BUILDINGENERGY BOSTON

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

Kathryn Duff (studio2sustain)
Liz Moniz (Lloyd Center for the Environment)
Warley Williams (Greater New Bedford Vocational Technical HS)

Curated by Stephen Stuart (Sullivan County Office of Sustainable Energy) and
Clay Tilton (Sustainable Comfort)

Northeast Sustainable Energy Association (NESEA)
February 28, 2022

BUILDINGENERGY BOSTON

Your Building as Workforce Training:

Integrating students into high-performance projects

studio²sustain inc

architects consultants environmental evangelists

studio2sustain.com

Kathryn Duff, RA, CPHC
kathryn@studio2sustain.com

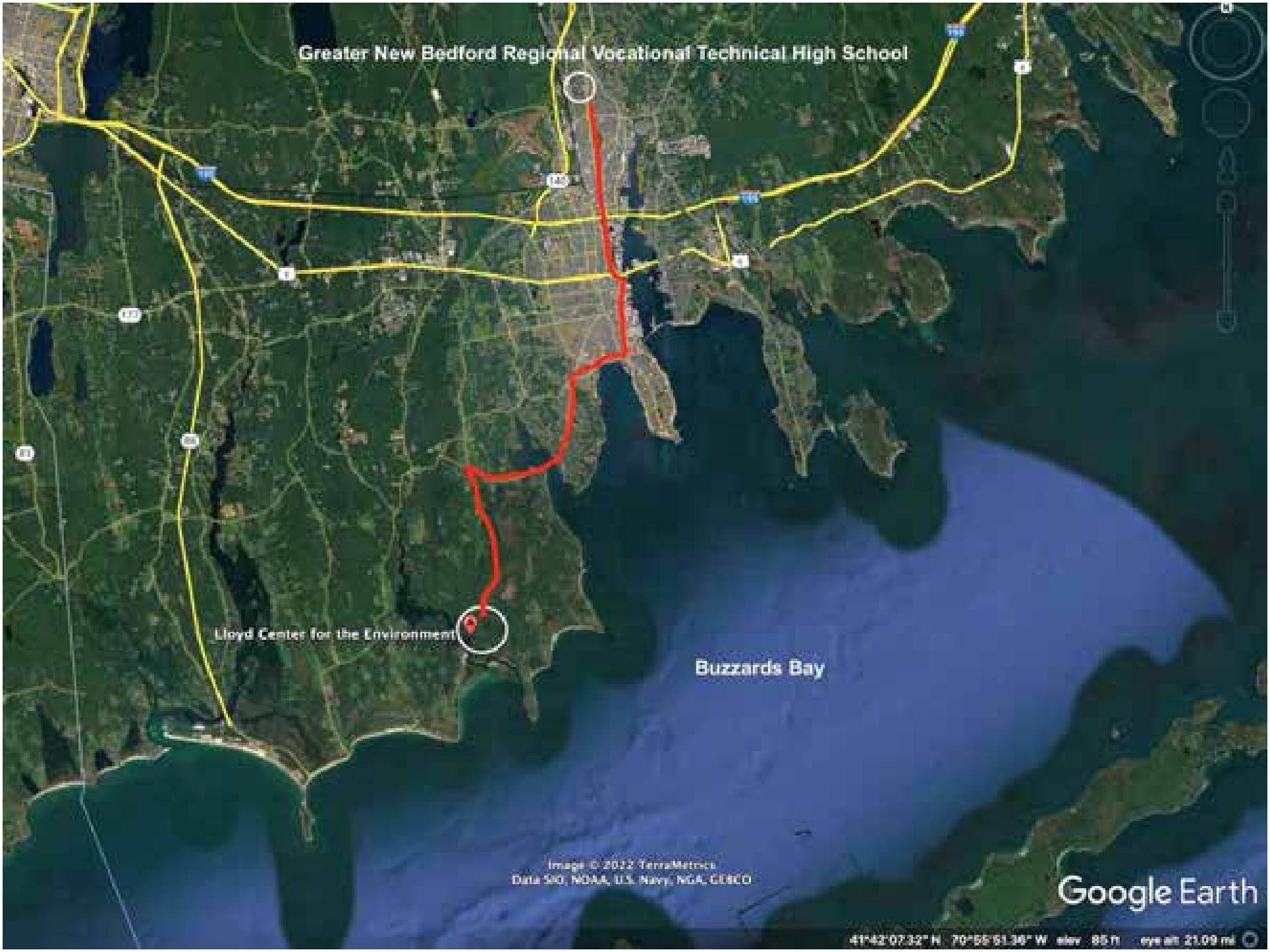
students building the LCE Welcome Center

Storey & Ansel wandering the trails of the Lloyd Center for the Environment

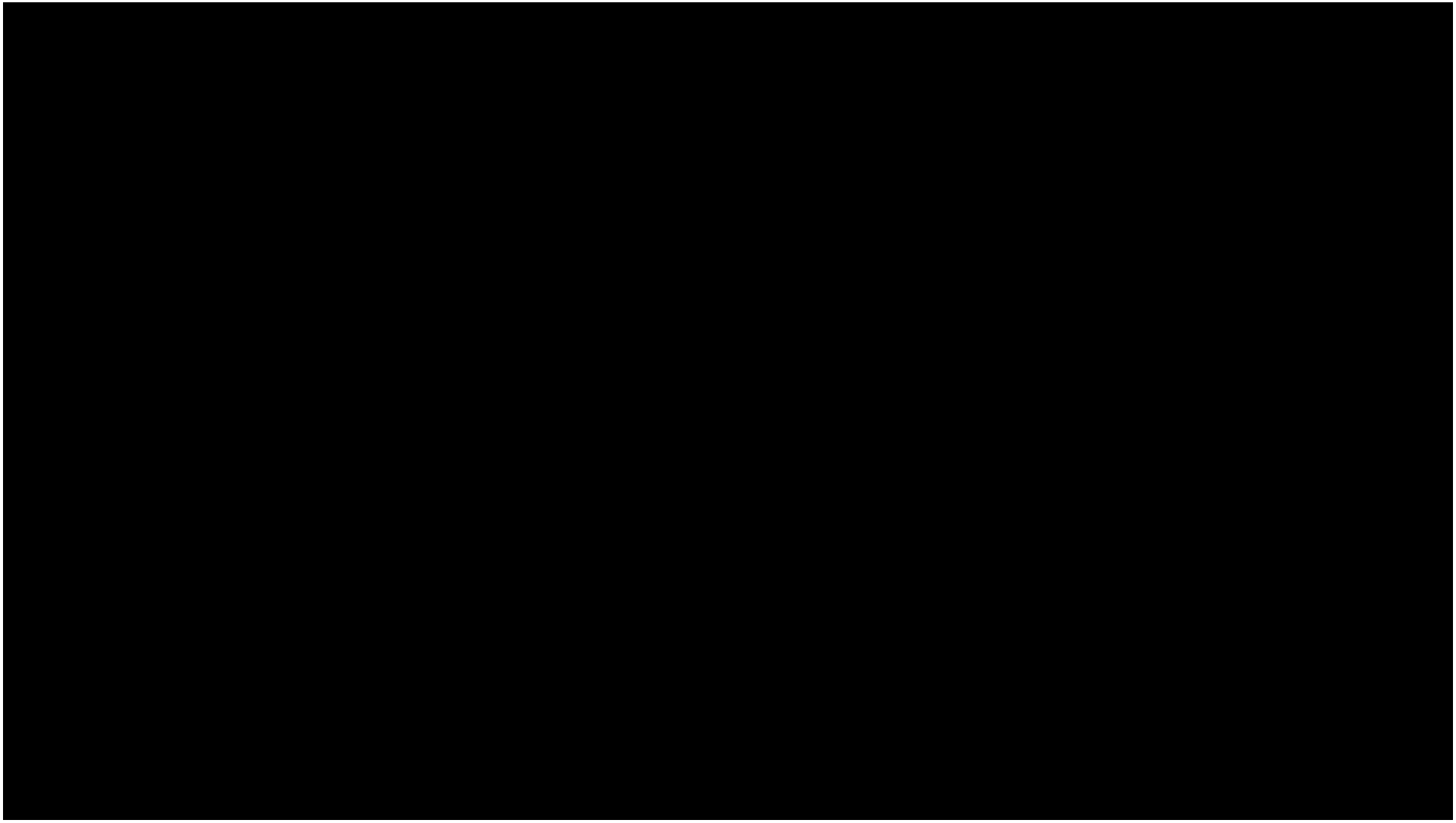
Antarctica, February – March, 2020

...when I returned...we resumed work on the Welcome Center – begun in 2015

Place Petal


Greater New Bedford Regional Vocational Technical High School
Lloyd Center for the Environment
Buzzards Bay
Image © 2022 TerraMetrics
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google Earth
41°42'07.32" N 70°55'51.36" W elev 85 ft eye alt 21.09 mi

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 (CO_2) emissions,
  - **40%** of raw materials use,
  - **30%** of waste output (136 million tons annually)
  - **14%** of potable water consumption.

