

F*#M-FREE ASSEMBLIES

Carri Beer, AIA
Brennan + Company Architects

Michael Hindle CPHC, CPHB
Passive to Positive Consulting

brennan+company
ARCHITECTS

Passive to **POSITIVE**

WHY FOAM FREE?



HOLISTIC,
LOW-IMPACT DESIGN

WHY FOAM FREE?



HOLISTIC,
LOW-IMPACT DESIGN

living in america

2 million plastic beverage bottles every 5 minutes



How many carcinogens are released by these bottles and plastic bags?

How many endocrine enhancing chemicals are released?

How much oil did it take to manufacture them?

WHAT ABOUT YOUR INSULATION?

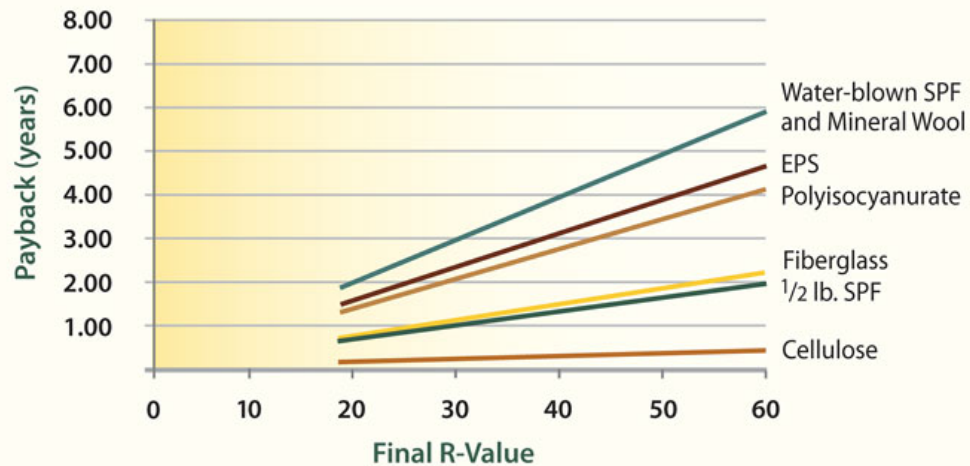
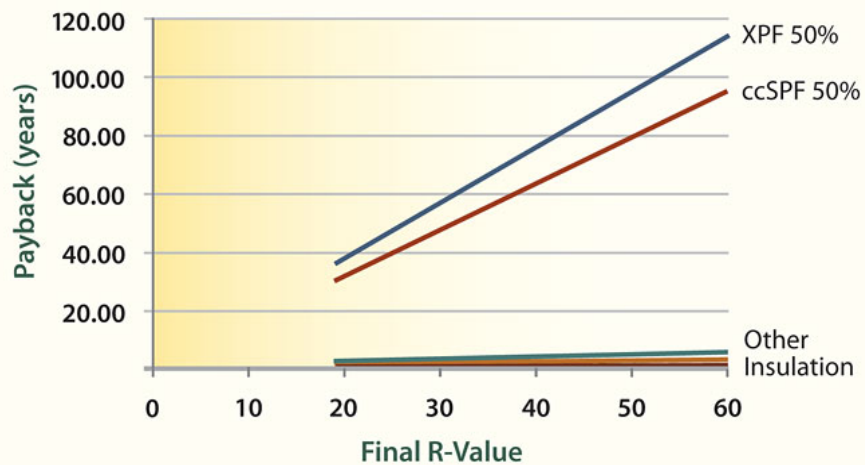




