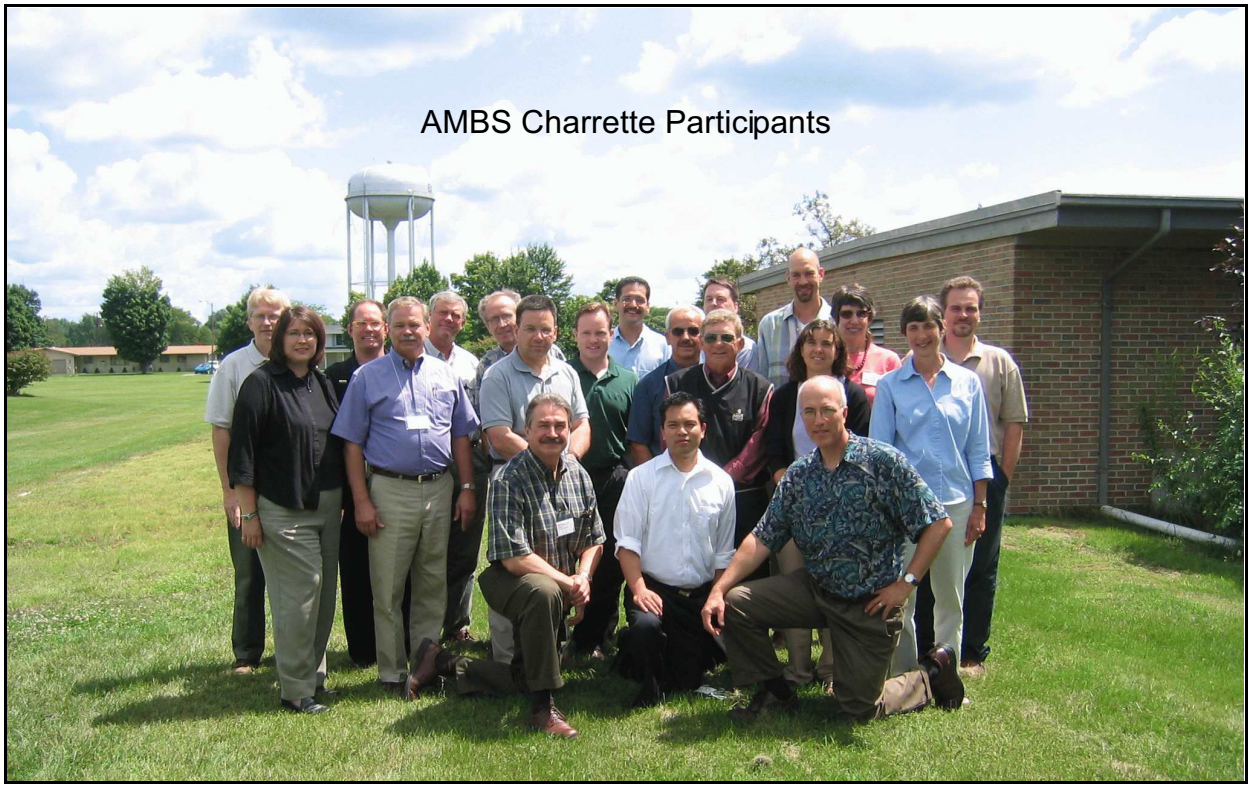
HIGH PERFORMANCE GREEN BUILDING DESIGN CHARRETTE REPORT

Associated Mennonite Biblical Seminary
New Library Building

August 4 and 5, 2004



AMBS Charrette Participants

TABLE OF CONTENTS

SUMMARY

Associated Mennonite Biblical Seminary Library

AMBS has been engaged in the development of a new library project. The Seminary had begun the process by hiring The Troyer Group to provide design services and a schematic design was created. Fund-raising and other activities ensued. During this undertaking, the Seminary became interested in the concept of a green building and began to explore how best to proceed.

With the influence of a nearby green building project affiliated with Goshen College, AMBS contacted 7group to begin the exploration. Marcus Sheffer of 7group visited AMBS on April 21, 2004 to discuss the integrated design concept and introduce the project team to LEED. Subsequently AMBS hired additional design and construction professionals to round out the project team and begin the design process anew with a focus on sustainability.

On August 4 and 5, 2004 members of the design and construction team for the new library at AMBS gathered to discuss and evaluate sustainable design elements. This report provides the highlights of this two day charrette.