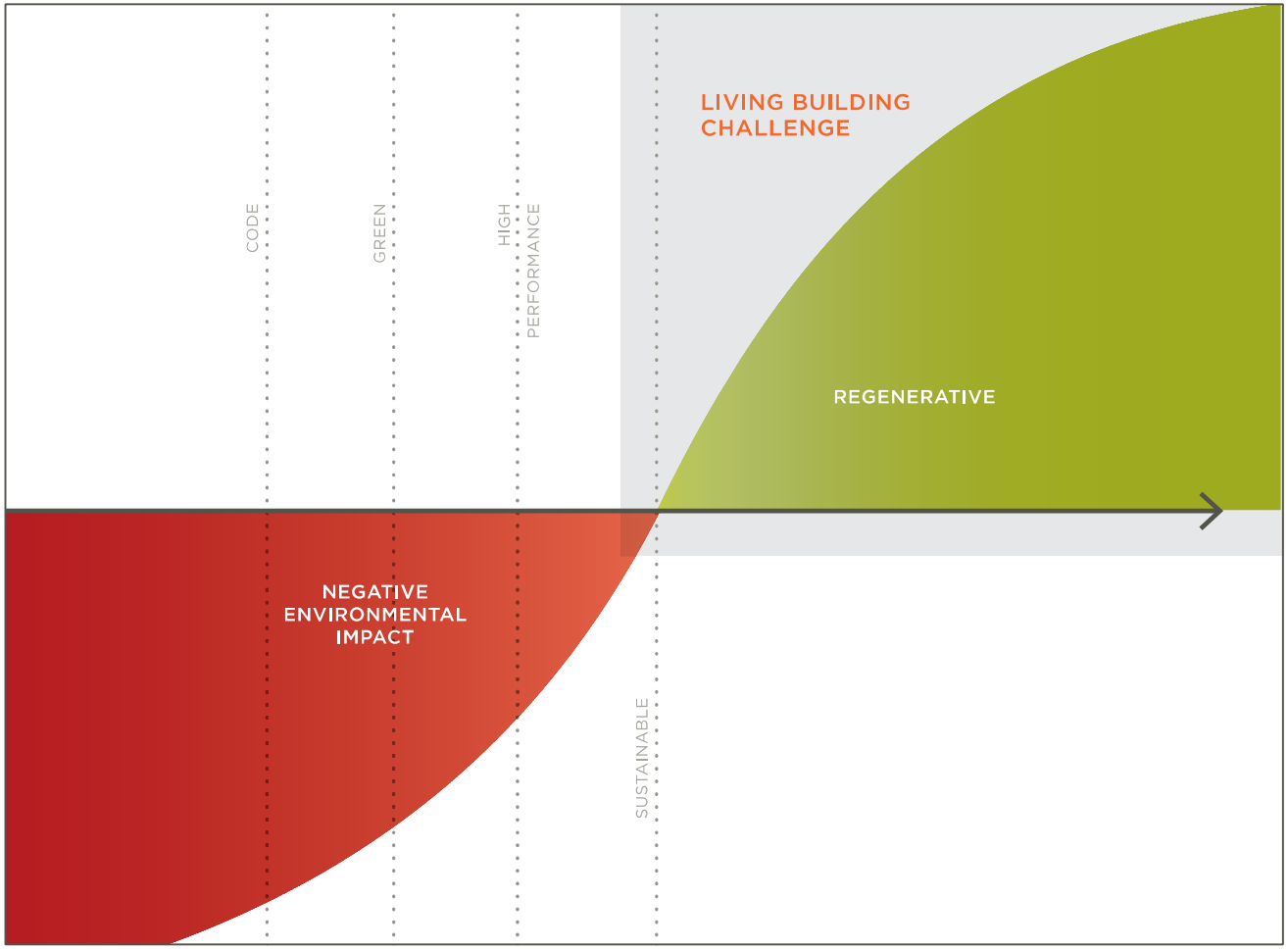
YEAR	HOME SIZE	FAMILY SIZE	SF/PERSON
1950	983 SF	3.9	252 SF
2008	2,500 SF	2.6	962 SF

image from ILFI LBC Program

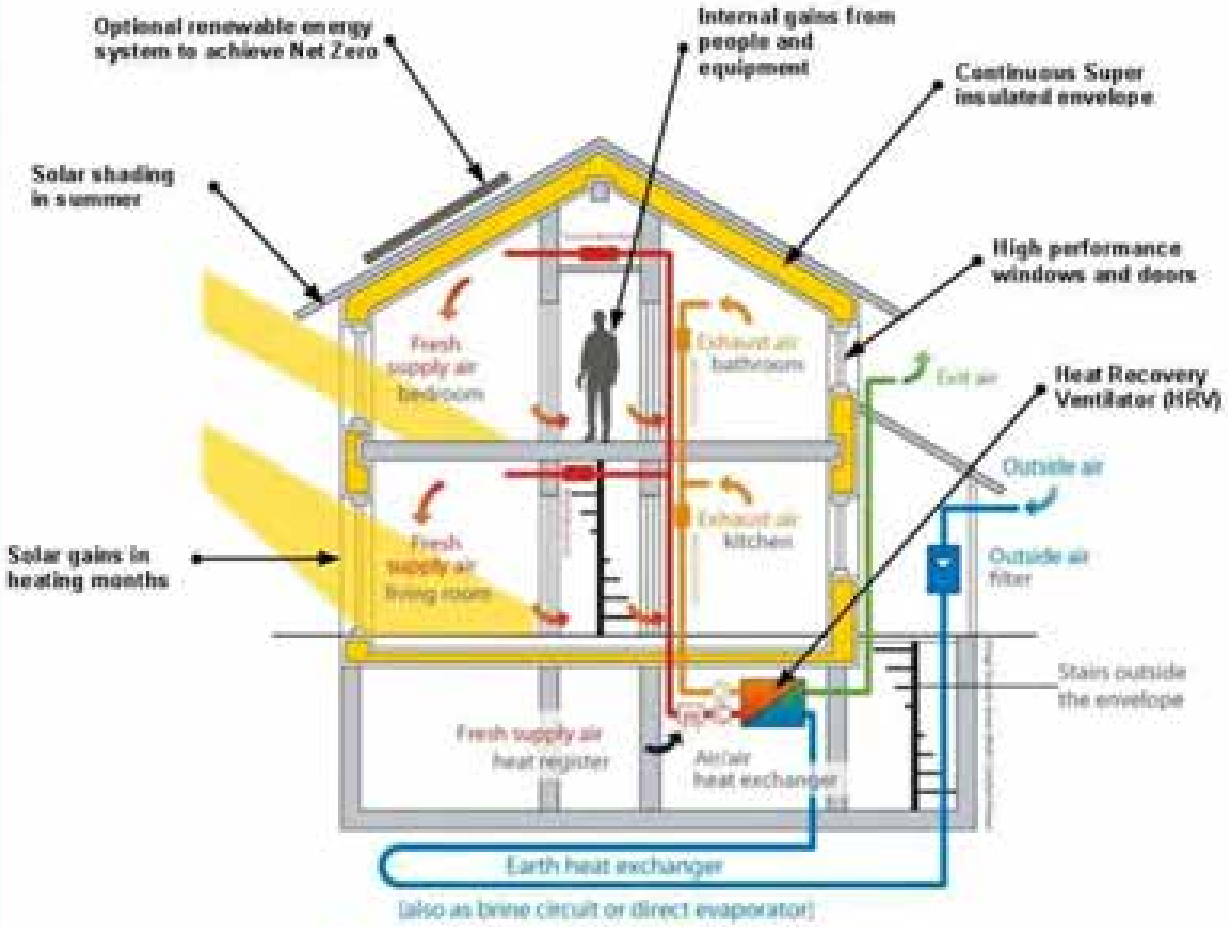
...the need...students arriving for field studies camp at the Lloyd Center...

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.