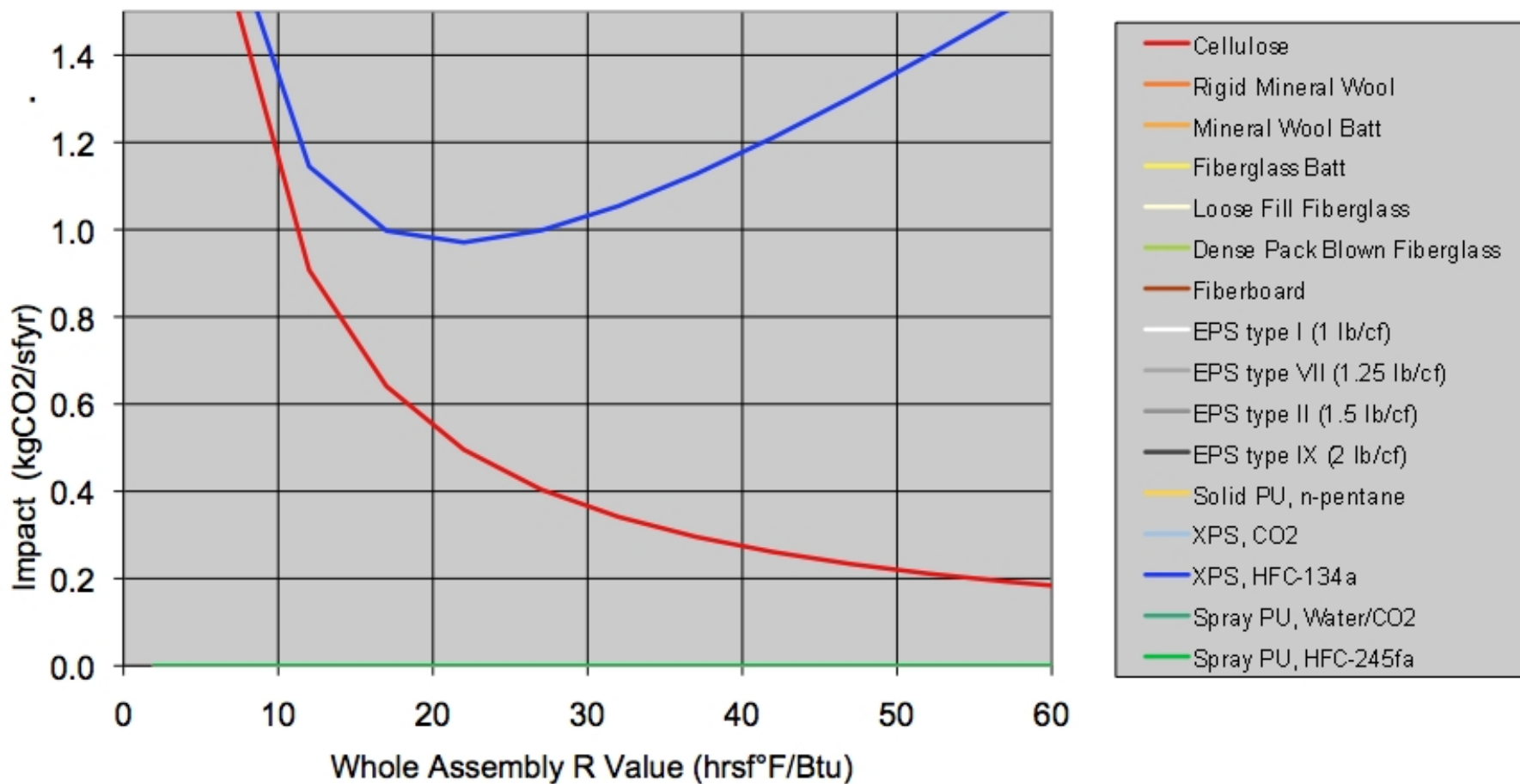
500 YEARS



MATERIALS LIFE-CYCLE IMPACT



Climatic Impact of Energy Use + Embodied GWP



A close-up photograph of a nest containing several bright blue eggs. The nest is made of dry, brownish twigs and straw, creating a textured background. The lighting is soft, highlighting the smooth surface of the eggs.

REMEMBER RACHEL CARSON?

MATERIALS' LIFE- CYCLE IMPACT MATTERS

American babies are born with the highest blood levels of flame retardants in the world.
(EBN June 2004).

. . . when the flame retardant hits wastewater streams . . . it loses bromine atoms, increasing its bioaccumulation potential and potential subsequent health hazards.
(EBN vol. 20 #12).

"PBDEs disrupt thyroid and estrogen hormones, which can cause . . . permanent changes to the brain and to reproductive systems (including reduced sperm count in males and changes to ovarian cell structure in females). . .

PBDE levels for . . . about 15 million people are nearing concentrations that have been found to cause serious health effects in animal studies. "The current margin of safety is low."

toxicologist Thomas P. McDonald, (EBN vol. 13 #6)

And Styrenes ? . . .

A close-up photograph of a nest containing several bright blue eggs. The nest is made of dry, brownish twigs and straw. The lighting is soft, highlighting the texture of the twigs and the smooth surface of the eggs.

REMEMBER RACHEL CARSON?

MATERIALS' LIFE- CYCLE IMPACT MATTERS

Styrenes are highly fat soluble materials and neurotoxins that accumulate in lipid-rich tissues of the brain and nervous system, causing acute and chronic functional impairment . . .

a known carcinogen . . .

<http://www.earthresource.org/campaigns/capp/capp-styrofoam.html>

EPA National Human Adipose Tissue Survey 1982 – documented styrenes present in 100% of human tissue samples

EPA National Human Adipose Tissue Survey 1982

1988 study by the Foundation for Advancements in Science and Education found styrene contamination in 100% of samples from 8 – 350ng/g (1/3 levels determined to cause neurotoxic symptoms)

Foundation for Advancements in Science and Education

A close-up photograph of a nest containing several bright blue eggs. The nest is made of dry, brownish twigs and straw. The lighting is soft, highlighting the texture of the twigs and the smooth surface of the eggs.

