

# **A Handbook for Planning and Conducting Charrettes for High-Performance Projects**

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# Forward

Sustainable building design can most easily be achieved through a *whole-building design* process. This process is a multidisciplinary strategy that effectively integrates all aspects of site development, building design, construction, and operations and maintenance to minimize a building's resource consumption and environmental impact while improving the comfort, health, and productivity of building occupants. An integrated design can also save money in energy and operating costs, cut down on expensive repairs over the lifetime of the building, and reduce tenant turnover.

Process is key to whole-building design. Sustainable design is most effective when applied at the earliest stages of a design. This philosophy of creating a good building must be maintained throughout design and construction. The early steps for a sustainable and high-performance building design are:

- Creating a vision for the project and setting design performance goals
- Forming a strong, all-inclusive project team
- Outlining important first steps to take in achieving a sustainable design.

The best way to achieve the steps above is through a high-performance charrette. A charrette is an intensive workshop in which various stakeholders and experts are brought together to address a particular design issue. It is the mechanism that starts the communication process among the project team members, building users, and project management staff. A facilitated discussion allows the team to brainstorm solutions to meeting the building user's requests and the sustainability vision for the building design. By the time the charrette concludes, the participants should have identified performance goals in the context of validating the program needs.

The charrette should result in good communication among project team members and the development of unified design and construction goals for everyone to work toward. For sustainable building projects, the project team must consider how the building design and interior function can affect the building's overall environmental impact. Building design decisions address site, energy consumption, human comfort, building material, and landscaping issues. A good design will integrate these factors so that the effects of one will minimally impact, or even benefit, the others. The project team for such a design should, therefore, possess the expertise to analyze the interactive affects of various design strategies on the building's overall energy efficiency and environmental impact. Computer simulation tools that are capable of modeling building performance are invaluable resources for understanding the trade offs associated with all design decisions. Continuing to use these tools after the building is constructed give insight into how well the building is actually performing compared to how it should perform.

Following the design phase, the project team will account for how design decisions influence construction and long-term building operation. Writing effective construction documents, and safeguarding design goals will result in projects that are built as the original design intended. In addition, protecting the project site during construction will minimize the site impacts both during and after construction and ensure a safe working environment during construction.

Post-construction activities guarantee continued sustainable building operation. Building commissioning completed before occupation as well as continuous commissioning activities conducted throughout the life of the building ensure the building always performs as originally intended. Also, regularly educating and training the building operators and occupants will encourage these groups to take an active role in minimizing the environmental impacts of their building.

Rigorously adhering to the process discussed here will facilitate the design, construction, and operation of a sustainable project. Additional information is available through the U.S. Department of Energy's High Performance Buildings Research Initiative, [www.highperformancebuildings.gov](http://www.highperformancebuildings.gov).

## Preface

The purpose of this handbook is to furnish guidance for planning and conducting a “high-performance building” charrette, sometimes called a “greening charrette.” The handbook answers typical questions that will arise, such as “What is a charrette?” “Why conduct a charrette?” “What topics should we cover during the charrette?” and “Whom should we invite?” It also contains samples of agendas, invitation letters, and other commonly used charrette materials.

In addition to answering questions about charrettes and giving logistical information, this handbook outlines the characteristics of a good charrette facilitator. It gives suggestions for the types of experts to invite to the event to motivate participants and answer their questions. The handbook includes sample presentations that can be used by these experts to ensure they address the required technical content. It suggests the types of participants, including technical, political, and community representatives, to invite to the charrette. It offers advice for forming effective breakout groups to ensure that a broad range of complementary expertise is represented in each group. We have also included guidance on how best to include key decision makers and stakeholders who are able to attend only portions of the event.

The handbook *will not* take the place of skilled facilitators and experts in key areas. A well-organized charrette depends on qualified facilitators and speakers with expertise in areas important to the project. Without these fundamental components, a charrette cannot adequately kick off a high-performance project.

Owners, design team leaders, site planners, state energy office staff, and others who believe a design charrette will benefit their project will find the information contained in this handbook helpful. Here we present detailed information for planning and conducting a charrette and following up after the event.

The handbook includes a number of worksheets and samples in the appendices to assist with planning and conducting charrettes. In summary, the appendices contain:

- Appendix A – a checklist to help guide the user of the handbook through the charrette process
- Appendix B – sample agendas for several types of charrettes
- Appendix C – a worksheet to assist with identifying the types of participants to invite to the charrette
- Appendix D – sample letters to send to charrette invitees
- Appendix E – recommended information to provide to the charrette participants
- Appendix F – sample evaluation forms for participants to complete following the charrette
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# Chapter 1: Charrettes for High-Performance Projects

Understanding the difference between a workshop and a charrette and knowing what benefits and outcomes to expect from the charrette are important first steps in the charrette process. It is also important to determine if the project is sufficiently developed to benefit from a charrette. In this chapter, we answer basic questions about charrettes and give guidance on whether your project is ready for the charrette process.

## What Is a Charrette?

A charrette is a creative burst of energy that builds momentum for a project and sets it on a course to meet project goals. It can transform a project from a static, complex problem to a successful, buildable plan. Usually, it is an intensely focused, multiday session that uses a collaborative approach to create realistic and achievable designs that work.

Charrette planners and facilitators use strategic planning to overcome conflict. Part of their strategy is to focus on both the *big picture* and the *details* of a project to produce collaborative agreement on specific goals, strategies, and project priorities. Charrettes establish trust, build consensus, and help to obtain project approval more quickly by allowing participants to be a part of the decision-making process.

**charrette** (shar-ette') *n.* **1.** A small cart. **2.** A collection of ideas. During the 19<sup>th</sup> century, students of l'Ecole des Beaux Arts in Paris would ride in the cart sent to retrieve their final art and architecture projects. While en route to the school in the cart, students frantically worked together to complete or improve these projects. The meaning of the word has evolved to imply a collection of ideas or a session of intense brainstorming. **3.** An intensely focused activity intended to build consensus among participants, develop specific design goals and solutions for a project, and motivate participants and stakeholders to be committed to reaching those goals. Participants represent all those who can influence the project design decisions.  
[Fr. *charrette*]

## Charrette Benefits

The benefits of using charrettes early in the high-performance design process are many. Most importantly, charrettes can save time and money while improving project performance. In general, charrettes:

- Provide a forum for those who can influence design decisions on a project to meet and begin planning the project.
- Encourage agreement on project goals.
- Kick off the design process.

- Save time and money by soliciting ideas, issues, and concerns for the project design to help avoid later iterative redesign activities.
- Promote enthusiasm for a project and result in early direction for the project outcome.

Conducting a charrette early in the design/decision-making process will:

- Establish a multidisciplinary team that can set and agree on common project goals.
- Develop early consensus on project design priorities.
- Generate early expectations or quantifiable metrics for final energy and environmental outcomes.
- Provide early understanding of the potential impact of various design strategies.
- Initiate an integrated design process to reduce project costs and schedules, and obtain the best energy and environmental performance.
- Identify project strategies to explore with their associated costs, time considerations, and needed expertise to eliminate costly “surprises” later in the design and construction processes.
- Identify partners, available grants, and potential collaborations that can provide expertise, funding, credibility, and support to the project.
- Set a project schedule and budget that all team members feel comfortable following.

#### **History of Green Charrettes**

Following the highly successful Greening of the White House charrette, one of the first green charrettes conducted by a federal agency, the U.S. Department of Defense and the National Park Service implemented green charrettes for Pentagon and Grand Canyon National Park projects. Since the White House charrette, numerous federal, state, and local government agencies, military bases and installations, nonprofits, and private-sector owners have used the green charrette process. This process enables these varied sectors to quickly and effectively achieve buy-in from diverse constituents; identify key short-, mid-, and long-term priority greening goals; and create overall strategic sustainability action plans.

## **What Is a High-Performance Project?**

Charrettes for high-performance projects establish a creative environment for identifying and incorporating design strategies that result in projects that are designed and built to minimize resource consumption, reduce life cycle costs, and maximize health and environmental performance across a wide range of measures—from indoor air quality (IAQ) to habitat protection. For example, high-performance projects can:

- Achieve energy savings of more than 50% compared with conventional projects
- Achieve higher employee productivity and longer job retention
- Reduce water consumption; operations, maintenance, and repair costs; capital costs; and overall environmental impacts
- Reduce tenant turnover.

## Starting the Charrette Planning Process

Ask the following critical questions before beginning the charrette planning process. Understanding where the project stands relative to these issues will increase the likelihood of meeting the overall project goals. Be able to comfortably answer “yes” to these questions before proceeding with planning the charrette.

Yes    No

- |                          |                          |  |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | <b>Is the project program developed?</b> The program includes the estimated size of the project, functions and adjacencies of the required spaces, average number of occupants in the spaces, the time of use of the spaces, lighting and space condition (e.g., temperature and humidity) requirements, and any unique requirements for specific spaces.  |
| <input type="checkbox"/> | <input type="checkbox"/> | <b>Has the project site been selected or narrowed to a small number of alternatives?</b> Having one or more alternative sites identified will increase the likelihood that charrette participants can work out specific design solutions. You may find it necessary to hold a site selection charrette before a building charrette.  |
| <input type="checkbox"/> | <input type="checkbox"/> | <b>Are there staff or volunteers available to support the planning and implementation of the event?</b> Planning and organizing a charrette requires considerable staff support for tasks such as developing lists of participants, sending invitations and tracking responses, arranging for a meeting facility and refreshments, working with speakers, and preparing materials.   |
| <input type="checkbox"/> | <input type="checkbox"/> | <b>Are the resources needed to support the event available?</b> The costs to conduct a charrette can vary widely. Assume that costs will be incurred. The up-front funds to pay for mailings, photocopying, catering deposits, facility deposits, speaker costs, and any other costs associated with preparing for the event must be available or identified when the planning begins.   |
| <input type="checkbox"/> | <input type="checkbox"/> | <b>Is there an overall “champion” to lead the event?</b> The most effective charrettes have at least one champion to ensure that the overall event schedule and tasks move forward as planned. Identify that champion early in the project. The champions should be one or more individuals who are passionately involved in the project, can influence project decisions, and have previous experience and time with the project. |
| <input type="checkbox"/> | <input type="checkbox"/> | <b>For large-scale projects, such as campuses, military bases, or other developments, are issues to be addressed in the charrette well defined?</b> These issues could include overall master planning, transportation, facilities construction or renovation, operations and maintenance, green procurement and contracting, and education and outreach.  |

In this handbook, we furnish guidance on conducting charrettes that integrate energy and environmental issues to significantly change the way buildings are designed, constructed, and operated. The described charrette is intended to engage an interdisciplinary group of professionals in a structured process to identify, evaluate, and recommend strategies for improving the energy and environmental performance of a project. The project can be a new or renovated individual building or a group of buildings, such as a campus, a military installation, a national or state park, or a community center. Even though the overall principles contained in this handbook apply to charrettes for projects of all sizes, this handbook focuses on individual building projects.

### **University of North Carolina-Ashville Charrette Saved Time and Money**

The University of North Carolina in Asheville (UNCA) used the charrette process with tremendous results. A 1-day charrette saved the university time and money on its new campus facility site location decision compared to a traditional design approach. Approximately 40 people from outside and inside the university gathered to discuss the relative merits of three site choices (A, B, and C). After a sustainable site issues briefing and several hours of group work, three of the four work groups independently selected an overlap area between sites A and B. The remaining group, although it recognized the significant advantages of the overlap choice, preferred Site C, giving the university the required two choices necessary to take to the university board. Aided by the development costs and the buy-in information from the charrette participants, UNCA quickly settled on the overlap area. In addition to coming to consensus on the site for the project, which was the focus of the charrette, UNCA now has a good understanding of Site C sustainable development options and costs for future considerations.

## Chapter 2: Getting Started

### At least 3 months before the event . . .

- ☐ Create a steering committee.
- ☐ Hold a kickoff meeting.
- ☐ Determine event date and location.

Initial decisions on the key issues to discuss, participants to involve, and the best dates and locations to hold the event are made during the first stages of the charrette planning process. This chapter gives suggestions for how to begin this planning process.

### Create a Steering Committee

The first step in planning and organizing a charrette is to set up a steering committee. The purpose of the steering committee is to guide the charrette planning process and ensure support from key individuals and organizations. Discussing the charrette objectives and logistical issues with several enthusiastic and dedicated people will stimulate the generation of ideas and make the charrette a more successful event.

A small group of five to eight individuals working closely together will enhance the efficiency of the charrette planning process. In general, effective steering committee members:

- Represent a variety of interests:
  - Owner and/or owner's representative(s)
  - Charrette organizers
  - Overall facilitator
  - Local community leader(s)
  - High profile stakeholder(s)
  - Overall project champion(s).
- Demonstrate good organizational skills.
- Accept and encourage new ideas.
- Identify and engage potential participants, partners, and speakers.

Anyone who will have an important role in planning, organizing, and managing the charrette should attend the steering committee meetings. This includes those making logistical arrangements and preparing participant packets as well as those designing the agenda and identifying participants and speakers. As the event gets closer, additional people can be invited to the steering committee meetings so that they can hear firsthand the decisions that are made and report on their efforts.

## **Hold a Kickoff Meeting**

Hold a kickoff meeting to assemble the steering committee and begin the charrette planning process. A kickoff meeting is vitally important for defining the roles of each of the steering committee members and for bringing focus to the tasks that need to be accomplished.

The steering committee members can meet for the kickoff meeting in person, by conference call, or by videoconference. Typically, a kickoff meeting will last between 1 and 2 hours. Use the kickoff meeting to begin shaping the event, not to make final detailed decisions. Ask all steering committee members to review the checklist for planning and conducting charrettes for high-performance projects prior to the kickoff meeting (Appendix A). During the kickoff meeting, be sure to discuss:

- Purpose of the charrette
- Type and length of the charrette
- Products resulting from the charrette
- Agenda for the charrette
- Location for the charrette
- Date of the charrette
- Resources needed to help cover or defray costs of the charrette
- Participants to invite to the charrette
- Speakers to provide the desired motivation and education during the charrette
- Facilitators to lead the charrette and breakout groups
- Partners to supply resources or buy into the charrette process and its results, or both
- Project information for charrette participants
- Date, time, and logistics of the next steering committee meeting.

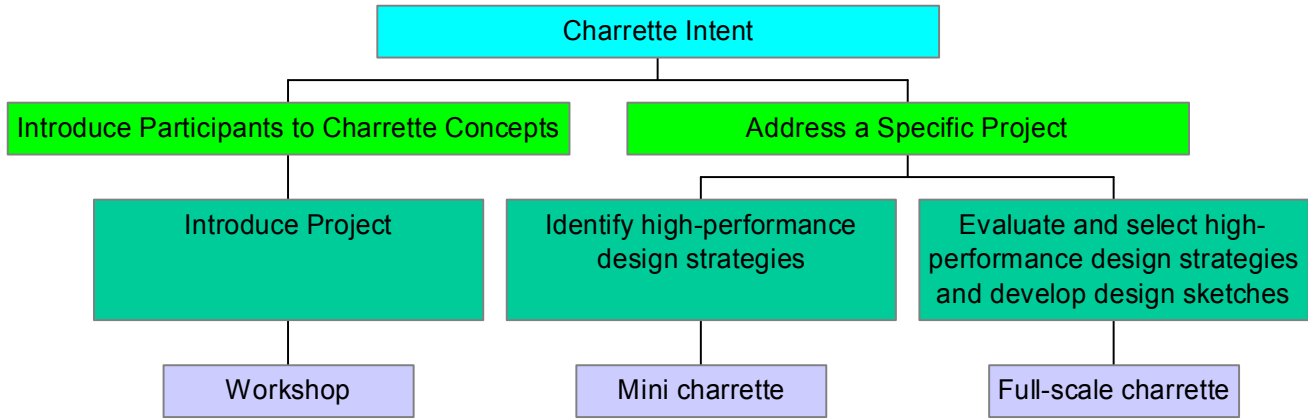
End the kickoff meeting with a review of action items. Designate a member of the steering committee to record the kickoff meeting discussions, prepare meeting minutes, and distribute the minutes to all steering committee members. Include in the minutes an overview of the discussions of the topics listed above and described in more detail below.

### **Purpose of the Charrette**

Carefully identify the purpose of the event and the characteristics and expertise of participants needed to achieve that goal. The purpose will affect the event's format, along with all other decisions made during the event planning process. A good understanding of the intended outcome and participant characteristics will improve the likelihood of a successful event and help participants agree that it was worth their time to participate.

## Type and Length of the Charrette

Charrettes include two major elements: an educational component (workshop) and an interactive planning component (charrette). Refer to Figure 1 and Table 1 to identify the purpose and type of event most appropriate for a particular project.



**Figure 1. Flow chart for determining type and length of charrette**

**Table 1. Summary of Charrettes for High-Performance Projects**

Event Type	Description	Length	Purpose
Workshop	Large-group presentations and discussions	½ day	<p>Introduce participants with limited time to high-performance design concepts.</p> <p>Introduce participants to the charrette process.</p> <p>Educate participants about individual high-performance design strategies.</p> <p>Engage participants in “practice” charrette exercises.</p> <p>Conduct a low-cost high-performance event.</p>
Minicharrette	Workshop plus interactive exercises	1 to 1½ days	<p>Provide basic training in high-performance design topics (conduct in a workshop format).</p> <p>Conduct charrette activities within breakout groups for a specific project.</p> <p>Identify high-performance design strategies appropriate to consider for a specific project.</p>
Full-scale charrette	Workshop plus intensive breakout group discussions	2 or more days	<p>Discuss the high-performance design strategies that were identified while conducting the predesign energy analysis as being appropriate for the specific project (conduct in a workshop format).</p> <p>Select specific strategies to incorporate into the project.</p> <p>Develop sketches and drawings to be incorporated into the project design.</p>

The workshop is part of all event types. It introduces participants to high-performance, green design and kicks off the process for selecting specific strategies. Specialists and major stakeholders are usually invited to present during this workshop. Conduct just a workshop if:

- Time and resources are limited.
- The participants have little previous experience with high-performance design concepts and charrettes.
- Potential sites have not yet been selected for the project.

The purpose of the workshop is to motivate the participants, describe the project, state its goals, and present high-performance design strategies and case study examples that will help the participants with later charrette activities. If minicharrette or full-scale charrette participants already have expertise with high-performance design and charrettes, the workshop can be reduced to a minimum—for example, presentation of information on the project that the charrette will address.

### **Products Resulting from the Charrette**

As you discuss the purpose and type of the event, also address the desired event outcomes. Make sure that these desired results are achievable within the budget constraints set for the event, the level of expertise of the proposed participants, and the amount of detailed information available about the project.

The following list describes suggested reports to produce as end products for each event type. We give guidance for preparing these reports in Chapter 5 and present sample reports in Appendix I.

- Workshop—short summary of the presentations and discussions that took place during the workshop and recommendations for the next steps agreed to by participants.
- Minicharrette—summary of the large-group discussions and information presented in a workshop format, recommended strategies to consider for the specific project, and suggested follow-up activities.
- Full-scale charrette—summary of the background information provided to the participants; detailed summary of the large-group discussions, information presented in a workshop format, and individual breakout group recommendations; detailed summary of the specific strategies that will be included in the project design; and sketches and drawings to be incorporated into the project construction plans.

### **Agenda for the Charrette**

The agenda depends on the type of event you select. Chapter 3 gives more information about the agenda and Appendix B contains sample agendas for each event type. In addition to these sample agendas, the steering committee members may choose to offer optional activities in conjunction with the event. For example:

- Hold a reception the first or second evening of the minicharrette or the full-scale charrette. This gives participants an opportunity to network and can also include local dignitaries and community groups.
- Conduct a tour of the project site before the minicharrette or full-scale charrette.

### Location for the Charrette

Determine whether to convene the event at or near the project site. Hold the charrette at a nearby location if adequate facilities do not exist at the project site or if travel to the site is difficult. After selecting a location, identify potential facilities for the event. Table 2 lists the requirements of potential facilities.

**Table 2. Minimum Facility Requirements**

Requirement	Workshop	Minicharrette	Full-Scale Charrette
Large room that can accommodate the potential number of participants (usually 25 to 50 people) in a classroom- or auditorium-style configuration, or at tables for 6 to 8 people.	√	√	√
Small rooms for breakout group sessions or large room(s) that can accommodate multiple breakout groups. Breakout groups usually require a large round table for 6 to 8 people, flip charts, and wall space for hanging flip chart pages and sketches.		√	√
Space for resource table/library (e.g., documents, software, and other resources that may be useful to the participants during the event).		√	√
Optional—space for a registration table, food and beverages, event reception, exhibits, Internet and fax services, or other special needs.	√	√	√

### Planning tip—facility selection hints:

- Set an example for the participants by conducting the charrette in a “green” building.
- Investigate opportunities for donated space from event partners or cosponsors.

### Date of the Charrette

Discuss potential event dates during the kickoff meeting and commit to finalizing the date soon after the kickoff meeting. Many of the essential tasks to plan a charrette (Chapter 3) can be completed only after the event date is established. Consider the following when selecting an event date:

- Allow enough time to plan the event, contact participants, make logistical arrangements, ensure that participants are not already too scheduled to attend, and prepare background information for participants (including a predesign energy analysis). We highly recommend scheduling the event date no less than 3 months after the kickoff meeting.
- Investigate potential conflicts (such as holidays or other events and conferences) that could make it difficult to draw participants to the charrette.

- Investigate opportunities for coordinating the charrette in conjunction with related events to increase participant interest in attending the charrette.
- Confirm the availability of key participants, speakers, and facilitators before selecting the final date.
- Schedule the event so that the project design process can continue to move forward. For example, consider the possibilities for scheduling briefings for city officials, meetings with funding sources, development and issuance of a Request for Proposals (RFP) to select an architectural/engineering (A/E) firm, and ongoing meetings with the community soon after the charrette event.

### **Resources to Help Cover or Defray Costs of Conducting the Charrette**

Use the kickoff meeting to begin discussing the event budget and costs that will be incurred. Begin identifying who will be responsible for those costs. Finalize an event budget shortly after the kickoff meeting.

Potential costs to conduct the event include (discussed in detail in Chapters 3 and 5):

- Steering committee time and travel
- Mailings (flyers, e-mails, invitation letters)
- Charrette materials and reproduction (including predesign energy analysis)
- Speakers' and facilitators' time and travel
- Staffing support for the event
- Photographers and writers
- Facility rental
- Food
- Audiovisual (AV) equipment
- Internet connection at the facility (optional)
- Final charrette report and follow-up with participants.

### **Participants to Invite to the Charrette**

Plan to invite 25 to 50 people to participate in a minicharette or full-scale charrette. More than 50 participants results in a larger than optimum number of people assigned to each breakout group or additional breakout groups. Both cases increase the reporting out time, the time needed to complete the charrette, and the potential that less assertive breakout group members will refrain from participating in breakout group discussions. Fewer than 25 participants will result in fewer than 3 breakout groups or breakout groups with fewer than 6 to 8 members. Either of these cases reduces the highly charged exchanges that are usually found with groups of 25 to 50 participants. Invite more than 50 participants to a workshop only if the steering committee feels comfortable that an effective workshop can be conducted with this larger number of participants.

Figure 2 identifies several types of participants we recommend inviting to a charrette. Refer to the Participation Identification Worksheet in Appendix C to determine the types of expertise and backgrounds of invited participants. Settle on the approximate number of participants to invite in each category during the kickoff meeting. If possible, also identify specific participants by

name. Plan to complete a list of invitees (name, affiliation, address, phone, fax, and e-mail) soon after the kickoff meeting.



**Figure 2. Areas of expertise that could benefit your charrette**

### **Speakers to Provide the Desired Motivation and Education During the Charrette**

An assortment of speakers representing a variety of expertise will make the workshop portion of the charrette more effective. Good presenters motivate the participants and impart valuable information that the participants can apply during the charrette activities and other high-performance projects. Consider inviting the following types of speakers to participate in the event.

- Kickoff speaker(s) to energize and excite participants
- Local dignitaries to demonstrate support
- Project owner or project representative to explain the project and goals for the charrette
- Content experts for specific topics to be addressed, such as energy and materials
- Case study speakers to share previous experience gained from actual projects.

#### **Planning tip:**

The ideal mix of speakers is a combination of national and local experts. National experts can be identified through such groups as the U.S. Green Building Council (USGBC), the American Institute of Architects (AIA) Committee on the Environment (COTE), and the

American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE). Local experts can be identified through local chapters of these membership organizations.

Identify potential speakers during the kickoff meeting, as well as other people who may be able to recommend additional speakers for specific categories (if the steering committee members are not familiar with quality speakers in specific areas). Contact potential speakers soon after determining them, to verify that they are interested in participating in the event and that the proposed dates fit in their schedules. Be sure to communicate the costs that the invited speakers may be asked to cover for their participation.

### **Facilitators to Lead the Design Charrette and Breakout Groups**

Good facilitators keep the group motivated and encourage participant involvement in the group discussions. They foster a sense of openness and inclusion for all group members by keeping the momentum going in the group setting.

Identify potential facilitators during the kickoff meeting. An overall facilitator leads the event and ensures that the desired results are achieved. Breakout group facilitators perform similar functions during the breakout group discussions.

The success of the actual event depends almost entirely on the overall facilitator's ability to motivate the participants and keep the charrette on track. Obtain recommendations for facilitators from trusted colleagues. Select an overall facilitator who:

- Is skilled and practiced at leading group discussions and, preferably, has experience facilitating charrettes
- Has demonstrated skill in encouraging constructive contributions from all participants and adhering to the agenda to ensure that participants and organizers are satisfied with the results
- Has a good understanding of the high-performance design process.

Contact potential facilitators soon after selecting them to verify that they are interested in participating in the event and that the proposed dates fit within their schedules. Integrate the facilitators as members of the steering committee immediately after obtaining commitment from them. Their previous experience will prove valuable during the event planning process.

### **Planning tip:**

Assign the content experts recruited as speakers to also serve as breakout group facilitators; however, be sure that these content experts have the skills to facilitate.