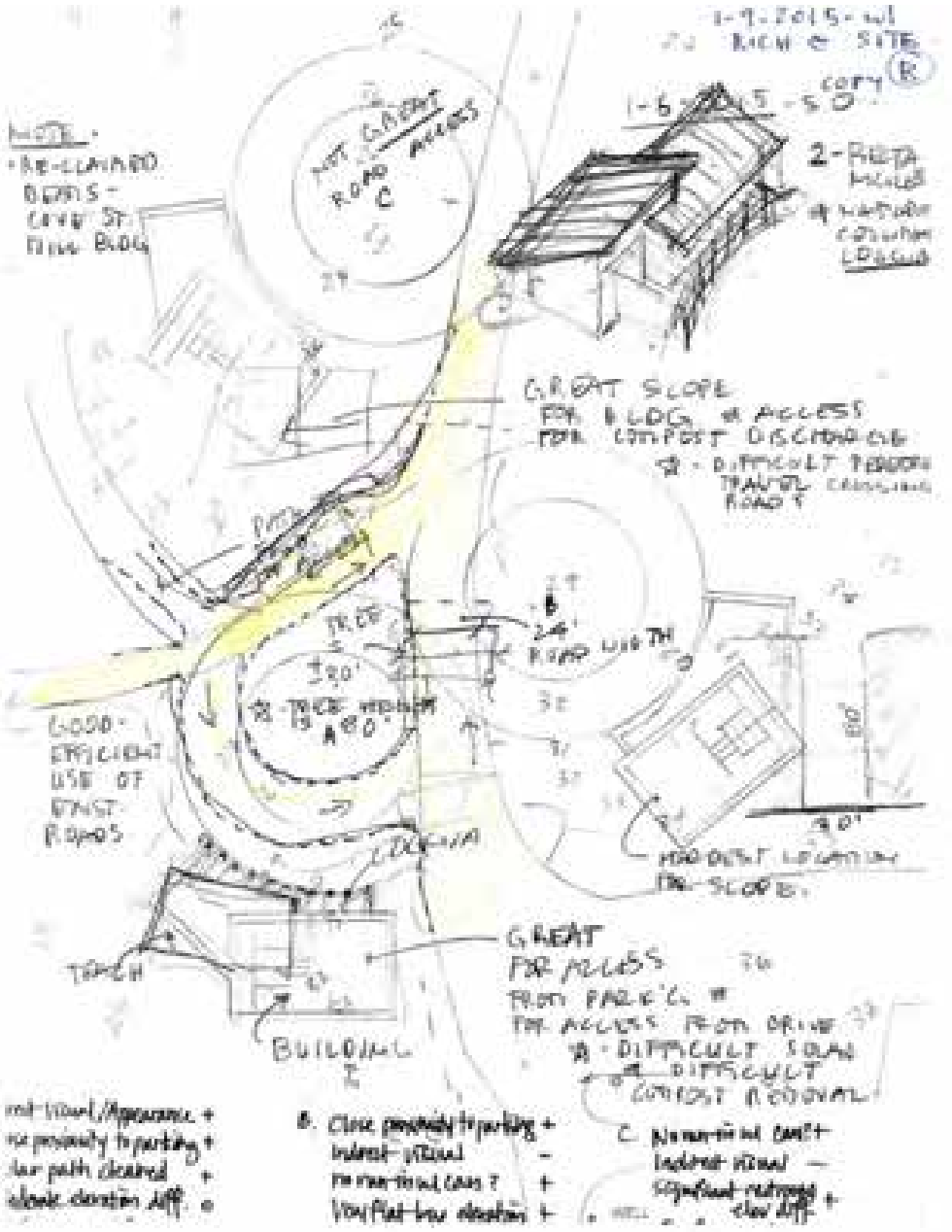
ENERGY BALANCE

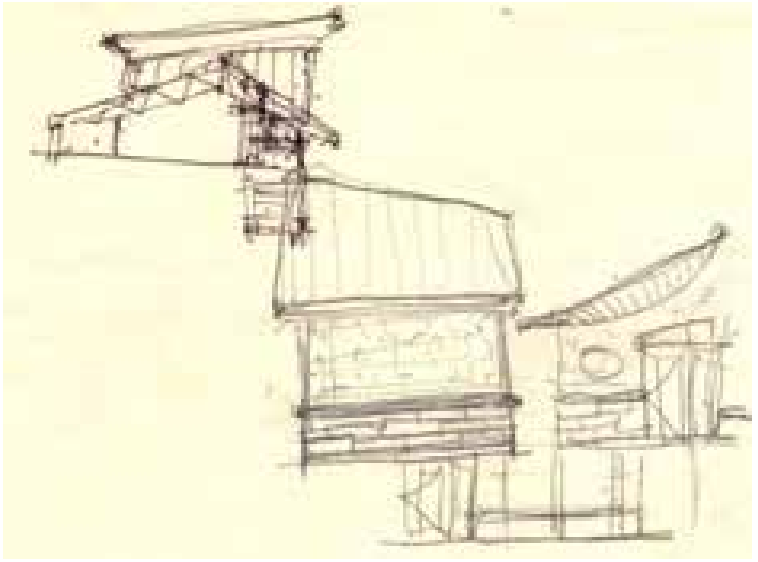


Passive House Diagram

LCE Welcome Center - East Elevation

J-Term students launch LCE Welcome design - 2016





J-Term students launch LCE Welcome design charrette @ studio2sustain

Harvard College students and Harvard University students majoring in Sustainability built site & building models.

Various studies explored site contours, site circulation, building masses and access...

At the end of the design charrette, a site plan emerged.

The Lloyd Center pursues **L**iving **B**uilding **C**hallenge (LBC): 7 Petals:
Place_Water_Energy_Health & Happiness_Materials_Equity_Beauty

Solar array at The Hawaii Preparatory Academy Energy Lab, Kamuela, HI
Living Certification - Living Building Challenge 1.3
Photo: Matthew Millman Photography / Courtesy: Flansburgh Architects

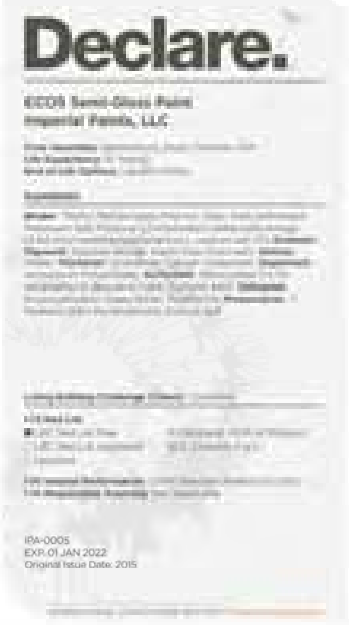
ENERG

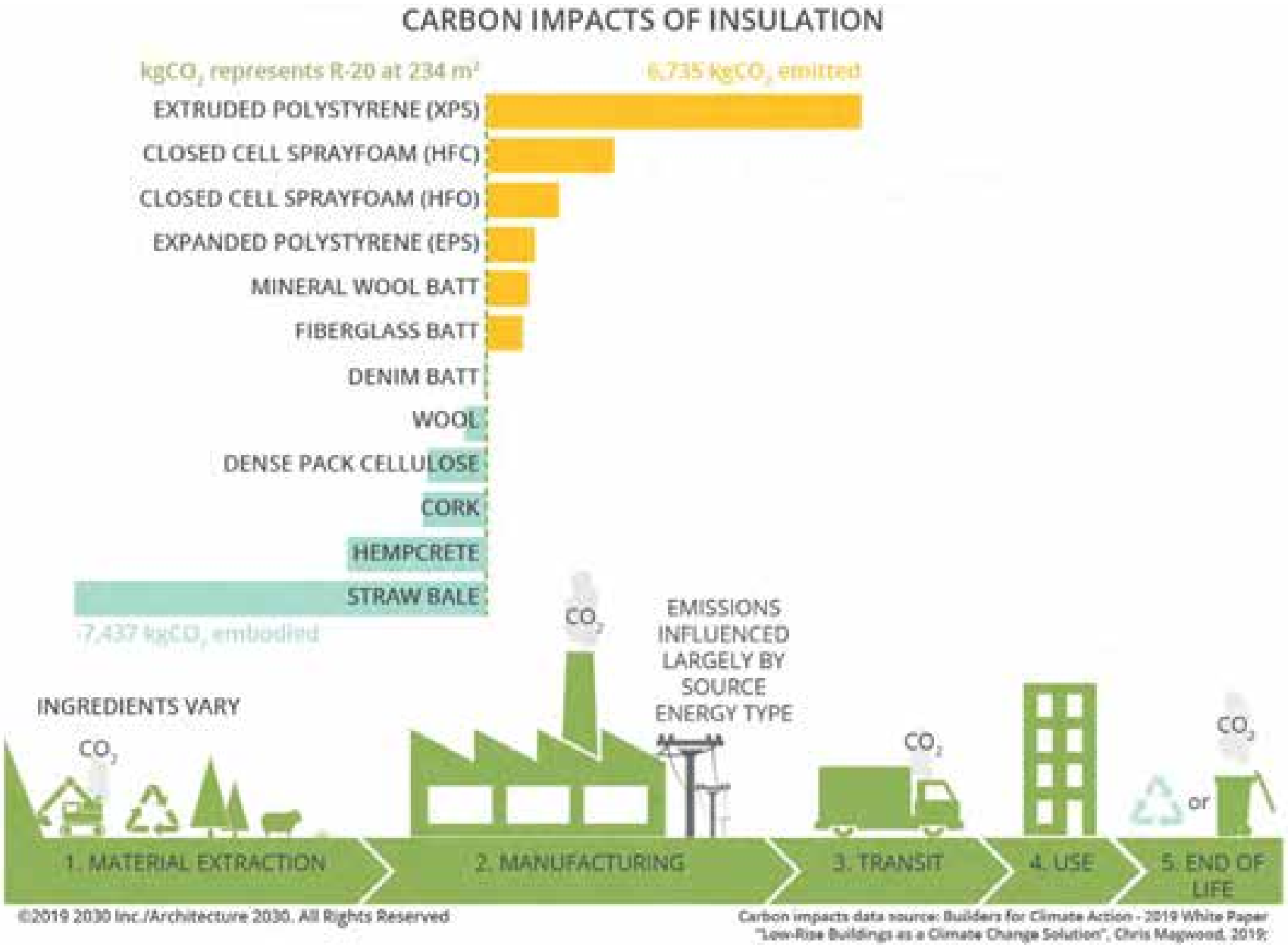

MATERIALS
42
Living Building Challenge™ 3.0
University Childcare Centre
Burnaby, BC
Courtesy: stacesZplace