REMEMBER RACHEL CARSON?

MATERIALS' LIFE- CYCLE IMPACT MATTERS

Among the chemicals used in spray polyurethane foam (SPF) insulation, “Isocyanates, such as MDI (methylene diphenyl diisocyanate), are highly reactive chemicals that can cause skin, eye, and lung irritation, asthma, and chemical sensitization when absorbed through the skin or inhaled.”

Building Green, EPA Takes Action on Spray-Foam Health Risks, May 3rd, 2011

Polyurethane foam has been known to cause chemical sensitivity in extremely small exposures after initial work related exposures.

Briefing on Sprayed Polyurethane Foam: EPA/OSHA

MATERIALS LIFE- CYCLE IMPACT

WE HAVE ALTERNATIVES –
we just have to choose them + design + build accordingly



THE PASSIVE BIRDHOUSE

PASSIVE HOUSE, NET-ZERO, FOAM FREE

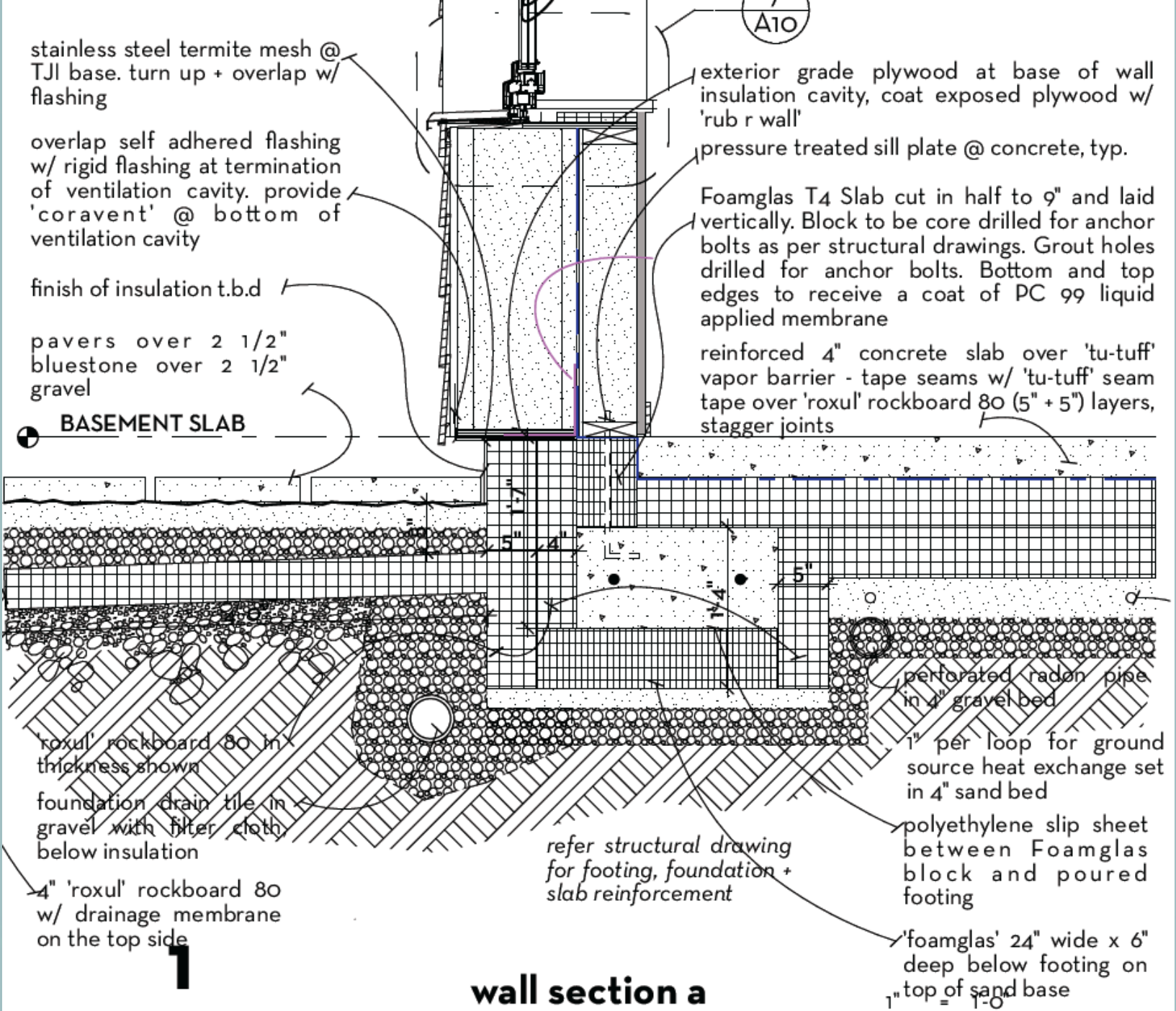


Architect: Carri Beer, AIA LEED AP
Brennan+Company Architects

PH Consultant: Michael Hindle, CPHC
Passive to Positive

Builder: Gosnell Builders Inc.

