UNC – Asheville
New Science Building
Greening Charrette

Greening Charrette Final Report

This report is a summary of the *Environmental Design Charrette* conducted at UNC – Asheville on September 27-28, 2001

Funding provided by:
UNC – Asheville
LABS 21: Lawrence Berkeley Laboratory
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UNC- Asheville New Science Building Greening Charrette Team Members

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EXECUTIVE SUMMARY

The University of North Carolina – Asheville selected the O'Brien Atkins Architecture firm to assist them in the design of their New Science Building. The University stated early in the design process that energy and environmental considerations were critical; in fact, the University felt strongly that the project should use the nationally-recognized LEED Green Building Rating System to document and quantify their energy and environmental initiatives. With this directive in mind, the O'Brien Atkins recommended a one and a half day "Greening Charrette" as an efficient way to quickly address the LEED system. The charrette (an intensive, focused brainstorming session involving a wide variety of experts) would provide an effective means to identify realistic and cost-effective sustainable measures that the new facility could implement. During the charrette planning, partnerships were established with the US Department of Energy, National Renewable Energy Laboratory, and Labs 21, to help fund and assist in the charrette process and documentation. Ongoing relationships with these partners and with the diverse and knowledgeable charrette participants will continue to aid the University in meeting their stated energy and environmental commitments long after they have established this project as a leader in the field.

Greening Charrette participants for the New UNC-A Science Building

The charrette took place during September 2001 at the University of Asheville campus. Its stated focus: to incorporate environmental excellence and high performance, guided by the LEED Green Building Rating System, in the design of the University's New Science Building. Approximately 55 individuals participated from various backgrounds and fields: the University (faculty, personnel, students, administration, etc.), the community, state agencies, and private companies. Four distinct environmental design areas were addressed in detail: site & water, energy, materials and indoor environmental quality.

Greening Charrette Brainstorming

National experts in "integrated design", LEED, and the four areas facilitated the focus groups and gave educational presentations on their topics to the charrette participants. In addition, representatives from O'Brien Atkins and the University presented information on the project and potential project sites. UNC-A students shared their creative thoughts and ideas on the new building while numerous other participants were asked to join in the brainstorming and to become "champions" of the charrette results.

The ultimate goals of this charrette were to:

Site information for the New Science Building

1. Inform and educate charrette participants about the energy and environmental implications of designing and constructing a new building on the UNC-A campus, while clarifying the term "integrated approach", so that they could effectively use the LEED Green Building System to help define green design/high performance.

2. Identify economically viable and doable action items that University of North Carolina – Asheville could undertake to incorporate high performance sustainable design measures into their New Science Building and, in doing so, attain a high LEED rating.

3. Establish a database of contacts, champions, and partners for all identified sustainable design action items, including approximate costs and schedule implications. In addition, understand the levels of difficulty and commitment required to fulfill each of the proposed action items.

4. Determine immediate next steps, research initiatives, and strategies/technologies necessary to enable the design team to implement the proposed LEED points.

5. Use the new Science Building to initiate a benchmark for environmental excellence in design and construction at UNC-A campus, and outline energy and environmental initiatives that will establish the UNC –A facility as a model for other university science facilities.

Throughout the Greening Charrette, the overall large group of charrette participants, as well as the three smaller "break-out" topic focus groups, all reviewed the LEED Green Building Rating System points. They determined that out of a potential 69 point system, the New UNC-A Science Building's target should be 40 points; thereby attaining a **GOLD** achievement level in the rating system. More in-depth review and research is needed on several potential points, while several of the potential 40 points are "very doable."

Greening Charrette Discussions

With the New Science Building, UNC-A is embarking on a new level of education not only for its faculty, students, and staff, but for a much larger "community".

IMMEDIATE NEXT STEPS: OBSERVATIONS & RECOMMENDATIONS

1. **Benefit from other Green Projects and their "Lessons Learned"**
   - Make site visits to similar high performance showcase projects and talk with their "champions" for insights, "lessons learned", and 'best practices" (One project that is close and its champions are very helpful is the US EPA RTP research facility; Contact Chris Long, Project Manager at (919) 541-0249 for a visit or to discuss "lessons learned")
   - Review showcase projects that are part of the Labs 21 Program
   - Attend the Labs 21 Conference in Washington, DC – January 2002

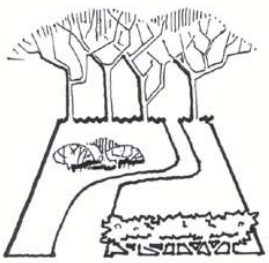
2. **Set up a project sustainability research schedule; identify and collect tools & resources**
   - Acquire more in-depth information on certain targeted LEED points that have high levels of difficulty related to cost and scheduling. In particular; review the Cost Considerations page that identifies building systems and site systems that are noted as more costly than standard practice.
   - Assign to various champions the responsibility for information & resource collection; set up an overall schedule defining when research will be completed and decisions made
   - Collect tools and resources that will assist in achieving the LEED points identified at the greening charrette (Suggestions: LEED V.2 Reference Guide and project registration, EPA RTP IAQ Manual and specifications, Energy modeling tools, WasteSpec, GreenSpec, Green Building Advisor, Pennsylvania Green Office Building video, etc.)

3. **Continue to make this project an educational endeavor**
   - Continue to videotape the process of this project (Check with Chris Long at the US EPA RTP facility concerning how they produced their video – funding sources, taping experts, etc.)
   - Determine how to coordinate classroom education with the built facility; determine best research for students to undertake (suggestions: Water conservation fixtures, Photo-voltaics and solar applications, and Green Roof.)
   - Document difficulties in using LEED V.2 with this laboratory design; share information with the USGBC to help inform LEED V.3 and, if required, the creation of a specific laboratory LEED module.
   - Share all charrette and project process information on the US DOE high performance website (currently being created) and on the Labs 21 website. (This charrette report will be given to US DOE folks and the Labs 21 group for their review) Present this project at the Labs 21 Conference in its proposed "University Science Buildings Panel Discussion" in Washington, DC -January 2002.
   - Share sustainability knowledge from this campus project with other projects underway; set up a network for conveying sustainable design knowledge effectively with other UNC-A staff, faculty, students, A/E firms, contractors, etc. (suggestion: link to an overall campus green guidelines/strategic plan initiative).

COST CONSIDERATIONS

The following are the cost considerations raised during the UNC-A greening charrette that need to be addressed in order to pursue or implement the agreed-upon potential LEED points.

