Your Building as Workforce Training: Integrating Students into High Performance Projects

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Northeast Sustainable Energy Association (NESEA)
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Your Building as Workforce Training: Integrating students into high-performance projects

studio²sustain inc
architects consultants environmental evangelists

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students building the LCE Welcome Center
Storey & Ansel wandering the trails of the Lloyd Center for the Environment
…when I returned…we resumed work on the Welcome Center – begun in 2015
THE PORT CITY OF NEW
GNBVT Students...in their words...
Frank Goncalves – lead Instructor in Carpentry
Scott Thibault – lead Instructor in Plumbing
Glenn Morell – lead Instructor in HVAC
The site of the project – LCE Welcome Center & GNBVT.
...reframing the relationship between climate, energy & natural resources...
buildings consume resources!

- In the United States alone, buildings account for:
  - 72% of electricity consumption
  - 39% of energy use,
  - 38% of all carbon dioxide (CO₂) emissions,
  - 40% of raw materials use,
  - 30% of waste output (136 million tons annually)
  - 14% of potable water consumption.
...the need...students arriving for field studies camp at the Lloyd Center...
SETTING THE IDEAL AS THE INDICATOR OF SUCCESS

THE LIVING BUILDING CHALLENGE IS A PHILOSOPHY, CERTIFICATION AND ADVOCACY TOOL FOR PROJECTS TO MOVE BEYOND MERELY BEING LESS BAD AND TO BECOME TRULY REGENERATIVE.
ENERGY BALANCE

Passive House Diagram

Optional renewable energy system to achieve Net Zero
Internal gains from people and equipment
Continuous Super insulated envelope
High performance windows and doors
Heat Recovery Ventilator (HRV)
Outside air filter
Stairs outside the envelope
Earth heat exchanger
(also as brine circuit or direct evaporator)

Solar shading in summer
Solar gains in heating months

Fresh supply air bedroom
Exhaust air bathroom
Exhaust air kitchen
Fresh supply air living room
Fresh supply air heat register
Air/air heat exchanger
LCE Welcome Center - East Elevation
J-Term students launch LCE Welcome design charrette @ studio2sustain
Various studies explored site contours, site circulation, building masses and access...

Harvard College students and Harvard University students majoring in Sustainability built site & building models.
At the end of the design charrette, a site plan emerged.
The Lloyd Center pursues Living Building Challenge (LBC): 7 Petals: Place_Water_Energy_Health & Happiness_Materials_Equity_Beauty
One hundred and five percent of the project’s energy needs must be supplied by on-site renewable energy on a net annual basis, without the use of on-site combustion. Projects must provide on-site energy storage for resiliency.

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13. Refer to the Energy Petal handbook for a list of renewable energy systems, clarifications, and exceptions.
14. Projects must demonstrate that sufficient backup battery power be installed for emergency lighting at least 10 percent of lighting load and refrigeration use for up to one week for greater resiliency.
materials matter

red-list chemical free
sustainably sourced
recycled wood, paper & cardboard
carbon storing
materials matter:  from the Moran Square, Fitchburg, MA, team
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Universal Access to Nature & Place

All primary transportation, roads and non-building infrastructure that are considered externally focused must be equally accessible to all members of the public regardless of background, age and socioeconomic class—including the homeless—with reasonable steps taken to ensure that all people can benefit from the project’s creation.

For any project (except single-family residential) located in Transect L3-L6, the public realm must be provided for and enhanced through design measures and features such as street furniture, public art, gardens and benches that are accessible to all members of society.

Access for those with physical disabilities must be safeguarded through designs meeting the Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines.6

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56 Refer to the Equity Petal Handbook for a complete list of applicable infrastructure and exceptions that address issues of safety.
57 Refer to the Equity Petal Handbook for specific exceptions, such as those for private residences and historic structures. Complete ADA and ABA Accessibility Guidelines are available online at www.access-board.gov/adaag/about.
The project must be designed to include elements that nurture the innate human/nature connection. Each project team must engage in a minimum of one all-day exploration of the biophilic design potential for the project. The exploration must result in a biophilic framework and plan for the project that outlines the following:

1. How the project will be transformed by deliberately incorporating nature through Environmental Features, Light and Space, and Natural Shapes and Forms.
2. How the project will be transformed by deliberately incorporating nature’s patterns through Natural Patterns and Processes and Evolved Human-Nature Relationships.
3. How the project will be uniquely connected to the place, climate and culture through Place-based Relationships.
4. The provision of sufficient and frequent human-nature interactions in both the interior and exterior of the project to connect the majority of occupants with nature directly.