FOAM FREE ENCLOSURE #1



stainless steel termite mesh @ TJI base. turn up + overlap w/ flashing

overlap self adhered flashing w/ rigid flashing at termination of ventilation cavity. provide 'coravent' @ bottom of ventilation cavity

finish of insulation t.b.d

pavers over 2 1/2" bluestone over 2 1/2" gravel

BASEMENT SLAB

A10

exterior grade plywood at base of wall insulation cavity, coat exposed plywood w/ 'rub r wall'

pressure treated sill plate @ concrete, typ.

Foamglas T4 Slab cut in half to 9" and laid vertically. Block to be core drilled for anchor bolts as per structural drawings. Grout holes drilled for anchor bolts. Bottom and top edges to receive a coat of PC 99 liquid applied membrane

reinforced 4" concrete slab over 'tu-tuff' vapor barrier - tape seams w/ 'tu-tuff' seam tape over 'roxul' rockboard 80 (5" + 5") layers, stagger joints

'roxul' rockboard 80 in thickness shown

foundation drain tile in gravel with filter cloth below insulation

4" 'roxul' rockboard 80 w/ drainage membrane on the top side

refer structural drawing for footing, foundation + slab reinforcement

perforated radon pipe in 4" gravel bed

1" per loop for ground source heat exchange set in 4" sand bed

polyethylene slip sheet between Foamglas block and poured footing

'foamglas' 24" wide x 6" deep below footing on 1" top of sand base

wall section a

1

1-0

4" 'roxul' rockboard 80
over 'rub r wall' or
approved alternative
waterproofing

pressure treated sill plate @
concrete, typ.

reinforced 4" concrete slab
over 'tu-tuff' vapor barrier -
tape seams w/ 'tu-tuff' seam
tape over 'roxul' rockboard 80
(5" + 5") layers, stagger joints

BASEMENT SLAB

'roxul' rockboard 80 in
thickness shown

foundation drain tile in
gravel with filter cloth,
below insulation

perforated radon pipe in
4" gravel bed

1" per loop for ground
source heat exchange set
in 4" sand bed

polyethylene slip sheet
between 'foamglas' block
and poured footing

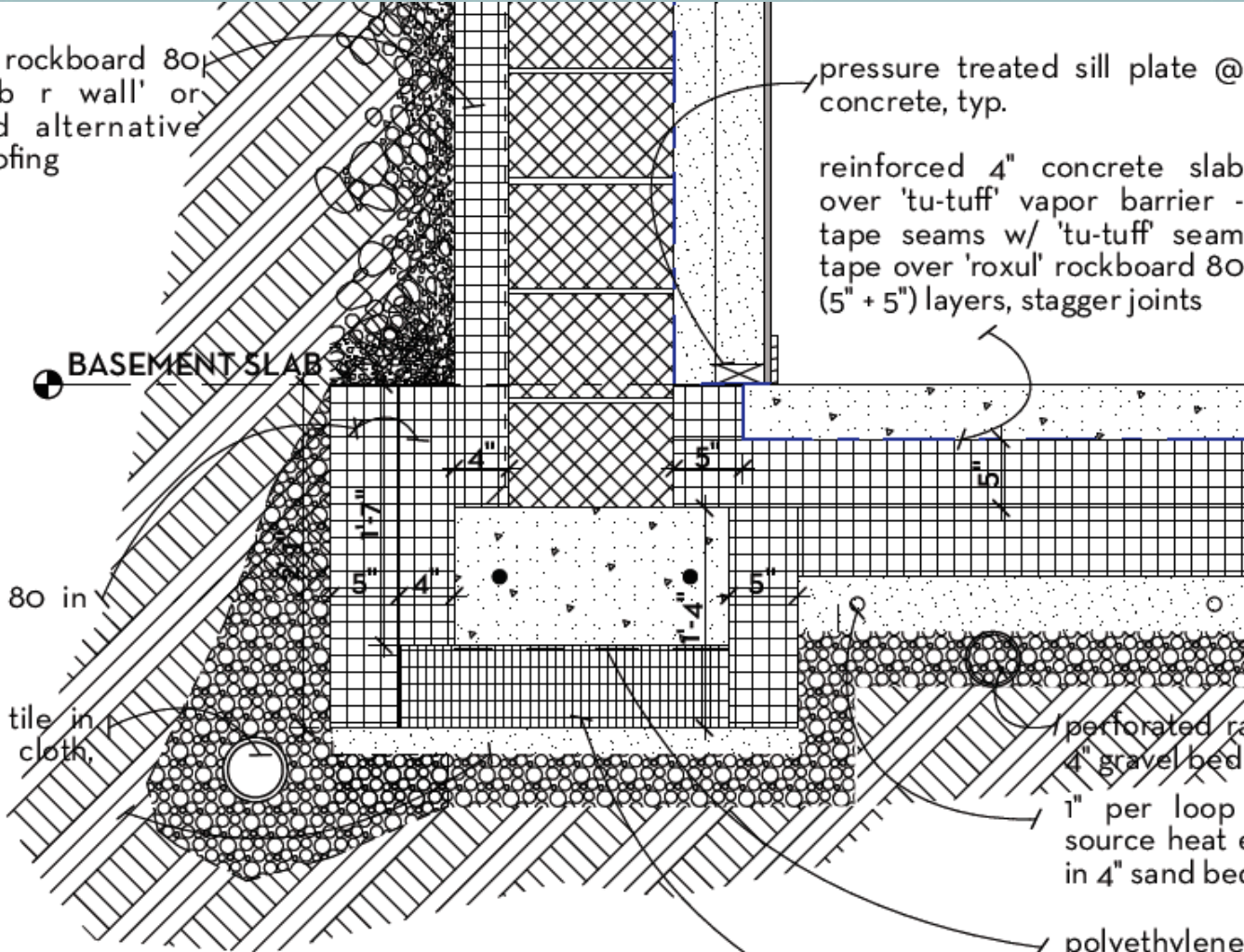
'foamglas' 24" wide x 6"
deep below footing on
top of sand base

