the concepts. The living building challenge requires teams to engage in one all-day exploration of biophilic design potential. Teams must also develop a biophilic framework and plan.

Discussion:
- 14 Patterns of biophilia
- Humans require proximity to life and lifelike processes
- Active within natural systems
- Functions like nature
- Modality more than vision
- Walks like membrane / interface
- Smell of rain
- Integrate all of our senses – expand our comfort range
- Urban agriculture relates to sense of taste

Conclusion:
The design team has scheduled a two-day Biophilia Charrette for September 8-9, 2016.
The project must be designed to include elements that nurture the innate human nature connection. Each project team must engage in a minimum of one all-day exploration of the biophilic design potential for the project.
Towards the end of day 1, participants were asked to break into one of four groups to delve further into some of the ideas from the morning sessions, and to continue to working through some design and engineering issues.

The following notes came directly from the “Water Water Everywhere: Net Positive Water” breakout group, which covered topics including, but not limited to:

- Potable water
- Greywater
- Blackwater

**Wastewater**

- Traditional Practice and Perception
  - Comfort
  - Accessibility
  - Low cost
- Non-traditional Practice and Perception
  - Teaching tool
  - No smell
  - No blackwater requirements (cost)
  - Smaller greywater system
- Blackwater system - $2.1 Million
- Composting Toilets - $350,000 over 15 years

**Greywater Opportunities**

- Use in sinks/toilets
- Use in subsurface aquaponics
- Do we have enough water for grey use?
- Will the urban agriculture include water intensive crops?

**Learning experience**

- Display actual items
- Make testing data available to users

**LED displays**

- Level indicators

**Rainwater**

- The preliminary numbers meet the potable/greywater demand
- Potable
  - Filtration opportunites/carbon/ultraviolet (UV)
- City allows for residential, but do they allow at a commerical scale?

---

**COMPOST TOILET SCENARIO**

- Potable demand: 94,365 gpy
- Non-potable demand: 182,500 gpy
- Total Water Footprint: 276,865 gpy

**BLACKWATER SCENARIO**

- Potable demand: 803,415 gpy
- Non-potable demand: 182,500 gpy
- Total Water Footprint: 985,915 gpy
Project water use and release must work in harmony with the natural water flows of the site and its surroundings. One hundred percent of the project’s water needs must be supplied by captured precipitation or other natural closed loop water systems, and/or by re-cycling used project water, and must be purified as needed without the use of chemicals.

All stormwater and water discharge, including grey and black water, must be treated on site and managed either through re-use, a closed loop system, or infiltration. Excess stormwater can be released onto adjacent sites under certain conditions.

**NET POSITIVE WATER IMPERATIVE 05**

**COMPOST TOILET SCENARIO**

Total Water Footprint: 276,865 gpy

**BLACKWATER SCENARIO**

Total Water Footprint: 985,915 gpy

81.5%

803,415 gpy

18.5%

182,500 gpy

65.9%

182,500 gpy

34.1%

94,365 gpy
Net Positive Energy

The following notes came directly from the “Power Up: Net Positive Energy” breakout group, which covered topics including, but not limited to:

- Systems
- Photovoltaic (PV) and Storage
- Plug Loads

Systems

PAE will send modeling input form to Georgia Tech

Discussed Energy Conservation Measures:

- John McFarland suggested including a sensitivity component to the analysis to help us choose. For example, demand controlled ventilation (DCV) may not have as much impact if the building is at max occupancy all the time
- Greg asked if cistern can be used as a heat sink. Team will explore relative to the liquid Desiccant System
- What other waste heat sources can we capture? Shower drains posited as an example
- John wants to explore the liquid Desiccant system. Greg says a clean room on campus uses it.

- Pollen filter
- Potential research project for College of Engineering (ME)
- Dennis Creech cautioned on thermal comfort. Don’t want the building to be “warm” when a donor walks in.
- Georgia Tech Research Institute (GTRI) has floors that harnesses electricity from walking. It also counts people
  - Could help with DCV
  - Airport has people tracker

PV and Storage

There is a potential to make the project very positive given expected energy use intensity (EUI) compared to roof area. We could be 130% to 140% positive.

- Obviously this is a cost consideration, but provides safety factor.
- PV costs are going down.
- Team wants to explore this idea.
NET POSITIVE ENERGY IMPERATIVE 06

One hundred and five percent of the project’s energy needs must be supplied by on-site renewable energy on a net annual basis, without the use of on-site combustion. Projects must provide on-site energy storage for resiliency.