MATERIAL

materials matter

red-list chemical free
sustainably sourced
recycled wood, paper & cardboard
carbon storing

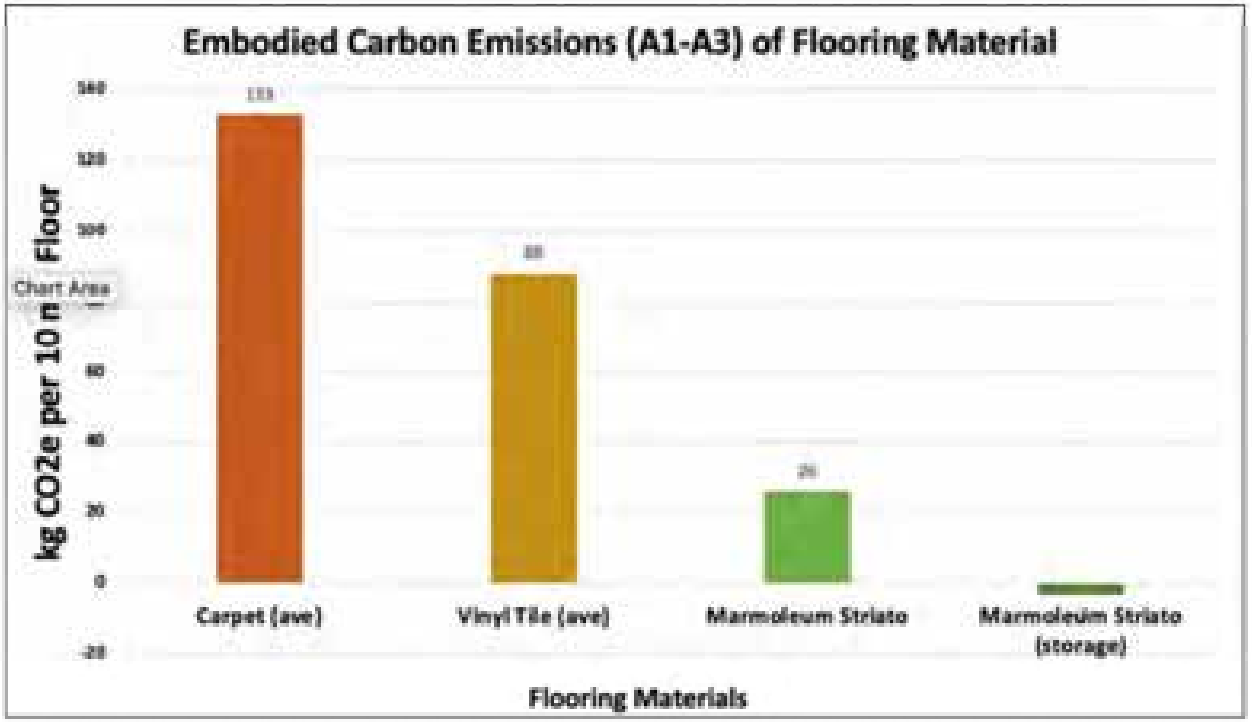




materials matter: from the Moran Square, Fitchburg, MA, team

Interiors Strategies

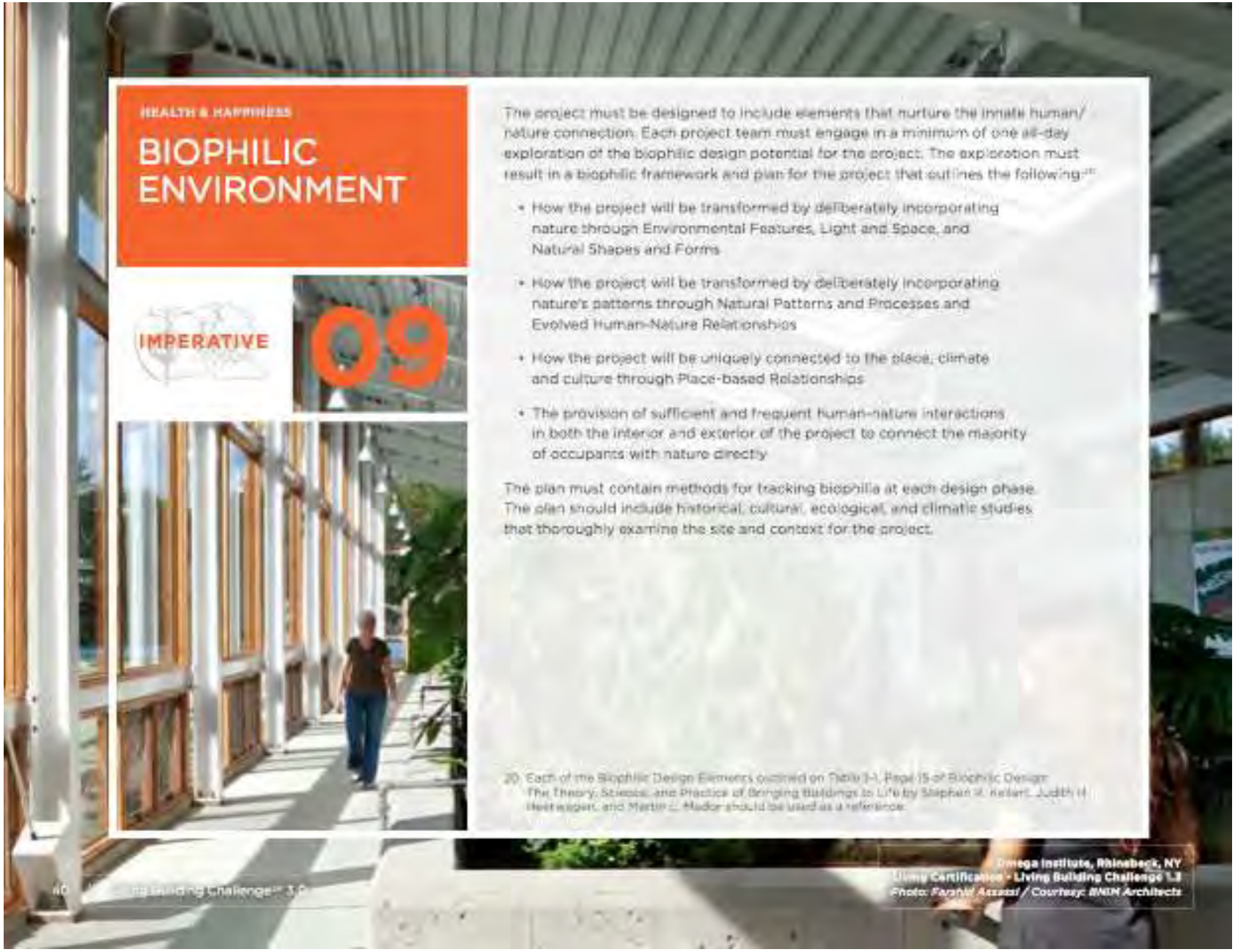
- Reclaimed Hardwood
- Marmoleum
- Carbon-neutral LVT
- No Carpet
- Recycled-content Formica or comp



materials matter: from the Moran Square, Fitchburg, MA, team


EQUITY
UNIVERSAL ACCESS TO NATURE & PLACE
IMPERATIVE
16
All primary transportation, roads and non-building infrastructure that are considered externally focused must be equally accessible[50] 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.[51]
continued >>
50 Refer to the Equity Petal Handbook for a complete list of applicable infrastructure and exceptions that address issues of safety.
51 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: www.access-board.gov/adaag/about
54 | Living Building Challenge™ 3.0

ACCESS TO


HEALTH & HAPPINESS
BIOPHILIC ENVIRONMENT
IMPERATIVE
09
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:[20]
• How the project will be transformed by deliberately incorporating nature through Environmental Features, Light and Space, and Natural Shapes and Forms
• How the project will be transformed by deliberately incorporating nature's patterns through Natural Patterns and Processes and Evolved Human-Nature Relationships
• How the project will be uniquely connected to the place, climate and culture through Place-based Relationships
• 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.
20. Each of the Biophilic Design Elements outlined on Table 1-1, Page 15 of Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life by Stephen R. Kellert, Judith H. Heerwagen, and Martin L. Mador should be used as a reference.
Omega Institute, Rhinebeck, NY
Living Certification • Living Building Challenge™ 3.1
Photo: Farshid Assassi / Courtesy: BNIM Architects