*refer structural drawing
for footing, foundation +
slab reinforcement*

2

wall section b

1" = 1'-0"





FOAMGLAS BELOW FOOTING



FOAMGLAS BELOW FOOTING



POURED FOOTINGS OVER
FOAMGLAS



FOAMGLAS PERIMETER BLOCK
+ MINERAL WOOL BELOW SLAB



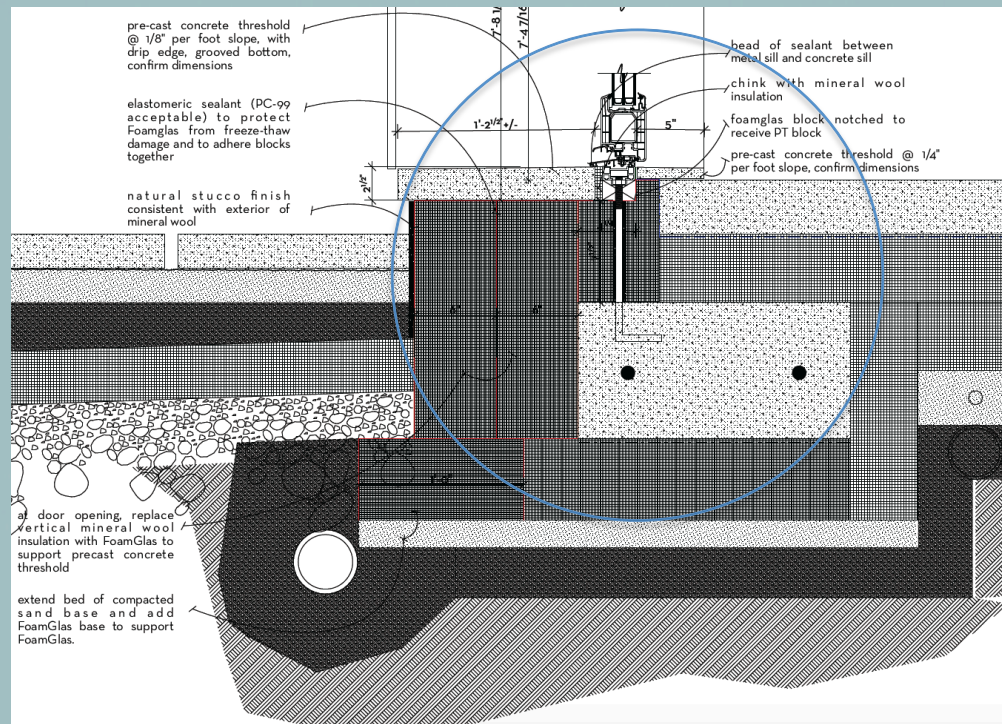
MINERAL WOOL BELOW SLAB



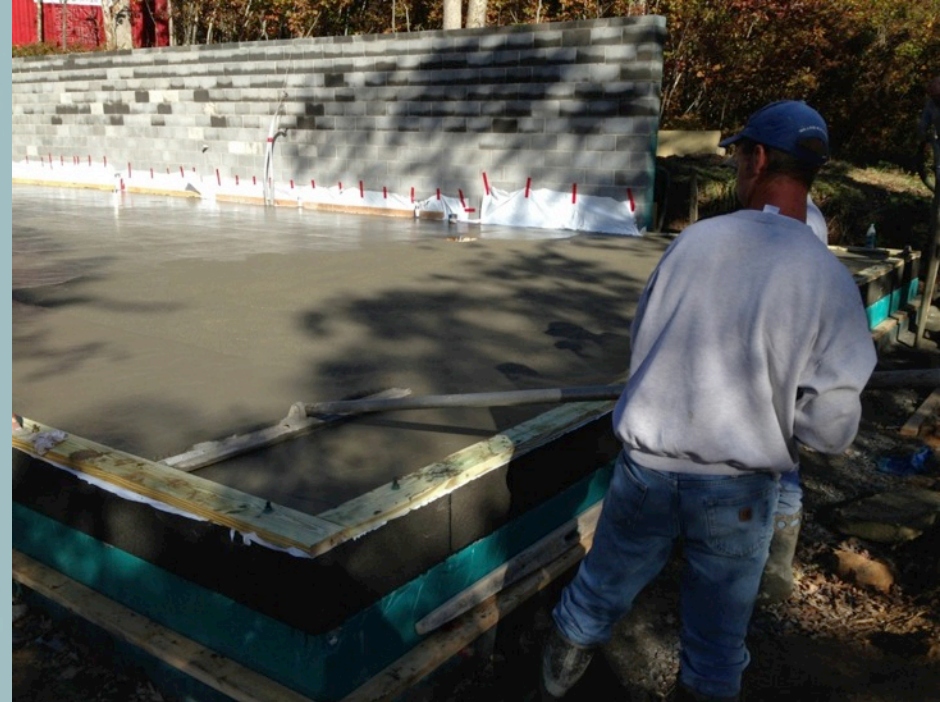
EXTERIOR MINERAL WOOL AT FOUNDATION



MINERAL WOOL FROST SKIRT



FOAMGLAS THRESHOLD



POURING CONCRETE ON
MINERAL WOOL