### **Partners to Supply Resources or Buy Into the Charrette Process, or Both**

Identify potential partners that could add to the charrette experience through needed expertise, credibility, funding, or support. These partners may be able to furnish monetary, product, or

service donations to defray some of the costs. For example, find a partner to pay for a lunch or for a pre- or post-charrette reception.

Partners bring new perspectives or expertise to the project, particularly if the local community is involved. A well-connected steering committee will know who the potential partners are in the local area. In addition, they are likely to have individual contacts within these organizations.

### **Project Information for Charrette Participants**

Providing sufficient information to help charrette participants become familiar with the project will lead to more time available during the charrette to discuss project design solutions (less time will be required to describe the project). It will also help the participants refine the design strategies they recommend while taking part in the charrette activities. At a minimum, plan to provide the basic project information described in Appendix E.

In addition to providing the basic information, we recommend conducting a predesign energy analysis of the project. This analysis will involve using computer simulation tools to model a project's energy performance. The results of this analysis provide information that will help designers conceive a building that is climate/site sensitive and meets programmatic requirements.

The level of detail to which this analysis is completed can vary with the event type. The steering committee should plan for:

- Workshop—no predesign analysis necessary, unless one is conducted to illustrate how it can be used to assist in making early design decisions.
- Minicharrette—predesign analysis of a baseline building to provide a description of the energy performance of a typical building on the project site that meets all the programmatic requirements.
- Full-scale charrette—detailed predesign analysis including an evaluation of a baseline building and a series of parametric analyses to identify specific design opportunities for the particular project.

Unless a member of the steering committee has the skill and the time to conduct a predesign energy analysis, it will be necessary to obtain the services of an energy analyst to complete this work. The analyst should be experienced in using hourly building energy simulation programs and possess a broad knowledge of energy design alternatives. Be prepared to give the analyst general information on the project and site; this may increase the overall lead time for gathering project information before the charrette.

### **Date, Time, and Logistics of the Next Steering Committee Meeting**

At the conclusion of the kickoff meeting, set the date and time for the next steering committee meeting and assign a steering committee member to make logistical arrangements for the meeting (e.g., reserve a conference room or obtain a call-in number for a conference call). We also recommend that the steering committee set a schedule and make logistical arrangements for regular meetings throughout the entire planning period.

## **Review of Kickoff Meeting Action Items**

Conclude the kickoff meeting by reviewing the action items that resulted from the discussion. Be sure that there is a clear outcome for each action item, a date by when each action item is to be completed, and a steering committee member assigned to complete each action. Assigning responsibility for actions will ensure that progress is made quickly on key decisions, such as the date, location, and speakers. Discuss the status of the action items at the beginning of the next steering committee meeting.

## **Determine Event Date and Location**

After the kickoff meeting, the steering committee members must act quickly to make the key decisions discussed above. Subsequent event planning cannot be completed until these vitally important actions are done. At a minimum, complete the following within 2 weeks after the kickoff meeting.

- Finalize the event date and location.
- Reach agreement on a preliminary agenda.
- Identify and contact key facilitators and speakers.
- Arrange for a predesign energy analysis of the project.

Remember, the makeup of the steering committee, the decisions they make during the kickoff meeting, and the chosen event dates and location will determine the event's outcome. A carefully selected steering committee and well-executed kickoff meeting will set the stage for a successful event.

## Chapter 3: Planning and Developing the Charrette

### Two to three months before the event . . .

- ☐ Develop an agenda.
- ☐ Confirm availability of key event players.
- ☐ Give presentation guidelines to the speakers.
- ☐ Invite participants and track responses.
- ☐ Finalize budget, expenditures, and resources.
- ☐ Make logistical arrangements.
- ☐ Assemble and distribute participant and resource material.
- ☐ Develop evaluation forms.
- ☐ Make arrangements for Continuing Education Units (CEUs).

This chapter covers the details of the charrette planning process. Charrettes can take more time, planning, and resources to organize than most people realize. Be sure to carefully go over the sections in this chapter to prevent problems from arising during the charrette.

### Develop an Agenda

Develop an agenda to meet the specific needs of the event (see Appendix B for samples). Clearly state the event goals at the top of the agenda. Developing the goals and agenda together will help the steering committee members identify their common objectives for the event. Later, when the agenda is distributed to participants, stating the goals will help the participants better understand the purpose of the event. Although the agenda should be tailored carefully to meet the goals of the charrette, we discuss the elements that should be included in the sections that follow.

### Welcome and Introductions

The first item on the agenda is to welcome the participants, make general announcements such as the location of the rest rooms, and thank event sponsors and partners. The overall facilitator generally thanks the participants for their interest in the event, introduces VIPs, and then asks the participants to introduce themselves. Following the introductions, the facilitator should review the expectations and goals of the event to ensure that all participants are clear on what they should expect from the event.

#### Planning tip:

It is best to allow sufficient time for participants to introduce themselves, as networking is a benefit of a charrette. If the number of participants is large (as may be the case for a workshop) or the time is limited, ask for a show of hands of participants representing various types of expertise (e.g., architects, engineers, project leaders, and contractors) instead of having people introduce themselves individually.

## **Keynote Speech**

Although a keynote speech is not necessary, a good speaker can motivate the participants and help them understand why their work at the charrette is important. The keynote speaker should energize and excite the participants. Generally, the keynoter should speak immediately after the opening formalities are complete. The presentation will capture the participants' interest and encourage them to actively take part in the rest of the event. If local dignitaries or VIPs are present, give them an opportunity early on the agenda to show their support for the event as well.

### **Planning tip:**

VIPs are generally given short time slots on the agenda so if they are unable to attend the event, the agenda can simply continue. If a VIP is expected to make a lengthy address, have an alternative in mind, such as a stand-in speaker, video, or additional discussion time, in case the VIPs are unable to attend at the last minute.

## **Project Overview**

The owner or owner's representative should present a clear, concise overview of the project. This presentation should include the project's goals and vision, current status (what decisions have been made), issues and problems, and specific objectives or questions to be addressed at the charrette. Reviewing the owner's presentation in draft form to ensure that appropriate material is covered in an appropriate level of detail is a good idea.

## **Technical Presentations**

The first technical presentation should be an overview of the findings from the predesign energy analysis (note, this presentation may not be available for workshops). The content experts present next. These speakers are the technical experts in areas relevant to high-performance design and the specific project. It is helpful if these speakers illustrate the successful applications of the topics presented through case study examples. Case studies prove that the concepts presented really do work and make it more likely that the participants will consider these concepts later during the charrette exercises or on their own projects.

Carefully balance the number and length of presentations. Give the speakers adequate time to present good information but not so much time that participants lose interest. Allow for questions and discussions after each presentation.

## **Breakout Groups and Reporting**

Minicharrette and full-scale charrette agendas continue to include multiple breakout group discussions and large-group reporting sessions. At the conclusion of these sessions, or after the technical presentations during a workshop, conclude the event by reviewing the purpose of the event, making suggestions for next steps, and thanking the participants for attending.

## **Confirm Availability of Key Event Players**

### **Facilitators**

Chapter 2 gave general guidance to assist the steering committee in identifying potential facilitators. We also emphasized the importance of gaining commitment from these people early in the event planning process. In addition to the characteristics of a good facilitator given in Chapter 2, the overall facilitator must be qualified to “MC” the event. The overall facilitator:

- Introduces speakers.
- Handles transitions between presentations.
- Ensures that speakers and breakout groups stay on schedule.
- Facilitates question and answer sessions.
- Refocuses the participants after breaks and lunch.
- Possesses good group process skills as well as an understanding of the subject matter.

The overall facilitator may also be responsible for describing the event goals and wrapping up the event.

Breakout group facilitators should have similar qualifications as the overall facilitator, in terms of guiding discussion groups, along with expertise in the subject matter of their breakout group. In addition to leading breakout group discussions and encouraging full participation from all breakout group members, these facilitators should also be subject experts in high-performance design or the specific topic addressed by the breakout group.

### **Speakers**

Refer to the guidance in Chapter 2 for identifying speakers. As soon as the steering committee agrees on potential speakers, contact these speakers and obtain commitments for participating in the event.

### **VIPs**

Inviting VIPs to participate in all or key parts of a charrette has two primary benefits.

1. VIPs demonstrate support for the event and the project by making time in their schedules to participate in the event.
2. VIPs develop a personal commitment to seeing a successful end to the project.

Don’t include too many VIP speakers—they can slow the momentum of the group and delay “getting down to work.”

#### **Planning tip:**

VIPs generally require as much advance notice of the event date and time as possible. They may not confirm their participation until just before the event.

## **Give Presentation Guidelines to the Speakers**

Provide the appropriate sample presentation from Appendix H to each speaker. Give the outline in Chapter 4 to the owner to assist in developing his or her presentation. Ask speakers to model their presentations after these samples to ensure that there is an adequate overview of each topic. The presenters can focus on particular areas within these samples and include additional information, as long as they also address the other material in some way.

Ask the speakers to supply a list of required AV equipment and special supplies or inform the speakers of the equipment and supplies that will be available to them. Speakers sometimes prefer to bring their own equipment. If this is the case, be sure the facility and event staff can accommodate and operate their equipment. For example, be sure that the speaker's laptop computer is compatible with the LCD projector that will be available.

Encourage the speakers to submit their presentations materials before the event. If the steering committee has not seen one or more speakers present similar material, ask to see a draft of their presentations. Having the final presentations before the event allows enough time for the electronic presentations from all the speakers to be loaded onto one computer. Doing so eliminates the time otherwise needed during the event to transfer computers or load presentations. Also, the presentations can be printed, copied, and included in the participant packages that are prepared before the event.

Verify with the speakers if they plan to bring additional handouts or resource materials for the participants. If so, encourage the speakers to bring enough for all participants or submit the handout materials with enough time before the event to reproduce the materials and include them in the participant packages. Give the speaker an accurate count of the number of participants expected to attend the event if the speaker plans to bring his or her own handouts.

Request that the speakers furnish travel information, including flight information and hotel accommodations, so that it is possible to communicate with them in an emergency or if they fail to appear on schedule.

## **Invite Participants and Track Responses**

Finalize the participant invitation list, including current contact information (name, title, company, address, phone, and e-mail address) for each invitee.

Send a "save the date" announcement as soon as possible after finalizing the participant invitee list, approximately 2 months before the event date (Appendix D). This announcement gives invitees a "heads up" about the event and encourages them to include the event in their schedules. (Although the save the date announcement is optional, it is extremely helpful in alerting potential participants to hold those dates on their calendars and schedule other meetings and events around those dates.)

Formally invite the participants after sending a save the date announcement. Include in the invitation letter:

- Clear, concise statement of the purpose of the event
- Anticipated event outcomes
- Description of the invitee's role
- Summary information
- Registration or RSVP form
- Logistical information.

Appendix D contains sample invitation letters for participants that can also be modified for individualized invitations for facilitators, speakers, local dignitaries, and VIPs. Provide enough information to stimulate the invitees to participate in the event, but be careful not overload them with too much information at this point. The invitation package should include:

### **Summary Information**

- ☐ Brief description of the project, including background and site information
- ☐ Preliminary agenda
- ☐ List of speakers and facilitators
- ☐ List of invitees
- ☐ Cost to participate in the event
- ☐ Instructions for submitting registration fee.

### **Registration or RSVP Form**

- ☐ Date that the form must be returned (2 to 3 weeks before the event)
- ☐ Procedure for returning the RSVP form (e.g., on-line registration on a Web site, e-mail and mail addresses, and/or fax and phone numbers)
- ☐ Responder's contact information (to be filled in by responder)
- ☐ Responder's dietary preferences (if meals are to be provided)
- ☐ Responder's area of expertise (optional)
- ☐ Responder's level of experience with high-performance design (optional)
- ☐ Form of payment, if there is a charge to participate in the event.

### **Logistical Information**

This information may be distributed later to those who note interest in attending the event.

- ☐ Logistical information
  - Hotel information, including reservation number, group name, and rates
  - Map to the meeting facility
  - Parking options
  - Forms of public transportation available to the meeting facility, including suggested lines and stops
  - Designated entrance to use at the meeting facility

- Security requirements, if there is controlled access to the facility
- Emergency contact information (e.g., facility telephone number) for reaching the participants during the event.
- Meals to be provided or where to go for meals
- Supplies and resources
  - Those that will be available during the event
  - Those that the participants may want to bring.

Develop a tracking system to record the RSVP responses and monitor the responses carefully. Tracking responses helps the steering committee members ensure a balance among the diversity of expertise represented by the participants. Invite additional participants in a timely manner when key people on the original invitee list respond that they are unable to attend the event.

**Planning tip:**

Multiple communications are likely to be sent to invitees and participants. To save time and effort, create a mail-merge system for hard-copy mailings and a group e-mail list for electronic communication. Also, maintain an electronic record of invitee names, contact information, RSVP responses, dietary requests (if meals will be provided), and special information to make it easier to track changes, add/remove names, and forward the record to other steering committee members.

Require that all those interested in attending the event register or RSVP so that the steering committee will know how many participants to expect. It may be necessary to cut off registration after a specified participant number and notify the remaining interested people that the event is full.

**Planning tip:**

For certain workshops, the steering committee may not know whom to invite. Contact the local AIA COTE or ASHRAE chapter to assist in sending out a general mailing to solicit interested participants. If your workshop will coincide with an event sponsored by one of these organizations, place an announcement about your workshop on their Web site with the registration information of the conference with which the event will be coordinated.

## **Finalize Budget and Resources**

Finalize the event budget and determine if there will be a cost to participants to attend the event. You may need to charge a small fee to cover the cost of snacks and meals during the event or to mail materials to each participant before and after the event.

Follow up with the potential partners identified by the steering committee during the kickoff meeting. Obtain commitments from these partners early in the planning process to defray specific costs. Knowing at the outset what contributions to expect will enable the steering

committee to more accurately estimate the out-of-pocket event expenses and determine if a registration fee must be charged.

## Make Logistical Arrangements

### Facility

In addition to the general facility information addressed during the kickoff meeting (Chapter 2), complete the following before selecting a facility.

- ☐ Tour the proposed facilities to determine suitability and evaluate:
  - o Meeting room configurations
  - o Meeting room acoustics
  - o Ability for participants to easily see and hear the presenters
  - o Locations for placement of resource tables, registration areas, and food or beverage tables
  - o Table size and shape for breakout group activities
  - o Wall space for hanging flip chart pages and drawings.
- ☐ Evaluate the ease of participant access to the facility, such as transportation to the facility, security at the facility, and convenience.
- ☐ Determine if the guest lodging options are acceptable.
- ☐ Evaluate the available dining and catering options.
- ☐ Fully understand and be comfortable with all contract requirements, including the cancellation clause, before committing to pay for a meeting facility.
- ☐ Ensure that the space is available after hours (e.g., evenings and weekends) if sessions are to be conducted during these periods.
  - o Verify that lighting, ventilation, heating, or air conditioning is available during these times.
  - o If access to the building will be restricted, clarify the arrangements that must be made for participants to enter the facility.
- ☐ Determine if the facility staff will need a list of participants before or on the day of the event to facilitate entry or parking.
- ☐ Be sure the facility is NOT under renovation during the event.

#### **Big versus small**

Which is better? Conducting a minicharrette or full-scale charrette in one room large enough to hold as many breakout tables as needed, or holding the breakout sessions in small, individual rooms? Holding breakout group sessions in one large room can promote spontaneous communication between the breakout groups. However, the noise level may be too high for members of individual breakout groups to easily communicate and there may not be sufficient wall space for each breakout group to post flip chart pages and drawings. On the other hand, renting many small meeting rooms may exceed the event budget. In all cases, keep in mind that participants need enough space around breakout groups to spread out the materials they are using and to have a good acoustic level in which to conduct discussions.

## **Food**

Serve refreshments to help the participants stay energized during the event. Offer healthy food and beverages such as:

- Morning—coffee, tea, juice, bottled water, bagels, yogurt, and fresh fruit
- Afternoon—bottled water, juice, soda pop, fresh fruit, cookies, or protein bars.

Serving lunch during the minicharrette and full-scale charrette or before or after a half-day workshop provides an opportunity for networking, visiting exhibits, continued breakout group discussions, and touring other breakout group areas. Generally, a 30-minute lunch break is sufficient if lunch is provided. If the lunch is not provided, participants will usually need an hour or more to leave the charrette meeting area to go out for lunch.

### **Planning tip:**

If lunch is to be served during the event, be sure to include a way to indicate dietary restrictions or preferences on the RSVP form. It is a good idea to provide vegetarian meals as an option during the event, even if none of the participants indicated a preference for such meals.

Typically, participants are anxious for a change of scenery and want to leave the event for dinner. Near the end of the charrette day, discuss possible dining options to give the participants an opportunity to informally form their own dinner groups.

Consider holding an opening reception the evening before (or during) the minicharrette or full-scale charrette to introduce participants and encourage informal interaction with the presenters. This type of reception usually begins right after business hours and lasts for a couple hours. If you are serving food, offer hors d'oeuvres, beverages, and possibly a cash bar.

## **Lodging**

Arrange for a block of rooms at a convenient hotel if participants are traveling from out of town. You may be able to obtain a reduced conference or group rate. Periodically check with the hotel to track if event participants are registering as expected. You may need to contact key participants, particularly speakers and facilitators, to remind them to secure their reservations.

## **Staffing**

Successful events depend on the skill of staff people assigned to take charge of or assist with specific duties. The number of staff people needed to complete these duties depends on the size of the event. Table 3 summarizes some of the important activities staff people perform during the event.

**Table 3. Event Staff Support Summary**

<b>Duty</b>	<b>Description</b>
Logistics	Oversees participant registration.  Ensures that refreshments and meals are served on time and when the overall facilitator expects them (may need to adjust serving times during the event according to the facilitator's direction).  Maintains communication with facility staff about meeting room comfort (e.g., temperature and lighting).  Makes certain that AV equipment is available when needed.  Runs errands during the event.
AV equipment operator	Sets up presentations.  Operates AV equipment (must be able to troubleshoot and solve equipment operation problems).
Photographer	Documents the event with photos.
Writer(s)	Takes detailed notes during the event.  Completes a written report following the event.

In addition to the suggested staff support, keep these recommendations in mind when planning the event:

- Assign more than one person to help with registration at the beginning of the event to ensure an efficient registration process.
- Allow the logistics person to focus only on logistics. If this person has other duties, it is likely that an important logistics-related detail will not go as planned.
- Always assume that there will be some type of equipment glitch and be prepared to handle it.
- Arrange for a professional photographer or assign someone skilled at using cameras to take photos throughout the event; explain to the photographer how the pictures will be used so that he/she will take the needed shots. For example, the final report might include photos of key speakers, breakout groups at work, breakout groups reporting, and the tour of the project. If the breakout groups draw site sketches, elevations, or other illustrations of their ideas, these should also be photographed. A photograph of the entire group is also good to include in the final report.
- Before the event, assign a person to take notes during the event and brief this person about the importance of recording the event thoroughly. It is best if this person has some expertise in the subject matter. The report writer should also be given an outline of the anticipated report before the event and should have an opportunity to review examples of charrette reports that most closely resemble the anticipated outcome.

### **Planning tip:**

Invite public relations professionals or journalists to attend part or all of the event, including presentations and breakout group sessions. The potential publicity resulting from these people attending the event can be very useful in developing broad support for the project, raising project funds, and fostering public acceptance.

### **Equipment and Supplies**

Begin identifying the AV equipment and meeting supplies that will be needed for the event early in the planning process. Determine the number needed and the cost to obtain or rent each item. We recommend making a set of the meeting supplies available to each breakout group in addition to the overall facilitator. Typical AV equipment and meeting supplies are

#### **AV Equipment**

- ☐ Wireless lapel microphone
- ☐ Wireless handheld microphone
- ☐ LCD projector
- ☐ Overhead projector (if needed)
- ☐ Projection screen
- ☐ Laser pointer
- ☐ Video tape player and monitor if a video is included in agenda (many LCD projectors now include VCR capabilities)
- ☐ Slide projector (if needed)
- ☐ Electrical extension cords\*
- ☐ Power strips\*
- ☐ Computer(s) and monitor(s) for resource table (optional)
- ☐ Computer loaded with presentations, with CD-ROM drive, or other types of drives needed to accommodate speaker presentations
- ☐ Internet access

#### **Meeting Supplies**

- ☐ Flip chart note pads and easels (one per breakout group and one more for overall group)
- ☐ Rolls of masking tape for each group or tacks, depending on the surface to which flip chart pages will be attached
- ☐ Drafting tape<sup>†</sup>
- ☐ Markers (variety of dark colors for easy visibility)
- ☐ Drawing pens (thick for easy visibility)
- ☐ Rolls of architectural tracing paper<sup>†</sup>
- ☐ Graph paper<sup>†</sup>
- ☐ Architectural and engineering drawing scales<sup>†</sup>
- ☐ Pads of medium-sized post-it notes
- ☐ Blank overhead transparencies (optional) and markers
- ☐ Duct tape (to tape electrical cords to the floor)
- ☐ Tubes or flat portfolios to store and carry charrette flip chart pages and drawings
- ☐ Sets of project drawings (e.g., site plans and aerial photos)

\* Determine if power should be available to all breakout groups. Breakout groups may benefit from having laptop computers and other equipment participants bring with them to the charrette.

<sup>†</sup> Provide this item if the breakout groups will be developing drawings for a particular project.

### **Planning tip:**

Leave plenty of time to make arrangements for obtaining these equipment and supplies. Some items, such as AV equipment, will likely need to be reserved in advance.

Arrange to have materials and supplies shipped a few days in advance to the event facility. If notified in advance, most hotels will hold materials for future meetings if the boxes are clearly marked with the responsible person's name, event name, and event date.

## **Signs and Name Tags**

Prepare the needed number of signs to direct participants to the meeting room in which the event will be held. Signs are especially important if the facility is large or has a confusing configuration. Also, place a sign outside the meeting room at the registration table. Use easels to hold all signs so that they can be placed in easy-to-find locations.

Prepare name tags for participants and speakers. Use a large, legible font to print each person's first name. Print the person's last name and affiliation in smaller font.

## **Exhibits**

An optional addition to the event is an exhibitor area. Invite exhibitors who offer "green" services or products to talk with participants and distribute information. Discuss expectations with exhibitors so there is no confusion about the number of participants and their available time to interact with the exhibitors during the event. Invite participants to visit exhibitors during lunch, breaks, an opening reception, or other designated periods.

## **Assemble and Distribute Participant and Resource Materials**

Prepare and assemble participant packages to be distributed when the participants check in at the event registration table with the following suggested contents:

- Tab 1: Event-specific information:
  - Final agenda
  - List of sponsors and contact information
  - List of participants and contact information
  - List of presenters with bios and contact information
  - List of exhibitors.
- Tab 2: Project information and predesign analysis results (see Appendix E)
- Tab 3: Presentations printed as handouts for each technical presentation
- Tab 4: Case studies of similar high-performance projects
- Tab 5: Resources (e.g., useful Web sites, articles on local green buildings, and other related materials)
- Tab 6: Evaluation form (see Appendix F).

Minicharette and full-scale charrette participants will find it helpful to have some of this material prior to the event. For example, distribute the project information and predesign analysis results at least two weeks before the charrette, if possible. Also, include this material in the participant package distributed during the charrette.

Assembling the packages is time consuming so plan to assemble them at least a week before the event. If they must be assembled just before the event, allow several hours and recruit volunteers to help. After assembly, check random samples to make sure all materials are included in the proper order.

Decide if notebooks or folders will be used, based on the quantity of materials. Use notebooks or folders constructed from recycled materials. The lead time to order notebooks or folders constructed from recycled materials may be longer than for conventional products so allow sufficient time to obtain them before the event. Personalize the materials with a label containing the charrette title and date and an attractive graphic affixed to the notebook or folder cover.

Set up a resource table to showcase examples of printed and electronic resources, particularly local resources. Provide participants information on how to order the resources if they are interested in obtaining their own copies. The resources may be useful during the charrette.

### **Lead by Example**

Employ green practices when preparing participant materials:

- Use recycled paper.
- Make double-sided copies of everything except site information and other charrette working materials.
- Use notebooks or folders made of recycled or environmentally preferable materials (e.g., recycled cardboard).
- Avoid using paper when possible:
  - Give Web site addresses and information on how to order materials instead of providing all of the materials.
  - Make available examples of supplemental materials at the resource table, such as brochures and flyers.

## **Develop Evaluation Forms**

Participant comments evaluating the event can be extremely useful to event planners and to the project team. Provide evaluation forms in the participant packages (Appendix F), and prepare a box where participants can place their completed evaluation forms. Use the comments to improve future events and to identify kudos or concerns not voiced during the event.

## **Make Arrangements for CEUs**

The training provided during the workshop can qualify for CEUs for participants. Offering CEUs may help draw participants to the event; however, this does involve extra work for the event organizers. The steering committee members should decide early in the event planning process if the benefits are worth the time, and sometimes the cost, of making arrangements to offer CEUs.

Many professional organizations have processes and procedures in place for applying to become a CEU host (e.g., AIA and ASHRAE). These processes vary among the organizations. Contact the national offices of the organization from which the CEUs are to be granted to obtain the appropriate process and procedure.

## Chapter 4: Conducting the Charrette

### **The day before the event . . .**

- ☐ Visit the facility.
- ☐ Check supplies and participant materials.
- ☐ Meet with the facilitator and the speakers.

### **The day of the event . . .**

- ☐ Verify logistical arrangements.
- ☐ Set the stage with the opening session.
- ☐ Describe project and charrette expectations.
- ☐ Create effective breakout groups.
- ☐ Implement successful charrette practices.

This chapter gives guidance on how to manage a successful charrette. We have included lessons learned as well as useful tips for reaching concept and project consensus.

## **The Day Before the Event**

### **Visit the Facility**

Visit the facility to check the room setup and confirm all arrangements with facility staff to be sure that no surprises will arise during the event. Confirm as many of the following as possible (some might not be possible until the morning of the event):

- ☐ Place the signage directing the participants to the appropriate meeting room (may not be possible until the morning of the event).
- ☐ Make certain all reserved equipment is available (Chapter 3).
- ☐ Test the AV equipment to ensure it is operating properly and to learn special operation requirements.
- ☐ Check to make sure all presentations can be opened and projected and that they are clear, bright, and visible.
- ☐ Check the room layout for seating arrangements, breakout group arrangements, resource table, refreshments, and registration.
- ☐ Double check scheduled breaks on the agenda with the planned arrival of refreshments and lunch.