Associated Mennonite Biblical Seminary Library
High Performance Green Building Design Meeting
August 4 & 5, 2004

A Summary of the Charrette Process
A successful high performance building is a solution that is greater than the sum of its parts. It is a system of integrated processes and products that increases the efficiency of the building systems and helps to reduce overall costs. A building that conserves energy alone does not constitute a high performance building. In the same respect, adding or overlaying environmental systems will not truly help the building to benefit from the connections and interdependencies of an integrated, or whole systems, design approach. This is the fundamental challenge of high performance building design.

High performance buildings are most effectively developed through a design process that invites the client, appropriate designers and consultants, a consulting general contractor/cost estimator and other appropriate stakeholders to participate from the very beginning of the project. This is done in a focused and collaborative design effort, or brainstorming session(s), known collectively as a design charrette process. The purpose of this composite design team and design process is to provide for an exchange of ideas and information that allows for truly integrated solutions to take form. A forum and methodology is provided where every team member is encouraged to cross fertilize one another with solutions to problems that may relate to, but are not typically addressed by, their specialty. The objective is to have every member of this composite design team understand the issues that the other members need to address. Thus more thorough and integrated solutions are the result.

The charrette method is very important when the client is not one person but consists of a number of interested people. This is a successful way to educate all the participants: architects, engineers, and the client team. There are many advantages in this. The client's staff members are invited to participate throughout the process. Participants are educated about the issues and "buy in" to the solutions. The education process is accelerated, decisions are verified, adversity is diminished, the nuances of organizational issues are learned and the design process is expedited. A final solution isn't necessarily produced in the charrette but most of the issues are explored with all the involved parties being present.

Most buildings have great potential for incorporating the most advanced green building design techniques and systems. Part of the job is to help find an acceptable balance between the economic, cultural, ecological areas of sustainability that will meet the Client's objectives and yet allow for future adaptation of new technologies and interactions with the community.

7group's approach is one of common sense application of thoughtful and integrated solutions. Market transformation in this area can only occur if environmentally responsible buildings can be built at conventional construction cost. The integrated design process is the key to producing high performance green buildings within budget.

Objectives for this charrette:
1. Gain an understanding of high performance green buildings.
2. Gain an understanding of the process required to realize high performance green goals.
3. Establish preliminary performance goals.
4. Familiarize participants with the importance of this approach.
5. Develop design concepts.
6. Establish next steps.

Description - Day 1: 9:00 am - 5:00pm

Welcome
- Introduction of participants
- Overview of the day
- What is a high performance green building?
- Why are we concerned?

Project Overview
- Program and site
- Opportunities and constraints, infrastructure issues, program concerns
- Overview of current design

Core Values Exercise

Integrated Design: The Key to Producing High Performance Green Buildings within Budget
- What it is
- Examples of its effects
- How to do it
- Changes to the standard design process

High Performance Green Buildings: Credit-by-Credit Review of LEED

Using the LEED rating system as a framework for discussion, we will review the many items that can compromise a high performance green building. Special emphasis will focus on the design process and the methodologies needed to achieve certain LEED credits. Specific project examples will demonstrate many of the concepts, techniques and technologies.

Sustainable Site Credits
Water Efficiency Credits

LUNCH: Noon to 1:00 pm

Energy & Atmosphere Credits
Materials & Resources Credits
Indoor Environmental Credits
Innovation & Design Credits

Day 2

9:00 am - 4:30 pm

Site Issues
- Presentation by Conservation Design Forum
- Regenerative/Restorative Design
- Integration of Library on campus
- Sustainable site opportunities created by this project

Building Design
- Explore potential conceptual design solutions:
- Primary site components (storm water, utilities, circulation, parking, etc.)
- Orientation
- Functional relationships
- Massing
- Daylighting design

LUNCH: Noon to 1:00 pm

Breakout Sessions

Focused small group sessions to explore and identify performance parameters and specific design solutions:

1. Site/Water
2. Energy (EQ 1, 2, 3, 5, 6, 7, 8)
3. Materials (EQ 3, 4, 5, 6, 8)

Report results from the small group sessions.

Integration of Performance Parameters
– Review and integrate various performance metrics and design ideas from the breakout groups, targeting holistic solutions. Consider budget, environmental efficacy, achievability, core values and project mission.
– Establish specific performance goals for the project.