Cost considerations to research further for the UNC –A New Science Building:

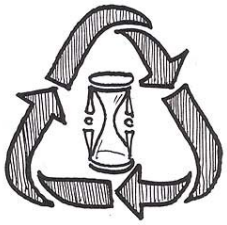


- **Site & Water:**

1. Stormwater Management (Champion: Jay Smith, OBA)
   $"Nominal Premiums"
2. Light Pollution Reduction (Champion: Tom Montgomery)
   $ Additional amount for lighting analysis (Tom Montgomery to check on additional cost if this is doable after first checking University lighting standards)
3. Water Use Reduction by 20% (Champion: Jim Mason)
   $$ Potential additional costs
   Waterless urinals, composting toilets, etc.

- **Energy:**

1. Fundamental & Additional Commissioning (Champion: Jay Tom Smith)
   $ Potential Cost: $100,000.
2. Optimize Energy Performance
   Geothermal (Champion: Pat Doyle)
   $ Cost varies: $3,500 per ton
   Ice/Thermal Storage (Champion: Baltimore Air Coil)
   $$$ Cost: Major
   Heat Recovery (Champion: OBA)
   $ Cost: Moderate increase
   High Performance Hoods (Champion: Greg Mills, Victor Neuman)
   $$ High initial costs
   Multi-stack Vs. High Efficiency Chiller (Champion: Paul Braese)
   $ Moderately higher initial cost
   Daylighting, Indirect lighting, occupancy sensors (Champion: Tom Montgomery)
   $ Moderate change in cost
   Green Roof (Champion: Paul Braese, Greg Kormanik)
   $$ Potential additional costs
3. Renewable Energy (Champion: Phil Bisesi)
   $$$ 1,000,000+ (ballpark for PV)
4. Elimination of HCFCs/Halons (Champion: Greg Mills)
   More research is needed to determine cost
5. Measurement & Verification (Champion: Greg Mills)
   $$ Cost impact, may cost 1-3% of total construction cost
6. Green Power (Champion: Rita Joyner, State Energy Office NCDOA)
   $ Additional cost



- **Materials and Indoor Environmental Quality:**

1. All chosen LEED points in these two sections are noted as standard cost and scheduling or minimal cost implications

CHARRETTE PROCESS

The University of North Carolina - Asheville, in planning for a new science facility on campus, was focused on addressing energy efficiency and sustainable initiatives and using the nationally recognized green building rating system, LEED. To help catalyze their focus, they contracted with O'Brien Atkins to initiate project programming and site analyses as well as a "Greening Charrette". (A charrette is a sustained, intensive brainstorming session in consideration of a single topic or problem.) High profile Greening Charrettes formally began in the early 1990's with the successful "Greening of the White House". Since that initial charrette, numerous others (such as the those for the National Park Service, the Pentagon, Habitat for Humanity, and other public and private groups) have been successfully undertaken to improve design and construction endeavors throughout the United States.

For the UNC-A New Science Building Greening Charrette, approximately 55 participants from various backgrounds assembled at UNC-A for the 1 ½ -day event.
The charrette participants worked both in a single large group, and as three focused working groups. Their goal: identify realistic and cost-effective "green" opportunities and objectives that would not only improve the project's performance levels but also satisfy the requirements of the LEED Green Building Rating System.

Project programming information presented to the charrette participants

Throughout the 1 ½ - day long charrette, a mixed format prevailed; presentations to the participants about project programming, site considerations, and sustainability topics were linked to breakout work sessions where the participants worked toward the formulation of specific sustainability opportunities and recommendations for the design team.

THURSDAY (September 27, 2001)

Steve Baxley, Head of UNC-A Design and Construction Department, opened the Greening Charrette early on Thursday morning with a welcome and introduction to the university, to the new science facility project, and to the university's commitment to a high performance buildings. Steve added a critical insight to the charrette endeavor, reminding participants that the sustainable initiatives developed during this charrette should also make overall functional sense and good business sense.

LEED for Labs Presentation

Jim Mullen, the Chancellor, arrived with Wayne McDevitt, the VC of Financial Affairs, to state his interest in and commitment to high performance both in this new facility as well as in the University body. After the University welcome and commitment comments, UNC-A students Mattew Raker and Zev Friedman of Unified Solar presented their creative visions and ideas of sustainable design for the new science building.

Introductions of all the participants and logistics followed the morning speakers. Next came a viewing of the 25-minute video detailing Pennsylvania's first green office building, the DEP South Central Office Building. The video set the stage for the charrette – showcasing sustainable initiatives and challenging the group to commit to sustainability and its implementation. After the video, Gail Lindsey spoke in more depth about past charrettes, and also about the expectations for this UNC-A greening charrette. Gail voiced the desire to have tangible benchmarks and goals and to format the charrette in a manner that others could easily learn from this experience.

Andy Zwiacher and Jay Smith of O'Brien Atkins, main greening charrette steering committee members, considerations provided fundamental information for the charrette participants: first an overview of the project programming issues and then site analysis information

Before and after the lunch break, the large group listened to national sustainability experts describe the "integrated design process" and give quick overviews of the individual topic areas for the focused work groups: Site and Water, Energy, Materials and Indoor Environmental Quality. During and after each topic presentation, questions and answers brought insights and highlighted key concerns that must later be addressed by the charrette participants in their focused work groups.

Participants listen intently to the various presentations

Near the middle of the first day, the large group split into three focused work groups (again: Site & Water, Energy, and Materials & Indoor Environmental Quality (IEQ)). The group sizes ranged from 11 participants to approximately 22. The groups were asked to review the LEED Green Building Rating System and identify doable and realistic LEED points in all categories by the end of the day.

By the end of the first day, a list of potential points to target under the LEED system was compiled. From the total of 69 potential LEED points, the charrette participants felt that 40 were reasonable to achieve.

FRIDAY (September 28, 2001)

For this half-day session, the large group room again spilt into the previous day's three distinct work areas. These work groups were asked to address those LEED points, identified by the larger group at the end of the first charrette day as both doable and realistic, that pertained to their specific topic area. Each group was asked to respond to the following issues for each potential LEED point:

- **Level of Difficulty**
- **Level of Commitment**
- **Contacts, Champions, and Partners**
- **Cost & Schedule Considerations**
- **Barriers, Issues, and Questions**
- **Strategies, Action Items, Details**

Work group discussing LEED points for Energy

The groups worked on these tasks until mid-morning, when a period for "cross-pollination" and "integration" was formally designated. Each group then sent one to two of its team members over to talk with the other work groups. All groups benefited from this exchange; with new ideas quickly generated while other ideas were challenged, praised, and/or ultimately coordinated. After lunch, each group was asked to appoint a speaker to relay their findings and insights regarding their specific LEED points.