DC

- Should include for battery loop
- Microgrid -plug loads
  - The available technology has not yet reached commercial viability.
  - Team will include infrastructure and space to allow
- Low voltage Lighting may be more achievable. Acuity is local potential partner

Battery Storage

- The LBC requirement is about resiliency
- Storage also provides other opportunities including PV storage
- Building could be battery test bed
- Requires more battery than LBC requires.
- GTRI is working on super capacitors. Could have prototype available given schedule:
  - Red list implications
  - LBC has exceptions. Karina knows of only one battery that meets it.
  - Team needs to research more
  - Good opportunity for research. Discuss with JulieAnne Williamson.
Materials Discussion

The following notes came directly from the “Eliminating Red for True Green: Materials Discussion” breakout group, which covered topics including, but not limited to:

- Red List Strategies
- Salvaged Materials Ideas
- Other Materials Challenges

Process:

Previously approved Red List free product list that exist cannot be taken at face value because materials suppliers are always reformulating their products, introducing proprietary formulas and new safer products are always in development. The team cannot assume materials that were approved in the past are still in compliance. Unique LBC documentation must be collected for each product for the Georgia Tech project. The vetting process is complex and time consuming but the team has developed some ground rules that should streamline the process and reduce risk. We estimate that a project of this size and scope might have between 1,200-1,500 products that will be required and arriving at the final LBC approval will take approximately 8-12 hours for each material considered.

Natural systems are efficient and elegant—taking only as much as they give in return. The project should strive to do more with less. Materials selection should follow these guiding principles:

- Reduce overall materials
- Reuse existing materials
- Choose low-energy materials
- Minimize any waste generated
- Design for adaptability/end-of-life reuse

Start the materials vetting process now. Use lists generated from Bullitt, Bertschi, Declare and other sources as a starting point. Roughly 80% of the materials that will be used are known now. The remaining 20% will likely require a great deal of exploration.

A Materials working group has been established and has set up a process for sharing and vetting information that will be shared with the entire group on a regular basis.

Responsible Industry:

LBC requires that all wood products on the project—from temporary shoring, shims, finished wood, lumber and furniture come from Forest Stewardship Council (FSC) sources or from salvaged sources. The State of Georgia prohibits certification systems (such as LEED and LBC) that require third party verification for wood on projects that receive public funds. The Living Building at Georgia Tech is privately funded and therefore this restriction does not technically apply. However, Georgia Tech has some concern over how the use of FSC wood will be received by the legislature.

The team will pursue several strategies for sourcing wood:

- Use salvage as much as practical
- Use FSC materials from Georgia mills and forests as much as practical

During the design competition, the design was based on using wood for the primary structure because it sequesters carbon (carbon negative); there is no need to add additional materials to finish the space; wood strengthens the connection to the outdoors and nature; wood is inherently beautiful; wood is no more expensive than other alternatives when you add the finishing costs for steel and concrete.

The design team will provide a summary of the pros and cons of using steel or concrete for the superstructure so that the OAC team can make a decision on which system to use moving forward. The decision on the superstructure will drive many design decisions.

Considerations:

- Salvage wood may not be practical for the superstructure however Skanska has found a source for sinker Cyprus in Louisiana. The team will look into the feasibility of using this source as an option.
The Living Building Challenge envisions a future where all materials in the built environment are regenerative and have no negative impact on human and ecosystem health. The precautionary principle guides all materials decisions when impacts are unclear.

The project cannot contain any of the following Red List materials or chemicals:

- Alkylphenols
- Asbestos
- Bisphenol A (BPA)
- Cadmium
- Chlorinated Polyethylene and Chlorosulfonated Polyethylene
- Chlorobenzenes
- Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs)
- Chloroprene (Neoprene)
- Chromium VI
- Chlorinated Polyvinyl Chloride (CPVC)
- Formaldehyde (added)
- Halogenated Flame Retardants (HFRs)
- Lead (added)
- Mercury
- Polychlorinated Biphenyls (PCBs)
- Perfluorinated Compounds (PFCs)
- Phthalates
- Polyvinyl Chloride (PVC)
- Polynylidene Chloride (PVDC)
- Short Chain Chlorinated Paraffins
- Wood treatments containing Creosote,
- Arsenic or Pentachlorophenol
- Volatile Organic Compounds (VOCs)
- in wet-applied products