Next Steps
- Application of integrated, whole-system design process
- Specific services required
- Schedule & Milestones

Adjourn

AMBS Library Design Charrette
August 4-5, 2004
Lambright Center, Room H

AMBS:
Ron Ringenberg, VP and Chair, Library Building Comm. rringenb@ambs.edu
Cal Zehr, AMBS Project Manager czehr@ambs.edu
Eileen Saner, Librarian esaner@ambs.edu
Don Steider, Supervisor of Maintenance dsteider@ambs.edu
Jacob Elias, Professor of New Testament jelias@ambs.edu
Lois Longenecker, Assistant Librarian llongenecker@ambs.edu
Nelson Kraybill, President nkraybill@ambs.edu
Twilla Epp, Student tjepp@student.ambs.edu

Jeff Miller, Business Administrator, jmiller@ambs.edu (not attending charrette)

7group (Charrette Leaders):
Marcus Sheffer, Energy and Environmental Consultant sheffer@sevengroup.com
John Boecker, Architect boecker@sevengroup.com

The Troyer Group (Architectural Firm):
Bill Ponko, Architect wrp@troyergroup.com
Arvin dela Cruz, Architect ard@troyergroup.com
Darla Aldred, Landscape Designer

Primera (Engineering Firm):
Michael deSantiago, PE Project Director mdesantiago@primerachicago.com
Joseph Clair, PE Project Manager

Conservation Design Forum (Site Management/Landscape Architecture):
Marcus de la fleur, Landscape Architecture and Design mdelafleur@cdfinc.com
Gerould Wilhelm, Director, Environmental Services

DJ Construction (General Contractor):
Tim Cataldo, Client Representative tim@djconstruction.com
Doug Wogoman, Vice President doug@djconstruction.com
Brad Dixon, Project Manager brad@djconstruction.com

CORE VALUES EXERCISE

Associated Mennonite Biblical Seminary Library

A brain-storming session was initiated to list the core values of the group. The values listed are to be important design considerations for the project team. Once the list was generated each project team member was allowed to vote for their six most important values. The results of the exercise are listed in the table below.

	Value	Votes
1	Resource stewardship	15
2	Life cycle cost	15
3	Integrated design collaboration	9
4	Site sensitivity	8
5	Educate others about environmental commitment	8
6	Research and staff functionality	7
7	Indoor air quality	6
8	Welcoming to the community	5
9	Total quality management process	5
10	Aesthetics	5
11	Sustainable materials	5
12	Daylighting	4
13	Maintainability	4
14	Comfort	4
15	Energy efficiency	3
16	Local economic impact	3
17	Secure and accessible collection	3
18	Simple controls	3
19	Theological symbol, Adaptability for new technologies, Water Efficiency, Power reliability, First cost	2
20	Connection to the outdoors (views), Acoustics appropriateness, Quality lighting	1
21	Naming opportunities, Ventilation, Landscaping	0

Associated Mennonite Biblical Seminary Library

The project team reviewed the LEED Green Building Rating System on a credit-by-credit basis in the context of the project. Each credit was determined to be a “Yes” - it will be implemented on this project; a “Maybe” - these credits will require further investigation; and a “No” - these credits are not feasible for this project. A summary preliminary scorecard for the project is included on the following page. A complete score card with comments and tasks is contained in the Appendix.

In addition, each credit was assigned a cost implication value of “No”, “Low, “Medium” or “High” cost. The figures assigned to these values are summarized below along with a list of the quantity of credits by feasibility and cost implications.

Total construction cost = $4 million
Low - $0 - $2,000 Medium - $2,000 to $10,000 High - over $10,000

LEED™ Targeted Credits by Cost Implications

	Yes	?	Total
No Cost	34	4	38
Low Cost	4	2	6
Mid Cost	2	5	7
High Cost	2	3	5
Totals	42	14	56

The results of the LEED review indicate a total of 42 points targeted as feasible with 14 additional points listed as maybe. The project team has determined that LEED Gold level certification should be targeted.