Reporting back to the other topic area groups

The group presentations generated good discussions and fruitful exchanges. Several participants had previously voiced skepticism that much could be accomplished in 1½ days; after the charrette presentations, several of those skeptics were quite amazed and impressed. They then voiced their support and approval for the endeavor and its results.

Closing remarks were given by Paul Braese, UNC – A , Design and Construction, and others, on behalf of the University. Paul felt the charrette identified several opportunities that were doable, attainable, made good business sense AND could be integral to a long range high performance guideline for the University.

By the conclusion of the Greening Charrette, participants felt that with continued teamwork, dialogue, and true partnerships, most targets set in this greening charrette could be attained.

UNC-A GREENING CHARRETTE PARTICIPANTS & FACILITATORS

NAME	COMPANY	E-MAIL
Phil Bisesi	Affiliated Consult Eng.	affilce@bellsouth.net
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James L Wise	UNCA - Facilities Management	jwise@unca.edu

UNC-A GREENING CHARRETTE PARTICIPANTS & FACILITATORS (cont)		
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Alison McKone	UNCA - Student	
Garth Johnson	UNCA - Unified Solar	solar@bulldog.unca.edu
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Zev Friedman	UNCA - Unified Solar	zhfriedm@bulldog.unca.edu
Wayne McDevitt	UNCA - VC Financial Affairs	wmcdevitt@unca.edu
Terry Albrect	Waste Reduction Partners	terry.albrecht@ncmail.net
Al Keiser	WRP-Land of Sky R.C.	al@alkeiser.com

FACILITATORS		
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Victor Neuman	Tek-Air	v.neuman@tek-air.com
Victor Olgyay	Ensar Group	victor@ensargroup.com

SITE & WATER TEAM ACTION PLAN

PARTICIPANTS

Gail A. Lindsey, FAIA (Facilitator) Design Harmony, Inc.
Jay Smith, Landscape Architect, O'Brien Atkins
Jim Mason, Architect, O'Brien Atkins
Melissa Acker, UNC-A Design & Construction
Leah Greden Mathews, UNC-A
Matt Raker, UNC – A Student, Unified Solar
Peter Alberice, Architect, Camille-Alberice Architects
Dan Hartenstine, Architect, Lee Nichols Architecture
Frank Herrera, Architect
Al Keiser, WRP – Land of Sky R.C.
Steve Olin, Architect, Boney Architects
Jeff Yeltin, Architect, Lee Nichols Architecture

Site and Water Team Members

SUSTAINABLE SITES: LEED Potential Points -- 1 Prerequisite and 8 out of 14 Points (4 very doable points, 4 of med. difficulty, and 3-4 points having possible associated costs)

1. Erosion and Sedimentation Control: (Prerequisite) ***^Very doable***
Degree of Difficulty: High, Medium, Low
Degree of Commitment: High, Medium, Low

Champion, Contacts, Partners:
- Jay Smith, OBA (Main Champion)
  (1) Melissa at UNC-A
  (2) Contractor

Cost and Schedule Considerations:
- Standard costs and scheduling (Weather issues are critical to schedule)

Barriers, Issues, Questions:
- Issue: Contractor Buy-In and Commitment

Strategies, Action Items, Details:
- Upfront meeting with local DENR representative
- Discuss this point with contractor in terms of it being a "line item" in the "schedule of values" (Discuss this point at the pre-construction meeting)

Integrated Issues/Synergies and Conflicts:
- Coordinate site selection for minimum erosion and sedimentation issues with energy efficiency and air quality issues

2. Site Selection: (1 Point) ***^Very doable***
Degree of Difficulty: High, Medium, Low
Degree of Commitment: High, Medium, Low

Champion, Contacts, Partners:
- Jim Mason, OBA (Main Champion)
  (1) Melissa at UNC-A (wetland issue and state park designation)
  (2) Leah At UNC-A (state park designation)

Cost and Schedule Considerations:
- Standard costs and scheduling

Barriers, Issues, Questions:
- Question: Is the "park" on campus designated as a "state park"?

Strategies, Action Items, Details:
- Check on state park designation question

- With site selection, check that 100 feet from a wetland distance is maintained

Integrated Issues/Synergies and Conflicts:
- Coordinate100 feet from wetlands distance in site selection along with energy efficiency (building orientation) and air quality issues

3. Alternative Transportation Level ll: Bicycle Racks (1 Point) ***^Very doable***
Degree of Difficulty: High, Medium, Low
Degree of Commitment: High, Medium, Low

Champion, Contacts, Partners:
- Jay Smith, OBA (Main Champion)
  (1) Pam King at UNC-A
  (2) Randy Williams at UNC-A

Cost and Schedule Considerations:
- Standard costs and scheduling

Barriers, Issues, Questions:
- Question: Can the university campus setting be leverage for having shower changing facilities close-by, but not within the new science building?

Reviewing site and water environmental considerations

Strategies, Action Items, Details:
- Install directional sign to shower changing facilities near new bike racks
- Check if 5% can just be for staff and check what that number would be
- Install additional bike racks at nearest facility with shower changing facilities

Integrated Issues/Synergies and Conflicts:
- Note reduction of water use in the new Science Building if nearby facility (such as the existing gym) could be used for showering

4. Reduced Site Disturbance Level l: (Area around building) (1 Point) ***^Medium difficulty***
Degree of Difficulty: High (if sites B or C are chosen), Medium, Low (if sites A, D or A/D are chosen)
Degree of Commitment: High, Medium, Low (dependent on site selection)

Champion, Contacts, Partners:
- Jim Mason, OBA (Main Champion) and Jay Smith, OBA
  (1) Melissa at UNC-A
  (2) ASHE (Matt and Heidi)
  (3) University Committee on Aesthetics

Cost and Schedule Considerations:

- Standard costs and scheduling (Check choice of materials)

Barriers, Issues, Questions:
- Barrier: Site Selection of Site B or Site C

Strategies, Action Items, Details:
- Review pros and cons of sites – include this issue of reduced site disturbance in the review
- Discuss this issue with contractor and clearly state reduced site disturbance parameters in the project specifications (Discuss this issue at the pre-construction meeting)

Integrated Issues/Synergies and Conflicts:
- Coordinate site selection for reduced site disturbance with energy efficiency and air quality issues

5. Stormwater Management: Flow Reduction (1 Point) **$^*Medium difficulty***
Degree of Difficulty: High, Medium, Low
Degree of Commitment: High, Medium, Low

Champion, Contacts, Partners:
- Jay Smith, OBA (Main Champion)
  (1) Gary Davis, local Civil Engineer with McGill Associates
  (2) Melissa at UNC-A (wetlands issue)

Cost and Schedule Considerations:
- **$** May have nominal premium associated with this point for stormwater management plan coordinated with Melissa's work and site selection