### **Check Supplies and Participant Materials**

Check with those responsible for logistics to be sure all logistical requirements have been addressed (Chapter 3). Make sure those responsible are prepared to handle last-minute logistical requests that may arise during the event. For example:

- ☐ Locate the nearest photocopy shop (hotel copy services are often quite expensive).
- ☐ Locate the nearest office supply store.
- ☐ Locate all the materials that were shipped to the meeting and ensure all materials arrived as anticipated.

## **Meet with Facilitators and Speakers**

Meet with all facilitators and speakers the night before the event if possible, to make sure everyone has arrived, has their materials, and is prepared for the event. This meeting gives the facilitators and speakers an opportunity to meet one another, which will help the event flow more smoothly. At the meeting:

- ☐ Go over the agenda and the role and responsibilities of each facilitator and speaker.
- ☐ Give the facilitators and speakers a copy of the participant packages so they can familiarize themselves with these materials before the event begins.

### **Planning tip:**

Give a list of all participants to guards, receptionists, parking lot attendants, or other “gatekeepers” on the day of the event to reduce the hassles for participants. If you are using a government building, security requirements have become more stringent, and you may also need to provide social security numbers and other identifying information for participants.

## **The Day of the Event**

### **Verify Logistical Arrangements**

Arrive at the event facility at least 1 hour before event registration starts. With the help of the event staff and other recruited volunteers, complete the following before the participants begin to arrive:

- ☐ Set up the registration table:
  - Alphabetize nametags so it is easier to find individual participants’ names as they arrive.
  - Place the participant packages so they are easy for those working at the registration table to reach (or set them on each chair or table in the meeting room).
  - Have at least two people at the registration table until the event begins. After the event begins, at least one person should stay at the table for an additional 30 minutes, or until all participants have registered.
- ☐ Verify meeting room arrangement and equipment operation.
  - Check the room setup (e.g., are tables and chairs arranged as planned and will the planned arrangement be effective?).
  - Check the room temperature and air circulation.
  - Check the equipment:

- All reserved equipment is present.
- All equipment is functioning properly—check that all electronic presentations can be opened and videotapes are set at the proper beginning points.
- The projection screen is located in a position that can be easily viewed by all participants.
- Check that the electrical extension cords are taped to the floor.
- Check that the Internet connection is operating.
- Check that a participant package is placed at each seat (or available at the registration table).
- Check that signs directing participants to the meeting room are in place.
- Check that the first snack and beverages are set up as expected.
- Check that the guards, receptionists, or other gatekeepers know about the event and are ready for the participants to arrive.
- Locate the rest rooms, telephones, soda pop machines, and snack bars.
- Arrange the resource table for easiest access to the materials.
- Arrange the exhibitor area as arranged with the facility. Allow enough space around each exhibitor for participants to talk with exhibitors and view exhibits.

### **Set the Stage with the Opening Session**

The opening session, which is critical to the success of the event, **MUST** accomplish the following:

- Introduce the participants to one another. One important outcome of the event will be the networking that occurs among participants. If the group is more than 25 people, limit introductions to name, affiliation, and profession. Just before the event begins, identify an individual to start the introductions and brief this person on the length of introduction he or she is to provide—others will follow this model, so be sure it is what you want.
- Establish the goals and objectives of the event and make sure that participants understand and buy into them. Walk through the agenda, participant materials, and resources available to demonstrate how the event has been designed to accomplish the goals.
- Demonstrate the owner's interest in the outcome. If the owner is enthusiastic and committed to the goals, the participants are more motivated.
- Remind all participants to turn off their cell phones.

### **Describe Project and Charrette Expectations**

Clearly state project description, issues, and goals and the expectations for the charrette. At a minimum, the event sponsor or project owner should address:

- Goals—what results he or she desires from the project and from the charrette
- Project description—brief overview of the project with photographs and drawings as appropriate
- Project status—what decisions have been made already and what work has been performed?
- Issues or concerns—are there any barriers or problems that affect the project?

Review the owner’s presentation before the event to ensure that it will give enough information for participants to work from but not so much that they become overwhelmed.

## Create Effective Breakout Groups

Ensuring diversity among the breakout group members is important to the success of the event. Table 4 describes three methods commonly employed when creating breakout groups.

**Table 4. Methods for Making Breakout Group Assignments**

Method	How to	Description
Counting-off method	Ask the participants to count off (e.g., 1, 2, 3, and so on, up to the number of planned breakout groups)	<p>Apply when each breakout group will have the same task.</p> <p>Effective way to separate friends and colleagues from the same firm, who are probably sitting together.</p> <p>Obtains a variety of interests and expertise in each breakout group.</p>
Self-selection method	Ask the participants to self divide into breakout groups depending on the topic of each breakout group and the individual’s area of expertise	<p>Apply when each breakout group will address different topics (e.g., energy, water, and site).</p> <p>Allow participants to select the topic of greatest interest to them.</p>
Predetermination of assignments method	Predetermine the members of each breakout group	<p>Apply when the expertise and interest of the participants is known.</p> <p>Apply to ensure that knowledge and personalities are balanced within each group.</p>

After creating the groups, check to make sure there is a good distribution of architects, engineers, landscape designers, and other expertise among the groups. Make changes as needed. If the breakout groups are created using the self-selection method, in addition to ensuring diversity, make adjustments so that all groups have approximately the same number of members. When using any of the above methods, adjustments may be necessary if individuals are not satisfied with their assignment or if a group drops below three members because of attrition.

## Implement Successful Charrette Practices

Here are some tricks of the trade that will lead to a successful event:

- ☐ Maintain consistency in breakout group assignments for the duration of the event. Breakout group members “bond” during the initial breakout group exercises. The

members of each group soon learn how to work together effectively and develop a rhythm that will carry through the entire event.

- Ask the groups to keep a record of items requested, questions or issues the group cannot answer, and barriers that the group sees to accomplishing a specific goal. These records will be given to the owner at the end of the charrette. (See the final charrette report samples in Appendix I for examples of the type of information or issues that could be requested or questioned.)
- At lunchtime, ask the participants to eat first and then take a tour of all of the breakout groups' work. For the tour, participants walk from table to table (or room to room) to view and hear a brief (3–5 minutes maximum) explanation of each of the other breakout groups' approaches and results thus far. One person from each breakout group remains with the group's work and explains it to the other participants. It is best if each breakout group does the tour together. The overall facilitator is the timekeeper and tells participants when to move to another group.
- Invite the owner and local dignitaries who might not have attended the entire charrette to return and hear the group reports at the end of the day during the final report-out session. Often, these special guests can react to some of the ideas on the spot and commit to specific actions.
- Ask each group to prepare a specific maximum amount of material summarizing their conclusions to use for the report-out session. For example, limit the report to four flip chart pages, one template page, or two blue boards<sup>1</sup>. This limitation helps to curb the amount of time each group spends to report the conclusions of their group, and it encourages the breakout group members to focus on the most important aspects of their work. Reassure the groups that, in addition to this summary, ALL of their work will be saved and given to the owners.
- Take photos of the speakers, breakout group discussions, materials produced by the breakout groups, and final presentations to ensure a complete record of the event. Take 35-mm or high-resolution digital photos so that the photos can later be used in a published report.
- Bring attention to the evaluation form in the participant packages during the event opening session. Periodically remind the participants to fill out the evaluation forms and deposit the completed forms in the collection box labeled “evaluation forms” located near the exit of the meeting room. Stress the importance of feedback.
- Gather ALL paper from the groups at the end of the event and label these items carefully (e.g., Group 1, Group 2, and so on). Large carrying cases (tubes or flat portfolios) are helpful for managing the collection, transportation, and retention of the material.
- Review and photograph or scan all written work completed by the breakout groups (e.g., summaries and brainstorming notes written on the flip charts pages and drawings) for future use in reports, funding proposals, and press releases.

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<sup>1</sup> Tools sometimes used in charrettes to encourage the breakout group members to be concise with the reporting materials they produce include templates (large “posters,” such as 3 feet by 5 feet, with clearly marked locations for summaries of specified breakout group discussions) and blue boards (4 feet by 8 feet foam insulation boards that can be purchased at most hardware or building materials stores) for attaching breakout group materials with thumb tacks or tape).

Facilitators can either record the group's discussion on flip chart pages or ask for a volunteer scribe to serve as the recorder. In either case, it is important to note main topic points discussed and capture the intent of the comments as closely as possible. In many cases, the scribe writes the exact words that were said. This record will be used later to summarize the event during the report-out session and to write the follow-up report.

## Chapter 5: Follow-Up and Next Steps

### **Within a month of the event . . .**

- ☐ Hold a debriefing meeting.
- ☐ Prepare a report on the results.
- ☐ Follow up with the participants.
- ☐ Encourage the participants to stay involved.
- ☐ Analyze and summarize the evaluations.
- ☐ Evaluate the value of follow-on events.

The follow-up for a charrette is an important element of the event. In this part of the process, confirmation is established on the project's future goals and momentum is generated for moving the project to completion. In this chapter, we describe how to follow up a charrette, what materials must be produced, and how to produce them.

### **Hold a Debriefing Meeting**

Conduct a debriefing meeting with the steering committee to wrap up the process of planning and conducting the charrette and to discuss the event outcomes. It is best to hold this meeting immediately after the event concludes, such as the evening or morning after the event. Use this time to review the success of the event activities, clarify the decisions and project directions agreed on by the participants, and consider the next steps. Action items resulting from the debriefing meeting should assign responsibilities and completion dates for the remaining items discussed in this chapter.

### **Prepare a Report on the Results**

Always produce a written report that summarizes the results of the event. The purpose of this report is to document and collate the information presented and discussed during the event. Appendix G contains a suggested outline for this report and Appendix I includes examples of reports from charrettes for high-performance projects. In many cases, these reports are useful in promoting acceptance of the decisions made during the event.

In advance, identify individuals who will take thorough notes and photographs and be responsible for preparing a final report of the meeting. Breakout group facilitators should plan to take notes themselves or assign a breakout group member the role of scribe to record the group's discussion. At the end of the event, these discussion notes should be given to the person who will prepare the final report, or the facilitators should be asked to summarize their groups' work and forward it to the final report writer.

It is best to develop an executive summary (one page front and back) of the most important event outcomes to accompany the more detailed report. The executive summary can be used to brief the owners, key stakeholders, event sponsors, potential providers of project funds, and other interested parties.

Make the final report available to those who want more detail on the event and its results. Incorporate photographs from the event and scanned drawings created during the breakout group discussions to illustrate the decisions made during the event.

A support letter or letter of commitment from the owner or key stakeholder is a valuable addition to the final report.

## **Follow Up with the Participants**

The greening process does not end when the event is over—in fact, it has just begun! Good follow-up with the participants shortly after the event will encourage continuation of the energy and momentum that emerged during the event.

Try to produce the executive summary of the event within 1 to 2 weeks of the event. Send the executive summary to all event participants with a note of thanks and appreciation for their time, expertise, and energy in making the charrette a successful event.

## **Encourage the Participants to Stay Involved**

Determine specific next steps and assign champions for each. Set a specific time to reconvene with a report on direct results from this charrette to share with the participants, a smaller committee, or a larger group.

## **Analyze and Summarize the Evaluations**

Review the evaluations immediately after the event concludes. Include a summary and analysis of this feedback in the final report. This information can also be very helpful when planning events for future high-performance projects.

## **Evaluate the Value of Follow-On Events**

Partners can also help to keep the momentum going. Local chapters of the AIA COTE, ASHRAE, environmental groups, and others can sponsor follow-up events to continue the networking and training that began at the event. In some cases, the event will become part of an ongoing green network in the local area.

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# Appendix A: Checklist for Planning and Conducting Charrettes for High-Performance Projects

✓	Description of Activity and Timetable for Completion	Discussion (chapter/page in this report)
	<b>Three Months or More Before the Event—Getting Started</b>	<b>Chapter 2</b>
<input type="checkbox"/>	Create a steering committee.	5
<input type="checkbox"/>	Hold a kickoff meeting to discuss:	6
	o Identify the purpose of the event.	6
	o Identify the type and length of the event.	7
	o Identify the products resulting from the event.	8
	o Draft an agenda.	8
	o Identify potential locations to hold the event.	9
	o Select potential dates for the event.	9
	o Plan the event budget.	10
	o Identify type and number of participants.	10
	o Identify workshop speakers.	11
	o Identify overall and breakout group facilitators.	12
	o Identify potential event partners.	13
	o Prepare project information for charrette participants.	13
	o Plan the next steering committee meeting.	13
	o Review kickoff meeting action items.	14
<input type="checkbox"/>	Determine event date and location.	14
	<b>Two to Three Months Before the Event—Planning and Developing the Charrette</b>	<b>Chapter 3</b>
<input type="checkbox"/>	Develop an agenda:	15
	State event goals.	15
	o Identify event opening activities.	15
	o Select a speaker to motivate the participants.	16
	o Select interesting speakers to present topics relevant to the project.	16
	o Determine amount of time for breakout group discussions.	16
<input type="checkbox"/>	Confirm availability of key event players:	17
	o Confirm facilitators.	17
	o Confirm speakers.	17
	o Confirm VIPs.	17
<input type="checkbox"/>	Provide presentation guidelines to the speakers:	18
	o Include presentation samples with instructions for use.	18
	o Obtain AV equipment requirements.	18
	o Obtain presentations and speaker handout materials.	18
	o Give speakers an accurate participant count, if the speaker plans to bring handouts	18
	o Request detailed travel itineraries from the speakers.	18
<input type="checkbox"/>	Invite participants and track responses:	18
	o Finalize the invitation list.	18
	o Send a save the date announcement.	18
	o Send formal invitations and registration or RSVP forms.	19
	o Monitor registration or RSVP responses.	19
<input type="checkbox"/>	Finalize budget, expenditures, and resources:	20
	o Determine participant registration fee.	20
	o Obtain commitments from partners to defray specific expenses.	20

□	Make logistical arrangements:	21
○	Select a facility in which to conduct the event.	21
○	Select food and beverages to be served during the event.	22
○	Reserve a block of hotel rooms for out-of-town participants.	22
○	Track participant reservations at the selected hotel.	22
○	Contact expected participants who do not register by a specified date.	22
○	Assign individuals to specific event staff positions.	22
○	Identify needed AV equipment.	24
○	Reserve AV equipment (typically through the meeting facility).	24
○	Ship materials and supplies to the event facility.	24
○	Prepare signs to direct participants to the event.	25
○	Prepare participant name tags.	25
○	Identify and invite exhibitors.	25
□	Assemble and distribute participant and resource materials:	25
○	Obtain materials for participant packages.	25
○	Assemble participant packages.	25
○	Check participant packages for completeness.	25
○	Distribute the participant packages.	25
○	Obtain materials for a resource library.	25
□	Develop evaluation forms:	26
○	Develop evaluation forms specific to the event.	26
○	Make a collection box for participants to drop their completed evaluation forms.	26
□	Make arrangements for CEUs:	26
○	Determine if CEUs are to be offered.	26
○	Make arrangements to offer CEUs.	26
	<b>Day Before and Day of the Event—Conducting the Charrette</b>	<b>Chapter 4</b>
□	Visit the facility.	27
□	Check supplies and participant materials.	27
□	Meet with facilitators and speakers.	28
□	Verify logistical arrangements.	28
□	Set the stage with the opening session.	29
□	Describe project and charrette expectations.	29
□	Create effective breakout groups.	30
□	Implement successful charrette practices.	30
	<b>Within a Month of the Event—Follow-Up and Next Steps</b>	<b>Chapter 5</b>
□	Hold a debriefing meeting.	33
□	Prepare a report on results.	33
□	Follow up with participants.	34
□	Encourage participants to stay involved.	34
□	Analyze and summarize evaluations.	34
□	Evaluate the value of follow-on events.	34

## Appendix B: Sample Agendas

### Half-Day Workshop: Setting a Project's High-Performance Goals

#### Goals

1. Introduce participants to integrated design and high-performance strategies.
2. Identify high-performance goals for the project in each topic area (site, water, energy, materials, indoor environmental quality, or other topics areas that are appropriate for the project).
3. Motivate participants to design a high-performance project.
4. Establish next steps and a process for moving forward.

The half-day workshop could be done in a morning session from 8:00 A.M. to noon, or as an afternoon session from 1:00 P.M. to 5:00 P.M. The afternoon session allows time for morning office check-in and after-five discussion, which may be preferable.

#### Agenda

Noon–1:00	Tour of the site (optional)
1:00–1:30	Welcome, introductions of participants, expectations and goals
1:30–2:00	Review of project information
2:00–3:00	High-performance process and issues (Project goals identified during the high-performance goals discussion) <ol style="list-style-type: none"><li>1) High-performance process and video (35-40 minutes)</li><li>2) Integrated design (process, benefits, costs) (15-20 minutes)</li></ol>
3:00–3:15	Break
3:15–4:45	High-performance goals, process, issues, and case study
4:45–5:00	Review of combined goals and next steps for the project

### One and One-Half Day Minicharrette

#### Goals

1. Introduce the concepts of high-performance green design and specific strategies.
2. Identify high-performance goals and potential strategies for the project in each topic area (site, water, energy, materials, indoor environmental quality, or other topics appropriate for the project)—what might be possible.
3. Identify issues and questions that will affect implementation of these goals and strategies.
4. Establish next steps and a process for moving forward.

#### Agenda

**Note:** Evening reception before next day workshop/minicharrette (optional)

### ***Day One: High-Performance Strategies***

- 8:00–8:30 Continental breakfast
- 8:30–9:30 Welcome, introductions of participants, expectations, and goals
- 9:30–10:00 Review of project information
- 10:00–10:15 Break
- 10:15–11:45 High-performance process and issues
- 1) High-performance process and video (35–40 minutes)
  - 2) Site and water (or master planning or transportation for a campus or other larger project; 20–25 minutes)
  - 3) Energy (or facilities/operations and maintenance for a campus or other larger project; 20–25 minutes)
- 11:45–12:45 Lunch
- 12:45–1:45 High-performance issues
- 4) Materials (or green procurement for a campus or other larger project; 15–20 minutes)
  - 5) Indoor environmental quality (or contracting, education, community outreach for a campus or other larger project; 15–20 minutes)
  - 6) Other—local or project priority topic (15–20 minutes)
- 1:45–2:00 Q&A on project-specific issues
- 2:00–4:30 Breakout groups
- What are the issues/questions, strategies, and actions needed?
- Four to five groups of 6–8 (maximum 10) people per group
- Groups should be made up of multidisciplinary team members
- 4:30–5:00 Reporting out
- Goals set by breakout groups and large group consensus of goals
- 5:00–6:00 Site tour (optional)

### ***Day Two: Minicharrette***

- 8:00–8:30 Continental breakfast
- 8:30–9:00 Review of first day and expectations of second day
- 9:00–11:30 Breakout groups
- Same breakout groups as first day
- Drawings and concepts
- 11:30–12:00 Reporting out and next steps
- 12:00–1:00 Optional lunch

## **Two-Day Full-Scale Charrette: Developing High-Performance Strategies for a Project**

### **Goals**

1. Provide basic training on concepts and importance of high-performance green design to enable attendees to participate effectively in the process.

2. Identify high-performance goals and potential strategies for the project in each topic area (site, water, energy, materials, indoor environmental quality, or other topics appropriate for the project)—what might be possible.
3. Identify issues and questions that will affect implementation of these goals and strategies.
4. Establish next steps and a process for moving forward that includes all relevant participants/stakeholders.

## **Agenda**

### ***Day 1: Defining High-Performance Strategies and Setting Project Goals***

8:00–8:30	Continental breakfast
8:30–9:00	Welcome and remarks from owner(s)
9:00–10:00	Charrette overview and expectations, logistics, and introductions
10:00–10:15	Break
10:15–11:00	Review of project information
11:00–12:00	High-performance issues <ol style="list-style-type: none"> <li>1) High-performance process and video (35–40 minutes)</li> <li>2) Site and water (or master planning or transportation for a campus or other larger project; 15–20 minutes)</li> <li>3) Energy (or facilities/operations and maintenance for a campus or other larger project; 15–20 minutes)</li> </ol>
1:00–2:00	Lunch and tour
2:00–3:00	High-performance issues <ol style="list-style-type: none"> <li>4) Materials (or green procurement for a campus or other larger project; 15–20 minutes)</li> <li>5) Indoor environmental quality (or contracting, education, community outreach for a campus or other larger project; 15–20 minutes)</li> <li>6) Other—local or project priority topic (15–20 minutes)</li> </ol>
3:00–4:30	Breakout groups <p>What are the issues/questions, strategies, and actions needed?</p> <p>Four to five groups of 6–8 (maximum 10) people per group</p> <p>Groups should be made up of multidisciplinary team members</p>
4:30–5:00	Reporting out <p>Goals set by breakout groups and large group consensus of goals</p>

### ***Day 2: Charrette: Hands-On Drawings and Strategies for the Project***

8:00–8:30	Continental breakfast
8:30–9:00	Review of first day and expectations of second day
9:00–11:30	Breakout groups <p>Same breakout groups as first day</p>
11:30–1:00	Lunch and tour of groups' progress
1:00–3:45	Breakout groups' drawings and concepts pulled together
3:45–4:30	Reporting out
4:30–5:00	Final wrap-up, final remarks, and next steps

## **Optional Kickoff Session**

This session can be several hours or half a day, depending on the number of speakers invited.

### **Goals**

1. Energize and motivate participants.
2. Demonstrate support for the project within the community and among local dignitaries.
3. Provide support for seeking additional funding for the project.

### **Agenda**

1:00–2:30	Welcome by project owner and speeches by local dignitaries
2:30–3:00	What is possible? (green project video)
3:00–3:30	Break and networking
3:30–5:00	Panel discussion of key issues (site, water, energy, materials, indoor environmental quality, other local issues)
5:00–6:30	Reception and networking

The agenda can be shortened if necessary by eliminating the panel discussion and limiting the event to speeches followed by a reception.

## Appendix C: Participant Identification Worksheet

Category of Participant	Number	Names
Owner(s) and owner representatives/ developer		
Future project users/occupants		
Land/transportation planners		
Architects		
Contractors		
Landscape architects		
Engineers (civil; mechanical; plumbing; electrical; structural; heating, ventilating, and air- conditioning [HVAC]; etc.)		
Interior designers		
Exhibit designers		
Construction specifiers (spec writers)		
Lighting designers		
Environmental building specialists (IAQ, energy, green materials, waste, water, etc.)		
Ecologists		
Commissioning agents		
LEED Green Building Rating System- accredited professionals		
Facility managers		
Additional participants for special building types such as: <div style="margin-left: 40px;">Educational facilities (faculty, students, labor unions, and administration)</div> <div style="margin-left: 40px;">Labs and science centers</div> <div style="margin-left: 40px;">Large-scale campuses, developments, and military installations</div>		
Community leaders: <div style="margin-left: 40px;">Government/political leaders</div> <div style="margin-left: 40px;">Civil/business leaders</div> <div style="margin-left: 40px;">Community service/health/religious leaders</div> <div style="margin-left: 40px;">Community economic development leaders</div> <div style="margin-left: 40px;">At-large community/neighbors</div>		

Partners: Local, state, or federal agencies  Private sector corporations  Community groups		
Other:		
Total number		

## Appendix D: Sample Letters

You may also want to include the definition of charrette and the event's goals and objectives in these letters.

### Sample Save the Date Letter

PLEASE SAVE THE DATE:

The Institute of American Indian Arts (IAIA), a federally chartered tribal college in Santa Fe, New Mexico, cordially invites you to attend a two- and one-half day planning workshop or “charrette” to develop the strategic plan for the “IAIA Initiative for a Sustainable Future.” The initiative will provide the environmental and energy blueprint for development of the IAIA campus and museum for many years to come. The event will take place on the IAIA campus March 12–14, 2003.

This promises to be a great couple of days, with experts in the field of sustainable design and development working closely with the IAIA staff and students, the local community, state and federal officials, and others who have an interest in sustainable design and wish to have a voice in the future of IAIA. We will identify key initiatives and action items to guide our efforts to build a more sustainable future for IAIA, our community, and our nation.

Invitations, including an agenda, a full list of invited participants, and other relevant information will be sent out in about 2 weeks. Meanwhile, please save the dates in your calendar and plan to attend! Hotel information for those of you arriving from out of town is attached here—please make room reservations as soon as possible.

If you have any questions, please contact \_\_\_\_\_  
Telephone number \_\_\_\_\_.

The \_\_\_\_\_ Group is planning and coordinating this activity on behalf of IAIA.

Warm regards,

Della Warrior  
President, IAIA

## Sample Invitation Letter for Workshop

Name  
Title  
Company Name  
Address  
Address

Dear \_\_\_\_\_:

\_\_\_\_\_ (owner) and \_\_\_\_\_ (list any prominent partners) will be conducting a half-day high-performance/green workshop on \_\_\_\_\_ (date) and would really appreciate and value your participation.

Greening workshops have been successfully implemented for the White House, the Department of Defense, and for the National Park Service as well as numerous other public and private clients. \_\_\_\_\_ (owner) is excited about the opportunity to host a high-performance/green workshop and they hope that you will join in this informative and critical initiative!

This workshop will address environmental considerations for the \_\_\_\_\_ (owner) designs for a \_\_\_\_\_ (name of project).

Approximately \_\_\_\_ (number) participants will consider the following topics during the half-day event:

1. Sustainable site/landscaping/transportation and water issues
2. Energy (heating/cooling systems and building envelope, lighting, and plug loads)
3. Materials and resources/waste and recycling/operations and maintenance
4. Indoor environmental quality
5. Integrated design

The workshop will engage the large group in interactive discussions regarding the feasibility of implementing specific high-performance/green strategies. In addition, the workshop participants will explore the opportunities and obstacles inherent in these strategies and decide what strategies and approaches would work best for the proposed project.