- Consider fire protection requirements and special coatings that may be required if using steel
- Acoustic considerations are important if exposed concrete is to be used.
- Local Materials Sources:
  - Lifecycle Building Center, a local non-profit group dedicated to providing salvaged materials to the marketplace in Atlanta, can work with the design team to identify possible materials and they identify and can help the team identify sources and hold materials. They have been involved to date with several buildings in the demolition phase: A salvage list has already been reviewed by the team for the church that is to be removed at Hemphill and 10th St. Several options for salvaged materials exist from this building.
- Engage Steel Case, Hayworth, Mohawk, Interface
- Local fabricators may be more agile and willing to work with the team. Georgia Tech may need to use products that are readily replaceable and not custom fabrications
- Carbon cure technology – a system that takes collected (from smokestacks) CO2 and injects it into concrete. This has 2 benefits: 1) it directly sequesters the CO2 and 2) it reduces the amount of Portland Cement required in the concrete mix, reducing the energy and carbon foot print of the concrete.
The small group discussed the buildings pedagogy in terms of three questions:

**Where do we learn best?**
- [By] shifting spaces
  - Indoor – outdoor
  - Can Georgia Tech facilitate impromptu outdoor learning space on campus now?
- Standing – sitting
- ‘Mood’ shift
- Changes in diversity/population
- In spaces with sensory engagement through...
  - Natural light
  - Ergonomics
  - Comfort
  - Multi-sensory

**How do we learn best?**
- We learn best by...
- Teaching
- Group work / active learning
- Making mistakes and learning from them
- Problem solving
- Answering + generating questions

**What is the didactic purpose of the building?**
- Landscape experimentation
- Building as learning lab
  - An opportunity for students to monitor and analyze building operations
  - Walls as interface
  - Multidisciplinary Education: are there opportunities for all schools, especially the School of Engineering?
- A home for interdisciplinary projects (e.g., Solar Decathlon)
- Community outreach
  - do we make the space open to community?
  - use the facility as an informal educator
Design Team Work Session

What We Know:

- After day 1 of the charrette, the design team took advantage of having the whole team together, compiled information and incorporated it into the design.
Discussion:

What are the shading opportunities on the east side of the building?

- Maintenance is a real concern with exterior, motorized shading systems. Georgia Tech prefers non-operable systems.
- Use trees as much as possible
- Is there an opportunity to incorporate an art-screen?

The complete presentation can be found in the Appendix, section 3.07
Wrap corner or treat individually

Opt A: motorized adjustable shades
Opt B: roller blind
Opt C: adjustable glass

Performance:
Cost: $$
Maintenance: NO
In addition to providing shade, the PV porch cover is also an opportunity to collect rain water. Rain water cannot be collected and reused if the green roof covering the remainder of the building is occupiable.

• What are the program opportunities on the roof?
  • outdoor labs
  • student / community gathering space (e.g. Clough Commons)

• What are the agriculture opportunities of the green roof?
  • Will it be an extensive or intensive green roof?

The complete presentation can be found in the Appendix, section 3.07
Controls Strategy/Intelligent Building

- Georgia Tech has a campus wide contract to use Johnson Controls (JCI) for building controls. That does not preclude using another system as a dashboard and analytic engine that would interface with the building controls.
- The design will need to include JCI and other control component manufacturers regarding red list material requirements and other LBC reporting requirements.
- The design team will organize a working group to further the discussion to consist of GeorgiaTech, Newcomb & Boyd, PAE, John McFarland, and Epsten Group at a minimum. This group will discuss the dashboard as well as analytic software options. Dashboard topics include:
  - Energy Use – how to make it relatable to the average visitor
  - Water
  - Health, Microbiome, air quality, elevator use
  - Other petals.
  - Measure “good”
  - Happiness (www.happy-or-not.com)
Thermal Comfort

Thermal comfort is the condition of mind that expresses satisfaction with the thermal environment and is assessed by subjective evaluation (ANSI/ASHRAE Standard 55).

- There are 6 factors to consider when designing for thermal comfort. The Living Building will challenge the status quo on campus by considering other ways to maintain thermal comfort than air temperature alone.