Potential Sites for the UNC-A New Science Building

Barriers, Issues, Questions:
- Issue: The timing and scope of Melissa's grant
- Issue: This point contingent on site selection (net imperviousness), designated site boundaries, and roofing choice

Strategies, Action Items, Details:
- Review pros and cons of site selections in regard to net imperviousness
- Research Green roof (check Point for Landscaping & Heat Island Reduction – Roof below)
- Research rainwater collection and storage systems (engage students, if possible)

Integrated Issues/Synergies and Conflicts:
- Coordinate stormwater flow reduction issues with site selection, heat island reduction/ green roof/energy efficiency, and rainwater collection/storage/use issues

6. Stormwater Management: Flow Treatment (1 Point) **$^*Medium difficulty***
Degree of Difficulty: High, <u>Medium</u>, Low
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- Jay Smith, OBA (Main Champion)
  (1) Gary Davis, local Civil Engineer with McGill Associates
  (2) Melissa at UNC-A (wetlands issue)

Cost and Schedule Considerations:
- **$** May have nominal premium associated with this point (Bioretention and detention strategies are not standard in this area)

Barriers, Issues, Questions:
- Issue: The timing and scope of Melissa's grant
- Issue: This point contingent on site selection and designated site boundaries
- Questions: What amount of land area will be needed for bioretention and detention efforts? How remote can those efforts be and still be effective? What impact will bioretention and detention have on trees and other ecosystems?

Strategies, Action Items, Details:
- Review pros and cons of site selections in regard to bioretention and detention efforts
- Research is needed on bioretention and detention in this area
- Coordinate with Melissa on her wetland efforts in regard to bioretention and detention
- Coordinate with previous point on flow reduction

Integrated Issues/Synergies and Conflicts:
- Coordinate Melissa's efforts with stormwater flow treatment
- Coordinate site selection with stormwater issues as well as energy efficiency, air quality, light pollution reduction, and operations & maintenance issues

7. Landscaping & Reduction of Heat Islands: Non-Roof (1 Point) ***^Very doable***
Degree of Difficulty: High, Medium, <u>Low</u>
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- Melissa at UNC-A (Main Champion)
  (1) Jay Smith, OBA
  (2) Matt Raker, Student
  (PR – Student Arbor Day)

Cost and Schedule Considerations:
- Standard costs and scheduling (Within landscaping budget)

Potential sites for the UNC-A new Science Building

Barriers, Issues, Questions:
- None

Strategies, Action Items, Details:
- Coordinate choices and locations of tree and vegetation species with Melissa
- Check on the possibility of a Student Arbor Day on campus (possible innovation point or augmentation of this point)

Integrated Issues/Synergies and Conflicts:
- Coordinate tree and vegetation species for shading with water and energy considerations

8. Landscaping & Reduction of Heat Islands: Roof (1 Point) ***^ Very doable***
$$^Medium difficulty

Degree of Difficulty: High, <u>Medium</u> (if green roof), <u>Low</u> (if Energy Star compliant roof)
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- Jim Mason, OBA (Main Champion)
  (1) Paul Braese at UNC-A (for Green Roof)
  (2) Hydro Tech Representative (for Green Roof)
  (3) Greg Kormanik at UNC-A (coordination with the Biology Department's Greenhouse)

Cost and Schedule Considerations:
- Standard costs and scheduling for Energy Star compliant roofing
- **$$?** Potential additional cost and scheduling considerations for a green roof (check on potential grant monies)

Barriers, Issues, Questions:
- Issue: Coordinate the green roof issue with the Biology Department's greenhouse
- Issue: University concern of low slope roofing leaks

Strategies, Action Items, Details:
- Collect information on the green roof from Hydro Tech (check on projects that have previously used Hydro Tech technologies/ check on any "lessons learned")
- Get students (Unified Solar) involved in the research of the green roofs
- Check influence, if any, on the size of the HVAC equipment if a green roof is used
- Check on maintenance issues of green roof **and** Energy Star compliant roofing

Integrated Issues/Synergies and Conflicts:
- Coordinate green roof issues with stormwater considerations, rainwater collection, HVAC sizing/energy efficiency, material use (structural), and maintenance issues

9. Light Pollution Reduction: (1 Point) **$^*Medium difficulty***
Degree of Difficulty: <u>High</u>, <u>Medium</u>, Low
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:

- Tom Montgomery, OBA (Main Champion) and Jay Smith, OBA (site selection has a bearing on this point)
    (1) Yav Iovacchini at UNC-A (University standard for lighting and security)
    (2) Paul Braese and Steve Baxley at UNC-A
    (3) Vice Chancellor of Student Affairs at UNC-A
    (4) Dave Nelson at Clanton Associates (Tom Montgomery has that information)

Cost and Schedule Considerations:

- **$** Additional amount for lighting analysis (Tom Montgomery to check on additional cost if this is doable after first checking University lighting standards)

Barriers, Issues, Questions:

- Issues: Check site boundaries and proximity/adjacencies to other structures during site selection

Strategies, Action Items, Details:

- Check on University Campus Guidelines for Lighting
- Review pros and cons of sites – include this issue of light pollution (site boundaries and adjacencies) in the review
- Check on additional cost for lighting analysis

Integrated Issues/Synergies and Conflicts:

- Coordinate light pollution issue with energy efficiency and security issues of lighting choices

WATER EFFICIENCY: LEED Potential -- 2 out of 5 Points
(1 very doable point, 1 of med. difficulty, and 1 point having possible associated costs)

1. Landscape: Potable-free system (1 Point) ***^Very doable***
Degree of Difficulty: High, Medium, <u>Low</u>
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- Jay Smith, OBA (Main Champion)
  (1) Melissa at UNC-A (Really key!)