We invite you to participate as a key member of this upcoming workshop. Enclosure (1) is a list of other potential participants. The workshop will meet per Enclosure (2) in the \_\_\_\_\_ Room at \_\_\_\_\_ (facility). Maps are included for your use as Enclosure (3). Site and project information is included as Enclosure 4.

Your ideas, insights, and action items will be compiled into a short report that will be easily accessible for future reference. This report will provide a listing of environmental considerations not only for this project, but also for numerous other projects. The overall goal is to make this project a model of excellence in terms of sustainable design and development and to share this knowledge with others.

Should you have any questions or need any further information, please feel free to call \_\_\_\_\_(name), \_\_\_\_\_(position), at \_\_\_\_\_(phone number).

We realize that this High-Performance Greening Charrette calls for a commitment of time from already busy schedules; however, your skills are greatly needed and we hope that you will consider joining in this effort as an important investment in this project, this community, and our country. If you cannot attend, please recommend others who can take your place. Also, please advise if we should invite anyone else.

Sincerely,

\_\_\_\_\_ (charrette host)

Enclosures:

- (1) Stakeholders list
- (2) Agenda
- (3) Maps
- (4) Site and project information

## Invitation Letter for Minicharrette and Full-Scale Charrette

Name  
Title  
Company Name  
Address  
Address

Dear \_\_\_\_\_:

\_\_\_\_\_ (owner) and  
\_\_\_\_\_ (list any prominent partners) will be  
conducting a “Greening Charrette” on \_\_\_\_\_ (dates) and would really appreciate  
and value your participation.

Greening charrettes began with a Greening of the White House Charrette in the early  
1990s, and have been successfully implemented for the Department of Defense at the  
Pentagon and for the National Park Service as well as numerous other public and private  
clients. \_\_\_\_\_ (owner) is excited about the opportunity to host a greening  
charrette and hope that you will join in this informative and critical initiative!

This charrette will address environmental considerations for the \_\_\_\_\_  
(owner) designs for a \_\_\_\_\_ (name of project).

Approximately \_\_\_\_ (number) participants will consider the following topics in small  
breakout groups during the (1-½ OR 2-) day event:

1. Sustainable site/landscaping/transportation and water issues
2. Energy (heating/cooling systems and building envelope, lighting, and plug loads)
3. Materials and resources/waste and recycling/operations and maintenance
4. Indoor environmental quality
5. Big-picture issues: process, education, and community outreach

Each group will ultimately generate a report noting existing conditions, priority issues to  
address, and a list of short-, mid-, and long-term action items and preliminary concept  
drawings for the project. Names of “champions” will be noted for action items.  
Opportunities as well as obstacles will be noted. The large group will determine an  
overall priority listing for the implementation of the goals and objectives that this  
charrette identifies.

We invite you to participate as a key member of this upcoming greening charrette.  
Enclosure (1) is a list of other potential participants. The charrette will meet per  
Enclosure (2) in the \_\_\_\_\_ Room at \_\_\_\_\_  
(Facility). Maps are included for your use as Enclosure (3).

In addition, should you require lodging during this charrette, please make arrangements with the \_\_\_\_\_(hotel), at \_\_\_\_\_(phone number). The group number for the charrette reservations is \_\_\_\_\_.

Your ideas, insights, and action items will be compiled into a report that will be easily accessible for future reference. This report will provide a strong foundation for environmental considerations not only for this project, but also for numerous other projects. The overall goal is to make this project a model of excellence in terms of sustainable design and development and to share this knowledge with others.

Should you have any questions or need any further information, please feel free to call \_\_\_\_\_(name), \_\_\_\_\_(position), at \_\_\_\_\_(phone number).

We realize that this High-Performance Greening Charrette calls for a commitment of time from already busy schedules; however, your skills are greatly needed and we hope that you will consider joining in this effort as an important investment in this project, this community, and our country. If you cannot attend, please recommend others who can take your place. Also, please advise if we should invite anyone else.

Sincerely,

\_\_\_\_\_ (charrette host)

Enclosures:

- (1) Stakeholders list
- (2) Agenda
- (3) Maps
- (4) Site and project information

# **Appendix E: Project Information to Distribute to Participants Before the Charrette**

## **Basic Project Information**

### **Building-Scale Project**

In this appendix, we list the highest priority items to collect before a building-scale project (a project addressing a single building). Also collect the information listed below for a large-scale development project (a project that addresses a complex consisting of two or more buildings) if it is available. Make this information available to all participants so they can review and become familiar with important project information before attending the charrette.

- ☐ Project mission statement and short paragraph about the project history
- ☐ Square footage of overall project and spaces
- ☐ Space requirements for the project:
  - o Define spaces, occupancy levels, use, daylighting needs, temperature ranges, and adjacency requirements
- ☐ Maps of the project site(s) showing topography, vegetation, existing structures and infrastructure. (Note scale on map for participant use.)
- ☐ Description (and drawings or images if possible) of larger context site, such as population, geography, transportation modes, utility lines, and other infrastructure of the surrounding area.

### **Large-Scale Development Project**

We recommend providing the following information for a larger scale development, such as a campus, military installation, national or state park, or community.

- ☐ Project mission statement and short paragraph about the project master planning
- ☐ Current site master plan, transportation modes and methods, and utility lines
- ☐ Maps of the overall site(s) and adjoining areas showing topography, vegetation, hazardous material sites, and infrastructure. (Note scale on map for participant use.)
- ☐ Base information of existing facilities and their operations and maintenance issues
- ☐ Current status of green procurement measures, retail initiatives, and interpretation and education considerations.

## **Predesign Energy Analysis Results**

The thermal performance of any building entails complex interactions between the exterior environment and the internal loads that must be mediated by the building envelope and mechanical systems. The number of potential interacting design alternatives and possible trade-offs is extremely large. Computer simulations are the only practical way to predict the dynamic energy and energy cost performance for a sizable number of potential design solutions.

A predesign energy analysis of an energy code-compliant baseline building gives the energy and energy cost profiles for a building of similar type, size, and location to the one that is the focus of the charrette. Charrette participants can use this information to develop design concepts that minimize energy loads and energy costs from the very outset. At this stage, the building massing, zoning, siting, orientation, internal organization, and appearance of the facades can be manipulated to maximize building energy performance without adding to the cost of design.

Provide the energy analyst conducting the computer simulation and summarizing the results with a description of the building design parameters, such as:

- ☐ Building codes to which the design must comply
- ☐ Required spaces/functions
- ☐ Space size/volume requirements
- ☐ Number of floors
- ☐ Orientation restrictions
- ☐ Occupancy schedules
- ☐ Lighting needs/schedules
- ☐ Space conditions (e.g., temperature) and schedules
- ☐ Type of construction.

After completing a baseline building computer simulation, the energy analyst may conduct an elimination parametric study to show the relative importance of particular loads. This analysis is completed by zeroing out individual sources of load in a series of simulations. The results of this study demonstrate the energy savings that can be expected for the specific project. The study will also show the relative importance of individual measures and how different design measures and building systems are integrated.

Summarize the results of the predesign energy analysis so that charrette participants can easily understand them. We recommend depicting the results graphically. Include in this summary estimations of the:

- ☐ Annual site energy use
- ☐ Annual site energy cost
- ☐ Energy use/cost for operating the HVAC systems
  - Break down the use/cost between cooling, heating, fan, and plug loads, if possible
- ☐ Energy use/cost for operating the lighting system
- ☐ Energy use/cost savings compared to baseline building for each parametric eliminated
- ☐ Conclusions that can be drawn from the analysis
- ☐ Recommendations for level of energy savings to adopt as a project goal.

In addition to evaluating the building energy performance, the predesign energy analysis may also evaluate:

- ☐ Expected performance of solar electric (photovoltaic or PV) systems for the site and climate and characterization of the potential for renewable energy production with respect to the energy use
- ☐ Microclimate and site issues in terms of the potential for natural ventilation and ground source heat exchanges
- ☐ How key design parameters affect energy use (e.g., glazing area, glazing properties, aspect ratio, and number of floors).
- ☐ How key programmatic details affect energy use (e.g., occupancy, plug loads, ventilation, and schedules).

## **In-Depth Project Information (Optional)**

The in-depth large-scale project information outlined here may be included in addition to the basic project information if the steering committee members feel that the additional information will benefit participant understanding of the project.

### **Site and Water Information**

- ☐ List of any endangered species
- ☐ Exact site costs (e.g., landscaping labor and materials)
- ☐ Percentage of impervious pavement on the project site
- ☐ Current run-off/storm water conditions on the project site
- ☐ Landfill areas (hazardous sites) and restoration efforts
- ☐ Transportation
- ☐ Partnerships
- ☐ Golf course information (e.g., fertilizers and chemicals) and costs to operate the golf course (if this type of area is part of project site)
- ☐ Lake side/water bodies information (buffers, recreation, etc.)
- ☐ Water wells—well head protection areas
- ☐ Water treatment plants (average discharges)
- ☐ Airport information (location, amount used, types of planes using runway—if this type of area is part of the project site)
- ☐ Metering or monitoring information besides costs
- ☐ Land use breakout (developed land, wetlands, pavement, etc.)
- ☐ Information on erosion, wetlands, forestry, wildlife, historic register sites/buildings, etc.
- ☐ Education/training efforts on site sustainability
- ☐ Case studies/exemplary projects
- ☐ Sustainability efforts currently under way on site.

### **Energy Information**

- ☐ Baseline conditions
- ☐ How power is provided to the project site
- ☐ Sources of energy use on the project site

- ☐ Breakout of energy use by type of fuel, units, amount consumed per fuel type, and total energy used (for the last 2 years, if applicable)
- ☐ Current HVAC systems
- ☐ Fuels/systems used on the project site and in the buildings
- ☐ Energy efficiency programs implemented or available to the project (e.g., relamping or motion sensor programs)
- ☐ Project-wide emissions
- ☐ Air pollution control strategies in use or available to the project
- ☐ Noise pollution control strategies in use or available to the project
- ☐ Radiation pollution control strategies in use or available to the project
- ☐ Monitoring and metering of energy consumption in use or available to the project
- ☐ Education/training on energy efficiency
- ☐ Cost information for energy
- ☐ Case studies/exemplary projects
- ☐ Sustainability efforts currently under way in terms of energy use.

### **Materials, Waste, and Recycling Information**

- ☐ Buildings—number of current buildings by types and square footage breakdown on project site
- ☐ How many buildings are built every year (by square footage)
- ☐ How many buildings have been demolished (last 2 years)
- ☐ How many buildings are to be demolished in the next 2 years
- ☐ What type of construction and demolition sorting of waste is currently under way
- ☐ Existing sample specification used for demolition of projects (also renovation and new projects)
- ☐ Sources of the waste stream on the project site (the current distribution of solid waste: paper, glass, plastics, food waste, wood/yard waste, textiles/leather, metals, other in tons per year)
- ☐ How solid waste is handled
- ☐ How hazardous waste is handled
- ☐ Project recycling programs
- ☐ Current solid waste management plan (solid waste diverted from landfill and solid waste delivered to landfill in last 2 years)
- ☐ Hazardous waste and materials generated in last 2 years—breakdown of amounts and types of hazardous waste
- ☐ Solid waste generated and disposal rates
- ☐ Metering/monitoring of waste
- ☐ Restoration sites (note also in site section)
- ☐ Scrap generated and recycled in the last 2 years
- ☐ Education/training about waste reduction (construction/occupants)
- ☐ Cost information on waste
- ☐ Case studies/exemplary projects
- ☐ Sustainability efforts

- ☐ Note what is currently being done about the following:
  - ☐ Asbestos
  - ☐ Polychlorinated biphenyls (PCB) removal
  - ☐ Chlorofluorocarbon (CFC) reduction
  - ☐ Remediation of contaminated sites

### **Operations and Maintenance (O&M)**

- ☐ Existing O&M practices (e.g., landscaping, water, and energy)
- ☐ Commissioning practices
- ☐ Cleaning practices
- ☐ Pest control
- ☐ Painting
- ☐ Feedback systems (e.g., lighting, glare, shades, temperature, and controls)
- ☐ IEQ management programs (e.g., checks for mold/mildew in ducts)
- ☐ Scheduled maintenance—repair and replacement of exterior and interior products and systems
- ☐ Metering/monitoring of systems
- ☐ Education/training on sustainable O&M practices
- ☐ Cost information for O&M
- ☐ Case studies/exemplary projects
- ☐ Sustainability efforts currently under way with O&M practices.

### **Big Picture: Process, Education, and Community Outreach**

- ☐ Procurement—RFP, cleaning contract, etc.
- ☐ Current environmental education (e.g., for employees, vendors, and contractors)
- ☐ Green teams/sustainability charrettes
- ☐ Current exchange of sustainability information with others
- ☐ Cost information for educational endeavors
- ☐ Case studies/exemplary projects
- ☐ Sustainability efforts in the big picture.

## **Appendix F: Sample Evaluation Forms**

### **Workshop Evaluation Form**

1. What was the most positive aspect of the workshop in your opinion?
  
  
  
  
  
  
  
  
  
  
2. If this workshop were to be held again, what three changes would you suggest to make it more effective?
  
  
  
  
  
  
  
  
  
  
3. Was the time for the workshop too short, too long, or just right?
  
  
  
  
  
  
  
  
  
  
4. What do you see as an immediate action item you can undertake in terms of sustainability after participating in this workshop?
  
  
  
  
  
  
  
  
  
  
5. Other feedback that you would like to share:

## Evaluation Form

Please rate sessions from 5 (Excellent, Very Valuable) to 1 (Poor, Not Valuable). Please explain any ratings of “1” so we can learn from your comments.

	<u>Excellent</u>			<u>Satisfactory</u>		<u>Poor</u>
Welcome and Introductions Comments/Suggestions:	5	4	3	2	1	
Session 1 Comments/Suggestions:	5	4	3	2	1	
Session 2 Comments/Suggestions:	5	4	3	2	1	
Session 3 Comments/Suggestions:	5	4	3	2	1	
Session 4 Comments/Suggestions:	5	4	3	2	1	
Etc.						

In the questions that follow, please circle the number that best describes your opinion or circle Yes or No to answer the question. Use the last page of the form to continue your comments or for overall comments.

- Overall, was the charrette content useful and applicable to your current work?  
[right on target]      5      4      3      2      1      [missed the mark]
- Was the material appropriate for your background?  
[too advanced]      5      4      3      2      1      [too elementary]
- Should any topics have been deleted from the charrette?  
Yes (please explain)      No

4. Should any topics have been added to the charrette?  
Yes (please explain) No
5. Do you have any suggestions for improving the participant materials?
6. How would you rate the overall charrette facilitator?  
[Very knowledgeable] 5 4 3 2 1 [Not knowledgeable]
7. What additional training would be useful to you?
8. Other comments?

Name (Optional)

## **Appendix G: Sample Report Outline**

### Executive Summary

1. Charrette Process
2. Charrette Planners and Participants
3. Group 1 Plan
4. Group 2 Plan
5. Group 3 Plan
6. Etc.
7. Appendices
  - Charrette agenda
  - Participant list
  - Presentation handouts
  - Site and project information, including predesign analysis results
  - LEED Green Building Rating System or other relevant codes, standards, or evaluation tools
  - High-performance building Web sites
  - Charrette evaluation summary.

## Appendix H: Sample Presentations

The example presentation slides contained in this appendix are designed to include photos and other visual enhancements for your charrette. If the presenter does not have photos of his or her own, libraries of photos are available (e.g., <http://www.nrel.gov/data/pix/pix.html> and [www.highperformancebuildings.gov](http://www.highperformancebuildings.gov)).

The presentations should be enhanced with examples of the specific principles and strategies outlined on the slides. The experts who will be presenting each session should provide examples from their own experience. Although examples are included on the DOE High-Performance Buildings Web site ([www.highperformancebuildings.gov](http://www.highperformancebuildings.gov)), it is difficult, if not impossible, to present an example that the speaker does not know well. Therefore, we do not recommend speakers using “generic” examples unless there is no other choice.

The sample PowerPoint presentations are listed below.

[Welcome and Introductions - Session 1](#)

[Charrette – Day 2](#)

[Review of Project Information – Session 2](#)

[High Performance Process – Session 3](#)

[Sustainable Sites - Session 4a](#)

[Water - Session 4b](#)

[Energy - Session 5](#)

[Materials and Resources - Session 6](#)

[Indoor Environmental Quality - Session 7](#)

[Other Local Topics - Session 8](#)

[Setting Preliminary Project Goals - Break Out Groups - Session 9](#)

## Session 1 - Welcome and Introductions

### **High Performance Workshop/Charrette**

#### **Welcome and Introductions Session 1**

### **Welcome & Introductions**

- **Welcome!**
- **Introductions of all participants:**
  - Please state your name, affiliation, and high performance knowledge or knowledge area....

### **Workshop Goals**

- Give participants a basic understanding of why there is a need for "high performance"/green facilities and what these facilities should address
- Provide information on an integrated design approach and high performance strategies
- Engage participants in discussion of realistic, doable, and economically viable high performance strategies for the proposed project

## Session 1 Day 2 - Charrette

### **High Performance Workshop/Charrette**

#### **Charrette Day 2**

### **Charrette Overview**

- Evaluate and select green strategies to address site, water, energy, materials, and indoor environmental quality
- Develop drawings to illustrate strategies
- Keep a list of issues, questions, and barriers
- Prepare a summary report for the group on 4 flip chart pages

## Session 2 - Review of Project Information

### **High Performance Workshop/ Charrette**

**Review of Project  
Information  
Session 2**

### **Name of Project**

■ Enter project information here

## Session 3 - High Performance Process

### High Performance Workshop/Charrette

#### High Performance Process Session 3

### Current Impacts of Facilities

- On the Environment
  - Buildings use 40% of the world's energy, 75% of the world's wood, and 16% of the world's water
- On the Economy
  - About 2% of a building's Life Cycle Costs are due to design & construction, 6% for O&M, and 92% for occupant salaries
- On People
  - People spend about 72% of their time indoors...30% of new and renovated buildings have IAQ problems

### Why High Performance Facilities? They...

- Protect the Environment
  - Rely on Renewable Resources
  - Reduce Disruption of Ecosystems
- Make Economic Sense
  - Lower Operating Costs
  - Enhance Occupant Productivity
- Enhance our Quality of Life
  - Promote Health & Safety

### High Performance: How can you tell?

- Green Guidelines
  - Early descriptions of "green"
  - Pennsylvania's Green Guidelines
- Case Studies
  - SCROB
  - Chesapeake Bay Foundation
- Assessments and Data Collection
  - Green Building Rating Systems
  - Metering and Monitoring

### Video

- Case Study
- High Performance Process
- High Performance Strategies
- High Performance O & M
- High Performance Data Collection

### Overview of High Performance Goals



- U.S. Green Building Council's Leadership in Energy & Environmental Design - LEED - Green Building Rating System
  - [www.usgbc.org](http://www.usgbc.org)
  - [www.leedbuilding.org](http://www.leedbuilding.org)
- Site, Water, Energy, Materials, and Indoor Environmental Quality
- Integrated Design

## Session 3 - High Performance Process

### LEED™ Overview



- Can be used as a checklist
- Promotes integrated design
- Provides a start for quantifiable/realistic high performance goals and targets for the design and development team
- Contains prerequisites, credits, and points
- Encourages good design process, innovation, and documentation
- To be adjusted every 3 years to "raise the bar" and address changes in our knowledge base and technology

### LEED™ Levels of Achievement



Total Available Points: 69  
(5 Points -- Design Process)

- Four Levels of Achievement:
  - Certified Level (26-32 points)
  - Silver Level (33-38 points)
  - Gold Level (39-51 points)
  - Platinum Level (52+ points)

### LEED™ Topic Areas



- Sustainable Sites
  - 1 Prerequisite and 14 Points
- Water Efficiency
- Energy and Atmosphere
  - 0 Prerequisites and 5 Points
  - 3 Prerequisites and 17 Points
- Materials and Resources
  - 1 Prerequisite and 13 Points
- Indoor Environmental Quality
  - 2 Prerequisites and 15 Points
- Design Process and Innovation
  - 4 Points

### High Performance Facilities: Implementation

- High Performance Facilities use an *Integrated Design Approach* that is easy to implement with a focus on...
  - Multidisciplinary teams
  - Up-front environmental goals
  - Champions
  - Whole systems approach
  - Follow-through/ Data collection

### Multidisciplinary Teams

- A Multidisciplinary Team Approach should:
  - Engage all team members early in the process
  - Involve Owners, users, designers, facility managers, spec writers, interior designers, etc.
  - Encourage a diversity of team members and an open forum for discussion

### Up-front Environmental Goals

- Up-front environmental goals should be:
  - Clarified early early early in the process
  - Quantifiable
  - Measurable (note method of measurement)
  - Reviewed and confirmed or changed at each stage of the project – 50%, 90%, and FINAL

## Session 3 - High Performance Process

### Champions

- **Identify champions for the project and:**
  - Connect the Champions with the Environmental Goals
  - Identify Champions as the “responsible party” for each action item
  - Encourage Champions to increase their Knowledge base of “Lessons Learned” and share this throughout the process

### Whole Systems Approach

- **Optimize whole project, not individual systems or components**

*“Optimizing components in isolation tends to pessimize the whole system... and hence the bottom line.”*

-Natural Capitalism

### Whole Systems Approach

- **How do we optimize?**
  - Look for synergy from the strategies
  - Link multiple tasks with one strategy
  - Look for reductions in first costs to offset more expensive items

### Whole Systems Approach

- **Example: Choosing a Window – looking at a whole systems approach...**
  - Can the window choice help omit perimeter heating/ cooling OR help downsize the overall HVAC system?
  - Can the window choice help reduce ductwork or other materials?
  - Can the window choice assist with the use of daylighting in the project?
  - Can the window choice help control heat gain and glare?

### Follow-Through

- **Elements of follow-through in a high-performance facility:**
  - Documentation of goals  
Specs, drawings, etc.
  - Data collection (Metering and Monitoring)  
Setting benchmarks and recording against them
  - Commissioning
  - Ongoing Education  
Training, videos, etc.

### Follow-Through

- **Documentation and Data Collection:**
  - Start early, early, early
  - Document throughout the design & construction process
  - Document pre- and post-occupancy
  - Document in an ongoing organized notebook
  - Schedule regular “check-ups” and feedback loops for ongoing documentation that will help to make improvements over time

## Session 3 - High Performance Process

### **Integrated Approach to High Performance Buildings**

#### **■ High Performance Strategies:**

- Know where you are.
- Assemble the best multidisciplinary team to undertake the project
- Set targets and goals for what you want to achieve...
- Identify the best tools and strategies for achieving your stated goals.
- Document your achievements.
- Use documentation and feedback to make improvements over time

### **Integrated Approach to High Performance Buildings**

**"If you don't know where you are  
going, any road will take you there."**

•

**Alice in Wonderland**

## Session 4a - Sustainable Sites

### High Performance Workshop/Charrette

#### Sustainable Sites Session 4a

### Key Principles

- Select the site carefully
- Understand the site
- Protect and restore the site
- Landscape sustainably
- Design **with** the site

### Site Selection

- Developed site or brownfield vs. pristine ecologically sensitive areas
- Existing structure
- Transportation access
- New infrastructure

### Understand the Site

- Landforms
  - geology, topography, soils, hydrology
- Vegetation
- Wildlife habitat and corridors
- Climate/microclimate
  - temperature, solar, wind, rain, humidity
- History of land use
- Aesthetics and views
- Toxics and hazards

### Site Protection/Restoration

- Ecologically significant areas
- Building footprint and associated construction (roads, parking, etc.)
- Stormwater and erosion controls
- Impacts of construction

### Stormwater Management

- Sheet flow vs. concentrated flow
- Infiltration
- Grassed swales
- Constructed wetlands
- Sediment traps
- Stormwater reuse
- Less impervious paving

## Session 4a - Sustainable Sites

### Landscape Sustainably

- Indigenous plants and trees to reduce need for water, fertilizer, pesticides
- Landscape for energy efficiency
- Integrated pest management instead of chemicals

### Design with the Site

- Solar orientation
- Avoid cut and fill
- Natural features for natural heating and cooling, daylighting, drainage, etc.