Conclusion/Action Items

- Find out about Tech research programs for DC power, battery types, building analytics
- Reach out to Mechanical Engineering about Pollen Filter mock up, CFD modeling
- PAE will provide a thermal comfort criteria memo for Georgia Tech review and approval.
- PAE will create on-line surveys for:
  - Systems criteria importance factors
  - Model input-assumptions
- PAE will develop diagrams of system options. These will be conceptually for proof of concept.
  - During the SD-Phase, the design team will provide a more detailed look at individual measures for energy savings
Water

What We Know:

On Day 1 of the charrette, participants discussed waste water technologies in support of the LBC Water Petal. In addition to a general discussion, there was a breakout discussion on water, and based on these discussions and others during the work session, the design team suggests that Option 1, the composting toilets and greywater treatment strategy, is the best solution for the Living Building at Georgia Tech.

Option 1 is preferable because it has a lower first cost and significantly lower maintenance and operation costs. Part of the challenge with Option 2 is the requirement of daily water sampling and testing (per the Authority Having Jurisdiction). This requirement contributes to the high maintenance costs for this option. Please refer to the table below for a detailed life cycle cost comparison for waste water treatment strategies. Please note life cycle costs are based on 15 years of ownership.

In addition to the overall cost savings, there are many benefits to the Option 1 system. Composting toilets will yield a smaller water footprint, require less energy, and are simple to operate. There is also the potential to reuse the leachate and the compost.

Both systems have the benefits of having treated greywater available for reuse for (e.g. sub-surface only) irrigation. However, Option 1 also requires a lower design flow to treat the water, which may be advantageous during the summer when the building may have lower occupancy. This system also requires less monitoring and less land on the site.
## Composting Toilet + Greywater vs. Blackwater Treatment

<table>
<thead>
<tr>
<th>Differences in Strategy</th>
<th>Option 1: Composting Toilets + Greywater Treatment</th>
<th>Option 2: Treat &amp; Reuse 100% of Wastewater</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Flow = 500-1,000 gpd greywater only (will need to include sinks + lab use + cooling tower blow down (if there is one))</td>
<td>• Flow = 2,500 gpd full wastewater flow</td>
</tr>
<tr>
<td></td>
<td>• Dosing Tank = 500 gallons</td>
<td>• Primary Tank = 6,000 gallons</td>
</tr>
<tr>
<td></td>
<td>• Sand Filter or Textile Filter = 200 sf</td>
<td>• Trickling Filter w/ Clarifier = 4'-6' diameter</td>
</tr>
<tr>
<td></td>
<td>• Filter to 20-50 microns</td>
<td>• Subsurface Wetlands = 1,500 sf</td>
</tr>
<tr>
<td></td>
<td>• UV Disinfection</td>
<td>• Recirculating Sand Filter = 300 sf</td>
</tr>
<tr>
<td></td>
<td>• Irrigation Dosing Tank = 1,000 gallons</td>
<td>• Bag filters to 5 microns</td>
</tr>
<tr>
<td></td>
<td>• 5,000-10,000 sf drip dispersal</td>
<td>• UV Disinfection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Dye injection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Day Tank = 2,000-4,000 gallons</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Irrigation Dosing Tank = 1,000 gallons</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 5,000-10,000 sf drip dispersal</td>
</tr>
<tr>
<td>Cultural Implications</td>
<td>&quot;Potty training&quot; for users, due to operation of toilet system (toilets require flush prior to use, wait time for foam)</td>
<td>Conventional use</td>
</tr>
<tr>
<td>Initial Cost</td>
<td>$90,770</td>
<td>$325,980</td>
</tr>
<tr>
<td>Maintenance Cost</td>
<td>$254,490</td>
<td>$1,828,830</td>
</tr>
<tr>
<td>Energy / Operation Cost</td>
<td>$9,016</td>
<td>$27,048</td>
</tr>
<tr>
<td>Total Lifecycle Cost</td>
<td>$354,280</td>
<td>$2,181,856</td>
</tr>
</tbody>
</table>
Water

What We Know:

LBC requires that all water for the project is captured on site. Stormwater, grey, and black water must also be treated on site (without the use of chemicals) and managed through re-use, a closed loop system, or infiltration.