Cost and Schedule Considerations:
- Standard costs and scheduling

Barriers, Issues, Questions:
- None

Strategies, Action Items, Details:
- Coordinate with Melissa

Integrated Issues/Synergies and Conflicts:
- Coordinate landscaping for shade/heat reduction with water issue
- Coordinate landscaping with energy efficiency (building orientation and surrounding vegetation)

Reporting to the larger group on site and water decisions

2. Water Use Reduction 20%: (1 Point) ***$$^Medium difficulty***
Degree of Difficulty: <u>High</u>, <u>Medium</u>, Low
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- Jim Mason, OBA (Main Champion)
  (1) Paul Braese at UNC-A
  (2) Matt Raker at UNC-A and Unified Solar
  (3) Jim Ellard at OBA
  (4) Marshall Mauney at NC State Construction Office
  (5) Victor Olgyay and Victor Neuman (alternatives to water uses in labs – vacuum system)
  (6) Bert at UNC-A (Alternative approaches to water use in the labs for the Chemistry Department -- closed loop cooling water system and dilution of chemical wastes)

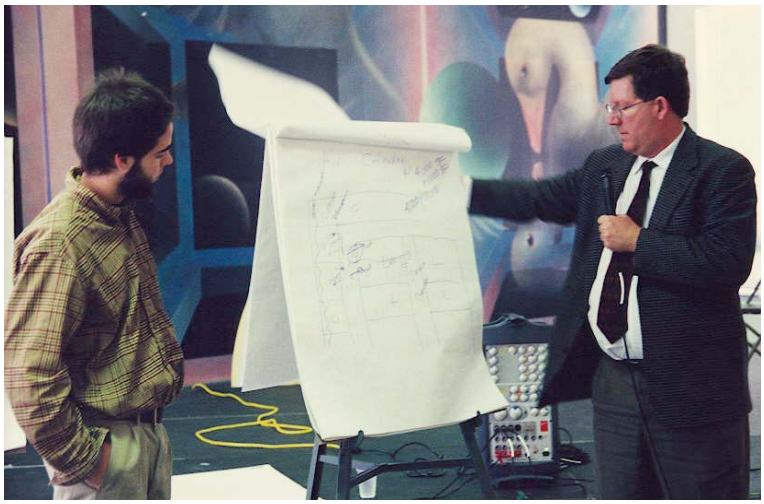
Cost and Schedule Considerations:
- **$$** Potential additional costs and scheduling considerations

Barriers, Issues, Questions:

- Barrier: Use of composting toilets in state facilities (check with Marshall Mauney)
- Issue: Effectiveness of certain low-flow toilets (check with Paul Braese)
- Issue: Use and maintenance of waterless urinals (check with Matt Raker)
- Issue: Maintenance concerns with faucet sensors

Strategies, Action Items, Details:

- Research waterless urinals, composting toilets, foot activated faucets, low-flow toilets, etc.
- Research alternatives to standard lab practices using water: vacuum system instead of water system, closed loop cooling water system, and alternative approach to high water dilution of chemical wastes
- Check maintenance and effectiveness issues with water reduction fixtures
- Check space requirements for composting toilets
- Research first costs and O&M costs for alternative fixtures (Remember to evaluate less piping/materials and labor as well as potential energy reduction for less hot water that needs to be generated)



Integrated Design: Connecting site, water, and energy considerations

Integrated Issues/Synergies and Conflicts:

- Coordinate water reduction fixtures and methods with rainwater collection/storage/use, energy efficiency, material use (piping, spatial needs), and operation & maintenance

ENERGY AND ATMOSPHERE TEAM ACTION PLAN

PARTICIPANTS

Victor Olgyay, AIA (Co-Facilitator) ENSAR Group, Inc.
Victor Neuman, (Co-Facilitator) Tek –Air
Andy Zwiacher, Architect, O'Brien Atkins
Greg Mills, Mechanical Engineer, O'Brien Atkins
Tom Montgomery, Electrical Engineer, O'Brien Atkins
Starlette Brown, State Energy Office
Rita Joyner, State Energy Office NCDOA
Phil Bisesi, Affliated Consulting Eng.
Zev Friedman, UNC –A Student, Unified Solar
Bobby Buckner, UNC-A Facilities Management
Bert Holmes, UNC-A Chemistry Department
Herman Holt, UNC-A Chemistry Department
Herb Pomfrey, UNC-A Biology Department
Greg Kormanik, UNC-A Biology Department
JoAnne McKnight, UNC-A
Paul Carter, Fisher Scientific
John Cort, Cort Architecture Group
Alan King, Sud Associates
George Heard, UNC-A
Pat Doyle, Co-Energy Group
Kevin Rossy, Ananda Morga
Jerome Hay, Sud Associates

Energy Group Team Members

ENERGY AND ATMOSPHERE: LEED Potential Points -- 3 Prerequisites and 12 out of 17 Points (12 very doable points, 2 of med. difficulty, and 3 points having possible associated costs)

LEED Summary chart:

Fundamental Building Commissioning	P	1	2	3
Minimum Energy Performance	P	✓	✓	✓
CFC Reduction	P	✓	✓	✓
Optimize Energy Performance	2			
30%	4			
40%	6			
50%	8	✓	✓	✓
60%	10			
Renewable Energy				
5%	1	?		?
10%	2			
20%	3			
Additional Commissioning	1	✓	✓	✓
Elimination of HCFC's / Halons	1		✓	?
Measurement & Verification	1	✓	✓	✓
Green Power	1		✓	

1. Fundamental Building Commissioning: (Prerequisite) **$^*Very doable***
Degree of Difficulty: High, <u>Medium</u>, Low
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- Jay Tom Smith, Exposure Control Technologies, Cary, NC (Main Champion)

Cost and Schedule Considerations:
- Potential Cost: $100,000
- Schedule: Standard

Barriers, Issues, Questions:
- Additional Cost

Strategies, Action Items, Details:
- Pick Person, Provide Budget

Integrated Issues/Synergies and Conflicts:
- Coordinate with Measurement and Verification (HVAC & Lighting systems, CO2 monitoring, etc.)

2. Minimal Energy Performance: (Prerequisite) ^***Very doable***
Degree of Difficulty: High, <u>Medium</u>, Low
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- O'Brien Atkins (Main Champion)

Cost and Schedule Considerations:
- Standard costs and scheduling

Barriers, Issues, Questions:
- Define Lab Baseline

Strategies, Action Items, Details:
- Standard

Integrated Issues/Synergies and Conflicts:
- Coordinate with daylighting, lighting, thermal comfort, and indoor air ventilation levels

NC State Energy Office employees added significant input to the energy discussions

3. CFC Reduction: (Prerequisite) ^***Very doable***
Degree of Difficulty: High, <u>Medium</u>, Low
Degree of Commitment: <u>High</u>, Medium, Low

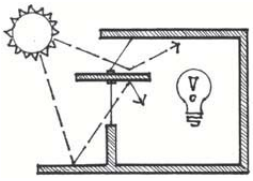
Champion, Contacts, Partners:
- GBA

Cost and Schedule Considerations:
- Standard costs and scheduling

Barriers, Issues, Questions:
- None

Strategies, Action Items, Details:
- None

Integrated Issues/Synergies and Conflicts:
- None



4. Optimize Energy Use (10 Points) (8 to 10 should be the Goal)
Degree of Difficulty: High, <u>Medium</u>, Low
Degree of Commitment: <u>High</u>, Medium, Low

Many strategies were discussed for this category, and several of these are listed below as "Innovation Credits". In general, the team felt that there was much room for improvement, especially in regard to using energy efficient fume hoods, daylighting, and heat recovery systems. In combination with careful design a reduction of 50 –60% (8-10 LEED points) in energy use should be achievable.