### Site Summary

- **The best engineered and designed projects feel natural, comfortable, and appropriate to the area. They are maintainable, sustainable, and cost effective.**

### LEED™ Sustainable Sites

Total Available Credits: 14

- (P) Erosion and Sediment Control
- Site Selection 1
  - Avoid inappropriate sites (1 of 5 criteria) (1)
- Urban Redevelopment 1
  - Increase localized density (1)
- Brownfield Redevelopment 1
  - Develop brown field site/remediation according to EPA (1)

### LEED™ Sustainable Sites

- Alternative Transportation 1-4
  - Locate within ½ mile of rail or subway or ¼ mile of 2+ buses (1)
  - Provide bike racks/changing/shower 5% bldg. Occupants (1)
  - Alternative fuel refueling stations for 3% of parking (1)
  - Size parking to minimum zoning and provide 5% preferred parking for carpools or no new parking and provide 5% preferred parking for carpools (1)

### LEED™ Sustainable Sites

- Reduced Site Disturbance 1-2
  - Limit greenfields disturbance to 40 ft beyond bldg. Perimeter, 5 ft beyond roadway/walkway/main utility branch, 25 ft beyond pervious paving areas or restore 50% open area on developed sites (1)
  - Reduce footprint 25% of open space requirements (1)

## Session 4a - Sustainable Sites

### LEED™ Sustainable Sites

- Stormwater Management 1-2  
No increase in existing to developed or  
25% decrease if existing imperviousness is  
greater than 50% (1)  
  
Treatment system to remove 80% TSS,  
40% TP by Best Management practice per  
EPA 840-B-92-002 V93 (1)

### LEED™ Sustainable Sites

- Landscape and Exterior 1-2  
Provide 30% shade or 30% high albedo  
materials or 50% underground parking or  
50% open grid paving (1)  
75% roof is Energy Star compliant or 50%  
vegetated roof (1)
- Light Pollution Reduction 1  
Do not exceed IESNA footcandle levels &  
zero illumination to leave site (1)

### High Performance Workshop/Charrette

#### Water Session 4b

### Key Principles

- Limit landscape water
- Use water-conserving plumbing fixtures and appliances
- Consider water recovery and re-use systems
- Educate building users/facility managers
- Use water-conserving industrial processes

### Limit Landscape Water Use

- Use native plants and trees that require little or no irrigation
- Eliminate lawns and turf grass
- Group plants that require similar irrigation
- Use drip irrigation
- Mulch plantings to help retain water

### Use Water Conserving Plumbing Fixtures

- Low-flow toilets, urinals, faucets, showerheads
- Water-conserving dishwashers, washing machines
- Waterless urinals and composting toilets
- Infrared sensors on toilets, urinals, sinks for self-closing valves

### Low-Flow Toilets

- Gravity flush
- Pressure assisted
- Pump assisted
- Vacuum assisted
- Flushometer valve models

### Consider Water Recovery and Re-use Systems

- Rainwater collection systems
- Greywater recovery and reuse
- On-site wastewater treatment

## Session 4b - Water

### Monitor Water Use Manage Consumption

- Install individual facility water meters
- Document water use and reduction
- Look for big users
- Use common sense in developing conservation strategies

### Educate Building Users and Facility Managers

- Place signs in bathrooms, kitchens to encourage proper use of fixtures and appliances
- Install educational exhibits on water conservation in public areas
- Conduct workshops on water use

### LEED™ Water Efficiency

- Total Available Credits: 5
- Water Efficient Landscaping  
Efficient irrigation tech. Or reduce potable water consumption 50% through reclaimed rain/recycled site water (1) 1-2  
100% reclaimed rain/recycled site water or no irrigation system (1)
- Innovative Wastewater Technologies  
50% reduction in potable water for sewage conveyance or 100% on site wastewater treatment 1

### LEED™ Water Efficiency

- Water Use Reduction 1-2  
Reduce building baseline calculation by 20% (Beyond Energy Policy Act of 1992) (1)  
Reduce building baseline calculation by 30% (1)

## Session 5 - Energy

### High Performance Workshop/Charrette

#### Energy Session 5

### Goals

- Engineer ***whole-building systems*** that effectively integrate passive solar and efficiency strategies to optimize energy consumption such that minimal renewable energy sources can exceed remaining needs.

### Benefits

- Provide Enhanced Comfort
- Energy efficiency and effectiveness ...
  - reduces operating costs
  - frequently enhances productivity
  - may be healthier
  - reduces environmental pollutants
- Use of renewables ...
  - reduces pollutants
  - reduces depletion of finite resources

### What is “Cost-Effective”?

- Is economical
- Provides operational reliability and power stability
- Gives higher user satisfaction and lower HR costs
- Reduces environmental impact
- Integrates the energy efficiency and architecture

### Key Principles

- Develop appropriate building siting, orientation, size
- Use appropriate building envelope strategies
- Use energy efficient lighting, appliances, equipment
- Optimize mechanical systems
- Use renewable/alternative systems
- Integrate all decisions
- Use an iterative design integration process
- Educate building users/facility managers
- Monitor energy performance

### Building Siting, Orientation, Size

- Integrate landscaping into energy strategies
- Orient building to optimize solar and wind
- Build smallest building that will meet needs

## Session 5 - Energy

### Use Appropriate Building Envelope Strategies

- Glazing/windows, placement and size
- Insulation
- Roofing design
- Sun control/shading devices
- Effective daylighting through building geometry, glazing strategies, daylight control, and surfaces

### Glazing Considerations

- Climate
- Application
- Orientation
- Technology
- Heat Transfer
- Solar Heat Gains
- Daylight Transmittance
- Visual Reflectivity
- UV Transmittance

### Insulation for the Walls and Roof

### Structural Insulated Panel

### Use Energy Efficient Lighting and Appliances, Equipment

- Occupancy sensors and energy efficient lighting controls
- Efficient luminaires
- Efficient appliances
- Efficient pumps and motors
- Daylighting

### Daylit Buildings

- Enhanced Visual Quality
- Connection to Nature
- Reduced Energy Cost
- Reduced HVAC
- Environmental Impact

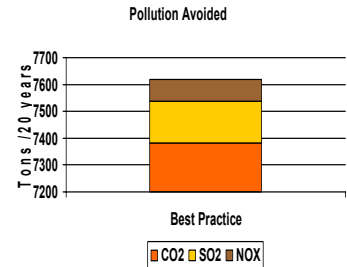
## Session 5 - Energy

### Daylight Design Considerations

- Sources
  - Windows
  - Overhead
- Form Givers
  - Daylight Control
  - Form
  - Glazing
  - Surfaces
- Electric Light

### Savings From Daylighting

- Energy Reduction:
  - kBtu/sq ft/year
- Pollution Avoided:
  - tons/year
- Money Saved:
  - \$k/year



### Optimize Mechanical Systems

- "Right size" HVAC systems
- Consider part-load performance
- Shift or shave electric loads during peak demand periods
- Plan for expansion, but don't size for it
- Commission the HVAC system
- Establish an O&M program

### Use Renewable/Natural Systems

- Passive solar heating
- Active solar water heating
- Building integrated photovoltaics
- Natural ventilation
- Evaporative cooling
- Building mass for natural heating and cooling

### Integrate Decisions

- Consider synergistic effects of decisions
  - increase efficiency/reduce energy demand
  - consider renewables and alternative sources
  - select HVAC systems
- Use an iterative process that revisits previous decisions

### Educate Building Users and Facility Managers

- Place signs to encourage efficient energy use
- Place educational exhibits on energy efficiency in public areas
- Conduct workshops for families and employees on energy use and efficiency

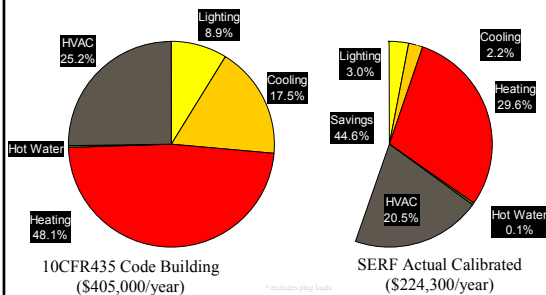
## Session 5 - Energy

### Monitor and Benchmark Energy Performance

- Install individual facility meters
- Document energy savings

### NREL Solar Energy Research Facility (SERF)

### SERF: 45% Energy Cost Savings



### SERF Energy Features

- Direct/indirect evaporative cooling
- Heat recovery
- Trombe wall for Shipping and Receiving
- Variable frequency and high-efficiency motors
- Daylighting in offices
- T-8 lighting on motion/daylight controls
- Highly reflective surfaces

### LEED™ Energy & Atmosphere

- Total Available Credits: 17
- (P) Fundamental Building Systems Commissioning
- (P) Minimum Energy Performance
- (P) CFC Reduction in HVAC & R Equipment

### LEED™ Energy & Atmosphere

- Optimize Energy Performance

2-10

New Bldgs	Existing Bldgs	Points
20%	10%	2
30%	20%	4
40%	30%	6
50%	40%	8
60%	50%	10

LEED™ Energy & Atmosphere	
■ Renewable Energy	1-3
5% (1)	
10% (2)	
20% (3)	
■ Best Practice Commissioning	1
■ Elimination of HCFC's and Halons	1
■ Measurement and Verification	1
■ Green Power	1

## Session 6 - Materials and Resources

### High Performance Workshop/Charrette

#### Materials and Resources Session 6

### Key Principles

- Reduce the amount of materials used
- Select environmentally preferable materials
- Reduce waste during construction and demolition
- Plan and design for future renovation

### Reduce Materials Used

- Reuse existing building
- Reduce size of building
- Optimize building dimensions
- Eliminate materials
- Review maintenance requirements

### Environmentally Preferable Materials

- Re-used / recycled content / recyclable
- Durable / low maintenance
- Low or no emissions / non-toxic
- No CFCs, HCFC's, other ozone depleters (no greenhouse gas replacements)
- Locally-produced
- Low embodied energy
- Certified wood

### Life Cycle Concepts



### Examples of Materials Assessment Tools

- Whole Building Design Guide
- GreenSpec
- Environmental Resource Guide Matrix

## Session 6 - Materials and Resources

### Reduce Waste During Construction/Demolition

- Waste Management Plan
- Demolition waste reuse/recycling
- Manufacturer "take back" programs

### Plan and Design for Future Renovation

- Adaptability and flexibility
- Durability

### LEED™ Materials & Resources

Total Available Credits: 13

- (P) Storage and Collection of Recyclables

- Building Reuse
  - 75% Structure and Shell (1)
  - 100% Structure and Shell (2)
  - 100% Structure and Shell and 50% Non-Shell (3)

1-3

- Construction Waste Management
  - Recycle/Salvage (1)
  - Adv. Recycle/Salvage (2)

1-2

### LEED™ Materials & Resources

- Resource Reuse
  - Salvaged/Refurbished 5% (1)
  - Salvaged /Refurbished 10% (2)

1-2

- Recycled Content
  - 25% of Building Materials (1)
  - 50% of Building Materials (2)

1-2

\*Materials must be at least 20% post-consumer or 40% post-industrial

### LEED™ Materials & Resources

- Local/Regional (within 500 miles) Materials
  - 20% (1)
  - 50% (2)

1-2

- Rapidly Renewable Materials
  - 5%

1

- Certified Wood
  - 50%

1

## Session 7 - Indoor Environmental Quality

### High Performance Workshop/Charrette

#### Indoor Environmental Quality Session 7

### Key Principles

- Eliminate or reduce the sources of indoor pollutants
- Manage remaining pollutants
- Ensure thermal comfort
- Encourage daylighting and visual connection to the outdoors
- Reduce problematic noise

### Eliminate Pollutant Sources

- Materials and finishes
- Cleaning products and equipment
- Moisture to minimize mold and mildew
- Interior pest control
- Radon from soil

### Cleaning Products



### Ensure Thermal Comfort

- Compliance with ASHRAE 55-1992
- Occupant controls
- HVAC systems and maintenance
- Sun shading and glazing

### Encourage Daylighting

- Visual connection to outdoors
- Control of heat gain and glare
- Integration with energy efficiency

## Session 7 - Indoor Environmental Quality

### Eliminate Problematic Noise

- Interior insulation levels
- Adjacent activity spaces
- Noise masking

### IEQ and Integrated Design

- IEQ and energy efficiency
- IEQ and materials
- IEQ and site planning

### LEED™ Indoor Environmental Quality

Total Available Credits: 15

- (P) Minimum IAQ Performance (ASHRAE 62-1999)
- (P) Environmental Tobacco Smoke (ETS) Control
- Carbon Dioxide (CO<sub>2</sub>) Monitoring
- Increase Ventilation Effectiveness  
ASHRAE 129-1997

1

1

### LEED™ Indoor Environmental Quality

- Construction IAQ Management Plan  
SMACNA/on-site protection/filtration media replacement (1)
- Two week flush out or IAQ testing (1)
- Low-emitting Materials  
Adhesives and Sealants (1)
- Paintings and Coatings (1)
- Carpet Systems (1)
- Composite Wood/Agrifiber Products (1)

1-2

1-4

### LEED™ Indoor Environmental Quality

- Indoor Chemical and Pollutant Source Control  
Entryway system/chemical waste disposal and ventilation (1)
- Controllability of Systems  
Operable windows and lighting control/  
200 sf within 15 ft of perimeter wall (1)
- Individual controls (air, temp, lighting) for  
50% non-perimeter areas (1)

1

1-2

### LEED™ Indoor Environmental Quality

- Thermal Control  
ASHRAE 55-1992/1995 (1)
- Permanent monitoring (temp & humidity) (1)
- Daylight and Views  
Minimum daylight factor of 2% in 75% of space (1)
- Direct line of sight to vision glazing for 90% of space (1)

1-2

1-2

## Session 8 - Other Local Topics

### **High Performance Workshop/Charrette**

**Other Local Topics  
Session 8**

### **Relevant Local Topics...**

■ To be inserted

## **Session 9 - Setting Preliminary Project Goals - Break Out Groups**

### **High Performance Workshop/Charrette**

#### **Setting Preliminary Project Goals - Break Out Groups Session 9**

### **The Task**

- Go through the LEED Rating System and determine which prerequisites can be met by the project and which credits could be obtained
- Think about other high performance strategies not included in LEED that the project could use - these might qualify as "innovation credits"

## Appendix I: Examples of Final Charrette Reports

This appendix includes example charrette reports for the projects listed below.

- I-A** [Boston National Historic Park Greening Charrette](#)—Boston National Historic Park comprises several historic sites within Boston, including the Charlestown Navy Yard and the U.S.S. Constitution. The goal of this charrette was to develop specific actions that combine historic preservation and sustainability for the park, with a focus on the Navy Yard. This event was the second in a series that will eventually reach all of the National Park Service Centers of Environmental Innovation.
- I-B** [UNC – Asheville New Science Building Greening Charrette](#)—In an effort to incorporate sustainable design elements into the University of North Carolina’s new science building, a one- and a one-half day charrette was conducted to document and quantify their energy and environmental initiatives. During the charrette planning, partnerships were established with the U.S. Department of Energy to help fund and assist in the charrette process and documentation.
- I-C** [Greenprints Charrette, Southface Energy Institute](#)—Southface Energy Institute hosted its annual Greenprints Conference in Atlanta, Georgia, in 2002. One of the conference highlights was a 1-day high-performance buildings charrette for the institute’s new building. Early in their design process, Southface representatives conveyed that energy and environmental considerations were critical; in fact, one of Southface’s project goals was to be a net-zero energy user. The charrette focused on that net-zero energy target as well as other goals highlighted by the use of the nationally recognized LEED Green Building Rating System.
- I-D** [NCSU High Performance Charrette College of Design](#)—As part of the early schematic design process for this project, North Carolina State University embraced the idea of hold a High Performance Charrette. The charrette focus was to incorporate environmental excellence and high performance in the design of the University’s Leazar Hall Renovation by using the high performance guidelines developed by the Triangle J. Council of Governments. Funding assistance was obtained from the North Carolina State Energy Office, DOE, and the Triangle J. Council of Governments.

## **Appendix I-A**

### **Boston National Historic Park Greening Charrette**

#### **Final Report**

# **Boston National Historic Park Greening Charrette**

## **October 28 – 31, 2002**

### **Charlestown Navy Yard**

### **Summary of Results**

#### **Executive Summary**

Boston National Historic Park comprises several historic sites within Boston, including the Charlestown Navy Yard and the USS Constitution. The goal of this charrette was to develop specific actions that combine historic preservation and sustainability for the Park, with a focus on the Navy Yard. This event was the second in a series that will eventually reach all of the National Park Service Centers of Environmental Innovation.



A diverse group of National Park Service employees, including the Superintendent and Deputy Superintendent of Boston Historic Park, local architects and engineers, and other experts gathered at the Navy Yard for a two-day charrette. The event was preceded by a tour of the Navy Yard to highlight some of the critical issues that would be discussed. The tour addressed the history and critical concerns of the park.



In her welcoming remarks, Deputy Regional Director Sandy Walker noted the link between sustainability and historic preservation. Presentations followed on the Presidio's accomplishments in sustainable design within a historic setting, an overview of Boston National Historic Park, and sustainability initiatives in the Northeast Region. Then, experts introduced participants to key principles and opportunities in the topics to be addressed in the charrette: planning and environmental leadership, transportation, facilities design and construction, operations and maintenance, concessions, interpretation and education, and procurement.



Participants formed small work groups to address topics most relevant to Boston Historic Park. Each group developed a vision, established a “baseline” of current conditions and key issues, and suggested short-term, mid-term, and long-term goals and strategies, as well as “champions” to carry these goals forward.



At the conclusion of the final day, the work groups presented the results of their discussions. Superintendent Terry Savage selected several goals for immediate follow-up and other park employees added to this list of high priorities.

Overall the charrette was invigorating and filled with fun, creative, and thoughtful insights for a realistic and strategic approach to greening Boston Historic Park.

Priority Actions	
Actions	Champions
Communicate results of charrette to entire Boston Historic Park staff	Terry Savage and Dave Brouillette
Prepare a comprehensive strategic campus plan	Terry Savage
Develop a business plan for the Park	Terry Savage
Develop a comprehensive recycling plan	Gene Gabriel
Identify additional partners	Terry Savage, Dave Brouillette, Bill Foley
“Right size” the park vehicle fleet	Dave Brouillette and division chiefs
Re-activate the Green Team	Terry Savage
Try to get funding for developing an EMS that would link to campus plan and business plan	Ruth Raphael
Develop criteria for contracts, based on existing models	Bill Barlow and Marcy Beitel

The remainder of this report presents additional details on the results of the charrette.

## Highlights of Work Group Recommendations:

### GROUP 1 -- Building Capacity for Environmental Leadership

**Vision:** Integrated planning in which all plans are infused with sustainability ... Boston National Historic Park is viewed as a model ... Economic sustainability is reached along with environmental sustainability.



- Communicate charrette results to staff and partners
- Re-activate green team
- Develop an Environmental Management System (EMS)
- Consider a public relations event to highlight sustainability at the Navy Yard
- Prepare a business plan for the park
- Update the GMP with sustainability as an integral component

### GROUP 2 -- Transportation

**Vision:** Coherent and easily understandable network to maximize visitors' use of public transportation ... Park vehicle fleet that meets needs and minimizes fossil fuel use and CO2 emissions ... Park vehicle fleet O&M that is as green as possible.

- Improve visitor transport – Provide better information on public transportation through Park Web site and brochures ... Investigate shuttle and trolley options ... Incorporate sustainable strategies in tour bus parking ... Install bike racks as part of installation of security structures



- Look at renewable energy sources for electric vehicle recharge
- “Right size” the fleet to improve overall efficiency and prepare a Fleet Management Plan ... Obtain more alternative fuel vehicles, including the employee shuttle to downtown Boston ... Use biolubricants
- Develop “take home” messages about transportation, such as amount of CO2 avoided by walking the distance



of the Freedom Trail, etc.

### **GROUP 3 – Facilities and Construction**

**Vision:** Economic sustainability ... Improved functionality (campus concept) ... Showcase a comprehensive project such as Building 5 Visitor Center

- Develop a strategic campus plan for Navy Yard, as well as a comprehensive energy management/conservation plan and a business management plan
- Develop sustainability criteria for RFPs and RFQs, and park SOPs for planning, design, procurement, and products
- Complete at least one comprehensive, sustainable project (instead of the piecemeal approach dictated by funding)
- Implement a stormwater management program including rainwater collection and bioretention/ bioremediation
- LEED-certify all buildings to the extent possible
- Achieve economic sustainability - all projects revenue neutral or positive
- Integrate all sustainability efforts into interpretation



### **GROUP 4 – Operations and Maintenance**

**Vision:** Maintenance becomes a proactive rather than reactive division ... Park maintenance optimizes resources use by minimizing waste, conserving energy and water, eliminating toxins, using recycled, renewable and green products and materials ... Green O&M is interpreted and shared broadly ... Staff level is adequate to enable success.

- Develop a comprehensive recycling program
- Review audit results with staff and get needed training and buy-in; assign responsibilities
- Investigate new janitorial products, in addition to



greener products now in use, and train staff on new products and processes

- Develop a stormwater and rainwater collection plan
- Develop a cyclic maintenance and prevention program



## **GROUP 5 – Interpretation and Education**



**Vision:** Visitors and staff will be motivated by an understanding of the use of resources (energy, waste, water, etc.) through history and how decisions we make today affect the future.

- Design a logo for sustainability at Boston National Historic Park to use in waysides, on vehicles, etc.
- Work on Building 5 plans to green the scope and exhibits
- Review the Interpretation Plan: Weave sustainability messages into current programs
- Conduct tailgate and other staff training sessions
- Weave sustainability into the Teacher Resource Workshop
- Prepare exhibits on the electric vehicles and the use of resources through history
- Develop a “clean trail” along the Freedom Trail highlighting sustainability initiatives using the logo – involve partners along the Trail
- Tell the story of greening efforts – find better ways of promoting results of greening



## Work Group Recommendations:

Each of the work groups developed short-term, mid-term, and long-term goals for their topic area. In addition, they considered the “baseline” or current conditions for that topic. Finally, they assigned “champions” where possible to ensure that each recommendation is carried out. The pages that follow present the results of their discussions.



Thanks to everyone...Boston Historic Park folks as well as the other steering committee members, facilitators, and energetic participants for making this Green Charrette a fun and productive event!

## **Appendix I-B**

### **UNC– Asheville New Science Building Greening Charrette**

#### **Final Report**

# **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**  
**National Renewable Energy Laboratory**  
**US Department of Energy**

Report Submitted November, 2001

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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.

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 participants for the New UNC-A Science Building*



*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:

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 *Site information for the New Science Building* 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



*Greening Charrette Discussions*

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.”

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 NCDORA)  
\$ 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 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 Matthew 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**

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.



*Work group discussing LEED points for Energy*



*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
Kevin Rossy	Ananda Morga	kevinrossy@hotmail.com
Frank Herrera	Architect	r.l.h2@mindspring.com
Steve O. Olin	Boney Architecture	solin@boneyarchitects.com
Peter Alberice	Camille-Alberice Architects	pya@camille-alberice.com
Pat Doyle	Co-Energy Group	pdoyle1@bellsouth.net
John Cort	Cort Architecture Group	plan@cortaia.com
Paul Carter	Fisher Scientific	paulc@vsit.net
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Jeff Yelton	Lee Nichols Architecture	yelton@leenichols.com
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Greg Mills	O'Brien Atkins	gmills@obrienatkins.com
Jay Smith	O'Brien Atkins	jsmith@obrienatkins.com
Jeff Bottomley	O'Brien Atkins	jbottomley@obrienatkins.com
Jim Mason	O'Brien Atkins	jmason@obrienatkins.com
Tom Montgomery	O'Brien Atkins	tmontgomery@obrienatkins.com
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Starlette Brown	State Energy Office	starlette.brown@ncmail.net
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Gregg Kormanik	UNCA - Biology Dept	kormanik@unca.edu
Herb Pomfrey	UNCA - Biology Dept	pomfrey@unca.edu
Jim Mullen	UNCA - Chancellor	jmullen@unca.edu
Tom Byers	UNCA - Chancellor's Office	byers@unca.edu
Bert Holmes	UNCA - Chemistry Dept	bholmes@unca.edu
Herman Holt	UNCA - Chemistry Dept	hholt@bulldog.unca.edu
Keith Krumpe	UNCA - Chemistry Dept	kkrumpe@unca.edu
Steve Baxley	UNCA - Design & Construction	sbaxley@unca.edu
George Brank	UNCA - Design & Construction	gbrank@unca.edu
Melissa Acker	UNCA - Design & Construction	macker@unca.edu
Pam King	UNCA - Design & Construction	pking@unca.edu
Paul Braese	UNCA - Design & Construction	pbraese@unca.edu
Randy Williams	UNCA - Design & Construction	rwilliams@unca.edu
Dee Eggers	UNCA - Environmental Science	eggers@unca.edu
Bobby Buckner	UNCA - Facilities Management	bbuckner@unca.edu
James L Wise	UNCA - Facilities Management	jwise@unca.edu

<b>UNC-A GREENING CHARRETTE PARTICIPANTS &amp; FACILITATORS (cont)</b>		
Lynne Patzig	UNCA - Recycling	lpatzig@unca.edu
Alison McKone	UNCA - Student	
Garth Johnson	UNCA - Unified Solar	solar@bulldog.unca.edu
Matthew Raker	UNCA - Unified Solar	mfraker@bulldog.unca.edu
Rita Stanton	UNCA - Unified Solar	ritapie7@hotmail.com
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Terry Albrect	Waste Reduction Partners	terry.albrecht@ncmail.net
Al Keiser	WRP-Land of Sky R.C.	al@alkeiser.com

<b>FACILITATORS</b>		
Gail Lindsey	Design Harmony	glindsey@ipass.net
Joel Todd		joeltodd@cpcug.org
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:**

- Coordinate 100 feet from wetlands distance in site selection along with energy efficiency (building orientation) and air quality issues

### **3. Alternative Transportation Level II: 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 I: (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

#### **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



*Potential Sites for the UNC-A New Science Building*

#### **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, 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 (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, Low**

**Degree of Commitment: High, 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, Medium (if green roof), Low (if Energy Star compliant roof)**Degree of Commitment:** High, 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: High, Medium, Low**

**Degree of Commitment: High, 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, Low**

**Degree of Commitment: High, 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: High, Medium, Low**

**Degree of Commitment: High, 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, Affiliated 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, Medium, Low**

**Degree of Commitment: High, 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)**  
**Degree of Difficulty: High, Medium, Low**  
**Degree of Commitment: High, Medium, Low**

*^Very doable*

**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)**  
**Degree of Difficulty: High, Medium, Low**  
**Degree of Commitment: High, Medium, Low**

*^Very doable*

**Champion, Contacts, Partners:**

- GBA

**Cost and Schedule Considerations:**

- Standard costs and scheduling

**Barriers, Issues, Questions:**

- None

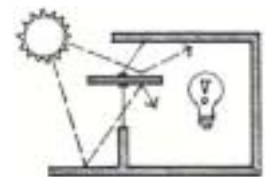
**Strategies, Action Items, Details:**

- None

**Integrated Issues/Synergies and Conflicts:**

- None

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

**Degree of Commitment: High, Medium, 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: High, Medium, Low**

**Degree of Commitment: High, Medium, Low**

**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: High, Medium, Low****Degree of Commitment: High, Medium, 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: High, Medium, Low****Degree of Commitment: High, 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****Degree of Difficulty: High, Medium, Low****Degree of Commitment: High, Medium, Low***\$^Medium difficulty***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”

**Integrated Issues/Synergies and Conflicts:**

- Can be used for walk-in cooler and heat rejection

*Energy presentation***(f) Indirect Lighting/ Daylighting/ Occupancy Sensors****Degree of Difficulty: High, Medium, Low****Degree of Commitment: High, Medium, Low***\$^Very doable*

**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, Medium, Low****Degree of Commitment: High, 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: High Medium, Low****Degree of Commitment: High, 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, Medium, Low**

**Degree of Commitment: High, Medium, Low**

**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, Medium, Low

**Degree of Commitment:** High, 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, Low

**Degree of Commitment:** High, 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*

<b>Other thoughts on Energy Efficiency considerations for the UNC-A New Science Building:</b>
---

**(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, Low**

**Degree of Commitment: High, 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, Medium, Low**

**Degree of Commitment: High, 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, Medium, Low

**Degree of Commitment:** High, 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, Medium, Low****Degree of Commitment: High, 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:** High, Medium, 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)**  
**Degree of Difficulty:** High, Medium, Low  
**Degree of Commitment:** High, Medium, Low

*^Very doable*

**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)**  
**Degree of Difficulty:** High, Medium, Low  
**Degree of Commitment:** High, Medium, Low

*^Very doable*

**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, Low****Degree of Commitment: High, 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, Low****Degree of Commitment: High, 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, Medium, Low**  
**Degree of Commitment: High, 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)**

**Degree of Difficulty:** High, Medium, Low

**Degree of Commitment:** High, Medium, Low

*^Very doable*

**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)**

**Degree of Difficulty:** High, Medium, Low

**Degree of Commitment:** High, Medium, Low

*^Very Doable*

**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, Medium, Low**

**Degree of Commitment: High, 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!*

## **Appendix I-C**

### **Greenprints Charrette Southface Energy Institute**

#### **Final Report**

# **Greenprints Charrette: Southface Energy Institute New Building**

This report is a summary of the *High Performance Buildings Charrette*  
Conducted at the Greenprints Conference on February 21-22, 2002

**Funding and coordination provided by:  
Southface Energy Institute  
National Renewable Energy Laboratory  
US Department of Energy**

Final Report prepared by Design Harmony, Inc.  
In cooperation with:  
NREL and BuildingGreen

# **High Performance Buildings Charrette: Final Report**



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## EXECUTIVE SUMMARY

Southface Energy Institute, a leader in energy and environmentally conscious educational efforts, hosted their annual Greenprints Conference in Atlanta, Georgia at the end of February 2002. One of the conference highlights was a one-day High Performance Buildings Charrette (an intensive and focused brainstorming session involving a wide variety of experts) for their new institute building addition. Early in their design process, Southface conveyed that energy and environmental considerations were critical; in fact, one of Southface's project goals was to be a net-zero energy user. The charrette focused on that net zero energy target as well as other goals highlighted by the use of the nationally recognized LEED Green Building Rating System.