Today, such practices are not allowed by local health departments or building regulations. Therefore each water strategy will have its own unique hurdles, and with different authorities having jurisdiction.
FSC Wood

What We Know:

LBC requires materials sourcing to be closely tracked. Materials need to come from near the project site, and certain percentages (on a cost basis) are required to come from within specific distances. Relating directly to wood products, there are other requirements as well; these include a compulsory ban on the use of harmful chemicals (such as formaldehyde) and the careful sourcing of wood from sustainable sources. The options for wood are limited to salvaged wood and wood from Forest Stewardship Council certified sources. The FSC requirement applies to all new wood products in the project, from concrete formwork to furniture.

As a part of the design process, the team has identified several sources of salvaged wood for the building and will continue to look for opportunities as they may arise during the process. This salvaged wood may be fashioned into any number of items for the final building, including finishes, stairs, flooring and maybe structural items such as glu-laminated timbers. However, it is unlikely that all the wood needs for the building will be met with salvaged wood. Therefore, the team will seek out FSC certified wood from Georgia suppliers as another source. Where certain products may not be available from Georgia FSC forests, the team will look to regional sources, and then, if needed, to national level ones.
The Living Building at Georgia Tech
outreach and engagement

Leveraging Activities

What We Know:
The Equity Petal emphasizes the development of positive relationships the communities adjacent to the project. The Living Building at Georgia Tech will be a great opportunity to engage Atlanta at multiple levels and develop a local conversation surrounding sustainability.

Discussion:
4 Types of Leverage Activities
1. Education — a one way conversation
2. Engagement — two way conversation
3. Advocacy — what are the regulatory hurdles or opportunities, and what is the best way engage the right people?
4. Documentation — ensure the process is captured in an organized way, providing a resource for future teams

Conclusion:
Charrette members were asked to share any contacts or advocates within each of the petals. Georgia Tech will compile a master list.

UPCOMING EVENTS

1. Development of annual speaker series
2. Policy/advocacy research and introduction to LBC discussions with various agencies
3. Incorporation of LBC components into a two-part policy class taking place over Fall 2016 - Spring 2017
4. A biophilia charrette for September 8-9, 2016
5. Series of workshops on various elements of the LBC
6. A regularly-updated LBC blog written through student perspective
7. Development of pilot projects on various areas of campus that will benefit operation of LBC
8. Greenovation competition – partnering with Georgia Tech’s Student Government Association
9. Development of community outreach with Georgia Tech’s Office of Government and Community Relations and the Center for Serve-Learn-Sustain
10. Faculty/student research under review

The complete presentation can be found in the Appendix, section 3.12

Educational materials about the operation and performance of the project must be provided to the public to share successful solutions and to motivate others to make change.
What We Know:
The image to the right represents the schedule as it stood going into the charrette.

Discussion:
Based on similar projects and the complexity of this building and site there were concerns related to the end portion of the schedule related to the certification time factored in.

Conclusion:
It was suggested that if it was at all possible to shorten the design and development pieces of the schedule than a longer period for certification would be ideal. From the experience of Skanska and others in attendance it is often the case that imperatives will require further detailing and resubmission prior to certification.

GOAL: Certified prior to 4/22/2020, which is the 50th Anniversary of Earth Day.
The chart on the left reflects the status of how the design is meeting each imperative of the Living Building Challenge at the beginning of the charrette. The requirements for “Limits to Growth” and “Just Organizations” have been met. The “Responsible Industry” imperative was in jeopardy due to the FSC Certified Lumber regulations within the State of Georgia. The initial strategies for achieving the remainder of the imperatives were under development. The team used the charrette to help further clarify the direction the project should take relative to each petal.

The complete presentation can be found in the Appendix, section 3.05
**What We Know:**

The items shown in black text are specific strategies applicable to the imperative requirement from the LBC and must be met.

**Limits to Growth**

- Site is previously developed and does not impact: wetlands, old growth forest, virgin prairie, 100-year flood plain.
- Distinct habitats and unique ecosystems will connect visitors to the story of place.
- Use Native landscapes. Piedmont forest is the reference habitat.
- Reestablishing habitats will connect students to the local bioregion.
- Need to confirm that Georgia Tech maintenance is aware that no petrochemicals or pesticides are to be used on site, and therefore alternative measures must be found.
- A preliminary plant list will be created and Georgia Tech will determine if they have ready access to the many natives that will be required, and if not if they can contract with their typical vendors to begin growth and proper care.

**Discussion:**

The items in orange are things that were learned during the charrette. The items in red are new points that require further discussion or research.