(a) Geothermal ***$^Medium difficulty***

Degree of Difficulty: High, <u>Medium</u>, Low
Degree of Commitment: High, <u>Medium</u>, Low

Champion, Contacts, Partners:
- Pat Doyle
- Unified Solar

Cost and Schedule Considerations:
- Cost: varies, $3,500/ton
- No schedule changes

Barriers, Issues, Questions:
- Higher first cost

Strategies, Action Items, Details:
- Study applicability

Integrated Issues/Synergies and Conflicts:
- Coordinate with site considerations

(b) Ice/Water Thermal Storage or Thermal Mass **$$$^ *High difficulty***

Degree of Difficulty: <u>High</u>, Medium, Low
Degree of Commitment: High, Medium, <u>Low</u>

Champion, Contacts, Partners:
- Baltimore Air Coil
- Calmac/Chicago Bridge and Iron

Cost and Schedule Considerations:
- Cost: Major
- Schedule: moderate adjustments

Barriers, Issues, Questions:
- Cost

Strategies, Action Items, Details:
- Pat at O'Brien Atkins to study applicability

Energy efficiency presentation and questions

Integrated Issues/Synergies and Conflicts:
- Coordinate with material choices
- Coordinate with design layout

(c) Heat Recovery ***$^Medium difficulty***
Degree of Difficulty: <u>High</u>, <u>Medium</u>, Low
Degree of Commitment: High, <u>Medium</u>, Low

Champion, Contacts, Partners:
- O'Brien Atkins
- Run Around: heat wheel, liquid system, heat pipe

Cost and Schedule Considerations:
- Moderate change in cost
- No change in schedule

Barriers, Issues, Questions:
- Higher initial cost

Strategies, Action Items, Details:
- O'Brien Atkins to study applicability

Integrated Issues/Synergies and Conflicts:
- Coordinate with energy modeling

(d) High Performance Hoods/VAV Hoods ***$$^High difficulty***
Degree of Difficulty: <u>High</u>, Medium, Low
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- Victor Neuman
- Tom Smith
- O'Brien Atkins
- Labs 21

Cost and Schedule Considerations:
- Moderate to high initial cost
- No change in schedule

Energy group discussion and review of LEED criteria

Barriers, Issues, Questions:
- Higher initial cost
- Check:
  (1) Hood design opening: combos
  Organic
  (2) Face velocity – High Performance 30 vs. 100 fpm (80)
  (3) Controls when unoccupied and overall control options
  (4) Sash management

Strategies, Action Items, Details:
- Check design alternatives
- Research Process Cooling Loop
- Measure Misc. Heat Loads

Integrated Issues/Synergies and Conflicts:
- Coordinate with air quality considerations

(e) Multistack vs. Higher Efficiency Chiller **$^*Medium difficulty***
Degree of Difficulty: High, <u>Medium</u>, Low
Degree of Commitment: High, <u>Medium</u>, Low

Champion, Contacts, Partners:
- Paul Braese
- O'Brien Atkins
- Geothermal – Pat Doyle

Cost and Schedule Considerations:
- Cost:
- Schedule:

Barriers, Issues, Questions:
- Higher first cost

Strategies, Action Items, Details:
- Research process cooling
- "Reduce, reheat, simultaneous heating and cooling"

Energy presentation

Integrated Issues/Synergies and Conflicts:
- Can be used for walk-in cooler and heat rejection

(f) Indirect Lighting/ Daylighting/ Occupancy Sensors **$^*Very doable***
Degree of Difficulty: High, Medium, <u>Low</u>
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- Tom Montgomery

Cost and Schedule Considerations:
- Moderate change to first cost
- No change to schedule

Barriers, Issues, Questions:
- Moderately higher first cost

Strategies, Action Items, Details:
- Research needed on lighting and sensor options

Integrated Issues/Synergies and Conflicts:
- Coordinate with energy modeling for energy performance levels

(g) Green Roof **$$^*Medium difficulty***
Degree of Difficulty: High, <u>Medium</u>, Low
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- Greg Kormanik at UNC-A (coordination with the Biology Department's Greenhouse)
- Paul Braese
- Hydro Tech Representative

Cost and Schedule Considerations:
- Moderate to high change to first cost
- No change to schedule

Barriers, Issues, Questions:
- Moderately higher first cost
- Do we want to let students up on roof? Liability/safety concerns

Strategies, Action Items, Details:
- Check on maintenance issues, details, and cost implications

Integrated Issues/Synergies and Conflicts:
- Coordinate with siting
- Coordinate with biology classwork (possible innovation credit)
- Coordinate with energy modeling

5. Renewable Energy (3 Points) **$$$^*High difficulty***
Degree of Difficulty: <u>High</u> Medium, Low
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- North Carolina Solar Energy Association
- Advanced Energy -- Phil Bisesi
- US Solar

Cost and Schedule Considerations:
- $1,000,000+ (ballpark for PV)
- Moderate schedule implications

Barriers, Issues, Questions:
- Cost (Include renewables even if 1% not achieved)

Strategies, Action Items, Details:
- Find the funding for Photovoltaic, Solar Thermal

Integrated Issues/Synergies and Conflicts:
- Coordinate with energy modeling
- Coordinate with roof decisions (green roof, light colored roof, etc.)

6. Additional Commissioning (1 point) (Combine with prerequisite including cost)

7. Elimination of HCFCs/Halons (1 Point) **$^*Medium difficulty*$**
Degree of Difficulty: High, <u>Medium</u>, Low
Degree of Commitment: High, Medium, <u>Low</u>

Champion, Contacts, Partners:
- Greg Mills, O'Brien Atkins

Cost and Schedule Considerations:
- Unknown, schedule should be early in the design process

Barriers, Issues, Questions:
- Can we use the existing machines with new refrigerant?

Strategies, Action Items, Details:
- Check with chiller manufacturer
    1) Walk-in cold rooms?
    2) Freezers?