FOAM-FREE CONTINUITY OF
AIR-TIGHT LAYER



THERMAL BREAK BETWEEN
CONDITIONED +
UNCONDITIONED FOUNDATION



FOAM-FREE WINDOW DETAIL



AIR-TIGHT TAPE INSIDE, FREE
DRAINING, BACK-DAMMED
SILL TO THE EXTERIOR

SUPER-INSULATED AND....



COMPLETELY FOAM-FREE!

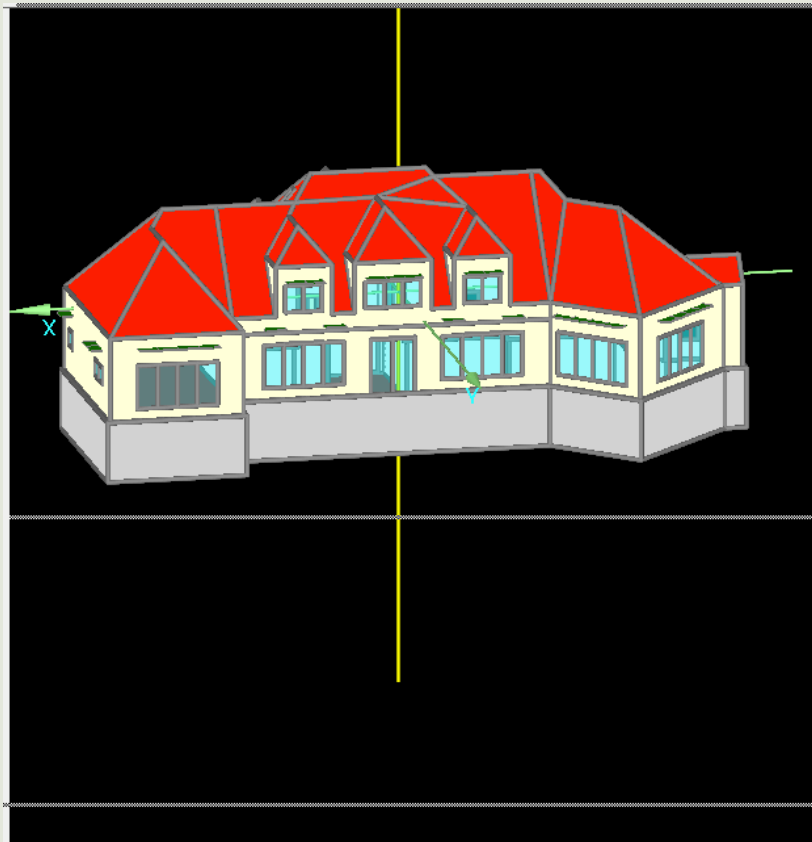
NON-FOAM DETAIL WAS \$6,524 MORE
THAN EPS FOAM

WHICH FOR THIS PROJECT WAS AN
INCREASE OF 0.006%

(LABOR WAS A WASH BECAUSE THE
MATERIALS WERE SO EASY AND
ENJOYABLE TO USE.)