BIOPHILIC

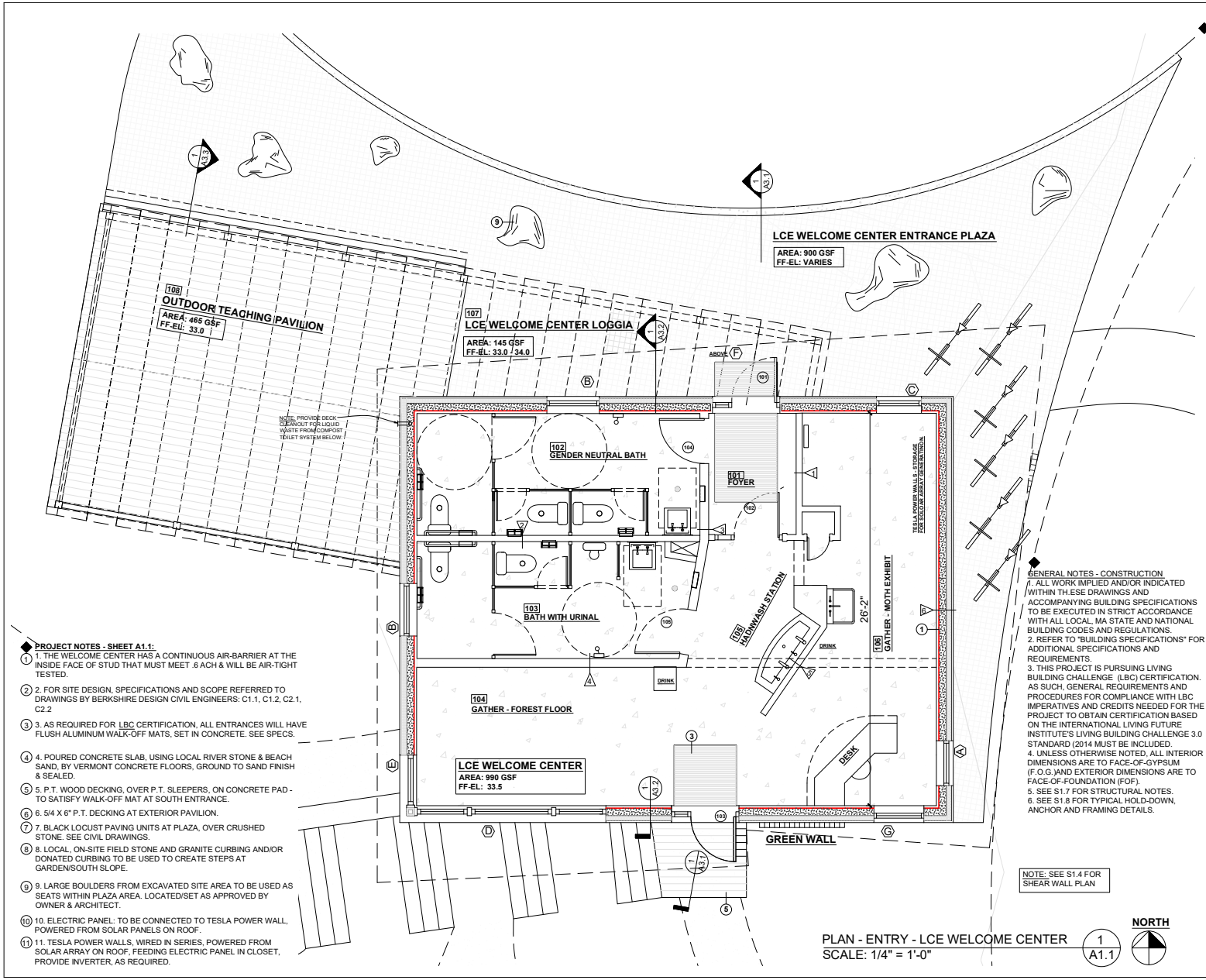
INSPIRATION &

EAST

NORTH

SOUTH

WEST



PLAN - ENTRY - LCE WELCOME CENTER (1 / A1.1)
SCALE: 1/4" = 1'-0"

PROJECT NOTES - SHEET A1.1:

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. 2. FOR SITE DESIGN, SPECIFICATIONS AND SCOPE REFERRED TO DRAWINGS BY BERKSHIRE DESIGN CIVIL ENGINEERS: C1.1, C1.2, C2.1, C2.2
3. 3. AS REQUIRED FOR LBC CERTIFICATION, ALL ENTRANCES WILL HAVE FLUSH ALUMINUM WALK-OFF MATS, SET IN CONCRETE. SEE SPECS.
4. 4. POURED CONCRETE SLAB, USING LOCAL RIVER STONE & BEACH SAND, BY VERMONT CONCRETE FLOORS, GROUND TO SAND FINISH & SEALED.
5. 5. P.T. WOOD DECKING, OVER P.T. SLEEPERS, ON CONCRETE PAD - TO SATISFY WALK-OFF MAT AT SOUTH ENTRANCE.
6. 6. 5/4 X 6" P.T. DECKING AT EXTERIOR PAVILION.
7. 7. BLACK LOCUST PAVING UNITS AT PLAZA, OVER CRUSHED STONE. SEE CIVIL DRAWINGS.
8. 8. LOCAL, ON-SITE FIELD STONE AND GRANITE CURBING AND/OR DONATED CURBING TO BE USED TO CREATE STEPS AT GARDEN/SOUTH SLOPE.
9. 9. LARGE BOULDERS FROM EXCAVATED SITE AREA TO BE USED AS SEATS WITHIN PLAZA AREA. LOCATED/SET AS APPROVED BY OWNER & ARCHITECT.
10. 10. ELECTRIC PANEL: TO BE CONNECTED TO TESLA POWER WALL, POWERED FROM SOLAR PANELS ON ROOF.
11. 11. TESLA POWER WALLS, WIRED IN SERIES, POWERED FROM SOLAR ARRAY ON ROOF, FEEDING ELECTRIC PANEL IN CLOSET, PROVIDE INVERTER, AS REQUIRED.

GENERAL NOTES - CONSTRUCTION

1. ALL WORK IMPLIED AND/OR INDICATED WITHIN TH.ESE DRAWINGS AND ACCOMPANYING BUILDING SPECIFICATIONS TO BE EXECUTED IN STRICT ACCORDANCE WITH ALL LOCAL, MA STATE AND NATIONAL BUILDING CODES AND REGULATIONS.
2. REFER TO "BUILDING SPECIFICATIONS" FOR ADDITIONAL SPECIFICATIONS AND REQUIREMENTS.
3. THIS PROJECT IS PURSUING LIVING BUILDING CHALLENGE (LBC) CERTIFICATION. AS SUCH, GENERAL REQUIREMENTS AND PROCEDURES FOR COMPLIANCE WITH LBC IMPERATIVES AND CREDITS NEEDED FOR THE PROJECT TO OBTAIN CERTIFICATION BASED ON THE INTERNATIONAL LIVING FUTURE INSTITUTE'S LIVING BUILDING CHALLENGE 3.0 STANDARD (2014 MUST BE INCLUDED.
4. UNLESS OTHERWISE NOTED, ALL INTERIOR DIMENSIONS ARE TO FACE-OF-GYPSUM (F.O.G.)AND EXTERIOR DIMENSIONS ARE TO FACE-OF-FOUNDATION (FOF).
5. SEE S1.7 FOR STRUCTURAL NOTES.
6. SEE S1.8 FOR TYPICAL HOLD-DOWN, ANCHOR AND FRAMING DETAILS.

DATE: 06.24.2016
REVISION: 02.10.2017

LLOYD CENTER FOR ENVIRONMENT
-
WELCOME CENTER

KEY

	PARTITION TYPE
C	WINDOW TYPE
101	DOOR TYPE
P-3	PLUMBING FIXTURE
F-1	LIGHT FIXTURE
1	SHEET NOTES
A-1	ACCESSORY TYPE
101	ROOM NUMBER