Integrated Issues/Synergies and Conflicts:
- Coordinate with energy efficiency of different HVAC systems

Discussion of potential energy options in the new building

8. Measurement & Verification (1 Point) **$$^*Medium difficulty***

Degree of Difficulty: High, <u>Medium</u>, Low
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- Paul Braese
- Greg Mills, O'Brien Atkins

Cost and Schedule Considerations:
- Cost impact, may cost 1-3% of total construction cost

Barriers, Issues, Questions:
- Cost considerations

Strategies, Action Items, Details:
- Estimate additional costs
- Check cost for this on the OBA EPA Computer Center project

Integrated Issues/Synergies and Conflicts:
- Check all systems that should be part of the measurement and verification; check HAVAC, lighting, indoor air quality (i.e. CO2 monitoring system)

9. Green Power (1 Point) **$^*Very doable***

Degree of Difficulty: High, Medium, <u>Low</u>
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- Progress Energy
- Duke Energy
- NC State Energy Office

Cost and Schedule Considerations:
- Standard scheduling
- Additional cost

Barriers, Issues, Questions:
- Green Power Option in NC must first be available

Integrated Issues/Synergies and Conflicts:
- None

Discussion of energy performance levels that are both efficient and cost-effective

Other thoughts on Energy Efficiency considerations for the UNC-A New Science Building:

(1) Organize Building Design

Labs needs are different from office needs

Some program areas need to be dark, e.g. video projection areas – It may be possible to put those areas underground while other areas should utilize **daylight**

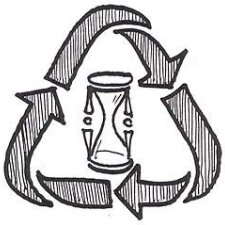
(2) Consider an Atrium

An atrium could be an integral part of the university, providing a sense of community

An atrium could be a central organizing space for the new science building and also used to temper incoming air to interior spaces

MATERIALS/IEQ TEAM ACTION PLAN

PARTICIPANTS



Joel Ann Todd, Facilitator
Jeff Bottomley, Architect, O'Brien Atkins
Paul Braese, UNC-A Design & Construction
Dee Eggers, UNC-A Environmental Science
Randy Williams, UNC-A Design & Construction
Lynne Patzig, UNC-A Recycling
Keith Krumpe, UNC-A Chemistry Department
Garth Johnson, UNC-A Student, Unified Solar
Heidi Plowe, UNCA - ASHE
Terry Albrect, Waste Reduction Partners
Farouk Zaman, State Construction Office

Materials and Indoor Environmental Quality Team Members

MATERIALS AND RESOURCES: LEED Potential Points -- 1 Prerequisite and 3-7 out of 13 Points (3 very doable points, 4 of med. difficulty, and none having significant associated costs)

1. Storage and Collection of Recyclables: (Prerequisite) ***^Very doable***

Degree of Difficulty: High, Medium, <u>Low</u>
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- Jeff Bottomley, O'Brien Atkins
- Lynne Patzig, UNC-A Recycling Coordinator
- Active Students for a Healthy Environment

Cost and Schedule Considerations:
- Standard costs and scheduling

Barriers, Issues, Questions:
- Could this define a model for the entire campus?

Strategies, Action Items, Details:
- Make this a part of overall building design process to design most efficient approach

Integrated Issues/Synergies and Conflicts:
- Conflict: Potentially more square footage – should be addressed early in the design
- Education of occupants and coordination with the campus-wide recycling program

2. Construction Waste Management: (1 Point) ***^Doable***

Degree of Difficulty: High, <u>Medium</u>, Low
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- Construction Manager
- Lynne Patzig, UNC-A
- Paul Braese, UNC-A
- Waste Reduction Partners (Terry Albrect)
- Check on strategies and lessons from EPA buildings in RTP

Cost and Schedule Considerations:
- Minimal

Barriers, Issues, Questions:
- Site constraints – where will staging area be located for gathering material for recycling?
- Resistance/ learning curve for contractors – what information or training will they need?
- Potential liability – if students are used to monitor the process, are there liability issues?
- Level of recycling possible – can the project reach the 75% level and achieve the second credit?

Strategies, Action Items, Details:

- Use *Waste Spec* as a model (available from Triangle J Council of Governments, online at http://www.tjcog.dist.nc.us)
- Add to specifications for procurement/contracts
- Consider need for workshop or meeting with construction supervisors to encourage buy-in
- Consider using interested students as monitors of the process (interest expressed by Unified Solar) – this could create student jobs or be done on a volunteer basis
- Make it easy for workers to ensure success

Integrated Issues/Synergies and Conflicts:

- Site area for staging should be coordinated with waste management considerations

3. Recycled Content (1 – 2 Points) ***^Doable to Medium Difficulty***

Degree of Difficulty: High, <u>Medium</u>, <u>Low</u>
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:

- Unified Solar (has already researched available materials) and Dee Eggers, UNC-A
- Construction Manager (to ensure materials specified are actually used)
- Waste Reduction Partners (have information on specific materials)
- O'Brien Atkins
- Check on strategies and lessons from EPA buildings in RTP

Cost and Schedule Considerations:

- Minimal cost and scheduling considerations, since higher cost materials will not be used

Barriers, Issues, Questions:

- Contractor resistance to new materials is possible
- Bidding and procurement – will competitive products be available or will it be necessary to write sole-source justifications?
- Available products – Unified Solar has researched available products but the group did not know what percentage would be achievable
- Lab needs – will recycled content materials be available for some lab-specific needs?
- Clarification of calculation – what is included and what is excluded in lab space (i.e., built-in counters, cabinets, etc.) for purposes of calculation?

Discussing materials and indoor environmental quality for the New Science

Strategies, Action Items, Details:
- Complete research on available materials – learn from EPA building in RTP
- Check on how calculation is applied to lab – start by talking to EPA contacts and confirm with US Green Building Council
- Add to specifications
- Consider a more in-depth pre-bid workshop to explain the requirements as well as a contractor workshop
- Create a list of materials that could be used by other construction projects on campus

Integrated Issues/Synergies and Conflicts:
- Check if recycled content materials are also local, energy efficient, and/or durable – low maintenance

4. Local/ Regional Materials (1 Point) ***^Medium difficulty***
Degree of Difficulty: High, <u>Medium</u>, Low
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- O'Brien Atkins
- Unified Solar
- Active Students for a Healthy Environment
- Dee Eggers

Cost and Schedule Considerations:
- Minimal cost or schedule considerations since higher cost materials will not be used

Barriers, Issues, Questions:
- Lack of knowledge of what is available
- Clarification of calculation (see above) – what is included and excluded in lab space for purposes of calculation?

Strategies, Action Items, Details:
- Complete research on available materials – learn from EPA building in RTP (e.g., are certified wood products available locally?)
- Check on how calculation is applied to lab – start by talking to EPA contacts and confirm with US Green Building Council
- Add to specifications
- Consider a more in-depth pre-bid workshop to explain the requirements as well as a contractor workshop
- Create a list of materials that could be used by other construction projects on campus

Integrated Issues/Synergies and Conflicts:
- Check if local/regional materials are also energy efficient, recycled content, and/or durable – low maintenance

5. Certified Wood (1 Point) ***^High - Medium difficulty***
Degree of Difficulty: <u>High</u>, <u>Medium</u>, Low
Degree of Commitment: High, Medium, Low

Champion, Contacts, Partners:
- Unified Solar
- Active Students for a Healthy Environment

Cost and Schedule Considerations:
- Minimal cost or schedule considerations since higher cost materials will not be used

Barriers, Issues, Questions:
- Lack of knowledge of what is available
- Clarification of calculation (see above) – what is included and excluded in lab space for purposes of calculation?