Summary LEED Scorecard

42	14	13	**Total Project Score**	Possible Points **69**

Certified 26 to 32 points Silver 33 to 38 points Gold 39 to 51 points Platinum 52 or more points

10	2	2	**Sustainable Sites**	Possible Points **14**	
Y	?	N			
Y			Prereq 1	Erosion & Sedimentation Control	0
1			Credit 1	Site Selection	1
		1	Credit 2	Development Density	1
		1	Credit 3	Brownfield Redevelopment	1
	1		Credit 4.1	Alternative Transportation, Public Transportation Access	1
1			Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
	1		Credit 4.3	Alternative Transportation, Alternative Fuel Refueling Stations	1
1			Credit 4.4	Alternative Transportation, Parking Capacity	1
1			Credit 5.1	Reduced Site Disturbance, Protect or Restore Open Space	1
1			Credit 5.2	Reduced Site Disturbance, Development Footprint	1
1			Credit 6.1	Stormwater Management, Rate and Quantity	1
1			Credit 6.2	Stormwater Management, Treatment	1
1			Credit 7.1	Landscape & Exterior Design to Reduce Heat Islands, Non-Roof	1
1			Credit 7.2	Landscape & Exterior Design to Reduce Heat Islands, Roof	1
1			Credit 8	Light Pollution Reduction	1

5	0	0	**Water Efficiency**	Possible Points **5**	
Y	?	N			
1			Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1
1			Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
1			Credit 2	Innovative Wastewater Technologies	1
1			Credit 3.1	Water Use Reduction, 20% Reduction	1
1			Credit 3.2	Water Use Reduction, 30% Reduction	1

6	6	5	**Energy & Atmosphere**	Possible Points **17**	
Y	?	N			
Y			Prereq 1	Fundamental Building Systems Commissioning	0
Y			Prereq 2	Minimum Energy Performance	0
Y			Prereq 3	CFC Reduction in HVAC&R Equipment	0
2			Credit 1.1	Optimize Energy Performance, 20% New / 10% Existing	2
2			Credit 1.2	Optimize Energy Performance, 30% New / 20% Existing	2
2			Credit 1.3	Optimize Energy Performance, 40% New / 30% Existing	2
	2		Credit 1.4	Optimize Energy Performance, 50% New / 40% Existing	2
		2	Credit 1.5	Optimize Energy Performance, 60% New / 50% Existing	2
		1	Credit 2.1	Renewable Energy, 5%	1
		1	Credit 2.2	Renewable Energy, 10%	1
		1	Credit 2.3	Renewable Energy, 20%	1
	1		Credit 3	Additional Commissioning	1
	1		Credit 4	Ozone Depletion	1
	1		Credit 5	Measurement & Verification	1
	1		Credit 6	Green Power	1

5	2	6	**Materials & Resources**	Possible Points **13**	
Y	?	N			
Y			Prereq 1	Storage & Collection of Recyclables	0
		1	Credit 1.1	Building Reuse, Maintain 75% of Existing Shell	1
		1	Credit 1.2	Building Reuse, Maintain 100% of Existing Shell	1
		1	Credit 1.3	Building Reuse, Maintain 100% Shell & 50% Non-Shell	1
1			Credit 2.1	Construction Waste Management, Divert 50%	1
1			Credit 2.2	Construction Waste Management, Divert 75%	1
		1	Credit 3.1	Resource Reuse, Specify 5%	1
		1	Credit 3.2	Resource Reuse, Specify 10%	1
1			Credit 4.1	Recycled Content, Specify 5%	1
	1		Credit 4.2	Recycled Content, Specify 10%	1
1			Credit 5.1	Local/Regional Materials, 20% Manufactured Locally	1
1			Credit 5.2	Local/Regional Materials, of 20% Above, 50% Harvested Locally	1
		1	Credit 6	Rapidly Renewable Materials	1
	1		Credit 7	Certified Wood	1

11	4	0	**Indoor Environmental Quality**	Possible Points **15**	
Y	?	N			
Y			Prereq 1	Minimum IAQ Performance	0
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	0
1			Credit 1	Carbon Dioxide (CO_2) Monitoring	1
	1		Credit 2	Increase Ventilation Effectiveness	1
	1		Credit 3.1	Construction IAQ Management Plan, During Construction	1
1			Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	1
1			Credit 4.2	Low-Emitting Materials, Paints	1
1			Credit 4.3	Low-Emitting Materials, Carpet	1
	1		Credit 4.4	Low-Emitting Materials, Composite Wood	1
1			Credit 5	Indoor Chemical & Pollutant Source Control	1
1			Credit 6.1	Controllability of Systems, Perimeter	1
	1		Credit 6.2	Controllability of Systems, Non-Perimeter	1
1			Credit 7.1	Thermal Comfort, Comply with ASHRAE 55-1992	1
1			Credit 7.2	Thermal Comfort, Permanent Monitoring System	1
1			Credit 8.1	Daylight & Views, Daylight 75% of Spaces	1
1			Credit 8.2	Daylight & Views, Views for 90% of Spaces	1