SUBSEQUENT DETAIL REVISIONS
YIELDED PROJECTED 30% SAVINGS,
REDUCING INCREMENTAL COST TO
\$3000

WAYLAND PASSIVE HOUSE



Pages: Selection All

Outer climate conditions
Z.1: Inner climate conditions
Z.1: PMV, PPD
Z.1: Comfort: air temperature, relative humidity
Z.1: Comfort: air temperature, average surf. temperatur
Z.1: Comfort: air temperature, floor temperature
Z.1: Comfort: air temperature, ceiling temperature
Z.1: Comfort: operative temperature, humidity ratio
Z.1: Comfort: mean gliding temp., operative temp. (EN
Z.1: Comfort: mean monthly gliding temp., operative te

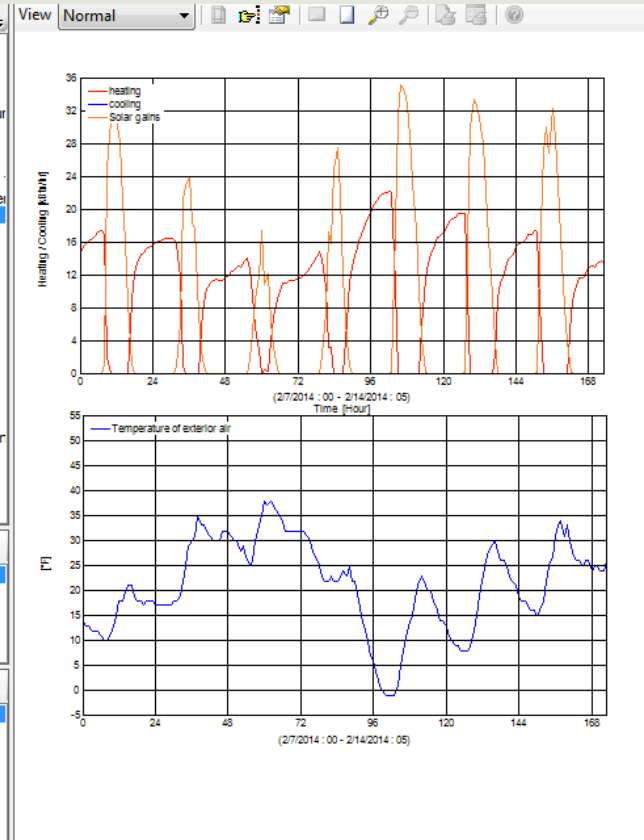
Z.1: Heating / Cooling
Z.1: Heating / Cooling, Outer temperature
Z.1: Heating / Cooling (monthly)
Z.1: Humidification / Dehumidification
Z.1: Humidification / Dehumidification (monthly)
Z.1: Heat flows
Z.1: Heat flows (monthly)
Z.1: Moisture flows
Z.1: Moisture flows (monthly)
Z.1: Air flows
Z.1: Air flows (monthly)
Z.1: CO2-concentration
Z.1: Latent heat - humidification/dehumidification
Z.1: Latent heat - humidification/dehumidification (mor

Graphs: [Icons]

Z.1: Heating / Cooling
outer temperature

Curves: [Icons]

Z.1: Heating [kBtu/hr]
Z.1: Cooling [kBtu/hr]
Solar gains [kBtu/hr]