The main goal was to identify realistic and cost-effective sustainable measures that the new Southface facility could implement, and the charrette provided an effective means to engage numerous conference participants in a hands-on effort to attain it. In planning the charrette, Southface identified the US Department of Energy and the National Renewable Energy Laboratory as partners. They helped fund and assist in the charrette process and documentation. Ongoing relationships with these partners and with the diverse and knowledgeable charrette participants will not only aid Southface reach the stated energy and environmental commitments, but remain beneficial long after this project has been established as a leader in the field.

The charrette proved to be an effective method for collecting viable high performance building ideas and strategies for the New Building Addition to the existing Southface Energy Institute facility. Many of the ideas and strategies addressed environmental excellence and high performance concepts found in the LEED Green Building Rating System. Approximately 55 individuals participated in the high performance buildings charrette. They came from a wide variety of backgrounds and fields: Southface employees, architects, engineers, government employees, green building consultants, university staff members, builders, and public & private company representatives. Six breakout groups were created and all participants were assigned to one of these groups; each group was tasked to design a "net zero" energy addition to Southface and brainstorm ideas and strategies to meet a LEED Platinum level for the addition.



*Greenprints Charrette participants listening to Southface speakers*

National experts in "integrated design", LEED, and energy efficiency helped to facilitate the charrette while representatives from Southface provided information on the project program, site, and goals. The charrette participants shared their creative thoughts and ideas, questioned original project assumptions, and ultimately came up with innovative solutions and strategies for a high performance new Southface addition.

**The ultimate goals of this charrette were to:**

1. Inform and educate charrette participants about energy and environmental implications of designing and constructing a new addition for the Southface Institute, while clarifying the term “integrated approach”, so that they could effectively use the LEED Green Building System to help define a high performance building.
2. Identify economically viable and doable strategies that Southface could implement in their New Building and, in doing so, attain a high LEED rating and, perhaps, “go beyond” the rating.
3. Establish a database of outside contacts and interested parties that could provide potential champions for the project.
4. Document the charrette both as a training tool for future high performance charrettes and also as a source of information to assist Southface with their new facility’s “next steps”.
5. Use the new addition to initiate a benchmark for environmental excellence in design and construction on a commercial level as the existing Southface structure has done for the residential level; outline energy and environmental initiatives that will establish Southface as a model for other similar facilities.



*Dr. Paul Torcellini, NREL, and Mike Chapman, AIA, NAVFAC, discuss high performance strategies identified by charrette participants*



*LEED Green Rating System used as a reference and a “starting point”*

Throughout the High Performance Buildings Charrette, the overall large group of charrette participants and the smaller “break-out” groups all reviewed the LEED Green Building Rating System points. The participants determined that out of a potential 69 point system, the New Southface Building target should be 52 + points; thereby attaining a **PLATINUM** achievement level in the rating system. More in-depth review and research are needed on some potential points, while other selected points are indeed “very doable”. The charrette participants used LEED as a resource and discussed ways to “go beyond” LEED. (See the Southface LEED matrix in the Appendix).

With their commercial addition, Southface is embarking on a new level of education not only for its visitors and staff, but also for a much larger “community”.

## **IMMEDIATE NEXT STEPS**

### **1. Benefit from Charrette Ideas**

- Review input and ideas from the charrette; when beneficial, contact charrette team members for further input. Provide copies of the charrette report and charrette drawings/ideas to the Southface addition's future design team.
- Review and revisit goals established during the charrette and create a schedule for attaining these goals and other targets.
- Identify champions and partners for the ideas and strategies noted during the charrette; identify gaps in knowledge required to implement specific charrette ideas.

### **2. Set up a project sustainability research schedule; identify and collect tools & resources**

- Acquire more in-depth information on targeted LEED points. Add comments and potential costs/savings to the Southface LEED matrix (See Appendix).
- Assign specific people the responsibility for information & resource collection for potential high performance efforts; 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, Best practice high performance specifications, case study information – See Southface Resources and web site listings in the Appendix).



*Greenprints Charrette participants from around the country provided a wealth of high performance knowledge*

### **3. Continue to make this project an educational endeavor**

- Create a videotape- documenting not only the project, but also the process.
- Document “Request for Proposal” and A+E selection criteria.
- Determine how to coordinate classroom education/training with the built facility.
- Document the “Lessons Learned” throughout this project in order to teach others; share information from this project with others; set up a network for conveying the sustainable design knowledge effectively
- Consider being a case study on the US DOE High Performance website; review its case study template. The information requested will actually assist the design team throughout the design and construction process. (See web address on the Southface Resources listing in the Appendix)

## CHARRETTE PROCESS

Southface Energy Institute, in planning for the new commercial addition to their existing “residential” educational facility, sought a net zero energy user facility as well as a one that would address energy efficiency and sustainable initiatives using the nationally recognized green building rating system, LEED. To help catalyze their focus, they sought partnerships with the US Department of Energy and the National Renewable Energy Laboratory to initiate a “High Performance Buildings Charrette”. (A charrette is a sustained, intensive brainstorming session in consideration of a project, 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 Southface New Building High Performance Buildings Charrette, approximately 55 participants from various backgrounds assembled at the 2002 Greenprints Conference in Atlanta, Georgia for the one-day event. The charrette participants worked both in a single large body and as six focused working groups. Their goal: to identify realistic and cost-effective “high performance” opportunities and objectives that would not only improve the project’s efficiency levels but also satisfy the requirements of the LEED Green Building Rating System.



*Charrette participants engage in a “hands-on” approach to high performance design*

Throughout the daylong charrette, a mixed format prevailed; presentations to the participants about project programming, site considerations, and sustainability topics were linked to breakout work sessions. At these sessions, the participants worked toward the formulation of specific sustainability opportunities and recommendations for the design of the new facility.

### **THURSDAY (February 21, 2002)**

A one-hour evening gathering prior to the charrette provided participants with a chance to get acquainted and to hear Dennis Creech, one of the originators of the Southface Energy Institute, deliver a brief overview of the project program, site, and goals. Dennis added a critical insight to the charrette endeavor, reminding participants that Southface Institute has had a long history of commitment to high performance buildings and a passion for educating others about this critical topic.

During this evening gathering, Dr. Paul Torcellini of the National Renewable Energy Laboratory gave a short PowerPoint presentation that gave a “kick-start” to the charrette brainstorming. His presentation centered on the discussion of “value” and, in particular, the value of high performance buildings. Rounding up the evening, Gail Lindsey, FAIA, overall facilitator for the Southface charrette, added logistical instructions and assigned the participants to their breakout groups for the next day.



*PowerPoint presentation on the “value” of high performance design and construction*

## **FRIDAY (February 22, 2002)**

Dennis Creech and Mike Barchik of Southface Institute started the Charrette on Friday morning with a more in-depth look at the existing Southface Institute building and discussed the need for a commercial addition to the current “residential” teaching facility. Energy and environmental goals and targets were also covered (such as the structure being a net zero energy user.) Southface also raised the concept of “Regenesis” or “closed loop/cradle to cradle” non-waste for their new facility.



*Mike Barchik and Dennis Creech present Southface project program, site, and overall goals*

Dru Crawley, US DOE and Paul Torcellini, NREL as funders and supporters of this charrette made introductory remarks and welcomed Southface as a partner in high performance building efforts. Short introductions of the participants and logistics followed.

Next came a viewing of the 20-minute video, “Growing Smart – The Chesapeake Bay Foundation Merrill Center”, about the first LEED Platinum building. The video set the stage for the charrette by showcasing sustainable initiatives and challenging the group to commit to sustainability and its implementation at a Platinum level.

After the video, Gail Lindsey addressed the participants about the expectations for this high performance charrette. Gail voiced the desire to have tangible benchmarks and goals and to format the charrette in a manner that would allow others to easily learn from this experience.

Immediately following the video, the charrette participants were assigned to one of the six break-out working groups and were asked to review the LEED rating system checklist to determine which points/credits were appropriate for this specific Southface project. After approximately an hour, the participants reassembled as a large group and discussed their findings. The overwhelming consensus was that this project, with Southface as an innovative leader in energy and environmental concerns with “in-house” expertise, should strive for at least 52 points out of the possible 69 points, thus achieving a Platinum LEED rating.

Once the targeted LEED points were selected, the charrette participants went back to work in their assigned breakout groups. (Each breakout group was made up of 8-9 participants from varied disciplines and “high performance” knowledge levels.) The break-out groups were then asked to begin designing and creating their solutions to the project based on the LEED strategies as well as innovative and “beyond LEED” initiatives. This activity took the remainder of the day until the late afternoon presentations from each group. (Box lunches allowed the participants to have a working lunch and enjoy a period for “cross-pollination” of ideas and strategies.)



*Large group discussion and consensus on the LEED rating system credits and points*

At 3:30 in the afternoon, each group was asked to appoint a speaker or several speakers to relay their findings, insights, and strategies. These presentations generated good discussions and fruitful exchanges. Several participants had previously voiced skepticism that much could be accomplished in a one-day charrette but after the six work group presentations, several of those skeptics had been “converted” and expressed that they were both amazed and impressed. The participants voiced their support and approval for the endeavor and its results. A striking discovery- the original assumed location for the new Southface addition was questioned by several work groups and an alternative location warranted a closer look after the charrette input.

Closing comments were given by participants, facilitators, and Southface staff; many felt the charrette identified opportunities that were doable, attainable, made good business sense AND could be integral to a long-range vision of high performance design and education at Southface Institute. By the conclusion of the High Performance Buildings Charrette, participants felt that with continued research, consistent reviews, teamwork, and partnerships, most targets set in this charrette could be attained.

The charrette ended in time to transport the charrette drawings/boards to the Southface Institute for the Friday night Greenprints reception. During the reception, the charrette work was exhibited and presentations were made to other conference attendees – spreading these ideas and insights to a wider audience and welcoming their input and feedback.

## **FACILITATORS**

### FACILITATORS:

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*Paul Torcellini, Mike Barchik, and Drury  
Crawley – Charrette facilitators*

## CHARRETTE FOCUS -- PROJECT INFORMATION

### PROJECT CONSIDERATIONS: Southface New Building

- Mixed-use integration
- Common entry point between existing Southface structure and new building
- Commercial Demonstration project
- Sample floor plates:  
Breakout work groups 1-3: Design a 2 story 1,500 - 2,000 sq. ft. new building  
Breakout work groups 4-6: Design a 3 story 2,500 - 3,000 sq. ft. new building
- Design for \$150. per sq. ft. cost
- Spaces to design for: Offices (closed/open), restrooms, connector spaces, conference/educational spaces, and storage (possible storefronts on first floor)
- Elevator to connect to existing second level
- Site planning issues



*Charrette Focus Issues were presented to the six breakout groups as overall project considerations to take into account while they designed energy and environmental strategies for the new building.*

## GROUP 1

### PARTICIPANTS:

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*Group 1 Team members*

Participants in this breakout group came up with numerous individual concepts and high performance ideas while sharing their findings collectively.

## **GROUP ONE -- HIGHLIGHTS**

### **High Performance Ideas and Strategies from Group 1:**

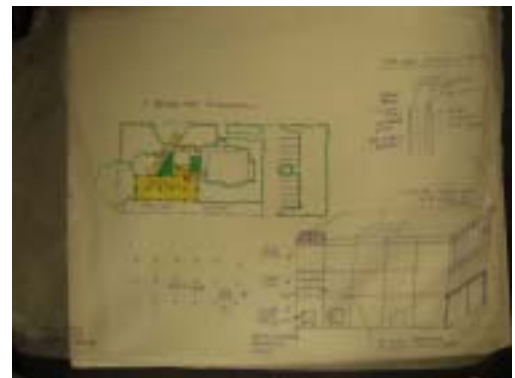
#### Concept A:

- Build to the east of the existing structure
- Retain existing new garage
- Entry between new and existing buildings
- Cisterns as visual art
- PV trellis to shade parking
- Outdoor classroom area
- Urban trellis from urban deconstruction
- Edible landscaping, fruit trees, and permaculture



#### Concept B:

- Design for future disassembly
- New building placed at rear of property
- 2,560 sq. ft. of three levels
- Lower level for vehicles
- 16' x 16' grid of building integrated PV
- Glass curtain wall
- Modular green/vegetated roof
- Visible water catchment and treatment system



#### Concept C:

- Build addition on top of existing structure:
- Remove top story and attic of existing structure
- Add one large 2,700 sq. ft. upper story
- Retain daylight
- Use flat roof as a roof garden
- Install elevator within existing structure to access all floors
- Accessible parking
- Solar considerations – shading on West and South
- PV shading on south
- Shade from existing building in the rear



**Additional ideas:**

- Nature trail
- Pervious pavers for parking area
- Composting toilets
- Living Technologies waste system
- PVs for shade and visual education



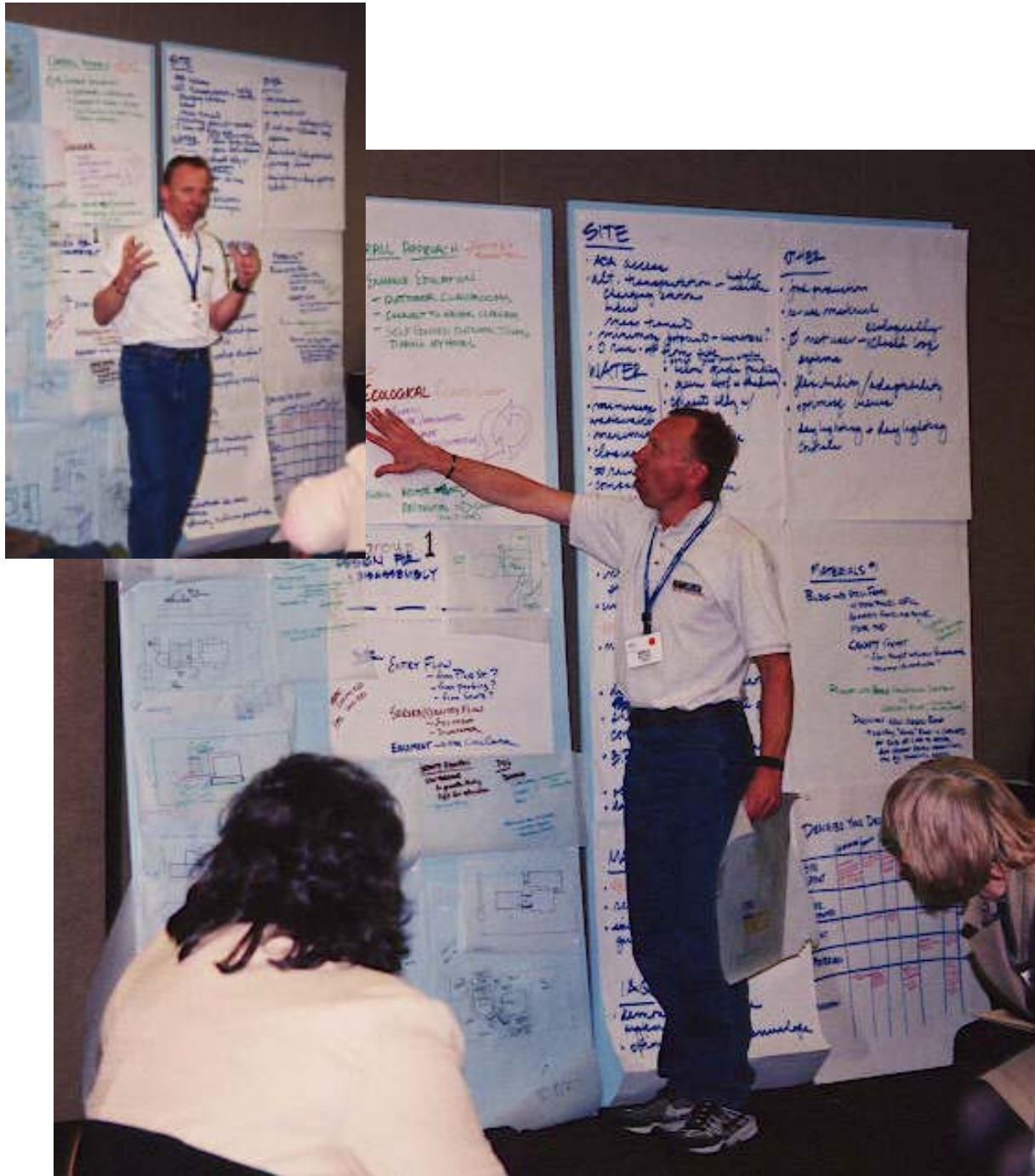
*Above: Group 1 participants engage Mike Barchik in a discussion about the project goals*

*Left: Sketch of a potential water collection and treatment system for the new Southface project*



*Group 1 participants work individually on their concepts while brainstorming together throughout the process*

## Final Reporting Out from Group 1:



*Karlis Viceps presents the concepts and ideas generated by Group 1 participants*

## GROUP 2

### PARTICIPANTS:

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*Group 2 Team Members*

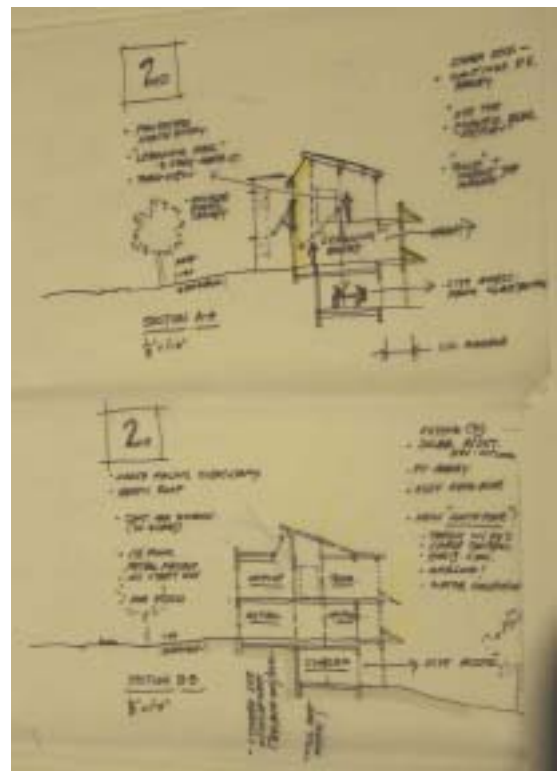
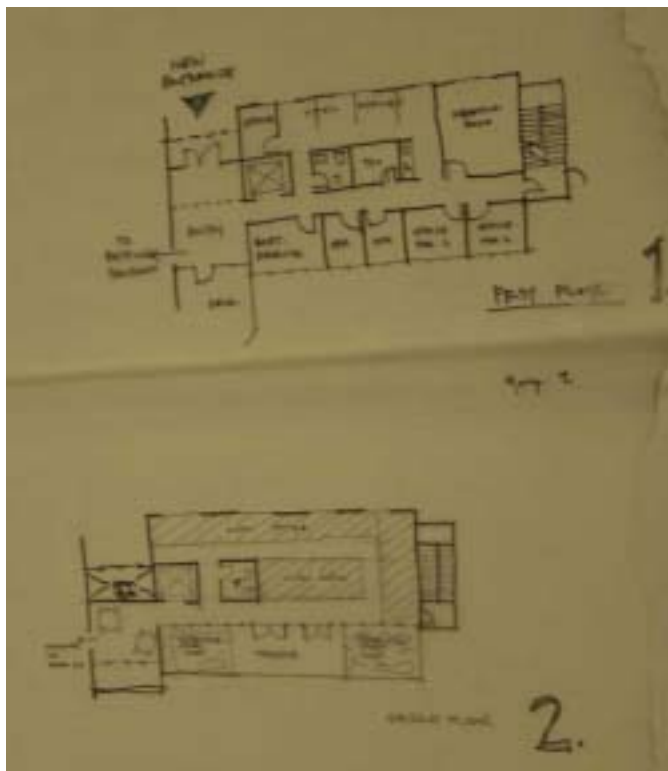
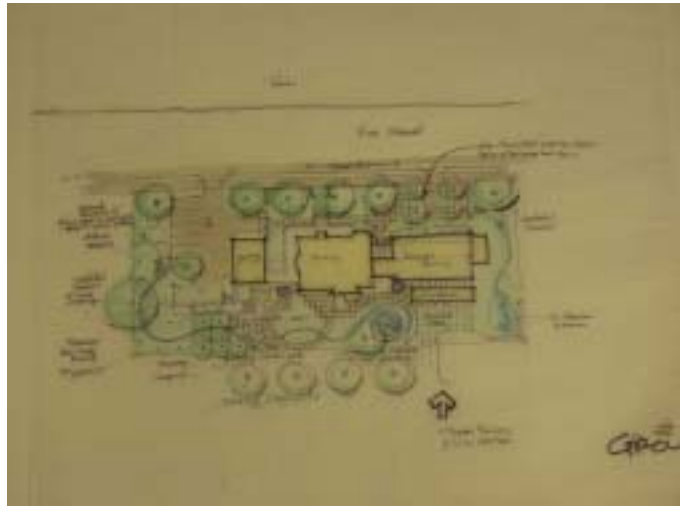
Participants in this breakout group came up with general project goals then collectively worked on one overall site and building concept with elevations, floor plans, and details.