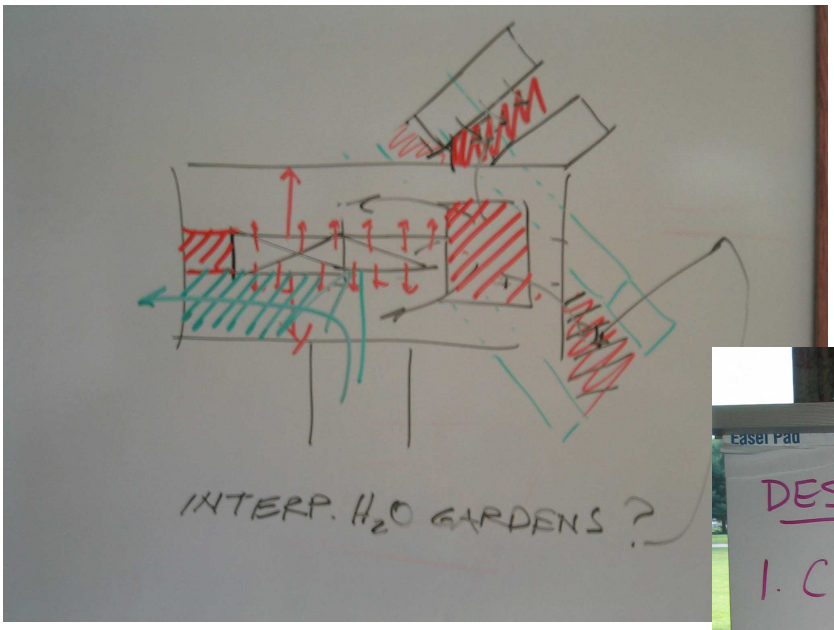
5	0	0	**Innovation & Design Process**	Possible Points **5**	
Y	?	N			
1			Credit 1.1	Innovation in Design: Green Building Demonstration	1
1			Credit 1.2	Innovation in Design: Exemplary Performance WE 3	1
1			Credit 1.3	Innovation in Design: Exemplary Performance MR 5.1	1
1			Credit 1.4	Innovation in Design: Blended Cement	1
1			Credit 2	LEED™ Accredited Professional	1

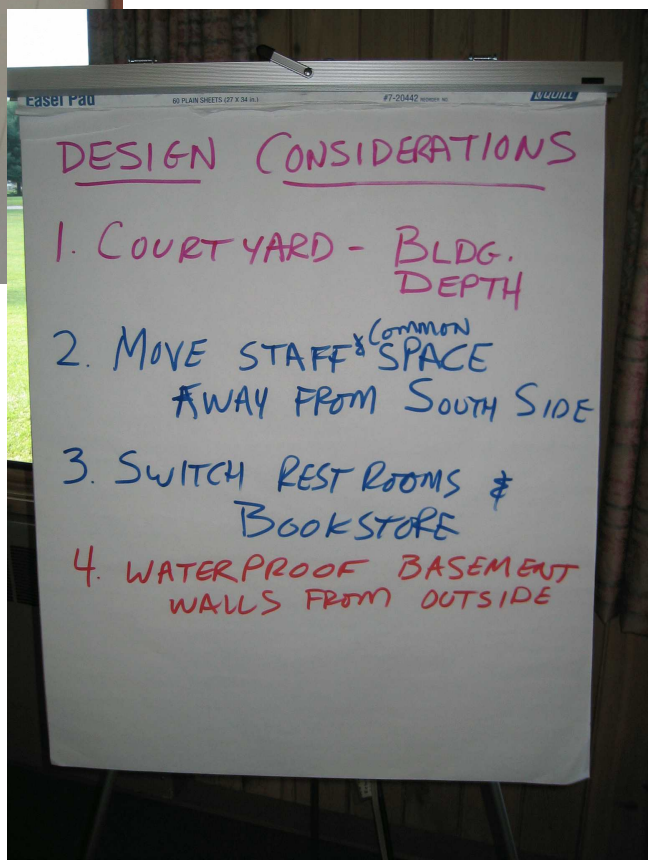
Associated Mennonite Biblical Seminary Library

Conservation Design Forum presented both philosophical and practical justifications for environmental site design. The PowerPoint slides used during the presentation have been provided in the appendix.