Designer: Donald Gross
Donald Gross + Associates

PH Consultant: Michael Hindle, CPHC
Passive to Positive

Builder: Auburndale Builders

FOAM FREE ENCLOSURE #2



FOAM FREE FOUNDATION

PERIMETER FOOTING INSULATION



FOAM FREE FOUNDATION

**FOOTING
INSULATION LAID
WITH SLIP SHEET**

FOOTER POST POUR





FOAM FREE FOUNDATION

PERIMETER THERMAL
BREAK OF FOOTING
EDGE



FOAM FREE FOUNDATION

FOAMGLAS THERMAL
BREAK OF
CONDITIONED
BASEMENT TO
UNCONDITIONED
GARAGE
FOUNDATION



ENVELOPE DESIGN + OCCUPANT HEALTH

MANAGEMENT OF
CONDENSATION
PLANE
TEMPERATURES –
**NO MOLD GROWTH
ASSURED**

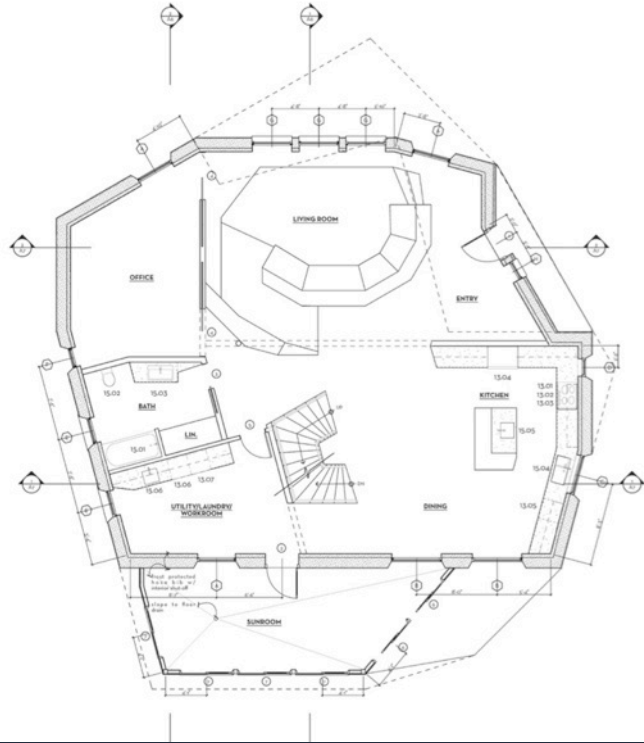




WELL-POOL
1010-1300



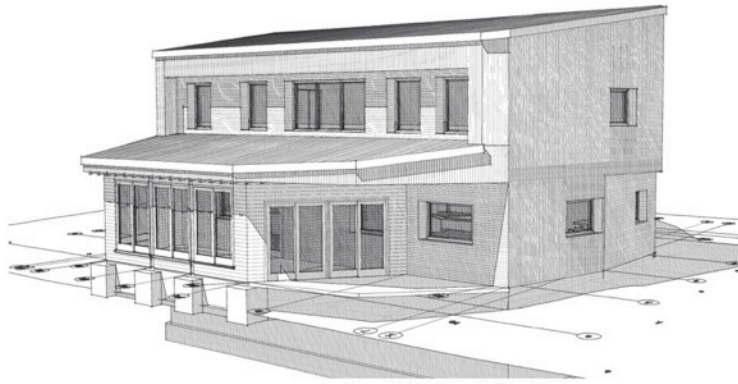
HONEYCOMB BUNKER PASSIVE HOUSE, NET-ZERO FOAM FREE



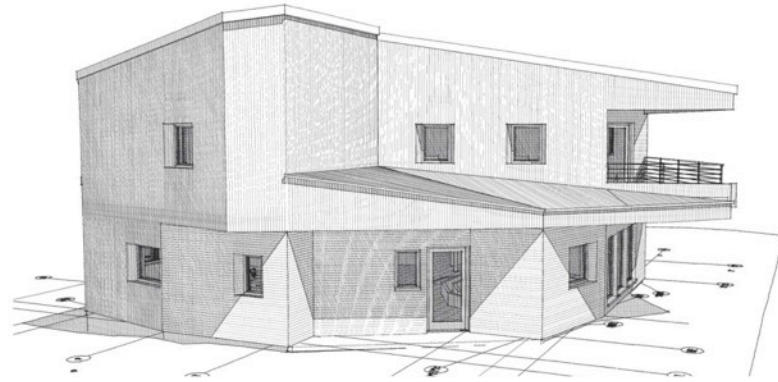
Designer: Daniel Gantenbein
Architect: Carri Beer, AIA LEED AP
Brennan+Company Architects

FOAM FREE ENCLOSURE #3

PH Consultant: Michael Hindle, CPHC
Passive to Positive



1 southeast sketch



2 northeast sketch



3 northwest sketch



4 southwest sketch

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PROJECT: GANTEBAIN RESIDENCE
 238 Commissioners St.
 Woodbridge, New Jersey 08095

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 238 Commissioners St.
 Woodbridge, New Jersey 08095

phase: sketch
 date: 02/15

drawing: exterior elevations



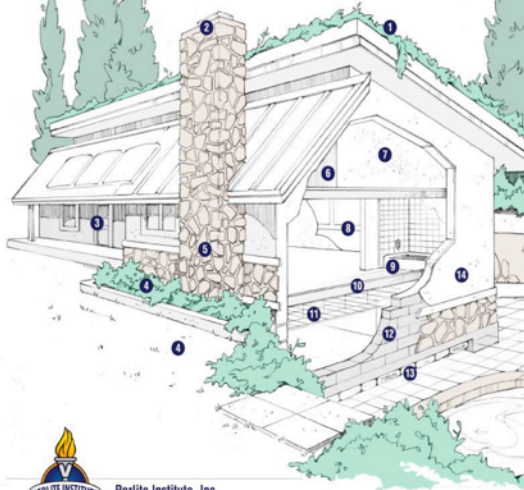
sheet no.

A5

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wool?



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photo by Chris Jordan: "midway: message from the gyre" series <http://www.chrisjordan.com/>

“Whether we and our politicians know it or not, Nature is party to all our deals and decisions, and she has more votes, a longer memory, and a sterner sense of justice than we do.”

Wendell Berry

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