## GROUP TWO -- HIGHLIGHTS

### High Performance Ideas and Strategies from Group 2:

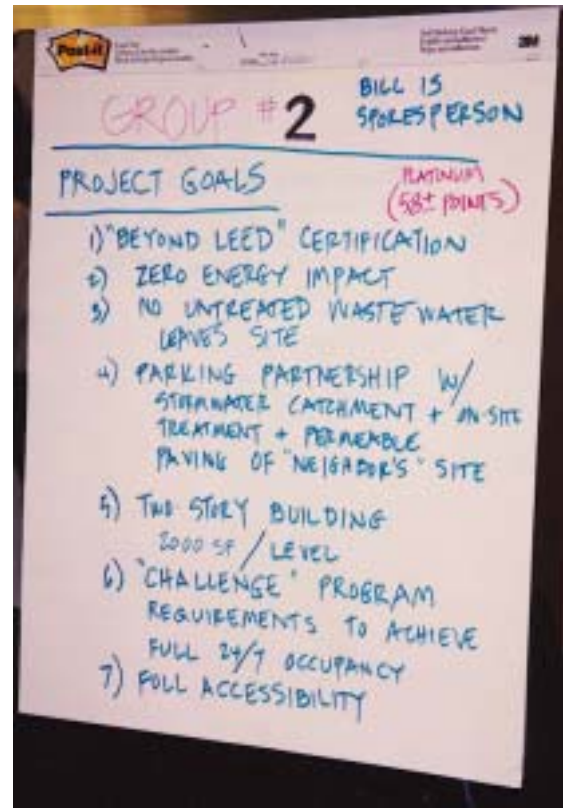
#### Overall Project Goals:

- Go beyond LEED Green Building Rating System Certification
- “Net-zero” Energy Impact
- No untreated wastewater to leave the site
- Establish parking partnership with stormwater catchment, on-site treatment, and permeable paving
- Create a two-story building
- Challenge existing program to develop a 24/7 usable facility
- Provide for full ADA accessibility



### Project ideas and strategies:

- Keep existing structures in place as they are; reuse garage
- Add new building to east of existing structure
- Living machine to be added to the rear of the new structure
- New service area to rear of proposed living machine
- Multi-purpose outdoor urban plaza
- Vegetated swales with rock outcroppings
- Street parking
- Relocate existing parking to west of garage
- Use porous paving for parking area
- Create an orchard area with fruit trees
- Designate an outdoor composting area
- Shade new building deck with continuous PV array
- Protect North “common” entry
- Create a entry “learning hall” with two story north light
- First floor to have retain façade on street side
- Full ADA accessibility
- Site access from lower level classroom



*Group 2 overall project goals*



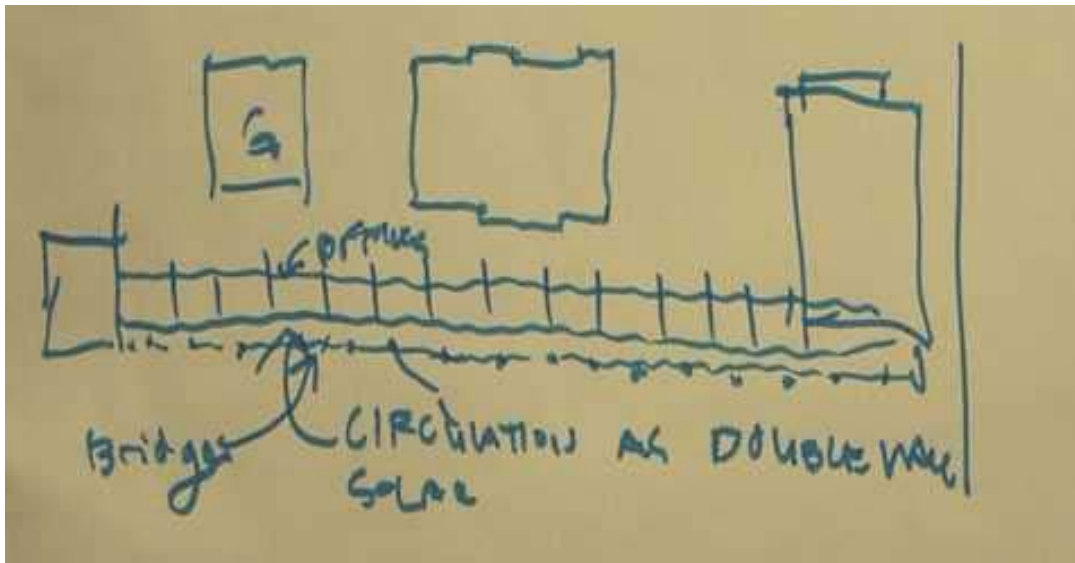
*Group 2 team members work collectively on their project ideas*

### MAIN concept:

#### New “South Face”

- Second floor terrace
- Trellis with PV
- Shade control
- Horizontal circulation
- Overlook
- Water collection

## Final Reporting Out from Group 2:



*Reporting out by members of Group 2 highlighting their new Southface building to the east of the existing structure*

## GROUP 3

### PARTICIPANTS:

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*Group 3 Team Members*

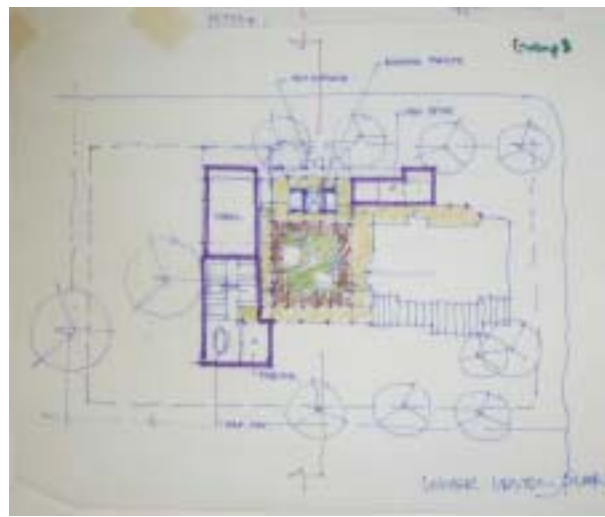
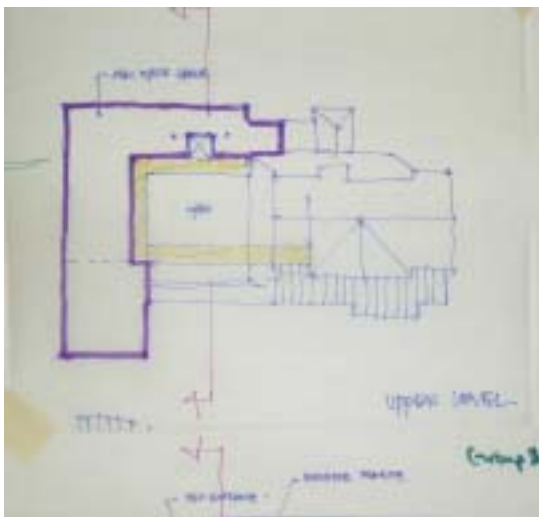
This breakout group showcased a zero energy use elevator, a central garden courtyard and a new building connected to the existing by the courtyard space.

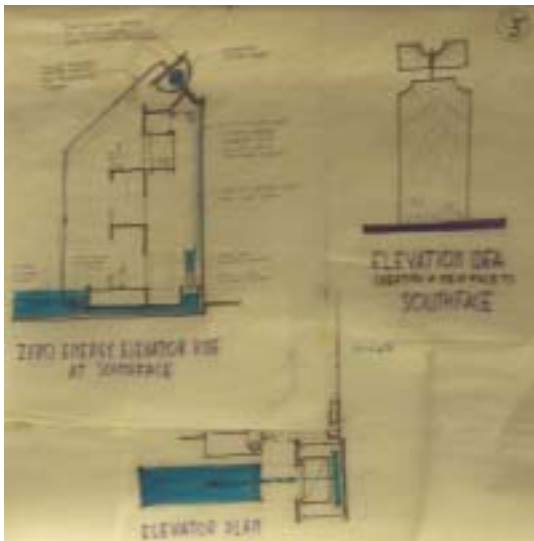
## GROUP THREE -- HIGHLIGHTS

### High Performance Ideas and Strategies from Group 3:

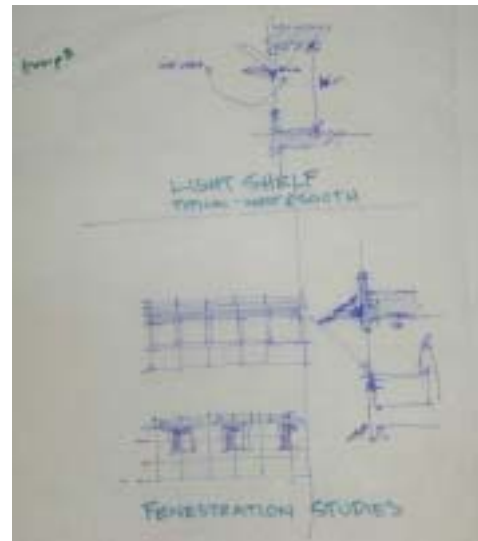
“Creating a new face to Southface”

- Relocated existing garage and built new structure in its place
- Totally new street front entrance
- New retail to one side of entry and office space in front of existing Southface structure
- Zero energy elevator as building attraction and ride at new entrance
- Central inner courtyard
- Circulation around inner courtyard
- Direct view to inner courtyard from entrance and elevator
- New office space on upper level
- Lightshelves typical on South and West elevations
- PVs as prominent exterior architectural elements
- Offices, Conference room, and director's office towards rear of structure
- Inner office walls of rice paper (recyclable, lightweight, flexible, and natural)





*Zero energy elevator sketches*

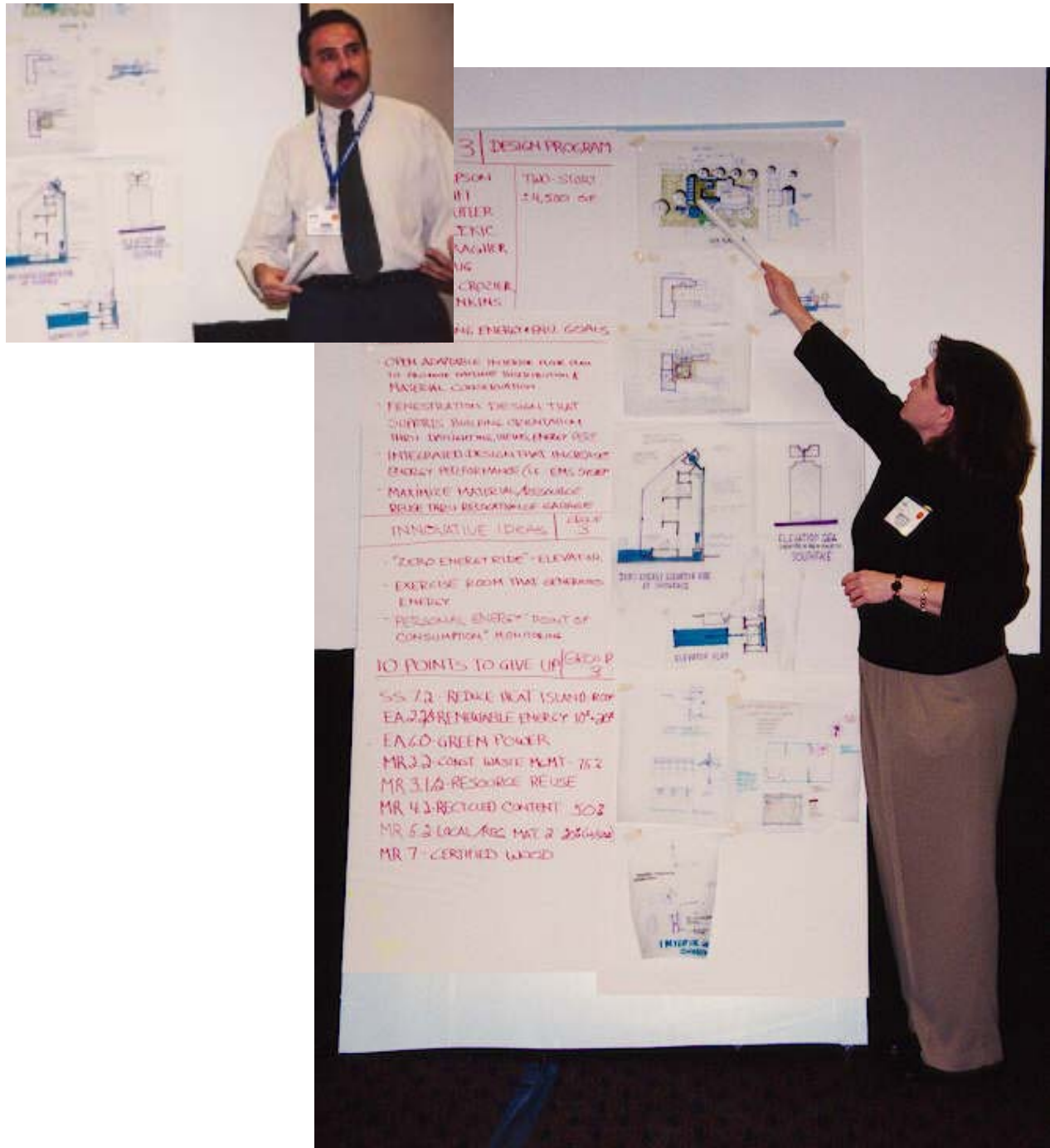


*Light shelf and fenestration studies*



*Group 3 participants work together on their central courtyard concept*

### Final Reporting Out from Group 3:



*Emad Afifi and Mary Pat Crozier report back to the larger charrette group on their Group 4 ideas: A new front façade (a new face to Southface”), a zero energy elevator, and a central courtyard.*

## GROUP 4

### PARTICIPANTS:

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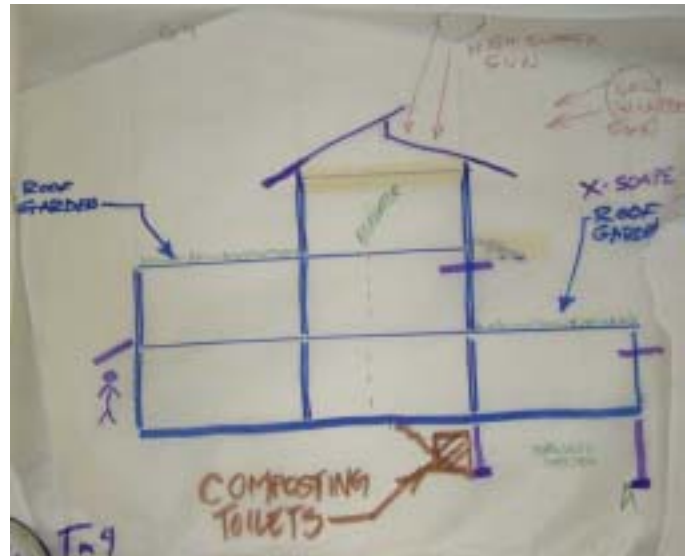
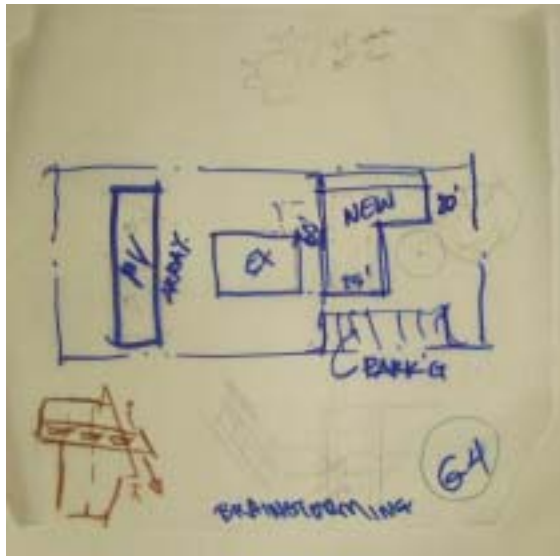
*Group 4 Team Members with Robert Korbet, one of the charrette facilitators.*

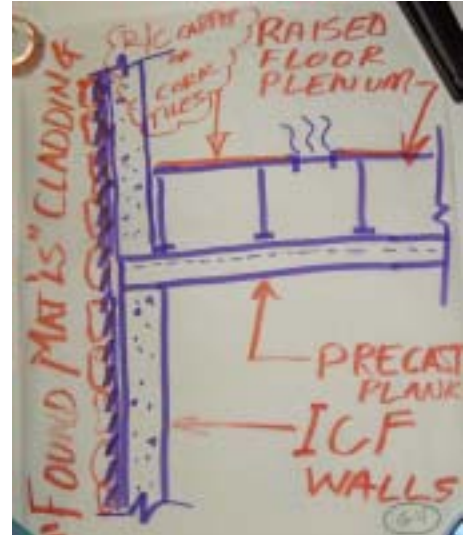
Participants of Group 4 located the new commercial building with first floor street level retail/storefront office space west of the existing Southface structure (removing the existing garage) and added a large PV array above the existing parking area.

## GROUP FOUR -- HIGHLIGHTS

### High Performance Ideas and Strategies from Group 4:

- New common front entry with second story glazed walkway between existing building and new addition
- New L-shaped commercial building in place of existing garage
- Storefront/retail/offices on first floor street level for new building
- Roof gardens/roof plaza
- Composting toilets and earth tubes
- PV array located above existing parking area
- Found materials as exterior cladding for new building
- IFC walls, raised floor plenum, structural paralam trusses, and recycled carpet or cork tiles for flooring





*Participants of Group 4 developed high performance building strategies and design details.*



*Group 4 participants work as a whole to create their site and building concepts.*

## A man with a beard and glasses, wearing a white long-sleeved shirt, is pointing with his right hand to a hand-drawn site plan on a large sheet of paper. The plan depicts a building footprint with a gabled roof, a parking area with several spaces, and surrounding streets. The man is standing in front of a wall that has other documents pinned to it, including a map of the area. The site plan includes labels for 'PARKING', 'STREET', and 'BUILDING'. The man is also wearing a name tag that says 'JOHN'.



*Group 4 team members report back to larger charrette audience on their ideas and innovations.*

## GROUP 5

### PARTICIPANTS:

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Wright Gardner	(404) 946-6826	<a href="mailto:wgardner@tvsa.com">wgardner@tvsa.com</a>
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*Group 5 Team Members*

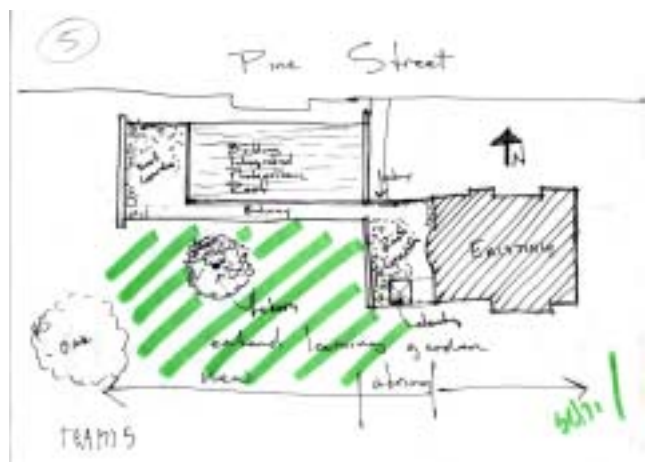
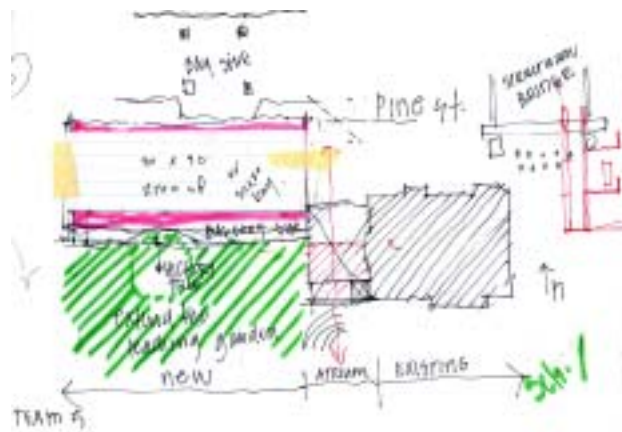
Group 5 team members worked collectively on two schemes; scheme one removed the existing Southface garage and located the new building in its place while the second scheme built the new commercial structure over the existing parking lot.

## GROUP FIVE -- HIGHLIGHTS

### High Performance Ideas and Strategies from Group 5:

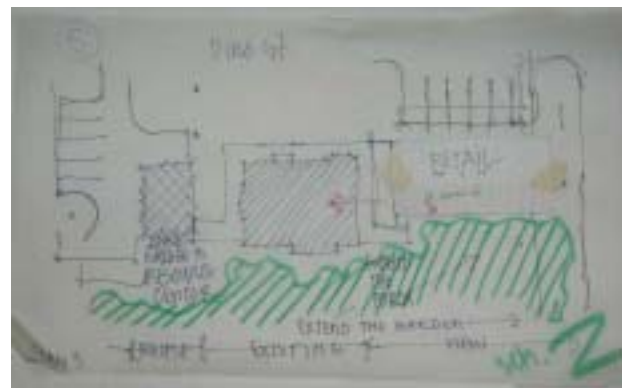
#### Scheme 1:

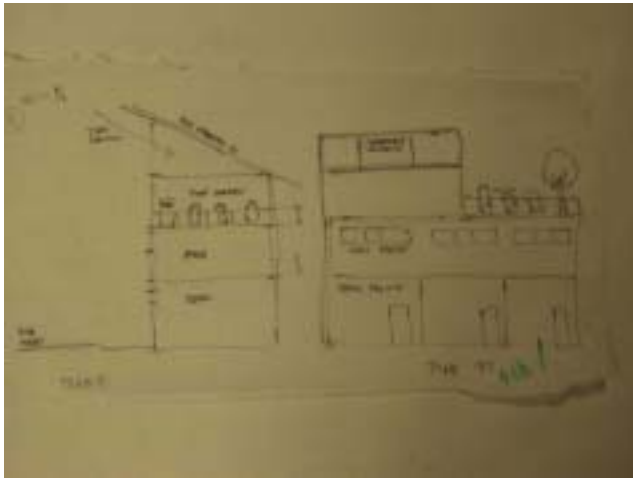
- Remove existing garage and locate new building in its place and close to Pine Street
- New building to have roof integrated PV and roof garden
- Entry connector to two buildings to have garden atrium and elevator
- New building to have clerestory windows, and light shelves
- Structural bridge/balcony between the two structures
- Extend porch and existing teaching garden



#### Scheme 2:

- New building located above existing parking lot
- New building to have retail on first floor street level
- New building to be three levels with parking below (2,700 – 3,00 sq. ft. per level)
- Existing Southface garage to be reused as Resource Center
- New elevator to access all floors of new and existing structures





*Group 5 participants sketch project elevations, strategies, and details*



*Participants of breakout Group 5 brainstorm their two distinct schemes and refer to the LEED Reference Guide*

## Final Reporting Out from Group 5:



*Terry Osborn, Diana Tracey, and other Group 5 members explain their two distinct concepts for the new Southface building*

## GROUP 6

### PARTICIPANTS:

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Cindy Meehan-Patton	(828) 251-5888	<a href="mailto:sheltereco@earthlink.net">sheltereco@earthlink.net</a>



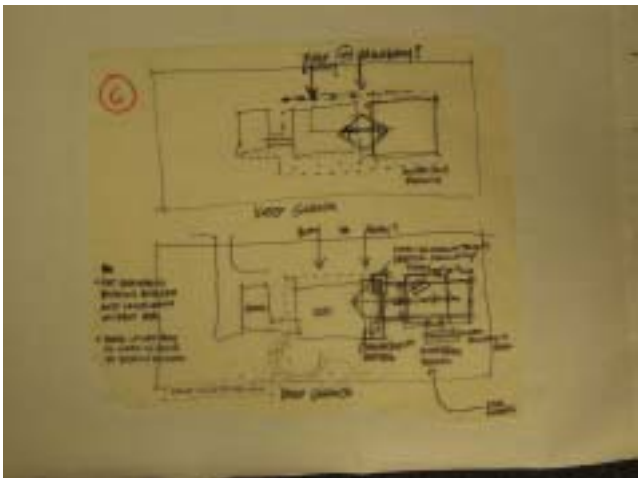
*Group 6 Team Members*

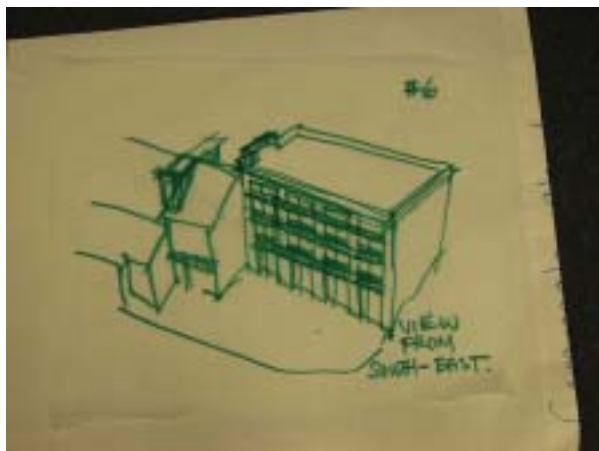
Group 6 team members located their new Southface commercial building to the east of the existing building working with an “urban infill” concept.