The plan must contain methods for tracking biophilia at each design phase.

The plan should include historical, cultural, ecological and climatic studies that thoroughly examine the site and context for the project.
Educational materials about the operation and performance of the project must be provided to the public to share successful solutions and to motivate others to make change.

Projects must provide:

- An annual open day for the public.
- An educational web site that shares information about the design, construction, and operation of the project.
- A simple brochure describing the design and environmental features of the project, as well as ways for occupants to optimize project function.
- Interpretive signage that teaches visitors and occupants about the project.
- A Living Building Case Study to be posted on the Institute website.

42 Refer to the Beauty and Inspiration Path Handbook for additional information.
SOUTH
PLAN - ENTRY - LCE WELCOME CENTER

SCALE: 1/4" = 1'-0"

LCE WELCOME CENTER

AREA: 990 GSF

FF-EL: 33.5

1. As required for LBC certification, all entrances will have flush aluminum walk-off mats, set in concrete. See specs.
2. Outdoor Teaching Pavilion.
3. Indoor Teaching Pavilion.
4. Footnotes.
5. Locations.

PROJECT NOTES - SHEET A1.1:

1. The Welcome Center has a continuous air barrier at the inside face of stud that must meet .6 ACH & will be air-tight tested.
2. For site design, specifications and scope referenced to drawings by Berkshire Design Civil Engineers C1.1, C1.2, C2.1, C2.2.
3. As required for LBC certification, all entrances will have flush aluminum walk-off mats, set in concrete. See specs.
6. Local, on-site field stone & granite curbing and/or donated curbing to be used to create steps at garden/south slope.
7. Large boulders from excavated site area to be used as seats within plaza area. Laid/located as approved by Owner & Architect.
8. Electric panel, to be connected to Tesla Power Wall, powered from solar panels on roof.
9. Green Wall.
10. TESLA POWER WALLS - STORAGE FOR SOLAR ARRAY GENERATION.
COMPOST TOILET SYSTEM
DETAILS OF HIGH-PERFORMANCE STUDENT BUILD
THE TEAM
REUSE
RECYCLE
REDUCE
IT’S TIME TO IMAGINE A LIVING FUTURE AND A WORLD OF LIVING BUILDINGS

GNBVT DEMO DAY
01.11.2017
WORKFORCE TRAINING: TEST. TRY. CORRECT. INSTALL. REPEAT...
WORKFORCE TRAINING: TEST. TRY. CORRECT.
INSTALL. REPEAT.
WORKFORCE TRAINING THE BUILD
WORKFORCE TRAINING – THE BUILD
WORKFORCE TRAINING - SYSTEM INTEGRATION
WORKFORCE TRAINING – LEARNING OF/FROM PROFESSIONALS
WORKFORCE TRAINING – LEARNING OF/FROM PROFESSIONALS
HIGH PERFORMANCE BUILD SITE LEARNING PROCESS:
1. find a project, create a scope, sign agreement
2. develop a schedule, OWNER installs all site work
3. inter-disciplinary/demo day @ school-INTRODUCE
4. test build. site build. test model. site build.

HIGH-PERFORMANCE BUILD SITE WORKFORCE SKILLS:
1. state-of-the-art thermal, HVAC, electric/solar, plumbing
2. collaborative, team-based, problem-solving
3. spatial reasoning – integrated systems
4. professionalism – interacting with experts throughout
5. design process – iterative learning – understanding failu

HIGH-PERFORMANCE BUILD SITE LIFE SKILLS:
1. sustainability leadership – understanding the holistic visi
2. collaboration – 22nd century problem-solving skills
LCE Welcome Center: today...pursuing LBC
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“You teach me, I forget. You show me, I remember. You involve me, I understand.” – Edward O. Wilson
...what is the next adventure...
...engage students and they will make history...
...and, in the process, build a better tomorrow...
WORKFORCE TRAINING: GNBVT VIDEOS OF GNBVT STUDENTS
GNBVT students building the LCE Welcome Center
lloydcenter.org - Lloyd Center for the Environment
living-future.org – International Living Future Institute - LBC
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