Building design ideas were discussed to modify the existing building design to accommodate the LEED and green building parameters discussed during day one. Alternative design concepts were discussed in general to incorporate sustainable design elements into the project.

One early concept is shown below which facilitated discussion. A few of the design considerations under discussion are listed below as well.





BREAKOUT SESSIONS

Associated Mennonite Biblical Seminary Library

Following lunch breakout sessions were convened to focus discussion on issues related to the site, building design, and energy issues. Notes from those sessions are provided on the following pages.

Site/Water Performance Criteria

Performance Criteria	Standard Practice	AMBS Target
Self sustaining landscape treatment	Maintenance and resource intensive landscape treatments	No or limited mowing, no fertilizing, no pesticide application, no irrigation
Restoration of a human-cultural relationship that restores the land	Default landscape treatment (i.e. turf grass)	Restore min. of 50% of project site with self sustaining landscapes
Integrated landscape treatment	Landscape treatment serves "aesthetic" objectives only	Integrate landscape into the project programming and storm water management system (site civil)
Minimize soil compaction	Mass grading and use of heavy equipment throughout the site	Reduce need for grading and limit/restrict use of heavy equipment
Contain and treat all rainwater on site up to the 100 yr storm event	Comply with local storm water ordinance discharge rates	Exceed local ordinance requirements and reduce/eliminate discharge volume.
Implement decentralized storm water management system	Installation of a centralized treatment/detention system	Manage the rainwater where it falls/accumulates, eliminate flux in centralized storage areas

Implement infiltration based storm water management system	Conveyance based storm water systems	Storm water retention and treatment, discharge volume reduction/elimination
Improve runoff water quality - temperature	Discharge of runoff with elevated temperature	Prevention of elevated temperatures in runoff and/or cooling of runoff temperatures to healthy levels
Improve runoff water quality - pollutants (Phosphorus, suspended solids, hydrocarbons, etc.)	Filtering in turf swales, settling in detention ponds	Multiple levels of decentralized biological, mechanical and bio-mechanical filtering; prevention of upland resource losses (phosphorus).
Improve runoff water quality - eliminate need for chlorine based de-icing agents	De-icing salt application in winter time w/ no water quality treatment	Application of materials and technologies that prevent sheet ice formation and eliminate the need for chlorine based de-icing agents.
Interpretative/educational landscape treatment	Default landscape treatment	Integrate site design and site civil into educational and interpretive opportunities.

One potential site delineation.