**GROUP SIX -- HIGHLIGHTS**

### High Performance Ideas and Strategies from Group 6:

- New building does not disturb existing building, garage, or landscaping/rock on the west side of the property
- Keep existing gardens and protect existing trees; add street trees along Pine Street; keep geothermal
- Locate new building on east side of existing Southface structure
- New commercial building to be three levels (basement plus two levels above); each level to be approximately 950-1,000 sq. ft.
- Use existing entry to Southface; add entry courtyard between the two structures and allow for secondary entrance from courtyard into new building
- Create a glass enclosed bridge between the two structures with open structural stairs ; install biotreatment water cisterns accessible from stair landings
- New building as urban infill; address street front as commercial building
- New structure to have PV array, daylighting, light shelves, and roof garden (edible landscaping on roof a possibility)
- Install composting toilets in new structure
- Allow new building to be expandable
- Break up new building to work with scale of existing Southface building
- Create a strong connection between indoors and outdoors; create an outdoor seating wall behind the new building
- No change in vehicular access
- Remove existing parking and locate new parking in the rear behind the new facility (add handicap parking in the rear as well and address ADA accessibility to new building; reclaim civic parking
- Insert a bioretention area in rear of property





*Section and elevation perspective drawings of the new commercial Southface structure by Group 6*

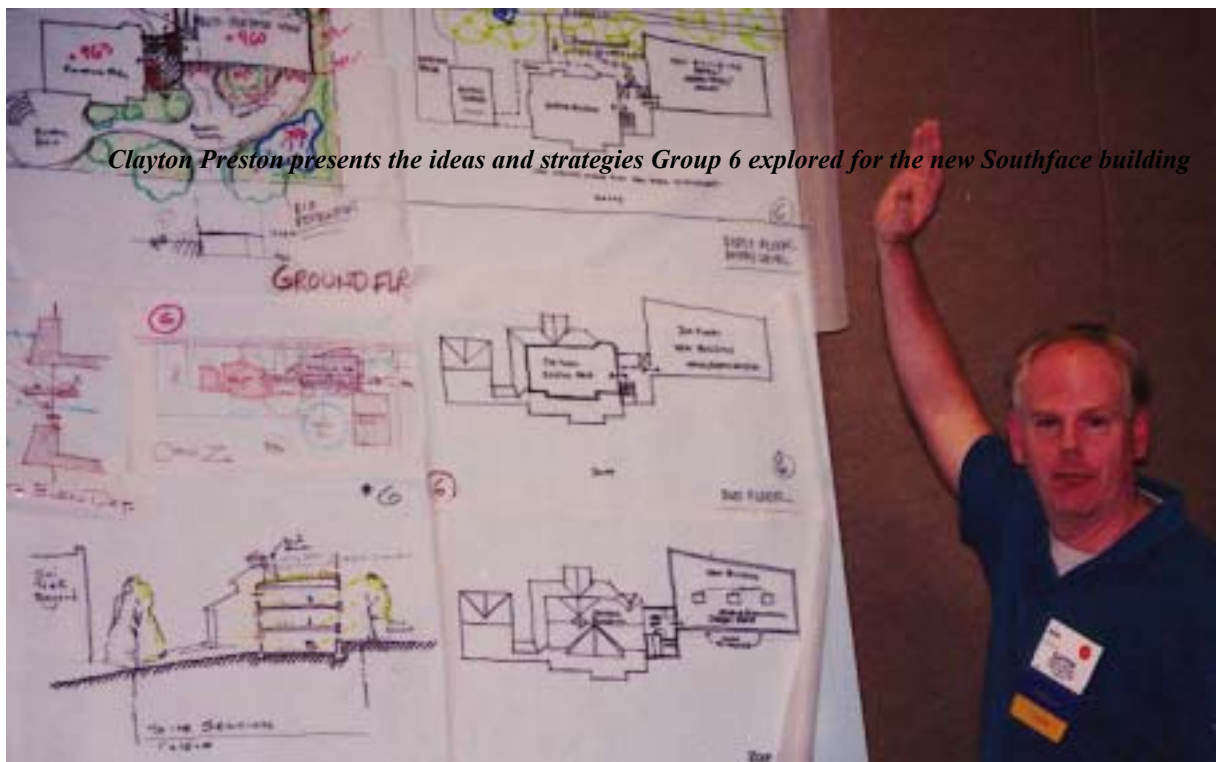


*Group 6 participants brainstorm together on overall site plan and floor plans*

## Final Reporting Out from Group 6:



*Clayton Preston presents the ideas and strategies Group 6 explored for the new Southface building*



*Clayton Preston presents the ideas and strategies Group 6 explored for the new Southface building*

## APPENDIX

Charrette Agenda  
Project Information (Program and Drawings)  
LEED Matrix for Southface New Building  
LEED Version 2.0  
LEED V.2 Documentation Requirements  
Other Green Resources List & Sustainable Websites and Videos



*Thanks to everyone – the Southface Institute and staff as well as the other organizers, facilitators, sponsors, and energetic participants for making this High Performance Building Charrette a fun and productive event!*

## **Appendix I-D**

**NCSU High Performance Charrette  
College of Design**

**Final Report**

# **NCSU High Performance Charrette College of Design Leazar Hall Renovation**

This report is a summary of the *High Performance Charrette* conducted at NCSU-College of Design – Raleigh on November 5, 2002

## ***Funding provided by:***

**State Energy Office, N.C. Department of Administration and  
The U.S. Department of Energy, with State Energy Program funds  
in cooperation with Triangle J Council of Governments**

## ***Other sponsors:***

NCSU College of Design  
NCSU Office of the University Architect  
NCSU Facilities Division  
NC Solar Center, College of Engineering

Alicia Ravetto, AIA – Architect  
Brown and Jones Architects  
Cannon Architects  
Design Harmony, Inc.  
Winstead Wilkinson Architects



## EXECUTIVE SUMMARY

North Carolina State University College of Design selected Cannon Architects to assist them in the design of the renovation of Leazar Hall. As part of the early schematic design process for the project, the University and Cannon Architects embraced the idea of holding a High Performance Charrette. A charrette is an intensive, focused brainstorming session involving a variety of experts, intended to provide an effective means to identify realistic and cost-effective high performance measures that could be implemented in the facility's design. Critical to the charrette and its documentation was funding from the State Energy Office, N.C. Department of Administration and the U.S. Department of Energy, with State Energy Program funds in cooperation with Triangle J Council of Governments. Ongoing relationships with these partners, and with the diverse and knowledgeable charrette participants, will accrue additional benefits to the University. These relationships will continue to aid the University in meeting its overall energy and environmental commitments long after the Leazar Hall project has been established as a leader in the field on the NCSU campus.



The charrette took place on November 5, 2002 at the College of Design, NCSU Raleigh campus. Its stated focus was to incorporate environmental excellence and high performance in the design of the University's Leazar Hall Renovation by using the High Performance Guidelines developed by the Triangle J Council of Governments. In his welcoming remarks, Dean Marvin Malecha noted the importance of balancing program and budget needs with high performance/"green" priorities. Approximately 50 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.

Local experts in "integrated design", in the Triangle J High Performance Guidelines and LEED, and in each of the four design areas added their expertise to the charrette. In addition, representatives from Cannon Architects and from the University presented project information. NCSU-College of Design 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.





Participants formed four small work groups to address topics relevant to the Leazar Hall Renovation. Each group looked at all high performance issues of the project and set priorities that they felt this project should address. At the conclusion of the day, all work groups presented the results of their discussions and then collaborated to determine a handful of Priority Action Items. The Priority Action Items determined by the Charrette participants are listed below.

Overall, the charrette proved to be fun and invigorating, and was filled with thoughtful insights for a realistic and strategic approach to incorporating high performance strategies into the renovation project. It laid good groundwork to expect that the design and construction of Leazar Hall will raise the “high performance bar” at North Carolina State University.



Priority Actions	
Actions	Champions
<b>SITE:</b> Preservation /Construction Staging	Sallie Ricks (Office of the University Architect) and David Tucker (Design Team)
<b>ENERGY:</b> Energy efficient Windows (Envelope), HVAC, and Lighting	Chris Garris/Tika Hicks (Cannon Architects), Engineers (Design Team), John Royal (Facilities Planning & Design), and Ed Sekmistrz (Facilities Operations)
<b>WATER:</b> Rainwater Collection	Nancy White (College of Design Faculty) and David Tucker (Design Team)
<b>MATERIALS:</b> C& D Waste Reduction and Occupant Waste Reduction and Recycling	Sarah Ketchum and Bill Beardall (NCSU Facilities Operations)
<b>MATERIALS:</b> Env. Preferable Products	Brad Moore and Others (NCSU)



*Thanks to all for making this High Performance Charrette a very fun and productive event!*

## CHARRETTE PARTICIPANTS

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## CHARRETTE GOALS and PROCESS

### Charrette Goals:

1. Inform and educate charrette participants about the energy and environmental implications of designing and renovating an existing building on the NCSU-Raleigh campus. At the same time, clarify the “integrated approach” concept, encouraging the effective use of the Triangle J Council of Government High Performance Guidelines to help define and implement high performance strategies.



2. Support North Carolina high performance or “greening” efforts tailored to the renovation of the Leazar Hall on the campus of NC State University. Encourage charrette participants to work “hands-on” with facilitators (who have wide expertise with high performance design) to develop a strategic integrated approach to the project’s design/



construction approach and priority issues.

3. Identify economically viable and doable High Performance Priority Action items that the University could undertake that would incorporate high performance sustainable design measures into their Leazar Hall Renovation (and also with future university renovations).

4. Establish an initial database of contacts, champions, and partners for the identified sustainable design action items. Include (where possible) approximate costs and schedule implications. In addition, create a basis for the understanding of the levels of difficulty and commitment that will be needed required to fulfill each of the proposed action items.



5. Determine immediate next steps, champions, and strategies & technologies necessary to enable the

design team to implement the proposed High Performance Priority Action Items.

## **Charrette Process:**

After initial presentations by the University, the Design Team, Triangle J Council of Government, the State Energy Office and Gail Lindsey, participants were each assigned to one of four work groups. In the morning, the groups analyzed the basic program requirements and discussed all high performance issues that were deemed important to the project. Lunch was served at Leazar Hall allowing some time for the participants to visit the building and become familiar with the existing conditions of the building shell, use, etc. After lunch, Gail Lindsey proposed the following basic task list for the remainder of the day:



### **1. SET PRIORITIES:**

- What 5 to 10 items do your group want to “champion”?
- If you could only accomplish one item, what would it be?
- How will you make each of them happen?

### **2. BE SPECIFIC:**

- Identify the “champions”, “partners” and “leaders” for each of these priority items
- What are the cost issues: \$, \$\$, or \$\$\$? (Little additional cost to high additional costs)
- What time issues are involved? (Additional research, O&M training, availability, etc.)
- What can be learned from others? (Case studies / mentors, what worked... what

### **3. SET SUCCESS INDICATORS:**

- How will you get feedback and otherwise assess if the project is successful?



The pages that follow present the discussion results of the four work groups; under topic headings are both high performance strategies and, in boxed format, specific priority actions.

## **GROUP 1: OBSERVATIONS & RECOMMENDATIONS**

### **PARTICIPANTS:**

Alicia Ravetto, AIA (Facilitator) Architect  
John Tector, College of Design Faculty  
Chris Garris, (Design Team) Cannon Architects  
Adam Johnson, (Design Team) Edmonson  
Engineers, Electrical Engineer  
John Royal, Facilities Planning & Design, Engineer  
Sumayya Jones-Humienny, Facilities Planning &  
Design, Architect  
Ed Sekmistrz, Facilities Operations  
Larry Hicks, Pilot Programs UNC-Chapel Hill  
Trevor Dvorzsak, College of Design Student  
Luke Buchanan, College of Design Student



**ENERGY****\$\$\$ (Cost)****+++ (Value)****OVERALL RESOURCE: Alicia Ravetto, Architect****1) WINDOWS & DOORS:**

- Replace windows to reduce heat gain/losses
- Introduce Daylighting to reduce lighting load
- Use light shelves (only on the inside), baffles and glazing types as required by orientation (remove mezzanine, expose light monitors)
- Coordinate energy efficient, historic, and aesthetic issues
- Explore natural ventilation vs. controlled HVAC (operable vs. fixed windows)
- Implement more energy efficient lights + task lighting + zoning strategies

**ENERGY (WINDOWS & DOORS):****\$\$\$****+++****CHAMPION: Chria Garris (Design Team)****RESOURCE: Carole Acquesta (UNC- cost issues)****PRIORITIES:**

- ☐ Avoid piecemeal approach (the thermal envelope is very important!)
- ☐ Use double glazing / low-e / argon filled windows
- ☐ Specify and install through glazing grilles
- ☐ Specify and install vinyl / aluminum clad wood windows
- ☐ Introduce daylighting and daylight controls (i.e. interior light shelves)

**POSSIBLE PARTNERS:**

- ☐ CAMPUS DESIGN REVIEW PANEL (involve them early in the process)

**POSSIBLE BARRIERS:**

- ☐ Additional effort but no additional time

**SUCCESS INDICATORS:**

- ☐ LCC/LCA to demonstrate success and value
- ☐ Performance based specs
- ☐ Historic / aesthetic issues
- ☐ Post occupancy evaluations (possibly graduate student work/ grant/class project)

**\*CRITICAL ISSUE: CHECK THE ENTIRE ENVELOPE (roof / walls / etc.)****2) HVAC:**

- Provide good air flow and meet fresh air intake requirements
- Review lifecycle costs for central loop vs. stand alone system & for initial vs. long term operating costs
- Determine special HVAC and exhaust needs required for painting studios and shops

**ENERGY (HVAC):**

\$

+++

**PRIORITIES:**

- ☐ Replace existing system (it is a requirement so the cost issue is not as relevant) with more efficient HVAC
- ☐ Add make up air
- ☐ Compartmentalize which could have a big impact on the HVAC

**POSSIBLE PARTNER:**

- ☐ Alan Daeke (Utilities)

**IEQ**

- Train users (STUDENTS) to reduce use of toxic substances (currently no treated wood is allowed in the carpentry shop)
- Use occupancy sensors
- Properly install and maintain all building assemblies to reduce leaks and the introduction of moisture / mildew problems

**IEQ -- LIGHTING):**

\$\$

++

**CHAMPIONS: John Shanahan & Ray Winstead**  
**Adam Johnson (Design Team / Electrical Engineer)**

**PRIORITIES:**

- ☐ Install efficient and effective lighting
- ☐ Specify and install occupancy sensors and other lighting controls
- ☐ Combine effective general lighting with task lighting

**POSSIBLE PARTNER:**

- ☐ Green Lights Program at NCSU

**MATERIALS**

- Conduct a baseline assessment of existing hazardous materials (asbestos and lead paint, mold, mildew, etc.)
- Specify that new materials meet the LEED and Triangle J High Performance guidelines for carpet, paint, etc. (low VOC, etc.)
- Retain existing long use materials (eg. terrazzo floors) whenever possible
- Specify low maintenance finishes
- Recycle construction and demolition debris

**MATERIALS:****CHAMPION: Brad Moore (NCSU)****PRIORITIES:**

- ❑ Reuse existing floors (terrazzo, etc.) whenever possible
- ❑ Use environmentally preferred products (can be from \$ to \$\$\$)
- ❑ Recycle construction and demolition debris

**WATER**

- Conserve water by collecting water for graywater use in toilets and/or irrigation [Nancy White provided the following calculation to have an idea of the system size 35,000 gallons/month    Cistern 20'x20'x15' = 1 ½ month capacity]
- Install low flow plumbing fixtures and waterless urinals (Check maintenance and access issues)

**WATER:****\$\$****+****CHAMPION: Nancy White (NCSU Faculty)****PRIORITY:**

- ❑ Specify and implement a water reclamation roof system



## GROUP 2: OBSERVATIONS & RECOMMENDATIONS

### PARTICIPANTS:

Carl Winstead, AIA (Facilitator)  
Nancy White, (Faculty), NCSU  
Susan Cannon, (Design Team) Cannon Architects  
Stephen Berg, (Design Team) Cannon Architects  
Charles Crawl, (Design Team) Edmondson Engineers  
Michael Harwood, Office of the University Architect  
Lisa Johnson, OUA Water Efficiency  
David Wood, Construction Management  
Shashi Rao, Facilities Operations  
Carole Acquesta, Pilot Programs  
Willis Dewitt, NCSU Student  
Cullen Lovette, Developer



## **SITE & STORMWATER MANAGEMENT**

- Determine possible impacts of construction area
- Preserve existing landscape
- Investigate light pollution issue
- Integrate and evaluate site strategies with other environmental aspects AND with EDUCATION of students, faculty, and visitors (“Environmental Art”)

## **ENERGY**

- Evaluate performance and efficiency of existing and new mechanical systems
- Review energy use related to shell/building envelope/windows

## **IEQ**

- Assess baseline conditions for existing lighting and determine strategies for more energy efficient and effective lighting/ daylighting
- Address Indoor Air Quality Issues (Use LEED and Triangle J High Performance Guidelines for top priority strategies)

### **IEQ – (DAYLIGHTING/ LIGHTING):**

**\$\$-\$\$\$**

**CHAMPIONS: Lisa Johnson (Office of the University Architect)  
Design Team Members**

#### **PRIORITIES:**

- ☐ Reuse existing skylight/clerestory
- ☐ Control daylight from existing areas of glazing
- ☐ Investigate glazing options as well as window replacements or modifications
- ☐ Install sunscreens/lightshelves
- ☐ Coordinate daylight and artificial lighting

#### **POSSIBLE PARTNERS:**

- ☐ Window Suppliers
- ☐ Wayne Place at NCSU
- ☐ EPA in RTP (Contacts: Chris Long and Pete Schubert)

#### **POSSIBLE BARRIERS:**

- ☐ State bidding requirements
- ☐ Cost and time (including possibility of additional consultants)
- ☐ Aesthetics

**\*CRITICAL ISSUE: THIS INFO. IS NEEDED ON OR BEFORE FEBRUARY 2003**

## **MATERIALS**

- Establish and implement a Construction Waste Management Plan
- Use environmentally preferable products and reuse existing durable materials where feasible and practical
- Design for user recycling and directly connect to educational aspects of students, faculty, and other users

## **WATER**

- Establish and implement a Water Management Plan that addresses the following: stormwater, building systems, rainwater, toilets, irrigation, and water treatment
- Explore educational opportunities addressing water management
- Identify waste water treatment strategies, options, and issues
- Benchmark water fixtures and DOE requirements
- Check population of building occupants and document any water use changes over time
- Investigate existing sprinkler system
- Determine possibility of a roof water collection system

### **WATER:**

\$\$

**CHAMPION: Nancy White and David Wood (NCSU)**

### **PRIORITIES:**

- ☐ Study and verify water demands (Review project program information in regard to water)
- ☐ Check plumbing code in reference to rainwater collection and use (Potable vs Non-potable)
  - a) Potable: Sensors at certain locations, alternate fixtures, possible recycling, etc.
  - b) Non-potable: flushing and irrigation

### **POSSIBLE BARRIERS:**

- ☐ Cost
- ☐ Existing utilities
- ☐ Size, availability, and location
- ☐ Appearance

**\*CRITICAL ISSUE: THIS INFO. IS NEEDED ON OR BEFORE FEBRUARY 2003**

## **\*\*MEASUREMENT & VERIFICATION of SYSTEMS**

- Determine baseline conditions (benchmarks) for energy and water use (possibly others) and set realistic goals to reduce consumption in these areas
- Check existing systems, code requirements, and innovation standards\* (\*such as those found in LEED and the Triangle J High Performance Guidelines)

## **MEASUREMENT & VERIFICATION:**

### **PRIORITIES:**

- ❑ Establish baseline data especially with Energy and Water
- ❑ Establish methods for measurements (solar power, central energy distribution, green power, sustainable energy, etc.)
- ❑ Identify ways to measure life cycle costs and begin documenting LCC
- ❑ Set goals to reduce water and energy consumption



## **GROUP 3: OBSERVATIONS & RECOMMENDATIONS**

### **PARTICIPANTS:**

Charles Brown, (Facilitator) Brown & Jones Architects  
Judy Kincaid, Triangle J Council of Governments  
Tika Hicks, (Design Team) Cannon Architects  
Roger Clark, (Design Team), Cannon Architects and NCSU Faculty  
Michael Edmondson and Tommy Weaver (Design Team) Edmondson Engineers  
Robert Bishop, Little and Associates  
Cindy Williford, Office of the University Architect  
Alan Daeke, Facilities Operations  
Greg Selzer, NCSU  
Manny Amaro, Pilot Programs



## ENERGY

### 1) ENVELOPE:

- Replace existing roof
- Investigate original glazing
- Check existing thermal envelope (barrier wall and ceiling insulation)

### **ENERGY (ENVELOPE):**

**CHAMPION: Tika Hicks, Cannon Architects (Design Team)**

#### **PRIORITIES:**

- ☐ Utilize existing fenestration with new windows (\$\$\$ +++)
  - a) PRO: Better energy performance and quality of space
  - b) CON: Historic appearance difficulty and high cost
- ☐ Integrate daylighting with artificial lighting [controls] (\$ +)
- ☐ Open existing clerestory (\$\$\$ ++)
- ☐ Install transoms for borrowed light (\$\$ +)
- ☐ Use reflective interior surfaces (\$ +)
- ☐ Install new skylights (\$\$\$ ++)

#### **POSSIBLE PARTNERS:**

- ☐ Edmondson Engineers (Energy benefits)
- ☐ NC Solar Center, quotes, manufacturers (Cost of historic appearance)

#### **POSSIBLE BARRIERS:**

- ☐ Fixed orientation (different glazing per orientation)
- ☐ Budget
- ☐ Historic character

### 2) OTHER:

- Investigate a raised floor (review expense, flexibility, “dancing elephants” issue, etc.)
- Explore Building Management Systems (ventilation - especially CO2 monitoring, lighting, make-up air, and HVAC system)
- Engage students and faculty in high performance education and involvement
- Measure efficiency of systems over time
- Investigate strategies for energy efficient hot water
- Review appropriateness of existing HVAC and electrical systems (determine best approach --start from scratch or service existing)

## **IEQ**

### **1) AIR QUALITY:**

- Research low VOC adhesives, paints, carpets, etc.
- Investigate central air space (review enforcement issues)
- Determine proximities of spaces (especially explore shop exhaust issues)
- Involve students in air quality issues and documentation

### **2) DAYLIGHTING/LIGHTING:**

- Investigate the use of transoms for borrowed light, opening the existing clerestory, etc.
- Check the depth of the building while exploring daylighting options
- Install new glazing in existing window openings and clerestory opening
- Replace existing roof and investigate new roof openings for daylighting
- Explore options for sun control (light shelves, trees, glazing options)
- Coordinate daylighting strategies and HVAC strategies with artificial light and lighting controls (remember the 24/7 occupancy of this building)
- Investigate energy efficient and effective fixture strategies, automated controls, and lighting levels
- Check current lighting standards used around the University

## **MATERIALS**

- Keep existing terrazzo flooring whenever possible
- Use materials as educational artifacts
- Inventory salvagable materials
- Conserve, reclaim, and recycle materials
- Use environmentally preferable products

## **WATER**

- Collect rain water from the roof – Explore spaces for cisterns
- Use graywater for irrigation and other uses (?)
- Install low-flow fixtures (investigate waterless urinals)
- Explore rain gardens to lower stormwater runoff
- Implement independent water metering to collect water use data

## **\*\*BUILDING as “LEARNING LAB”**

- Identify ways that this building could educate students, faculty, and other occupants about high performance building strategies and their direct impact on our lives and surrounding environment

## **BUILDING as “LEARNING LAB”:**

### **PRIORITIES:**

- ❑ Overtly present educational information throughout the building on high performance strategies (especially those related to energy efficiency, daylighting, and environmentally preferable products)

### **POSSIBLE PARTNERS:**

- ❑ NC Solar Center
- ❑ Fatih Rifki and Wayne Place at College of Design NCSU
- ❑ Dale Brentrup at UNC-Charlotte Architecture School
- ❑ Daylighting Consortium
- ❑ University of Washington Daylighting Lab
- ❑ Carnegie Mellon
- ❑ Environmental Building News
- ❑ LEED and Triangle J High Performance Case Studies

### **POSSIBLE BARRIERS:**

- ❑ Additional time and effort



## **GROUP 4: OBSERVATIONS & RECOMMENDATIONS**

### **PARTICIPANTS:**

Dona Stankus, AIA (Facilitator) NCSU – Solar Center  
Jolie Frasier, (Design Team) Cannon Architects  
David Tucker (Design Team) Edmudson Engineers  
Sallie Ricks, Office of the University Architect  
Tom Hunter, Office of the University Architect  
Sarah Ketchum, Facilities Operations  
Bill Beardall, Facilities Operations  
Gina Shoemaker, Pilot Programs  
Carol Woodyard, NCSU



## **SITE**

### **1) CONSTRUCTION STAGING & LANDSCAPE PRESERVATION:**

- Coordinate construction staging and landscaping preservation

#### **SITE (CONSTRUCTION STAGING & LANDSCAPE PRESERVATION):**

**\$-\$\$\$**

**CHAMPIONS:** Sallie Ricks, University Landscape Architect  
Bill Beardall, Facilities Operations (Sustainable Sites)

#### **PRIORITIES:**

- ☐ Reduce negative impacts of construction on existing landscape

#### **POSSIBLE PARTNERS:**

- ☐ Construction Management
- ☐ Grounds Management

#### **POSSIBLE BARRIERS:**

- ☐ Contractor attitude

#### **SUCCESS INDICATORS:**

- ☐ Vegetation lives
- ☐ No site creep

### **2) EXTERIOR SITE LIGHTING:**

- Implement energy efficient and effective exterior lighting

#### **SITE (EXTERIOR LIGHTING):**

**\$**

**CHAMPIONS:** Sallie Ricks, University Landscape Architect

#### **PRIORITIES:**

- ☐ Reduce energy consumption and reduce exterior light pollution

#### **POSSIBLE BARRIERS:**

- ☐ Additional time

#### **SUCCESS INDICATORS:**

- ☐ Energy savings
- ☐ Possible reduction in light pollution

## ENERGY

- Specify and install energy efficient daylighting/lighting (\$\$)
- Maintain good access on all mechanical systems for future retrofits (\$\$\$)
- Establish baseline data of existing water and energy use (\$)
- Monitor existing chiller load and air quality (\$ -- may be difficult)

## IEQ

- Investigate daylighting, energy efficient lighting and controls (i.e. occupancy sensors)

## MATERIALS

### 1) CONSTRUCTION WASTE MANAGEMENT:

- Establish and implement a Construction Waste Management Plan.

### **MATERIALS (CONSTRUCTION WASTE MANAGEMENT):**

**\$-\$\$\$**

**CHAMPIONS:** Sarah Ketchum and Carol Woodyard (NCSU)

#### **PRIORITIES:**

- ☐ Time (Learning curve)

#### **POSSIBLE PARTNERS:**

- ☐ IBM & RTP Materials reclamation

#### **POSSIBLE BARRIERS:**

- ☐ Time (Learning curve)
- ☐ University specs
- ☐ Attitudes and habits

#### **SUCCESS INDICATORS:**

- ☐ Avoided waste

### 2) OTHER:

- Use environmentally preferable products (\$)
- Reuse of existing or salvaged materials (\$)
- Design for user reduce/reuse/recycle program/education (\$\$)

## **\*\*BUILDING as “TEACHING TOOL”**

- Identify ways that this building could educate students, faculty, and other occupants about high performance building strategies and their direct impact on our lives and surrounding environment

### **BUILDING as “TEACHING TOOL”:**

**\$-\$\$\$**

**CHAMPIONS:** School Users and Design Team

#### **PRIORITIES:**

- ❑ Become a “leading example/case study” of high performance design – document “lessons learned” and share with others

#### **POSSIBLE PARTNERS:**

- ❑ Sarah Ketchum (OWRR) outreach and development as a tool
- ❑ College of Design and College of Engineering outreach

#### **POSSIBLE BARRIERS:**

- ❑ Additional time and effort (coordination and documentation)
- ❑ Codes

#### **SUCCESS INDICATORS:**

- ❑ Documented case study to share (also documentation of process)



## ATTACHMENTS:

Charrette Agenda  
Triangle J High Performance Guidelines – Leazar Hall by Brad Moore  
Case Study Template  
Sustainable Websites

### **Additional websites and resources:**

#### **National Websites:**

- EPA Procurement guidelines [www.ergweb2.com/cpg](http://www.ergweb2.com/cpg)
- CSI Division materials [www.oikos.org](http://www.oikos.org)
- Energy Star Program [www.energystar.gov](http://www.energystar.gov)
- Environmental Building News [www.buildinggreen.com](http://www.buildinggreen.com)

#### **NCSU Resources**

- Sustainable coalition [lucylaffitte@ncsu.edu](mailto:lucylaffitte@ncsu.edu)
- Recycling/waste reduction [sarah\\_ketchem@ncsu.edu](mailto:sarah_ketchem@ncsu.edu)
- Renewable/Energy efficiency [www.ncsc.ncsu.edu](http://www.ncsc.ncsu.edu)
- Storm water/site [nancy\\_white@ncsu.edu](mailto:nancy_white@ncsu.edu)



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