studio2sustain inc

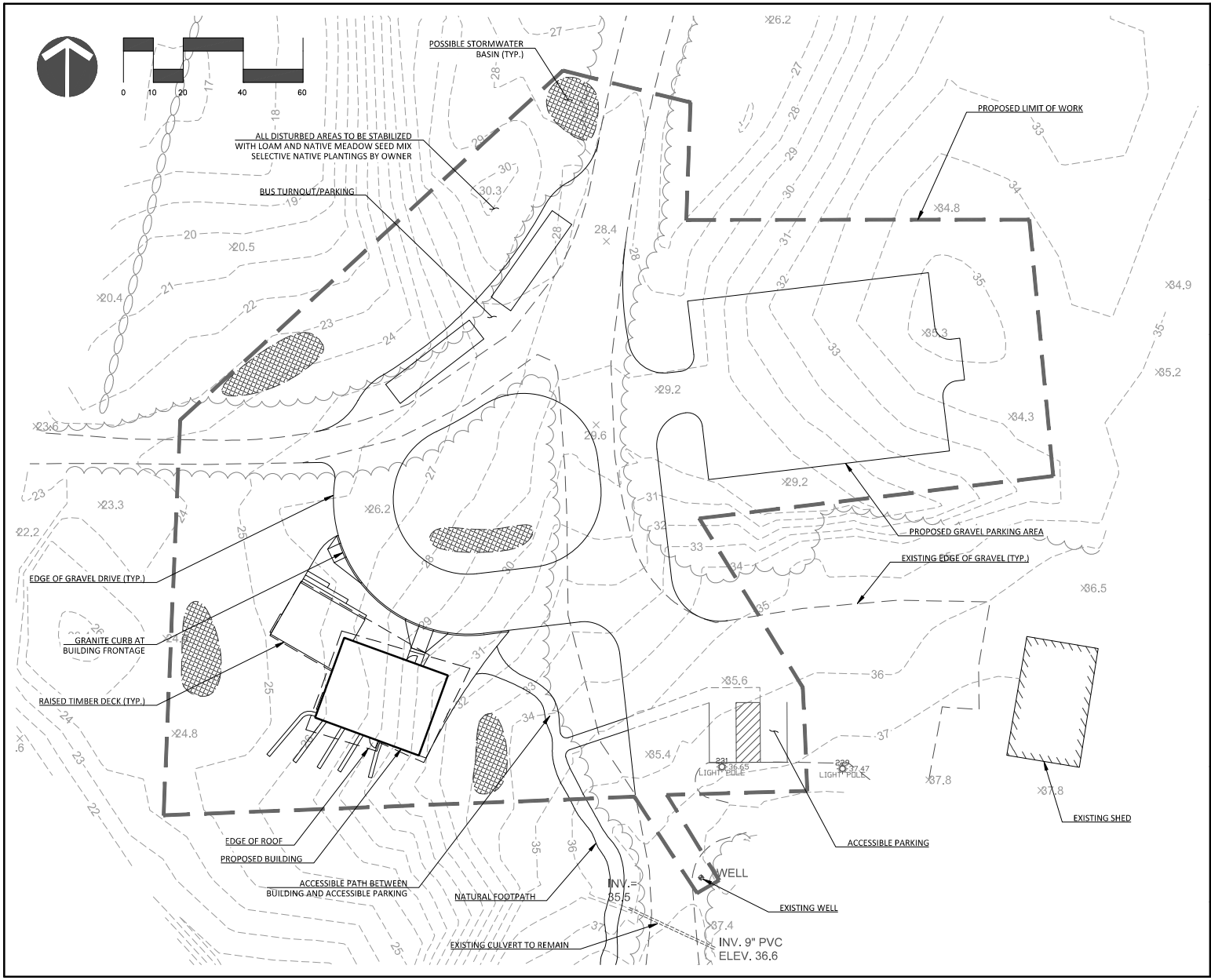
S2S

CONSTRUCTION

PLAN - MAIN ENTRANCE

A | 1.1

PLAN



DATE: 02.18.2016
REVISION:

LCE-WELCOME CENTER
-
CONSTRUCTION DRAWINGS
-
AN LBC PROJECT

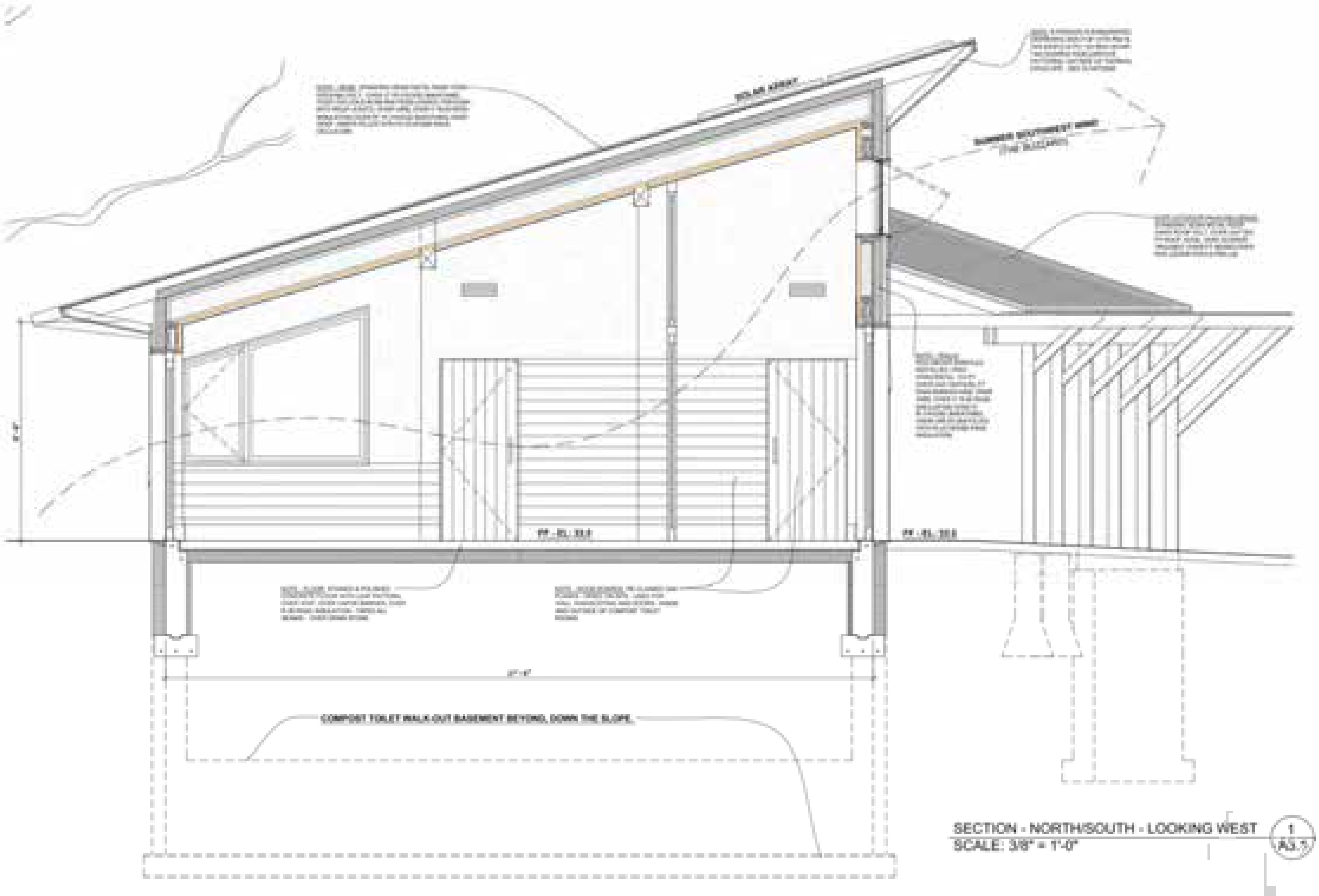
The Berkshire Design Group, Inc.
Landscape Architecture
Civil Engineering
Planning
Land Surveying
4 Allen Place, Northampton, Massachusetts 01060
(413) 582-7000 • FAX (413) 582-7005
Email: bdg@berkshiredesign.com
Web: http://www.berkshiredesign.com