Strategies, Action Items, Details:
- Complete research on available materials – learn from EPA building in RTP (e.g., are certified wood products available?)
- Check on how calculation is applied to lab – start by talking to EPA contacts and confirm with US Green Building Council
- Add to specifications
- Create a list of materials that could be used by other construction projects on campus

Integrated Issues/Synergies and Conflicts:
- Check if certified wood is local

INDOOR ENVIRONMENTAL QUALITY LEED Potential Points -- 2 Prerequisites and 9 - 10 out of 15 Points (8 very doable points, 2 of med. difficulty, and 2-3 points having possible associated costs)

1. Minimum IAQ Performance (Prerequisite) ***^Very doable***
Degree of Difficulty: High, Medium, Low
Degree of Commitment: High, Medium, Low

Champion, Contacts, Partners:
- O'Brien Atkins

Cost and Schedule Considerations:
- Standard cost and scheduling

Barriers, Issues, Questions:
- None

Strategies, Action Items, Details:
- Build into design and specifications – standard practice

Integrated Issues/Synergies and Conflicts:
- Coordinate with energy efficiency efforts

Lunchtime discussions about the New Science Building

2. Environmental Tobacco Smoke (Prerequisite) ***^Very doable***
Degree of Difficulty: High, Medium, Low
Degree of Commitment: High, Medium, Low

Champion, Contacts, Partners:
- O'Brien Atkins

Cost and Schedule Considerations:
- None

Barriers, Issues, Questions:
- None – all campus buildings ban smoking

Strategies, Action Items, Details:
- None

Integrated Issues/Synergies and Conflicts:

- Smoking ban would be helpful even during construction when construction materials can easily act as "sinks" "holding" toxic particulates in for a long time period (fabrics and carpet, just like clothing act as the best "sinks")

3. CO2 Monitoring (1 Point) ***^Very doable***

Degree of Difficulty: High, Medium, <u>Low</u>
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:

- Paul Braese UNC-A
- O'Brien Atkins

Cost and Schedule Considerations:

- Small cost required

Barriers, Issues, Questions:

- CO2 monitoring is irrelevant for lab portion of building – can credit be achieved by monitoring remainder of the building?

Strategies, Action Items, Details:

- Build into planned monitoring system

Listening to the Materials presentation

Integrated Issues/Synergies and Conflicts:

- Coordinate CO2 monitoring with overall energy monitoring system
- Coordinate air quality and energy efficiency

4. Construction IAQ Management Plan (2 Points) ***^ Very doable***

Degree of Difficulty: High, Medium, <u>Low</u>
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:

- OBA (to prepare plan)
- Construction manager (to implement plan)
- "Faculty shepherd" to monitor process
- Unified Solar/ Active Students for a Healthy Environment

Cost and Schedule Considerations:

- Minimal costs
- Will need to build in time for flush-out if that option is selected
- If testing option is selected, there will be some cost implication

Barriers, Issues, Questions:
- Not sure at this point if there will be time for flush-out since the move from existing building to new building must take place between semesters – completion must occur at least 2 weeks prior to move
- Chemistry faculty expressed interest in serving as "faculty shepherds" if they could get leave time to monitor process

Strategies, Action Items, Details:
- Use EPA building in RTP as a model

Integrated Issues/Synergies and Conflicts:
- Coordinate schedule with commissioning plan, since time is also required for commissioning process

5. Low Emitting Materials: (2 Points, for paints and carpets) ^*Doable -Medium Difficulty*
Degree of Difficulty: High, <u>Medium</u>, <u>Low</u>
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- O'Brien Atkins
- "Faculty shepherd"
- Unified Solar/ Active Students for a Healthy Environment (research)

Cost and Schedule Considerations:
- Minimal

Barriers, Issues, Questions:
- The building might not contain any carpet
- Preferred lab fixtures might use particleboard with UF resins – will research whether cabinets, etc. are available without UF resins

Strategies, Action Items, Details:
- Check on resins used in lab fixtures
- Use EPA building in RTP as a model
- Write into specifications
- Educate contractors
- Monitor selected items to ensure specified materials are used

Integrated Issues/Synergies and Conflicts:
- Check if low-emitting materials are local, durable, and/or low-maintenance

6. Indoor Chemical Pollutant Source Control (1 Point) ***^Very doable***
Degree of Difficulty: High, Medium, <u>Low</u>
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- O'Brien Atkins

Cost and Schedule Considerations:
- No costs and scheduling considerations unless alternative approach to handling hazardous wastes is adopted

Barriers, Issues, Questions:
- The Chemistry Department is considering alternative approach to handling aqueous hazardous wastes and this will affect storage areas.

Strategies, Action Items, Details:
- Build into the design
- Coordinate with university on waste disposal issue

Integrated Issues/Synergies and Conflicts:
- Synergy with water use and quality
- Coordinate with HVAC system design early in the process

Reporting back to the larger group on materials and IEQ decisions

7. Thermal Comfort (2 points) ***^Very Doable***
Degree of Difficulty: High, Medium, <u>Low</u>
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- O'Brien Atkins

Cost and Schedule Considerations:
- No cost or schedule considerations

Barriers, Issues, Questions:
- None

Strategies, Action Items, Details:
- Build into design process

Integrated Issues/Synergies and Conflicts:
- Coordinate with energy modeling and energy performance levels

8. Daylight and Views (1-2 Point) ***^Very doable***
Degree of Difficulty: High, <u>Medium</u>, <u>Low</u>
Degree of Commitment: <u>High</u>, Medium, Low

Champion, Contacts, Partners:
- O'Brien Atkins

Cost and Schedule Considerations:
- No costs and scheduling considerations

Barriers, Issues, Questions:
- Not sure if line-of-sight for views can be achieved in laboratory space.

Strategies, Action Items, Details:
- Build into the design

Integrated Issues/Synergies and Conflicts:
- Coordinate with energy modeling and energy performance levels

APPENDIX

Charrette Agenda
LEED Matrix for UNC-A New Science Building
LEED Version 2.0
LEED for Labs
Labs 21 Information
Charrette Powerpoints
Case Study: New EPA Campus, Research Triangle Park
Case Study Template
Sustainable Websites

Thanks to all the University Staff, Faculty, and Students who made this Greening Charrette a GREAT event!