**Urban Agriculture**

- 25-30% of site area is required for Urban Agriculture
- Scale jumping — the design team recommends no scale jumping as all remote locations would also need to comply with the LBC imperatives.
- Soil restoration is critical and needs to be adequately budgeted for.
- Need to determine how much site needs to be restored.
- Determine how much water will be available for irrigation.
- Defining the site boundary including general contractor staging area need to be determined before this is final.
- An Urban Ag subcommittee should be formed with Georgia Tech to determine:
  - Food forest Fruit and nut trees may be incorporated.
  - Permaculture gardens may be incorporated.
  - Need to determine what kind of habitat is appropriate for roof planting (e.g., bee habitat, extensive or intensive, hydroponics or aquaponics, greenhouse, etc.).
  - Is there opportunity for food sharing or a food bank?
Habitat Exchange

Based on the preliminary site area calculation, the Institute will need to set aside approximately two acres in permanent land trust.

- Design team can see if land already set aside in perpetuity by the Institute can be used for this imperative- but we recommend researching alternatives before defaulting to this approach.
- Defining the site boundary including general contractor staging area need to be determined before this is final.
- Opportunity for complimentary habitat research with the Institute — need to determine who would be the lead for Georgia Tech.
- Does Georgia Tech own other habitat that might support climate refugees?

Human-Powered Living

- Enhance pedestrian connections
- Encourage hang out spaces along the paths adjacent to the building; encourage pedestrians to cut through the building on their way to other destinations; provide weather protection and places to sit; and, provide learning opportunities that teach about living buildings/landscapes.
- Classrooms should be linked to outdoor gathering areas.
- Use pervious trails routed through site.
- Secure bike storage for 15% of occupants
- Storage should be celebrated rather than hidden in the basement.
- Design quality stairways to encourage activity.
- Advocate and support human powered transportation in the community
- Link to regional bike trails.
What We Know:

The items shown in black text are specific strategies applicable to the imperative requirement from the LBC and must be met.

- **Net Positive Water**
  - A cistern will capture rainwater and store for potable water use
    - need to meet with the authority having jurisdiction (AHJ) to determine the regulatory pathways.
  - Eliminate wastewater discharge.
  - Manage all stormwater flows beyond a pre-existing forest ecosystem and building discharge on site.
  - 30 day storage capacity is required to provide resiliency against drought and climate change.
  - Constructed wetland cells expressed in landscape, energy used is for recirculation through filter cells and for UV disinfection/water delivery.
    - Need to meet with the AHJ to determine the regulatory pathways.
  - Reclaimed effluent to satisfy toilet flushing demand, remainder used for irrigation or infiltrated on site.
    - Possible for excess clean effluent sent to adjacent buildings or condensing unit.
  - Possible for living infrastructure system to teach visitors about water treatment technologies.

Discussion:

The items in orange are things that were learned during the charrette. The items in red are new points that require further discussion or research.

- How to interface with Water Hub/Eco Commons?
- Need to nail down site area boundary, which greatly impacts the amount of rainwater on site.
- Determine if temporary erosion control measures can be incorporated into final storm water design.
- Design team recommends composting toilets in lieu of natural systems. Cost and maintenance concerns for black water treatment outweigh the benefits. System would include urine diversion composting toilets collected for agriculture or soil building and waterless urinals.
Incorporate passive architectural strategies such as:
- Thermally efficient envelope.
- Thermal mass
- Optimize daylighting.
- Strategically locate shade trees.
- Prefer fixed shade strategies to motorized
  - Study potential for incorporating art as a solar screen.

Study passive mechanical strategies such as:
- Earth tubes.
- Displacement ventilation.
- Natural ventilation.
- Passive downdraft chimney w/ pollen filter
  - The team will perform CDF modeling.
  - Opportunity for the engineering school to create a mock up. Georgia Tech will advise how that might be implemented and how the design team will need to coordinate and interact with faculty and students.

Study active mechanical strategies such as:
- Chilled beams.
- Radiant floors.
- 230 kW rooftop PV array and battery storage system.
  - Opportunity for interpretive energy generators. Georgia Tech will advise how that might be implemented and how the design team will need to coordinate and interact with faculty and students.
  - MEP will summarize pros and cons of a desiccant system for Georgia Tech’s consideration.
- The MEP must determine based on the mandate that the building use Johnson controls, whether they can meet red list and other LBC operational requirements.
- The MEP team will issue and online survey to determine systems and operational hours, etc.