PRELIMINARY
NOT FOR CONSTRUCTION

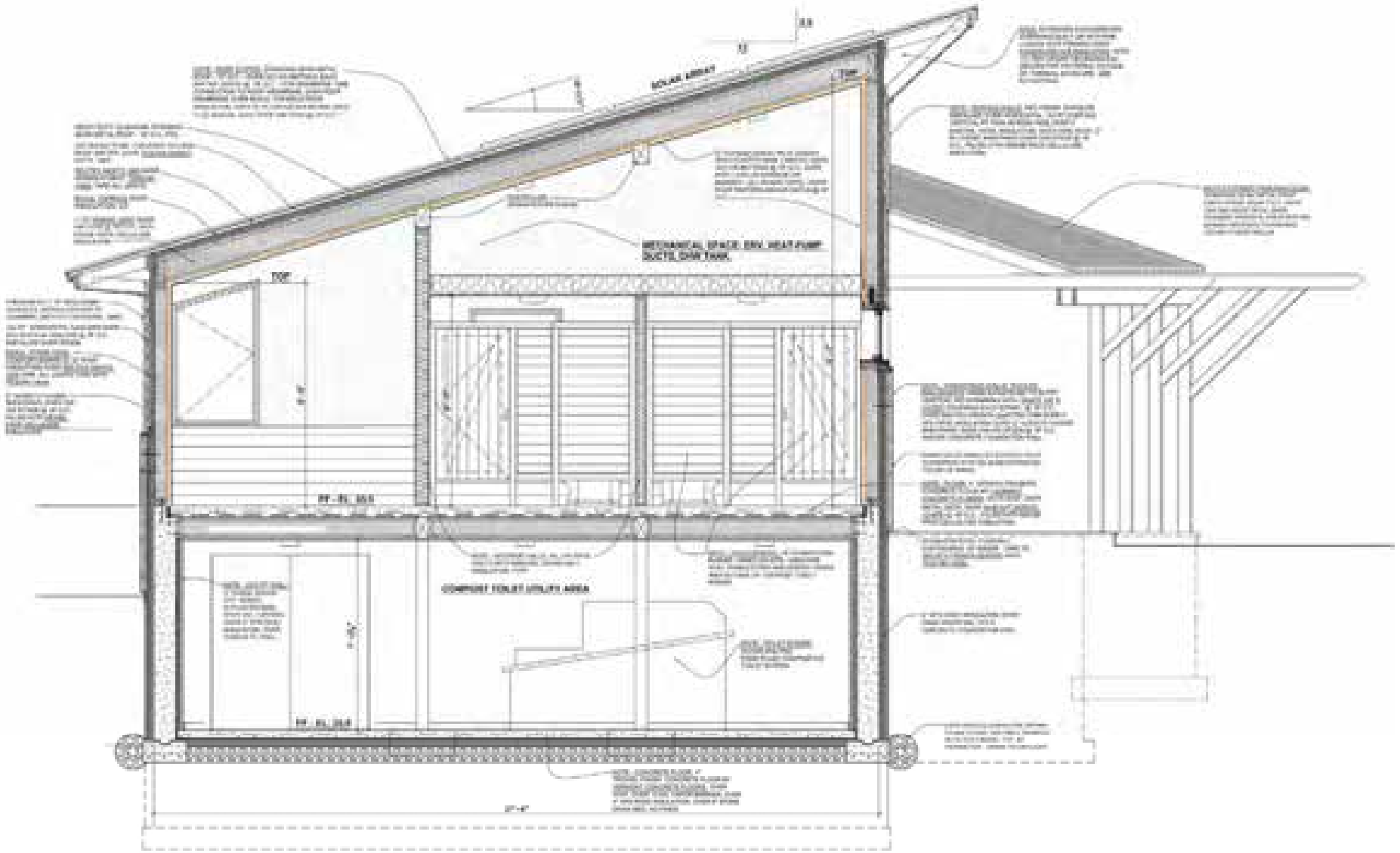
SITE PLAN

C | 1.1

SITE


SOLAR ARRAY
SUMMER SOUTHWEST WIND
COMPOST TOILET WALK-OUT BASEMENT BEYOND, DOWN THE SLOPE.
SECTION - NORTH/SOUTH - LOOKING WEST
SCALE: 3/8" = 1'-0"
1
A3.1

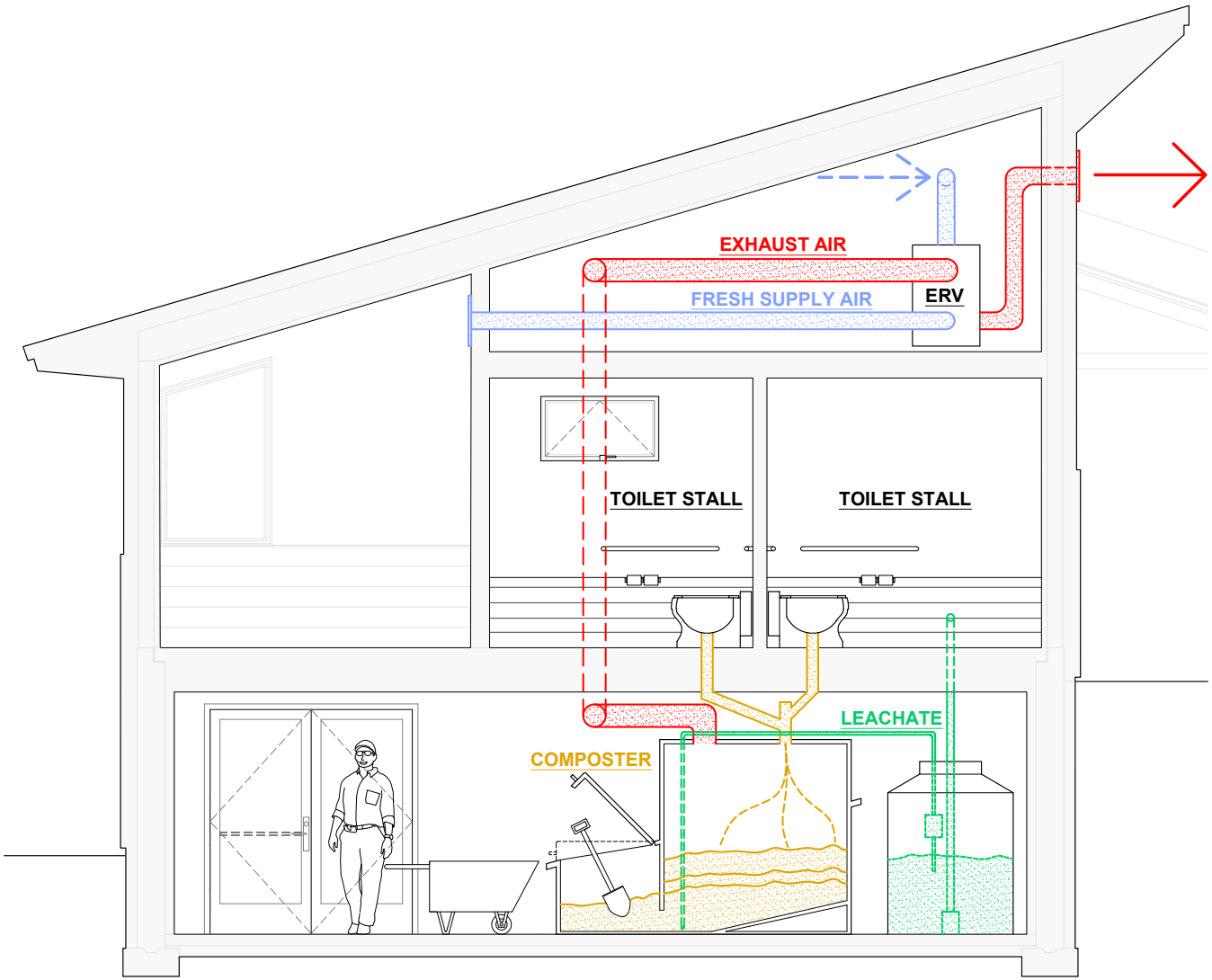
SECTION



SECTION - NORTH/SOUTH - LOOKING WEST - THROUGH BATHROOMS
SCALE: 3/8" = 1'-0"

1
A3.2

SECTION



SECTION - DIAGRAM - CLIVIUS MULTRUM COMPOSTING TOILET SYSTEM
SCALE: 1/2" = 1'-0"

1
SK-9

DATE: 04.30.2019

LLOYD CENTER FOR ENVIRONMENT
-
WELCOME CENTER

KEY

	PARTITION TYPE
C	WINDOW TYPE
101	DOOR TYPE
P-1	PLUMBING FIXTURE
F-1	LIGHT FIXTURE
1	SHEET NOTES
A-1	ACCESSORY TYPE
101	ROOM NUMBER