Design Performance Criteria

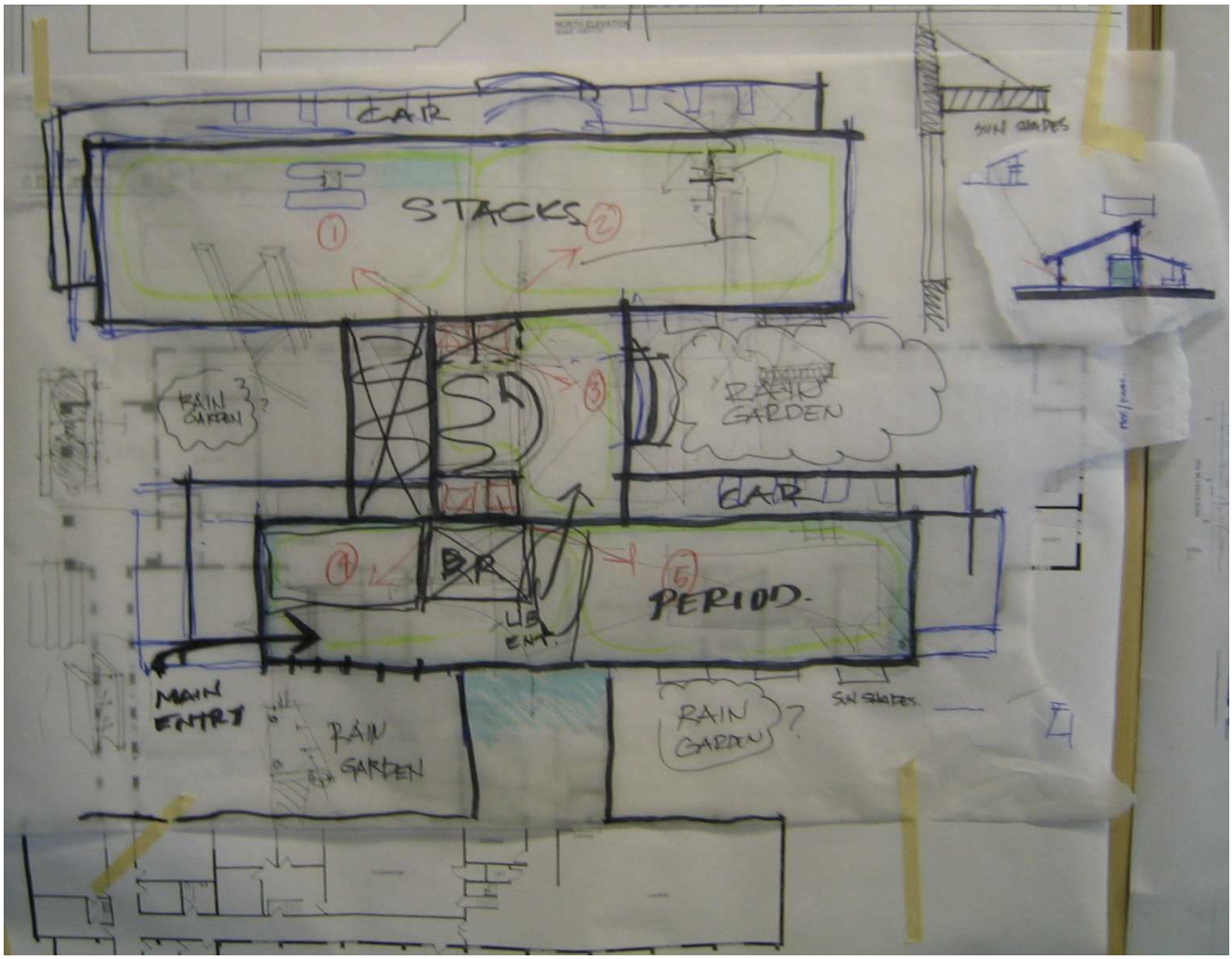
Performance Criteria
Daylight Model vs Energy Model (thermal) of North Facing Clerestory vs Glass (at Stack areas)
UFAD 5 Zones
Centralized Mechanical Room/ Courtyard
2 Possible Eco-Courtyards
Offset Parallel Boxes
Investigate Eco Block
Central Staff areas w/ High Lobby
Check out Interface AR Access Floor
North-facing corrals
2 courtyards (3?, 4?)
Possible demonstration gardens
centralized mechanical zone
Eco-block- insulated concrete forms

Energy Performance Criteria

Performance Criteria	Standard Practice	AMBS Target
Cost/square foot	$0.95 (0.97)	$0.50
BTU/Square foot	90,620 BTU	30,000 BTU
Lighting - Watts/square foot	1.5 W/sf	<1 W/SF
Plug Load - Watts/square foot		<2 W/SF
Cooling Load - Square foot/ton	300 SF/Ton	450 SF/Ton (Equip)
Mean Radiant Temperature	perimeter heat	eliminate system
Windows (Triple Pane) - U-value	U 0.33	U 0.22
Windows - SHGC	SHGC 0.6	SHGC 0.4
Walls	R 13	R 25
Roof (Attic) Solid surface to prevent infiltration	R 30	R 30
Infiltration	??	0.2 ACH
HVAC - Utilize Existing Boiler? - (Compare GSHP vs Boiler/Chiller)		
Ventilation - (SQ. FT. vs. People)		
Maintenance		
Elec Reliability - (UPS or Generator)		
Winter Setpoints	70	74 (35%)
Summer Setpoints	72	74 (55%)
IMC Ventilation		
Shading	0	>0
Maintenance		
Electricity Reliability	0	>0

Associated Mennonite Biblical Seminary Library

Following the breakout sessions the entire group reconvened. Each breakout group reported on the results of their discussions. The visual results from the design group are included below.



A discussion was facilitated to incorporate the possible performance criteria and sustainability concepts into the design.

Next Steps

1. Feedback - bid by January 05, construction March 05
2. Analysis - utility survey, daylighting analysis
3. Complete schedule
4. Scope of Work