Define resiliency plan. At a minimum the ability to store the energy equal to 10% of the lighting load for 1 week.
- Battery Storage
  - Georgia Tech to determine what battery systems they would like to study - this would be a demonstration project.
  - Georgia Tech to determine what DC systems they would like to study - this would be a demonstration project.
- Building commissioning and monitoring.
  - The dashboard control system will need a focused work session to determine desired outputs.
- Need to determine what the impact is of designing to yellow book in terms of thermal comfort. The design team will summarize pros and cons for Georgia Tech’s consideration.
- The type of food service needs to be determined as that will impact energy balance.
- The server location needs to be determined as a dedicated vs. distributed vs. off site server location will impact the energy balance.
- Scale jumping.
  - MEP will summarize pros and cons of campus chilled water for Georgia Tech’s consideration.
What We Know:
The items shown in black text are specific strategies applicable to the imperative requirement from the LBC and must be met.

Civilized Environment
- Optimize daylight
- Operable windows are required.
- Narrow floor plates preferred.
- Minimum 13’ ceiling height required.
- Large windows in lecture hall with light and glare control
  - All exposures lecture hall be challenging.
  - Optimize light glare and performance in the configuration of windows. Start with passive fixed control measures.

Healthy Interior Environment
- Meet ASHRAE 62 ventilation.
- Provide dedicated exhaust systems for kitchens bathrooms and janitorial rooms.
- Permanent entryway dirt tracking systems.
- CO2 monitors.
- FFE items will be reviewed for VOC compliance.
- IAQ Plan that tests air quality before and 9 months after occupancy.
- Must use CDPH standard measurement to gauge VOC’s for interior products

Discussion:
The items in orange are things that were learned during the charrette. The items in red are new points that require further discussion or research.

Biophilic Environment
- Conduct a Biophilic Design charrette
- Biomimicry is one aspect of Biophilic Design
- Multiple direct connections with the outdoors.
- Indoor-outdoor classrooms to provide flexible teaching environments and hands-on interaction with the site.
- Representation of vernacular and historical Georgian architecture concepts.
**Materials Petal**

<table>
<thead>
<tr>
<th>PLACE</th>
<th>WATER</th>
<th>ENERGY</th>
<th>HEALTH</th>
<th>MATERIALS</th>
<th>EQUITY</th>
<th>BEAUTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limits to Growth</td>
<td>Embodied Carbon Footprint</td>
<td>Civilized Environment</td>
<td>Net Positive Energy</td>
<td>Red List</td>
<td>Human Scale + Humane Places</td>
<td>Beauty + Spirit</td>
</tr>
<tr>
<td>Urban Agriculture</td>
<td>Responsible Industry</td>
<td>Healthy Interior Environment</td>
<td></td>
<td></td>
<td>Universal Access to Nature + Place</td>
<td>Inspiration + Education</td>
</tr>
<tr>
<td>Habitat Exchange</td>
<td>Living Economy Sourcing</td>
<td>Biophilic Environment</td>
<td></td>
<td></td>
<td>Equitable Investment</td>
<td></td>
</tr>
<tr>
<td>Human-Powered Living</td>
<td>Net Positive Waste</td>
<td>Red List</td>
<td></td>
<td></td>
<td>Just Organizations</td>
<td></td>
</tr>
</tbody>
</table>

**What We Know:**

The items shown in black text are specific strategies applicable to the imperative requirement from the LBC and must be met.

**Red List**

- Simple and straightforward construction methods.
- Material palette found in nature.
- Exposed building systems.
- Outline a process for materials selection and set up a subcommittee for that specific purpose.
- Identify major materials (80/80), “known” materials, and pre-vetted Declare products. Begin with the usual suppliers, but also looks for at least 3 potential sources for competitive pricing.
- All materials that do not comply with Georgia Tech’s standard, “yellow book” need to be identified.

**Embodied Carbon Footprint**

- One-time carbon offset in the amount of approximately $46,600.
- Limit use of high carbon materials such as concrete and steel.

**Discussion:**

The items in orange are things that were learned during the charrette. The items in red are new points that require further discussion or research.