studio2sustain inc

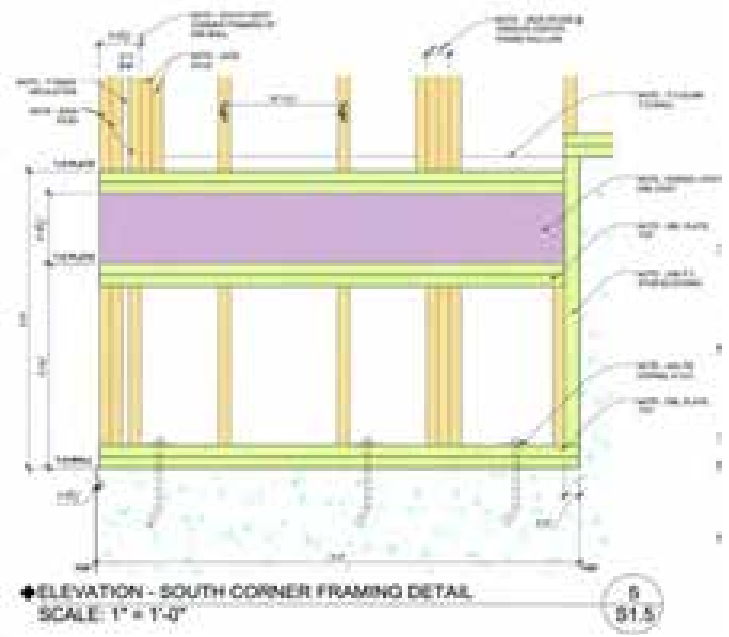
S2S

CA DRAWINGS

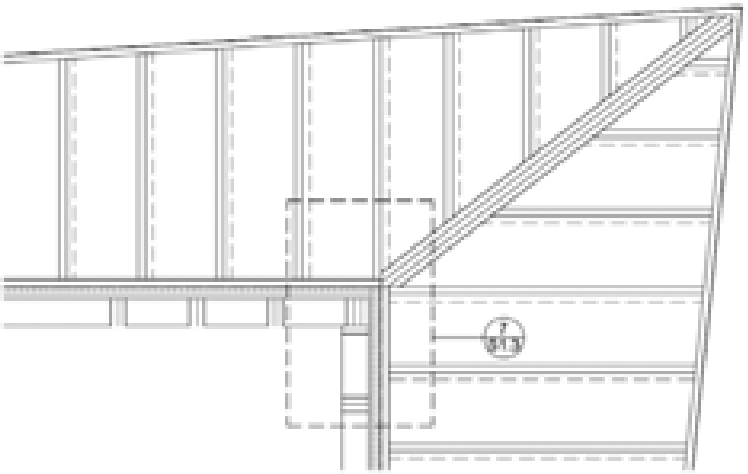
CLIVUS MULTRUM COMPOST TOILET DIAGRAM

SK 9

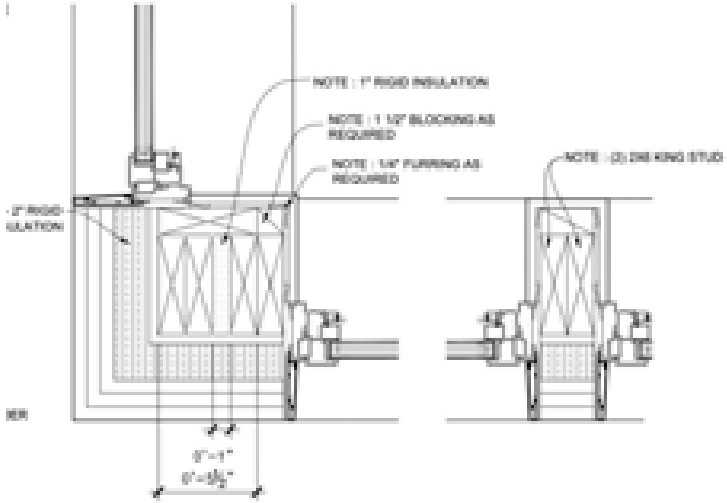
COMPOST TOILET SYSTEM



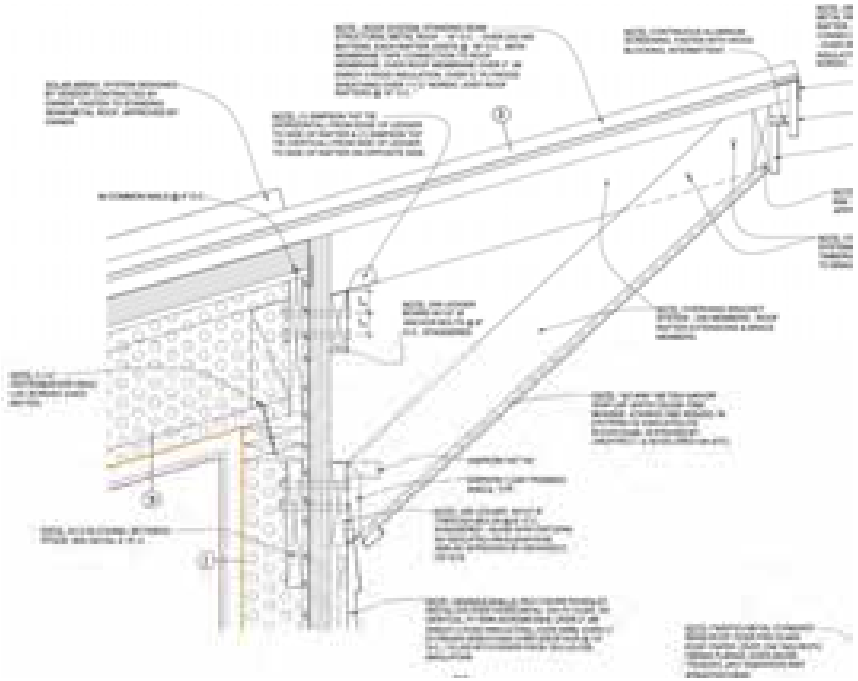
ELEVATION - SOUTH CORNER FRAMING DETAIL
SCALE: 1" = 1'-0"
6
S1.5



DETAIL - PLAN - EXPANDED VIEW OF OVERHANG BRACING, TYP.
SCALE: 1/2" = 1'-0"
3
S1.3



PLAN - SOUTH WEST CORNER DETAIL
SCALE: 1 1/2" = 1'-0"
3
S1.5



DETAILS OF HIGH-PERFORMANC STUDENT

studio²sustain

architects consultants environmental evangelists

integrated ecostrategy

Berkshire Design Group

baukraft

ENGINEERING BETTER HOMES

CLEAResult®

FIELDSTONE GARDENS

Landscape Design & Construction

GREATER NEW BEDFORD REGIONAL VOCATIONAL TECHNICAL HIGH

DARTMOUTH FAIRHAVEN NEW BEDFORD

ASAP Engineering & Design Co., Inc.

Apex Engineering

Structural & Civil Engineering

THE TEAM

REUSE – RECYCLE - REDUCE

REUSE
RECYCLE
REDUCE

REUSE
RECYCL
E
REDUCE

GNBVT DEMO DAY
01.11.2017

WORKFORCE
TRAINING:
TEST.
TRY.
CORRECT.
INSTALL.
REPEAT...

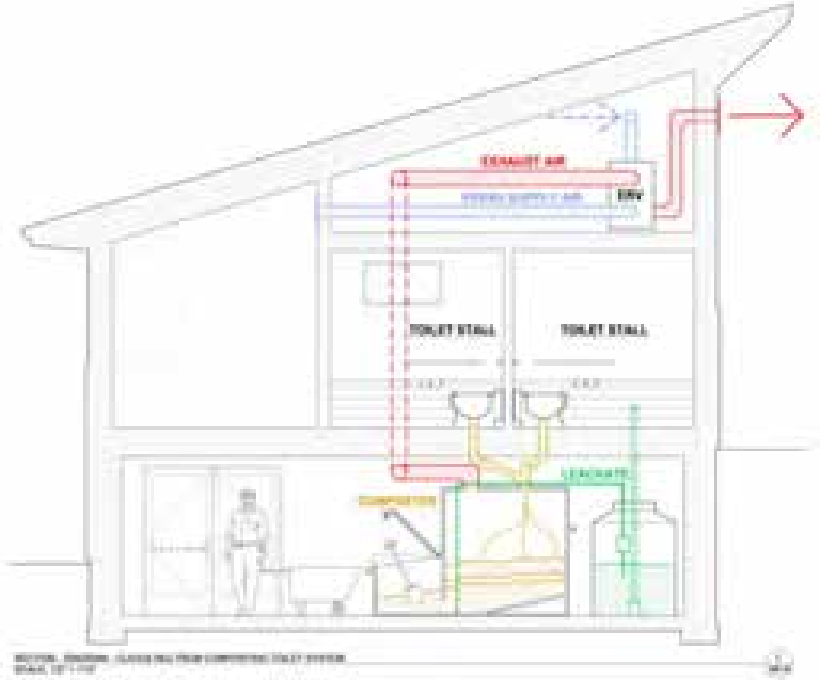
WORKFORCE TRAINING: TEST. TRY. CORRECT.

WORKFORCE TRAINING THE BUILD


INTELLO

WORKFORCE TRAINING – THE BUILD

WORKFORCE TRAINING – THE BUILD



WORKFORCE TRAINING - SYSTEM INTEGRATION




WORKFORCE TRAINING – LEARNING OF/FROM PROFESSIONALS

HILTI CLEAResults 475 BAUKRAFT

WORKFORCE TRAINING – LEARNING OF/FROM

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 – understainding 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

LCE Welcome Center: today...pursuing LBC

LCE Welcome Center: today...pursuing LBC

LCE Welcome Center: today...pursuing LBC


studio²sustain
architects consultants environmental evangelists
Berkshire Design Group
GURNEY'S SAW MILL, INC.
Native Lumber & By-Products
East Freetown, MA | 508-763-2502
integrated ecostrategy
baukraft
ENGINEERING BETTER HOMES
VERMONT NATURAL COATINGS
CLEAResult®
FIELDSTONE GARDENS
Landscape Design & Construction
HILTI
ALPEN
HIGH PERFORMANCE PRODUCTS
Apex Engineering
Structural & Civil Engineering
JM OF NEW BEDFORD
A WEATHERIZATION CO.
GREATER NEW BEDFORD REGIONAL VOCATIONAL TECHNICAL HIGH
DARTMOUTH
FAIRHAVEN
NEW BEDFORD
HIGH PERFORMANCE BUILDING SUPPLY
KNAUFINSULATION
aquatherm
state of the pipe
BUILDING

"You teach me, I forget. You show me, I remember. You involve me, I understand." **– Edward O. Wilson**

...what is the next adventure...

LCE Welcome Center

...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

kathryn@studio2sustain.com

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 – understainding failu

HIGH-PERFORMANCE BUILD SITE LIFE SKILLS:

1. sustainability leadership – understanding the holistic visi
2. collaboration – 22nd century problem-solving skills