**Responsible Industry**

- All wood will be FSC certified or salvaged
  - Georgia Tech to determine ramifications for having FSC wood on the project & develop “talking point” for the team. Use Georgia sourced FSC. Maximize salvaged wood. Consider sinker Cyprus for both structural and finish wood as an alternative. Consider urban salvage.
- Advocate that all stone will meet National Stone Council 373 standards.
- Identify products that have the Declare Label.
- Summarize pros and cons of wood vs. steel vs. concrete for Georgia Tech’s consideration.

**Living Economy Sourcing**

- Identify products and services that meet sourcing location criteria.

**Net Positive Waste**

- Specify durable products/materials/assemblies.
- Seek out salvage opportunities.
- Divert construction waste from landfills.
- Plan for end of material life.
**What We Know:**

The items shown in black text are specific strategies applicable to the imperative requirement from the LBC and must be met.

**Human Scale + Humane Places**

- No additional parking beyond service and ADA parking.
- Avoid blank facades.
- Limit building signage.
- Enhance sidewalk life.
- Expansive covered porch that is tiered with grade and interspersed with functional water treatment provides spill out space for classroom and community functions.

**Universal Access to Nature + Place**

- Maintain natural site drainage.
- Site and building circulation carefully designed to allow universal access to sloping site.
- Sunlight is not hindered on future development sites.
- Confirm that the location of the bus stop will be nearest the “front door”.
- Determine if there are air quality issues—no toxic fumes can be omitted from the building.

**Discussion:**

The items in orange are things that were learned during the charrette. The items in red are new points that require further discussion or research.

**Equitable Investment**

Approximately $93,000 donation by Georgia Tech to any 501(c)(3). [($18,600,000 (total project cost) x 0.005 = $93,000]

**Just Organizations**

- Either Lead Architect, or Engineer or Owner must be JUST certified
- Miller Hull — JUST.
- LAS — in process.
- Newcomb & Boyd — in process.
- The design team recommends that Georgia Tech begin the JUST process.
What We Know:

The items shown in black text are specific strategies applicable to the imperative requirement from the LBC and must be met.

**Beauty + Spirit**

- Landscape and natural topography embraced and brought into building creating a seamless connection to the site.
- Large overhanging porch roof provide dappled light emulating the natural tree canopy.
- Large sky lit central atrium space brings natural light deep into the building promoting and strengthening awareness of the circadian rhythm.
- Exterior materials will be natural unfinished and ‘of the site’.
- Must incorporate public art
  - Plan for rotating art exhibits.

**Discussion:**

The items in orange are things that were learned during the charrette. The items in red are new points that require further discussion or research.

**Inspiration + Education**

- Educational materials explaining the performance and operation of the building and landscape.
  - Opportunity for hands on experience of how much power it takes to pump water, virtual scavenger hunts, LBC guide book, etc.
- Expressed mechanical systems.
- Expressed water systems providing real-time data on gallons used/saved.
- Comprehensive information accessed from mobile devices.
- Provide meeting space for community events and school tours.
- Need to meet with students to determine how they envision using/interacting with the building.
acknowledgments

Thank you to the following charrette participants:

**Georgia Institute of Technology**
Anna Nord  
David Heim  
Rushi Patel  
Anne Boykin-Smith, CPSM  
Anne Rogers, Sustainability  
Dan Nemec, CPSM  
Drew Cutright, Admin. and Finance  
Gary Jelin, D&C  
Greg Spiro, D&C  
Howard Wertheimer, CPSM  
Jason Gregory, CPSM  
Jeannette Yen, Center for Bioinspired Design  
Jerry Young, CPSM  
John DuConge’, D&C  
JulieAnne Williamson, Admin. and Finance  
Michael Gamble, College of Design  
Malte Weiland, Sustainability  
Rachael Pocklington, Admin and Finance  
Scott Jones, D&C

**Kendeda Fund**
Barry Berlin  
John McFarland, Working Buildings  
Ken Edelstein  
Mona Lemoine

**Southface**
Dennis Creech
3.01 Summary of Work To Date
3.02 Kendeda and Skanska: Lessons Learned
3.03 Program Update
3.04 Site Selection Update
3.05 Living Building Challenge Update
3.06 Biophilia
3.07 Design Work Session Review: Architecture
3.08 Design Work Session Review: Systems
3.09 Moving Forward: Systems
3.10 Moving Forward: Dashboard
3.11 Moving Forward: Water
3.12 Outreach and Engagement: Leverage
3.13 Working Together: Schedule
3.14 Sign-In Sheets